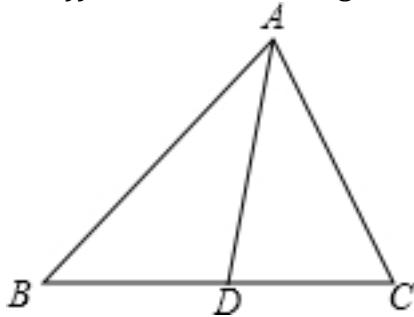


题目信息

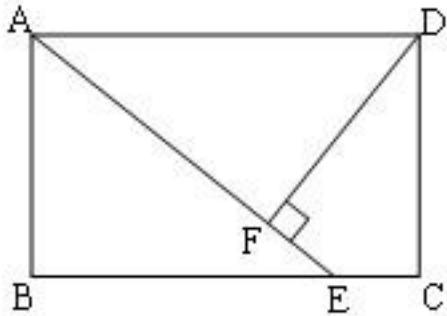
1、topic: 如图,在 $\triangle ABC$ 中,AD是它的角平分线.求证: $S_{\triangle ABD} : S_{\triangle ACD} = AB : AC$.#%#



graph:
{"stem": {"pictures": [{"picturename": "003098C1CE944094999C6A4BC2E74DC3_Q_1.jpg", "coordinate_s": {"A": "-12.00,8.00", "B": "-16.00,4.00", "C": "-10.00,4.00", "D": "-12.65,4.00"}, "collineations": {"0": "A##B", "1": "A##D", "2": "B##C", "3": "C##A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle CAD$, angle2= $\angle BAD$ }, ProveConclusionRelation:[证明: EqualityRelation{ $S_{\triangle ABD} / S_{\triangle ACD} = (AB) / (AC)$ }]

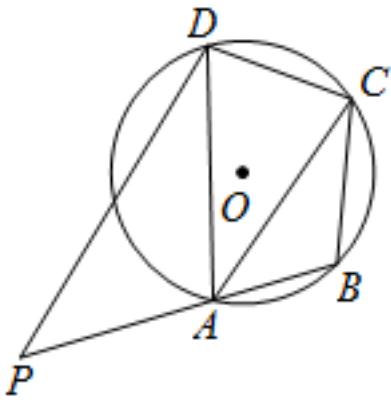
2、topic: 如图,在矩形\$ABCD\$中,点E是\$BC\$上一点,\$AE=AD,DF\bot AE\$,垂足为\$F\$,求证:\$DF=DC\$.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000005461_Q_1.jpg", "coordinates": {"A": "-9.95,5.00", "B": "-9.82,-2.17", "C": "3.05,-1.93", "D": "2.92,5.24", "E": "0.87,-1.97", "F": "-0.96,-0.79"}, "collineations": {"0": "A##F#E", "1": "B##E##C", "2": "A##B", "3": "A##D", "4": "C##D", "5": "D##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{AE=AD}, LinePerpRelation{line1=DF, line2=AE, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{DF=CD}]

3、topic: 如图,ABCD是 $\odot O$ 的内接四边形, $DP \parallel AC$, 交BA的延长线于点P.求证: $AD \cdot DC = PA \cdot BC$.#%#

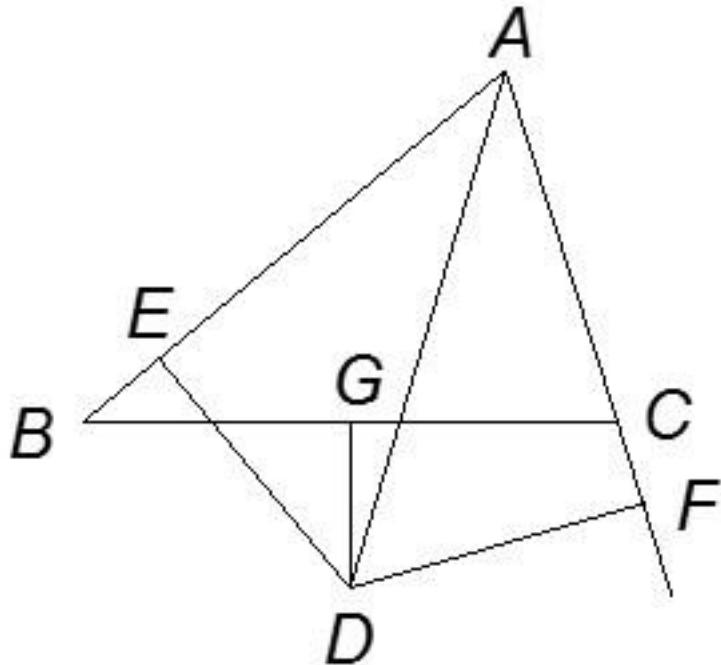


graph:

```
{"stem":{"pictures":[{"picturename":"1000060803_Q_1.jpg","coordinates":{"A":"5.84,4.01","B":"7.11,4.34","C":"7.64,7.15","D":"5.28,7.87","E":"2.59,3.17","O":"6.00,6.00"}, "collineations":{"0":"E###D","1":"D##C","2":"C##B","3":"B##A##E","4":"A##C","5":"A##D"}, "variable-equals":{}, "circles":[{"c enter":"O","pointincircle":"A##B##C##D"}]}], "appliedproblems":{}, "substems":[]}
```

NLP: InscribedShapeOfCircleRelation{closedShape=ABCD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LineParallelRelation [iLine1=DP, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(P), iLine1=DP, iLine2=BA], ProveConclusionRelation:[证明: EqualityRelation{AD*CD=AP*BC}]

4、topic: 如图,\$\triangle ABC\$中,AD平分\$\angle BAC\$, \$DG \perp BC\$且平分BC,\$DE \perp AB\$于E, \$DF \perp AC\$于F.?(1)说明\$BE=CF\$的理由;?(2)如果\$AB=a\$,\$AC=b\$,求AE、BE的长.

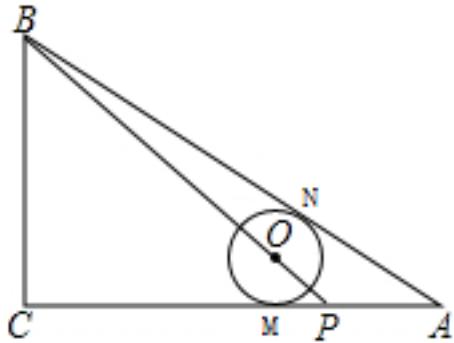


graph:

```
{"stem":{"pictures":[{"picturename":"065C15CF9977441B837306BA5B715915_Q_1.jpg","coordinates":{"A":"-11.00,6.00","B":"-16.00,3.00","C":"-9.00,3.00","D":"-12.50,-0.67","E":"-15.05,3.57","F":"-8.38,2.07","G":"-12.50,3.00"}, "collineations":{"0":"A##D","1":"A##B##E","2":"A##C##F","3":"B##C##G","4":"D##E","5":"D##G","6":"D##F"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{}, "substems":[]}
```

NLP: TriangleRelation:△ABC, AngleBisectorRelation{line=AD, angle=∠CAE, angle1=∠CAD, angle2=∠DAE}, LinePerpRelation{line1=DG, line2=BC, crossPoint=G}, LineDecileSegmentRelation[iLine1=DG, iLine2=BC, crossPoint=Optional.of(G)], LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=AC, crossPoint=F}, EqualityRelation{AB=a}, EqualityRelation{AC=b}, 求值(大小):
 (ExpressRelation:[key:]AE), 求值(大小): (ExpressRelation:[key:]BE), ProveConclusionRelation:[证明:
 EqualityRelation{BE=CF}], SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AE}), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]BE})

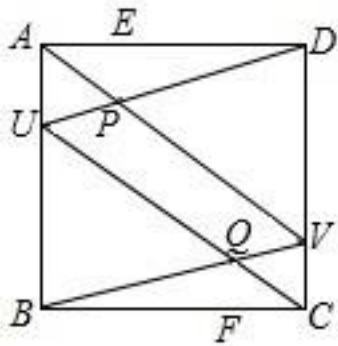
5、topic: 如图,在△ABC中, $\angle C=90^\circ$, $AC=8$, $AB=10$,点P在AC上, $AP=2$,若 $\odot O$ 的圆心在线段BP上,且 $\odot O$ 与AB、AC都相切,切点分别为N、M,求 $\odot O$ 的半径.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000052563_Q_1.jpg", "coordinates": {"A": "0.35,-4.10", "B": "-7.65,1.90", "C": "-7.65,-4.10", "P": "-1.65,-4.10", "O": "-2.65,-3.10", "M": "-2.65,-4.10", "N": "-2.05,-2.30"}, "collinearities": {"O": "B##C", "1": "A##N##B", "2": "B##O##P", "3": "A##P##M##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "M##N"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: CircleCenterRelation{point=Q_0, conic=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, TriangleRelation:△ABC, EqualityRelation{∠BCM=(1/2*Pi)}, EqualityRelation{AC=8}, EqualityRelation{AB=10}, PointOnLineRelation{point=P, line=AC, isConstant=false, extension=false}, EqualityRelation{AP=2}, PointOnLineRelation{point=Q_0, line=BP, isConstant=false, extension=false}, LineContactCircleRelation{line=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(N), outpoint=Optional.absent()}, LineContactCircleRelation{line=AC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(M), outpoint=Optional.absent()}, 圆的半径: CircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]MO)}

6、topic: 如图,\$ABCD\$是一个边长为1的正方形,U、V分别是AB、CD上的点,AV与DU相交于点P,BV与CU相交于点Q.求四边形\$PUQV\$面积的最大值.

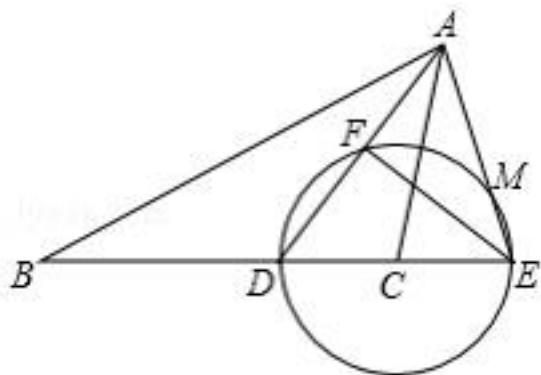


graph:
 {"stem": {"pictures": [{"picturename": "0908A274E21F47299A8E3015080A0BFA_Q_1.jpg", "coordinate": "A": "-9.00,5.00", "B": "-9.00,1.00", "C": "-5.00,1.00", "D": "-5.00,5.00", "U": "-9.00,4.00", "V": "-5.00,2.00", "P": "-8.00,4.25", "Q": "-6.09,1.68"}, "collineations": {"0": "B###C", "1": "A###B##U", "2": "A###D", "3": "A##P##V", "4": "Q##B##V", "5": "Q##C##U", "6": "D##V##C", "7": "D##P##U"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: 已知条件

QuadrilateralRelation{quadrilateral=PUQV}, EqualityRelation{S_PUQV=v_0}, SquareRelation{square=Square:ABCD}, EqualityRelation{AB=1}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=AV, iLine2=DU], LineCrossRelation [crossPoint=Optional.of(Q), iLine1=BV, iLine2=CU], 最大值: (ExpressRelation:[key:]v_0[v_0=v_0]), SolutionConclusionRelation{relation=最大值: (ExpressRelation:[key:]v_0[v_0=v_0])}

7、topic: \$(2013•\$呼和浩特)如图\$,AD\$是\$\triangle ABC\$的角平分线,以点C为圆心\$,CD\$为半径作圆交\$BC\$的延长线于点\$E,\$交\$AD\$于点\$F,\$交\$AE\$于点\$M,\$且\$\angle B=\angle CAE, EF:FD=4:3.\$?(1)\$求证:点F是\$AD\$的中点;?(2)\$求\$\cos\angle AED\$的值;?(3)\$如果\$BD=10,\$求半径\$CD\$的长.

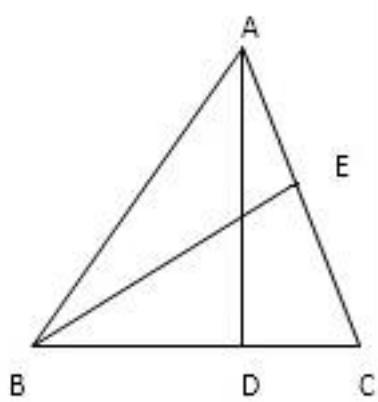


graph:
 {"stem": {"pictures": [{"picturename": "1000010169_Q_1.jpg", "coordinates": {"A": "2.20,9.60", "B": "-15.00,0.00", "C": "0.00,0.00", "D": "-5.00,0.00", "E": "5.00,0.00", "F": "-1.40,4.80", "M": "4.22,2.69"}, "collineations": {"0": "B##A", "1": "C##A", "2": "E##F", "3": "A##M##E", "4": "B##D##C##E", "5": "A##F##D"}, "variable-equals": {}, "circles": [{"center": "C", "pointincircle": "E##D##F##M"}]}, "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "2", "pictures": [], "appliedproblems": {}}]}}

NLP: RadiusRelation{radius=CD, circle=Circle[○C]{center=C,

$\text{analytic} = \{(x-x_C)^2 + (y-y_C)^2 = r_C^2\}$,
 $\text{length=null}\}, \text{TriangleRelation: } \triangle ABC, \text{LineCrossCircleRelation}\{\text{line}=BC, \text{circle}=\odot O_0, \text{crossPoints}=[E],$
 $\text{crossPointNum=1}\}, \text{LineCrossCircleRelation}\{\text{line}=AD, \text{circle}=\odot O_0, \text{crossPoints}=[F],$
 $\text{crossPointNum=1}\}, \text{LineCrossCircleRelation}\{\text{line}=AE, \text{circle}=\odot O_0, \text{crossPoints}=[M],$
 $\text{crossPointNum=1}\}, \text{EqualityRelation}\{\angle ABD = \angle CAM\}, \text{EqualityRelation}\{(EF)/(DF) = (4)/(3)\}, \text{AngleBisect}$
 $\text{orRelation}\{\text{line}=AD, \text{angle}=\angle BAC, \text{angle1}=\angle CAD, \text{angle2}=\angle BAD\}, \text{求值(大小):}$
 $(\text{ExpressRelation: } [\text{key:}] \cos(\angle CEM)), \text{EqualityRelation}\{CD=v_1\}, \text{EqualityRelation}\{BD=10\}, \text{ProveConclusionRelation: } [\text{证明:}]$
 $\text{MiddlePointOfSegmentRelation}\{\text{middlePoint}=F, \text{segment}=AD\}], \text{SolutionConclusionRelation}\{\text{relation=}$
 $\text{求值(大小): } (\text{ExpressRelation: } [\text{key:}] \cos(\angle CEM))\}$

8、topic: 已知:如图,\$\triangle ABC\$中,AD是高,BE是中线,且\$\angle EBC = 30^\circ\$求证:\$AD = BE\$

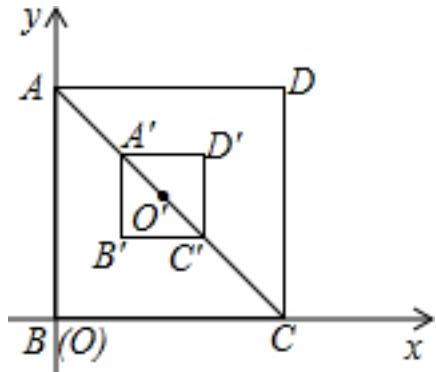


graph:

{"stem": {"pictures": [{"picturename": "112B56FFB3A74507BB100E40B0081909_Q_1.jpg", "coordinate_s": {"A": "-7.86,7.12", "B": "-10.00,3.00", "C": "-5.00,3.00", "D": "-7.86,3.00", "E": "-6.43,5.06"}, "collinearities": {"0": "D##A", "1": "A##B", "2": "A##C##E", "3": "B##E", "4": "B##C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: \$\triangle ABC\$, EqualityRelation\$\{\angle DBE = (1/6 * \pi)\}\$, LinePerpRelation\$\{\text{line1}=AD, \text{line2}=BD, \text{crossPoint}=D\}\$, MidianLineOfTriangleRelation\$\{\text{midianLine}=BE, \text{triangle}=\triangle BAC, \text{top}=B, \text{bottom}=AC\}\$, ProveConclusionRelation: [证明: EqualityRelation\$\{AD=BE\}\$]

9、topic: 如图,正方形ABCD的两边BC、AB分别在平面直角坐标系的x轴、y轴的正半轴上,正方形A'B'C'D'是以AC的中点O'为中心的位似图形,已知\$AC=3\sqrt{2}\$,若点A'的坐标为(1,2),求正方形A'B'C'D'与正方形ABCD的相似比.%#

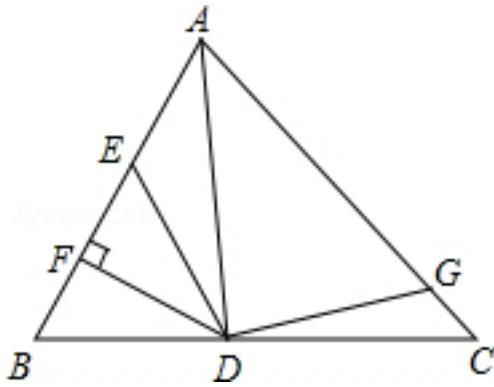


graph:

{"stem":{"pictures":[{"picturename":"1000061304_Q_1.jpg","coordinates":{"A":"0.00,3.00","B":"0.00,0.00","C":"3.00,0.00","D":"3.00,3.00","A'":"1.00,2.00","B'":"1.00,1.00","C'":"2.00,1.00","D'":"2.00,2.00","O":"0.00,0.00","O'":"1.50,1.50"}],"collineations":{"0":"A###B","1":"A##O","2":"B##C","3":"O##C","4":"C##D","5":"D##A","6":"A##D","7":"A##O##C##A##C","8":"D##C","9":"C##B","10":"B##A"}],"variable>equals":{}, "circles":[]}, "appliedproblems":{}, "substems":[]}

NLP:

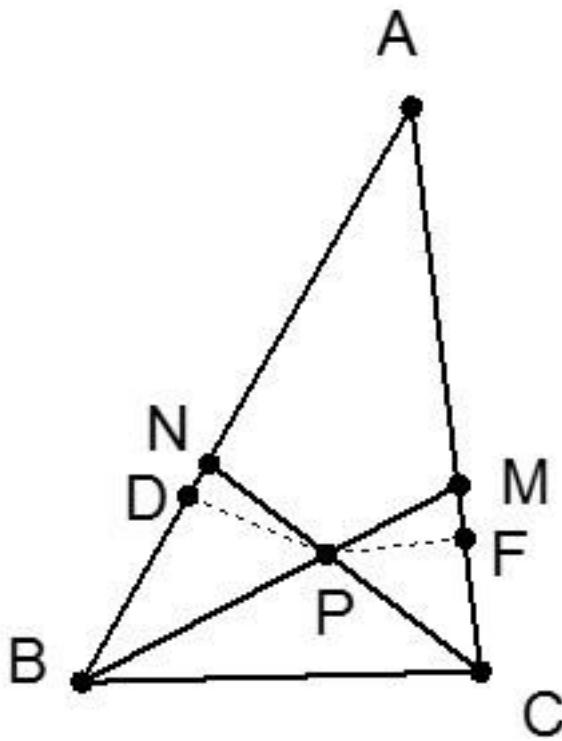
MiddlePointOfSegmentRelation{middlePoint=O,segment=AC},SquareRelation{square=Square:ABCD},
 LineCoincideRelation [iLine1=BC, iLine2=StraightLine[X] analytic :y=0 slope:0 b:0
 isLinearFunction:false], LineCoincideRelation [iLine1=AB, iLine2=StraightLine[Y] analytic :x=0 slope:
 b:
 isLinearFunction:false], SquareRelation{square=Square:A'B'C'D'}, SquareRelation{square=Square:ABC
 D}, EqualityRelation{AC=3*(2^(1/2))}, PointRelation:A'(1,2), 求值(大小):
 (ExpressRelation:[key:]r_1), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]r_1)}

10、topic: 如图,AD是 $\triangle ABC$ 的角平分线, $DF \perp AB$, 垂足为点F, $DE=DG$, $\triangle ADG$ 和 $\triangle AED$ 的面积分别为50和39, 求 $\triangle EDF$ 的面积.


graph:
 {"stem":{"pictures":[{"picturename":"168017878BAB4F52B42C3D9A0DB60780_Q_1.jpg","coordinate s":{"A": "-11.00,6.00","B": "-13.00,2.00","C": "-6.00,2.00","D": "-10.12,2.00","E": "-12.01,3.98","F": "-12.42,3.15","G": "-7.81,3.45"}],"collineations":{"0":"D##A","1":"A##B##E##F","2":"A##C##G","3":"B##C##D","4":"F##D","5":"D##E","6":"D##G"}, "variable>equals":{}, "circles":[]}, "appliedproblems":{}, "substems":[]}}

NLP: EqualityRelation{S_△DEF=v_0}, TriangleRelation:△ABC, LinePerpRelation{line1=DF, line2=AB, crossPoint=F}, EqualityRelation{DE=DG}, EqualityRelation{S_△ADG=50}, EqualityRelation{S_△ADE=39}, 求值(大小): (ExpressRelation:[key:]v_0), AngleBisectorRelation{line=AD, angle=∠EAG, angle1=∠DAG, angle2=∠DAE}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]S_△DEF)

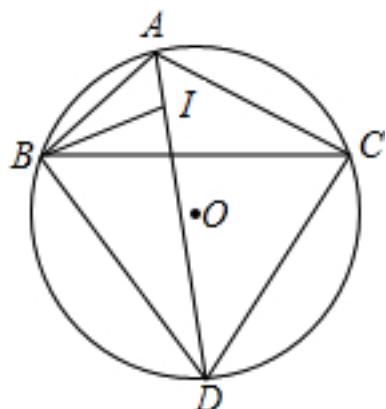
11、topic: 已知如图,\$\triangle ABC\$的角平分线BM、CN相交于点P. 求证:\$\angle BAC\$的平分线也经过点P.



graph:
 {"stem": {"pictures": [{"picturename": "1A84DEF9D2324A69BC5F57BFFD9295CB_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-12.00,2.00", "C": "-6.00,2.00", "M": "-7.03,4.06", "N": "-9.71,4.29", "P": "-8.41,3.49"}, "collinearities": {"0": "B###P###M", "1": "A##B##N", "2": "A##C##M", "3": "B##C", "4": "N##C##P"}, "variable>equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}]}}

NLP: TriangleRelation:△ABC, LineCrossRelation [crossPoint=Optional.of(P), iLine1=BM, iLine2=CN], AngleBisectorRelation{line=BM, angle= $\angle CBN$, angle1= $\angle MBN$, angle2= $\angle CBM$ }, AngleBisectorRelation{line=CN, angle= $\angle BCM$, angle1= $\angle BCN$, angle2= $\angle MCN$ }, ProveConclusionRelation:[AngleBisectorRelation{line=PA, angle= $\angle MAN$, angle1= $\angle MAP$, angle2= $\angle NAP$ }]

12、topic: 如图所示,圆O是 $\triangle ABC$ 的外接圆, $\angle BAC$ 与 $\angle ABC$ 的平分线相交于点I,延长AI交圆O于点D,连接BD、DC.(1)求证 $BD=DC=DI$;(2)若圆O的半径为10cm, $\angle BAC=120^\circ$,求 $\triangle BDC$ 的面积.

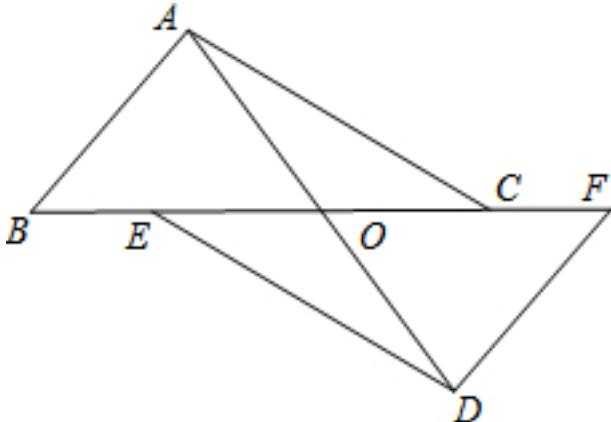


graph:
 {"stem": {"pictures": [{"picturename": "1000060750_Q_1.jpg", "coordinates": {"A": "0.56,-0.17", "B": "0.13,-0.5", "C": "0.56,-0.5", "D": "0.13,-0.17", "I": "0.34,-0.34", "O": "0.34,-0.34"}}]}}

0.56", "C": "1.28,-0.56", "D": "0.75,-1.39", "I": "0.59,-0.37", "O": "0.71,-0.78"}, "collineations": {"0": "B###C", "1": "I###A##D", "2": "A###C", "3": "A##B", "4": "B##I", "5": "B##D", "6": "D##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems": {}, "substems": []}

NLP: AngleBisectorRelation{line=AI,angle= $\angle BAC$, angle1= $\angle BAI$, angle2= $\angle CAI$ },AngleBisectorRelation{line=BI,angle= $\angle ABC$, angle1= $\angle ABI$, angle2= $\angle CBI$ },InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }},LineCrossCircleRelation{line=AI, circle= $\odot O$, crossPoints=[D], crossPointNum=1},SegmentRelation:BD,SegmentRelation:DC,EqualityRelation{ $S_{\triangle BCD}=v_5$ },RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }},length=Express:[10]},EqualityRelation{ $\angle BAC=(2/3\pi)$ },求值(大小): (ExpressRelation:[key:]v_5),ProveConclusionRelation:[证明: MultiEqualityRelation [multiExpressCompare=BD=CD=DI, originExpressRelationList=[], keyWord=null, result=null]],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_{\triangle BCD})}

13、topic: 已知:如图,AD、BF相交于点O,点E、C在BF上,BE=FC,AC=DE,AB=DF.求证:#%#AO=DO,#%#BO=FO.



graph:
{"stem": {"pictures": [{"picturename": "1000061418_Q_1.jpg", "coordinates": {"A": "5.00,8.00", "B": "3.00,5.00", "C": "9.00,5.00", "D": "9.00,2.00", "E": "5.00,5.00", "F": "11.00,5.00", "O": "7.00,5.00"}, "collineations": {"0": "A##B", "1": "B##E##O##C##F", "2": "F##D", "3": "D##E", "4": "A##C", "5": "A##O##D"}, "variable>equals": {}, "circles": {}}, "appliedproblems": {}, "substems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AD, iLine2=BF], PointOnLineRelation{point=E, line=BF, isConstant=false, extension=false}, PointOnLineRelation{point=C, line=BF, isConstant=false, extension=false}, EqualityRelation{BE=CF}, EqualityRelation{AC=DE}, EqualityRelation{AB=DF}, ProveConclusionRelation:[证明: EqualityRelation{AO=DO}], ProveConclusionRelation:[证明: EqualityRelation{BO=FO}]

14、topic: 四边形ABCD中, $\angle B=\angle D=90^\circ$, $\angle BAD$ 和 $\angle BCD$ 的内(或外)角平分线分别为AE和CF.#%#当AE、CF都为内角平分线时(如图1),不难证明 $AE \parallel CF$.过程如下:#%#\because \angle BAD + \angle BCD = \angle 1 + \angle 2 + \angle 3 + \angle 4 = 360^\circ - (\angle B + \angle D), \angle B = \angle D = 90^\circ, \angle 1 = \angle 2, \angle 3 = \angle 4, \therefore 2(\angle 2 + \angle 4) = 360^\circ - 180^\circ = 180^\circ, \therefore \angle 2 + \angle 4 = 90^\circ#%#又 $\because \angle B = 90^\circ, \therefore \angle 2 + \angle 5 = 90^\circ$,则 $\angle 4 = \angle 5$.#%#AE||CF.#%#(1)当AE、CF都为外角平分线时(如图2),AE与CF位置关系怎样?给出证明.#%#(2)当AE是内角平分线,CF是外角平分线时(如图3),请你探索AE与CF的位置关系,并给出证明.#%#

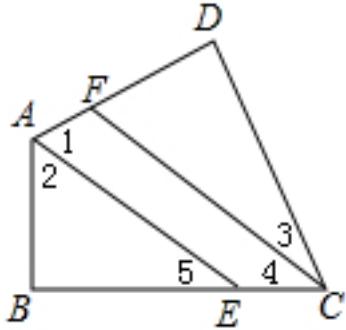


图1

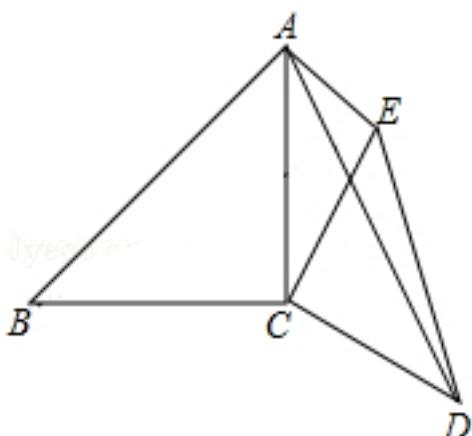
```

graph:
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```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},MultiEqualityRelation [multiExpressCompare= $\angle B = \angle D = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], SegmentRelation:AE, 证明: LineParallelRelation [iLine1=AE, iLine2=CF], MultiEqualityRelation [multiExpressCompare= $\angle BAD + \angle BCD = \angle 1 + \angle 2 + \angle 3 + \angle 4 = (2 * \pi) - (\angle B + \angle D)$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare= $\angle B = \angle D = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{ $\angle 1 = \angle 2$ }, EqualityRelation{ $\angle 3 = \angle 4$ }, MultiEqualityRelation [multiExpressCompare= $2 * (\angle 2 + \angle 4) = (2 * \pi) - (\pi) = (\pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{ $\angle B = (1/2 * \pi)$ }, EqualityRelation{ $\angle 2 + \angle 5 = (1/2 * \pi)$ }, EqualityRelation{ $\angle 4 = \angle 5$ }, LineParallelRelation [iLine1=AE, iLine2=CF], SegmentRelation:AE, LineRoleRelation{Segment=AE, roleType=ANGULAR_BISECTOR}, JudgePostionConclusionRelation: [data1=AE, data2=CF], JudgePostionConclusionRelation: [data1=AE, data2=CF]

15、topic: 如图,已知 $\angle ACB = \angle DCE = 90^\circ$, $AC = BC = 6$, $CD = CE$, $AE = 3$, $\angle CAE = 45^\circ$,求AD的长.#%#



graph:

{"stem": {"pictures": [{"picturename": "1000081326_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "-3.00,0.00", "C": "0.00,0.00", "D": "1.94,-1.06", "E": "1.06,1.94"}, "collineations": {"0": "A##D", "1": "A##C", "2": "A##B", "3": "A##E", "4": "B##C", "5": "C##E", "6": "E##D", "7": "C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AD=v_0}, MultiEqualityRelation
[multiExpressCompare= $\angle ACB = \angle DCE = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare=AC=BC=6, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{CD=CE}, EqualityRelation{AE=3}, EqualityRelation{ $\angle CAE = (1/4 * \pi)$ }, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AD)}

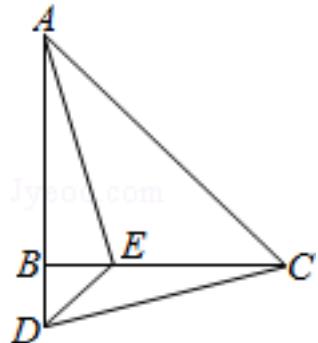
16、topic: 如图,已知线段AB、CD相交于点O,AD、CB的延长线交于点E,OA=OC,EA=EC.求证: $\angle A = \angle C$.#%#

graph:

{"stem": {"pictures": [{"picturename": "1000030734_Q_1.jpg", "coordinates": {"A": "-11.00,7.00", "B": "-6.2,0.500", "C": "-5.00,7.00", "D": "-9.80,5.00", "E": "-8.00,2.00", "O": "-8.00,5.75"}, "collineations": {"0": "A##D##E", "1": "A##O##B", "2": "C##O##D", "3": "C##B##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: SegmentRelation:AB, SegmentRelation:CD, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], LineCrossRelation [crossPoint=Optional.of(E), iLine1=AD, iLine2=CB], EqualityRelation{AO=CO}, EqualityRelation{AE=CE}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle DAO = \angle BCO$ }]

17、topic: 如图,在 $\triangle ABC$ 中, $AB=CB$, $\angle ABC=90^\circ$,D为AB延长线上一点,点E在边BC上,且 $BE=BD$,连接AE,DE,DC.#%#(1)试说明: $\triangle ABE \cong \triangle CBD$;#%#(2)若 $\angle CAE=30^\circ$,求 $\angle BDC$ 的度数.#%#



graph:

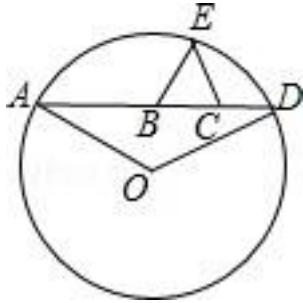
{"stem": {"pictures": [{"picturename": "1000029171_Q_1.jpg", "coordinates": {"A": "3.00,7.00", "B": "3.00,3.00", "C": "7.00,3.00", "D": "3.00,2.00", "E": "4.00,3.00"}, "collineations": {"0": "C##A", "1": "C##D", "2": "A##E", "3": "D##E", "4": "A##B##D", "5": "B##E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"questionrelies": "1"}]}}

NLP:
TriangleRelation: $\triangle ABC$, EqualityRelation{AB=BC}, EqualityRelation{ $\angle ABE = (1/2 * \pi)$ }, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, PointOnLineRelation{point=E, line=BC, isConstant=false},

extension=false},EqualityRelation{BE=BD},SegmentRelation:AE,SegmentRelation:DE,SegmentRelation:DC,EqualityRelation{ $\angle CAE = (1/6 * \pi)$ },求角的大小:

AngleRelation{angle= $\angle BDC$ },ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABE$, triangleB= $\triangle CBD$ }],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BDC$)}

18、topic: 如图,A、B、C、D依次为一直线上4个点,\$BC=2\$,\$\triangle BCE\$为等边三角形,\$\odot O\$过A、D、E三点,且\$\angle AOD=120^\circ\$. 设\$AB=x\$,\$CD=y\$,求y与x的函数关系式.



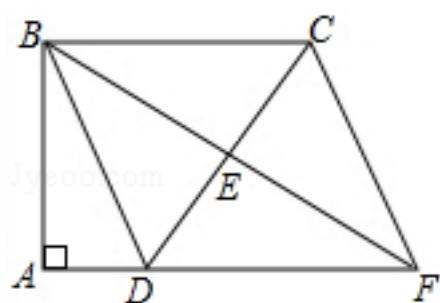
graph:

{"stem": {"pictures": [{"picturename": "1000024939.jpg", "coordinates": {"A": "-4.33,2.50", "B": "0.00,2.50", "C": "2.68,2.50", "D": "4.33,2.50", "E": "1.34,2.82", "O": "0.00,0.00"}, "collineations": {"0": "A##O", "1": "O##D", "2": "D##B##A##C", "3": "E##C", "4": "E##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##E##D"}]}], "appliedproblems": {}, "substems": []}}

NLP:

PointRelation:A,PointRelation:B,PointRelation:C,EqualityRelation{BC=2},RegularTriangleRelation:RegularTriangle: $\triangle BCE$,PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[A, D, E]},EqualityRelation{ $\angle AOD=(2/3*\pi)$ },EqualityRelation{AB=x},EqualityRelation{CD=y},表达式之间的关系: DualExpressRelation{expresses=[Express:[y], Express:[x]]},SolutionConclusionRelation{relation=表达式之间的关系: DualExpressRelation{expresses=[Express:[y], Express:[x]]}}}

19、topic: 如图,四边形ABCD中, $\angle A=\angle ABC=90^\circ$, $AD=1$, $BC=3$, E是边CD的中点,连接BE并延长与AD的延长线相交于点F.连接CF.(1)求证:四边形BDFC是平行四边形;(2)已知CB=CD,求四边形BDFC的面积.



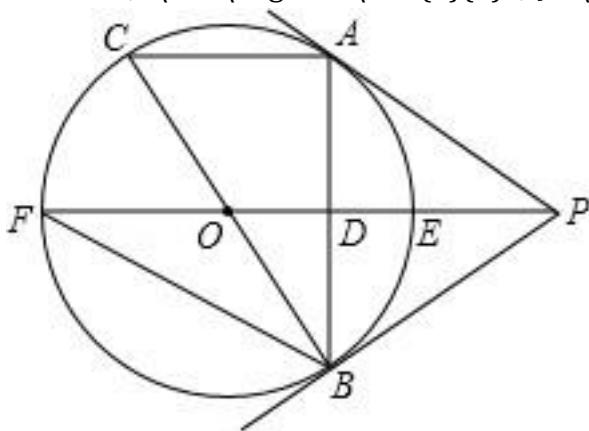
graph:

{"stem": {"pictures": [{"picturename": "A1AEFF80AD0F4B48860835EB0452987.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-14.00,5.80", "C": "-11.00,5.80", "D": "-13.00,3.00", "E": "-12.00,4.40", "F": "-10.00,3.00"}, "collineations": {"0": "B##A", "1": "A##D##F", "2": "B##F##E", "3": "B##C", "4": "B##D", "5": "D##E##C", "6": "C##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"su": "1"}]}}

bstemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},MultiEqualityRelation[multiExpressCompare= $\angle BAD = \angle ABC = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AD=1}, EqualityRelation{BC=3}, MiddlePointOfSegmentRelation{middlePoint=E, segment=CD}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=AD], SegmentRelation:CF,已知条件QuadrilateralRelation{quadrilateral=BCFD}, EqualityRelation{S_BCFD=v_0}, EqualityRelation{BC=CD}, 求值(大小): (ExpressRelation:[key:v_0]), ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BCFD}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:S_BCFD])}

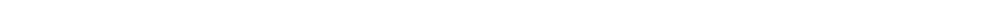
20、topic: 如图,\$PA\$为\$\odot O\$的切线,A为切点,直线\$PO\$交\$\odot O\$与点E,F过点A作\$PO\$的垂线\$AB\$垂足为D,交\$\odot O\$与点B,延长\$BO\$与\$\odot O\$交与点C,连接\$AC\$,\$BF\$. (1)求证:\$PB\$与\$\odot O\$相切; #%(2)试探究线段\$EF\$,\$OD\$,\$OP\$之间的数量关系,并加以证明; #%(3)若\$AC=12\$,\$\tan \angle F=\frac{1}{2}\$,求\$\cos \angle ACB\$的值.

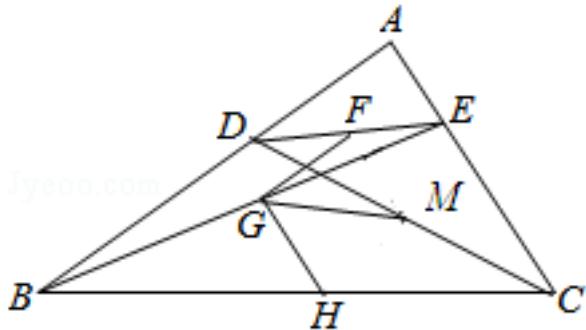


graph:
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NLP: LinePerpRelation{line1=PO, line2=AB, crossPoint=}, PointOnLineRelation{point=A, line=AB, isConstant=false, extension=false}, LineContactCircleRelation{line=PA, circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(A), outpoint=Optional.of(P)}, LineCrossCircleRelation{line=PO, circle=O, crossPoints=[E]}, crossPointNum=1}, LineCrossCircleRelation{line=AB, circle=O, crossPoints=[B]}, crossPointNum=1}, LineCrossCircleRelation{line=BO, circle=O, crossPoints=[C]}, crossPointNum=1}, SegmentRelation:AC, SegmentRelation:BF, 求值(大小): (ExpressRelation:[key:](EF/DO)), 求值(大小): (ExpressRelation:[key:](DO/OP)), EqualityRelation{AC=12}, EqualityRelation{\$\tan(\angle F)=(1/2)\$}, 求值(大小): (ExpressRelation:[key:]\cos(\angle ACO)), ProveConclusionRelation:[证明: LineContactCircleRelation{line=PB, circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.absent(), outpoint=Optional.absent()}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:](EF/DO))), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:](DO/OP))}, SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]cos(\angle ACO))}

21、topic: 如图,点D、E分别是Rt \triangle ABC两直角边AB、AC上的点,连接BE,已知点F、G、H分别是DE、BE、BC的中点.(1)求 $\angle FGH$ 的度数;(2)连接CD,取CD的中点M,连接GM,若BD=8,CE=6,求GM的长.



graph:

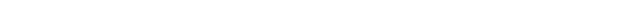
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{"stem":{"pictures":[{"picturename":"1000031946_Q_1.jpg","coordinates":{"A": -11.00, "B": -13.25, "C": 2.01, "D": -12.07, "E": 3.57, "F": -9.65, "G": 3.98, "H": -10.86, "I": 3.78, "J": -11.45, "K": 2.99, "L": -10.12, "M": 2.00}, "collineations": {"0": "A###D##B", "1": "B###H###C", "2": "A###E###C", "3": "D##F##E", "4": "B##G##E", "5": "G##F", "6": "G##H", "7": "C##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000031946_Q_1.jpg", "coordinates": {"M": -9.53, "N": 2.79}}, "collineations": {"0": "G##M"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}]}]
```

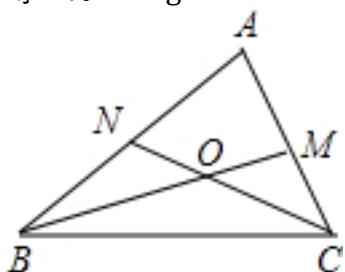
NLP: PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], LineRoleRelation{Segment=AB, roleType=RIGHTLEG}, LineRoleRelation{Segment=AC, roleType=RIGHTLEG}, SegmentRelation:BE, MiddlePointOfSegmentRelation{middlePoint=F, segment=DE}, MiddlePointOfSegmentRelation{middlePoint=G, segment=BE}, MiddlePointOfSegmentRelation{middlePoint=H, segment=BC}, 求角的大小:
 AngleRelation{angle= $\angle FGH$ }, MiddlePointOfSegmentRelation{middlePoint=M, segment=CD}, EqualityRelation{GM=v_0}, SegmentRelation:CD, PointRelation:M, SegmentRelation:GM, EqualityRelation{BD=8}, EqualityRelation{CE=6}, 求值(大小):

(ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:]∠FGH),SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:]GM)}

22、topic: 如图, $\triangle ABC$ 的角平分线 BM, CN 相交于 O .求证:点 O 到三边 AB, BC, CA 的距离相等.

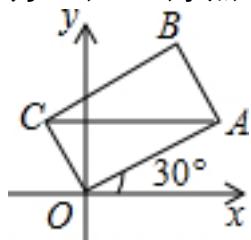


graph:

{"stem": {"pictures": [{"picturename": "1000035764_Q_1.jpg", "coordinates": {"A": "2.17,2.28", "B": "0.00,0.00", "C": "3.41,0.00", "M": "2.77,1.18", "N": "1.23,1.29", "O": "1.98,0.85"}, "collineations": {"0": "A###N####B", "1": "B###C", "2": "C###M##A", "3": "B###O###M", "4": "C###O##N"}, "variable-equals": {}, "circles": "[]"}, "appliedproblems": {}}, "subsystems": []]}

NLP: TriangleRelation: $\triangle ABC$, LineCrossRelation [crossPoint=Optional.of(O), iLine1=BM, iLine2=CN], PointToLineDistanceRelation{point=O, line=AB, distance=Express:[d_1]}, PointToLineDistanceRelation{point=O, line=BC, distance=Express:[d_2]}, PointToLineDistanceRelation{point=O, line=CA, distance=Express:[d_3]}, AngleBisectorRelation{line=BM, angle= $\angle CBN$, angle1= $\angle MBN$, angle2= $\angle CBM$ }, AngleBisectorRelation{line=CN, angle= $\angle BCM$, angle1= $\angle BCN$, angle2= $\angle MCN$ }, ProveConclusionRelation:[证明: MultiEqualityRelation [multiExpressCompare=d_1=d_2=d_3, originExpressRelationList=[], keyWord=null, result=null]]]

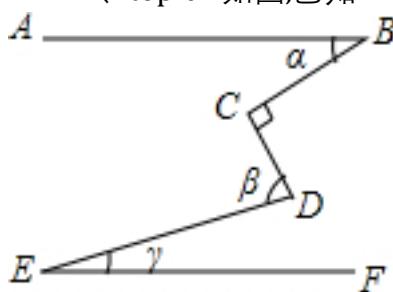
23、topic: 如图,在平面直角坐标系中,矩形OABC的对角线AC平行于x轴,边OA与x轴正半轴的夹角为 30° , $OC=2$,求点B的坐标.%#



graph:
{"stem": {"pictures": [{"picturename": "1000061900_Q_1.jpg", "coordinates": {"A": "10.01,6.73", "B": "9.01,8.47", "C": "6.00,6.73", "O": "7.00,5.00", "E": "9.01,5.00"}, "collineations": {"0": "A###B", "1": "B###C", "2": "C###O", "3": "O###A", "4": "A###C", "5": "B###O", "6": "B###E", "7": "E###O"}, "variable-equals": {}, "circles": "[]"}, "appliedproblems": {}}, "subsystems": []}}

NLP: RectangleRelation{rectangle=Rectangle:OABC}, LineParallelRelation [iLine1=AC, iLine2=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false], LinesAngleRelation [line1=StraightLine[AO] analytic :y=k_AO*x+b_AO slope:null b:null isLinearFunction:false, line2=StraightLine[X] analytic :y=0[x>0] slope:0 b:0 isLinearFunction:false, angle=(1/6*Pi)(普通角)], EqualityRelation{CO=2}, 坐标PointRelation:B, SolutionConclusionRelation{relation=坐标 PointRelation:B}

24、topic: 如图,已知 $AB \parallel EF$, $\angle BCD=90^\circ$,试探求图中 α 、 β 、 γ 之间的关系.%#

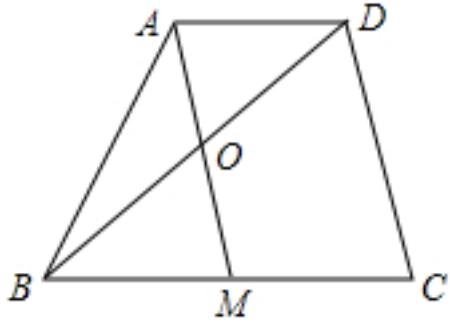


graph:
{"stem": {"pictures": [{"picturename": "1000082663_Q_1.jpg", "coordinates": {"A": "2.00,8.00", "B": "10.00,8.00", "C": "6.00,6.00", "D": "6.89,4.21", "E": "2.00,2.00", "F": "10.00,2.00"}, "collineations": {"0": "A###C", "1": "A###B", "2": "E###D", "3": "D###C", "4": "E###F"}, "variable-equals": {"0": "\u03b1=\u03b1ABC", "1": "\u03b2=\u03b1CDE"}, "circles": "[]"}, "appliedproblems": {}}, "subsystems": []}]

"2": " $\angle \gamma = \angle DEF$),"circles":[]],"appliedproblems":{},"substems":[]}

NLP: LineParallelRelation [iLine1=AB, iLine2=EF], EqualityRelation{ $\angle BCD = (1/2 * \pi)$ }, (ExpressRelation:[key:] β), 求值(大小): (ExpressRelation:[key:] α), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] α)

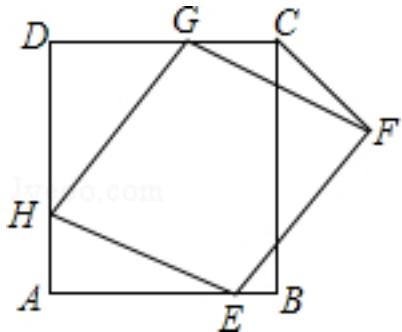
25、topic: 如图,在四边形ABCD中,已知M是BC的中点,AM、BD互相平分并交于点O,求证:四边形AMCD是平行四边形.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000037168_Q_1.jpg", "coordinates": {"A": "2.00,4.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "5.00,4.00", "M": "3.00,0.00", "O": "2.50,2.00"}, "collineations": {"0": "B##A", "1": "B##O##D", "2": "B##M##C", "3": "A##O##M", "4": "D##A", "5": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "substems": []}

NLP: 已知条件
QuadrilateralRelation{quadrilateral=ABCD}, MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, LineDecileSegmentRelation [iLine1=AM, iLine2=BD, crossPoint=Optional.of(O)], LineDecileSegmentRelation [iLine1=BD, iLine2=AM, crossPoint=Optional.of(O)], ProveConclusionRelation:[证明:
ParallelogramRelation{parallelogram=Parallelogram:ADCM}]

26、topic: 如图,正方形ABCD边长为6.菱形EFGH的三个顶点E、G、H分别在正方形ABCD的边AB、CD、DA上,且AH=2,连接CF. #%#(1)当DG=2时,求证:菱形EFGH为正方形; #%#(2)设DG=x,试用含x的代数式表示 $\triangle FCG$ 的面积.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000040726_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "3.00,0.00", "C": "3.00,3.00", "D": "0.00,3.00", "E": "2.00,0.00", "F": "4.00,2.00", "G": "2.00,3.00", "H": "0.00,1.00"}, "collineations": {"0": "A##B##C##D", "1": "B##C", "2": "C##G##D", "3": "D##H##A", "4": "E##F", "5": "F##G", "6": "G##H", "7": "E##H", "8": "C##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "substems": []}

},"subsystems":[]}]

NLP: SquareRelation{square=Square:ABCD,
length=6},SegmentRelation:CD,SegmentRelation:DA,EqualityRelation{AH=2},SegmentRelation:CF,Equ
alityRelation{DG=2},EqualityRelation{S \triangle CFG=v_0},EqualityRelation{DG=x},表达式之间的关系:
DualExpressRelation{expresses=[Express:[v_0], Express:[x]]},ProveConclusionRelation:[证明:
SquareRelation{square=Square:EFGH}],SolutionConclusionRelation{relation=表达式之间的关系:
DualExpressRelation{expresses=[Express:[v_0], Express:[x]]}}}

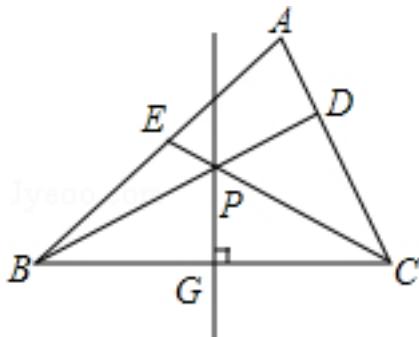
27、topic: 如图,点M、N为线段AB上的两个三等分点,点A、B在 $\odot O$ 上,求证: $\angle OMN = \angle ONM$

graph:

{"stem": {"pictures": [{"picturename": "1000024869_Q_1.jpg", "coordinates": {"A": "-14.00,4.00", "B": "-8.0", "C": "0,4.00", "D": "-12.00,4.00", "E": "-10.00,4.00", "F": "-11.00,8.00", "G": "0,8.00"}, "collineations": {"0": "M##O", "1": "O##N", "2": "A###M##N##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: SegmentAliquotsPointRelation{aliquotsNum='3', points=[M, N],
segment=AB},PointOnCircleRelation{circle=Circle[$\odot O$]{center=0,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, points=[A, B]},ProveConclusionRelation:[证明:
EqualityRelation{ $\angle NMO = \angle MNO$ }]

28、topic: 如图,在 $\triangle ABC$ 中,PG为BC边的垂直平分线,且 $\angle PBC = \frac{1}{2}\angle A$,BP的延长线交AC于点D,CP的延长线交AB于点E,求证:BE=CD.#%#

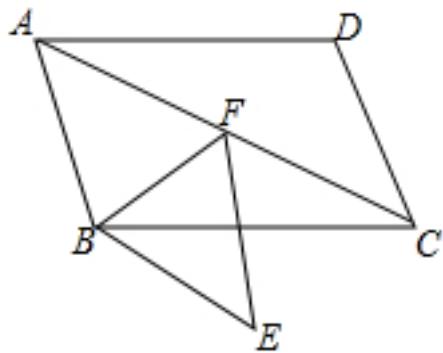


graph:

{"stem": {"pictures": [{"picturename": "1000027221_Q_1.jpg", "coordinates": {"A": "6.58,7.65", "B": "1.00,1.00", "C": "9.00,1.00", "D": "7.61,4.82", "E": "3.61,4.11", "P": "5.00,3.31", "G": "5.00,1.00"}, "collineations": {"0": "P##G", "1": "A##E##B", "2": "A##D##C", "3": "B##G##C", "4": "B##P##D", "5": "C##P##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$,MiddlePerpendicularRelation [iLine1=PG, iLine2=BC,
crossPoint=Optional.of(G)],EqualityRelation{ $\angle GBP = (1/2) * \angle DAE$ },LineCrossRelation
[crossPoint=Optional.of(D), iLine1=BP, iLine2=AC],LineCrossRelation [crossPoint=Optional.of(E),
iLine1=CP, iLine2=AB],ProveConclusionRelation:[证明: EqualityRelation{BE=CD}]

29、topic: 如图,点F在平行四边形ABCD的对角线AC上,过点F、B分别作AB、AC的平行线相交于点E,连接BF, $\angle ABF = \angle FCB + \angle FBC$.#%#(1)求证:四边形ABEF是菱形;#%#(2)若AF=5,BC=8, $\angle CBE = 30^\circ$,求AC的长.#%#

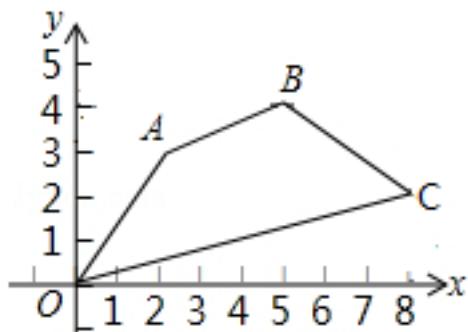


graph:

```
{"stem": {"pictures": [{"picturename": "1000080090_Q_1.jpg", "coordinates": {"A": "1.32,1.90", "B": "2.09,0.00", "C": "5.19,0.00", "D": "4.42,1.90", "E": "3.68,-0.98", "F": "3.41,0.87"}, "collineations": {"0": "A###F##C", "1": "A###B", "2": "A##D", "3": "B##C", "4": "B##E", "5": "B##F", "6": "C##D", "7": "E##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, LineParallelRelation [iLine1=FE, iLine2=AB], LineParallelRelation [iLine1=BE, iLine2=AC], SegmentRelation:BF, EqualityRelation{ $\angle ABF = \angle BCF + \angle CBF$ }, EqualityRelation{AC=v_0}, EqualityRelation{AF=5}, EqualityRelation{BC=8}, EqualityRelation{ $\angle CBE = (1/6 * \pi)$ }, 求值(大小): (ExpressRelation:[key:v_0]), ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:ABEF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:AC])}

30、topic: 如图所示,在直角坐标系中,四边形OABC各顶点的坐标分别是O(0,0)、A(2,3)、B(5,4)、C(8,2),试确定这个四边形的面积.#%#

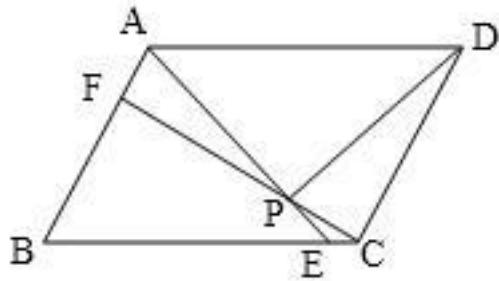


graph:

```
{"stem": {"pictures": [{"picturename": "1000070674_Q_1.jpg", "coordinates": {"A": "2.00,3.00", "B": "5.00,4.00", "C": "8.00,2.00", "O": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "A##O", "3": "C##O"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: CoorSysTypeRelation [name=xOy, types=直角坐标系], 已知条件 QuadrilateralRelation{quadrilateral=ABCO}, PointRelation:O(0,0), PointRelation:A(2,3), PointRelation:B(5,4), PointRelation:C(8,2)

31、topic: 平行四边形\$ABCD\$中,设E、F分别是BC、AB上的一点,AE与CF相交于P,且\$AE = CF\$.求证:\$\angle DPA = \angle DPC\$.

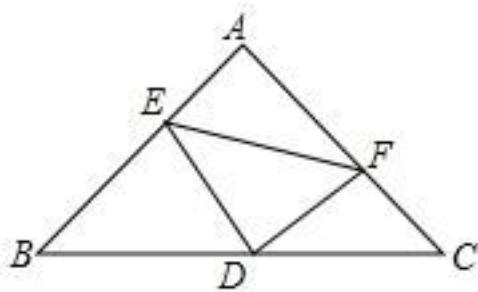


graph:

```
{"stem":{"pictures":[{"picturename":"1000011151_Q_1.jpg","coordinates":{"A":"3.00,6.00","B":"0.00,0.00","C":"12.00,6.00","D":"9.00,0.00","E":"7.00,0.00","F":"2.11,4.21","P":"5.63,2.06"},"collineations":{"0":"D##C","1":"E##B##D","2":"A##F##B","3":"C##A","4":"A##E##P","5":"C##P","6":"D##P##P","7":"A##P##E"}, "variable-equals":{},"circles":[]}, "appliedproblems":{},"substems":[]}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AB, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=AE, iLine2=CF], EqualityRelation{AE=CF}, ProveConclusionRelation:[证明: EqualityRelation{∠APD=∠CPD}]

32、topic: 如图,\$\triangle ABC\$是等腰直角三角形,\$AB=AC\$,点D是斜边BC的中点,E、F分别是AB、AC边上的点,且\$DE\perp DF\$,若\$BE=12\$,\$CF=5\$,求\$\triangle DEF\$的面积.



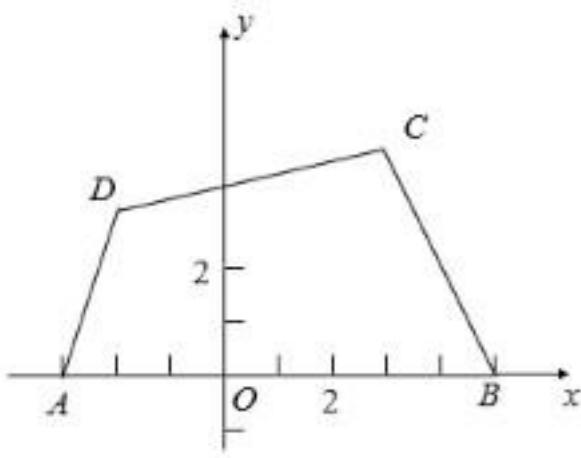
graph:

```
{"stem":{"pictures":[{"picturename":"1000007044_Q_1.jpg","coordinates":{"A":"12.02,12.02","B":"0.0,0.00","C":"24.04,0.00","D":"12.02,0.00","E":"8.48,8.48","F":"20.50,3.54"},"collineations":{"0":"A##F##C","1":"D##C##B","2":"E##F","3":"A##B##E","4":"D##E","5":"D##F"}, "variable-equals":{},"circles":[]}, "appliedproblems":{},"substems":[]}}
```

NLP:

EqualityRelation{S_△DEF=v_0}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle:△ABC[Optional.of(A)][Optional.of(A)], EqualityRelation{AB=AC}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, LinePerpRelation{line1=DE, line2=DF, crossPoint=D}, EqualityRelation{BE=12}, EqualityRelation{CF=5}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]S_△DEF)}

33、topic: 如图,在平面直角坐标系中,点\$A(-3,0)\$、\$B(5,0)\$、\$C(3,4)\$、\$D(-2,3)\$,求四边形ABCD的面积.



graph:

```
{"stem": {"pictures": [{"picturename": "1000006945_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "5.00,0.00", "C": "3.00,4.00", "D": "-2.00,3.00", "O": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "C##B", "2": "C##D", "3": "D##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{S_ABCD=v_0}, PointRelation:A(-3,0), PointRelation:B(5,0), PointRelation:C(3,4), PointRelation:D(-2,3), 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]S_ABCD)}

34、topic: 如图,已知: $\odot O$ 为Rt $\triangle ABC$ 的外接圆,点D在边AC上,AD=AO;(1)如图1,若弦BE \parallel OD,求证:OD=BE;(2)如图2,点F在边BC上,BF=BO,若 $OD=2\sqrt{2}$,OF=3,求 $\odot O$ 的直径.

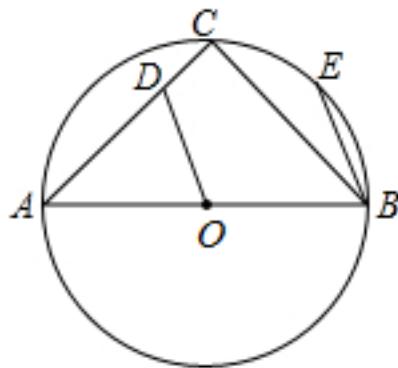


图1

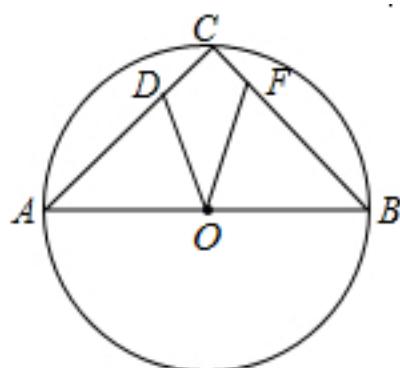


图2

graph:

```
{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000052512_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "0.15,3.00", "D": "-0.83,2.07", "E": "2.17,2.07", "O": "0.00,0.00"}, "collineations": {"0": "B##O##A", "1": "C##D##A", "2": "C##B", "3": "D##O", "4": "B##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##C##E##B"}]}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000052512_Q_2.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "0.15,3.00", "D": "-0.83,2.07", "F": "0.93,2.17", "O": "0.00,0.00"}, "collineations": {"0": "B##O##A", "1": "C##D##A", "2": "C##F##B", "3": "D##O", "4": "F##O"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}]}]}, {"substemid": "3", "questionrelies": "", "pictures": []}], "appliedproblems": {}}}
```

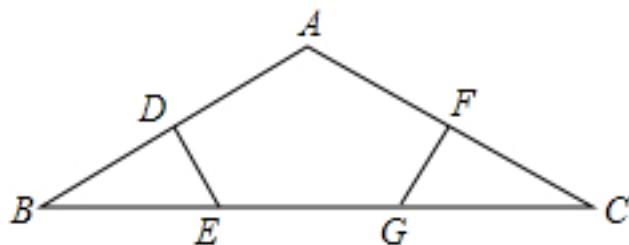
NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O_0$]{center= O_0 ,

```

analytic=(x-x_0_0)^2+(y-y_0_0)^2=r_0^2},PointOnLineRelation{point=D, line=AC,
isConstant=false, extension=false},EqualityRelation{AD=AO},ChordOfCircleRelation{chord=BE,
circle=Circle[O]{center=O, analytic=(x-x_0)^2+(y-y_0)^2=r_0^2},
chordLength=null,straightLine=null},(ExpressRelation:[key:]1),LineParallelRelation [iLine1=BE,
iLine2=OD],(ExpressRelation:[key:]2),PointOnLineRelation{point=F, line=BC, isConstant=false,
extension=false},EqualityRelation{BF=BO},EqualityRelation{DO=2*(2^(1/2))},EqualityRelation{FO=3
},圆的直径: CircleRelation{circle=Circle[O]{center=O,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}},ProveConclusionRelation:[证明:
EqualityRelation{DO=BE}],SolutionConclusionRelation{relation=圆的直径:
CircleRelation{circle=Circle[O]{center=O, analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}}}

```

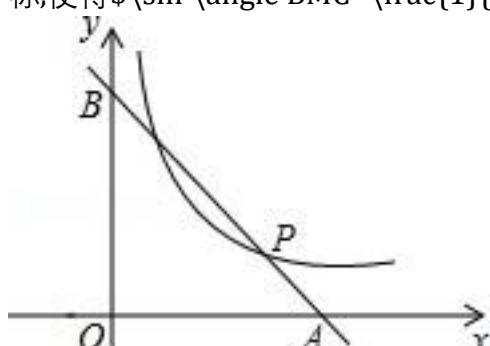
35、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, $\angle BAC=120^\circ$,D、F分别为AB、AC的中点,DE $\perp AB$,GF $\perp AC$,点E、G均在BC上, $BC=15\text{cm}$,求EG的长.#%#



graph:
{"stem":{"pictures":[{"picturename":"483B98C9CC3649BFBC4D02A6EA451C0C.jpg","coordinates":{"A": "-7.50,7.33","B": "-15.00,3.00","C": "-0.00,3.00","D": "-11.25,5.17","E": "-10.00,3.00","F": "-3.75,5.17","G": "-5.00,3.00"}, "collinearities": {"0": "C##A##F", "1": "A##B##D", "2": "D##E", "3": "C##B##E", "4": "F##G"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "subsystems": []}]}

NLP:
EqualityRelation{EG=v_0},TriangleRelation: $\triangle ABC$,EqualityRelation{AB=AC},EqualityRelation{ $\angle DAF = (2/3\pi)$ },MiddlePointOfSegmentRelation{middlePoint=D,segment=AB},MiddlePointOfSegmentRelation{middlePoint=F,segment=AC},LinePerpRelation{line1=DE, line2=AB, crossPoint=D},LinePerpRelation{line1=GF, line2=AC, crossPoint=F},PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=G, line=BC, isConstant=false, extension=false},EqualityRelation{BC=15},求值(大小):
(ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]EG)}

36、topic: 如图,直线 $y=-x+3$ 与x,y轴分别交于点A,B,与反比例函数的图象交于点P(2,1).?%#(1)求该反比例函数的关系式; ?%#(2)设PC \bot y轴于点C,点A关于y轴的对称点为A'; ?%#①求 $\triangle A'BC$ 的周长和 $\sin \angle BA'C$ 的值; ?%#②对大于1的常数m,求x轴上的点M的坐标,使得 $\sin \angle BMC=\frac{1}{\pi}$.



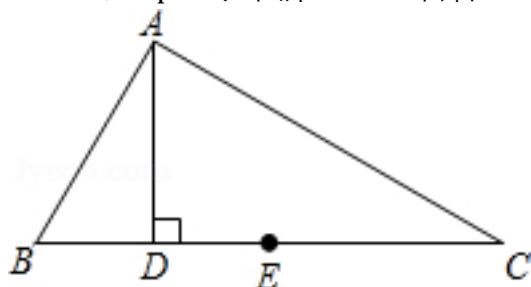
```

graph:
{"stem": {"pictures": [{"picturename": "1000010411_Q_1.jpg", "coordinates": {"A": "3.00,0.00", "B": "0.00,3.00", "P": "2.00,1.00", "O": "0.00,0.00"}, "collineations": {"0": "B###A###P"}, "variable>equals": {}, "circles": []}, {"subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [{"picturename": "45.jpg", "coordinates": {"A": "-3.00,0.00", "C": "0.00,1.00"}}, "collineations": {"0": "B###A", "1": "C###A", "2": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}], "circles": []}

```

NLP: LineCrossRelation [crossPoint=Optional.of(A), iLine1=StraightLine[n_0] analytic :y=-x+3 slope:-1 b:3 isLinearFunction:true, iLine2=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false], LineCrossRelation [crossPoint=Optional.of(B), iLine1=StraightLine[n_0] analytic :y=-x+3 slope:-1 b:3 isLinearFunction:true, iLine2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false], FunctionCrossRelation: {function1=INVERSEPROPORTION, InverseProportion[]:y=-x+3, function2=CommonFunction[]:y=k_1/x, 定义域:null Conditions:[[]]}, crossPoints=[point1:[P(2,1)]], 解析式, 圆锥曲线解析式, 标准方程, 方程: InverseProportionFunctionRelation{inverseProportion=INVERSEPROPORTION, InverseProportion[]:y=k_1/x}, LinePerpRelation{line1=PC, line2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, crossPoint=C}, SymmetricRelation{preData=A, afterData=A', symmetric=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, pivot=}, EqualityRelation{C_△A'BC=v_2}, 求值(大小): (ExpressRelation:[key:]v_2), 求值(大小): (ExpressRelation:[key:]sin(BA'*∠C)), ConstantValueRelation [constantObject=Express:[m]], InequalityRelation{m>1}, EqualityRelation{sin(∠BMC)=(1/(Pi))}, 坐标 PointRelation:M, PointOnLineRelation{point=M, line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false}, SolutionConclusionRelation{relation=解析式, 圆锥曲线解析式, 标准方程, 方程: InverseProportionFunctionRelation{inverseProportion=INVERSEPROPORTION, InverseProportion[]:y=k_1/x}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]C_△A'BC)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]sin(BA'*∠C))}, SolutionConclusionRelation{relation=坐标PointRelation:M}}

37、topic: 如图,在 $\triangle ABC$ 中,若 $\angle B=2\angle C$, $AD \perp BC$, E 为 BC 边的中点,求证: $AB=2DE$.#%#



```

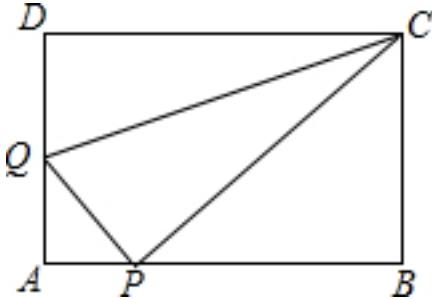
graph:
{"stem": {"pictures": [{"picturename": "1000031911_Q_1.jpg", "coordinates": {"A": "-6.49,5.78", "B": "-8.26,2.75", "C": "-1.24,2.73", "D": "-6.50,2.75", "E": "-4.75,2.74"}, "collineations": {"0": "B###A", "1": "A###C", "2": "A##D", "3": "B###D###E###C"}, "variable>equals": {}, "circles": []}, {"subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [{"picturename": "45.jpg", "coordinates": {"A": "-3.00,0.00", "C": "0.00,1.00"}}, "collineations": {"0": "B###A", "1": "C###A", "2": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}], "circles": []}

```

NLP: TriangleRelation:△ABC, EqualityRelation{∠ABD=2*∠ACE}, LinePerpRelation{line1=AD, line2=BC},

crossPoint=D},MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},ProveConclusionRelation :[证明: EqualityRelation{AB=2*DE}]

38、topic: 如图,在矩形ABCD中,AB=5,AD=3,点P是AB边上一点(不与A,B重合),连接CP,过点P作PQ \perp CP交AD边于点Q,连接CQ.(1)当 $\triangle CDQ \cong \triangle CPQ$ 时,求AQ的长;(2)取CQ的中点M,连接MD,MP,若MD \perp MP,求AQ的长.(提示:梯形的中位线平行于两底,且等于两底和的一半)



graph:

```
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```

NLP:

PointRelation:A,PointRelation:B,RectangleRelation{rectangle=Rectangle:ABCD},EqualityRelation{AB=5},EqualityRelation{AD=3},PointOnLineRelation{point=P, line=AB, isConstant=false, extension=false},SegmentRelation:CP,LineCrossRelation [crossPoint=Optional.of(Q), iLine1=PQ, iLine2=AD],LinePerpRelation{line1=PQ, line2=CP, crossPoint=P},SegmentRelation:CQ,EqualityRelation{AQ=v_0},TriangleCongRelation{triangleA= $\triangle CDQ$, triangleB= $\triangle CPQ$ },求值(大小):

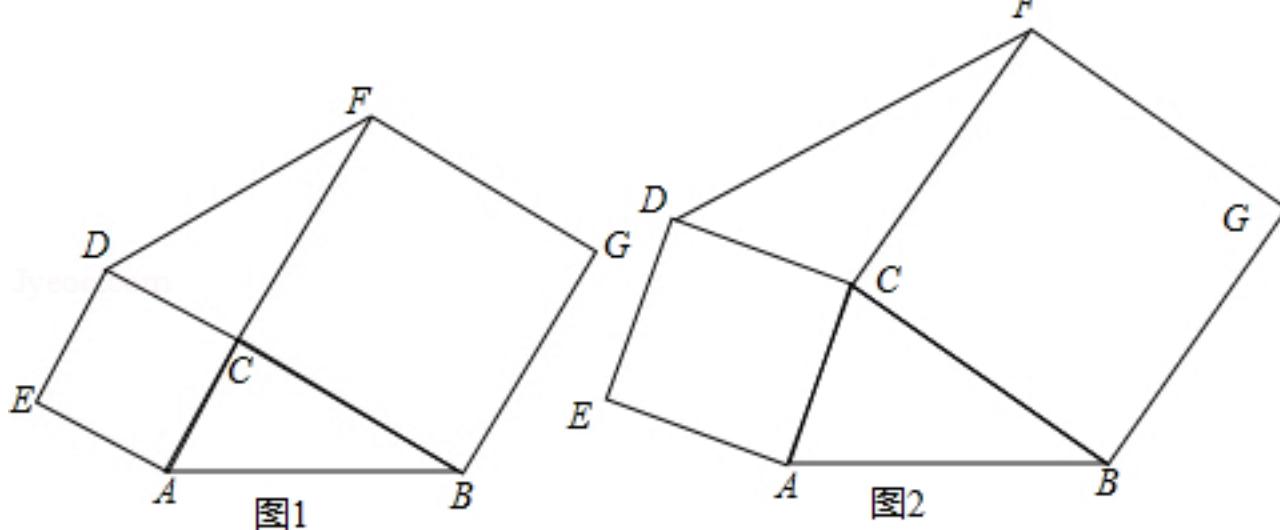
(ExpressRelation:[key:]v_0),MiddlePointOfSegmentRelation{middlePoint=M,segment=CQ},EqualityRelation{AQ=v_1},PointRelation:M,SegmentRelation:MD,SegmentRelation:MP,LinePerpRelation{line1=MD, line2=MP, crossPoint=M},求值(大小):

(ExpressRelation:[key:]v_1),SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]AQ),SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]AQ)}

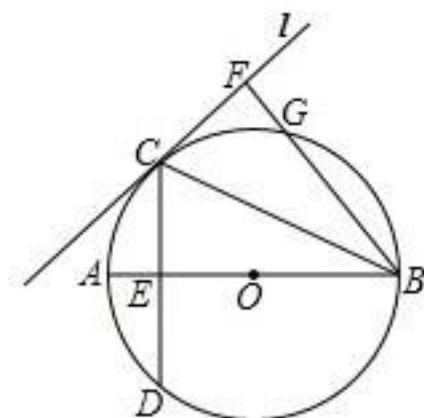
39、topic: 分别以 $\triangle ABC$ 的两边AC、BC为边向三角形外侧作正方形ACDE和正方形BCFG,记 $\triangle ABC$ 、 $\triangle DCF$ 的面积分别为 $\{S\}_1$ 和 $\{S\}_2$.#%#%#(1)如图1,当 $\angle ACB=90^\circ$ 时,求证:
 $\{S\}_1=\{S\}_2$.#%#(2)如图2,当 $\angle ACB \neq 90^\circ$ 时, $\{S\}_1$ 和 $\{S\}_2$ 是否仍然相等? 请说明理由.



graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000030868_Q_1.jpg", "coordinates": {"A": "-5.80,0.00", "B": "0.00,0.00", "C": "-5.00,2.00", "D": "-7.00,2.80", "E": "-7.80,0.80", "F": "-3.00,7.00", "G": "2.00,5.00"}, "collineations": {"0": "A###B", "1": "B###C", "2": "A###C", "3": "A###E", "4": "E###D", "5": "D###C", "6": "D###F", "7": "C###F", "8": "G###F", "9": "G###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000030868_Q_2.jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,0.00", "C": "-3.00,2.00", "D": "-5.00,3.00", "E": "-6.00,1.00", "F": "-1.00,5.00", "G": "2.00,3.00"}, "collineations": {"0": "A###B", "1": "B###C", "2": "A###C", "3": "A###E", "4": "E###D", "5": "D###C", "6": "D###F", "7": "C###F", "8": "G###F", "9": "G###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

NLP:
 SquareRelation{square=Square:ACDE}, SquareRelation{square=Square:BCFG}, TriangleRelation:△ABC,
 EqualityRelation{S_△ABC=S_1}, EqualityRelation{S_△CDF=S_2}, (ExpressRelation:[key:]1), EqualityRelation{∠ACB=(1/2*Pi)}, (ExpressRelation:[key:]2), ProveConclusionRelation:[证明:
 EqualityRelation{S_1=S_2}], ProveConclusionRelation:[证明: EqualityRelation{S_1=S_2}]

40、topic: 如图,已知AB是\$ ⊙O \$的直径,直线\$l\$与\$ ⊙O \$相切于点C,且弧AC=弧AD,弦CD交AB于E,\$ BF \perp l \$,垂足为F,BF交\$ ⊙O \$于G.(1)求证:\$\{CE\}^2=FG \cdot FB \$(2)若\$ \tan \angle CBF = \frac{1}{2} \$,\$ AE=3 \$,求\$ ⊙O \$的直径.

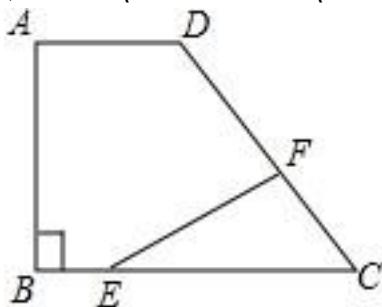


graph:
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0.00", "C": "-4.50,6.00", "D": "-4.50,-6.00", "E": "-4.50,0.00", "F": "0.30,9.60", "G": "2.10,7.20", "O": "0.00,0.00"}
 , "collineations": {"0": "F###G##B", "1": "F##C", "2": "B##C", "3": "D##C##E", "4": "A##E##O##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D##G"}]}, "applydproblems": {}, "substems": []}]

NLP: ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, chordLength=null, straightLine=null}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=null}, LineContactCircleRelation{line=CF, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(C), outpoint=Optional.of(F)}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=CD, iLine2=AB], LinePerpRelation{line1=CF, line2=BF, crossPoint=F}, LineCrossCircleRelation{line=BF, circle= $\odot O$, crossPoints=[G]}, crossPointNum=1}, EqualityRelation{tan $\angle(CBF)=(1/2)$ }, EqualityRelation{AE=3}, 圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, ProveConclusionRelation:[证明: EqualityRelation{((CE) 2)=FG*BF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)}

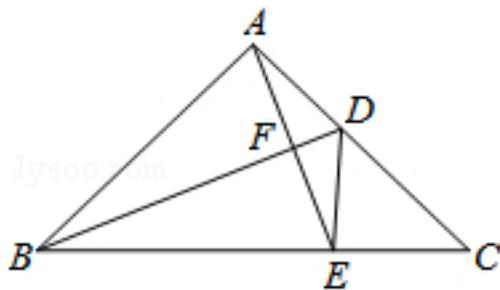
41、topic: 已知:如图,在直角梯形\$ABCD\$中,\$AD\parallel BC\$,\$\angle A=90^\circ\$,\$BC=CD=10\$,\$\sin C = \frac{4}{5}\$.
 (1)求直角梯形\$ABCD\$的面积; (2)点E是BC上一点,过点E作\$EF\perp DC\$于点F.求证: \$AB \cdot CE = EF \cdot CD\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000007566_Q_1.jpg", "coordinates": {"A": "0.00,8.00", "B": "0.00,0.00", "C": "10.00,0.00", "D": "4.00,8.00", "E": "2.00,0.00", "F": "7.12,3.84"}, "collineations": {"0": "D##A", "1": "F##C##D", "2": "F##E", "3": "A##B", "4": "B##C"}, "variable>equals": {}, "circles": []}], "applydproblems": {}, "substems": []}}

NLP: RightTrapezoidRelation{rightTrapezoid=RightTrapezoid:ABCD
 randomOrder:true}, LineParallelRelation [iLine1=AD, iLine2=BC], EqualityRelation{ $\angle BAD=(1/2)\pi$ }, MultiEqualityRelation
 [multiExpressCompare=BC=CD=10, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{ $\sin(\angle ECF)=\frac{4}{5}$ }, TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, EqualityRelation{S_ABCD=v_0}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, LinePerpRelation{line1=EF, line2=DC, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{AB*CE=EF*CD}]

42、topic: 如图,\$\triangle ABC\$中,\$AB=AC=5\$,\$BC=8\$,点D在AC上,点E在BC上,且BD恰好垂直平分AE于点F,求\$\triangle BEF\$与\$\triangle AEC\$的面积之比.
 #%#



graph:

```
{"stem":{"pictures":[{"picturename":"1000030974_Q_1.jpg","coordinates":{"A": -10.00, "B": -14.00, "C": 6.00, "D": -9.56, "E": -8.63, "F": -9.18}, "collineations": {"0": "A##D##C", "1": "D##F##B", "2": "A##F##E", "3": "B##E##C", "4": "A##B", "5": "D##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

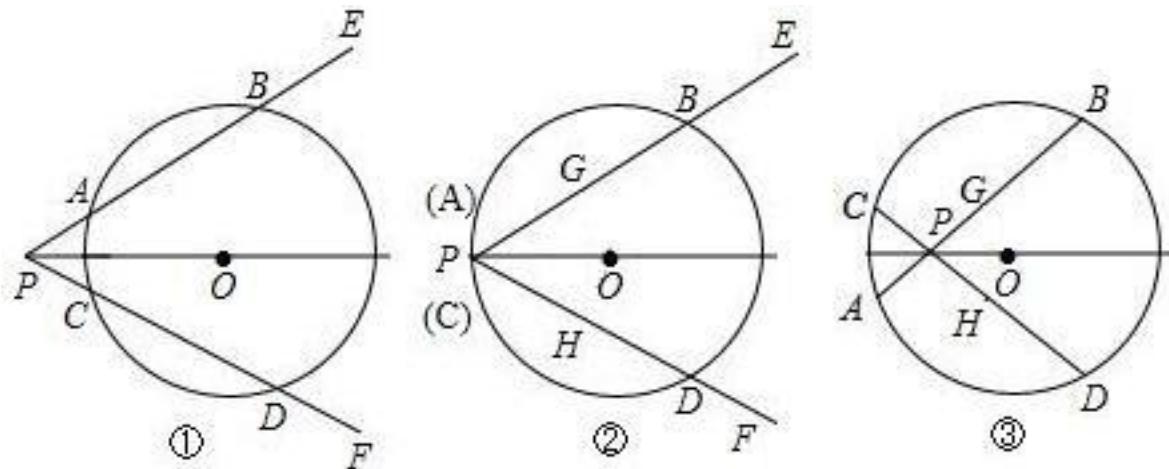
NLP:

```

EqualityRelation{S_△BEF=v_0}, EqualityRelation{S_△ACE=v_1}, EqualityRelation{v_0/(v_1)=v_2}, TriangleRelation:△ABC, MultiEqualityRelation [multiExpressCompare=AB=AC=5, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BC=8}, PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, MiddlePerpendicularRelation [iLine1=BD, iLine2=AE, crossPoint=Optional.of(F)], 求值(大小): (ExpressRelation:[key:]v_2), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]v_2)}

```

43、topic: 如图①所示,已知点O是 $\angle EPF$ 的平分线上的点,以点O为圆心的圆与角的两边分别交于点A,B和C,D.
 (1)求证: $AB=CD$.
 (2)若角的顶点P在圆上,如图②所示,上述结论成立吗?请加以说明;
 (3)若角的顶点P在圆内,如图③所示,上述结论成立吗?请加以说明.

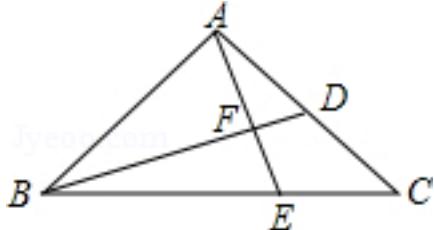
graph:

```
{"stem":{"pictures":[{"picturename":"1000008153_Q_1.jpg","coordinates":{"A":0.06,0.53,"B":3.54,2.27,"C":0.06,-0.53,"D":3.54,-2.27,"E":5.00,3.00,"F":5.00,-3.00,"O":2.50,0.00,"P":-1.00,0.00}],"collineations":{"0":B###A###P###E","1":C###D###F###P}),"variable>equals":{},"circles":[{"center":0,"pointincircle":C###D###A###B}]}],"appliedproblems":{},"substems":[{"substemid":1,"questionrelies":"","pictures":[{"picturename":"1000008153_Q_2.jpg","coordinates":{"A":0.00,0.00,"B":3.68,2.21,"C":0.00,0.00,"D":3.68,-2.21,"E":5.00,3.00,"F":5.00,-3.00,"O":2.50,0.00,"P":0.00,0.00}],"collineations":{"0":B###P###E,"1":D###F###P}),"variable>equals":{},"circles":[]}],apply
```

dproblems":{}}, {"substemid": "2", "questionreplies": "", "pictures": [{"picturename": "1000008153_Q_3.jpg", "coordinates": {"A": "0.11,-0.73", "B": "3.68,2.21", "C": "0.11,0.73", "D": "3.68,-2.21", "O": "2.50,0.00", "P": "1.00,0.00"}, "collineations": {"0": "B###P###A", "1": "D###C###P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}]

NLP: AngleBisectorRelation{line=M_0N_0,angle= $\angle APC$, angle1= $\angle APM_0$, angle2= $\angle CPM_0$ }, CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, PointRelation:B, PointRelation:C, PointRelation:D, ProveConclusionRelation:[证明: EqualityRelation{AB=CD}]

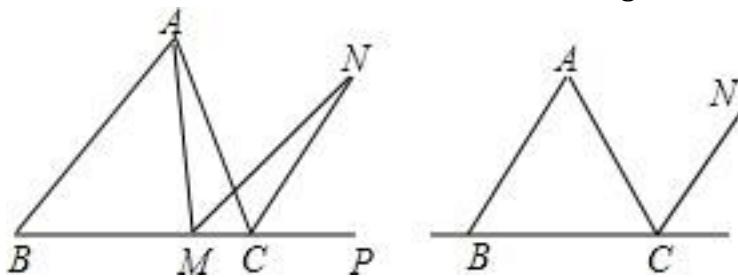
44、topic: 如图, 在 $\triangle ABC$ 中,BD为AC边上的中线,BE=AB,且AE与BD相交于点F.求证: $\frac{AB}{BC}=\frac{EF}{AF}$.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000041517_Q_1.jpg", "coordinates": {"A": "1.79,1.95", "B": "0.00,0.00", "C": "4.29,0.00", "D": "3.04,0.97", "E": "2.65,0.00", "F": "2.32,0.74"}, "collineations": {"0": "A###B", "1": "B###E###C", "2": "C###D###A", "3": "A###F###E", "4": "B###F###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, LineDecileSegmentRelation [iLine1=BD, iLine2=AC, crossPoint=Optional.of(D)], EqualityRelation{BE=AB}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AE, iLine2=BD], ProveConclusionRelation:[证明: EqualityRelation{((AB)/(BC))=((EF)/(AF))}]

45、topic: 如图,在等边三角形ABC中,M是BC边(不含端点B、C)上任意一点,P是BC延长线上一点,N是 $\angle ACP$ 的平分线上一点.已知 $\angle AMN=60^\circ$.#%#(1)求证:AM=MN;#%#(2)当M在直线BC上运动时,上述结论是否成立?若成立,请画图证明.#%#

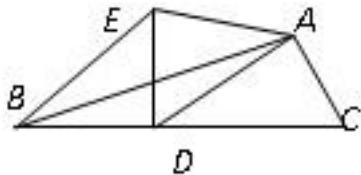


graph:
{"stem": {"pictures": [{"picturename": "1000040801_Q_1.jpg", "coordinates": {"A": "-1.92,1.08", "B": "-4.42,-3.25", "C": "0.58,-3.25", "P": "3.12,-3.25", "M": "-1.14,-3.25", "N": "2.21,-0.43"}, "collineations": {"0": "A###B", "1": "A###M", "2": "C###A", "3": "M###N", "4": "B###M###C###P", "5": "C###N"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=CN,angle= $\angle ACP$, angle1= $\angle ACN$, angle2= $\angle NCP$ }, PointRelation:C, RegularTriangleRelation:RegularTriangle: $\triangle ABC$, PointOnLineRelation{point=M, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=P, line=BC, isConstant=false, extension=true}, EqualityRelation{ $\angle AMN=(1/3\pi)$ }, PointOnLineRelation{point=M,

line=BC, isConstant=false, extension=false},ProveConclusionRelation:[证明:
EqualityRelation{AM=MN}]

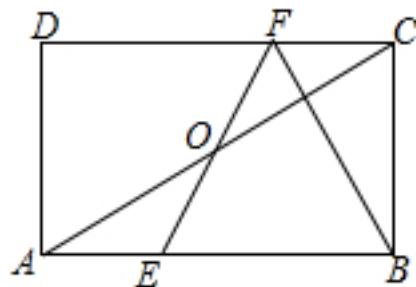
46、topic: 如图,已知AD是 $\triangle ABC$ 的中线, $\angle ADC = 45^\circ$,把 $\triangle ABC$ 沿AD对折,点C落在点E的位置,连接BE,若 $BC = 6\text{cm}$.#%(1)求BE的长;#%(2)当 $AD = 4\text{cm}$ 时,求四边形BDAE的面积.



graph:
[{"variable>equals":{}, "picturename": "1000001498_Q_1.jpg", "collineations": {"0": "B##D##C"}, "coordinates": {"D": "0.00,0.00", "E": "0.00,3.00", "A": "2.83,2.83", "B": "-3.00,0.00", "C": "3.00,0.00"}]]

NLP: TriangleRelation:△ABC, EqualityRelation{∠ADC=((1/4*Pi))}, TurnoverRelation{start=C, segment=AD, target=E}, SegmentRelation:BE, EqualityRelation{BC=6}, MidianLineOfTriangleRelation{medianLine=AD, triangle=△ABC, top=A, bottom=BC}, EqualityRelation{BE=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), 已知条件 QuadrilateralRelation{quadrilateral=ADBE}, EqualityRelation{S_ADBE=v_1}, EqualityRelation{AD=4}, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BE)}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]S_ADBE)}

47、topic: 如图所示,在矩形ABCD中,E,F分别是边AB,CD上的点,AE=CF,连接EF,BF,EF与对角线AC交于点O,且BE=BF, $\angle BEF=2\angle BAC$.#%(1)求证:OE=OF;#%(2)若 $BC=2\sqrt{3}\text{cm}$,求AB的长.#%#

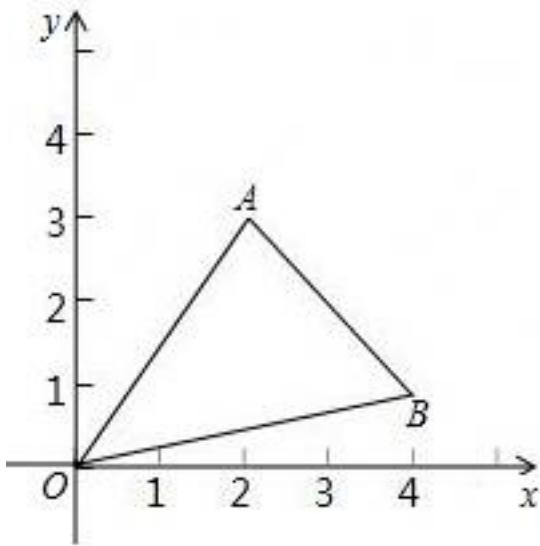


graph:
{"stem": {"pictures": [{"picturename": "1000041785_Q_1.jpg", "coordinates": {"A": "-6.00,0.00", "B": "-0.00,0.00", "C": "-0.00,3.46", "D": "-6.00,3.46", "E": "-4.00,0.00", "F": "-2.00,3.46", "O": "-3.00,1.73"}, "collineations": {"0": "A##F##B", "1": "D##F##C", "2": "A##O##C", "3": "F##O##E", "4": "B##F", "5": "D##A", "6": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, EqualityRelation{AE=CF}, MultiPointCollinearRelation:[E, F], MultiPointCollinearRelation:[B, F], LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=EF], EqualityRelation{BE=BF}, EqualityRelation{∠BEO=2*∠BAE}, EqualityRelation{AB=v_0}, EqualityRelation{BC=2*(3^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证]

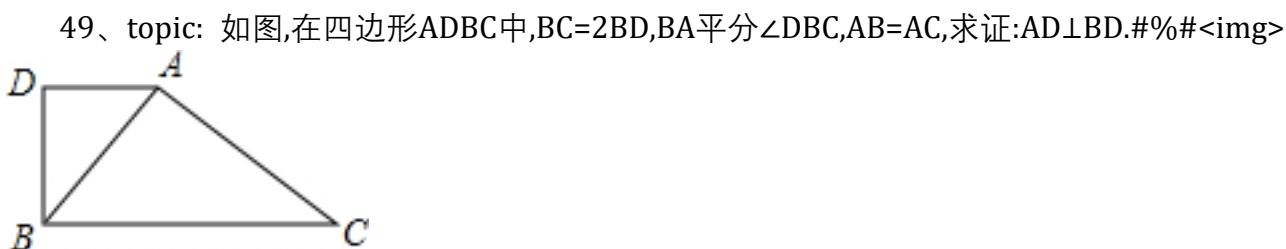
明: EqualityRelation{EO=FO}], SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]AB)}

48、topic: 如图,在平面直角坐标系中\$A\$、\$B\$两点的坐标分别为\$A(2,3)\$、\$B(4,1)\$,\$试求\$\triangle ABO\$的面积.



graph:
 {"stem": {"pictures": [{"picturename": "1000024453_Q_1.jpg", "coordinates": {"A": "2.00,3.00", "B": "4.00,1.00", "O": "0.00,0.00"}, "collineations": {"0": "B##A", "1": "O##B", "2": "O##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{S_△ABO=v_0}, PointRelation:A(2,3), PointRelation:B(4,1), 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]S_△ABO)}

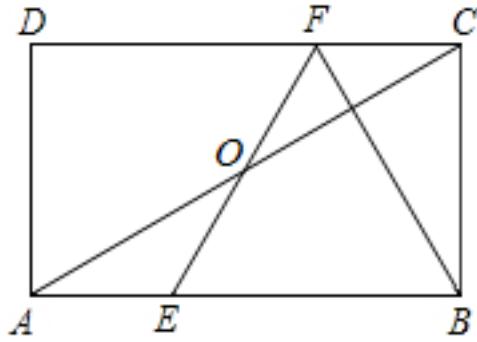


graph:
 {"stem": {"pictures": [{"picturename": "1000035761_Q_1.jpg", "coordinates": {"A": "3.00,3.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "0.00,3.00"}, "collineations": {"0": "A##D", "1": "A##C", "2": "B##A", "3": "D##B", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ACBD}, EqualityRelation{BC=2*BD}, AngleBisectorRelation{line=BA, angle=∠CBD, angle1=∠ABC, angle2=∠ABD}, EqualityRelation{AB=AC}, ProveConclusionRelation:[证明: LinePerpRelation{line1=AD, line2=BD, crossPoint=D}]

50、topic: 如图所示,在矩形ABCD中,E、F分别是边AB、CD上的点,AE=CF,连接EF、BF,EF与对角线

AC交于点O,且BE=BF, $\angle BEF=2\angle BAC$.#%#(1)求证:OE=OF.#%#(2)若 $BC=2\sqrt{3}$,求AB的长.#%#

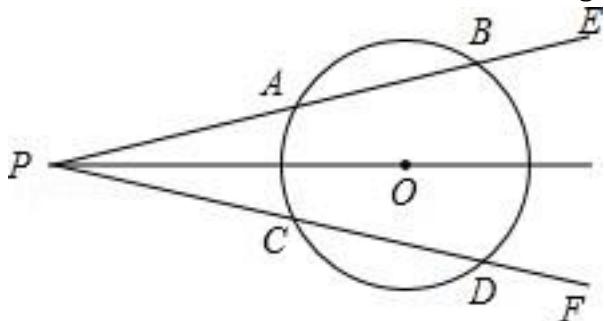


graph:

```
{"stem": {"pictures": [{"picturename": "1000035800_Q_1.jpg", "coordinates": {"A": "-4.00,1.00", "B": "2.00,1.00", "C": "2.00,4.46", "D": "-4.00,4.45", "E": "-2.00,1.00", "F": "0.00,4.46", "O": "-1.00,2.73"}, "collineations": {"0": "A##D", "1": "B##F", "2": "B##C", "3": "A##O##C", "4": "E##O##F", "5": "D##F##C", "6": "A##E##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, EqualityRelation{AE=CF}, MultiPointCollinearRelation:[E, F], MultiPointCollinearRelation:[B, F], LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=EF], EqualityRelation{BE=BF}, EqualityRelation{ $\angle BEO=2*\angle EAO$ }, EqualityRelation{AB=v_0}, EqualityRelation{BC=2*(3^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{EO=FO}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)}

51、topic: 如图,已知点O是 $\angle EPF$ 的平分线上一点,点P在圆外,以O为圆心的圆与 $\angle EPF$ 的两边分别相交于A、B和C、D.求证: $AB=CD$.



graph:

```
{"substems": [], "stem": {"pictures": [{"circles": [{"center": "O", "pointincircle": "A##B##C##D"}], "variable-equals": {}, "picturename": "1000001519_Q_1.jpg", "collineations": {"2": "A##O##B##D", "1": "P##C##D##F", "2": "P##O", "0": "P##A##B##E"}, "coordinates": {"D": "-11.28,5.65", "E": "-9.49,9.01", "F": "-9.49,4.99", "A": "-13.42,7.57", "B": "-11.28,8.35", "C": "-13.42,6.43", "O": "-12.00,7.00", "P": "-15.00,7.00"}}]}}
```

NLP: AngleBisectorRelation{line=PO, angle= $\angle APC$, angle1= $\angle APO$, angle2= $\angle CPO$ }, CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, PointOutCircleRelation{point=P, curve=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, points=[P], LineCrossCircleRelation{line=EP, circle= $\odot O$,

`crossPoints=[A, B], crossPointNum=2},LineCrossCircleRelation{line=PF, circle=O, crossPoints=[C, D], crossPointNum=2},ProveConclusionRelation:[证明: EqualityRelation{AB=CD}]`

52、topic: 解答:(1)如图1,正方形ABCD中,点E,F分别在边BC,CD上,\$\angle EAF=45^\circ\$,延长CD到点G,使\$DG=BE\$,连结EF,AG.求证:\$EF=FG\$.#%(2)如图2,等腰直角三角形ABC中,\$\angle BAC=90^\circ\$,\$AB=AC\$,点M,N在边BC上,且\$\angle MAN=45^\circ\$,若\$BM=1\$,\$CN=3\$,求MN的长.

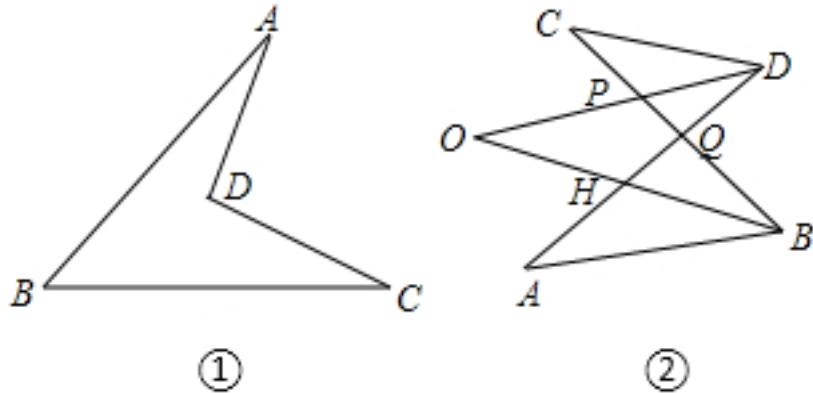
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000010197_Q_1.jpg","coordinates":{"A":"8.00,8.00","B":"0.00,8.00","C":"0.00,0.00","D":"8.00,0.00","E":"0.00,6.00","F":"3.20,0.00","G":"10.00,0.00"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##G", "3": "C##D##F##G", "4": "A##E", "5": "A##F", "6": "B##C##E", "7": "E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000010197_Q_2.jpg", "coordinates": {"A": "8.00,8.00", "B": "0.00,8.00", "C": "0.00,0.00", "M": "8.00,0.00", "N": "0.00,6.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "A##M", "3": "B##M##N##C", "4": "A##N"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}}
```

NLP:

(ExpressRelation:[key:]1),SquareRelation{square=Square:ABCD},PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false},EqualityRelation{\$\angle EAF=(1/4*\pi)\$},PointOnLineRelation{point=G, line=CD, isConstant=false, extension=true},EqualityRelation{DG=BE},SegmentRelation:EF,SegmentRelation:AG,EqualityRelation{MN=v_0},(ExpressRelation:[key:]2),IsoscelesRightTriangleRelation:IsoscelesRightTriangle:IsoscelesTriangle:\$\triangle ABC\$[Optional.of(B)][Optional.of(B)],EqualityRelation{\$\angle BAC=(1/2*\pi)\$},EqualityRelation{AB=AC},PointOnLineRelation{point=M, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=N, line=BC, isConstant=false, extension=false},EqualityRelation{\$\angle MAN=(1/4*\pi)\$},EqualityRelation{BM=1},EqualityRelation{CN=3},求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: EqualityRelation{EF=FG}],SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]MN)}

53、topic: (1)如图①,\$\angle ADC=100^\circ\$,试求\$\angle A+\angle B+\angle C\$的度数;#%(2)如图②所示,DO平分\$\angle CDA\$,BO平分\$\angle CBA\$,\$\angle A=20^\circ\$,\$\angle C=30^\circ\$,试求\$\angle O\$的度数.#%#



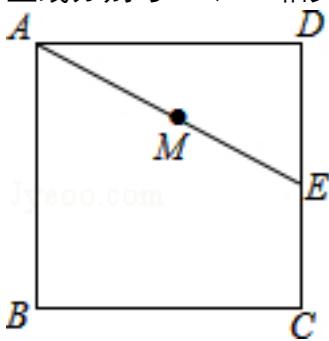
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid": "1","questionrelies": "", "picture": [{"picturename": "1000051264_Q_1.jpg", "coordinates": {"A": "-3.94,5.98", "B": "-8.02,2.01", "C": "-2.46,2.04", "D": "-4.97,3.86"}, "collineations": {"0": "A##B", "1": "D##C", "2": "B##C", "3": "A##D"}, "variable": {}}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000051264_Q_2.jpg", "coordinates": {"A": "-3.94,5.98", "B": "-8.02,2.01", "C": "-2.46,2.04", "D": "-4.97,3.86"}, "collineations": {"0": "A##B", "1": "D##C", "2": "B##C", "3": "A##D"}, "variable": {}}], "appliedproblems": {}}]}
```

e>equals":{},"circles":[]}]}, "appliedproblems":{}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000051264_Q_2.jpg", "coordinates": {"A": "-8.23,-5.37", "B": "-4.82,-4.42", "C": "-8.68,-1.91", "D": "-3.76,-2.17", "H": "-6.53,-4.16", "O": "-9.17,-3.75", "P": "-6.87,-3.08", "Q": "-5.91,-3.71"}, "collineations": {"0": "C###P###Q###B", "1": "D###Q###H###A", "2": "D###P###O", "3": "O###H###B", "4": "C###D", "5": "A###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]]}

NLP: EqualityRelation{ $\angle ADC = (5/9 * \pi)$ }, 求值(大小):
 (ExpressRelation:[key:] $\angle BAD + \angle ABC + \angle BCD$), AngleBisectorRelation{line=D0, angle= $\angle ADC$, angle1= $\angle ADO$, angle2= $\angle CDO$ }, AngleBisectorRelation{line=B0, angle= $\angle ABC$, angle1= $\angle ABO$, angle2= $\angle CBO$ }, EqualityRelation{ $\angle BAD = (1/9 * \pi)$ }, EqualityRelation{ $\angle BCD = (1/6 * \pi)$ }, 求角的大小:
 AngleRelation{angle= $\angle O$ }, SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle BAD + \angle ABC + \angle BCD$), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle O$)

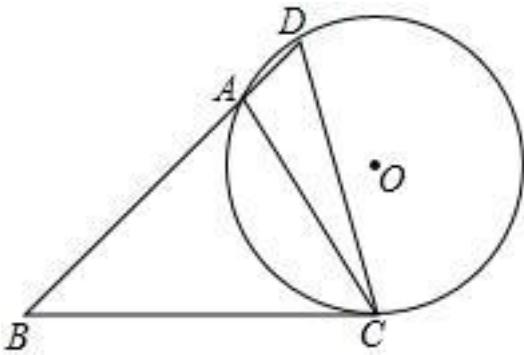
54、topic: 如图,正方形ABCD的边长为3cm,E为CD边上一点, $\angle DAE = 30^\circ$,点M为AE的中点,过点M作直线分别与AD、BC相交于点P、Q.若PQ=AE,求AP的值.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000035179_Q_1.jpg", "coordinates": {"A": "-13.52,8.63", "B": "-13.52,3.36", "C": "-8.25,3.36", "D": "-8.25,8.63", "E": "-8.25,5.59", "M": "-10.89,7.11", "P": "-12.06,8.63", "Q": "-9.02,3.36"}, "collineations": {"0": "B###Q###C", "1": "A###P###D", "2": "A###M###E", "3": "D###E###C", "4": "A###B", "5": "M###P", "6": "M###Q", "7": "Q###P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: SquareRelation{square=Square:ABCD, length=3}, PointOnLineRelation{point=E, line=CD, isConstant=false, extension=false}, EqualityRelation{ $\angle MAP = (1/6 * \pi)$ }, MiddlePointOfSegmentRelation{middlePoint=M, segment=AE}, EqualityRelation{PQ=AE}, 求值(大小):
 (ExpressRelation:[key:]AP), PointOnLineRelation{point=M, line=PM, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(Q), iLine1=BC, iLine2=PM], LineCrossRelation [crossPoint=Optional.of(P), iLine1=AD, iLine2=PM], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AP)}

55、topic: 如图,在 $\triangle ABC$ 中, $\angle B = 45^\circ$, $\angle ACB = 60^\circ$, $AB = 3\sqrt{2}$, 点D为 BA 延长线上的一点,且 $\angle D = \angle ACB$, O 为 $\triangle ACD$ 的外接圆.(1)求 BC 的长; (2)求 O 的半径.



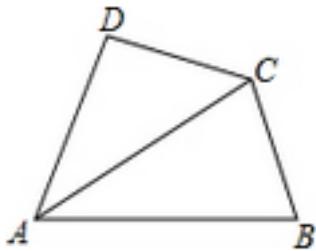
graph:

```
{"stem": {"pictures": [{"picturename": "1000010402_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "-3.00,0.00", "C": "1.73,0.00", "D": "0.73,0.73", "O": "1.73,2.00"}, "collineations": {"0": "B###A###D", "1": "C###A", "2": "C##D", "3": "C##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##D##A"}]}, "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ABC = (1/4 * \pi)\}$, EqualityRelation $\{\angle ACB = (1/3 * \pi)\}$, EqualityRelation $\{AB = 3 * (2^{(1/2)})\}$, PointOnLineRelation $\{\text{point}=D, \text{line}=BA, \text{isConstant}=\text{false}, \text{extension}=\text{true}\}$, EqualityRelation $\{\angle ADC = \angle ACB\}$, InscribedShapeOfCircleRelation $\{\text{closedShape}=\triangle ACD, \text{circle}=\text{Circle}[\odot O]\{\text{center}=O, \text{analytic}=(x-x_O)^2+(y-y_O)^2=r_O^2\}\}$, EqualityRelation $\{BC=v_0\}$, 求值(大小): (ExpressRelation:[key:]v_0), 圆的半径: CircleRelation $\{\text{circle}=\text{Circle}[\odot O]\{\text{center}=O, \text{analytic}=(x-x_O)^2+(y-y_O)^2=r_O^2\}\}$, SolutionConclusionRelation $\{\text{relation}=\text{求值(大小)}: (\text{ExpressRelation}:[\text{key}:]BC)\}$, SolutionConclusionRelation $\{\text{relation}=\text{求值(大小)}: (\text{ExpressRelation}:[\text{key}:]CO)\}$

56、topic: 四边形ABCD中,已知AB=a,AD=b,且a>b,对角线AC平分 $\angle BAD$, $DC=BC$,求证: $\angle B+\angle D=180^\circ$ #%#



graph:

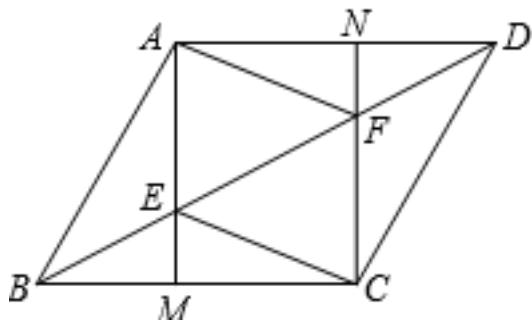
```
{"stem": {"pictures": [{"picturename": "1000040373_Q_1.jpg", "coordinates": {"A": "-5.95,-2.51", "B": "-0.95,-2.51", "C": "-1.8,0.58", "D": "-4.52,2.27"}, "collineations": {"0": "A##C", "1": "A##D", "2": "A##B", "3": "B##C", "4": "C##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: 已知条件

QuadrilateralRelation $\{\text{quadrilateral}=ABCD\}$, EqualityRelation $\{AB=a\}$, EqualityRelation $\{AD=b\}$, InequalityRelation $\{a>b\}$, AngleBisectorRelation $\{\text{line}=AC, \text{angle}=\angle BAD, \text{angle1}=\angle BAC, \text{angle2}=\angle CAD\}$, EqualityRelation $\{CD=BC\}$, ProveConclusionRelation: [证明: EqualityRelation $\{\angle ABC + \angle ADC = (\pi)\}]$

57、topic: 如图,已知平行四边形ABCD,过A作AM $\perp BC$ 于M,交BD于E,过C作CN $\perp AD$ 于N,交BD于F,连接AF、CE.#%#(1)求证:四边形AECF为平行四边形;#%#(2)当AECF为菱形,M点为BC的中点时,求 $\angle CBD$

的度数.#%#

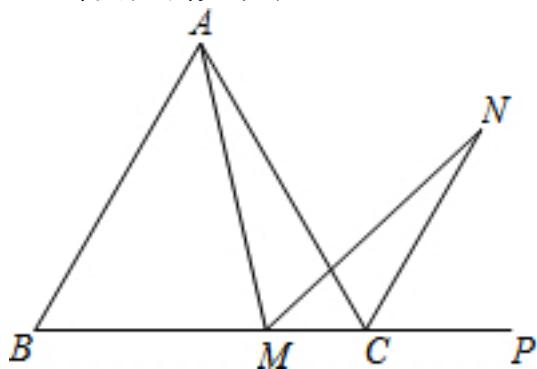


graph:

```
{"stem": {"pictures": [{"picturename": "1000050132_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-10.0,2.00", "C": "-5.00,2.00", "D": "-3.00,6.00", "E": "-8.00,3.14", "F": "-5.00,4.86", "M": "-8.00,2.00", "N": "-5.00,6.00"}, "collineations": {"0": "A###N###D", "1": "A###E###M", "2": "C###F###N", "3": "B###E###F###D", "4": "B###M###C", "5": "A###B", "6": "A###F", "7": "E##C", "8": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LinePerpRelation{line1=AM, line2=BC, crossPoint=M}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AM, iLine2=BD], LinePerpRelation{line1=CN, line2=AD, crossPoint=N}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=CN, iLine2=BD], SegmentRelation:AF, SegmentRelation:CE, RhombusRelation{rhombus=Rhombus:AECF}, MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, 求角的大小: AngleRelation{angle= $\angle EBM$ }, ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:AECF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle EBM$)}

58、topic: 如图,在等边三角形ABC中,M是BC边(不含端点B、C)上任意一点,P是BC延长线上一点,N是 $\angle ACP$ 的平分线上一点.已知 $\angle AMN=60^\circ$.(1)求证:AM=MN;(2)当M在直线上运动时,上述结论是否成立?若成立,请画图证明.#%#%#%#%#



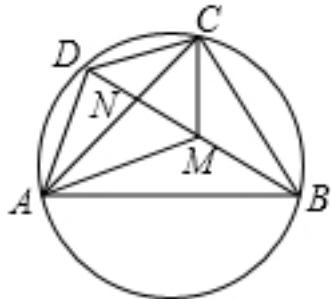
graph:

```
{"stem": {"pictures": [{"picturename": "1000040801_Q_1.jpg", "coordinates": {"A": "-1.92,1.08", "B": "-4.42,-3.25", "C": "0.58,-3.25", "P": "3.12,-3.25", "M": "-1.14,-3.25", "N": "2.21,-0.43"}, "collineations": {"0": "A##B", "1": "A##M", "2": "C##A", "3": "M##N", "4": "B##M##C##P", "5": "C##N"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: AngleBisectorRelation{line=CN, angle= $\angle ACP$, angle1= $\angle ACN$, angle2= $\angle NCP$ }, PointRelation:C, RegularTriangleRelation:RegularTriangle: $\triangle ABC$, PointOnLineRelation{point=M, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=P, line=BC,

isConstant=false, extension=true}, EqualityRelation{ $\angle AMN = (1/3 * \pi)$ }, ProveConclusionRelation:[证明:
EqualityRelation{AM=MN}]

59、topic: 如图所示,已知圆内接四边形ABCD的对角线AC、BD交于点N,点M在对角线BD上,且满足 $\angle BAM = \angle DAN, \angle BCM = \angle DCN$.求证:(1)M为BD的中
点;(2) $\frac{AN}{CN} = \frac{AM}{CM}$.

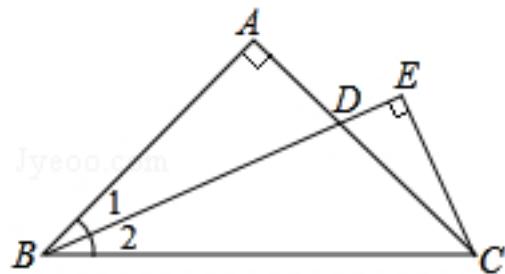


graph:
{"stem": {"pictures": [{"picturename": "1000052577_Q_1.jpg", "coordinates": {"A": "-0.86,1.29", "B": "4.80, 0.87", "C": "2.42,4.98", "D": "0.00,4.20", "M": "2.40,2.54", "N": "1.07,3.46", "O": "2.04,2.01"}, "collineations": {"0": "A###B", "1": "A##D", "2": "A##M", "3": "C##D", "4": "C##M", "5": "C##B", "6": "A##N##C", "7": "D##N##M##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, InscribedShapeOfCircleRelation{closedShape=ABCD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LineCrossRelation [crossPoint=Optional.of(N), iLine1=AC, iLine2=BD], PointOnLineRelation{point=M, line=BD, isConstant=false, extension=false}, EqualityRelation{ $\angle BAM = \angle DAN$ }, EqualityRelation{ $\angle BCM = \angle DCN$ }, ProveConclusionRelation:[证明:
MiddlePointOfSegmentRelation{middlePoint=M, segment=BD}], ProveConclusionRelation:[证明:
EqualityRelation{ $(AN)/(CN) = (AM)/(CM)$ }]]

60、topic: 在Rt△ABC中, $\angle BAC=90^\circ$, $AB=AC$, $CE\perp BD$ 的延长线于点E, $\angle 1=\angle 2$.求
证: $BD=2CE$.

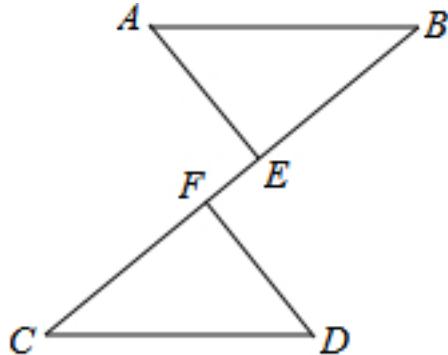


graph:
{"stem": {"pictures": [{"picturename": "1000027208_Q_1.jpg", "coordinates": {"A": "3.00,3.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "4.24,1.76", "E": "5.12,2.12"}, "collineations": {"0": "B##A", "1": "B##C", "2": "E##C", "3": "A##D##C", "4": "B##D##E"}, "variable>equals": {"0": "\angle 1 = \angle ABD", "1": "\angle 2 = \angle CBD"}, "circles": {}, "appliedproblems": {}, "subsystems": []}}}

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)],EqualityRelation{ $\angle BAD = (1/2 * \pi)$ },Equalit
yRelation{AB=AC},EqualityRelation{ $\angle ABD = \angle CBD$ },ProveConclusionRelation:[证明:
EqualityRelation{BD=2*CE}]

61、topic: 如图,AB||CD,AB=CD,点E、F在BC上,且BE=CF.(1)求证: $\triangle ABE \cong \triangle DCF$;(2)试证
明:以A、F、D、E为顶点的四边形是平行四边形.

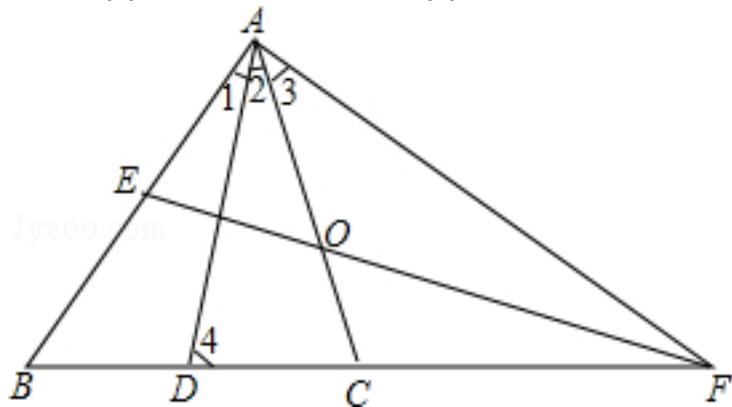


graph:

{"stem": {"pictures": [{"picturename": "1000034182_Q_1.jpg", "coordinates": {"A": "-7.96,6.01", "B": "-1.96,6.01", "C": "-9.92,0.08", "D": "-3.92,0.08", "E": "-5.34,3.49", "F": "-6.55,2.59"}, "collineations": {"0": "A##B", "1": "A##E", "2": "B##E##F##C", "3": "F##D", "4": "D##C"}, "variable>equals": {}, "circles": []}], "apppliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB,
iLine2=CD],EqualityRelation{AB=CD},PointOnLineRelation{point=E, line=BC, isConstant=false,
extension=false},PointOnLineRelation{point=F, line=BC, isConstant=false,
extension=false},EqualityRelation{BE=CF},ProveConclusionRelation:[证明:
TriangleCongRelation{triangleA= $\triangle ABE$, triangleB= $\triangle DCF$ }],ProveConclusionRelation:[证明:
ParallelogramRelation{parallelogram=Parallelogram:AEDF}]

62、topic: 如图,AD为 $\triangle ABC$ 的角平分线,AD的中垂线交AB于点E、交BC的延长线于点F,AC交EF于点O.(1)求证: $\angle 3 = \angle B$;(2)连接OD,求证: $\angle B + \angle ODB = 180^\circ$.



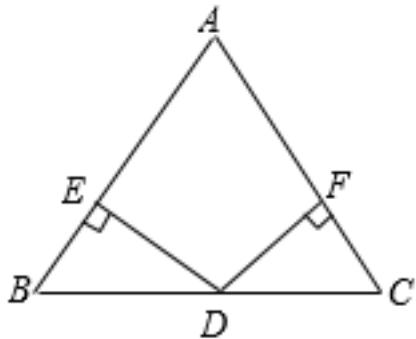
graph:

{"stem": {"pictures": [{"picturename": "1000026426_Q_1.jpg", "coordinates": {"A": "5.00,5.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "3.49,0.00", "E": "2.91,2.91", "F": "12.50,0.00", "O": "5.58,2.09"}, "collineations": {"0": "A##B", "1": "B##D##C##F", "2": "A##F", "3": "A##D", "4": "A##O##C", "5": "E##O##F"}, "variable>equals": {"0": " $\angle 1 = \angle BAD$ ", "1": " $\angle 2 = \angle DAC$ ", "2": " $\angle 3 = \angle CAF$ "}, "circles": []}], "appliedproble

ms":{},"substems":[]}]

NLP: TriangleRelation: $\triangle ABC$, LineCrossRelation [crossPoint=Optional.of(0), iLine1=AC, iLine2=EF], AngleBisectorRelation{line=AD, angle= $\angle EAO$, angle1= $\angle DAO$, angle2= $\angle DAE$ }, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BC, iLine2=FE], LineCrossRelation [crossPoint=Optional.absent(), iLine1=AD, iLine2=FE], LineCrossRelation [crossPoint=Optional.of(E), iLine1=AB, iLine2=FE], SegmentRelation:OD, ProveConclusionRelation:[证明: EqualityRelation{ $\angle FAO = \angle DBE$ }], ProveConclusionRelation:[证明: EqualityRelation{ $\angle DBE + \angle ODB = (Pi)$ }]]

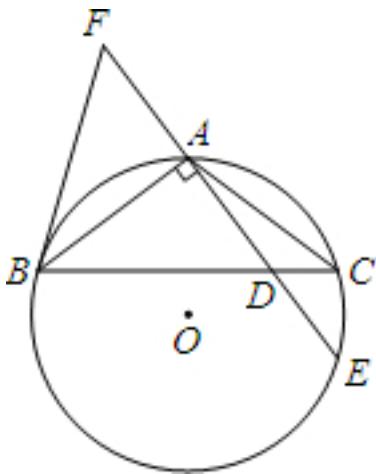
63、topic: 如图:已知在 $\triangle ABC$ 中, $\angle B = \angle C$,D为BC边的中点,过点D作 $DE \perp AB$, $DF \perp AC$,垂足分别为E,F. #%#(1)求证: $\triangle BED \cong \triangle CFD$; #%#(2)点D在 $\angle A$ 的平分线上吗? 若在请说明理由.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000040794_Q_1.jpg", "coordinates": {"A": "-2.27,3.39", "B": "-5.27, -1.01", "C": "0.73,-1.01", "D": "-2.27,-1.01", "E": "-4.31,0.39", "F": "-0.22,0.39"}, "collineations": {"0": "A##B", "1": "F###C##A", "2": "E##D", "3": "B##D##C", "4": "F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
EqualityRelation{ $\angle DBE = \angle DCF$ }, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=AC, crossPoint=F}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BED$, triangleB= $\triangle CFD$ }], ProveConclusionRelation:[AngleBisectorRelation{line=DA, angle= $\angle EAF$, angle1= $\angle DAE$, angle2= $\angle DAF$ }]

64、topic: 如图,在 $\triangle ABC$ 中, $AB = AC$, $\odot O$ 是 $\triangle ABC$ 的外接圆, $AE \perp AB$ 交BC于点D,交 $\odot O$ 于点E,F在DA的延长线上,且 $AF = AD$.若 $AF = 3$, $\tan \angle ABD = \frac{3}{4}$,求 $\odot O$ 的直径.#%#



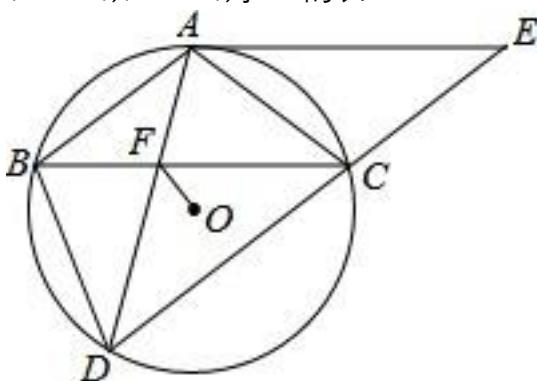
graph:

```
{"stem": {"pictures": [{"picturename": "1000060745_Q_1.jpg", "coordinates": {"A": "0.00,3.33", "B": "-3.20,0.93", "C": "3.20,0.93", "D": "1.80,0.93", "E": "3.20,-0.93", "F": "-1.80,5.73", "O": "0.00,0.00"}, "collineations": {"0": "F###A###D###E", "1": "B###C###D", "2": "A###C", "3": "A##B", "4": "B##F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C##E"}]}, "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=AC$ }, InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LinePerpRelation{line1=AE, line2=AB, crossPoint=A}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=AE, iLine2=BC], LineCrossCircleRelation{line=AE, circle= $\odot O$, crossPoints=[E], crossPointNum=1}, PointOnLineRelation{point=F, line=DA, isConstant=false, extension=true}, EqualityRelation{AF=AD}, EqualityRelation{AF=3}, EqualityRelation{ $\tan(\angle ABD)=(3/4)$ }, 圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, SolutionConclusionRelation{relation=圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}}

65、topic: 如图, $\triangle ABC$ 内接于 $\odot O$, $AB=AC$, BD 为 $\odot O$ 的弦, 且 $AB \parallel CD$, 过点A作 $\odot O$ 的切线AE与DC的延长线交于点E, AD与BC交于点F. (1)求证:四边形 $ABCE$ 是平行四边形; (2)若 $AE=6$, $CD=5$, 求OF的长.



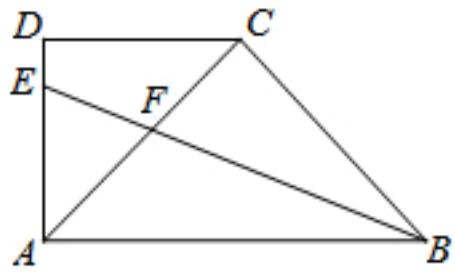
graph:

```
{"stem": {"pictures": [{"picturename": "1000026291_Q_1.jpg", "coordinates": {"A": "0.00,3.50", "B": "-3.00,1.80", "C": "3.00,1.80", "D": "-3.09,-1.64", "E": "6.00,3.50", "F": "-1.02,1.80", "O": "0.00,0.00"}, "collineations": {"0": "C##A", "1": "C##B##F", "2": "C##E##D", "3": "D##A##F", "4": "A##B", "5": "O##F", "6": "D##B", "7": "C##E", "8": "E##A"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B##A"}]}, "appliedproblems": {}, "substems": []}}
```

C###D###A"]}], "appliedproblems":{}, "substems":[]}

NLP: InscribedShapeOfCircleRelation{closedShape=△ABC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, EqualityRelation{AB=AC}, ChordOfCircleRelation{chord=BD, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, chordLength=null, straightLine=null}, LineParallelRelation [iLine1=AB, iLine2=CD], LineContactCircleRelation{line=AE, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(A), outpoint=Optional.of(E)}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AE, iLine2=DC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=AD, iLine2=BC], EqualityRelation{FO=v_0}, EqualityRelation{AE=6}, EqualityRelation{CD=5}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明]: ParallelogramRelation{parallelogram=Parallelogram:ABCE}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]FO)}

66、topic: 如图,在直角梯形ABCD中,DC||AB, $\angle DAB = 90^\circ$, $AC \perp BC$, $AC = BC$, $\angle ABC$ 的平分线分别交AD、AC于点E、F,求 $\frac{BF}{EF}$ 的值.#%#

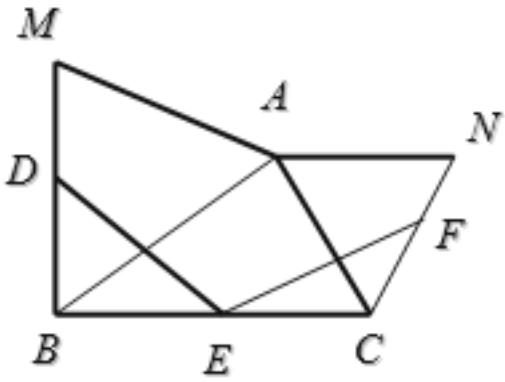


graph:

{"stem": {"pictures": [{"picturename": "1000001262_Q_1.jpg", "coordinates": {"A": "-8.35,2.76", "B": "-8.34,2.36", "C": "-8.28,0.40", "D": "-3.55,0.53", "E": "-5.98,2.83", "F": "-6.93,1.82"}, "collinearities": {"0": "B###A", "1": "B###F##E", "2": "C##D", "3": "A##F##C", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: RightTrapezoidRelation{rightTrapezoid=RightTrapezoid:ABCD, randomOrder:true}, LineParallelRelation [iLine1=DC, iLine2=AB], EqualityRelation{ $\angle DAB = (1/2\pi)$ }, LinePerpRelation{line1=AC, line2=BC, crossPoint=C}, EqualityRelation{AC=BC}, 求值(大小): (ExpressRelation:[key:]((BF)/(EF))), LineCrossRelation [crossPoint=Optional.of(F), iLine1=AC, iLine2=FE], AngleBisectorRelation{line=FE, angle= $\angle ABC$, angle1= $\angle AFB$, angle2= $\angle CBF$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AD, iLine2=FE], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]((BF)/(EF)))}

67、topic: 已知:如图, $\triangle ABC$ 是锐角三角形.分别以AB,AC为边向外侧作等边三角形ABM和等边三角形CAN.D、E、F分别是MB,BC,CN的中点,连结DE,EF.#%#求证:DE=EF.#%#



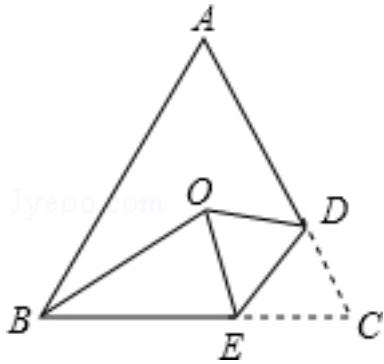
graph:

```
{"stem": {"pictures": [{"picturename": "1000040184_Q_1.jpg", "coordinates": {"A": "-2.73,6.83", "B": "-6.75, 3.94", "C": "-1.03,3.92", "D": "-6.99,6.40", "E": "-3.89,3.93", "F": "-0.19,5.38", "M": "-7.23,8.87", "N": "0.64,6.84"}, "collineations": {"0": "A##B", "1": "A##M", "2": "A##C", "3": "A##N", "4": "M##D##B", "5": "B##E##C", "6": "E##D", "7": "E##F", "8": "N##F##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

AcuteTriangleRelation:AcuteTriangle: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=MB},MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},MiddlePointOfSegmentRelation{middlePoint=F,segment=CN},SegmentRelation:DE,SegmentRelation:EF,ProveConclusionRelation:[证明: EqualityRelation{DE=EF}]

68、topic: 如图,在等腰三角形ABC中,AB=AC,将 $\triangle ABC$ 沿DE折叠,使底角顶点C落在三角形三边的垂直平分线的交点O处.若BE=BO,求 $\angle ABC$ 的度数.#%#



graph:

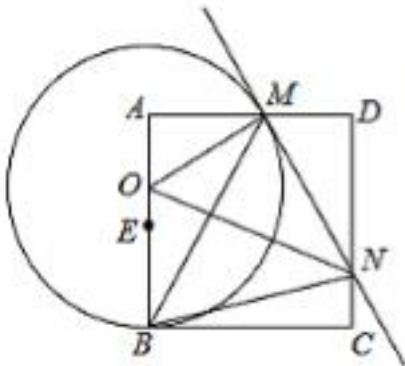
```
{"stem": {"pictures": [{"picturename": "1000027235_Q_1.jpg", "coordinates": {"A": "3.00,5.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "4.98,1.70", "E": "4.07,0.00", "O": "3.00,1.60"}, "collineations": {"0": "A##B", "1": "C##E##B", "2": "A##C##D", "3": "O##E", "4": "O##D", "5": "E##D", "6": "O##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

IsoscelesTriangleRelation:IsoscelesTriangle: $\triangle ABC$ [Optional.of(A)],EqualityRelation{AB=AC},EqualityRelation{BE=BO},求角的大小: AngleRelation{angle= $\angle ABE$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ABE$)}

69、topic: 如图,已知正方形ABCD,点E是边AB的中点,点O是线段AE上的一个动点(不与点A、E重合),以O为圆心,OB为半径的圆与边AD相交于点M,过点M作 $\odot O$ 的切线交DC于点N,连接OM、ON、BM、

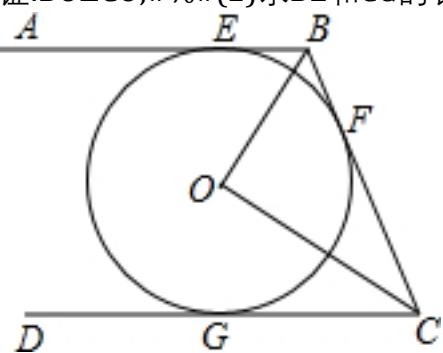
BN.记 $\triangle MNO$ 、 $\triangle AOM$ 、 $\triangle DMN$ 的面积分别为 S_1 、 S_2 、 S_3 .#%#(1)
求证: $\triangle AOM \sim \triangle DMN$; #%#(2)求证: $MN = AM + CN$.



graph:
 {"stem": {"pictures": [{"picturename": "1000025034.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "0.00,2.00"}, "collineations": {"0": "B###E##A", "1": "B##C", "2": "D##A", "3": "D##C"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "subsystems": []}]}}

NLP: CircleCenterRelation{point=O, conic=Circle[$\odot O_1$]{center= O_1 , analytic= $(x-x_{O_1})^2+(y-y_{O_1})^2=r_{O_1}^2$ }}, RadiusRelation{radius=OB, circle=Circle[$\odot O_1$]{center= O_1 , analytic= $(x-x_{O_1})^2+(y-y_{O_1})^2=r_{O_1}^2$ }, length=null}, PointRelation:A, PointRelation:E, SquareRelation{square=Square:ABCD}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, PointOnLineRelation{point=O, line=AE, isConstant=false, extension=false}, LineCrossCircleRelation{line=AD, circle= $\odot O_1$, crossPoints=[M], crossPointNum=1}, MultiPointCollinearRelation:[O, M], MultiPointCollinearRelation:[O, N], MultiPointCollinearRelation:[B, M], MultiPointCollinearRelation:[B, N], EqualityRelation{S $_{\triangle MNO}$ =S_1}, EqualityRelation{S $_{\triangle AOM}$ =S_2}, EqualityRelation{S $_{\triangle DMN}$ =S_3}, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle AOM$, triangleB= $\triangle DMN$ }], ProveConclusionRelation:[证明: EqualityRelation{MN=AM+CN}]]

70、topic: 如图,AB、BC、CD分别与 $\odot O$ 相切于点E、F、G,且 $AB \parallel CD$, $BO=6cm$, $CO=8cm$.#%#(1)求证: $BO \perp CO$;(2)求BE和CG的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000001262_Q_1.jpg", "coordinates": {"A": "-8.14,1.33", "B": "-2.79,3.81", "C": "0.50,0.04", "D": "-5.73,-2.84", "E": "-4.42,3.05", "F": "-1.60,2.45", "G": "-2.40,-1.30", "O": "-3.41,0.87"}, "collineations": {"0": "A###E##B", "1": "D##G##C", "2": "B##F##C", "3": "B##O", "4": "C##O"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "E##F##G"}]}, "appliedproblems": {}, "subsystems": []}]}

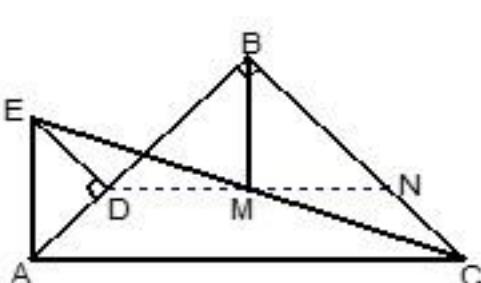
NLP: LineContactCircleRelation{line=AB, circle=Circle[$\odot O$]{center=O,

```

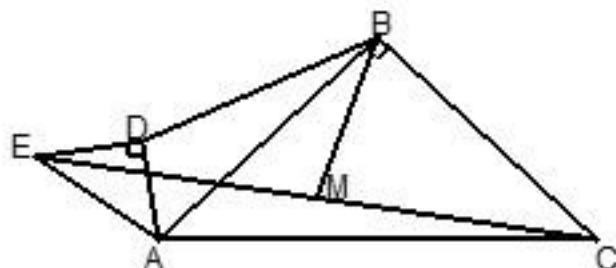
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, contactPoint=Optional.of(E),
outpoint=Optional.absent()}, LineContactCircleRelation{line=BC, circle=Circle[O]{center=0,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, contactPoint=Optional.of(F),
outpoint=Optional.absent()}, LineContactCircleRelation{line=CD, circle=Circle[O]{center=0,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, contactPoint=Optional.of(G),
outpoint=Optional.absent()}, LineParallelRelation [iLine1=AB,
iLine2=CD], EqualityRelation{BO=6}, EqualityRelation{CO=8}, 求值(大小): (ExpressRelation:[key:]BE),
求值(大小): (ExpressRelation:[key:]CG), ProveConclusionRelation:[证明: LinePerpRelation{line1=BO,
line2=CO, crossPoint=0}], SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]BE)}, SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]CG)}

```

71、topic: 已知:\$\triangle ABC\$和\$\triangle ADE\$都是等腰直角三角形,\$\angle ABC=\angle ADE=90^\circ\$,点M是CE的中点.连接BM.(1)如图①,点D在AB上,连接DM,并延长DM交BC于点N. 求证:\$\triangle EDM \cong \triangle CNM\$;(2)在(1)的条件下,试探究BD与BM之间存在什么样的数量关系,并给予证明;(3)如图②,点D不在AB上,(2)中的结论还成立吗? 如果成立,请证明;如果不成立,说明理由.



图①



图②

graph:

```

{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000027835_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,4.00", "C": "4.00,0.00", "D": "-2.00,2.00", "E": "-4.00,4.00", "M": "0.00,2.00", "N": "2.00,2.00"}, "collineations": {"0": "B###D###A", "1": "B##N##C", "2": "M##B", "3": "D##M##N", "4": "E##D", "5": "C##M##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "3A_20(2).jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,4.00", "C": "4.00,0.00", "D": "-5.00,3.00", "E": "-8.00,2.00", "M": "-2.00,1.00"}, "collineations": {"0": "B##D", "1": "E##D", "2": "A##D", "3": "A##B", "4": "A##C", "5": "E##A", "6": "B##M", "7": "C##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]

```

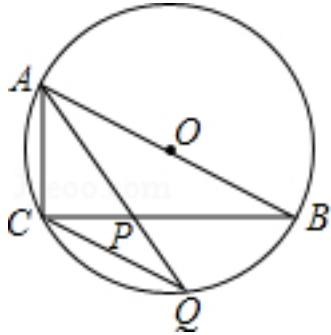
NLP:

```

IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$[Optional.of(B)][Optional.of(B)], IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ADE$[Optional.of(D)][Optional.of(D)], MultiEqualityRelation [multiExpressCompare=$\angle DBN = \angle ADE = (1/2\pi)$], originExpressRelationList=[], keyWord=null, result=null], MiddlePointOfSegmentRelation{middlePoint=M, segment=CE}, SegmentRelation: BM, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, LineCrossRelation[crossPoint=Optional.of(N), iLine1=BC, iLine2=DM], 求值(大小): (ExpressRelation:[key:](BD/BM)), NegativeRelation{relation=PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=$\triangle EDM$, triangleB=$\triangle CNM$}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](BD/BM))}

```

72、topic: 如图,AB是 $\odot O$ 的直径, $\angle BAC$ 的平分线AQ交BC于点P,交 $\odot O$ 于点Q.已知 $AC=6$, $\angle AQC=30^\circ$.#%#(1)求AB的长;#%#(2)求点P到AB的距离;#%#(3)求PQ的长.#%#

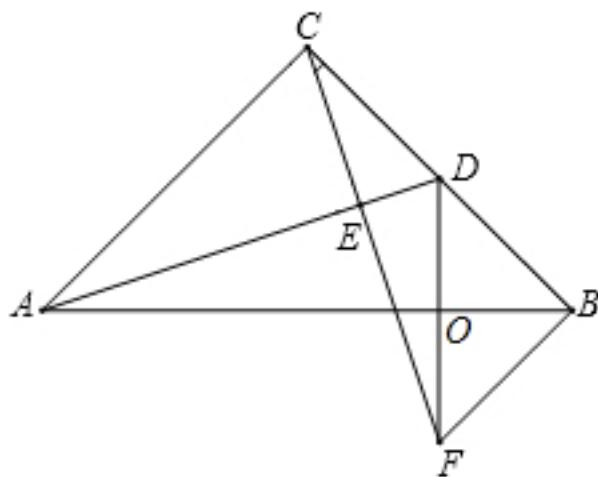


graph:

{"stem": {"pictures": [{"picturename": "1000080883_Q_1.jpg", "coordinates": {"A": "-2.46,1.72", "B": "2.46,-1.72", "C": "-2.72,-1.27", "O": "0.00,0.00", "P": "-0.99,-1.42", "Q": "-0.26,-2.99"}, "collineations": {"0": "A##C", "1": "A##O##B", "2": "C##P##B", "3": "C##Q", "4": "A##P##Q"}, "variable>equals": {}, "circles": [{"center": "O"}], "appliedproblems": {}, "substems": []}}]

NLP: AngleBisectorRelation{line=AQ, angle= $\angle CAO$, angle1= $\angle CAQ$, angle2= $\angle OAQ$ }, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=AQ, iLine2=BC], LineCrossCircleRelation{line=AQ, circle= $\odot O$, crossPoints=[Q]}, crossPointNum=1}, EqualityRelation{AC=6}, EqualityRelation{ $\angle CQP=(1/6\pi)$ }, EqualityRelation{AB=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), 距离, 求距离: PointToLineDistanceRelation{point=P, line=AB, distance=null}, EqualityRelation{PQ=v_1}, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AB)}, SolutionConclusionRelation{relation=距离, 求距离}: PointToLineDistanceRelation{point=P, line=AB, distance=null}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]PQ)}

73、topic: 如图,在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=BC$,点D是BC的中点,CE $\perp AD$ 于E,BF $\parallel AC$ 交CE的延长线于点F.求证:AB垂直平分DF.#%#



graph:

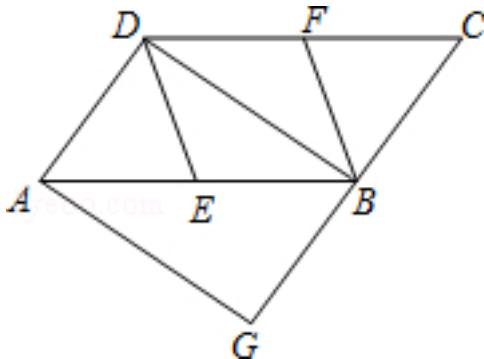
{"stem": {"pictures": [{"picturename": "1000080528_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.35,0.00", "C": "3.17,3.17", "D": "4.76,1.59", "E": "3.81,1.27", "F": "4.76,-1.59", "O": "4.76,0.00"}, "collineations": {"0": "0"}}}]

```
:"A###E###D","1":"A###O###B","2":"C###E###F","3":"D###O###F","4":"C###D###B","5":"C###A","6":"F###B"},"variable-equals":{},"circles":[]}, "appliedproblems":{},"substems":[]}
```

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACD = (1/2 * \pi)$ }, EqualityRelation{AC=BC}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, LinePerpRelation{line1=CE, line2=AD, crossPoint=E}, LineParallelRelation [iLine1=BF, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=BF, iLine2=CE], ProveConclusionRelation:[MiddlePerpendicularRelation [iLine1=AB, iLine2=DF, crossPoint=Optional.of(O)]]]

74、topic: 如图,在四边形ABCD中,E、F分别为边AB、CD的中点, $\triangle ADE \cong \triangle CBF$,过A点作AG \parallel BD交CB的延长线于点G. #%(1)求证:四边形ABCD是平行四边形; #%(2)求证:DE \parallel BF; #%(3)当四边形BEDF是菱形,则四边形AGBD是什么特殊四边形?并证明你的结论. #%#



```
graph:
{"stem": {"pictures": [{"picturename": "1000080197.jpg", "coordinates": {"A": "-5.00,2.00", "B": "-2.00,2.00", "C": "-1.00,4.00", "D": "-4.00,4.00", "E": "-3.50,2.00", "F": "-2.50,4.00", "G": "-3.00,0.00"}, "collineations": {"0": "A###E###B", "1": "D###F###C", "2": "A###G", "3": "B###G", "4": "A###D", "5": "B###C", "6": "D###E", "7": "D###B", "8": "B###F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=F, segment=CD}, TriangleCongRelation{triangleA= $\triangle ADE$, triangleB= $\triangle CBF$ }, PointOnLineRelation{point=A, line=AG, isConstant=false, extension=false}, LineParallelRelation [iLine1=AG, iLine2=BD], LineCrossRelation [crossPoint=Optional.of(G), iLine1=AG, iLine2=CB], RhombusRelation{rhombus=BEDF}, ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:ABCD}], ProveConclusionRelation:[证明: LineParallelRelation [iLine1=DE, iLine2=BF]], ShapeJudgeConclusionRelation{geoEle=ADBG}

75、topic: 如图1,在正方形ABCD中,E、F分别是边AD、DC上的点,且 $AF \perp BE$. #%(1)求证: $AF = BE$; #%(2)如图2,在正方形ABCD中,M、N、P、Q分别是边AB、BC、CD、DA上的点,且 $MP \perp NQ$. MP与NQ是否相等?并说明理由.

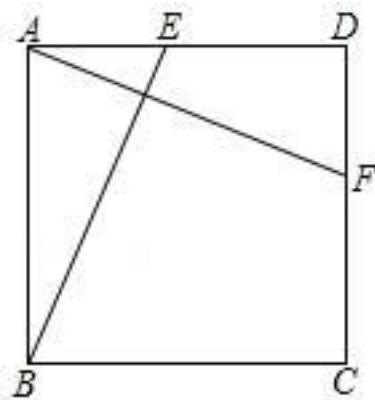
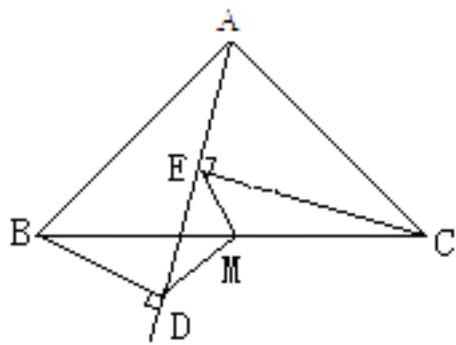


图1

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000026222_Q_1.jpg", "coordinates": {"A": "0.00,6.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "6.00,6.00", "E": "3.00,6.00", "F": "6.00,3.00"}, "collineations": {"0": "B##A", "1": "B##E", "2": "F##A", "3": "A##D##E", "4": "C##D##F", "5": "C##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000026222_Q_2.jpg", "coordinates": {"A": "0.00,6.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "6.00,6.00", "M": "0.00,4.00", "P": "6.00,2.00", "Q": "4.00,6.00", "N": "2.00,0.00"}, "collineations": {"0": "B##M##A", "1": "B##N##C", "2": "M##P", "3": "C##D##P", "4": "Q##D##A", "5": "Q##N"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=DC, isConstant=false, extension=false}, LinePerpRelation{line1=AF, line2=BE, crossPoint=}, (ExpressRelation:[key:]2), SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=M, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=N, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=P, line=CD, isConstant=false, extension=false}, PointOnLineRelation{point=Q, line=DA, isConstant=false, extension=false}, LinePerpRelation{line1=MP, line2=NQ, crossPoint=}, EqualityRelation{MP=NQ}, ProveConclusionRelation:[证明: EqualityRelation{AF=BE}]

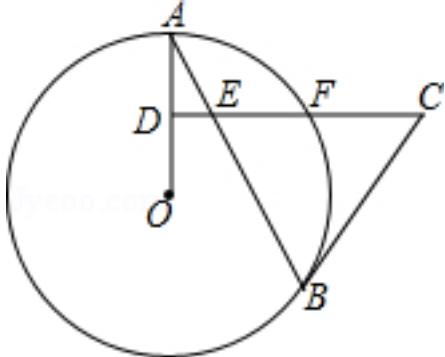
76、topic: 如图,已知, $\triangle ABC$ 中, $CE \perp AD$ 于E, $BD \perp AD$ 于D, $BM = CM$. 求证: $ME = MD$. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040695_Q_1.jpg", "coordinates": {"A": "-6.35,5.21", "B": "-9.00,2.00", "C": "-4.00,2.00", "D": "-7.26,1.57", "E": "-6.97,2.74", "M": "-6.50,2.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##M##C", "3": "A##E##D", "4": "D##B", "5": "D##M", "6": "M##E", "7": "E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "subsystems": []}

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=CE, line2=AD, crossPoint=E}, LinePerpRelation{line1=BD, line2=AD, crossPoint=D}, EqualityRelation{BM=CM}, ProveConclusionRelation:[证明: EqualityRelation{EM=DM}]

77、topic: 如图,AB是 $\odot O$ 的弦,D为半径OA的中点,过D作 $CD \perp OA$ 交弦AB于点E,交 $\odot O$ 于点F,且 $CE=CB$.#%#(1)求证:BC是 $\odot O$ 的切线;#%#(2)连接AF、BF,求 $\angle ABF$ 的度数;#%#(3)如果 $CD=15$, $BE=10$, $\sin A = \frac{5}{13}$,求 $\odot O$ 的半径.#%#

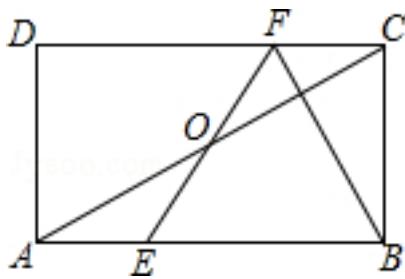


graph:

{"stem": {"pictures": [{"picturename": "1000039846_Q_1.jpg", "coordinates": {"A": "0.00,1.96", "B": "1.55,-1.20", "C": "3.24,0.98", "D": "0.00,0.98", "E": "0.48,0.98", "F": "1.70,0.98", "O": "0.00,0.00"}, "collinearities": {"0": "A###D##O", "1": "D###E###C", "2": "A###E###B", "3": "B###C"}, "variable>equals": {}, "circle_s": [{"center": "O", "pointincircle": "A###B###F"}]}], "appliedproblems": {}, "substems": []}}

NLP: RadiusRelation{radius=OA, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}}, ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, chordLength=null, straightLine=null}}, ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, chordLength=null, straightLine=null}}, MiddlePointOfSegmentRelation{middlePoint=D, segment=OA}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=CD, iLine2=AB], LinePerpRelation{line1=CD, line2=OA, crossPoint=D}, LineCrossCircleRelation{line=CD, circle= $\odot O$, crossPoints=[F]}, crossPointNum=1}, EqualityRelation{CE=BC}, SegmentRelation:AF, SegmentRelation:BF, 求角的大小: AngleRelation{angle= $\angle ABF$ }, EqualityRelation{CD=15}, EqualityRelation{BE=10}, EqualityRelation{sin($\angle DAE$)=(5/13)}, 圆的半径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=BC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, contactPoint=Optional.of(B), outpoint=Optional.of(C)}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ABF$), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AO)}}]

78、topic: 如图,在矩形ABCD中,E、F分别是边AB、CD上的点,AE=CF,连接EF、BF,EF与对角线AC交于点O,且 $BE=BF$, $\angle BEF=2\angle BAC$.#%#(1)求证: $OE=OF$;#%#(2)求 $\angle EBF$ 的度数;#%#(3)若 $BC=2\sqrt{3}$,求矩形ABCD的面积.#%#

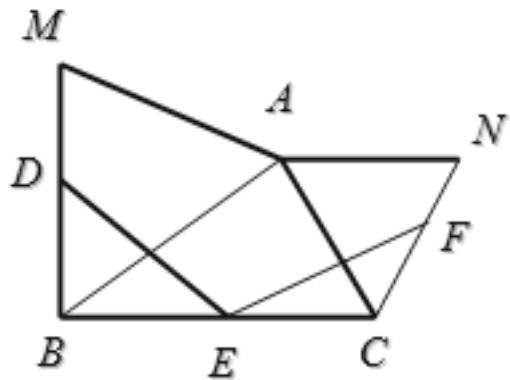


graph:

{"stem": {"pictures": [{"picturename": "1000041072_Q_1.jpg", "coordinates": {"A": "-9.00,2.00", "B": "-3.00,2.00", "C": "-3.00,5.46", "D": "-9.00,5.46", "E": "-7.00,2.00", "F": "-5.00,5.46", "O": "-6.00,3.73"}, "collineations": {"0": "D##A", "1": "A##E##B", "2": "B##C", "3": "D##F##C", "4": "A##O##C", "5": "E##O##F", "6": "B##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": [{"questionrelies": "1"}, {"questionrelies": "2"}]}]

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, EqualityRelation{AE=CF}, MultiPointCollinearRelation:[E, F], MultiPointCollinearRelation:[B, F], LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=EF], EqualityRelation{BE=BF}, EqualityRelation{ $\angle BEO = 2 * \angle EAO$ }, 求角的大小: AngleRelation{angle= $\angle EBF$ }, RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{S_ABCD = v_0}, EqualityRelation{BC=2*(3^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{EO=FO}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle EBF$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]S_ABCD)}

79、topic: 已知:如图,已知 $\triangle ACN$ 、 $\triangle ABM$ 为等边三角形,D、E、F分别是BM,BC,CN的中点.求证: $DE=EF$.#%#



graph:

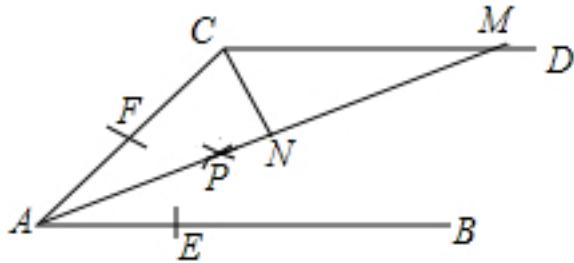
{"stem": {"pictures": [{"picturename": "1000040184_Q_1.jpg", "coordinates": {"A": "-2.73,6.83", "B": "-6.75,3.94", "C": "-1.03,3.92", "D": "-6.99,6.40", "E": "-3.89,3.93", "F": "-0.19,5.38", "M": "-7.23,8.87", "N": "0.64,6.84"}, "collineations": {"0": "A##B", "1": "A##M", "2": "A##C", "3": "A##N", "4": "M##D##B", "5": "B##E##C", "6": "E##D", "7": "E##F", "8": "N##F##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

TriangleRelation: $\triangle ACN$, RegularTriangleRelation:RegularTriangle: $\triangle ABM$, MiddlePointOfSegmentRelation[middlePoint=D, segment=BM], MiddlePointOfSegmentRelation[middlePoint=E, segment=BC], MiddlePointOfSegmentRelation[middlePoint=F, segment=CN]

ePointOfSegmentRelation{middlePoint=F,segment=CN},ProveConclusionRelation:[证明:
EqualityRelation{DE=EF}]

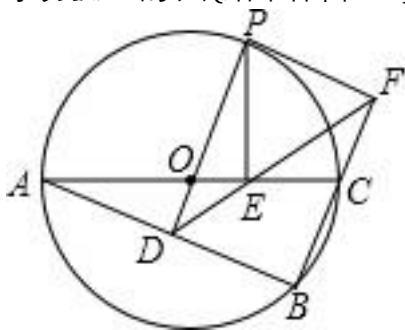
80、topic: 如图,AB||CD,以A为圆心,小于AC的长为半径画弧,分别交AB、AC于点E、F,再分别以E、F为圆心,大于 $\frac{1}{2}EF$ 的长为半径画弧,两弧交于点P,射线AP交CD于点M.(1)若 $\angle ACD=114^\circ$,求 $\angle MAB$ 的度数;(2)若 $CN \perp AM$,垂足为N,求证: $\triangle ACN \cong \triangle MCN$.



graph:
 {"stem": {"pictures": [{"picturename": "1000072666_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "5.00,0.00", "C": "1.34,3.00", "D": "6.00,3.00", "E": "1.00,0.00", "F": "0.41,0.91", "M": "4.63,3.00", "N": "2.31,1.50", "P": "1.63,1.06"}, "collineations": {"0": "B###E##A", "1": "A##F##C", "2": "C##M##D", "3": "C##N", "4": "A##P##N##M"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AC=v_0},LineParallelRelation [iLine1=AB,
iLine2=CD],CircleCenterRelation{point=A, conic=Circle[$\odot A$]{center=A,
analytic= $(x-x_A)^2+(y-y_A)^2=r_A^2$ }},LineCrossRelation [crossPoint=Optional.of(E), iLine1=AB,
iLine2=AB],LineCrossRelation [crossPoint=Optional.of(F), iLine1=AB, iLine2=AC],LineCrossRelation
[crossPoint=Optional.of(M), iLine1=AP, iLine2=CD],EqualityRelation{ $\angle FCM=(19/30\pi)$ },求角的大小:
AngleRelation{angle= $\angle EAP$ },LinePerpRelation{line1=CN, line2=AM,
crossPoint=N},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle EAP$)},ProveConclusionRelation:[证明:
TriangleCongRelation{triangleA= $\triangle ACN$, triangleB= $\triangle MCN$ }]

81、topic: 如图,\$\odot O\$是\$\triangle ABC\$的外接圆,AC是直径,过点O作\$OD \perp AB\$于点D,延长DO交\$\odot O\$于点P,过点P作\$PE \perp AC\$于点E,作射线DE交BC的延长线于F点,连接PF.(1)若\$\angle POC=60^\circ\$, $AC=12$,求劣弧PC的长;(结果保留\$\pi\$);(2)求证:\$OD=OE\$;(3)求证:PF是\$\odot O\$的切线.

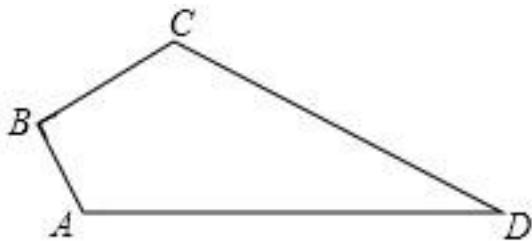


graph:
 {"stem": {"pictures": [{"picturename": "1000026765_Q_1.jpg", "coordinates": {"A": "2.00,8.00", "B": "11.00,2.80", "C": "14.00,8.00", "D": "6.50,5.40", "E": "11.00,8.00", "F": "15.50,10.60", "O": "8.00,8.00", "P": "11.00,13.20"}, "collineations": {"0": "P##F", "1": "P##E", "2": "P##O##D", "3": "F##C##B", "4": "D##E##F", "5": "A##D##B", "6": "A##O##E##C"}, "variable>equals": {}, "circles": [{"center": "O"}], "pointincir": []}], "appliedproblems": {}, "substems": []}}

cle": "C###A###B###P"}]], "appliedproblems": {}, "subsystems": []}

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, DiameterRelation{diameter=AC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=null}, LinePerpRelation{line1=OD, line2=AB, crossPoint=D}, LineCrossCircleRelation{line=DO, circle= $\odot O$, crossPoints=[P], crossPointNum=1}, LinePerpRelation{line1=PE, line2=AC, crossPoint=E}, SegmentRelation:PF, EqualityRelation{ $\angle EOP = (1/3 * \pi)$ }, EqualityRelation{AC=12}, 求值(大小): (ExpressRelation:[key:] \sim CP), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] \sim CP)}, ProveConclusionRelation:[证明: EqualityRelation{DO=EO}], ProveConclusionRelation:[证明: LineContactCircleRelation{line=PF, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(P), outpoint=Optional.of(F)}]

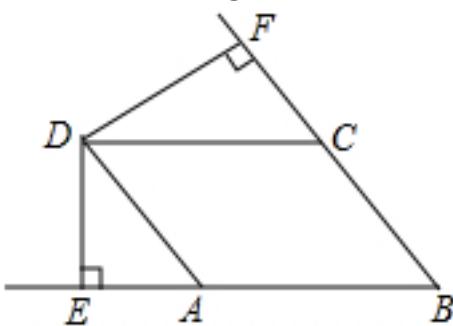
82、topic: 如图,在四边形ABCD中,\$\angle B=90^\circ\$,\$AB=3\$,\$BC=4\$,\$CD=12\$,\$AD=13\$,求四边形ABCD的面积.



graph:
{"stem": {"pictures": [{"picturename": "1000007024_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "-1.53,2.58", "C": "1.92,4.62", "D": "13.00,0.00"}, "collineations": {"0": "A##C", "1": "D##C", "2": "C##D", "3": "A##B", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{S_ABCD=v_0}, 已知条件
QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{ $\angle ABC = (1/2 * \pi)$ }, EqualityRelation{AB=3}, EqualityRelation{BC=4}, EqualityRelation{CD=12}, EqualityRelation{AD=13}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_ABCD)}

83、topic: 如图,四边形ABCD是菱形,DE \perp BA交BA的延长线于点E,DF \perp BC交BC的延长线于点F.求证:DE=DF.#%#

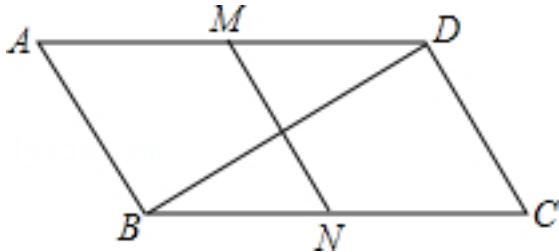


graph:
{"stem": {"pictures": [{"picturename": "1000034566_Q_1.jpg", "coordinates": {"A": "-7.20,-0.34", "B": "-2.4", "C": "0.0,0.0", "D": "-2.4,2.4", "E": "-7.20,0.0", "F": "0.0,2.4"}, "collineations": {"0": "A##C", "1": "D##C", "2": "C##D", "3": "A##B", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

1,-0.40","C": "-4.76,3.78","D": "-9.55,3.83","E": "-9.59,-0.32","F": "-5.93,5.86"},"collineations":{"0": "D##E","1": "A###D","2": "C##D","3": "D###F","4": "E###A###B","5": "B###C###F"},"variable-equals":{},"circles":[]}, "appliedproblems":{},"subsystems":[]}]

NLP: RhombusRelation{rhombus=Rhombus:ABCD}, LinePerpRelation{line1=DE, line2=BA, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=BA], LinePerpRelation{line1=DF, line2=BC, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{DE=DF}]

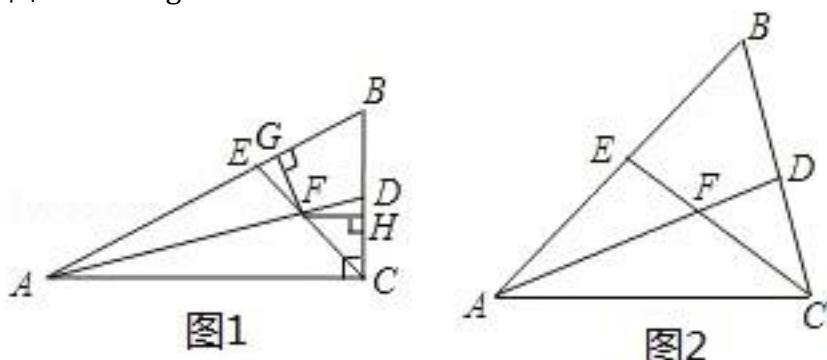
84、topic: 如图,在平行四边形ABCD中,\$\angle C = 60^\circ\$,M、N分别是AD、BC的中点,\$BC = 2CD\$.
(1)求证:四边形MNCD是平行四边形;
(2)求证: \$BD = \sqrt{3} MN\$.



graph:
{"stem": {"pictures": [{"picturename": "1000010825_Q_1.jpg", "coordinates": {"A": "-1.50,4.33", "B": "1.00,0.00", "C": "11.00,0.00", "D": "8.50,4.33", "M": "3.50,4.33", "N": "6.00,0.00"}, "collineations": {"0": "A###B", "1": "D###B", "2": "N##M", "3": "B##N##C", "4": "D##M##A", "5": "C##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP:
ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{\$DCN=(1/3*\Pi)\$}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AD}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BC}, EqualityRelation{BC=2*CD}, ProveConclusionRelation:[证明:
ParallelogramRelation{parallelogram=Parallelogram:CDMN}], ProveConclusionRelation:[证明:
EqualityRelation{BD=(3^(1/2))*MN}]}

85、topic: 如图1,在\$\triangle ABC\$中,\$\angle ACB\$是直角,\$\angle B=60^\circ\$,AD、CE分别是\$\angle BAC\$、\$\angle BCA\$的平分线,AD、CE相交于点F,且\$FG \perp AB\$于G,\$FH \perp BC\$于H.
(1)求证:\$\angle BEC=\angle ADC\$.
(2)请你判断FE与FD之间的数量关系,并证明.
(3)如图2,在\$\triangle ABC\$中,如果\$\angle ACB\$不是直角,\$\angle B=60^\circ\$,AD、CE分别是\$\angle BAC\$、\$\angle BCA\$的平分线,AD、CE相交于点F.请问,你在(2)中所得结论是否仍然成立?若成立,请证明;若不成立,请说明理由.



graph:

```
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```

NLP:

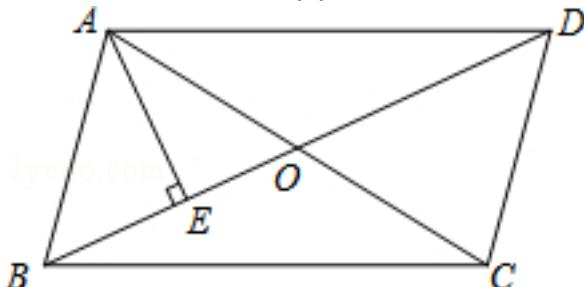
TriangleRelation: $\triangle ABC$, RightAngleRelation: $\angle ACH/RIGHT_ANGLE$, EqualityRelation $\{\angle DBG=(1/3*\pi)\}$, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, AngleBisectorRelation{line=CE, angle= $\angle ACH$, angle1= $\angle ACE$, angle2= $\angle ECH$ }, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AD, iLine2=CE], LinePerpRelation{line1=FG, line2=AB, crossPoint=G}, LinePerpRelation{line1=FH, line2=BC, crossPoint=H}, 求值(大小):

(ExpressRelation:[key:] (EF/DF)), (ExpressRelation:[key:] 2), TriangleRelation: $\triangle ABC$, NegativeRelation{relation=RightAngleRelation: $\angle ACH/RIGHT_ANGLE$ }, EqualityRelation $\{\angle DBG=(1/3*\pi)\}$, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, AngleBisectorRelation{line=CE, angle= $\angle ACH$, angle1= $\angle ACE$, angle2= $\angle ECH$ }, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AD, iLine2=CE], ProveConclusionRelation:[证明:

EqualityRelation $\{\angle FEG=\angle FDH\}$, SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:] (EF/DF)))

86、topic: 如图, $\square ABCD$ 中,AC与BD相交于点O, $\angle ABD=2\angle DBC$, $AE \perp BD$ 于点E. #%(1)若 $\angle ADB=25^\circ$,求 $\angle BAE$ 的度数;#%(2)求证: $AB=2OE$.#%#



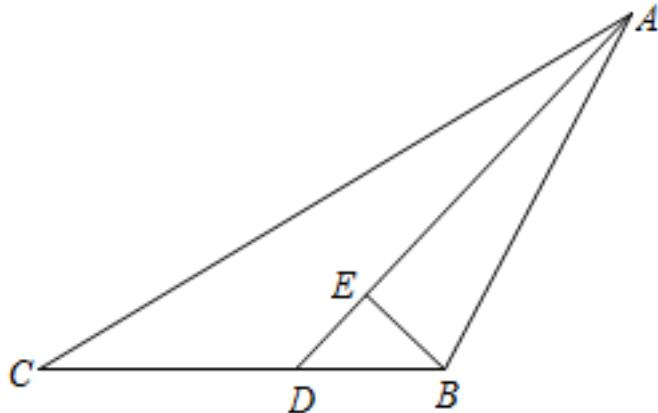
graph:

```
{"stem":{"pictures": [{"picturename": "1000041535_Q_1.jpg", "coordinates": {"A": "-8.00,12.00", "B": "-9.0", "C": "-5.00,10.00", "D": "-4.00,12.00", "E": "-7.45,10.62", "O": "-6.50,11.00"}, "collineations": {"0": "A ## B", "1": "A ### D", "2": "B ### C", "3": "D ### C", "4": "A ### E", "5": "A ### O ### C", "6": "B ### E ### O ### D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "subsystems": []}]
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD], EqualityRelation $\{\angle ABE=2*\angle CBE\}$, LinePerpRelation{line1=AE, line2=BD, crossPoint=E}, EqualityRelation $\{\angle ADO=(5/36*\pi)\}$, 求角的大小:

AngleRelation{angle= $\angle BAE$ }, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle BAE$)}, ProveConclusionRelation:[证明: EqualityRelation{AB=2*EO}]

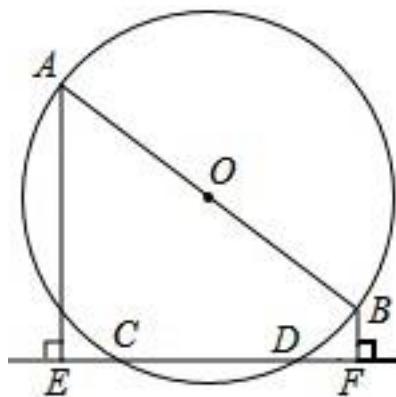
87、topic: 如图,在 $\triangle ABC$ 中, $\angle ABE = 2\angle C$,AD是 $\angle BAC$ 的平分线,BE \perp AD,垂足为E.(1)若 $\angle C = 30^\circ$,求证:AB=2BE;(2)若 $\angle C \neq 30^\circ$,求证: $BE = \frac{1}{2}(AC - AB)$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000052716_Q_1.jpg", "coordinates": {"A": "-2.29, 7.00", "B": "-4.00, 3.00", "C": "-8.00, 3.00", "D": "-5.54, 3.00", "E": "-4.93, 3.75"}, "collinearations": {"0": "B##E", "1": "A##B", "2": "A##C", "3": "B##D##C", "4": "A##E##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "subsystems": []}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABE = 2 * \angle ACD$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, LinePerpRelation{line1=BE, line2=AD, crossPoint=E}, EqualityRelation{ $\angle ACD = (1/6 * \pi)$ }, ProveConclusionRelation:[证明: EqualityRelation{AB=2*BE}], ProveConclusionRelation:[证明: EqualityRelation{BE=(1/2)*(AC-AB)}]

88、topic: 如图,已知AB是 $\odot O$ 的直径,CD是弦,AE \perp CD,垂足为E,BF \perp CD,垂足为F.(1)求证:EC=DF;(2)如果让AB绕点O旋转,点A、B都不与点C、D重合,(1)中结论还成立吗?如果成立,请证明;如果不成立,请说明理由.#%#

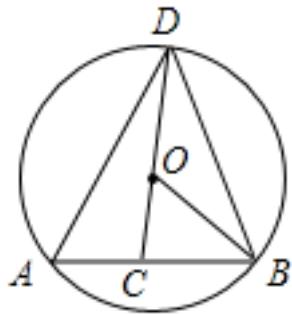


graph:
 {"stem": {"pictures": [{"picturename": "1000035146_Q_1.jpg", "coordinates": {"A": "-3.08, 2.55", "B": "3.08, -2.55", "C": "-2.14, -3.38", "D": "2.14, -3.38", "E": "-3.08, -3.38", "F": "3.08, -3.38", "O": "0.00, 0.00", "H": "-3.08, -2.55"}, "collinearations": {"0": "B##E", "1": "A##B", "2": "A##C", "3": "B##D", "4": "A##E", "5": "B##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "subsystems": []}

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NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, LinePerpRelation{line1=AE, line2=CD, crossPoint=E}, LinePerpRelation{line1=BF, line2=CD, crossPoint=F}, ConstantPointOnLineRelation [line=StraightLine[AB] analytic : $y=k_{AB}x+b_{AB}$ slope:null b:null isLinearFunction:false, point=O], NegativeRelation{relation=PointCoincidenceRelation{point1=A, point2=C}}, NegativeRelation{relation=PointCoincidenceRelation{point1=A, point2=D}}, NegativeRelation{relation=PointCoincidenceRelation{point1=B, point2=C}}, NegativeRelation{relation=PointCoincidenceRelation{point1=B, point2=D}}, ProveConclusionRelation:[证明: EqualityRelation{CE=DF}]

89、topic: 如图,已知AB是 $\odot O$ 的弦, $OB=4$, $\angle OBC=30^\circ$,点C是弦AB上任意一点(不与点A、B重合),连接CO并延长CO交 $\odot O$ 于点D,连接AD、DB.(1)当 $\angle ADC=18^\circ$ 时,求 $\angle DOB$ 的度数;(2)若 $AC=2\sqrt{3}$,求证: $\triangle ACD \sim \triangle OCB$.



graph:
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NLP: ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, PointRelation:A, PointRelation:B, ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, EqualityRelation{BO=4}, EqualityRelation{ $\angle CBO=(1/6\pi)$ }, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, LineCrossCircleRelation{line=CO, circle= $\odot O$, crossPoints=[D]}, crossPointNum=1}, SegmentRelation:AD, SegmentRelation:DB, EqualityRelation{ $\angle ADO=(1/10\pi)$ }, 求角的大小: AngleRelation{angle= $\angle BOD$ }, EqualityRelation{AC=2*(3^(1/2))}, SolutionConclusionRelation{relation =求值(大小): (ExpressRelation:[key:] $\angle BOD$)}, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle ACD$, triangleB= $\triangle OCB$ }]

90、topic: 已知 $\odot O$ 的直径 $AB=2\text{cm}$,过点A的两条弦 $AC=\sqrt{2}\text{cm}$, $AD=\sqrt{3}\text{cm}$,求 $\angle CAD$ 与所夹弧组成的面积.

graph:

```
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```

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[A]}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, length=Express:[AB=2], EqualityRelation{AC=(2^(1/2))}, EqualityRelation{AD=(3^(1/2))}

91、topic: 如图,点E是矩形ABCD的对角线BD上一点,且 $BE=BC$, $AB=3$, $BC=4$,点P为直线EC上的一点,且 $PQ \perp BC$ 于点Q, $PR \perp BD$ 于点R.
#%#(1)如图1,当点P为线段EC中点时,易证: $PR+PQ=\frac{1}{2}\sqrt{5}$ (不需证明)
#%#(2)如图2,当点P为线段EC上的任意一点(不与点E、点C重合)时,其他条件不变,则(1)中的结论是否仍然成立?若成立,请给予证明;若不成立,请说明理由.
#%#(3)如图3,当点P为线段EC延长线上的任意一点时,其他条件不变,则PR与PQ之间又具有怎样的数量关系?请直接写出你的猜想.#%#

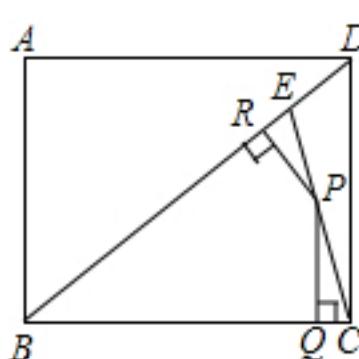


图1

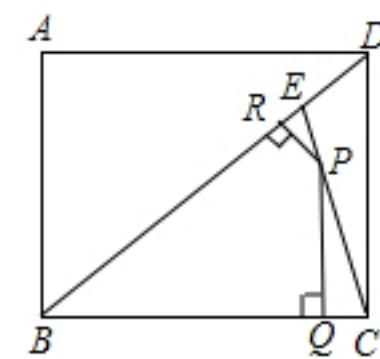


图2

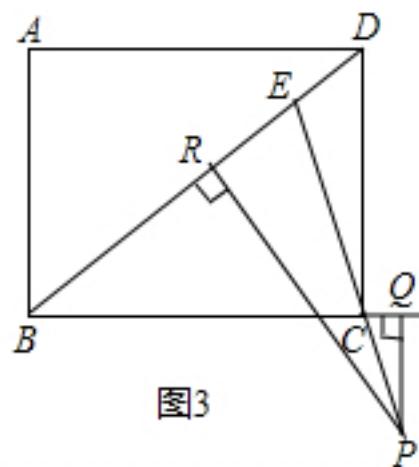


图3

graph:

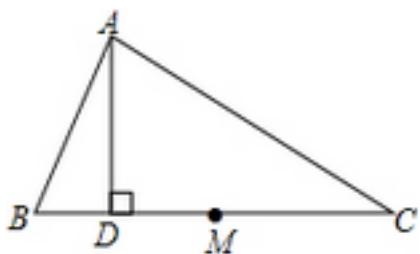
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```

```

####Q","8":"B###C##Q"},"variable>equals":{},"circles":[]],"appliedproblems":{}}
NLP: RectangleRelation{rectangle=Rectangle:ABCD},PointOnLineRelation{point=E, line=BD, isConstant=false, extension=false},EqualityRelation{BE=BC},EqualityRelation{AB=3},EqualityRelation{BC=4},PointOnLineRelation{point=P, line=EC, isConstant=false, extension=false},LinePerpRelation{line1=PQ, line2=BC, crossPoint=Q},LinePerpRelation{line1=PR, line2=BD, crossPoint=R},MiddlePointOfSegmentRelation{middlePoint=P, segment=EC},PointRelation:E,PointRelation:C,(ExpressRelation:[key:]2),(ExpressRelation:[key:]3),求值(大小):(ExpressRelation:[key:](PR/PQ)),ProveConclusionRelation:[证明:(ExpressRelation:[key:]1)],ProveConclusionRelation:[证明:EqualityRelation{PR+PQ=(12/5)}],SolutionConclusionRelation{relation=求值(大小):(ExpressRelation:[key:](PR/PQ))}

92、topic: 如图,在三角形ABC中,  $\angle B = 2\angle C$ ,AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$ .#%#<img>

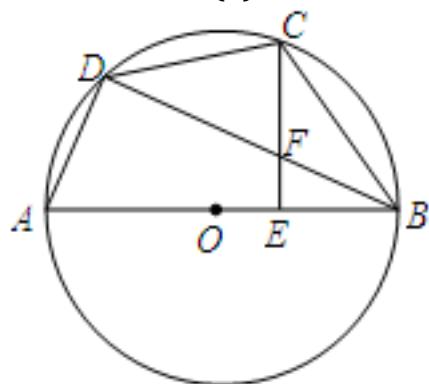
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graph:
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NLP:
TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABD = 2 * \angle ACM$ }, MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{ $DM = (1/2) * AB$ }]

93、topic: 如图,AB是 $\odot O$ 的直径,C是弧BD的中点,CE \perp AB,垂足为点E,BD交CE于点F. #%(1)求证: $CF = BF$; #%(2)若 $AD = 2$, $\odot O$ 的半径为3,求BC的长.#%#

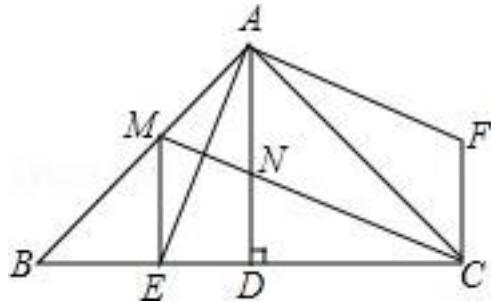


graph:

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NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, MiddlePointOfArcRelation:C/type:MAJOR_ARC \cap BD, LinePerpRelation{line1=CE, line2=AB, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BD, iLine2=CE], EqualityRelation{BC=v_0}, EqualityRelation{AD=2}, RadiusRelation{radius=null}, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=Express:[3]}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{CF=BF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}

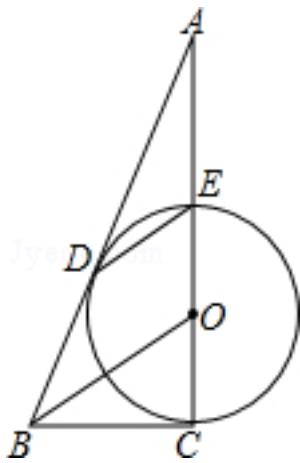
94、topic: 如图,\$\triangle ABC\$中,\$\angle BAC=90^\circ\$,\$AB=AC\$,\$AD \perp BC\$,垂足是D,AE平分\$\angle BAD\$,交BC于点E. 在\$\triangle ABC\$外有一点F,使\$FA \perp AE\$,\$FC \perp BC\$.?(1)求证:\$BE=CF\$;(2)在AB上取一点M,使\$BM=2DE\$,连接MC,交AD于点N,连接ME.求证:(1)\$ME \perp BC\$;(2)\$DE=DN\$.



graph:
{"stem": {"pictures": [{"picturename": "1000026620_Q_1.jpg", "coordinates": {"A": "10.00,5.00", "B": "5.00,0.00", "C": "15.00,0.00", "D": "10.00,0.00", "E": "7.93,0.00", "F": "15.00,2.93", "M": "7.86,2.86", "N": "10.00,2.00"}, "collinearations": {"0": "A###M###B", "1": "A###E", "2": "A###N###D", "3": "A###C", "4": "A###F", "5": "M###E", "6": "M###N###C", "7": "F###C", "8": "B###E###D###C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
TriangleRelation:\$\triangle ABC\$, EqualityRelation{\$\angle CAM=(1/2*\pi)\$}, EqualityRelation{AB=AC}, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, AngleBisectorRelation{line=AE, angle=\$\angle MAN\$, angle1=\$\angle EAM\$, angle2=\$\angle EAN\$}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AE, iLine2=BC], PositionOfPoint2RegionRelation{point=F, region=EnclosedRegionRelation{name=ABC, closedShape=\$\triangle ABC\$}, position=outer}, LinePerpRelation{line1=FA, line2=AE, crossPoint=A}, LinePerpRelation{line1=FC, line2=BC, crossPoint=C}, PointOnLineRelation{point=M, line=AB, isConstant=false, extension=false}, EqualityRelation{BM=2*DE}, SegmentRelation:MC, LineCrossRelation [crossPoint=Optional.of(N), iLine1=MC, iLine2=AD], SegmentRelation:ME, ProveConclusionRelation:[证明: EqualityRelation{BE=CF}]

95、topic: 如图,CE是\$\odot O\$的直径, BD切\$\odot O\$于点D, DE||BO, CE的延长线交BD于点A.?(1)求证:直线BC是\$\odot O\$的切线;?(2)若\$AE=2\$, \$\tan \angle DEO=\sqrt{2}\$,求AO的长.

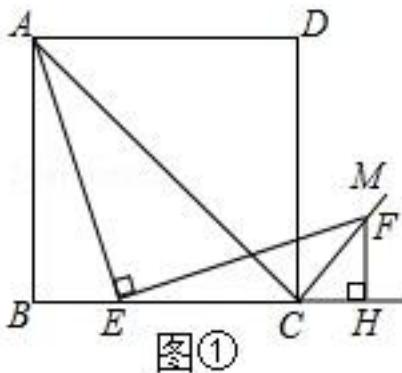


graph:

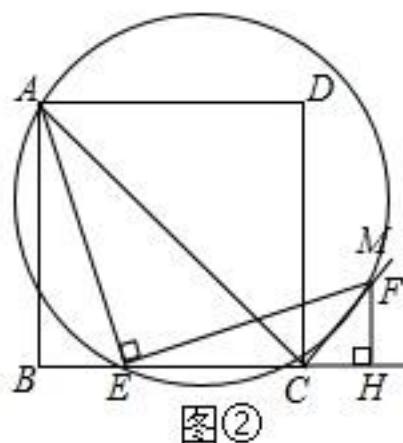
```
{"stem": {"pictures": [{"picturename": "1000040066_Q_1.jpg", "coordinates": {"A": "0.00,6.00", "B": "-2.83,-2.00", "C": "0.00,-2.00", "D": "-1.89,0.67", "E": "0.00,2.00", "O": "0.00,0.00"}, "collinearations": {"0": "A###E###O##C", "1": "A###D###B", "2": "C##B", "3": "B##O", "4": "D##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "E##D##C"}]}, "appliedproblems": {}, "subsystems": []}}
```

NLP: DiameterRelation{diameter=CE, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LineContactCircleRelation{line=BD, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.of(B)}, LineParallelRelation [iLine1=DE, iLine2=BO], LineCrossRelation [crossPoint=Optional.of(A), iLine1=CE, iLine2=BD], EqualityRelation{AO=v_0}, EqualityRelation{AE=2}, EqualityRelation{tan(\angle DEO)= $(2^{(1/2)})$ }}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: LineContactCircleRelation{line=BC, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(C), outpoint=Optional.of(B)}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AO)}

96、topic: 如图①,四边形ABCD是正方形,点E是边BC上一点,点F在射线CM上,\$\angle AEF=90^\circ\$,\$AE=EF\$,过点F作射线BC的垂线,垂足为点H,连接AC.(1)试判断BE与FH的数量关系,并说明理由; (2)求证:\$\angle ACF=90^\circ\$; (3)连接AF,过A、E、F三点作圆,如图②,若\$EC=4\$,\$\angle CEF=15^\circ\$,求\$\widehat{AE}\$的长.



图①



图②

graph:

```
{"stem": {"pictures": [{"picturename": "1000025049.jpg", "coordinates": {"A": "-4.00,0.00", "B": "4.00,0.00", "C": "0.00,-4.00", "D": "0.00,4.00", "E": "1.5,0", "F": "2,1.5", "M": "2,-1.5", "H": "3,0"}}, "appliedproblems": {}, "subsystems": []}}
```

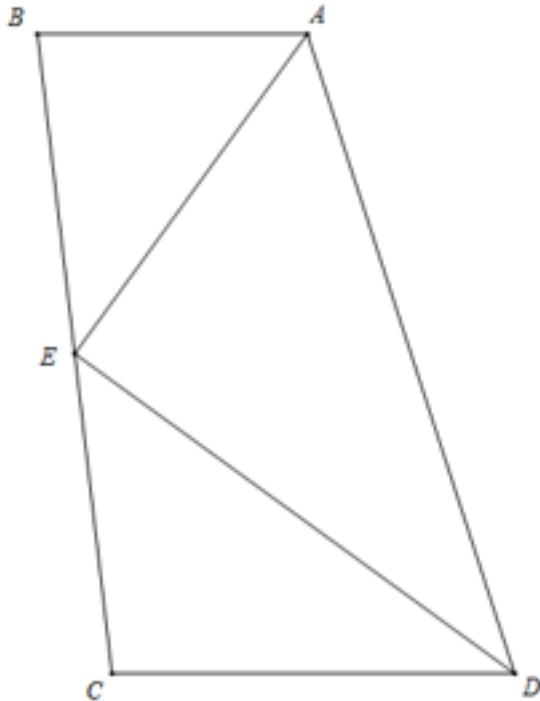
```

,"C":"0.50,3.97","D":"4.87,1.65","E":"8.00,0.00","F":"0.00,0.00","O":"4.87,1.65","M":"8.00,0.00","H": "0.0
0,0.00}),"collineations": {"0": "B###E###H###C", "2": "D##C", "3": "E##F", "4": "A##C", "5": "F##H"
,"6": "F##M##C", "7": "E##A", "8": "B##A", "9": "D##A"}, "variable-equals": {"0": " $\alpha = \angle PCB$ ", "1": " $\beta = \angle POC$ "}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}, "appliedproblems": {}}, "substems": []
]

```

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CM, isConstant=false, extension=false}, EqualityRelation{ $\angle AEF = (1/2\pi)$ }, EqualityRelation{AE=EF}, LinePerpRelation{line1=Ray:BC, line2=FH, crossPoint=H}, SegmentRelation:AC, 求值(大小):
 (ExpressRelation:[key:]BE/FH), MultiPointCollinearRelation:[A, F, A], MultiPointCollinearRelation:[A, F, E], EqualityRelation{CE=4}, EqualityRelation{ $\angle BEF = (1/12\pi)$ }, 求值(大小):
 (ExpressRelation:[key:] $\sim AE$), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]BE/FH)), ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle ACF = (1/2\pi)$ }], SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\sim AE$)}

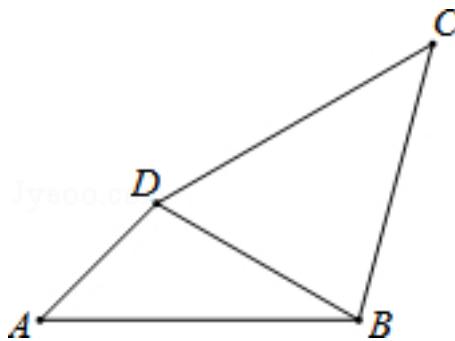
97、topic: 如图,已知AB//CD,AE、DE分别 $\angle BAD$ 和 $\angle ADC$ 的平分线,求证:AB+CD=AD#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040372_Q_1.jpg", "coordinates": {"A": "-2.73,10.08", "B": "-6.75,10.08", "C": "-5.64,0.56", "D": "0.36,0.56", "E": "-6.19,5.32"}, "collineations": {"0": "A##E", "1": "A##D", "2": "A##B", "3": "B##E##C", "4": "D##E", "5": "C##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, "substems": []}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], AngleBisectorRelation{line=AE, angle= $\angle BAD$, angle1= $\angle BAE$, angle2= $\angle DAE$ }, AngleBisectorRelation{line=DE, angle= $\angle ADC$, angle1= $\angle ADE$, angle2= $\angle CDE$ }, ProveConclusionRelation:[证明: EqualityRelation{AB+CD=AD}]

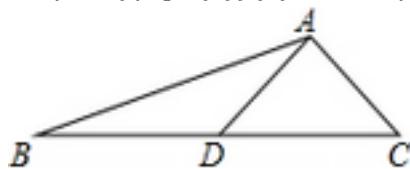
98、topic: 如图,在四边形ABCD中, $\angle A=\angle C=45^\circ$, $\angle ADB=\angle ABC=105^\circ$. #(1)若AD=2,求AB; #(2)若 $AB+CD=2\sqrt{3}+2$,求AB.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000027196_Q_1.jpg", "coordinates": {"A": "1.00#%#1.00#", "B": "7.00#%#1.00#", "C": "8.39#%#6.20#", "D": "3.20#%#3.20"}, "collineations": {"0": "A##B##1": "A###D##2": "B##D##3": "B##C##4": "D##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},MultiEqualityRelation [multiExpressCompare= $\angle A = \angle C = (1/4\pi)$, originExpressRelationList=[], keyWord=null, result=null],MultiEqualityRelation [multiExpressCompare= $\angle ADB = \angle ABC = (7/12\pi)$, originExpressRelationList=[], keyWord=null, result=null],EqualityRelation{AD=2},求值(大小): (ExpressRelation:[key:]AB),EqualityRelation{AB+CD=2*((3^(1/2)))+2},求值(大小): (ExpressRelation:[key:]AB),SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AB}),SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AB})

99、topic: 如图,AD是 $\triangle ABC$ 的中线,\$\tan B=\frac{1}{3}\$,\$\cos C=\frac{\sqrt{2}}{2}\$,\$AC=\sqrt{2}\$.求:(1)BC的长;(2)\$\sin \angle ADC\$的值.

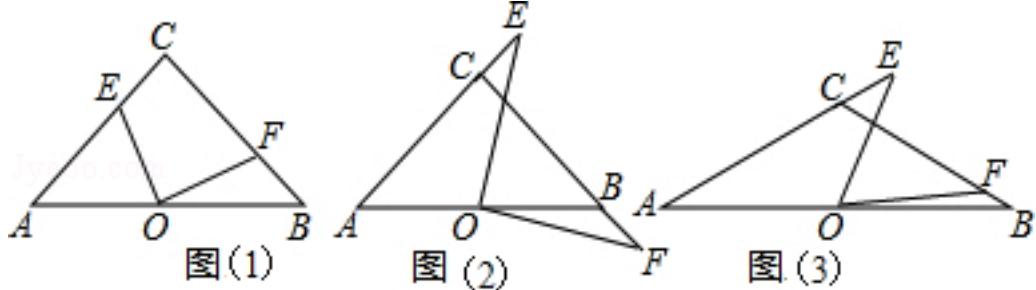


graph:
 {"stem": {"pictures": [{"picturename": "1000052250_Q_1.jpg", "coordinates": {"A": "-5.00,3.00", "B": "-8.00,2.00", "C": "-4.00,2.00", "D": "-6.00,2.00"}, "collineations": {"0": "A##C", "1": "A##B", "2": "A##D", "3": "B##D##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation: $\triangle ABC$,EqualityRelation{\$\tan(\angle ABD)=(1/3)\$},EqualityRelation{\$\cos(\angle ACD)=((2^{(1/2)})/2)\$},EqualityRelation{\$AC=(2^{(1/2)})\$},MidianLineOfTriangleRelation{midianLine=AD, triangle= $\triangle ABC$, top=A, bottom=BC},EqualityRelation{\$BC=v_0\$},求值(大小): (ExpressRelation:[key:]v_0),求值(大小): (ExpressRelation:[key:]\$\sin(\angle ADC)\$),SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BC}),SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]\$\sin(\angle ADC)\$)}

100、topic: 已知:在 $\triangle ABC$ 中,CA=CB=10cm,O为AB的中点,E、F分别在直线AC、BC上,且 $\angle EOF=2\angle A$.若 $\angle A=45^\circ$,如图(1),连结OC,当E、F分别在线段AC、BC上时,求

证: $\triangle COE \cong \triangle BOF$; #%(2)如图(2),当E、F分别在AC延长线上和CB延长线上时,求 $CF - CE$ 的值; #%(2)如图(3),若 $\angle A = 30^\circ$,且E、F分别在AC延长线上和线段BC上,试说明 CF 与 CE 满足怎样的关系式.#%#(提示:在直角三角形中,30°角所对的直角边等于斜边的一半.)#%#

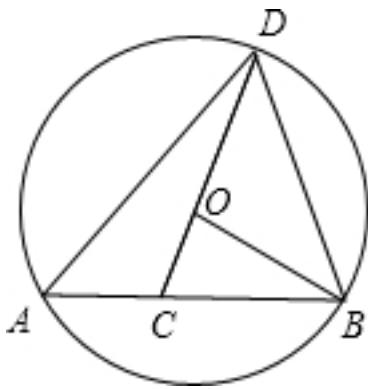


graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":1,"questionrelies":"","picture": [{"picturename": "1000037839_Q_1.jpg","coordinates": {"A": "-14.98,10.03", "B": "-9.05,10.03", "C": "-12.01,12.99", "O": "-11.99,10.03", "E": "-12.94,12.06", "F": "-9.95,10.98"}, "collineations": {"0": "B##O##A", "1": "A##E##C", "2": "E##O", "3": "B##F##C", "4": "F##O"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": 2, "questionrelies": "", "picture": [{"picturename": "1000037839_Q_2.jpg", "coordinates": {"A": "-14.95,4.00", "B": "-8.97,4.00", "C": "-11.96,6.98", "O": "-11.99,4.00", "E": "-10.77,8.20", "F": "-7.83,2.83"}, "collineations": {"0": "A##C##E", "1": "C##B##F", "2": "E##O", "3": "F##O", "4": "A##O##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": 3, "questionrelies": "", "picture": [{"picturename": "1000037839_Q_3.jpg", "coordinates": {"A": "-14.00,-1.00", "B": "-5.97,-1.04", "C": "-9.97,1.30", "O": "-10.03,-1.02", "E": "-8.56,2.15", "F": "-6.55,-0.71"}, "collineations": {"0": "A##C##E", "1": "C##F##B", "2": "E##O", "3": "F##O", "4": "A##O##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}
```

NLP: TriangleRelation: $\triangle ABC$, MultiEqualityRelation [multiExpressCompare=AC=BC=10, originExpressRelationList=[], keyWord=null, result=null], MiddlePointOfSegmentRelation{middlePoint=O, segment=AB}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false}, EqualityRelation{ $\angle EOF = 2 * \angle EAO$ }, EqualityRelation{ $\angle EAO = (1/4 * \pi)$ }, SegmentRelation{OC}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CB, isConstant=false, extension=false}, 求值(大小): (ExpressRelation:[key:]CF-CE), EqualityRelation{ $\angle EAO = (1/6 * \pi)$ }, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false}, 求值(大小): (ExpressRelation:[key:](CF/CE)), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle COE$, triangleB= $\triangle BOF$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CF-CE)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](CF/CE))}

101、topic: 如图,已知AB是 $\odot O$ 的弦, $OB=4$, $\angle OBC=30^\circ$,点C是弦AB上任意一点(不与点A、B重合),连接CO并延长交 $\odot O$ 于点D,连接AD、DB.#%#(1)当 $\angle ADC=18^\circ$ 时,求 $\angle DOB$ 的度数; #%#(2)若 $AC=2\sqrt{3}$,求证 $\triangle ACD \sim \triangle OCB$.#%#

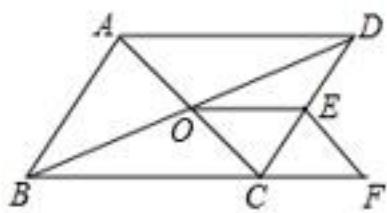


graph:

```
{"stem":{"pictures":[{"picturename":"1000060729_Q_1.jpg","coordinates":{"A":"0.84,-3.91","B":"2.97,2.68","C":"1.63,-1.47","D":"-2.97,2.68","O":"0.00,0.00"},"collineations":{"0":"B###C##A","1":"D##O##C","2":"B##O","3":"D##B","4":"A##D"},"variable-equals":{},"circles":[{"center":O,"pointincircle":A##B##D}]}],"appliedproblems":{},"substems": [{"substemid":2,"questionrelies":"","pictures":[{"picturename":"1000060729_Q_1.jpg","coordinates":{"A":12.00,-3.46,"B":12.00,3.46,"C":12.00,0.00,"D":6.00,0.00,"O":10.00,0.00},"collineations":{"0":"B##C##A","1":D##O##C,"2":B##O,"3":D##B,"4":A##D}),"variable-equals":{},"circles":[{"center":O,"pointincircle":A##B##D}]}],"appliedproblems":{}}]}
```

NLP: ChordOfCircleRelation{chord=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, PointRelation:A, PointRelation:B, ChordOfCircleRelation{chord=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, EqualityRelation{BO=4}, EqualityRelation{ $\angle CBO=(1/6\pi)$ }, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, LineCrossCircleRelation{line=CO, circle= \odot O, crossPoints=[D]}, crossPointNum=1}, SegmentRelation:AD, SegmentRelation:DB, EqualityRelation{ $\angle ADO=(1/10\pi)$ }, 求角的大小:
AngleRelation{angle= $\angle BOD$ }, EqualityRelation{AC=2*(3^(1/2))}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BOD$)}, ProveConclusionRelation:[证明:
TriangleSimilarRelation{triangleA= $\triangle ACD$, triangleB= $\triangle OCB$ }]

102、topic: 如图,在平行四边形\$ABCD\$中,点O是对角线AC、BD的交点,点E是边CD的中点,点F在BC的延长线上,且\$CF=\frac{1}{2}BC\$.求证:四边形\$OCFE\$是平行四边形.



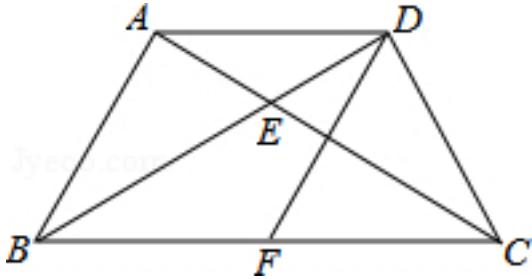
graph:

```
{"stem":{"pictures":[{"picturename":"1000024672.jpg","coordinates":{"A":2.00,5.00,"B":0.00,0.00,"C":6.00,0.00,"D":8.00,5.00,"E":7.00,2.50,"F":9.00,0.00,"O":4.00,2.50}),"collineations":{"0":A##B,"1":C##O##A,"2":D##O##B,"3":C##F##B,"4":D##C##E,"5":O##E,"6":E##F,"7":A##D}),"variable-equals":{},"circles":[]}, "appliedproblems":{},"substems":[]}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LineCrossRelation

[crossPoint=Optional.of(O), iLine1=AC, iLine2=BD],MiddlePointOfSegmentRelation{middlePoint=E,segment=CD},PointOnLineRelation{point=F, line=BC, isConstant=false, extension=true},EqualityRelation{CF=(1/2)*BC},ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:CFEO}]

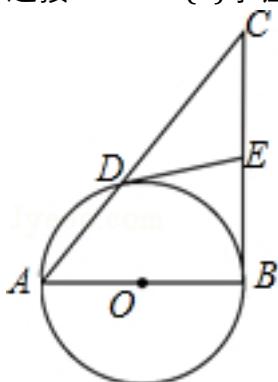
103、topic: 如图,在四边形ABCD中,AB=AD,AC与BD交于点E, $\angle ADB=\angle ACB$.#%#(1)求证: $\frac{AB}{AE}=\frac{AC}{AD}$;(2)若 $AB \perp AC$, $AE:EC=1:2$,点F是BC的中点,求证:四边形ABFD是菱形.#%#



graph:
 {"stem": {"pictures": [{"picturename": "D38B55624FC24103908600A2EE9DF528.jpg", "coordinates": {"A": "-12.00,6.00", "B": "-13.50,3.40", "C": "-7.50,3.40", "D": "-9.00,6.00", "E": "-10.50,5.13", "F": "-10.50,3.40"}, "collineations": {"0": "B##A", "1": "A##D", "2": "A##E##C", "3": "B##F##C", "4": "B##E##D", "5": "F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{AB=AD}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD], EqualityRelation{ $\angle ADE=\angle ECF$ }, LinePerpRelation{line1=AB, line2=AC, crossPoint=A}, EqualityRelation{ $(AE)/(CE)=(1)/(2)$ }, MiddlePointOfSegmentRelation{middlePoint=F, segment=BC}, ProveConclusionRelation:[证明: EqualityRelation{ $((AB)/(AE))=((AC)/(AD))$ }], ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:ABFD}]

104、topic: 如图,在 $\triangle ABC$ 中,BC是以AB为直径的 $\odot O$ 的切线,且 $\odot O$ 与AC相交于点D,E为BC的中点,连接DE.#%#(1)求证:DE是 $\odot O$ 的切线;#%#(2)连接AE,若 $\angle C=45^\circ$,求 $\sin \angle CAE$ 的值.#%#

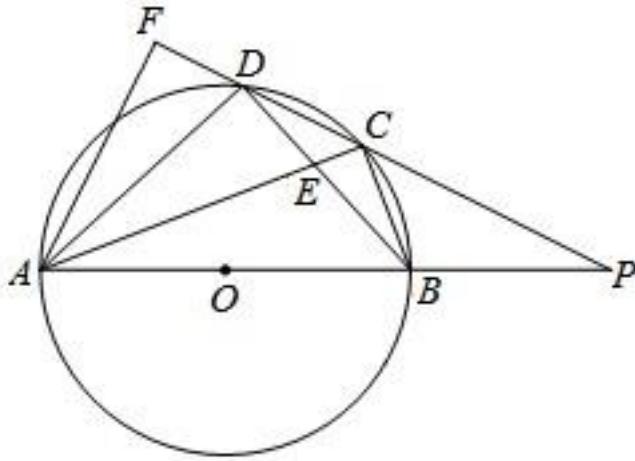


graph:
 {"stem": {"pictures": [{"picturename": "1000039418_Q_1.jpg", "coordinates": {"A": "4.00,2.00", "B": "8.00,2.00", "C": "6.00,4.00", "D": "5.00,3.00", "E": "6.50,3.00", "O": "5.00,2.00"}}], "appliedproblems": {}, "substems": {}}}

.00","C":"8.00,6.00","D":"6.00,4.00","E":"8.00,4.00","O":"6.00,2.00"},"collineations":{"0":"C###E###B","1":"A###O###B","2":"A###D###C","3":"D###E"},"variable-equals":{},"circles":[{"center": "O","pointincircle": "A###D###B"}]}],"appliedproblems":{},"subsystems":[]}]

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2}$, length=null}, TriangleRelation: $\triangle ABC$, LineContactCircleRelation{line=BC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(B), outpoint=Optional.of(C)}}, LineCrossCircleRelation{line=AC, circle= $\odot O$, crossPoints=[D], crossPointNum=1}, MiddlePointOfSegmentRelation{middlePoint=E, segment=BC}, SegmentRelation:DE, SegmentRelation:AE, EqualityRelation{ $\angle DCE = (1/4\pi)$ }, 求值(大小): (ExpressRelation:[key]:sin($\angle CAE$)), ProveConclusionRelation:[证明: LineContactCircleRelation{line=DE, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.of(E)}]}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:sin($\angle CAE$))}]}

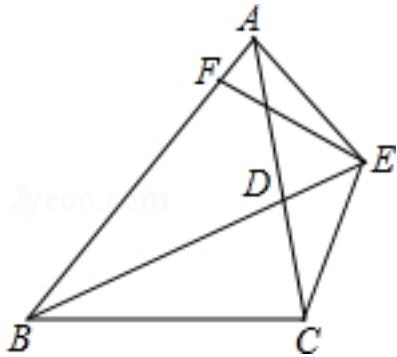
105、topic: 如图,四边形ABCD内接于 $\odot O$,AB是 $\odot O$ 的直径,AC和BD相交于点E,且 $DC^2 = CE \cdot CA$.
 (1)求证: $BC = CD$;
 (2)分别延长AB,DC交于点P,过点A作 $AF \perp CD$ 交CD的延长线于点F,若 $PB = OB$, $\{CD\} = 2\sqrt{2}$.求DF的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000008211_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "4.00,0.00", "C": "2.99,2.65", "D": "0.48,3.97", "E": "1.99,2.27", "F": "-1.40,4.96", "O": "0.00,0.00", "P": "8.00,0.00"}, "collineations": {"0": "B###D###E", "1": "A##C", "2": "A##D", "3": "A##F", "4": "F##D##C##P", "5": "B##C"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems": {}, "subsystems": []}]}

NLP: InscribedShapeOfCircleRelation{closedShape=ABCD, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD], EqualityRelation{ $DC^2 = CE \cdot CA$ }, EqualityRelation{DF=v_0}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=AB, iLine2=DC], LinePerpRelation{line1=AF, line2=CD, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AF, iLine2=CD], PointOnLineRelation{point=A, line=AF, isConstant=false, extension=false}, EqualityRelation{BP=BO}, EqualityRelation{ $DC = 2\sqrt{2}$ }, 求值(大小): (ExpressRelation:[key]:v_0), ProveConclusionRelation:[证明: EqualityRelation{BC=CD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:DF)}}]

106、topic: 如图, BD 为 $\triangle ABC$ 的角平分线, 且 $BD=BC$, E 为 BD 延长线上的一点, $BE=BA$, 过 E 作 $EF \perp AB$, F 为垂足. 求证:(1) $\triangle ABD \cong \triangle EBC$; (2) $\angle BCE + \angle BCD = 180^\circ$; (3) $BA+BC=2BF$.

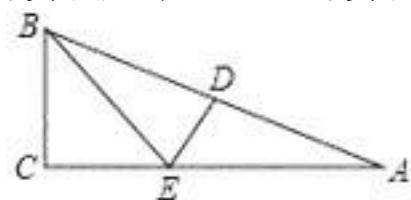


graph:

```
{"stem":{"pictures":[{"picturename":"D7F4F9174E4E4BF0A503FD15B81F0662.jpg","coordinates":{"A": "-10.20,8.07","B": "-14.00,3.00","C": "-9.00,3.00","D": "-9.53,5.24","E": "-8.33,5.83","F": "-10.60,7.54"}, "collineations": {"0": "B###F##A", "1": "A##D##C", "2": "A##E", "3": "C##B", "4": "B##D##E", "5": "C##E", "6": "F##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"subste mid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $BD=BC$ }, PointOnLineRelation{point=E, line=BD, isConstant=false, extension=true}, EqualityRelation{ $BE=AB$ }, LinePerpRelation{line1=EF, line2=AB, crossPoint=F}, PointOnLineRelation{point=E, line=EF, isConstant=false, extension=false}, AngleBisectorRelation{line=BD, angle= $\angle CBF$, angle1= $\angle DBF$, angle2= $\angle CBD$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABD$, triangleB= $\triangle EBC$ }], ProveConclusionRelation:[证明: EqualityRelation{ $\angle BCE + \angle BCD = (\text{Pi})$ }], ProveConclusionRelation:[证明: EqualityRelation{ $AB+BC=2*BF$ }]]

107、topic: 如图, $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=12$, $BC=5$, D 是 AB 边上的动点, E 是 AC 边上的动点, 则 $BE+ED$ 的最小值

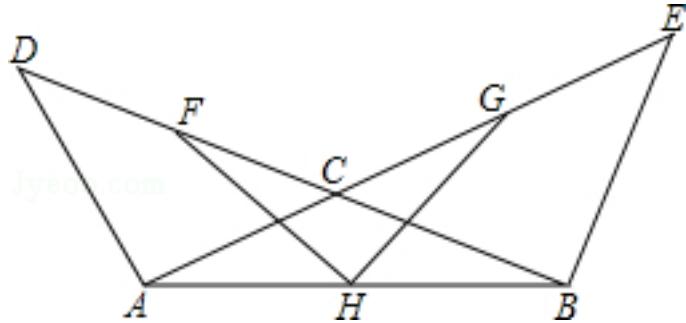


graph:

```
{"stem":{"pictures":[{"picturename":"1000027620_Q_1.jpg","coordinates":{"A": "12.00,0.00","B": "0.00,5.00","C": "0.00,0.00","D": "3.55,3.52","E": "2.08,0.00"}, "collineations": {"0": "B##D##A", "1": "A##E#C", "2": "B##C", "3": "B##E", "4": "D##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: ExtremumRelation [key=Express:[$BE+DE$], value=Express:[v_0], extremumType=MIN], RightTriangleRelation: RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle BCE=(1/2*\text{Pi})$ }, EqualityRelation{ $AC=12$ }, EqualityRelation{ $BC=5$ }, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, (ExpressRelation:[key:] v_0)

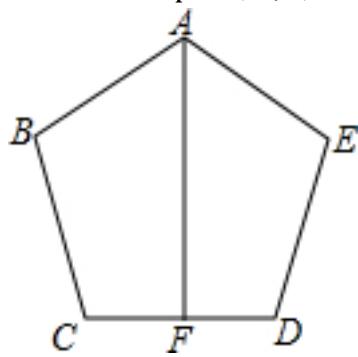
108、topic: 如图,已知AE、BD相交于点C,AC=AD,BC=BE,F、G、H分别是DC、CE、AB的中点.求证:(1) $HF=HG$;(2) $\angle FHG=\angle DAC$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041565_Q_1.jpg", "coordinates": {"A": "-9.97,2.04", "B": "-5.98,2.04", "C": "-7.98,2.86", "D": "-10.80,4.03", "E": "-5.16,4.03", "F": "-9.39,3.45", "G": "-6.57,3.45", "H": "-7.98,2.04"}, "collineations": {"0": "A###H##B", "1": "A##D", "2": "B##E", "3": "D##F##C##B", "4": "A##C##G##E", "5": "F##H", "6": "G##H"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(C), iLine1=AE, iLine2=BD], EqualityRelation{AC=AD}, EqualityRelation{BC=BE}, MiddlePointOfSegmentRelation{middlePoint=F, segment=DC}, MiddlePointOfSegmentRelation{middlePoint=G, segment=CE}, MiddlePointOfSegmentRelation{middlePoint=H, segment=AB}, EqualityRelation{(2)* $\angle FHG=\angle CAD$ }, ProveConclusionRelation:[证明: EqualityRelation{FH=GH}]

109、topic: 如图,AB=AE, $\angle ABC=\angle AED$, BC=ED, 点F是CD的中点.求证: $AF \perp CD$.#%#

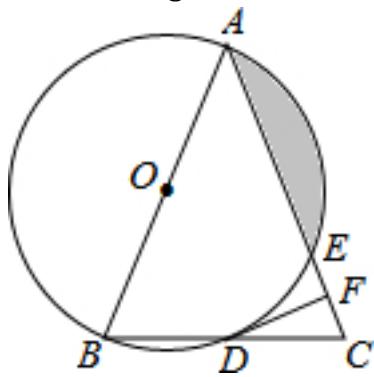


graph:
 {"stem": {"pictures": [{"picturename": "DC0D0ECBF8A74741829B940520CA0B39.jpg", "coordinates": {"A": "-11.00,8.00", "B": "-14.00,6.00", "C": "-13.00,3.00", "D": "-9.00,3.00", "E": "-8.00,6.00", "F": "-11.00,3.00"}, "collineations": {"0": "B##A", "1": "A##E", "2": "F##A", "3": "C##B", "4": "C##D##F", "5": "D##E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{AB=AE}, EqualityRelation{ $\angle ABC=\angle AED$ }, EqualityRelation{BC=DE}, MiddlePointOfSegmentRelation{middlePoint=F, segment=CD}, ProveConclusionRelation:[证明:
 LinePerpRelation{line1=AF, line2=CD, crossPoint=F}]

110、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, 以AB为直径的 $\odot O$ 分别与BC、AC交于点D、E, 过点D作 $\odot O$ 的切线DF, 交AC于点F. #%#(1)求证: $DF \perp AC$; #%#(2)若 $\odot O$ 的半径为4, $\angle CDF=22.5^\circ$, 求阴影部分的面

积.%#

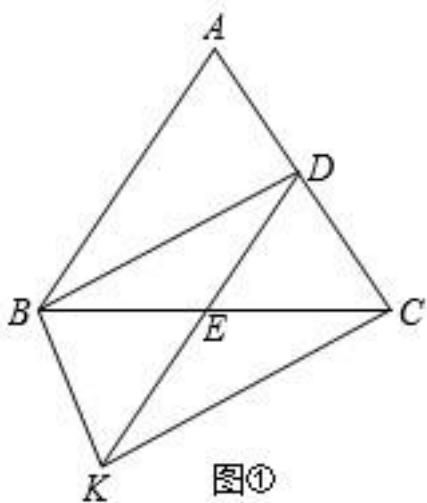


graph:

{"stem": {"pictures": [{"picturename": "1000081030_Q_1.jpg", "coordinates": {"A": "1.72,3.61", "B": "-1.72,-3.61", "C": "4.39,-3.93", "D": "1.33,-3.77", "E": "3.61,-1.72", "F": "4.00,-2.83", "O": "0.00,0.00"}, "collineations": {"0": "B###O###A", "1": "C###D###B", "2": "A###E###F###C", "3": "D###F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###D###E"}]}], "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, TriangleRelation: \triangle ABC, EqualityRelation{AB=AC}, PointRelation:E, LineContactCircleRelation{line=DF, circle=Circle[\odot O]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.of(F)}}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=AC], RadiusRelation{radius=null, circle=Circle[\odot O]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=Express:[4]}}, EqualityRelation{ \angle CDF=(1/8*Pi)}, ProveConclusionRelation:[证明: LinePerpRelation{line1=DF, line2=AC, crossPoint=F}]]

111、topic: 如图①,在 $\triangle ABC$ 中, BD 是 $\angle ABC$ 的角平分线, $DK \parallel AB$ 交 BC 于点 E ,且 $DK=BC$,连结 BK, CK .(1)求证: $\triangle BDK \cong \triangle DBC$;(2)若 $BA=BC$,猜想四边形 $BDCK$ 是何种特殊四边形?并证明你的猜想.(3)若 $\angle BAC=90^\circ$ (如图②), $\angle ABC=30^\circ$, $AB=2\sqrt{3}$,求四边形 $BDCK$ 的面积.



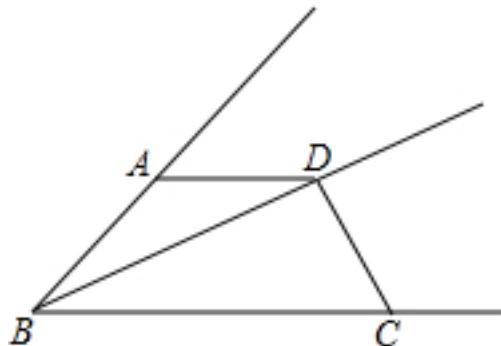
graph:

{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000027748_Q_1.jpg", "coordinates": {"A": "5.00,7.46", "B": "3.00,4.00", "C": "7.00,4.00"}]}]}]}

0","D":"6.00,5.73","E":"5.00,4.00","K":"4.00,2.27}],"collineations":{"0":"A##B","1":"A##D##C","2":"B##D","3":"B##E##C","4":"B##K","5":"K##E##D","6":"K##C}),"variable>equals":{},"circles":[]}]}. "appliedproblems":{}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000027748_Q_2.jpg"}, "coordinates": {"A": "6.50,6.60", "B": "2.00,4.00", "C": "8.00,4.00", "D": "7.20,5.39", "E": "4.78,4.00", "K": "2.00,2.39"}, "collineations": {"0": "A##B", "1": "A##D##C", "2": "B##D", "3": "B##E##C", "4": "B##K", "5": "K##E##D", "6": "K##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]]}

NLP: TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=BD, angle= $\angle ABE$, angle1= $\angle ABD$, angle2= $\angle DBE$ }, LineParallelRelation [iLine1=DK, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(E), iLine1=DK, iLine2=BC], EqualityRelation{DK=BC}, SegmentRelation:BK, SegmentRelation:CK, EqualityRelation{AB=BC}, 已知条件
QuadrilateralRelation{quadrilateral=BDCK}, EqualityRelation{S_BDCK=v_0}, EqualityRelation{ $\angle ABE = (1/6 * \pi)$ }, EqualityRelation{AB=2*(3^(1/2))}, 求值(大小):
(ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BDK$, triangleB= $\triangle DBC$ }], ShapeJudgeConclusionRelation{geoEle=BDCK}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_BDCK)}

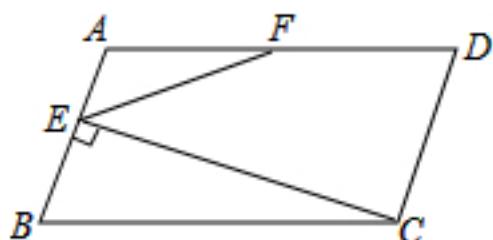
112、topic: 如图, BD是 $\angle ABC$ 的平分线, AD=CD, 求证 $\angle DAB + \angle BCD = 180^\circ$. #%#



graph:
{"stem": {"pictures": [{"picturename": "1000060078_Q_1.jpg"}, "coordinates": {"A": "1.21,1.61", "B": "0.00,0.00", "C": "4.63,0.00", "D": "3.32,1.61"}, "collineations": {"0": "B##A", "1": "A##D", "2": "B##C", "3": "D##C", "4": "B##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "substems": []}]}

NLP: AngleBisectorRelation{line=BD, angle= $\angle ABC$, angle1= $\angle ABD$, angle2= $\angle CBD$ }, EqualityRelation{AD=CD}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle BAD + \angle BCD = (\pi)$ }]

113、topic: 如图,在平行四边形ABCD中,已知AB=5,BC=10,F为AD的中点,CE \perp AB于点E,设 $\angle ABC=\alpha(60^\circ \leq \alpha < 90^\circ)$. #%#(1)当 $\alpha=60^\circ$,求CE的长; #%#(2)当 $60^\circ < \alpha < 90^\circ$ 时,是否存在正整数k,使得 $\angle EFD=k\angle AEF$?若存在,求出k的值;若不存在,请说明理由.#%#



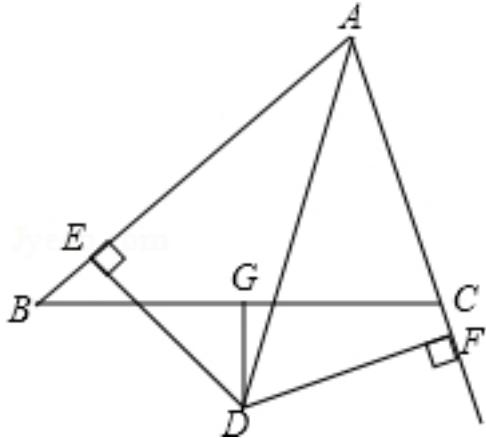
graph:

{"stem": {"pictures": [{"picturename": "1000036948_Q_1.jpg", "coordinates": {"A": "-8.29,4.40", "B": "-9.00, 2.00", "C": "-4.00,2.00", "D": "-3.29,4.40", "F": "-6.19,4.40", "E": "-8.59,3.37"}, "collineations": {"0": "A###F##D", "1": "A###E###B", "2": "C###D", "3": "B###C", "4": "E###C", "5": "E###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{AB=5}, EqualityRelation{BC=10}, MiddlePointOfSegmentRelation{middlePoint=F, segment=AD}, LinePerpRelation{line1=CE, line2=AB, crossPoint=E}, EqualityRelation{ $\angle CBE = \alpha$, Condition:
[[$(1/3 * \pi) \leq \alpha < (1/2 * \pi)$]]}, EqualityRelation{CE=v_0}, EqualityRelation{ $\alpha = (1/3 * \pi)$ }, 求值(大小):
(ExpressRelation:[key:]v_0), AtomAttributeRelation{atomAttribute=AtomAttribute{atomExpr=Express:[k]}, numberType=POSITIVE_INTEGER}}, ConditionRelation{ThreeItemsInequalityRelation{multiExpressCompare: $(1/3 * \pi) < \alpha < (1/2 * \pi)$ }, (ExpressRelation:[key:]k)}, 求值(大小):
(ExpressRelation:[key:]k), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]CE)}, SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]k)}

114、topic: 如图,在 $\triangle ABC$ 中,AD为 $\angle BAC$ 的平分线,DG $\perp BC$ 且平分BC,DE $\perp AB$ 于E,DF $\perp AC$ 交AC的延长线于F.
(1)求证:BE=CF;
(2)如果AB=6,AC=4,求AE,BE的长.

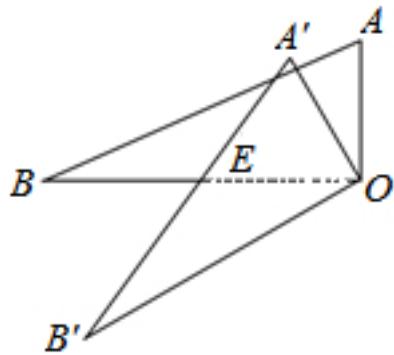


graph:

{"stem": {"pictures": [{"picturename": "1000080174_Q_1.jpg", "coordinates": {"A": "1.00,4.00", "B": "-1.46, 2.28", "C": "1.65,2.11", "D": "0.03,1.02", "E": "-1.05,2.57", "F": "1.81,1.64", "G": "0.10,2.19"}, "collineations": {"0": "A###E###B", "1": "A###D", "2": "A###C###F", "3": "B###G###C", "4": "E###D", "5": "G###D", "6": "F###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, LinePerpRelation{line1=DG, line2=BC, crossPoint=G}, LineDecileSegmentRelation[iLine1=DG, iLine2=BC, crossPoint=Optional.of(G)], LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=AC, crossPoint=F}, LineCrossRelation[crossPoint=Optional.of(F), iLine1=DF, iLine2=AC], EqualityRelation{AB=6}, EqualityRelation{AC=4}, 求值(大小): (ExpressRelation:[key:]AE), 求值(大小):
(ExpressRelation:[key:]BE), ProveConclusionRelation:[证明:
EqualityRelation{BE=CF}], SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AE)}, SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]BE)})

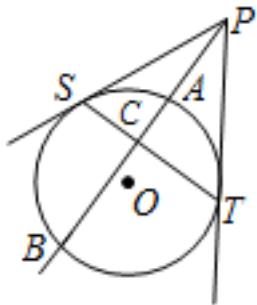
115、topic: 如图, $\triangle AOB$ 中, $\angle AOB = 90^\circ$, $AO = 3$, $BO = 6$, $\triangle AOB$ 绕顶点 O 逆时针旋转到 $\triangle A'OB'$ 处, 此时线段 $A'B'$ 与 BO 的交点 E 为 BO 的中点, 求线段 $B'E$ 的长度. # % #



graph:
 {"stem": {"pictures": [{"picturename": "1000070466_Q_1.jpg", "coordinates": {"A": "-9.00, 6.00", "B": "-3.00, 4.00", "O": "-3.00, 6.00", "A)": "-4.81, 8.40", "B)": "-7.79, 2.39", "E": "-6.00, 6.00"}, "collineations": {"0": "A###B", "1": "B###O", "2": "A###O", "3": "B'###O", "4": "A###E###O", "5": "A'###E###B'"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(E), iLine1=A'B',
 iLine2=BO], EqualityRelation{B'E=v_0}, TriangleRelation: $\triangle AOB$, EqualityRelation{ $\angle BOE = (1/2\pi)$ }, EqualityRelation{AO=3}, EqualityRelation{BO=6}, 求值(大小):
 (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]B'E)}

116、topic: 如图, 已知点 P 是 $\odot O$ 外一点, PS, PT 是 $\odot O$ 的两条切线, 过点 P 作 $\odot O$ 的割线 PAB, 交 $\odot O$ 于 A、B 两点, 并交 ST 于点 C, 求证 $\frac{1}{PC} = \frac{1}{2}(\frac{1}{PA} + \frac{1}{PB})$. # % #

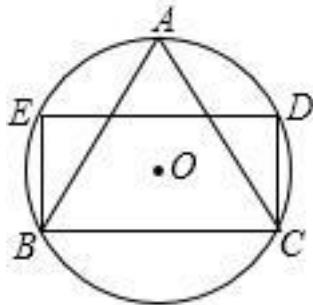


graph:
 {"stem": {"pictures": [{"picturename": "1000052579_Q_1.jpg", "coordinates": {"A": "-4.24, 4.23", "B": "-5.78, 1.18", "C": "-4.67, 3.38", "S": "-5.90, 3.91", "P": "-3.30, 6.09", "T": "-3.07, 2.70", "O": "-4.79, 2.59"}, "collineations": {"0": "P###T", "1": "S###P", "2": "S###C###T", "3": "P###A###C###B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "S###A###T##B"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: PointOutCircleRelation{point=Pcurve=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2 + (y-y_O)^2 = r_O^2$, points=[P]}, LineContactCircleRelation{line=PS, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2 + (y-y_O)^2 = r_O^2$ }, contactPoint=Optional.of(S)}, outpoint=Optional.of(P)}, LineContactCircleRelation{line=PT, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2 + (y-y_O)^2 = r_O^2$ }, contactPoint=Optional.of(T)}, outpoint=Optional.of(P)}, ProveConclusionRelation:[证明]:

EqualityRelation{(1/(CP))=(1/2)*((1/(AP))+(1/(BP))))}]

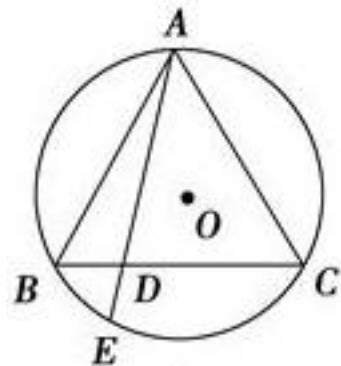
117、topic: 如图,\$\odot O\$的半径为1,\$\triangle ABC\$是\$\odot O\$的内接等边三角形,点D、E在圆上,四边形BCDE为矩形,求这个矩形的面积.#%#



graph:
 {"stem": {"pictures": [{"picturename": "F06509CA3C974FC18706AD56696F7E0A.jpg", "coordinates": {"A": "-11.00,8.00", "B": "-13.60,3.50", "C": "-8.40,3.50", "D": "-8.40,6.50", "E": "-13.60,6.50", "O": "-11.00,5.00"}, "collineations": {"0": "C##A", "1": "B##A", "2": "B##C", "3": "B##E", "4": "C##D", "5": "E##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##D##A##B##E"}]}, "appliedproblems": {}, "substems": []}}

NLP:
 RectangleRelation{rectangle=Rectangle:BCDE}, EqualityRelation{S_BCDE=v_0}, RadiusRelation{radius=null, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, length=Express:[1]}, PointOnCircleRelation{circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, points=[D, E]}, RectangleRelation{rectangle=Rectangle:BCDE},
 求值(大小): (ExpressRelation:[key]:v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:S_BCDE)}

118、topic: 如图,在圆内接\$\triangle ABC\$中,\$AB=AC\$,D是BC边上一点,AD交圆于点E.?%#(1)求证:\$\{AB\}^2 = AD \cdot AE\$?%#(2)当D为BC延长线上一点时,(1)的结论还成立吗?若成立,请给出证明;若不成立,请说明理由.

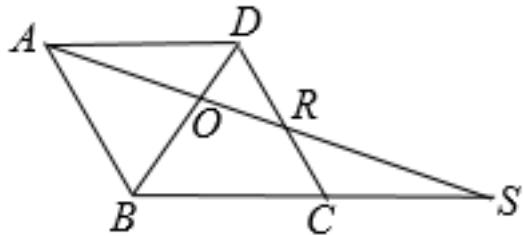


graph:
 {"stem": {"pictures": [{"picturename": "1000008181_Q_1.jpg", "coordinates": {"A": "0.00,6.00", "B": "-4.00,0.00", "C": "4.00,0.00", "D": "-1.39,0.00", "E": "-1.91,-2.22", "O": "0.00,1.67"}, "collineations": {"0": "B##A", "1": "A##C", "2": "B##C", "3": "D##A##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##E"}]}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "3.4.1B_4.jpg", "coordinates": {"D": "8.00,0.00", "E": "4.16,2.88"}, "collineations": {"0": "B##C##E", "1": "D##A##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A"}]}]}]}

###B###C###D"}]], "appliedproblems": {}}}

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, EqualityRelation{AB=AC}, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, LineCrossCircleRelation{line=AD, circle= $\odot O$, crossPoints=[E], crossPointNum=1}, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=true}, ProveConclusionRelation:[证明: EqualityRelation{(AB) $^2=AD*AE$ }]

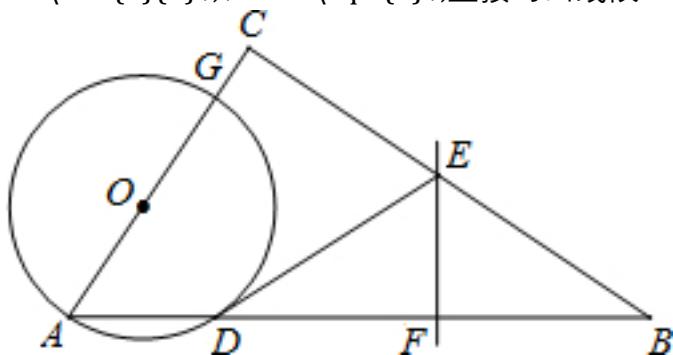
119、topic: 已知如图:在菱形ABCD中,O是对角线BD上的一点.连接AO并延长,与DC交于点R,与BC的延长线交于点S.若AD=4, $\angle DCB=60^\circ$,BS=10.%(1)求AS的长度;%(2)求OR的长度.%



graph:
{"stem":{"pictures":[{"picturename":"1000040744_Q_1.jpg","coordinates":{"A": "-1.00,1.73","B": "0.00,0.00","C": "2.00,0.00","D": "1.00,1.73","O": "0.71,1.24","R": "1.40,1.04","S": "5.00,0.00"}, "collinearities": {"0": "A##B", "1": "B##C##S", "2": "C##R##D", "3": "D##A", "4": "A##O##R##S", "5": "B##O##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: RhombusRelation{rhombus=Rhombus:ABCD}, PointOnLineRelation{point=O, line=BD, isConstant=false, extension=false}, SegmentRelation:AO, LineCrossRelation [crossPoint=Optional.of(R), iLine1=AO, iLine2=DC], LineCrossRelation [crossPoint=Optional.of(S), iLine1=AO, iLine2=BC], EqualityRelation{AD=4}, EqualityRelation{ $\angle BCR=(1/3*\pi)$ }, EqualityRelation{BS=10}, EqualityRelation{AS=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{OR=v_1}, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AS)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]OR)}

120、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$,点G是线段AC上的一动点(点G不与A、C重合),以AG为直径的 $\odot O$ 交AB于点D,直线EF垂直平分BD,垂足为F,EF交BC于点E,连接DE.%(1)求证:DE是 $\odot O$ 的切线;%(2)若 $\cos A=\frac{1}{2}$, $AB=8\sqrt{3}$, $AG=2\sqrt{3}$,求BE的长;%(3)若 $\cos A=\frac{1}{2}$, $AB=8\sqrt{3}$,直接写出线段BE的取值范围.%

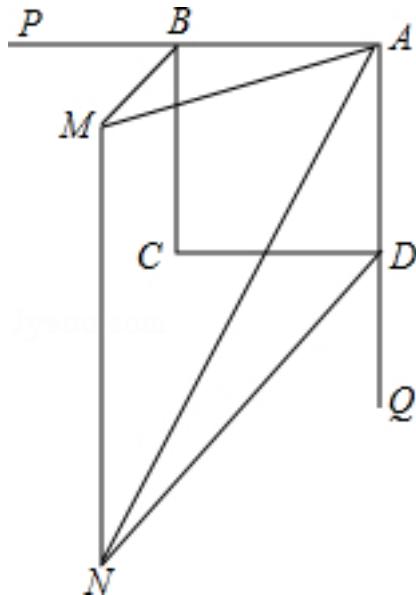


graph:
{"stem":{"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": ""}]}}

s": [{"picturename": "1000080890_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.93,0.00", "C": "1.73,3.00", "D": "1.21,0.00", "E": "4.07,1.65", "F": "4.07,0.00", "G": "1.21,2.10", "O": "0.61,1.05"}, "collineations": {"0": "A###D###F###B", "1": "C###G###O###A", "2": "C###E###B", "3": "D###E", "4": "F###E"}, "variable-equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000080890_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.93,0.00", "C": "1.73,3.00", "D": "0.87,0.00", "E": "3.90,1.75", "F": "3.90,0.00", "G": "0.87,1.50", "O": "0.43,0.75"}, "collineations": {"0": "A###D###F###B", "1": "C###G###O###A", "2": "C###E###B", "3": "D###E", "4": "F###E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}], "appliedproblems": {}}]

NLP: DiameterRelation{diameter=AG, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, NegativeRelation{relation=PointCoincidenceRelation{point1=G, point2=A}}, NegativeRelation{relation=PointCoincidenceRelation{point1=G, point2=C}}, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ECG = (1/2)\pi$ }, PointOnLineRelation{point=G, line=AC, isConstant=false, extension=false}, LineCrossCircleRelation{line=AB, circle= $\odot O$, crossPoints=[D], crossPointNum=1}, MiddlePerpendicularRelation [iLine1=EF, iLine2=BD, crossPoint=Optional.of(F)], LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=BC], SegmentRelation:DE, EqualityRelation{BE=v_0}, EqualityRelation{cos($\angle DAO$)=(1/2)}, EqualityRelation{AB=8*(3^(1/2))}, EqualityRelation{AG=2*(3^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{cos($\angle DAO$)=(1/2)}, EqualityRelation{AB=8*(3^(1/2))}, SegmentRelation:BE, 取值范围: (ExpressRelation:[key:]BE), ProveConclusionRelation:[证明: LineContactCircleRelation{line=DE, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.absent(), outpoint=Optional.absent()}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BE)}, SolutionConclusionRelation{relation=取值范围: (ExpressRelation:[key:]BE)}]

121、topic: 已知:如图,正方形ABCD,BM、DN分别平分正方形的两个外角,且满足 $\angle MAN = 45^\circ$,连结MN.(1)若正方形的边长为a,求 $BM \cdot DN$ 的值.(2)若以BM,DN,MN为三边围成三角形,试猜想三角形的形状,并证明你的结论.



graph:
{"stem": {"pictures": [{"picturename": "1000010830_Q_1.jpg", "coordinates": {"A": "15.00,5.00", "B": "10.00,5.00", "C": "10.00,0.00", "D": "15.00,0.00", "M": "8.19,3.19", "N": "8.19,-6.74", "P": "6.00,5.00", "Q": "15.00,-4.00"}, "collineations": {"0": "B###P###A", "1": "B###M", "2": "D###Q###A", "3": "A###M", "4": "N###M", "5": "C###D", "6": "A###N", "7": "D###N", "8": "C###B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}]}

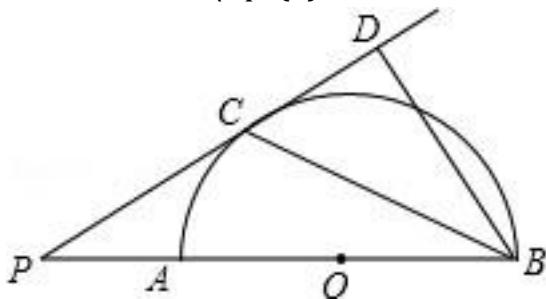
ems":{},"substems":[{"substemid": "1","questionrelies": "2","pictures":[],"appliedproblems":{}},{"substemid": "2","questionrelies": "1","pictures":[],"appliedproblems":{}}]}

NLP:

SquareRelation{square=Square:ABCD}, EqualityRelation{ $\angle MAN = (1/4 \cdot \pi)$ }, SegmentRelation:MN, SquareRelation{square=Square:ABCD, length=a}, 求值(大小):

(ExpressRelation:[key:]BM*DN), SegmentRelation:BM, SegmentRelation:DN, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BM*DN)}

122、topic: 如图,AB是半圆O的直径,点P在BA的延长线上,PD切 $\odot O$ 于点C,\$BD \perp PD\$,垂足为D,连接BC.?(1)求证:BC平分 $\angle PBD$?#%(2)求证: $\{BC\}^2 = AB \cdot BD$?#%(3)若 $PA=6$, $PC=6\sqrt{2}$,求BD的长.

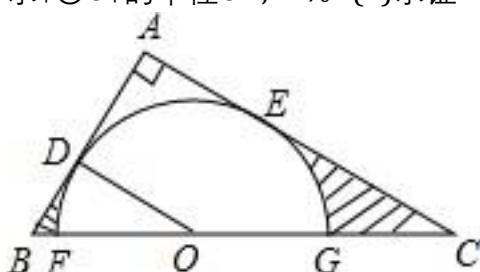


graph:

{"stem": {"pictures": [{"picturename": "1000026758_Q_1.jpg", "coordinates": {"A": "9.00,7.00", "B": "15.00,7.00", "C": "11.00,9.83", "D": "13.67,10.77", "O": "12.00,7.00", "P": "3.00,7.00"}, "collineations": {"0": "B##D", "1": "B##C", "2": "D##C##P", "3": "B##O##A##P"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}]}], "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, PointOnLineRelation{point=P, line=BA, isConstant=false, extension=true}, LineContactCircleRelation{line=PD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(C), outpoint=Optional.absent()}}, LinePerpRelation{line1=BD, line2=PD, crossPoint=D}, SegmentRelation:BC, EqualityRelation{BD=v_0}, EqualityRelation{AP=6}, EqualityRelation{CP=6*(2^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: AngleBisectorRelation{line=BC, angle= $\angle DBO$, angle1= $\angle CBD$, angle2= $\angle CBO$ }], ProveConclusionRelation:[证明: EqualityRelation{((BC)^2)=AB*BD}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BD)}

123、topic: 如图,在 $Rt\triangle ABC$ 中, $\angle A=90^\circ$,O是BC边上一点,以O为圆心的半圆与AB边相切于点D,与AC、BC边分别交于点E、F、G,连接OD,已知 $BD=2$, $AE=3$, $\tan \angle BOD=\frac{2}{3}$.?(1)求 $\odot O$ 的半径OD?#%(2)求证:AE是 $\odot O$ 的切线?#%(3)求图中两部分阴影面积的和.

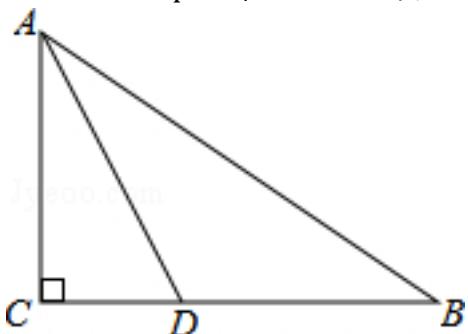


graph:

{"stem": {"pictures": [{"picturename": "1000026757_Q_1.jpg", "coordinates": {"A": "2.89,5.10", "B": "0.54,1.00", "C": "10.03,1.00", "D": "1.40,2.49", "E": "5.49,3.60", "F": "1.00,1.00", "G": "7.00,1.00", "O": "4.00,1.00"}, "collinearities": {"0": "O##D", "1": "A##D##B", "2": "A##E##C", "3": "B##F##O##G##C"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "D##E##F##G"}]}, "appliedproblems": {}, "substems": []}}

NLP: CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{ $\angle DAE=(1/2\pi)$ }, PointOnLineRelation{point=O, line=BC, isConstant=false, extension=false}, LineContactCircleRelation{line=AB, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.absent()}, SegmentRelation:AB, PointRelation:F, PointRelation:G, SegmentRelation:OD, EqualityRelation{BD=2}, EqualityRelation{AE=3}, EqualityRelation{tan($\angle DOF)=(2/3)$ }, ProveConclusionRelation:[证明: LineContactCircleRelation{line=AE, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(E), outpoint=Optional.of(A)}]

124、topic: 在Rt $\triangle ABC$ 中, $\angle C=90^\circ$, AD平分 $\angle CAB$, AC=6, BC=8, 求CD的长度.#%#



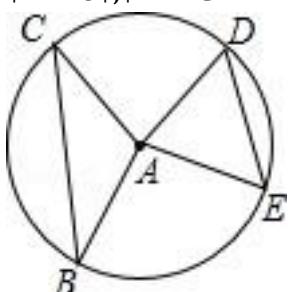
graph:

{"stem": {"pictures": [{"picturename": "1000031255_Q_1.jpg", "coordinates": {"A": "-9.00,5.00", "B": "-5.00,2.00", "C": "-9.00,2.00", "D": "-7.50,2.00"}, "collinearities": {"0": "A##D", "1": "A##B", "2": "A##C", "3": "B##D##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{CD=v_0}, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACD=(1/2\pi)$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, EqualityRelation{AC=6}, EqualityRelation{BC=8}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]CD)}

125、topic: 如图,半径为5的 $\odot A$ 中,弦BC,ED所对的圆心角分别是 $\angle BAC$, $\angle EAD$.已知 $\angle BAC+\angle EAD=180^\circ$,求弦BC的弦心距.

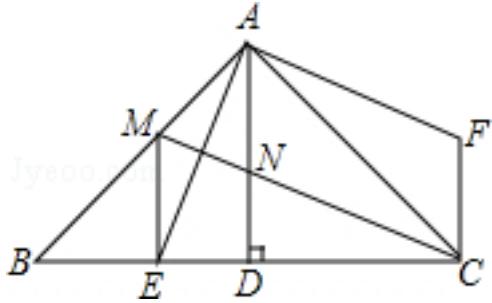


graph:

{"stem":{"pictures":[{"picturename":"1000024907_Q_1.jpg","coordinates":{"A":"0.00,0.00","B":"-3.00,-4.00","C":"-3.00,4.00","D":"1.40,4.800","E":"5.00,0.00"}],"collineations":{"0":"A###B","1":"B###C","2":"C###A","3":"D###A","4":"D###E","5":"A###E"}, "variable>equals":{},"circles":[{"center": "A","pointInCircle": "C###D###B###E"}]}],"appliedproblems":{},"substems":[]}

NLP: RadiusRelation{radius=null, circle=Circle[\odot A]{center=A}, analytic=(x-x_A)^2+(y-y_A)^2=r_A^2}, length=Express:[5], ChordOfCircleRelation{chord=BC, circle=Circle[\odot A]{center=A, analytic=(x-x_A)^2+(y-y_A)^2=r_A^2}, chordLength=null, straightLine=null}, AngleRelation{angle= $\angle DAE$ }, EqualityRelation{DE=6}, EqualityRelation{ $\angle BAC + \angle DAE = (\pi)$ }

126、topic: 如图, $\triangle ABC$ 中, $\angle BAC = 90^\circ$, $AB = AC$, $AD \perp BC$, 垂足是点D, AE 平分 $\angle BAD$, 交 BC 于点E. 在 $\triangle ABC$ 外有一点F, 使 $FA \perp AE$, $FC \perp BC$. #%#(1) 求证: $BE = CF$; #%#(2) 在AB上取一点M, 使 $BM = 2DE$, 连接MC, 交AD于点N, 连接ME. #%#求证: ① $ME \perp BC$; ② $DE = DN$. #%#



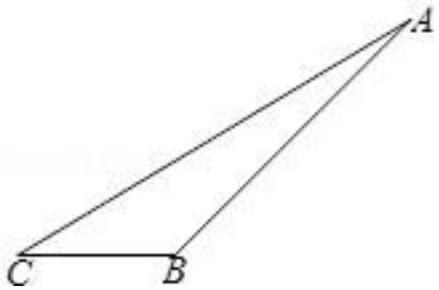
graph:

{"stem":{"pictures":[], "appliedproblems":{}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000031212_Q_1.jpg", "coordinates": {"A": "-10.00,4.00", "B": "-13.00,1.00", "C": "-7.0", "D": "-10.00,1.00", "E": "-11.22,1.00", "F": "-7.00,2.78"}, "collineations": {"0": "B###E##D###C", "1": "B###A", "2": "A###F", "3": "A###E", "4": "A###C", "5": "A###D", "6": "F###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "picture": [{"picturename": "1000031212_Q_2.jpg", "coordinates": {"M": "-11.27,2.73", "N": "-10.00,2.22"}, "collineations": {"0": "M###E", "1": "M###N###C", "2": "A###N###D", "3": "A###M###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle BAC = (1/2\pi)$ }, EqualityRelation{ $AB = AC$ }, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, AngleBisectorRelation{line=AE, angle= $\angle BAD$, angle1= $\angle BAE$, angle2= $\angle DAE$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AE, iLine2=BC], PositionOfPoint2RegionRelation{point=F, region=EnclosedRegionRelation{name=ABC, closedShape= $\triangle ABC$ }, position=outer}, LinePerpRelation{line1=FA, line2=AE, crossPoint=A}, LinePerpRelation{line1=FC, line2=BC, crossPoint=C}, PointOnLineRelation{point=M, line=AB, isConstant=false, extension=false}, EqualityRelation{BM=2*DE}, SegmentRelation:MC, LineCrossRelation [crossPoint=Optional.of(N), iLine1=MC, iLine2=AD], SegmentRelation:ME, ProveConclusionRelation:[证明: EqualityRelation{BE=CF}]

127、topic: 已知:如图,在 $\triangle ABC$ 中,\$BC=2\$,\$\{S\}_{\triangle ABC}=3\$,\$\angle ABC=135^\circ\$,求\$\{AC\}^2\$,\$\{AB\}^2\$的长.

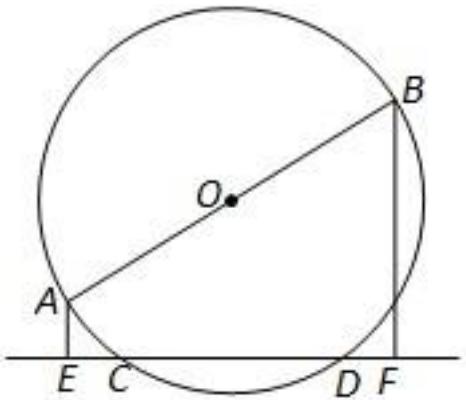


graph:
 {"stem": {"pictures": [{"picturename": "1000027619_Q_1.jpg", "coordinates": {"A": "3.00,3.00", "B": "0.00,0.00", "C": "-2.00,0.00"}, "collineations": {"0": "B##C", "1": "A##B", "2": "A##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $BC=2$ }, EqualityRelation{ $(S_{\triangle})^*_{ABC}=3$ }, EqualityRelation{ $\angle ABC=(3/4*\pi)$ }, 求值(大小): (ExpressRelation:[key:] $((AB)^2)$), 求值(大小): (ExpressRelation:[key:] $((AB)^2)$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $((AB)^2)$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $((AB)^2)$)

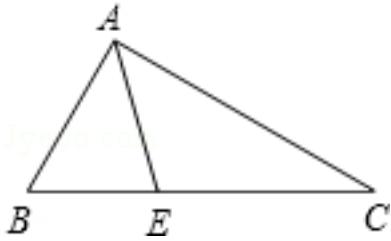
128、topic: 如图,已知AB是 $\odot O$ 直径,CD是弦, $AE \perp CD$, $BF \perp CD$,求证: $EC = DF$



graph:
 {"stem": {"pictures": [{"picturename": "1941A79572FF4CF19596DDC5D9C90EE7_Q_1.jpg", "coordinates": {"A": "-15.37,3.84", "B": "-8.63,8.16", "C": "-14.65,3.00", "D": "-9.35,3.00", "E": "-15.37,3.00", "F": "-8.63,3.00", "O": "-12.00,6.00"}, "collineations": {"0": "B##O##A", "1": "A##E", "2": "B##F", "3": "E##C##D##F"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C##A##B##D"}]}, "appliedproblems": {}, "substems": []]}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}}, LinePerpRelation{line1=AE, line2=CD, crossPoint=E}, LinePerpRelation{line1=BF, line2=CD, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{CE=DF}]

129、topic: 如图,在 $\triangle ABC$ 中, $\angle B=60^\circ$, $\angle C=30^\circ$,AE是 $\triangle ABC$ 的角平分线.(1)作BC边上的高AD;(2)求 $\angle DAE$ 的度数.



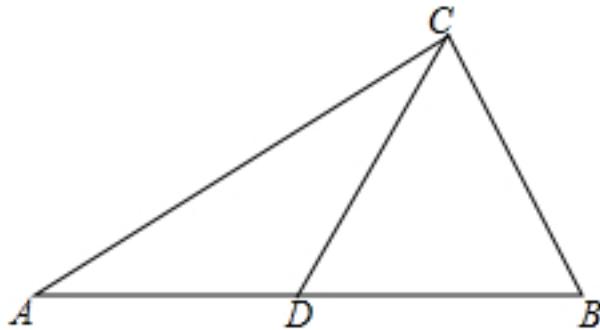
graph:

```
{"stem": {"pictures": [{"picturename": "1000030697_Q_1.jpg", "coordinates": {"A": "1.25,2.17", "B": "0.00,0.00", "C": "5.01,0.00", "D": "1.25,0.00", "E": "1.83,0.00"}, "collineations": {"0": "B###D###E###C", "1": "B##A", "2": "A###D", "3": "E###A", "4": "A###C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ABD = (1/3\pi)\}$, EqualityRelation $\{\angle ACE = (1/6\pi)\}$, TriangleRelation: $\triangle ABC$, AngleBisectorRelation $\{line = AE, angle = \angle BAC, angle1 = \angle CAE, angle2 = \angle BAE\}$, LinePerpRelation $\{line1 = BC, line2 = AD, crossPoint = D\}$, SegmentRelation:AD, LinePerpRelation $\{line1 = AD, line2 = BD, crossPoint = D\}$, 求角的大小: AngleRelation $\{angle = \angle DAE\}$, SolutionConclusionRelation $\{relation = \text{求值(大小)}: (\text{ExpressRelation}:[key:] \angle DAE)\}$

130、topic: 如图,在 $\triangle ABC$ 中,已知D是AB的中点, $AC=12$, $BC=5$, $CD=\frac{13}{2}$.求证: $\triangle ABC$ 为直角三角形.#%#



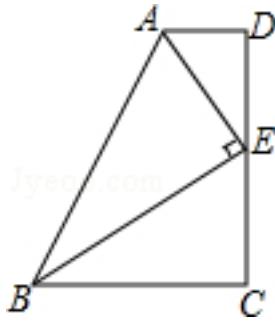
graph:

```
{"stem": {"pictures": [{"picturename": "1000035800_Q_1.jpg", "coordinates": {"A": "-24.00,1.00", "B": "-11.00,1.00", "C": "-12.92,5.62", "D": "-17.50,1.00"}, "collineations": {"0": "A###C", "1": "C##B", "2": "C##D", "3": "A##D##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, MiddlePointOfSegmentRelation $\{middlePoint = D, segment = AB\}$, EqualityRelation $\{AC = 12\}$, EqualityRelation $\{BC = 5\}$, EqualityRelation $\{CD = \frac{13}{2}\}$, ProveConclusionRelation:[证明: RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)]]]

131、topic: 如图,在四边形ABCD中, $AD \parallel BC$,E为CD的中点,连接AE、BE, $BE \perp AE$.求证: $AB = BC + AD$.#%#

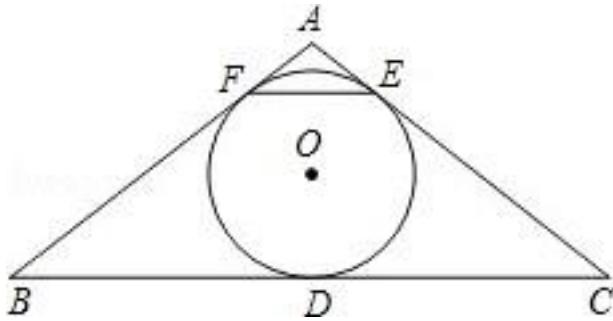


graph:

{"stem": {"pictures": [{"picturename": "1000033511_Q_1.jpg", "coordinates": {"A": "3.20,6.00", "B": "0.00,0.00", "C": "5.00,0.00", "D": "5.00,6.00", "E": "5.00,3.00"}, "collineations": {"0": "A##E", "1": "E##B", "2": "B##A", "3": "A##D", "4": "D##E##C", "5": "C##B"}, "variable-equals": {}, "circles": []}], "appliedproblem": {}}, "substems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LineParallelRelation [iLine1=AD,iLine2=BC],MiddlePointOfSegmentRelation{middlePoint=E,segment=CD},SegmentRelation:AE,SegmentRelation:BE,LinePerpRelation{line1=BE, line2=AE, crossPoint=E},ProveConclusionRelation:[证明:EqualityRelation{AB=BC+AD}]

132、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$,内切圆O与边BC、AC、AB分别切于D、E、F.
#%#(1)求证: $BF=CE$;
#%#(2)若 $\angle C=30^\circ$, $CE=2\sqrt{3}$,求AC的长.
#%#



graph:

{"stem": {"pictures": [{"picturename": "1000008275_Q_1.jpg", "coordinates": {"A": "0.00,2.00", "B": "-3.46,0.00", "C": "3.46,0.00", "E": "0.46,1.73", "D": "0.00,0.00", "F": "-0.46,1.73", "O": "0.00,0.93"}, "collineations": {"0": "A##E##C", "1": "A##B##F", "2": "B##D##C", "3": "E##F"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "D##E##F"}]}, "appliedproblems": {}}, "substems": []]}

NLP:

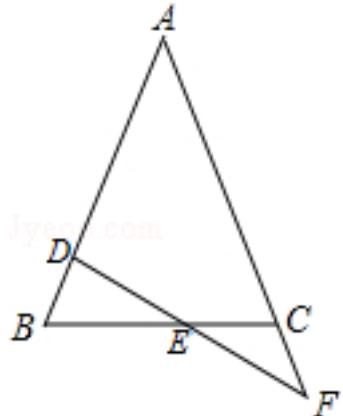
TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=AC$ }, PointRelation:E, PointRelation:F, EqualityRelation{ $A C=v_0$ }, EqualityRelation{ $\angle DCE=(1/6\pi)$ }, EqualityRelation{ $CE=2*(3^{(1/2)})$ }, 求值(大小):
(ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
EqualityRelation{ $BF=CE$ }], SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AC)}

133、topic: 如图,在正方形ABCD中, $AB=4$,P是CD边上的动点(P点不与C,D重合),过点P作直线与BC的延长线交于点E,与AD交于点F,且 $CP=CE$,连接DE,BP,BF,设 $CP=x$, $\triangle PBF$ 的面积为 $\{S_1\}$, $\triangle PDE$ 的面积为 $\{S_2\}$.
#%#(1)求证: $BP \perp DE$;
#%#(2)求 $\{S_1\}-\{S_2\}$ 关于x的函数关系式,并写出x的取值范围;
#%#(3)分别求当 $\angle PBF=30^\circ$ 和 $\angle PBF=45^\circ$ 时, $\{S_1\}-\{S_2\}$ 的值.
#%#

graph:

NLP: NegativeRelation{relation=PointCoincidenceRelation{point1=P, point2=C}},NegativeRelation{relation=PointCoincidenceRelation{point1=P, point2=D}},SquareRelation{square=Square:ABCD},EqualityRelation{AB=4},PointOnLineRelation{point=P, line=CD, isConstant=false, extension=false},PointOnLineRelation{point=P, line=StraightLine[l_0] analytic :y=k_l_0*x+b_l_0 slope:null b:null isLinearFunction:false, isConstant=false, extension=false},LineCrossRelation [crossPoint=Optional.of(E), iLine1=StraightLine[l_0] analytic :y=k_l_0*x+b_l_0 slope:null b:null isLinearFunction:false, iLine2=BC],LineCrossRelation [crossPoint=Optional.of(F), iLine1=StraightLine[l_0] analytic :y=k_l_0*x+b_l_0 slope:null b:null isLinearFunction:false, iLine2=AD],EqualityRelation{CP=CE},SegmentRelation:DE,SegmentRelation:BP,SegmentRelation:BF,E qualityRelation{CP=x},EqualityRelation{S_△BFP=S_1},EqualityRelation{S_△DEP=S_2},表达式之间的关系: DualExpressRelation{expresses=[Express:[S_1-S_2], Express:[x]]},取值范围: (ExpressRelation:[key:]x),求值(大小): (ExpressRelation:[key:]S_1-S_2),ProveConclusionRelation:[证明: LinePerpRelation{line1=BP, line2=DE, crossPoint=}],SolutionConclusionRelation{relation=表达式之间的关系: DualExpressRelation{expresses=[Express:[S_1-S_2], Express:[x]]}},SolutionConclusionRelation{relation=取值范围: (ExpressRelation:[key:]x)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_1-S_2)}

134、topic: 已知 $\triangle ABC$ 中, $AB=AC$,直线DF交AB于点D,交BC于点E,交AC的延长线于点F, $BD=CF$,求证: $DE=EF$.#%#

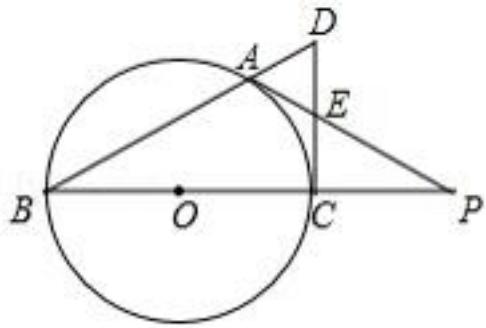


graph:

{"stem": {"pictures": [{"picturename": "1000030932_Q_1.jpg", "coordinates": {"A": "-9.00,6.00", "B": "-10.59,2.02", "C": "-7.41,2.03", "D": "-10.19,3.01", "E": "-8.63,2.03", "F": "-7.00,1.00"}, "collinearities": {"0": "B##D##A", "1": "A###C###F", "2": "C###E###B", "3": "D###E###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}

NLP: TriangleRelation:△ABC,EqualityRelation{AB=AC},LineCrossRelation [crossPoint=Optional.of(D), iLine1=DF, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(E), iLine1=DF, iLine2=BC],LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=AC],EqualityRelation{BD=CF},ProveConclusionRelation:[证明: EqualityRelation{DE=EF}]

135、topic: 如图,\$BC\$是\$\odot O\$的直径,\$A\$是\$\odot O\$上一点,过点\$C\$作\$\odot O\$的切线,交\$BA\$的延长线于点\$D\$,取\$CD\$的中点\$E\$,\$AE\$的延长线与\$BC\$的延长线交于点\$P\$.?%#(1)求证:\$AP\$是\$\odot O\$的切线;?(2)\$OC=CP\$,\$AB=6\$,求\$CD\$的长.



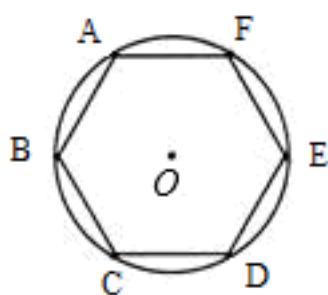
graph:

```
{"stem": {"pictures": [{"picturename": "1000010170_Q_1.jpg", "coordinates": {"A": "1.74,2.99", "B": "-3.46,0.00", "C": "3.46,0.00", "D": "3.46,4.00", "E": "3.46,1.99", "P": "6.87,0.00", "O": "0.00,0.00"}, "collineations": {"0": "B###A##D", "1": "C##E##D", "2": "A##P##E", "3": "B##O##C##P"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}]}, {"appliedproblems": {}, "substems": [{"subste mid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}]
```

NLP:

```
MiddlePointOfSegmentRelation{middlePoint=E,segment=CD},DiameterRelation{diameter=BC,circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2},length=null},PointOnCircleRelation{circle=Circle[O]{center=O,analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, points=[A]},LineContactCircleRelation{line=CE,circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(C),outpoint=Optional.of(E)},PointRelation:E,LineCrossRelation [crossPoint=Optional.of(P), iLine1=AE, iLine2=BC],EqualityRelation{CD=v_1},EqualityRelation{CO=CP},EqualityRelation{AB=6},求值(大小): (ExpressRelation:[key:]v_1),ProveConclusionRelation:[证明: LineContactCircleRelation{line=AP,circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(A),outpoint=Optional.of(P)}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CD)}
```

136、topic: 如图,已知 $\odot O$ 的周长等于\$6\pi cm\$,求圆内接正六边形ABCDEF的面积.#%#

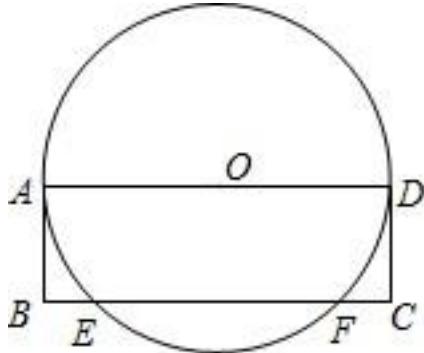


graph:

```
{"stem": {"pictures": [{"picturename": "1000083407_Q_1.jpg", "coordinates": {"A": "-0.99,1.69", "B": "-1.96,-0.02", "C": "-0.96,-1.70", "D": "0.99,-1.69", "E": "1.96,-0.03", "F": "0.96,1.70", "O": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "D##E", "4": "E##F", "5": "A##F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D##E##F"}]}, {"appliedproblems": {}, "substems": []}]}
```

NLP: EqualityRelation{C_O=v_0},EqualityRelation{v_0=6*Pi*c*m}

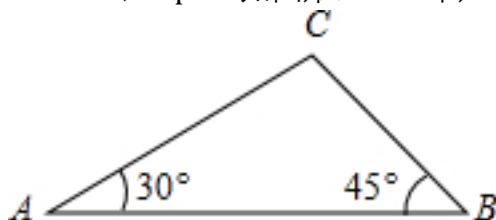
137、topic: 如图,四边形\$ABCD\$是矩形,以AD为直径的\$\odot O\$交BC边于点E、F,\$AB=4\$,\$AD=12\$.求线段EF的长.



graph:
 {"stem": {"pictures": [{"picturename": "1A1B9A2D68BA400788D6220CF3B816E5_Q_1.jpg", "coordinate": "s": {"A": "-16.00,7.00", "B": "-16.00,-3.00", "C": "4.00,-3.00", "D": "4.00,7.00", "E": "-4.00,-3.00", "F": "4.00,-3.00", "O": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "A##O##D", "2": "B##E##F##C", "3": "D##C"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##D##E##F"}], "appliedproblems": {}}, "substems": []}}

NLP: DiameterRelation{diameter=AD, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, length=null}, EqualityRelation{EF=v_0}, RectangleRelation{rectangle=Rectangle:ABCD}, LineCrossCircleRelation{line=BC, circle=\$\odot O\$, crossPoints=[E], crossPointNum=1}, PointRelation:F, EqualityRelation{AB=4}, EqualityRelation{AD=12}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]EF)}

138、topic: 如图,在\$\triangle ABC\$中,\$\angle A=30^\circ\$,\$\angle B=45^\circ\$,\$AC=2\sqrt{3}\$,求AB的长.%#

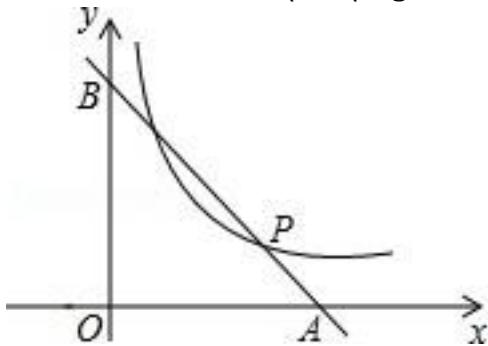


graph:
 {"stem": {"pictures": [{"picturename": "1000060434_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.73,0.00", "C": "3.00,1.73"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##C"}, "variable-equals": {}, "circles": {}}, "appliedproblems": {}}, "substems": []}}

NLP:
 EqualityRelation{AB=v_0}, TriangleRelation:\$\triangle ABC\$, EqualityRelation{\$\angle BAC=(1/6*\pi)\$}, EqualityRelation{\$\angle ABC=(1/4*\pi)\$}, EqualityRelation{AC=2*(3^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0[v_0=v_0]), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AB)}

139、topic: 如图,直线\$y=-x+3\$与x,y轴分别交于点A,B,与反比例函数的图象交于点\$P(2,1)\$.
 (1)求该反比例函数的关系式;
 (2)设\$PC\$与y轴于点C,点A关于y轴的对称点为\$A'\$;
 ①求\$\triangle A'BC\$的周长和\$\sin \angle BA'C\$的值;
 ②对大于1的常数m,求x轴上

的点M的坐标,使得 $\sin \angle BMC = \frac{1}{\pi}$.

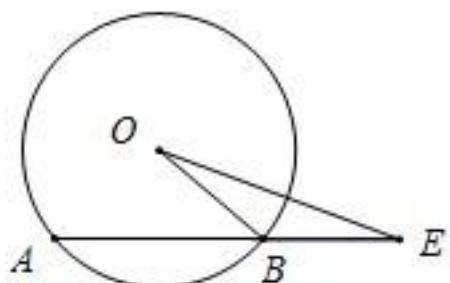


graph:

```
{"stem": {"pictures": [{"picturename": "1000010411_Q_1.jpg", "coordinates": {"A": "3.00,0.00", "B": "0.00,3.00", "P": "2.00,1.00", "O": "0.00,0.00"}, "collineations": {"0": "B###A###P"}, "variable>equals": {}, "circles": []}, {"appliedproblems": {}}, {"substems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [{"picturename": "45.jpg", "coordinates": {"A": "-3.00,0.00", "C": "0.00,1.00"}}, {"0": "B###A", "1": "C###A", "2": "B##C"}], "variable>equals": {}, "circles": []}]}]
```

NLP: LineCrossRelation [crossPoint=Optional.of(A), iLine1=StraightLine[n_0] analytic :y=-x+3 slope:-1 b:3 isLinearFunction:true, iLine2=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false], LineCrossRelation [crossPoint=Optional.of(B), iLine1=StraightLine[n_0] analytic :y=-x+3 slope:-1 b:3 isLinearFunction:true, iLine2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false], FunctionCrossRelation: {function1=INVERSEPROPORTION, InverseProportion[]:y=-x+3, function2=CommonFunction[]:y=k_1/x, 定义域:null Conditions:[[]]}, crossPoints=[point1:[P(2,1)]], crossPointNum=[1], 解析式, 圆锥曲线解析式, 标准方程, 方程: InverseProportionFunctionRelation{inverseProportion=INVERSEPROPORTION, InverseProportion[]:y=k_1/x}, LinePerpRelation{line1=PC, line2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, crossPoint=C}, SymmetricRelation{preData=A, afterData=A', symmetric=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, pivot=}, ConstantValueRelation [constantObject=Express:[m]], InequalityRelation{m>1}, EqualityRelation{sin(∠BMC)=(1/(Pi))}, 坐标 PointRelation:M, PointOnLineRelation{point=M, line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false}, SolutionConclusionRelation{relation=解析式, 圆锥曲线解析式, 标准方程, 方程: InverseProportionFunctionRelation{inverseProportion=INVERSEPROPORTION, InverseProportion[]:y=k_1/x}}, SolutionConclusionRelation{relation=坐标 PointRelation:M}

140、topic: 如图,在 $\odot O$ 中,半径 $OB=10cm$,E是弦AB延长线上一点,连结OE,且 $\angle E=30^\circ$, $OE=12cm$,求AB.

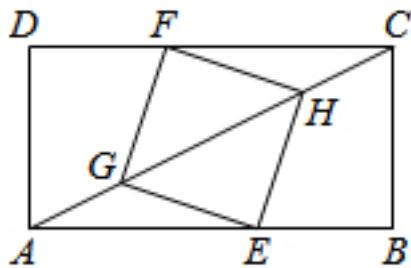


graph:

{"stem": {"pictures": [{"picturename": "1000025134.jpg", "coordinates": {"A": "-4.00, -3.00", "B": "4.00, -3.00", "E": "5.20, -3.00", "O": "0.00, 0.00"}, "collineations": {"0": "B###A###E", "1": "O###B", "2": "O###E"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###B"}]}, "appliedproblems": {}, "substems": "[]"}}

NLP: ChordOfCircleRelation{chord=AB, circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, chordLength=null, straightLine=null}, CircleRelation{circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, RadiusRelation{radius=OB, circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, length=Express:[10], PointOnLineRelation{point=E, line=AB, isConstant=false, extension=true}, SegmentRelation:OE, EqualityRelation{ $\angle BEO = (1/6 * \pi)$ }, EqualityRelation{EO=12}, 求值(大小): (ExpressRelation:[key:]AB), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)}

141、topic: 如图,在矩形ABCD中,AB=8,BC=4,点E在AB上,点F在边CD上,点G、H在对角线AC上.若四边形EGFH是菱形,求AE的长.#%#



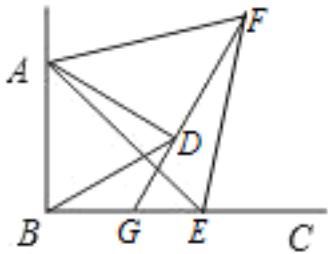
graph:

{"stem": {"pictures": [{"picturename": "22EE08FEA59D4D43B3BDC941948D1F83.jpg", "coordinates": {"A": "-15.00, 3.00", "B": "-7.00, 3.00", "C": "-7.00, 7.00", "D": "-15.00, 7.00", "E": "-10.00, 3.00", "F": "-12.00, 7.00", "G": "-13.00, 4.00", "H": "-9.00, 6.00"}, "collineations": {"0": "A###B###E", "1": "A###C###G###H", "2": "A###D", "3": "B###C", "4": "C###D###F", "5": "E###H", "6": "E###G", "7": "F###H", "8": "F###G"}, "variable-equals": {}, "circles": "[]"}, "appliedproblems": {}, "substems": "[]"}}

NLP:

EqualityRelation{AE=v_0}, RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=8}, EqualityRelation{BC=4}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, PointOnLineRelation{point=G, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=H, line=AC, isConstant=false, extension=false}, RhombusRelation{rhombus=Rhombus:EGFH}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AE)}

142、topic: 如图,已知 $\angle ABC = 90^\circ$, $\triangle ABD$ 是边长为3的等边三角形,点E为射线BC上任意一点(点E与点B不重合),连结AE,在AE上方作等边三角形AEF,连结FD并延长交射线BC于点G.#%#(1)如图(1),当 $BE=BA$ 时,求证: $\triangle ABE \cong \triangle ADF$;%#(2)如图(2),当 $\triangle AEF$ 与 $\triangle ABD$ 不重叠时,求 $\angle FGC$ 的度数;%#(3)若将已知条件中的“在AE的上方作等边三角形AEF,连结FD并延长交射线BC于点G.”改为“在AE的下方作等边三角形AEF,连结FD交射线BC于点G.”如图(3)所示,试问当点E在何处时 $BD \parallel EF$?并求此时 $\triangle AEF$ 的周长.#%#



图(1)

```

graph:
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000037809_Q_1.jpg","coordinates":{"A": "-13.00,6.00","B": "-13.00,-3.00","C": "3.00,-8.63,0.00","D": "-10.40,4.50","E": "-10.00,3.00","F": "-8.90,7.10","G": "-11.30,3.00"}, "collineations": {"0": "B# ##G##E##C", "1": "F##D##G", "2": "A##B", "3": "A##F", "4": "A##D", "5": "A##E", "6": "B##D", "7": "F##E"}, "variable>equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000037809_Q_2.jpg", "coordinates": {"A": "-12.00,-8.00", "B": "-12.00,-11.00", "C": "-3.00,-11.00", "D": "-9.40,-9.50", "E": "-6.00,-11.00", "F": "-6.40,-4.30", "G": "-11.30,-11.00"}, "collineations": {"0": "B##G##E##C", "1": "F##D##G", "2": "A##B", "3": "A##F", "4": "A##D", "5": "A##E", "6": "B##D", "7": "F##E"}, "variable>equals": {}, "circles": []}, {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000037809_Q_3.jpg", "coordinates": {"A": "-15.00,-15.00", "B": "-15.00,-18.00", "C": "-8.00,-18.00", "D": "-12.40,-16.50", "E": "-9.80,-18.00", "F": "-15.00,-21.00", "G": "-13.27,-18.00"}, "collineations": {"0": "A##B##F", "1": "A##D##E", "2": "D##B", "3": "B##G##E##C", "4": "D##G##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000037809_Q_2.jpg", "coordinates": {"A": "-12.00,-8.00", "B": "-12.00,-11.00", "C": "-3.00,-11.00", "D": "-9.40,-9.50", "E": "-6.00,-11.00", "F": "-6.40,-4.30", "G": "-11.30,-11.00"}, "collineations": {"0": "B##G##E##C", "1": "F##D##G", "2": "A##B", "3": "A##F", "4": "A##D", "5": "A##E", "6": "B##D", "7": "F##E"}, "variable>equals": {}, "circles": []}, {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000037809_Q_3.jpg", "coordinates": {"A": "-15.00,-15.00", "B": "-15.00,-18.00", "C": "-8.00,-18.00", "D": "-12.40,-16.50", "E": "-9.80,-18.00", "F": "-15.00,-21.00", "G": "-13.27,-18.00"}, "collineations": {"0": "A##B##F", "1": "A##D##E", "2": "D##B", "3": "B##G##E##C", "4": "D##G##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000037809_Q_3.jpg", "coordinates": {"A": "-15.00,-15.00", "B": "-15.00,-18.00", "C": "-8.00,-18.00", "D": "-12.40,-16.50", "E": "-9.80,-18.00", "F": "-15.00,-21.00", "G": "-13.27,-18.00"}, "collineations": {"0": "A##B##F", "1": "A##D##E", "2": "D##B", "3": "B##G##E##C", "4": "D##G##F"}, "variable>equals": {}, "circles": []}]}]

```

NLP: NegativeRelation{relation=PointCoincidenceRelation{point1=E, point2=B}}, EqualityRelation{ $\angle ABG = (1/2 \cdot \pi)$ }, RegularTriangleRelation:RegularTriangle:△ABD, EqualityRelation{AB=3}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, SegmentRelation:AE, RegularTriangleRelation:RegularTriangle:△AEF, LineCrossRelation [crossPoint=Optional.of(G), iLine1=FD, iLine2=BC], EqualityRelation{BE=AB}, 求角的大小: AngleRelation{angle= $\angle DGE$ }, EqualityRelation{C_△AEF=v_0}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=FD, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(G), iLine1=FD, iLine2=BC], 求值(大小): (ExpressRelation:[key]:v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△ABE, triangleB=△ADF}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]: $\angle DGE$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:C_△AEF)}

143、topic: 如图,在平面直角坐标系中,已知\$A(0,a)\$、\$B(b,0)\$、\$C(3,c)\$三点,其中a、b、c满足关系式: \$|a - 2| + \sqrt{(b - 3)^2 + c^2} = 0\$ #(1)求a、b、c的值.
#%(2)如果在第二象限内有一点\$P(m, \frac{1}{2})\$,请用含m的式子表示四边形ABOP的面积.
#%(3)在(2)的条件下,是否存在点P,使四边形ABOP的面积为\$△AOP\$的面积的两倍? 若存在,求出点P的坐标;若不存在,请说明理由.#%#

```

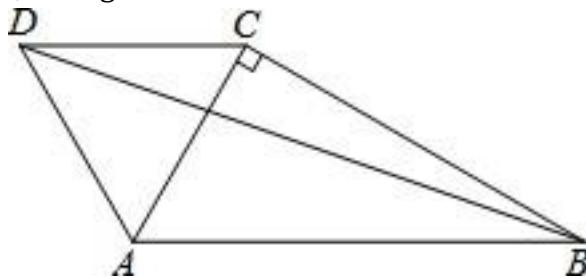
graph:
{"stem":{"pictures": [{"picturename": "1000020119_Q_1.jpg", "coordinates": {"A": "0.00,2.00", "B": "3.00,0.00", "C": "3.00,4.00", "O": "0.00,0.00"}, "collineations": {"0": "C##A", "1": "C##B", "2": "B##A", "3": "O##B", "4": "A##O"}, "variable>equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "3.2.3_14.jpg", "coordinates": {"P": "-3.00,0.50"}, "collineations": {"0": "P##O", "1": "P##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "3.2.3_14.jpg", "coordinates": {"P": "-3.00,0.50"}, "collineations": {"0": "P##O", "1": "P##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "3.2.3_14.jpg", "coordinates": {"P": "-3.00,0.50"}, "collineations": {"0": "P##O", "1": "P##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]

```

NLP:

PointRelation:A(0,a),PointRelation:B(b,0),PointRelation:C(3,c),(ExpressRelation:[key:]a),(ExpressRelation:[key:]b),求值(大小): (ExpressRelation:[key:]a),求值(大小): (ExpressRelation:[key:]b),求值(大小): (ExpressRelation:[key:]c),已知条件
 QuadrilateralRelation{quadrilateral=ABOP},EqualityRelation{S_ABOP=v_0},PointInDomRelation[point=P(m,(1/2)), local=SECOND_QUADRANT],表达式之间的关系:
 DualExpressRelation{expresses=[Express:[v_0], Express:[m]]},已知条件
 QuadrilateralRelation{quadrilateral=ABOP},EqualityRelation{S_ABOP=v_1},EqualityRelation{S_△AOP=v_2},坐标PointRelation:P,SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]a)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]b)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]c)},SolutionConclusionRelation{relation=表达式之间的关系:
 DualExpressRelation{expresses=[Express:[v_0], Express:[m]]}},SolutionConclusionRelation{relation=坐标PointRelation:P}

144、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $\angle ABC=30^\circ$, $BC = 2\sqrt{3}$,以 AC 为边在 $\triangle ABC$ 的外部作等边 $\triangle ACD$,连接 BD .?(1)求四边形 $ABCD$ 的面积;?(2)求 BD 的长.

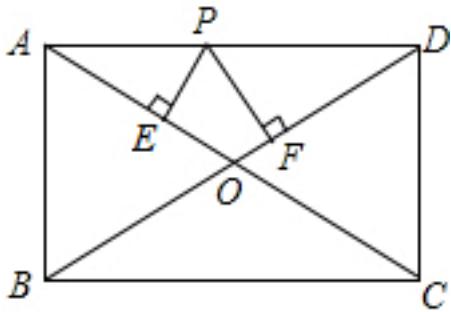


graph:
 {"stem": {"pictures": [{"picturename": "1000007598_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "0.50,1.94", "D": "-1.43,1.40"}, "collineations": {"0": "A##C", "1": "A##D", "2": "D##C", "3": "C##B", "4": "D##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}

NLP:

TriangleRelation:△ABC,EqualityRelation{∠ACB=(1/2*Pi)},EqualityRelation{∠ABC=(1/6*Pi)},EqualityRelation{BC=2*(3^(1/2))},SegmentRelation:BD,已知条件
 QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{S_ABCD=v_0},求值(大小): (ExpressRelation:[key:]v_0),EqualityRelation{BD=v_1},求值(大小): (ExpressRelation:[key:]v_1),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_ABCD)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BD)}

145、topic: 如图,在矩形ABCD中,AB=3,AD=4,P是AD上不与A和D重合的一个动点,过点P分别作AC和BD的垂线,垂足为E,F.求PE+PF的值.



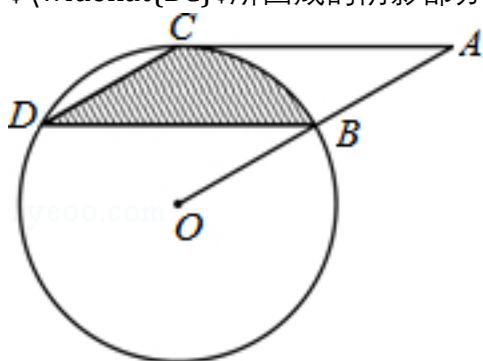
graph:

```
{"stem": {"pictures": [{"picturename": "1000050588_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-8.00,3.00", "C": "-4.00,3.00", "D": "-4.00,6.00", "E": "-6.86,5.14", "F": "-5.42,4.94", "P": "-6.22,6.00", "O": "-6.00,4.50"}, "collineations": {"0": "A###E###O###C", "1": "B###O###F###D", "2": "C##B", "3": "D##C", "4": "A##B", "5": "P###E", "6": "P###F", "7": "A###P###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=3}, EqualityRelation{AD=4}, PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false}, NegativeRelation{relation=PointCoincidenceRelation{point1=P, point2=A}}, NegativeRelation{relation=PointCoincidenceRelation{point1=P, point2=D}}, LinePerpRelation{line1=PE, line2=AC, crossPoint=E}, LinePerpRelation{line1=PF, line2=BD, crossPoint=F}, 求值(大小):
(ExpressRelation:[key:]EP+FP), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]EP+FP)}

146、topic: 如图,点B、C、D都在 $\odot O$ 上,过点C作 $AC \parallel BD$ 交 OB 延长线于点A,连接CD,且 $\angle CDB = \angle OBD = 30^\circ$, $DB = \sqrt{3}$ cm.(1)求证:AC是 $\odot O$ 的切线;(2)求由弦CD、BD与 \widehat{BC} 所围成的阴影部分的面积.(结果保留 π)



graph:

```
{"stem": {"pictures": [{"picturename": "1000040845_Q_1.jpg", "coordinates": {"A": "3.39,1.96", "B": "1.70,0.98", "C": "0.00,1.96", "D": "-1.70,0.98", "O": "0.00,0.00"}, "collineations": {"0": "O###B###A", "1": "A###C", "2": "C###D", "3": "D##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B##C##D"}]}, "appliedproblems": {}, "substems": []}}
```

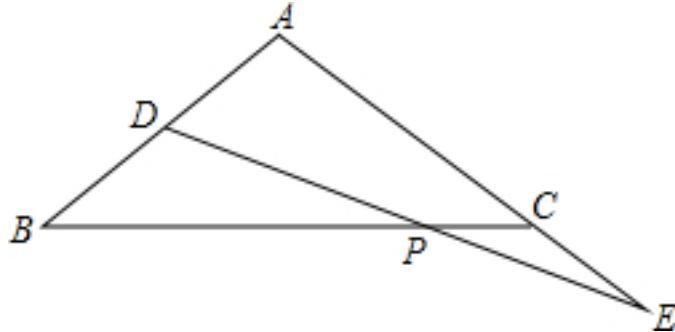
NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[B]}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[C]}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[D]}, PointOnLineRelation{point=C, line=AC},

```

isConstant=false, extension=false},LineParallelRelation [iLine1=AC, iLine2=BD],LineCrossRelation
[crossPoint=Optional.of(A), iLine1=AC, iLine2=OB],SegmentRelation:CD,MultiEqualityRelation
[multiExpressCompare= $\angle BDC = \angle DBO = (1/6 * \pi)$ , originExpressRelationList=[], keyWord=null,
result=null],EqualityRelation{BD={3^(1/2)}},ChordOfCircleRelation{chord=CD,
circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2},
chordLength=null,straightLine=null},ProveConclusionRelation:[证明:
LineContactCircleRelation{line=AC, circle=Circle[O]{center=O,
analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(C), outpoint=Optional.of(A)}]

```

147、topic: 在 $\triangle ABC$ 中,D在AB上,E在AC的延长线上,连接DE交BC于P, $BD=CE$, $DP=EP$,求证: $AB=AC$.#%#



```

graph:
{"stem": {"pictures": [{"picturename": "1000038054_Q_1.jpg", "coordinates": {"A": "0.00,2.35", "B": "-2.88,0.00", "C": "2.88,0.00", "D": "-1.60,1.05", "E": "4.17,-1.05", "P": "1.29,0.00"}, "collinearities": {"0": "A###D##B", "1": "B###P###C", "2": "E###C###A", "3": "E###P###D"}, "variable>equals": {}, "circles": []}, "applydproblems": {}, "substems": []}

```

NLP: TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=true}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=DE, iLine2=BC], EqualityRelation{BD=CE}, EqualityRelation{DP=EP}, ProveConclusionRelation:[证明: EqualityRelation{AB=AC}]

148、topic: (1)如图1,矩形ABCD中,\$\angle A=\angle B=\angle C=\angle D=90^\circ\$.且\$AB=CD\$, \$AD=BC\$,且\$\sqrt{AB-4}+|AD-6|=0\$,点P,Q分别是边AD,AB上的动点.求BD的长;(2)如图2,在P,Q运动中是否能使\$\triangle CPQ\$成为等腰直角三角形?若能,请求出PA的长;若不能,请说明理由;(3)如图3,在BC上取一点E,使\$EC=5\$,那么当\$\triangle EPC\$为等腰三角形时,求出PA的长.#%#

graph:

NLP:

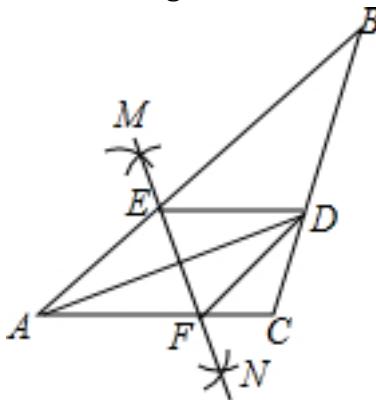
```

EqualityRelation{BD=v_0},(ExpressRelation:[key:]1),RectangleRelation{rectangle=Rectangle:ABCD},MultiEqualityRelation [multiExpressCompare= $\angle A = \angle B = \angle C = \angle D = (1/2 * \pi)$ , originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AB=CD}, EqualityRelation{AD=BC}, EqualityRelation{((AB-4)^(1/2))+abs(AD-6)=0}, PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=Q, line=AB, isConstant=false, extension=false}, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{AP=v_1}, (ExpressRelation:[key:]2), PointRelation:P, 求值(大小):

```

(ExpressRelation:[key:]v_1), EqualityRelation{AP=v_2}, (ExpressRelation:[key:]3), PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{CE=5}, IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle EPC$ [Optional. absent()], 求值(大小): (ExpressRelation:[key:]v_2), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BD)}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AP)}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AP)}

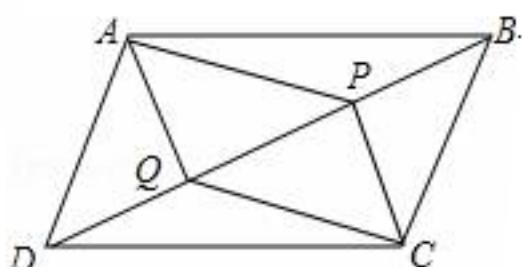
149、topic: 如图,在 $\triangle ABC$ 中,AD平分 $\angle BAC$,按如下步骤作图:第一步,分别以点A、D为圆心,以大于 $\frac{1}{2}AD$ 的长为半径在AD两侧作弧,交于两点M、N;第二步,连接MN分别交AB、AC于点E、F;第三步,连接DE、DF. #%(1)求证:四边形AEDF是菱形;#%(2)若BD=6,AF=4,CD=3,求BE的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000081309_Q_1.jpg", "coordinates": {"A": "2.25,5.10", "B": "10.50, 13.81", "C": "8.25,5.10", "D": "9.00,8.00", "E": "5.00,8.00", "F": "6.25,5.10", "M": "4.16,9.95", "N": "7.09,3.15"}, "collinearities": {"0": "A###E##B", "1": "A##F##C", "2": "A##D", "3": "B##D##C", "4": "E##D", "5": "M##E##F##N", "6": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=AD, angle= $\angle EAF$, angle1= $\angle DAE$, angle2= $\angle DAF$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=MN, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=MN, iLine2=AC], SegmentRelation: DE, SegmentRelation: DF, EqualityRelation{BE=v_0}, EqualityRelation{BD=6}, EqualityRelation{AF=4}, EqualityRelation{CD=3}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:AEDF}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BE)}

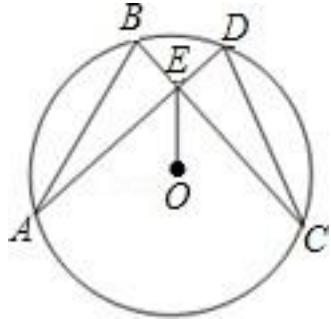
150、topic: 如图,在平行四边形ABCD中,P、Q是对角线BD上的两个点,且BP=DQ. #%#求证:四边形APCQ为平行四边形.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041537_Q_1.jpg", "coordinates": {"A": "1.14,2.35", "B": "5.37,2.35", "C": "4.23,0.00", "D": "0.00,0.00", "P": "3.82,1.67", "Q": "1.56,0.68"}, "collineations": {"0": "A###B", "1": "B###C", "2": "C###D", "3": "D###A", "4": "B###P###Q###D", "5": "A###P", "6": "A###Q", "7": "C###P", "8": "C###Q"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}]}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=P, line=BD, isConstant=false, extension=false}, PointOnLineRelation{point=Q, line=BD, isConstant=false, extension=false}, EqualityRelation{BP=DQ}, ProveConclusionRelation:[证明:
 ParallelogramRelation{parallelogram=Parallelogram:APCQ}]

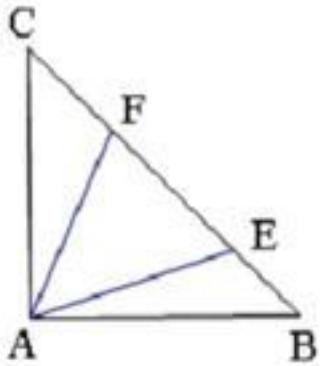
151、topic: 如图,在 $\odot O$ 中,AD、BC相交于点E,OE平分 $\angle AEC$.(1)求证: $AB=CD$;(2)如果 $\odot O$ 的半径为5, $AD \perp CB$, $DE=1$,求AD的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000025139.jpg", "coordinates": {"A": "-4.95,-0.71", "B": "-0.71,4.95", "C": "4.95,-0.71", "D": "0.71,4.95", "E": "0.00,4.24", "O": "0.00,0.00"}, "collineations": {"0": "E###B###C", "1": "A###B", "2": "C###D", "3": "A###D###E", "4": "O###E"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "B###A###C###D"}}], "appliedproblems": {}, "subsystems": []}]}

NLP: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AD, iLine2=BC], AngleBisectorRelation{line=OE, angle= $\angle AEC$, angle1= $\angle AEO$, angle2= $\angle CEO$ }, EqualityRelation{AD=v_0}, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, length=Express:[5], LinePerpRelation{line1=AD, line2=CB, crossPoint=E}, EqualityRelation{DE=1}, 求值(大小):
 (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
 EqualityRelation{AB=CD}], SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AD)}

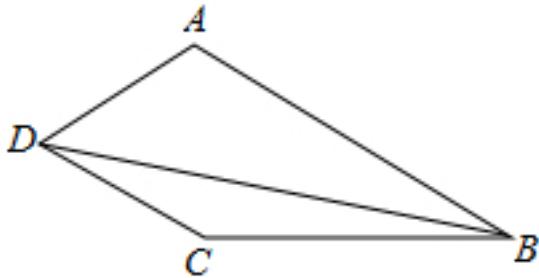
152、topic: 如图,在等腰直角 $\triangle ABC$ 的斜边上取异于B,C的两点E,F,使 $\angle EAF=45^\circ$,求证:以EF,BE,CF为边的三角形是直角三角形.



graph:
 {"stem": {"pictures": [{"picturename": "1000026796_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "0.00,8.00", "E": "6.40,1.60", "F": "3.00,5.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "C#E##F##B", "3": "A##F", "4": "A##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{ $\angle EAF = (1/4 * \pi)$ }, ProveConclusionRelation:[证明:
 SegmentRelation:EF], ProveConclusionRelation:[证明: SegmentRelation:BE]

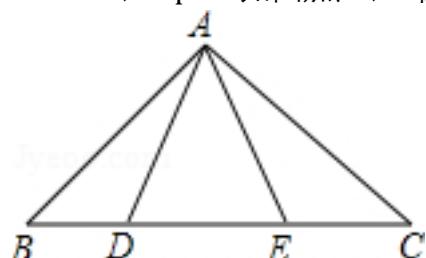
153、topic: 已知:如图,四边形ABCD中, $\angle ADC=60^\circ$, $\angle ABC=30^\circ$, $AD=CD$.求
 证: $\{(BD)^2\}=\{(AB)^2\}+\{(BC)^2\}$.%#



graph:
 {"stem": {"pictures": [{"picturename": "1000070813_Q_1.jpg", "coordinates": {"A": "3.15,4.07", "B": "6.16,2.86", "C": "2.97,2.44", "D": "1.64,3.41"}, "collineations": {"0": "A##D", "1": "D##C", "2": "C##B", "3": "A##B", "4": "D##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{ $\angle ADC=(1/3 * \pi)$ }, EqualityRelation{ $\angle ABC=(1/6 * \pi)$ }, EqualityRelation{AD=CD}, ProveConclusionRelation:[证明:
 EqualityRelation{ $((BD)^2)=((AB)^2)+((BC)^2)$ }]

154、topic: 如图,点D、E在 $\triangle ABC$ 的BC边上,AB=AC,AD=AE.求证:BD=CE.%#

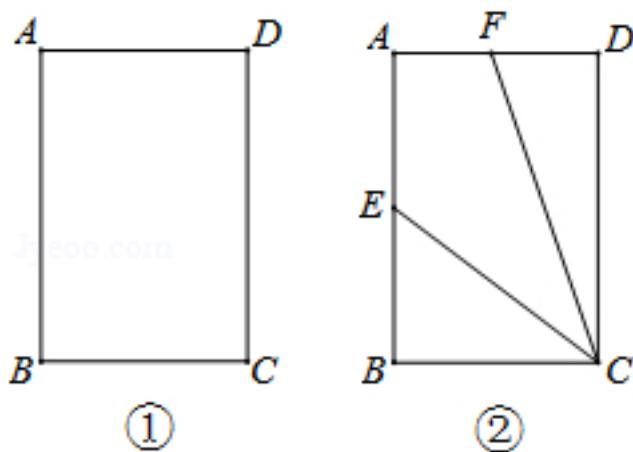


graph:

{"stem": {"pictures": [{"picturename": "1000035553_Q_1.jpg", "coordinates": {"A": "-5.00,7.00", "B": "-7.00, 5.00", "C": "-3.00,5.00", "D": "-6.00,5.00", "E": "-4.00,5.00"}, "collineations": {"0": "B###D###E###C", "1": "A###B", "2": "A###D", "3": "A###E", "4": "A###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: PointRelation:D, TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{AB=AC}, EqualityRelation{AD=AE}, ProveConclusionRelation:[证明: EqualityRelation{BD=CE}]

155、topic: 如图,已知 $AB \parallel CD$, $AB = CD$, $\angle A = \angle D$.#%#(1)求证:四边形ABCD为矩形;#%#(2)E是AB边的中点,F为AD边上一点, $\angle DFC = 2\angle BCE$.#%#i)如图②,若F为AD中点,DF=1.6,求CF的长度;#%#ii)如图②,若CE=4,CF=5,则 $AF+BC = \underline{\hspace{2cm}}$, $AF = \underline{\hspace{2cm}}$.#%#

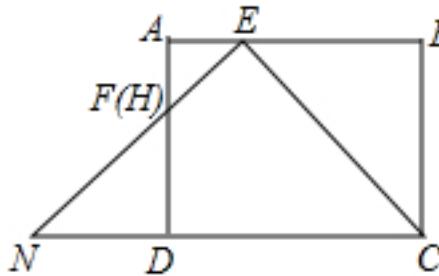


graph:

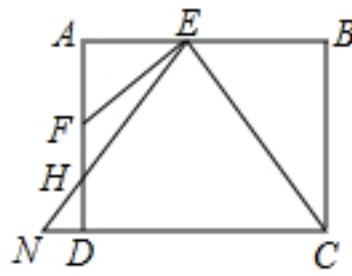
{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000040727_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "2.49,0.0", "D": "2.49,4.00"}, "collineations": {"0": "A###B", "1": "B###C", "2": "C###D", "3": "D###A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000040727_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "2.49,0.00", "D": "2.49,4.00", "E": "0.00,2.00", "F": "1.24,4.00"}, "collineations": {"0": "A###E###B", "1": "B###C", "2": "C###D", "3": "D###F###A", "4": "C###F", "5": "C###E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}], "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{AB=CD}, EqualityRelation{ $\angle BAD = \angle ADC$ }, EqualityRelation{CF=v_0}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, PointOnLineRelation{point=F, line=AD, isConstant=false, extension=false}, EqualityRelation{ $\angle DFC = 2 * \angle BCE$ }, EqualityRelation{DF=1.6}, EqualityRelation{CF=5}, 求值(大小): (ExpressRelation:[key:]v_0), 求值(大小): (ExpressRelation:[key:]AF+BC), 求值(大小): (ExpressRelation:[key:]AF), ProveConclusionRelation:[证明: RectangleRelation{rectangle=Rectangle:ABCD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CF)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AF+BC)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AF)}

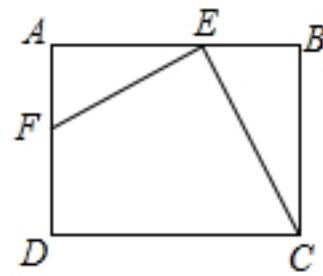
156、topic: 如图,在矩形ABCD中,AB=4,BC=3,E是AB边上一点,EF \perp CE交AD于点F,过点E作 $\angle AEH=\angle BEC$,交射线FD于点H,交射线CD于点N.
 (1)如图a,当点H与点F重合时,求BE的长;
 (2)如图b,当点H在线段FD上时,设BE=x,DN=y,求y与x之间的函数关系式,并写出它的自变量取值范围;
 (3)连接AC,当 $\triangle FHE$ 与 $\triangle AEC$ 相似时,求线段DN的长.



图a



图b



图c

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000060689_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "4.00,3.00", "C": "4.00,0.0", "D": "0.00,0.00", "E": "1.00,3.00", "F": "0.00,2.00", "H": "0.00,2.00", "N": "-2.00,0.00"}, "collineations": {"0": "A###F####D", "6": "A###H###D", "1": "B##A##E", "2": "N##F##E", "7": "N##H##E", "3": "N##D##C", "4": "E##C", "5": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000060689_Q_1.jpg", "coordinates": {"A": "0.00,-2.00", "B": "4.00,-2.00", "C": "4.00,-5.00", "D": "0.00,-5.00", "H": "0.00,-3.91", "F": "0.00,-3.31", "E": "1.75,-2.00", "N": "-1.00,-5.00"}, "collineations": {"0": "A##F##D##H", "1": "N##H##E", "2": "N##D##C", "3": "A##E##B", "4": "F##E", "5": "E##C", "6": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

NLP:

RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=4}, EqualityRelation{BC=3}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, LinePerpRelation{line1=EF, line2=CE, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=AD], EqualityRelation{ $\angle AEH=\angle BEC$ }, LineCrossRelation [crossPoint=Optional.of(H), iLine1=EF, iLine2=FD], LineCrossRelation [crossPoint=Optional.of(N), iLine1=EF, iLine2=CD], EqualityRelation{BE=v_0}, (ExpressRelation:[key:]a), PointCoincidenceRelation{point1=H, point2=F}, 求值(大小):

(ExpressRelation:[key:]v_0), (ExpressRelation:[key:]b), PointOnLineRelation{point=H, line=FD, isConstant=false, extension=false}, EqualityRelation{BE=x}, EqualityRelation{DN=y}, 表达式之间的关系: DualExpressRelation{expresses=[Express:[y], Express:[x]]}, EqualityRelation{DN=v_1}, SegmentRelation:AC, TriangleSimilarRelation{triangleA= $\triangle FH$ E, triangleB= $\triangle AEC$ }, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BE)}, SolutionConclusionRelation{relation=表达式之间的关系: DualExpressRelation{expresses=[Express:[y], Express:[x]]}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DN)}

157、topic: 已知 $\angle MAN$, AC平分 $\angle MAN$.
 (1)在图1中,若 $\angle MAN=120^\circ$,
 $\angle ABC=\angle ADC=90^\circ$,求证: $AB+AD=AC$.
 (2)在图2中,若 $\angle MAN=120^\circ$, $\angle ABC+\angle ADC=180^\circ$,则
 (1)中的结论是否仍然成立? 若成立,请给出证明;若不成立,请说明理由.

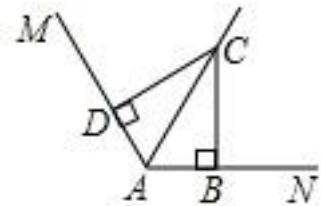


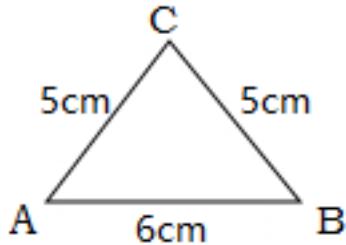
图1

graph:

```
{"stem": {"pictures": [{"picturename": "1000021304_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "0.92,0.00", "C": "0.92,1.60", "D": "-0.46,0.80", "M": "-1.00,1.73", "N": "2.46,0.00"}, "collineations": {"0": "M##A##D", "1": "C##A", "2": "C##D", "3": "C##B", "4": "A##B##N"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "100021304_Q_2.jpg", "coordinates": {"B": "1.36,0.00", "D": "-0.25,0.43"}, "collineations": {"0": "A##M##D", "1": "C##B"}, "variable>equals": {}, "circles": []}]}]}
```

NLP: AngleRelation{angle= $\angle BAD$ }, AngleBisectorRelation{line=AC, angle= $\angle BAD$, angle1= $\angle BAC$, angle2= $\angle CAD$ }, (ExpressRelation:[key:]1), EqualityRelation{ $\angle BAD = (2/3\pi)$ }, MultiEqualityRelation [multiExpressCompare= $\angle ABC = \angle ADC = (1/2\pi)$, originExpressRelationList=[], keyWord=null, result=null], (ExpressRelation:[key:]2), EqualityRelation{ $\angle BAD = (2/3\pi)$ }, EqualityRelation{ $\angle ABC + \angle ADC = (\pi)$ }, ProveConclusionRelation:[证明: EqualityRelation{AB+AD=AC}]

158、topic: 如图,求等腰三角形ABC的面积.#%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000072771_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.00,0.00", "C": "3.00,4.00"}, "collineations": {"0": "B##A", "1": "B##C", "2": "C##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}
```

NLP: EqualityRelation{S_△ABC=v_0},求值(大小):

(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]S_△ABC)}

159、topic: 如图1,四边形\$ABCD\$是矩形,\$P\$是\$BC\$边上的一点,连接\$PA\$,\$PD\$(1)求证:\$\{PA\}^2+\{PC\}^2=\{PB\}^2+\{PD\}^2\$(2)如图2,当点\$A\$在矩形\$ABCD\$的内部时,连接\$PA\$, \$PB\$, \$PC\$, \$PD\$.上面的结论是否还成立?说明理由.(3)当点\$P\$在矩形\$ABCD\$的外部时,连接\$PA\$, \$PB\$, \$PC\$, \$PD\$.上面的结论是否还成立?(不必说明理由)

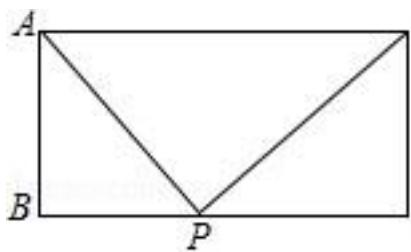


图1

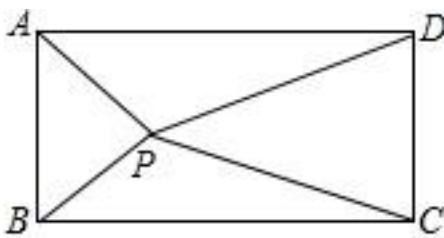
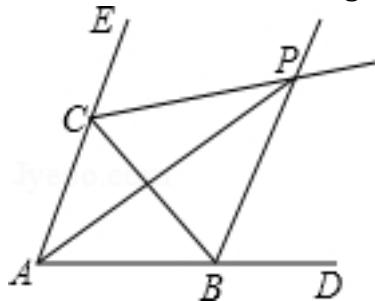


图2

```
graph:
{"stem": {"pictures": [{"picturename": "1000027627_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "6.00,3.00"}, "collineations": {"0": "B###A", "1": "A###D", "2": "D##C", "3": "B##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "1", "questionr elies": "", "pictures": [{"picturename": "1000027627_Q_1.jpg", "coordinates": {"P": "3.00,0.00"}, "collineati ons": {"0": "B##P##C", "1": "D##P", "2": "A##P"}, "variable>equals": {}, "circles": []}], "appliedproble ms": {}}]]}
```

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=P, line=BC, isConstant=false, extension=false}, SegmentRelation:PA, SegmentRelation:PD, (ExpressRelation:[key:]2), PositionOfPoint 2RegionRelation{point=A, region=EnclosedRegionRelation{name=ABCD, closedShape=Rectangle:ABCD}, position=inner}, MultiPointCollinearRelation:[P, A], MultiPointCollinearRelation:[P, B], MultiPointCollinearRelation:[P, C], MultiPointCollinearRelation:[P, D], MultiPointCollinearRelation:[P, A], MultiPointCollinearRelation:[P, B], MultiPointCollinearRelation:[P, C], MultiPointCollinearRelation:[P, D], ProveConclusionRelation:[证明: EqualityRelation{((AP)^2)+((CP)^2)=((BP)^2)+((DP)^2)}]

160、topic: 如图,在 $\triangle ABC$ 中, $\angle BAC=80^\circ$,点P是 $\triangle ABC$ 的外角 $\angle DBC$ 、 $\angle BCE$ 的平分线的交点,连接AP,求 $\angle DAP$ 的度数.#%#



```
graph:
{"stem": {"pictures": [{"picturename": "47A7A07BF7EF416EBF3576556B3BB14F.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-10.00,3.00", "C": "-13.49,5.92", "D": "-8.00,3.00", "E": "-13.05,8.39", "P": "-8.24,7.83"}, "collineations": {"0": "C##A##E", "1": "A##B##D", "2": "A##P", "3": "C##B", "4": "B##P", "5": "C##P"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}
```

NLP: AngleBisectorRelation{line=CP, angle= $\angle BCE$, angle1= $\angle BCP$, angle2= $\angle ECP$ }, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle BAC=(4/9\pi)$ }, SegmentRelation:AP, 求角的大小: AngleRelation{angle= $\angle BAP$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BAP$)}

161、topic: 如图所示,已知E是边长为1的正方形ABCD对角线BD上一动点,点E从B点向D点运动(与B、D不重合),过点E作直线GH \parallel BC,交AB于点G,交CD于点H,EF \perp AE于点E,交CD(或CD的延长线)于点F.
 (1)如图1,求证 $\triangle AGE \cong \triangle EHF$;
 (2)点E在运动的过程中(图1、2),四边形AFHG的面积是否发生变化?请说明理由.

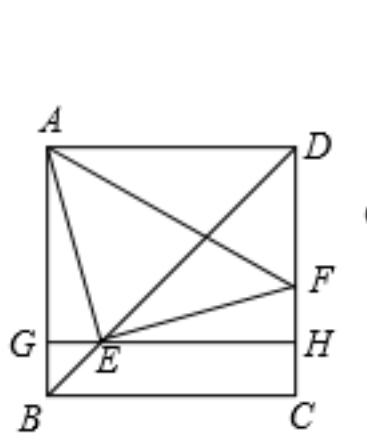


图 1

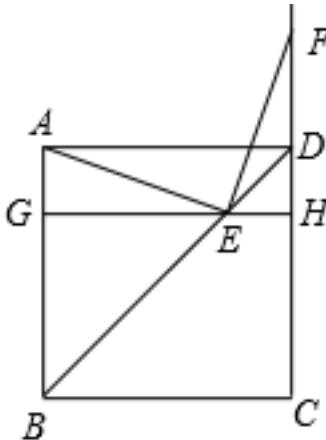
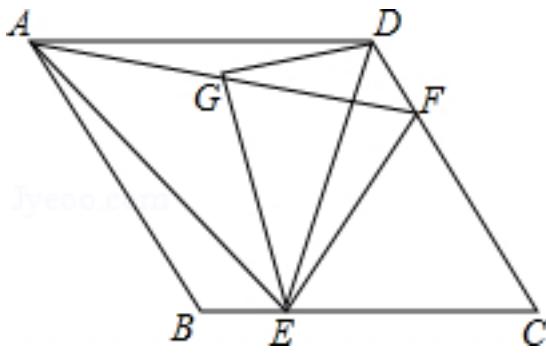


图 2

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000040831_Q_1.jpg", "coordinates": {"A": "0.00,2.99", "B": "0.00,0.00", "C": "2.99,0.0", "D": "2.99,2.99", "E": "0.70,0.70", "F": "2.99,1.40", "G": "0.00,0.70", "H": "2.99,0.70"}, "collineations": {"0": "A###G##B", "1": "B###C", "2": "C###H##F##D", "3": "D##A", "4": "B##E##D", "5": "G##E##H", "6": "A##E", "7": "E##F", "8": "A##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000040831_Q_1.jpg", "coordinates": {"A": "0.00,-2.00", "B": "0.00,-5.00", "C": "3.00,-5.00", "D": "3.00,-2.00", "E": "2.13,-2.87", "F": "3.00,-0.74", "G": "0.00,-2.87", "H": "3.00,-2.87"}, "collineations": {"0": "A##G##B", "1": "B##C", "2": "C##H##D##F", "3": "D##A", "4": "B##E##D", "5": "G##E##H", "6": "A##E", "7": "E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

NLP: PointOnLineRelation{point=E, line=GH, isConstant=false, extension=false}, PointRelation:B, SegmentRelation:CD, NegativeRelation{relation=PointRelation:D}, SquareRelation{square=Square:ABCD, length=1}, PointOnLineRelation{point=E, line=BD, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BD, isConstant=false, extension=false}, LineParallelRelation [iLine1=GH, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(G), iLine1=GH, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(H), iLine1=GH, iLine2=CD], LinePerpRelation{line1=EF, line2=AE, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=CD], (ExpressRelation:[key:]1), 已知条件 QuadrilateralRelation{quadrilateral=AFHG}, EqualityRelation{S_AFHG=v_0}, (ExpressRelation:[key:]1), (ExpressRelation:[key:]2), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle AGE$, triangleB= $\triangle EHF$ }]

162、topic: 如图,在菱形ABCD中,点E、F分别是BC、CD上一点,连接DE、EF,且 $AE=AF$, $\angle DAE=\angle BAF$.
 (1)求证:CE=CF;
 (2)若 $\angle ABC=120^\circ$,点G是线段AF的中点,连接DG,EG.求证:DG \perp GE.



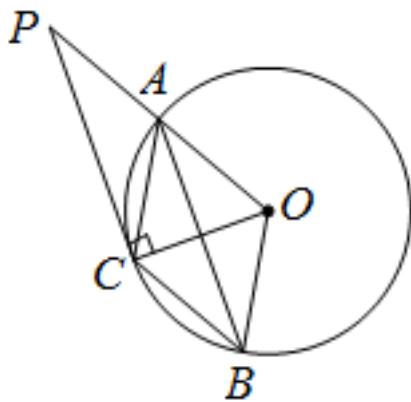
```

graph:
{"stem": {"pictures": [{"picturename": "1000041840_Q_1.jpg", "coordinates": {"A": "-1.81,3.14", "B": "0.00,0.00", "C": "3.62,0.00", "D": "1.81,3.14", "E": "1.00,0.00", "F": "2.31,2.27", "G": "0.25,2.71"}, "collineations": {"0": "A##B", "1": "B##E##C", "2": "C##F##D", "3": "D##A", "4": "A##E", "5": "A##G##F", "6": "G##E", "7": "G##D", "8": "D##E", "9": "E##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

```

NLP: RhombusRelation{rhombus=RhombusABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, SegmentRelation:DE, SegmentRelation:EF, EqualityRelation{AE=AF}, EqualityRelation {∠DAE=∠BAG}, EqualityRelation{∠ABE=(2/3*Pi)}, MiddlePointOfSegmentRelation{middlePoint=G, segment=AF}, SegmentRelation:DG, SegmentRelation:EG, ProveConclusionRelation:[证明: EqualityRelation{CE=CF}], ProveConclusionRelation:[证明: LinePerpRelation{line1=DG, line2=GE, crossPoint=G}]]

163、topic: 如图,A、B是圆O上的两点,∠AOB=120°,点C是弧AB的中点. #(1)求证:AB平分∠OAC; #(2)延长OA至点P使得OA=AP,连接PC,若圆O的半径R=1,求PC的长. #



```

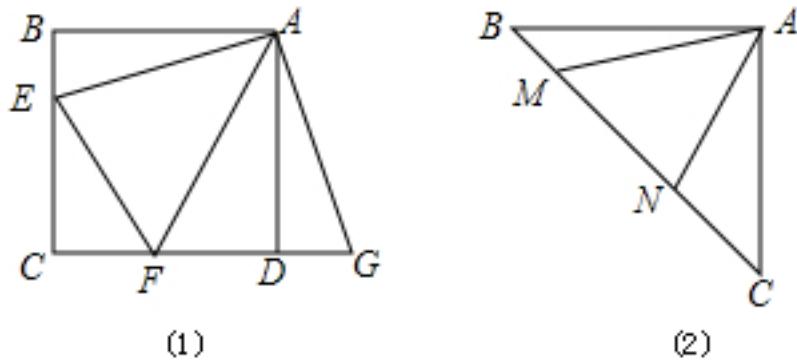
graph:
{"stem": {"pictures": [{"picturename": "1000060709_Q_1.jpg", "coordinates": {"A": "3.46,2.00", "B": "-3.46,2.00", "C": "0.00,4.00", "D": "0.00,2.00", "O": "0.00,0.00"}, "collineations": {"0": "O##C##D", "1": "B##A##D", "2": "A##C", "3": "B##C", "4": "O##A", "5": "O##B"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000060709_Q_1.jpg", "coordinates": {"P": "6.93,4.00"}, "collineations": {"0": "P##C", "1": "P##A##O"}, "variable-equals": {}, "circles": []}]}]}

```

NLP: PointOnCircleRelation{circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, points=[A, B]}, EqualityRelation{∠AOB=(2/3*Pi)}, MiddlePointOfArcRelation:C/type:MAJOR_ARC~AB, EqualityRelation{CP=v_0}, PointOnLineRelation{point=P, line=OA, isConstant=false, extension=false}, LinePerpRelation{line1=OP, line2=PC}

extension=true}, EqualityRelation{AO=AP}, SegmentRelation:PC, RadiusRelation{radius=null},
 circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=Express:[1]}, 求值(大小):
 (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
 AngleBisectorRelation{line=AB, angle= $\angle CAO$, angle1= $\angle BAC$,
 angle2= $\angle BAO$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CP)}}

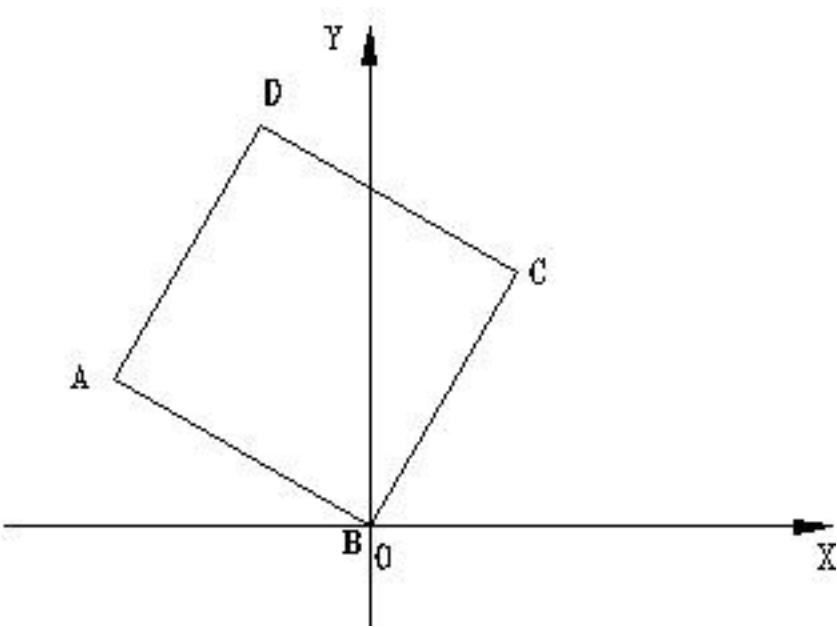
164、topic: (1)如图(1),在正方形ABCD中,已知点E、F分别在边BC、CD上, $\angle EAF=45^\circ$,延长CD到点G,使DG=BE,连结EF、AG.求证:#%#① $\angle BEA=\angle G$;#%#② $EF=FG$ #%(2)如图(2),在等腰直角三角形ABC中,已知 $\angle BAC=90^\circ$, $AB=AC$,点M、N在边BC上,且 $\angle MAN=45^\circ$.若 $BM=1$, $CN=3$,求MN的长.#%#



graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000036928_Q_1.jpg", "coordinates": {"A": "-6.00,5.00", "B": "-9.00,5.00", "C": "-9.00,2.00", "D": "-6.00,2.00", "E": "-9.00,4.00", "F": "-7.50,2.00", "G": "-5.00,2.00"}, "collineations": {"0": "B##E#C", "1": "C##F##D##G", "2": "A##D", "3": "A##B", "4": "A##G", "5": "A##E", "6": "A##F", "7": "E##F"}, "variable>equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000036928_Q_1.jpg", "coordinates": {"A": "-6.00,5.00", "B": "-9.00,5.00", "C": "-6.00,2.00", "M": "-8.59,4.59", "N": "-7.26,3.26"}, "collineations": {"0": "B##A", "1": "A##M", "2": "A##N", "3": "A##C", "4": "B##M##N##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, EqualityRelation{ $\angle EAF=(1/4\pi)$ }, PointOnLineRelation{point=G, line=CD, isConstant=false, extension=true}, EqualityRelation{DG=BE}, SegmentRelation:EF, SegmentRelation:AG, SubStemReliedRelation{selfDivideId=-1, reliedDivideId=1}, EqualityRelation{ $\angle AEB=\angle AGD$ }, SubStemReliedRelation{selfDivideId=-1, reliedDivideId=1}, EqualityRelation{EF=FG}, EqualityRelation{MN=v_0}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$ [Optional.of(B)][Optional.of(B)], EqualityRelation{ $\angle BAC=(1/2\pi)$ }, EqualityRelation{AB=AC}, PointOnLineRelation{point=M, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=N, line=BC, isConstant=false, extension=false}, EqualityRelation{ $\angle MAN=(1/4\pi)$ }, EqualityRelation{BM=1}, EqualityRelation{CN=3}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]MN)}}

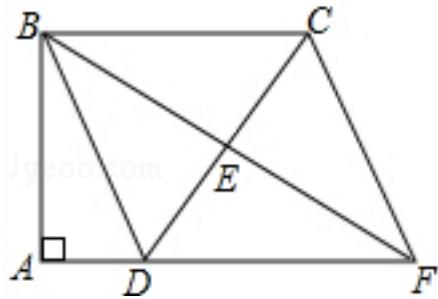
165、topic: 已知如图, 边长为2的正方形ABCD, 点B在原点, A、D两点在第二象限, AB与x轴负半轴的交角为 30° , 求C、D两点的坐标.



graph:
 {"stem": {"pictures": [{"picturename": "1000000962_Q_1.jpg", "coordinates": {"A": "-1.73,1.00", "D": "-0.73,2.73", "C": "1.00,1.73", "B": "0.00,0.00"}, "collineations": {"0": "B##A", "1": "B##C", "2": "A##D", "3": "C##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: SquareRelation{square=Square:ABCD, length=2}, PointRelation:B(0,0), PointInDomRelation [point=A, local=SECOND_QUADRANT], PointInDomRelation [point=D, local=SECOND_QUADRANT], 坐标PointRelation:C, 坐标PointRelation:D, SolutionConclusionRelation{relation=坐标 PointRelation:C}, SolutionConclusionRelation{relation=坐标PointRelation:D}

166、topic: 如图,四边形ABCD中, $\angle A = \angle ABC = 90^\circ$, $AD = 10\text{cm}$, $BC = 30\text{cm}$, E是边CD的中点,连接BE并延长与AD的延长线相交于点F. #(1)求证:四边形BDFC是平行四边形; #(2)若 $\triangle BCD$ 是等腰三角形,求四边形BDFC的面积. #



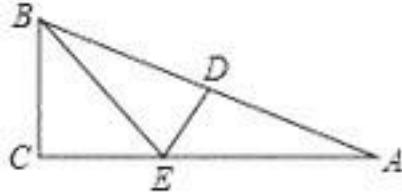
graph:
 {"stem": {"pictures": [{"picturename": "A1AEFF80AD0F4B48860835EB0452987.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-14.00,5.80", "C": "-11.00,5.80", "D": "-13.00,3.00", "E": "-12.00,4.40", "F": "-10.00,3.00"}, "collineations": {"0": "B##A", "1": "A##D##F", "2": "B##F##E", "3": "B##C", "4": "B##D", "5": "D##E##C", "6": "C##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": []}]}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, MultiEqualityRelation [multiExpressCompare= $\angle BAD = \angle ABC = (1/2)\pi$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AD=10}, EqualityRelation{BC=30}, MiddlePointOfSegmentRelation{middlePoint=E, segment=CD}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=AD], 已知条

件

QuadrilateralRelation{quadrilateral=BCFD}, EqualityRelation{S_BCFD=v_0}, IsoscelesTriangleRelation: IsoscelesTriangle:△BCD[Optional.of(B)], 求值(大小):
(ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
ParallelogramRelation{parallelogram=Parallelogram:BCFD}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]S_BCFD)}

167、topic: 如图,\$Rt\vartriangle ABC\$中,\$\angle ACB=90^\circ\$, \$AC=12\$, \$BC=5\$, D是\$AB\$边上的动点,\$E\$是\$AC\$边上的动点,则\$BE+ED\$的最小值

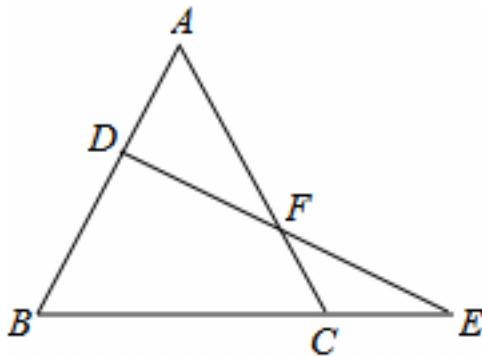


graph:

{"stem": {"pictures": [{"picturename": "1000027620_Q_1.jpg", "coordinates": {"A": "12.00,0.00", "B": "0.00, 5.00", "C": "0.00,0.00", "D": "3.55,3.52", "E": "2.08,0.00"}, "collinearities": {"0": "B##D##A", "1": "A##E#C", "2": "B##C", "3": "B##E", "4": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: ExtremumRelation [key=Express:[BE+DE], value=Express:[v_0], extremumType=MIN], RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], EqualityRelation{∠BCE=(1/2*Pi)}, EqualityRelation{AC=12}, EqualityRelation{BC=5}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, (ExpressRelation:[key:]v_0)

168、topic: 如图,点D在等边三角形ABC的边AB上,点F在边AC上,连接DF并延长交BC的延长线于点E,EF=FD.求证:AD=CE.#%#



graph:

{"stem": {"pictures": [{"picturename": "1000030963_Q_1.jpg", "coordinates": {"A": "-9.00,8.46", "B": "-11.05,0.00", "C": "-7.00,5.00", "D": "-9.65,7.34", "E": "-5.71,5.00", "F": "-7.68,6.17"}, "collinearities": {"0": "B##C", "1": "A##D##B", "2": "A##F##C", "3": "D##F##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: RegularTriangleRelation:RegularTriangle:△ABC, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DF,

iLine2=BC],EqualityRelation{EF=DF},ProveConclusionRelation:[证明： EqualityRelation{AD=CE}]

169、topic: 如图1,\$\odot O\$是\$\triangle ABC\$的外接圆,AB是直径,\$OD \parallel AC\$,且\$\angle CBD=\angle BAC\$,OD交\$\odot O\$于点E.?%#(1)求证:BD是\$\odot O\$的切线;?%#(2)若点E为线段OD的中点,证明:以O、A、C、E为顶点的四边形是菱形;?%#(3)作\$CF \perp AB\$于点F,连接AD交CF于点G(如图2),求\$\frac{FG}{FC}\$的值.

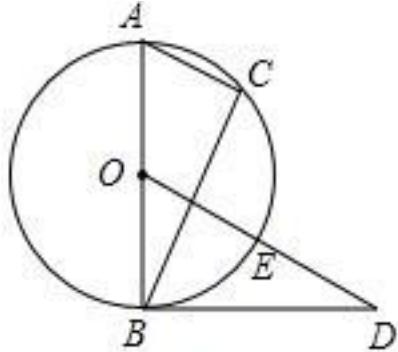
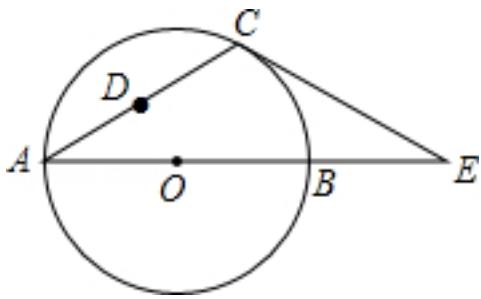


图1

graph:
 {"stem": {"pictures": [{"picturename": "5452947ECE9848858CF7E4F6652F3BED.jpg", "coordinates": {"A": "-11.00,9.00", "B": "-11.00,1.00", "C": "-7.54,7.00", "D": "-4.07,1.00", "E": "-7.54,3.00", "F": "-11.00,7.00", "G": "-9.27,7.00", "O": "-11.00,5.00"}, "collineations": {"0": "B###A###O##F", "1": "A###C", "2": "A##G# #D", "3": "A##F##C", "4": "B##D", "5": "B##C", "6": "G##F##C", "7": "O##E##D"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C##A##B##E"}]}, "appliedproblems": {}}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: InscribedShapeOfCircleRelation{closedShape=\$\triangle ABC\$, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}}, DiameterRelation{diameter=AB, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, length=null}, LineParallelRelation [iLine1=OD, iLine2=AC], EqualityRelation{\$\angle CBD=\angle CAF\$}, LineCrossCircleRelation{line=OD, circle=\$\odot O\$, crossPoints=[E]}, crossPointNum=1, MiddlePointOfSegmentRelation{middlePoint=E, segment=OD}, LinePerpRelation{line1=CF, line2=AB, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(G2), iLine1=AD, iLine2=CF], 求值(大小): (ExpressRelation:[key:]((FG)/(CF))), ProveConclusionRelation:[证明: LineContactCircleRelation{line=BD, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, contactPoint=Optional.of(B), outpoint=Optional.of(D)}], ProveConclusionRelation:[证明: CircleRelation{circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}}], ProveConclusionRelation:[PointRelation:A], ProveConclusionRelation:[PointRelation:C], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]((FG)/(CF)))}}

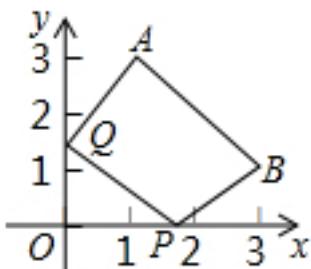
170、topic: 如图,在\$\triangle ACE\$中,CA=CE,\$\angle CAE=30^\circ\$,\$\odot O\$经过点C,且圆的直径AB在线段AE上.#%#(1)试说明CE是\$\odot O\$的切线;#%#(2)若\$\triangle ACE\$中AE边上的高为h,试用含h的代数式表示\$\odot O\$的直径AB;#%#(3)设点D是线段AC上任意一点(不含端点),连接OD,当\$\frac{1}{2}CD+OD\$的最小值为6时,求\$\odot O\$的直径AB的长.#%#



graph
 {"stem": {"pictures": [{"picturename": "1000039726_Q_1.jpg", "coordinates": {"A": "-13.00,7.00", "B": "-10.69,6.97", "C": "-11.25,7.98", "D": "-12.18,7.46", "E": "-9.53,6.96", "O": "-11.84,6.99"}, "collineations": {"0": "A###B##E", "1": "A###D##C", "2": "C##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2}$, length=null}, TriangleRelation: $\triangle ACE$, EqualityRelation{AC=CE}, EqualityRelation{ $\angle DAO=(1/6\pi)$ }, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[C]}, LineCoincideRelation [iLine1=AB, iLine2=AE], DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null}, TriangleRelation: $\triangle ACE$, HeightOfTriangleRelation{geo= $\triangle ACE$, height=null, base=AE, value=Express:[h]}, 表达式之间的关系: DualExpressRelation{expresses=[Express:[AB], Express:[h]]}, EqualityRelation{AB=v_0}, PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false}, SegmentRelation:OD, ExtremumRelation [key=Express:[$(1/2)CD+DO$], value=Express:[6], extremumType=MIN], ProveConclusionRelation:[证明: LineContactCircleRelation{line=CE, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.absent(), outpoint=Optional.absent()}], SolutionConclusionRelation{relation=表达式之间的关系: DualExpressRelation{expresses=[Express:[AB], Express:[h]]}}}

171、topic: 如图,在平面直角系中点A(1,3),点B(3,1),点P、Q分别在x轴、y轴上运动,求四边形PBAQ周长的最小值.#%#



graph
 {"stem": {"pictures": [{"picturename": "1000082384_Q_1.jpg", "coordinates": {"A": "1.00,3.00", "B": "3.00,1.00", "P": "2.00,0.00", "Q": "0.00,2.00", "O": "0.00,0.00"}, "collineations": {"0": "B##P", "1": "A##B", "2": "A##Q", "3": "Q##P", "4": "O##Q", "5": "O##P"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

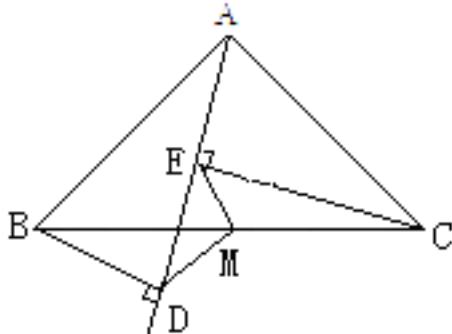
NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ABPQ}, EqualityRelation{C_ABPQ=v_0}, PointRelation:B(3,1), PointOnLineRelation{point=P, line=StraightLine[X] analytic:y=0 slope:0 b:0 isLinearFunction:false,

```

isConstant=false, extension=false},PointOnLineRelation{point=Q, line=StraightLine[X] analytic :y=0
slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false},最小值:
(ExpressRelation:[key:]v_0[v_0=v_0]),SolutionConclusionRelation{relation=最小值:
(ExpressRelation:[key:]v_0[v_0=v_0])}

```

172、topic: 如图,已知, $\triangle ABC$ 中, $CE \perp AD$ 于 E , $BD \perp AD$ 于 D , $BM = CM$. 求证: $ME = MD$.



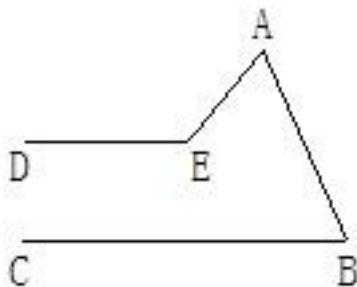
```

graph:
{"stem": {"pictures": [{"picturename": "1000040695_Q_1.jpg", "coordinates": {"A": "-6.35,5.21", "B": "-9.00, 2.00", "C": "-4.00,2.00", "D": "-7.26,1.57", "E": "-6.97,2.74", "M": "-6.50,2.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##M##C", "3": "A##E##D", "4": "D##B", "5": "D##M", "6": "M##E", "7": "E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}

```

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=CE, line2=AD, crossPoint=E}, LinePerpRelation{line1=BD, line2=AD, crossPoint=D}, EqualityRelation{BM=CM}, ProveConclusionRelation:[证明: EqualityRelation{EM=DM}]

173、topic: 如图,\$DE\parallel CB\$,试证明\$\angle AED=\angle A + \angle B\$.



```

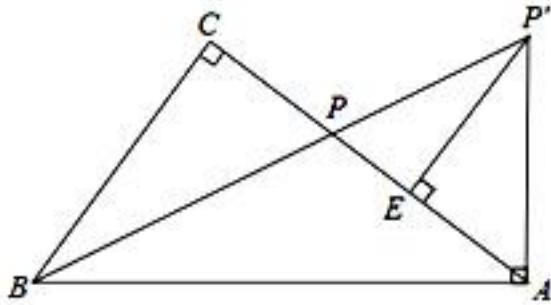
graph:
{"stem": {"pictures": [{"picturename": "1000035800_Q_1.jpg", "coordinates": {"A": "-9.00,8.00", "B": "-8.00, 4.00", "C": "-15.00,4.00", "D": "-15.00,6.00", "E": "-10.00,6.00"}, "collineations": {"0": "A##B", "1": "A##E", "2": "E##D", "3": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}

```

NLP: LineParallelRelation [iLine1=DE, iLine2=CB], ProveConclusionRelation:[证明: EqualityRelation{\$\angle AED = \angle BAE + \angle ABC\$}]

174、topic: 如图,在Rt $\triangle ABC$ 中, $\angle C = 90^\circ$, 点P为AC边上的一点, 将线段AP绕点A顺时针方向旋转(点P对应点 P')当AP旋转至 $AP' \bot AB$ 时, 点B、P、 P' 恰好在同一直线上, 此时作 $P'E \bot AC$ 于点E.(1)求证: $\angle CBP = \angle ABP$;(2)若 $AB - BC = 4$, $AC = 8$ 求AE的长;(3)当 $\angle ABC = 60^\circ$, $BC = 2$ 时, 点N为BC的中点, 点M为边BP上一个动

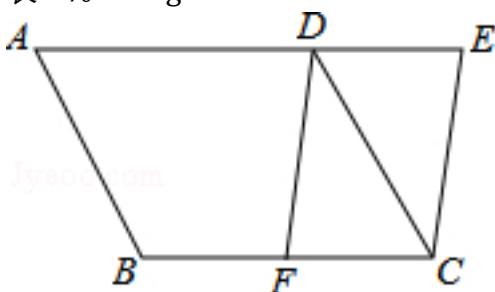
点,连接MC,MN求\$MC + MN\$的最小值?



graph:
[{"variable>equals":{}, "picturename": "1000002035_Q_1.jpg", "collineations": {"1": "A###E###P###C", "0": "B###P##P"}, "coordinates": {"E": "-5.41,0.34", "P": "6.32,0.98", "A": "-3.75,-0.79", "B": "-9.39,-1.01", "C": "-7.49,1.77", "P'": "-3.94,2.51"}}]

NLP:
RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], EqualityRelation{∠C=(1/2*Pi)}, PointOnLineRelation{point=P, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=B, line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=P, line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=P', line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, LinePerpRelation{line1=P'E, line2=AC, crossPoint=E}, EqualityRelation{AE=v_1}, EqualityRelation{AB-BC=4}, EqualityRelation{AC=8}, 求值(大小):
(ExpressRelation:[key:]v_1), EqualityRelation{∠ABC=((1/3*Pi))}, EqualityRelation{BC=2}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BC}, PointOnLineRelation{point=M, line=BP, isConstant=false, extension=false}, SegmentRelation:MC, SegmentRelation:MN, 最小值:
(ExpressRelation:[key:]CM+MN), ProveConclusionRelation:[证明:
EqualityRelation{∠CBP=∠ABP}], SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AE)}, SolutionConclusionRelation{relation=最小值:
(ExpressRelation:[key:]CM+MN)}

175、topic: 如图,将平行四边形ABCD的AD边延长至点E,使\$DE=\{\frac{1}{2}\}AD\$,连接CE,F是BC边的中点,连接FD. #(1)求证:四边形CEDF是平行四边形; #(2)若AB=3,AD=4,∠A=60°,求CE的长.#%#



graph:

{"stem":{"pictures":[{"picturename":"1000031875_Q_1.jpg","coordinates":{"A": "-11.50,4.60","B": "-10.00,2.00","C": "-6.00,2.00","D": "-7.50,4.60","E": "-5.50,4.60","F": "-8.00,2.00"}],"collineations":{"0": "A##D#E","1": "A##B","2": "E##C","3": "B##F##C","4": "D##C","5": "D##F"},"variable>equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}

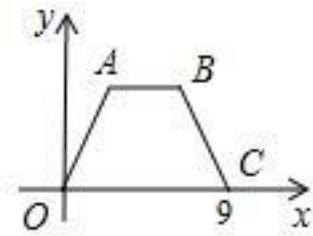
NLP: PointOnLineRelation{point=E, line=AD, isConstant=false, extension=true}, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{DE=(1/2)*AD}, SegmentRelation:CE, MiddlePointOfSegmentRelation{middlePoint=F, segment=BC}, SegmentRelation:FD, EqualityRelation{CE=v_0}, EqualityRelation{AB=3}, EqualityRelation{AD=4}, EqualityRelation{ $\angle BAD = (1/3 * \pi)$ }, 求值(大小): (ExpressRelation:[key:v_0]), ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:CEDF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:CE])}

176、topic: 在 $\odot O$ 中,AB为直径,点C为圆上一点,将劣弧沿弦AC翻折交AB于点D,连结CD.?(1)如图1,若点D与圆心O重合,\$AC=2\$,求 $\odot O$ 的半径r;(2)如图2,若点D与圆心O不重合,\$\angle BAC=25^\circ\$,请直接写出\$\angle DCA\$的度数.

graph:
{"stem":{"pictures":[],"appliedproblems":{},"subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000026195_Q_1.jpg", "coordinates": {"A": "2.40,2.50", "B": "7.60,5.50", "C": "7.60,2.50", "O": "5.00,4.00", "D": "5.00,4.00"}, "collineations": {"0": "A##O##D##B", "1": "A##C", "2": "C##O", "3": "C##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##C##B"}]}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000026195_Q_1.jpg", "coordinates": {"A": "3.40,-7.50", "B": "8.60,-4.50", "C": "8.82,-7.03", "D": "6.74,-5.57", "O": "6.00,-6.00"}, "collineations": {"0": "A##O##D##B", "1": "C##A", "2": "C##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}]}], "appliedproblems": {}}}

NLP: ChordOfCircleRelation{chord=AC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, chordLength=null, straightLine=null}, CircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[C]}, SegmentRelation:CD, CircleCenterRelation{point=0, conic=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, (ExpressRelation:[key:1]), PointCoincidenceRelation{point1=D, point2=0}, EqualityRelation{AC=2}, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, length=Express:[r]}, 求值(大小): (ExpressRelation:[key:r]), CircleCenterRelation{point=0, conic=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, (ExpressRelation:[key:2]), NegativeRelation{relation=PointCoincidenceRelation{point1=D, point2=0}}, EqualityRelation{ $\angle CAO = (5/36 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle ACD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:r])}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key: $\angle ACD$])}

177、topic: 如图,在梯形ABCO中,已知 $AB \parallel OC$, $AO=BC=5$,点A到x轴的距离是4,点C的坐标是(9,0),求点B的坐标.#%#

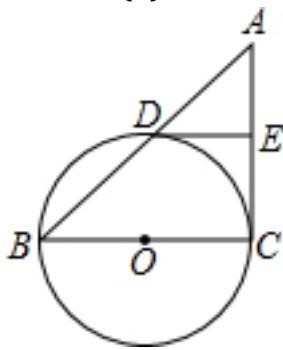


graph:

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{"stem": {"pictures": [{"picturename": "1000006934_Q_1.jpg", "coordinates": {"A": "3.00,4.00", "B": "6.00,4.00", "C": "9.00,0.00", "O": "0.00,0.00"}, "collineations": {"0": "O##A", "1": "A##B", "2": "B##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}
```

NLP: TrapezoidRelation{trapezoid=Trapezoid:ABCO, isRandomOrder:true}, LineParallelRelation [iLine1=AB, iLine2=OC], MultiEqualityRelation [multiExpressCompare=AO=BC=5, originExpressRelationList=[], keyWord=null, result=null], PointToLineDistanceRelation{point=A, line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, distance=Express:[4]}, PointRelation:C(9,0), 坐标 PointRelation:B, SolutionConclusionRelation{relation=坐标PointRelation:B}

178、topic: 如图,已知BC是 $\odot O$ 的直径,AC切 $\odot O$ 于点C,AB交 $\odot O$ 于点D,E为AC的中点,连接DE. #%(1)若AD=DB,OC=5,求切线AC的长;#%(2)求证:ED是 $\odot O$ 的切线.#%#

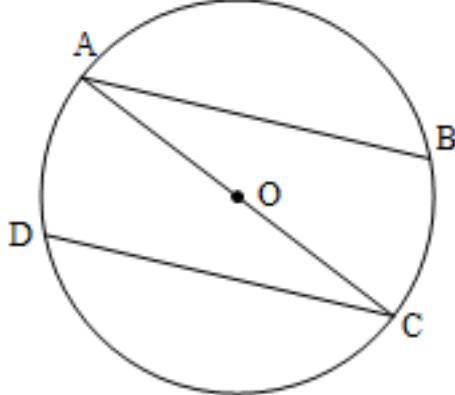


graph:

```
{"stem": {"pictures": [{"picturename": "1000080991_Q_1.jpg", "coordinates": {"A": "-1.01,6.62", "B": "-10.95,-3.44", "C": "-0.95,-3.39", "D": "-5.98,1.59", "E": "-0.98,1.62", "O": "-5.95,-3.41"}, "collineations": {"0": "B##O##C", "1": "A##E##C", "2": "B##D##A", "3": "D##E"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "D##B##C"}]}, "appliedproblems": {}, "substems": []}
```

NLP: DiameterRelation{diameter=BC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}, LineContactCircleRelation{line=AC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(C), outpoint=Optional.of(A)}, LineCrossCircleRelation{line=AB, circle= $\odot O$, crossPoints=[D], crossPointNum=1}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AC}, SegmentRelation:DE, LineContactCircleRelation{line=AC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(C), outpoint=Optional.of(A)}, EqualityRelation{AC=v_0}, EqualityRelation{AD=BD}, EqualityRelation{CO=5}, 求值(大小): (ExpressRelation:[key]:v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:AC)}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=ED, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(D), outpoint=Optional.of(E)}]

179、topic: 如图,AC是 $\odot O$ 的直径,AB,CD是 $\odot O$ 的两条弦,且 $\widehat{AD}=\widehat{BC}$,求 \widehat{DAB} 所对的圆周角的度数.#%#

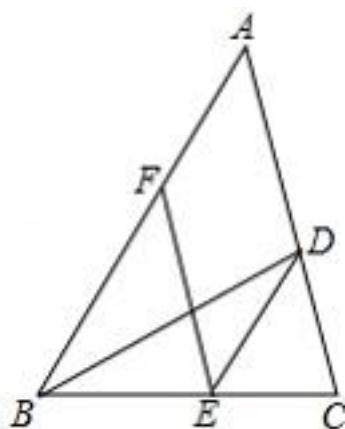


graph:

```
{"stem":{"pictures":[{"picturename":"1000083401_Q_1.jpg","coordinates":{"A": "-1.08,0.85","B": "1.38,0.00","C": "1.08,-0.85","D": "-1.38,0.00","O": "0.00,0.00"}, "collineations":{"0": "A###O###C","1": "B##A","2": "C##D"}, "variable-equals":{},"circles":[{"center": "O","pointincircle": "A###B###C##D"}]}],"appliedproblems":{},"substems":[]}}
```

NLP: DiameterRelation{diameter=AC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, EqualityRelation{ $\widehat{AD}=\widehat{BC}$ }

180、topic: 如图,\$BD\$是\$\triangle ABC\$的角平分线,点\$E,F\$分别在\$BC\$、\$AB\$上,且\$DE\parallel AB,EF\parallel AC\$.#%#\$(1)\$求证:\$BE=AF\$;#%#\$(2)\$若\$\angle ABC=60^\circ,BD=6\$,求四边形\$ADEF\$的面积.



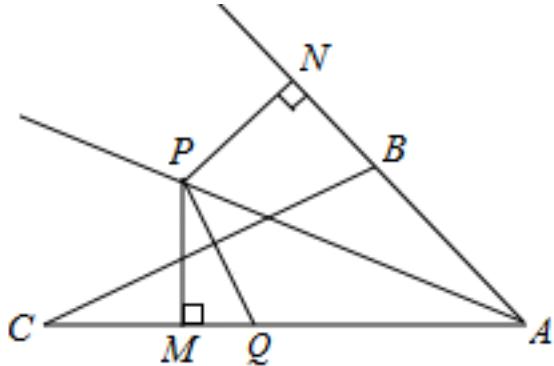
graph:

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{"stem":{"pictures":[{"picturename":"1000010204_Q_1.jpg","coordinates":{"A": "4.33,7.50","B": "0.00,0.00","C": "5.76,0.00","D": "5.19,3.00","E": "3.46,0.00","F": "2.60,4.50"}, "collineations":{"0": "B##E###C","1": "B##F##A","2": "C##D##A","3": "D##B","4": "E##D","5": "E##F"}, "variable-equals":{},"circles":[]]}],"appliedproblems":{},"substems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}
```

NLP: TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=E, line=BC, isConstant=false,

extension=false},PointOnLineRelation{point=F, line=AB, isConstant=false},
 extension=false},LineParallelRelation [iLine1=DE, iLine2=AB],LineParallelRelation [iLine1=EF, iLine2=AC],AngleBisectorRelation{line=BD,angle= $\angle EBF$, angle1= $\angle DBF$, angle2= $\angle DBE$ },已知条件
 QuadrilateralRelation{quadrilateral=ADEF},EqualityRelation{S_ADEF=v_0},EqualityRelation{ $\angle EBF=(1/3\pi)$ },EqualityRelation{BD=6},求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明:
 EqualityRelation{BE=AF}],SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]S_ADEF)}

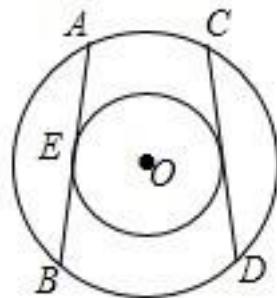
181、topic: 如图,在 $\triangle ABC$ 中, $\angle BAC$ 的角平分线与BC的垂直平分线PQ相交于点P,过点P分别作 $PN \perp AB$ 于点N, $PM \perp AC$ 于M,求证: $BN = CM$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040631_Q_1.jpg", "coordinates": {"A": "-8.00, 2.00", "B": "-10.0, 0.500", "C": "-16.00, 2.00", "P": "-13.84, 5.13", "N": "-11.24, 6.86", "M": "-13.84, 2.00", "Q": "-12.25, 2.00"}, "collinearities": {"0": "A##P", "1": "C##B", "2": "P##N", "3": "P##Q", "4": "P##M", "5": "A##Q##M##C", "6": "A##B##N"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=AP,angle= $\angle BAQ$, angle1= $\angle BAP$,
 angle2= $\angle PAQ$ },MiddlePerpendicularRelation [iLine1=PQ, iLine2=BC,
 crossPoint=Optional.absent()],TriangleRelation: $\triangle ABC$,LinePerpRelation{line1=PN, line2=AB,
 crossPoint=N},LinePerpRelation{line1=PM, line2=AC, crossPoint=M},ProveConclusionRelation:[证明:
 EqualityRelation{BN=CM}]

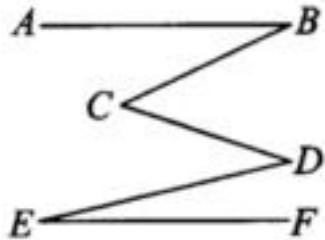
182、topic: 如图所示,在以O为圆心的两个同心圆中,大圆的弦AB和CD相等,且AB与小圆相切于点E,求证:CD与小圆相切.



graph:
 {"stem": {"pictures": [{"picturename": "1000008260_Q_1.jpg", "coordinates": {"A": "-1.21, 3.81", "B": "-2.70, -2.95", "C": "1.21, 3.81", "D": "2.70, -2.95", "E": "-1.95, 0.43", "O": "0.00, 0.00"}, "collinearities": {"0": "D##C", "1": "E##B##A"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "D##B##C##A"}, {"center": "O", "pointincircle": "E"}]}, "appliedproblems": {}, "substems": []}}

NLP: ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O_0$]{center=O_0}, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$, chordLength=null, straightLine=null}

183、topic: 如图,已知 $\angle B=25^\circ$, $\angle BCD=45^\circ$, $\angle CDE=30^\circ$, $\angle E=10^\circ$,求证: $AB \parallel EF$.



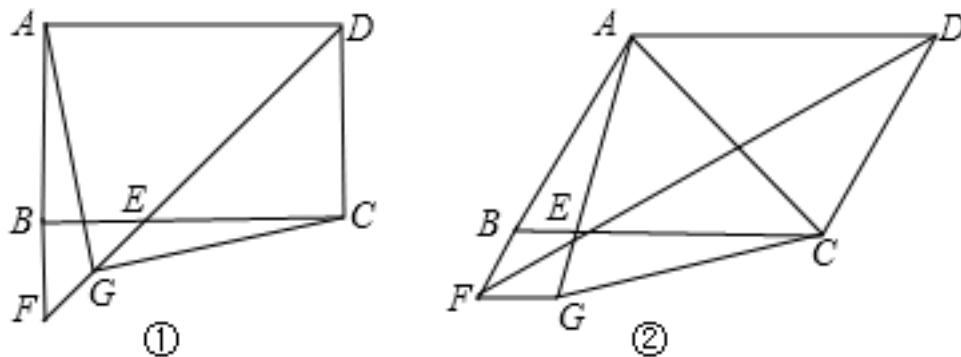
graph:

{"stem":{"pictures":[{"picturename":"1000021676_Q_1.jpg","coordinates":{"A":"0.00,2.93","B":"4.83,2.93","C":"2.39,1.79","D":"4.92,0.87","E":"0.00,0.00","F":"5.00,0.00"}, "collineations":{"0":"B###C","1":"C##D","2":"D##E","3":"A##B","4":"E##F"}, "variable-equals":{},"circles":[]}}],"appliedproblems":{},"subsystems":[]}

NLP:

EqualityRelation{ $\angle ABC=(5/36\pi)$ }, EqualityRelation{ $\angle BCD=(1/4\pi)$ }, EqualityRelation{ $\angle CDE=(1/6\pi)$ }, EqualityRelation{ $\angle DEF=(1/18\pi)$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=EF]]]

184、topic: 在平行四边形ABCD中, $\angle ADC$ 的平分线交直线BC于点E、交AB的延长线于点F,连接AC.
①如图(1),若 $\angle ADC=90^\circ$,G是EF的中点,连接AG、CG.①求证: $BE=BF$.②请判断 $\triangle AGC$ 的形状,并说明理由;
②如图(2),若 $\angle ADC=60^\circ$,将线段FB绕点F顺时针旋转 60° 至FG,连接AG、CG,那么 $\triangle AGC$ 又是怎样的形状.



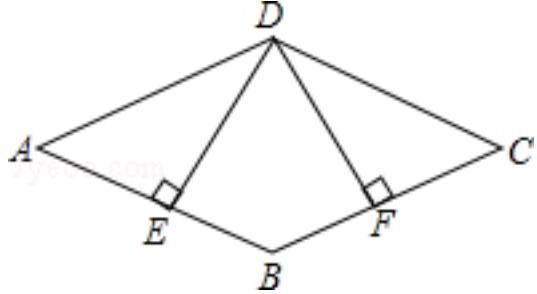
graph:

{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":1,"questionrelies":"","picture": [{"picturename":"1000024739_Q_1.jpg","coordinates":{"A":"0.00,4.00","B":"0.00,0.00","C":"5.00,0.00","D":"5.00,4.00","E":"1.00,0.00","F":"0.00,-1.00","G":"0.50,-0.50"}, "collineations":{"0":"A##B##F","1":"A##D","2":"B##E##C","3":"C##D","4":"F##G##E##D","5":"A##E","6":"A##E"}, "variable-equals":{},"circles":[]}]}, {"substemid":2,"questionrelies":"","pictures": [{"picturename":"1000024739_Q_1.jpg","coordinates":{"A": "-6.37,-3.17","B": "-8.00,-6.00","C": "-3.00,-6.00,"D": "-1.37,-3.17","E": "-3.00,2.00","F": "-8.87,-7.50","G": "-7.13,-7.50"}, "collineations":{"0":"A##B##F","1":"A##G","2":"A##C","3":"A##D","4":"C##G","5":"C##E##B","6":"C##D","7":"F##E##D","8":"F##G"}, "variable-equals":{},"circles":[]}]}}],"appliedproblems":{},"subsystems":[]}

NLP: AngleBisectorRelation{line=DG, angle= $\angle ADC$, angle1= $\angle ADG$,

angle2= $\angle CDG$, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, SegmentRelation:AC, EqualityRelation{ $\angle ADC=(1/2\pi)$ }, MiddlePointOfSegmentRelation{middlePoint=G, segment=EF}, SegmentRelation:AG, SegmentRelation:CG, EqualityRelation{ $\angle ADC=(1/3\pi)$ }, RotateRelation{preData=FB, afterData=FG, rotatePoint=F, rotateDegree='(1/3\pi)'}, rotateDirection=CLOCKWISE}, SegmentRelation:AG, SegmentRelation:CG, ProveConclusionRelation:[证明: EqualityRelation{BE=BF}], SolveGeoShapeConclusionRelation{iPolygon= $\triangle AGC$, iPolygonType=SOLVEENCLOSESHAPE}, ShapeJudgeConclusionRelation{geoEle= $\triangle AGC$ }

185、topic: 如图,四边形ABCD是菱形,DE \perp AB于E,DF \perp BC于F.求证:DE=DF.#%#



graph:

{"stem": {"pictures": [{"picturename": "1000080195.jpg", "coordinates": {"A": "1.50,1.25", "B": "4.00,0.00", "C": "6.50,1.25", "D": "4.00,2.50", "E": "3.00,0.50", "F": "5.00,0.50"}, "collineations": {"0": "A##E##B", "1": "B##F##C", "2": "A##D", "3": "E##D", "4": "F##D", "5": "C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: RhombusRelation{rhombus=Rhombus:ABCD}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=BC, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{DE=DF}]

186、topic: 在菱形ABCD中, $\angle ABC=60^\circ$,E是对角线AC上任意一点,F是线段BC延长线上一点,且CF=AE,连接BE、EF.#%#(1)如图1,当E是线段AC的中点时,求证BE=EF.#%#(2)如图2,当点E不是线段AC的中点,其它条件不变时,请你判断(1)中的结论是否成立,并说明理由;#%#(3)如图3,当点E是线段AC延长线上的任意一点,其它条件不变时,(1)中的结论是否成立?若成立,请给予证明;若不成立,请说明理由.#%#

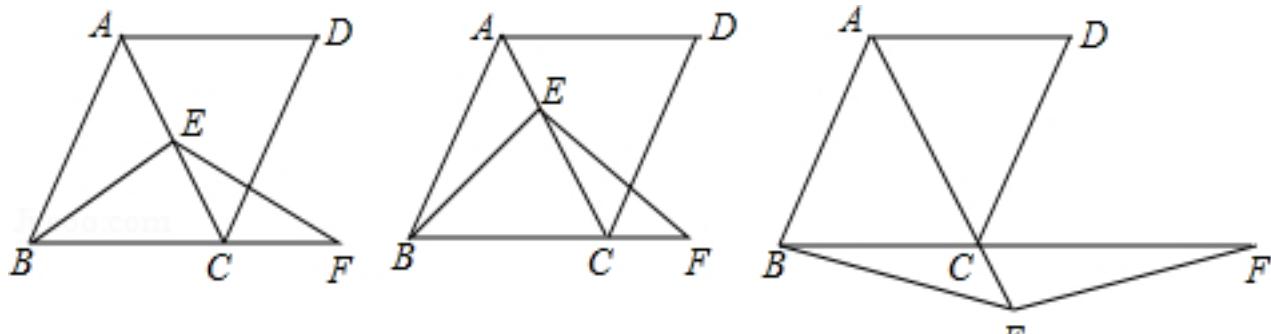


图1

图2

图3

graph:

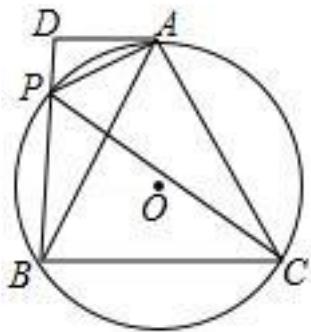
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les":[]],"appliedproblems":{}},{"substemid":"2","questionrelies":"","pictures":[{"picturename":"1000041575_Q_1.jpg","coordinates":{"A":"-8.00,7.73","B":"-9.00,6.00","C":"-7.00,6.00","D":"-6.00,7.73","E":"-7.75,7.30","F":"-6.50,6.00"},"collineations":{"0":"A###E###C","1":"B###C###F","2":"C###D","3":"A###D","4":"B###E","5":"A###B","6":"E###F"},"variable-equals":{},"circles":[]}], "appliedproblems":{}}, {"substemid":"3","questionrelies":"","pictures":[{"picturename":"1000041575_Q_1.jpg","coordinates":{"A":"-5.00,3.73","B":"-6.00,2.00","C":"-4.00,2.00","D":"-3.00,3.73","E":"-3.50,1.14","F":"-1.00,2.00"},"collineations":{"0":"A###C###E","1":"B###C###F","2":"C###D","3":"A###D","4":"B###E","5":"A##B","6":"E###F"},"variable-equals":{},"circles":[]}], "appliedproblems":{}}]

NLP:

RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{ $\angle ABC = (1/3 * \pi)$ }, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=true}, EqualityRelation{CF=AE}, SegmentRelation:BE, SegmentRelation:EF, (ExpressRelation:[key:]1), MiddlePointOfSegmentRelation{middlePoint=E, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=Q_0, segment=AC}, (ExpressRelation:[key:]2), NegativeRelation{relation=PointRelation:E}, (ExpressRelation:[key:]3), PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{BE=EF}]}

187、topic: 如图,A、P、B、C是 $\odot O$ 上的四个点, $\angle APC = \angle BPC = 60^\circ$,过点A作 $\odot O$ 的切线交BP的延长线于点D.
 (1)求证: $\triangle ADP \sim \triangle BDA$;
 (2)试探究线段PA、PB、PC之间的数量关系,并证明你的结论;
 (3)若 $AD=2$, $PD=1$,求线段BC的长.

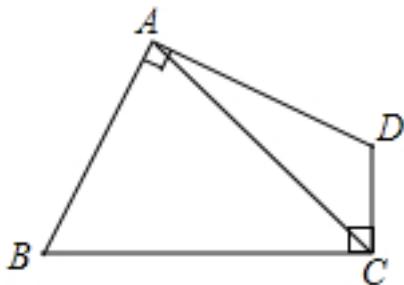


graph:
 {"stem": {"pictures": [{"picturename": "1000025018.jpg", "coordinates": {"A": "4.61,7.98", "B": "0.00,0.00", "C": "9.21,0.00", "D": "0.61,7.98", "P": "0.46,5.99", "O": "4.61,2.66"}, "collineations": {"0": "D###A", "1": "D##P##C", "2": "C###B", "3": "B###A", "4": "C###A", "5": "P###A", "6": "P###C"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C##P"}]}], "appliedproblems": {}, "substems": []}}

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[A, P, B, C]}, MultiEqualityRelation [multiExpressCompare= $\angle APD = \angle BPC = (1/3 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], LineContactCircleRelation{line=AD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(A), outpoint=Optional.of(D)}, 求值(大小): (ExpressRelation:[key:]AP/BP), 求值(大小): (ExpressRelation:[key:]BP/CP), EqualityRelation{BC=v_1}, EqualityRelation{AD=2}, EqualityRelation{DP=1}, 求值(大小): (ExpressRelation:[key:]v_1), ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle ADP$, triangleB= $\triangle BDA$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AP/BP)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BP/CP)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}

188、topic: 如图,四边形ABCD中, $\angle BAD = \angle BCD = 90^\circ$, $AB = AD$,若四边形ABCD的面积是\$24\{\{ c

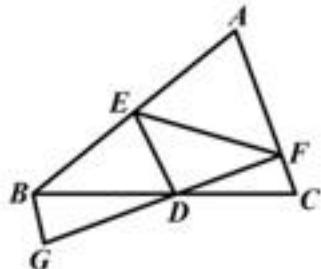
$m\}^2\}$.则AC的长是多少cm.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000050478_Q_1.jpg", "coordinates": {"A": "-6.00,6.00", "B": "-8.00,2.00", "C": "-2.00,2.00", "D": "-2.00,4.00"}, "collineations": {"0": "A##D", "1": "C##D", "2": "B##C", "3": "A##C", "4": "B##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AC=v_0},已知条件
 QuadrilateralRelation{quadrilateral=ABCD},MultiEqualityRelation
 [multiExpressCompare= $\angle BAD = \angle BCD = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AB=AD},已知条件
 QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{S_ABCD=24},求值(大小):
 (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AC)}

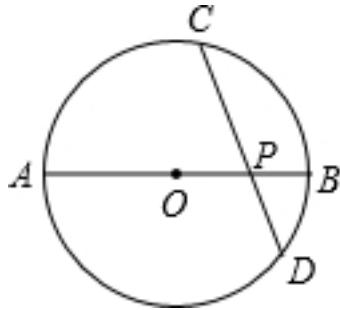
189、topic: 如图,在 $\triangle ABC$ 中,点E、F分别在AB、AC上, $DE \perp DF$,点D是BC的中点,延长FD到点G,使 $DG=DF$,连接BG.?(1)求证: $\triangle BGD \cong \triangle CFD$;(2)试比较 $BE+CF$ 与 EF 的大小.



graph:
 {"stem": {"pictures": [{"picturename": "1000021294_Q_1.jpg", "coordinates": {"A": "5.00,5.00", "B": "0.00,0.00", "C": "7.00,0.00", "D": "3.50,0.00", "E": "2.47,2.47", "F": "6.50,1.24", "G": "0.50,-1.24"}, "collineations": {"0": "A##B##E", "1": "D##F", "2": "E##F", "3": "D##E", "4": "D##F", "5": "G##B", "6": "A##F##C", "7": "B##D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$,PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false},PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false},LinePerpRelation{line1=DE, line2=DF, crossPoint=D},MiddlePointOfSegmentRelation{middlePoint=D, segment=BC},PointOnLineRelation{point=G, line=FD, isConstant=false, extension=true},EqualityRelation{DG=DF},SegmentRelation:BG,数字比较大小: DualExpressRelation{expresses=[Express:[EF], Express:[BE+CF]]},ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BGD$, triangleB= $\triangle CFD$ }],SolutionConclusionRelation{relation=数字比较大小: DualExpressRelation{expresses=[Express:[EF], Express:[BE+CF]]}}}

190、topic: 如图,已知AB是 $\odot O$ 的直径,弦CD和AB相交于P, $\angle APC=60^\circ$, $BP=2$, $AP=8$,求CD的长.#%#

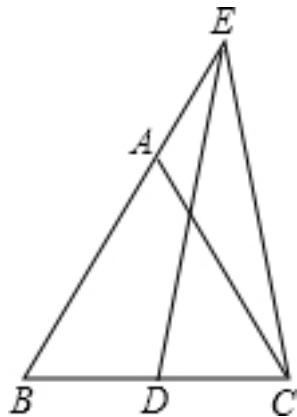


graph:

```
{"stem": {"pictures": [{"picturename": "1000060715_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "5.00,0.00", "C": "0.11,5.00", "D": "4.39,-2.40", "O": "0.00,0.00", "P": "3.00,0.00"}, "collineations": {"0": "B###A###O##P", "1": "C##P##D"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems": {}, "substems": []}]}
```

NLP: ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null, straightLine=null}, EqualityRelation{CD=v_0}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=CD, iLine2=AB], EqualityRelation{ $\angle CPO=(1/3\pi)$ }, EqualityRelation{BP=2}, EqualityRelation{AP=8}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]CD)}

191、topic: 如图, $\triangle ABC$ 为等边三角形,点E在BA的延长线上,点D在BC边上,且 $ED=EC$.若 $\triangle ABC$ 的边长为4, $AE=2$,求BD的长.#%#



graph:

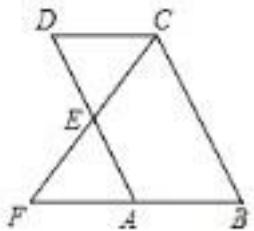
```
{"stem": {"pictures": [{"picturename": "1000062207_Q_1.jpg", "coordinates": {"A": "-2.00,3.45", "B": "-4.00,0.00", "C": "0.00,0.00", "D": "-2.00,0.00", "E": "-1.00,5.19"}, "collineations": {"0": "C##E", "1": "E##D", "2": "A##C", "3": "E##A##B", "4": "B##D##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}
```

NLP:

EqualityRelation{BD=v_0}, RegularTriangleRelation:RegularTriangle: $\triangle ABC$, PointOnLineRelation{point=E, line=BA, isConstant=false, extension=true}, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, EqualityRelation{DE=CE}, EqualityRelation{AE=2}, 求值(大小):

(ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]BD)}

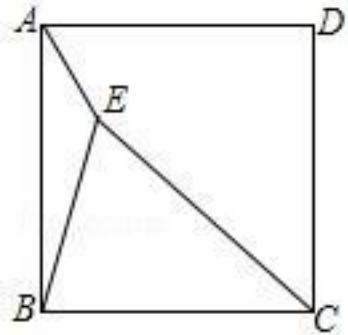
192、topic: 如图, 已知四边形ABCD是平行四边形, 点F在BA的延长线上, 连结CF交AD于点E?
(1)求证: $\triangle CDE \sim \triangle FAE$?#%#(2)当E是AD的中点, 且 $BC=2CD$ 时, 求证: $\angle F = \angle BCF$



graph:
[{"circles":[], "variable>equals":{}, "picturename":"1000002996_Q_1.jpg", "collineations":{"3":"D##C", "2":"F##B##A", "1":"F##E##C", "0":"D##E##A", "4":"C##B"}, "coordinates":{"D":{-9.45, 2.25}, "E":{-8.52, -0.28}, "F":{-10.28, -2.87}, "A":{-7.58, -2.82}, "B":{-4.89, -2.77}, "C":{-6.75, 2.30}}]

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=F, line=BA, isConstant=false, extension=true}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=CF, iLine2=AD], MiddlePointOfSegmentRelation[middlePoint=E, segment=AD], EqualityRelation{BC=2*CD}, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle CDE$, triangleB= $\triangle FAE$ }], ProveConclusionRelation:[证明: EqualityRelation{ $\angle AFE = \angle BCE$ }]]

193、topic: 如图, 点E为正方形\$ABCD\$内一点, 连接\$AE\$、\$BE\$、\$CE\$, 已知
 $AE=1$, $BE=2$, $CE=3$?#%#(1)求 $\angle AEB$?#%#(2)求\$ABCD\$的边长.

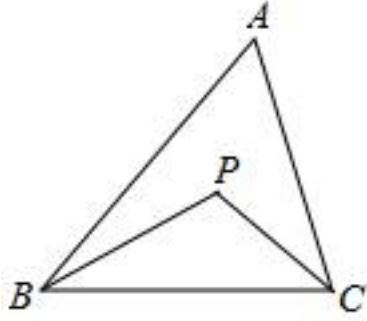


graph:
{"stem": {"pictures": [{"picturename": "10000_Q_1.jpg", "coordinates": {"A": "3.00,5.00", "B": "4.00,1.17", "C": "7.83,2.17", "D": "6.83,6.00", "E": "4.00,4.00"}, "collineations": {"0": "B##A", "1": "B##E", "2": "B##C", "3": "A##D", "4": "D##C", "5": "A##E", "6": "C##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: PositionOfPoint2RegionRelation{point=E, region=EnclosedRegionRelation{name=ABCD, closedShape=Square:ABCD}, position=inner}, SegmentRelation:AE, SegmentRelation:BE, SegmentRelation:CE, EqualityRelation{AE=1}, EqualityRelation{BE=2}, EqualityRelation{CE=3}, 求角的大小: AngleRelation{angle= $\angle AEB$ }, 已知条件 QuadrilateralRelation{quadrilateral=ABCD}, 求值(大小): (ExpressRelation:[key:]AB), 求值(大小): (ExpressRelation:[key:]BC), 求值(大小): (ExpressRelation:[key:]CD), 求值(大小): (ExpressRelation:[key:]AD), SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key:] $\angle AEB$ },SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]AB)},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]BC)},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]CD)},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]AD)}

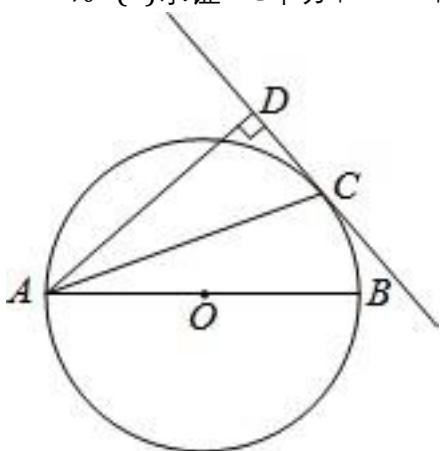
194、topic: 如图,已知点P是 $\triangle ABC$ 内一点.连结PB、PC.求证:(1) $\{AB+AC\} > \{PB+PC\}$; (2) $\angle BPC > \angle A$.



graph:
 {"stem": {"pictures": [{"picturename": "1000022503_Q_1.jpg", "coordinates": {"A": "0.00,5.00", "B": "-5.00,0.00", "C": "3.00,0.00", "D": "0.00,2.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##D", "3": "D#C", "4": "B##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation:△ABC,PositionOfPoint2RegionRelation{point=P,
 region=EnclosedRegionRelation{name=ABC, closedShape=△ABC},
 position=inner},SegmentRelation:PB,SegmentRelation:PC,ProveConclusionRelation:[证明:
 InequalityRelation{(AB+AC)>(BP+CP)}],ProveConclusionRelation:[证明:
 InequalityRelation{∠BPC>∠BAC}]

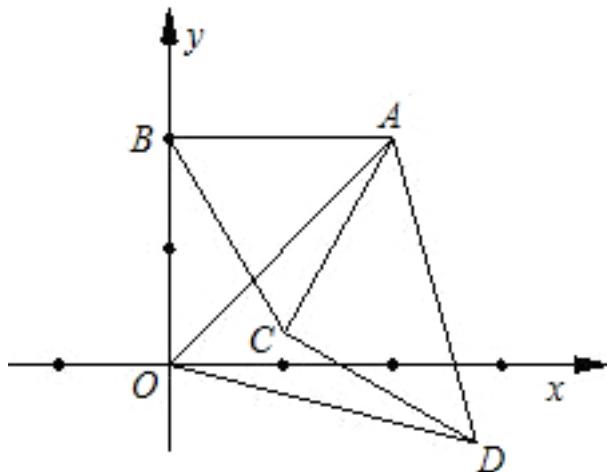
195、topic: 如图,点C是以AB为直径的 $\odot O$ 上的一点,AD与过点C的切线互相垂直,垂足为点D.(1)求证:AC平分 $\angle BAD$;(2)若 $CD=1$, $AC=\sqrt{10}$,求 $\odot O$ 的半径长.



graph:
 {"stem": {"pictures": [{"picturename": "1000008233_Q_1.jpg", "coordinates": {"A": "-3.33,0.00", "B": "3.33,0.00", "C": "1.83,2.78", "D": "1.21,3.57", "O": "0.00,0.00"}, "collineations": {"0": "D##A", "1": "C##A", "2": "A##O##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[C]}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[]}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[]}, EqualityRelation{CD=1}, EqualityRelation{AC=($10^{(1/2)}$)}, 圆的半径: CircleRelation{circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, ProveConclusionRelation:[证明: AngleBisectorRelation{line=AC, angle= $\angle DAO$, angle1= $\angle CAD$, angle2= $\angle CAO$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AO)}

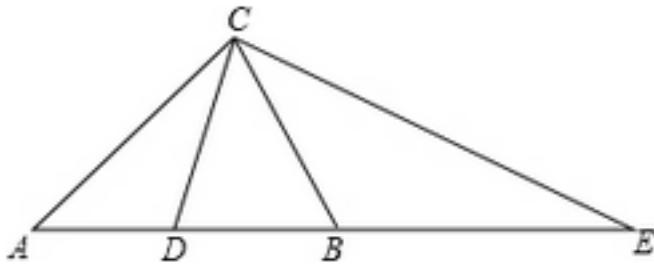
196、topic: 如图,已知A(a,b),AB \perp y轴于B,且满足 $\sqrt{a-2}+\sqrt{(b-2)^2}=0$,(1)求A点坐标;(2)分别以AB,AO为边作两个等边三角形 $\triangle ABC$ 和 $\triangle AOD$,试判定线段AC和DC的数量关系和位置关系.



graph:
 {"stem": {"pictures": [{"picturename": "1000034408_Q_1.jpg", "coordinates": {"A": "2,2", "B": "0,2"}, "collineations": {"0": "B##A"}, "variable-equals": {}, "circles": []}, {"appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000034408_Q_1.jpg", "coordinates": {"C": "1,0.27", "D": "2.74,-0.73", "O": "0,0"}}, {"picturename": "1000034408_Q_1.jpg", "coordinates": {"C": "1,0.27", "D": "2.74,-0.73", "O": "0,0"}]}, {"collineations": {"0": "B##C", "1": "A##C", "2": "D##C", "3": "O##A", "4": "O##D", "5": "D##A"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}}

NLP: (ExpressRelation:[key:]A*(a,b)), LinePerpRelation{line1=AB, line2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, crossPoint=B}, EqualityRelation{((a-2) $^{(1/2)}$)+((b-2) 2)=0}, 坐标PointRelation:A, 求值(大小): (ExpressRelation:[key:])(AC/CD)), SolutionConclusionRelation{relation=坐标 PointRelation:A}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:])(AC/CD))}, JudgePostionConclusionRelation: [data1=AC, data2=DC]

197、topic: CB,CD分别是钝角 $\triangle AEC$ 和锐角 $\triangle ABC$ 的中线,且AC=AB.求证:CE=2CD.



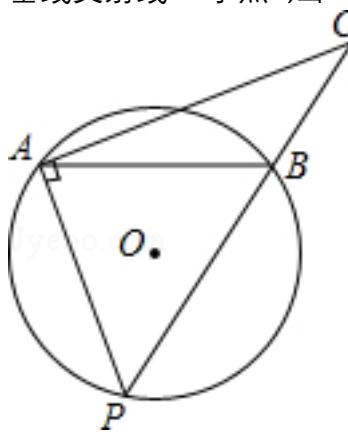
graph:

```
{"stem": {"pictures": [{"picturename": "1000040366_Q_1.jpg", "coordinates": {"A": "-6.91,2.17", "B": "-2.91,2.17", "C": "-4.33,5.23", "D": "-4.19,2.17", "E": "1.09,2.17"}, "collineations": {"0": "A###C", "1": "C##D", "2": "C##B", "3": "E##C", "4": "A##D##E##B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

ObtuseTriangleRelation:ObtuseTriangle: $\triangle AEC$ [Optional.absent()],AcuteTriangleRelation:AcuteTriangle: $\triangle ABC$,LineRoleRelation{Segment=CD, roleType=CENTRAL_LINE},EqualityRelation{AC=AB},MidianLineOfTriangleRelation{midianLine=CB, triangle= $\triangle CAE$, top=C, bottom=AE},ProveConclusionRelation:[证明: EqualityRelation{CE=2*CD}]

198、topic: 如图,在半径为5的 $\odot O$ 中,弦AB=8,P是弦AB所对的优弧上的动点,连接AP,过点A作AP的垂线交射线PB于点C,当 $\triangle PAB$ 是等腰三角形时,求线段BC的长.#%#



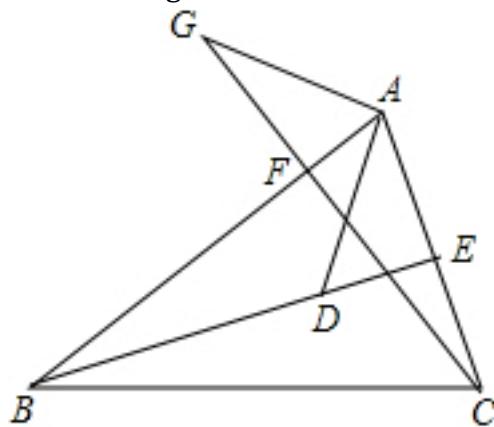
graph:

```
{"stem": {"pictures": [{"picturename": "1000040835_Q_1.jpg", "coordinates": {"A": "-2.00,1.49", "B": "2.00,1.50", "C": "3.16,3.13", "O": "0.00,0.00", "P": "-0.78,-2.38"}, "collineations": {"0": "A###P", "1": "P##B##C", "2": "C##A", "3": "A##B"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##P"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null,straightLine=null},LinePerpRelation{line1=CA, line2=AP, crossPoint=A},EqualityRelation{BC=v_1},RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, length=Express:[5],ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, chordLength=null,straightLine=null},EqualityRelation{AB=8},SegmentRelation:AP,IsoscelesTriangleRelation:IsoscelesTriangle: $\triangle PAB$ [Optional.of(A)],求值(大小): (ExpressRelation:[key:]v_1),LineCrossRelation [crossPoint=Optional.of(C), iLine1=PB, iLine2=CA],PointOnLineRelation{point=A, line=CA, isConstant=false},

extension=false},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}

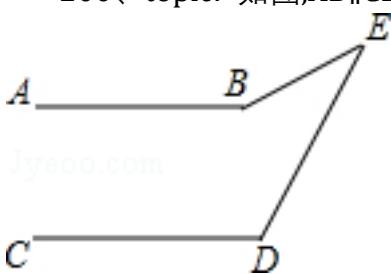
199、topic: 如图,在 $\triangle ABC$ 中,BE、CF分别是AC、AB两边上的高,在BE上截取 $BD=AC$,在CF的延长线上截取 $CG=AB$,连接AD、AG. #(1)求证: $\triangle ABD \cong \triangle GCA$; #(2)请你确定 $\triangle ADG$ 的形状,并证明你的结论.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030766_Q_1.jpg", "coordinates": {"A": "-7.38,5.45", "B": "-11.0,2.00", "C": "-6.00,2.00", "D": "-7.55,3.38", "E": "-6.69,3.72", "F": "-8.38,4.50", "G": "-9.45,5.62"}, "collineations": {"0": "B###C", "1": "B##D##E", "2": "B##F##A", "3": "A##G", "4": "A##D", "5": "A##E##C", "6": "G##F##D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation:△ABC,LinePerpRelation{line1=BE, line2=AC, crossPoint=E},LinePerpRelation{line1=CF, line2=AB, crossPoint=F},SegmentRelation:BE,EqualityRelation{BD=AC},SegmentRelation:CF,EqualityRelation{CG=AB},SegmentRelation:AD,SegmentRelation:AG,ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△ABD, triangleB=△GCA}],ShapeJudgeConclusionRelation{geoEle=△ADG}

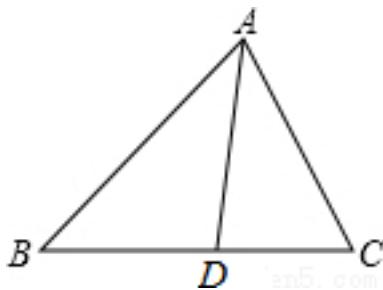
200、topic: 如图, $AB \parallel CD$,求证: $\angle BED = \angle B - \angle D$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030610_Q_1.jpg", "coordinates": {"A": "-15.00,6.00", "B": "-11.00,6.00", "C": "-15.00,4.00", "D": "-11.00,4.00", "E": "-9.00,7.00"}, "collineations": {"0": "A##B", "1": "B##E", "2": "C##D", "3": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD],ProveConclusionRelation:[证明: EqualityRelation{∠BED=∠ABE-∠CDE}]

201、topic: 如图, $\triangle ABC$ 中,AD是 $\angle BAC$ 的平分线.请说明 $AB:AC=BD:CD$.#%#

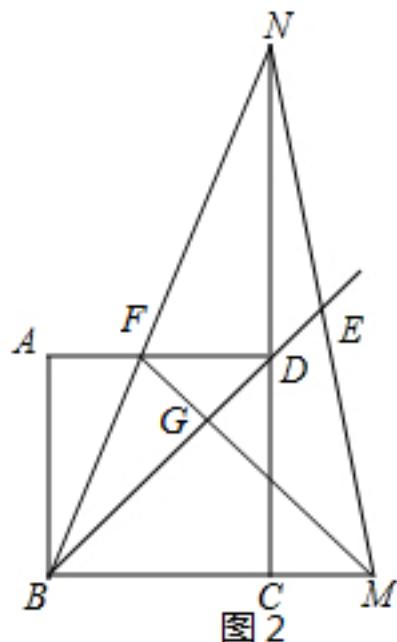
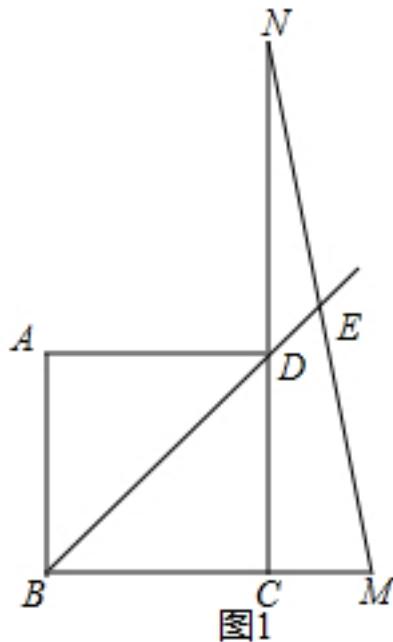


graph:

```
{"stem":{"pictures":[{"picturename":"1000062206_Q_1.jpg","coordinates":{"A": "-11.17,2.83","B": "-14.31,-0.69","C": "-9.90,-0.69","D": "-11.85,-0.69"}, "collineations": {"0": "D##A", "1": "A##C", "2": "A##B", "3": "B##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}
```

NLP: TriangleRelation:△ABC, AngleBisectorRelation{line=AD, angle=∠BAC, angle1=∠BAD, angle2=∠CAD}, ProveConclusionRelation:[证明: EqualityRelation{(AB)/(AC)=(BD)/(CD)}]

202、topic: 如图1,在正方形ABCD中,延长BC至点M,延长CD至点N,使BM=DN,连接MN交BD的延长线于点E.(1)求证:\$BD+2DE=\sqrt{2}BM\$.(2)如图2,连接BN交AD于点F,连接MF交BD于点G.若AF:FD=1:2,且CM=2,求DG的长度.



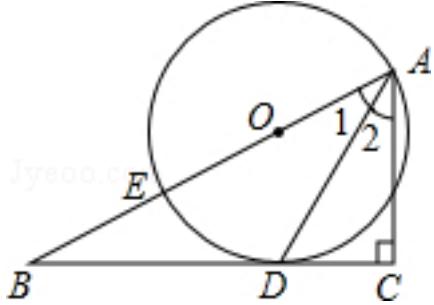
graph:

```
{"stem":{"pictures":[{"picturename":"95A12E4267434E4A8E45A89FE515F5D2.jpg","coordinates":{"A": "-13.00,7.00","B": "-13.00,3.00","C": "-9.00,3.00","D": "-9.00,7.00","E": "-7.00,9.00","F": "-11.67,7.00","G": "-10.00,6.00","M": "-5.00,3.00","N": "-9.00,15.00"}, "collineations": {"0": "A##B", "1": "D##F##A", "2": "B##F##N", "3": "B##M##C", "4": "B##G##D##E", "5": "C##D##N", "6": "M##E##N", "7": "F##G##M"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": []}]}}
```

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=M, line=BC, isConstant=false, extension=true}, PointOnLineRelation{point=N, line=CD, isConstant=false, extension=true}, EqualityRelation{BM=DN}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=MN, iLine2=BD], EqualityRelation{DG=v_0}, (ExpressRelation:[key:]2), LineCrossRelation [crossPoint=Optional.of(F), iLine1=BN, iLine2=AD], LineCrossRelation [crossPoint=Optional.of(G),

iLine1=MF, iLine2=BD], EqualityRelation{(AF)/(DF)=(1)/(2)}, EqualityRelation{CM=2}, 求值(大小):
 (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
 EqualityRelation{BD+2*DE=(2^(1/2))*BM}], SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]DG)}

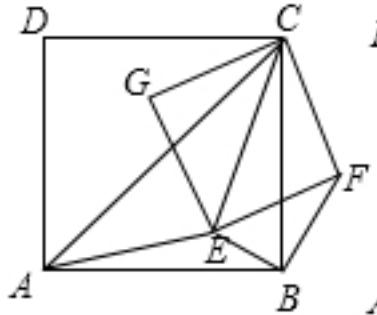
203、topic: 如图,已知点E在Rt $\triangle ABC$ 的斜边AB上,以AE为直径的 $\odot O$ 与直角边BC相切于点D.#%#(1)
 求证:AD平分 $\angle BAC$;#%#(2)若BE=2,BD=4,求 $\odot O$ 的半径.#%#



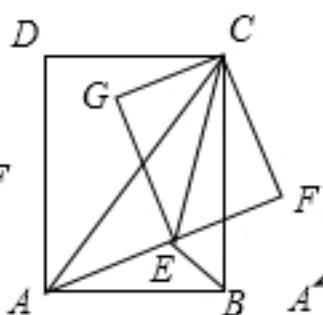
graph:
 {"stem": {"pictures": [{"picturename": "1000080879_Q_1.jpg", "coordinates": {"A": "2.40,1.80", "B": "-4.00,-3.00", "C": "2.40,-3.00", "D": "0.00,-3.00", "E": "-2.40,-1.80", "O": "0.00,0.00"}, "collineations": {"0": "A###C", "1": "A##O##E##B", "2": "A##D", "3": "C##D##B"}, "variable>equals": {"0": "\u03291=\u0329BAD", "1": "\u03292=\u0329CAD"}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AE, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, LineContactCircleRelation{line=BC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(D), outpoint=Optional.absent()}, EqualityRelation{BE=2}, EqualityRelation{BD=4}, 圆的半径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, ProveConclusionRelation:[证明: AngleBisectorRelation{line=AD, angle= $\angle CAO$, angle1= $\angle CAD$, angle2= $\angle DAO$ }], SolutionConclusionRelation{relation=圆的半径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}}

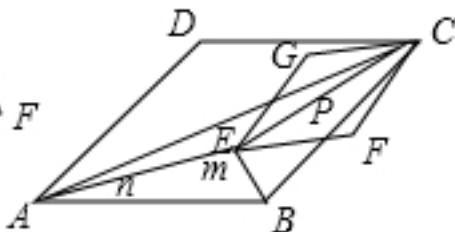
204、topic: 已知\$AC,EC\$分别为四边形\$ABCD\$和\$EFCG\$的对角线,点\$E\$在\$\vartriangle ABC\$内, \$\angle CAE + \angle CBE = 90^\circ\$.#%#(1)如图①,当四边形\$ABCD\$和\$EFCG\$均为正方形时,连接BF.#%#①求证: \$\vartriangle CAE \sim \vartriangle CBF\$;#%#②若\$BE=1,AE=2\$,求CE的长.#%#(2)如图②,当四边形\$ABCD\$和\$EFCG\$均为矩形,且\$\frac{AB}{BC}=\frac{EF}{FC}=k\$时,若\$BE=1,AE=2,CE=3\$,求k的值;#%#(3)如图③,当四边形\$ABCD\$和\$EFCG\$均为菱形,且\$\angle DAB=\angle GEF=45^\circ\$时,设\$BE=m,AE=n,CE=p\$,试探究\$m,n,p\$三者之间满足的等量关系.(直接写出结果,不必写出解答过程)#%#



图①



图②



图③

```

graph:
{"stem": {"pictures": [{"picturename": "1000039755_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "4.00,4.00", "D": "0.00,4.00", "E": "3.07,0.92", "F": "5.08,2.00", "G": "2.00,2.92"}, "collineations": {"0": "D##A", "1": "A##B", "2": "B##C", "3": "C##D", "4": "A##C", "5": "A##E", "6": "G##C", "7": "G##E", "8": "E##F", "9": "F##C", "10": "E##B", "11": "F##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},已知条件QuadrilateralRelation{quadrilateral=CFEG},TriangleRelation: $\triangle ABC$,PositionOfPoint2RegionRelation{point=E, region=EnclosedRegionRelation{name=ABC, closedShape= $\triangle ABC$ }, position=inner},EqualityRelation{ $\angle CAE + \angle CBE = ((1/2 * \pi))$ },SegmentRelation:BF,EqualityRelation{CE=v_0},EqualityRelation{BE=1},EqualityRelation{AE=2},求值(大小):
(ExpressRelation:[key:]v_0),RectangleRelation{rectangle=Rectangle:ABCD},RectangleRelation{rectangle=Rectangle:EFCG},MultiEqualityRelation [multiExpressCompare=((AB)/(BC))=((EF)/(CF))=k, originExpressRelationList=[], keyWord=null, result=null],EqualityRelation{BE=1},EqualityRelation{AE=2},EqualityRelation{CE=3},求值(大小):
(ExpressRelation:[key:]k),RhombusRelation{rhombus=Rhombus:ABCD},RhombusRelation{rhombus=Rhombus:EFCG},MultiEqualityRelation [multiExpressCompare= $\angle BAD = \angle FEG = ((1/4 * \pi))$, originExpressRelationList=[], keyWord=null, result=null],EqualityRelation{BE=m},EqualityRelation{AE=n},EqualityRelation{CE=p},求值(大小):
(ExpressRelation:[key:](m/n)),求值(大小):
(ExpressRelation:[key:](m/p)),ProveConclusionRelation:[证明:
TriangleSimilarRelation{triangleA= $\triangle CAE$, triangleB= $\triangle CBF$ }],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CE)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]k)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](m/n))},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](m/p))}}

205、topic: 在等腰直角三角形ABC中, $\angle BAC=90^\circ$, $AB=AC$,直线MN过点A且 $MN \parallel BC$,过点B为一锐角顶点作Rt $\triangle BDE$, $\angle BDE=90^\circ$,且点D在直线MN上(不与点A重合).#%#(1)如图1,DE与AC交于点P,求证: $BD=DP$.#%#(2)如图2,DE与CA的延长线交于点P, $BD=DP$ 是否成立?如果成立,请给予证明;如果不成立,请说明理由.#%#(3)如图3,DE与AC的延长线交于点P, BD 与 DP 是否相等?请直接写出你的结论,无须证明.#%#

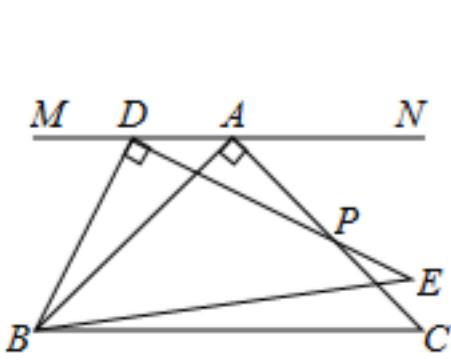


图1

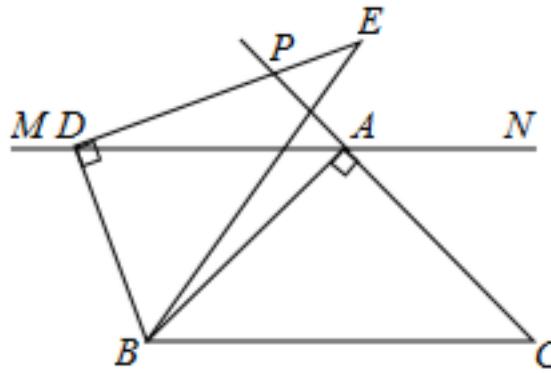


图2

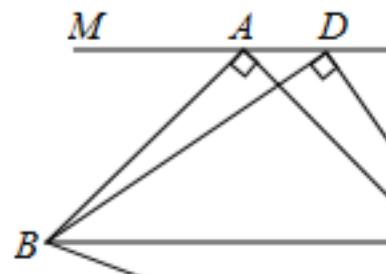


图3

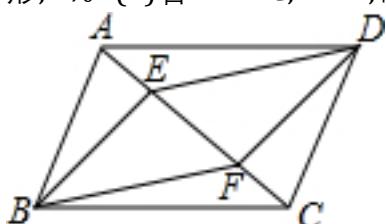
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"9A5D292ADB6B46938424F5277832C311_1.jpg","coordinates":{"A": "-9.00,7.00", "B": "-13.00,3.00", "C": "-5.00,3.00", "D": "-11.00,7.00", "E": "-5.00,4.00", "M": "-14.00,7.00", "N": "-4.00,7.00", "P": "-7.00,5.00"}, "collineations": {"0": "B##A", "1": "A##P##C", "2": "A##D##M##N", "3": "C##B", "4": "E##B", "5": "D##B", "6": "E##D##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "9A5D292ADB6B46938424F5277832C311_2.jpg", "coordinates": {"A": "-8.00,5.00", "B": "-11.00,2.00", "C": "-5.00,2.00", "D": "-12.00,5.00", "E": "-7.21,6.60", "M": "-14.00,5.00", "N": "-4.00,5.00", "P": "-9.00,6.00"}, "collineations": {"0": "B##A", "1": "A##P##C", "2": "A##D##M##N", "3": "C##B", "4": "E##B", "5": "D##B", "6": "E##D##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "pictures": [], "appliedproblems": {}}]}
```

NLP:

PointRelation:A,IsocelesRightTriangleRelation:IsocelesRightTriangle:IsocelesTriangle: $\triangle ABC$ [Optional.of(A)][Optional.of(A)],EqualityRelation{ $\angle BAP = (1/2 * \pi)$ },EqualityRelation{AB=AC},PointOnLineRelation{point=A, line=MN, isConstant=false, extension=false},LineParallelRelation [iLine1=MN, iLine2=BC],EqualityRelation{ $\angle BDP = (1/2 * \pi)$ },PointOnLineRelation{point=D, line=MN, isConstant=false, extension=false},(ExpressRelation:[key:]1),LineCrossRelation[crossPoint=Optional.of(P), iLine1=DE, iLine2=AC],(ExpressRelation:[key:]2),LineCrossRelation[crossPoint=Optional.of(P), iLine1=DE, iLine2=CA],(ExpressRelation:[key:]3),LineCrossRelation[crossPoint=Optional.of(P), iLine1=DE, iLine2=AC],EqualityRelation{BD=DP},ProveConclusionRelation:[证明: EqualityRelation{BD=DP}],ProveConclusionRelation:[证明: EqualityRelation{BD=DP}]

206、topic: 如图,四边形ABCD中,点E,F在直线AC上,BE||DF. #%(1)求证:四边形BEDF是平行四边形;#%(2)若 $AB \perp AC$, $AB=4$, $BC=2\sqrt{13}$,当四边形BEDF为矩形时,求线段AE的长.#%#

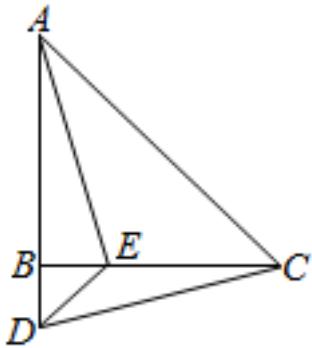


graph:

```
{"stem":{"pictures":[{"picturename":"4111B94343AF4BF3BFB281A0CA3BDA0F.jpg","coordinates":{"A": "-12.99,6.33","B": "-15.21,3.00","C": "-8.00,3.00","D": "-5.78,6.33","E": "-14.66,7.44","F": "-6.34,1.89"}],"collineations":{"0": "A###B","1": "A###D","2": "E###A###C###F","3": "B###C","4": "B###F","5": "B##E","6": "C###D","7": "D###F","8": "D###E"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{},"substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, LineParallelRelation [iLine1=BE, iLine2=DF], EqualityRelation{AE=v_0}, LinePerpRelation{line1=AB, line2=AC, crossPoint=A}, EqualityRelation{AB=4}, EqualityRelation{BC=2*(13^(1/2))}, RectangleRelation{rectangle=Rectangle:BEDF}, 求值(大小): (ExpressRelation:[key:v_0]), ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BEDF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:AE])}

207、topic: 如图,在 $\triangle ABC$ 中, $AB=CB$, $\angle ABC=90^\circ$.D为AB延长线上的一点,点E在边BC上,连接AE、DE、DC, $AE=CD$.#%#求证: $\angle BAE=\angle BCD$.#%#



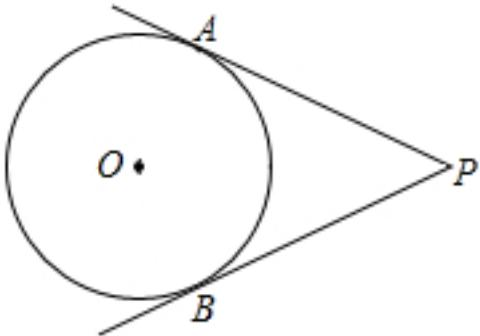
graph:

```
{"stem":{"pictures":[{"picturename":"1000072667_Q_1.jpg","coordinates":{"A": "0.00,5.00","B": "0.00,1.00","C": "4.00,1.00","D": "0.00,0.00","E": "1.00,1.00"}],"collineations":{"0": "B###E###C","1": "C###A","2": "A###E","3": "E###D","4": "D###C","5": "A###B###D"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{},"substems": []}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{AB=BC}, EqualityRelation{ $\angle ABE=(1/2\pi)$ }, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, SegmentRelation:AE, SegmentRelation:DE, SegmentRelation:DC, EqualityRelation{AE=CD}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle BAE=\angle DCE$ }]

208、topic: 如图, $\odot O$ 的半径为4,点P到圆心的距离为8,过点P画 $\odot O$ 的两条切线PA和PB,A,B为切点,求PA的长度和 $\angle P$ 的度数.#%#

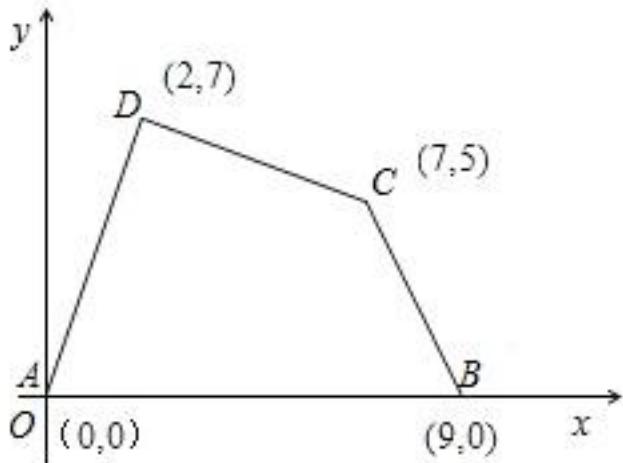


graph:

```
{"stem":{"pictures":[{"picturename":"1000083451_Q_1.jpg","coordinates":{"A": "-4.02,0.96","B": "-3.83,-2.50","P": "-0.93,-0.60","O": "-4.92,-0.82"},"collineations":{"0": "P###A","1": "P###B"},"variable-equals":{},"circles":[{"center": "O","pointincircle": "A###B"}]}],"appliedproblems":{},"substems":[]}
```

NLP: CircleCenterRelation{point=Q_0, conic=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, EqualityRelation{AP=v_1}, RadiusRelation{radius=null, circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, length=Express:[4], DistanceOfDualPointsRelation{pointA=P, pointB=Q_0, distance=Express:[8]}, LineContactCircleRelation{line=PA, circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, contactPoint=Optional.of(A)}, outpoint=Optional.of(P)}, LineContactCircleRelation{line=PB, circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, contactPoint=Optional.of(B)}, outpoint=Optional.of(P)}, PointOnLineRelation{point=P, line=PA, isConstant=false, extension=false}, PointOnLineRelation{point=P, line=PB, isConstant=false, extension=false}, PointRelation:A, PointRelation:B, 求值(大小): (ExpressRelation:[key:]v_1), 求角的大小: AngleRelation{angle= $\angle APB$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AP)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle APB$)}

209、topic: 在如图所示的直角坐标系中,四边形ABCD各顶点的坐标分别是A(0,0),B(9,0),C(7,5),D(2,7),求这个四边形的面积.



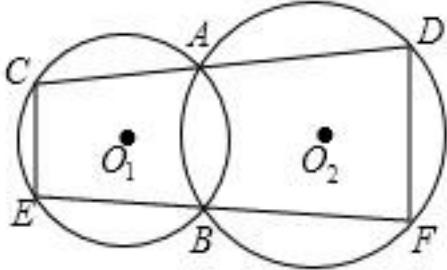
graph:

```
{"stem":{"pictures":[{"picturename":"1000024452_Q_1.jpg","coordinates":{"A": "0.00,0.00","B": "9.00,0.00","C": "7.00,5.00","D": "2.00,7.00"},"collineations":{"0": "B###A","1": "C###B","2": "D###A","3": "C##D##B"},"variable-equals":{},"circles":[]]}],"appliedproblems":{},"substems":[]}
```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, PointRelation:A(0,0), PointRelation:B(9,0), PointRelation:C(7,5), PointRelation:D(2,7)

210、topic: 如图,\$\odot\{O_1\}\$和\$\odot\{O_2\}\$都经过A、B两点,经过点A的直线CD交\$\odot\{O_1\}\$于C,交\$\odot\{O_2\}\$于D,经过点B的直线EF交\$\odot\{O_1\}\$于E,交\$\odot\{O_2\}\$于F.求证:\$CE \parallel DF\$.

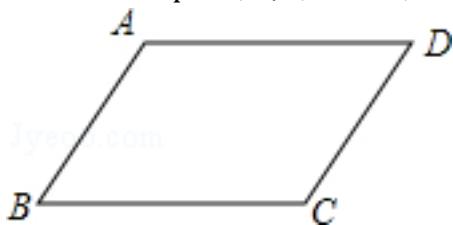


graph:

```
{"stem":{"pictures":[{"picturename":"1000008191_Q_1.jpg","coordinates":{"A": "-2.17,4.58","B": "-2.12,-0.74","C": "-9.21,3.89","D": "5.80,5.36","E": "-9.29,0.03","F": "5.66,-1.58","O1": "-5.46,1.89","O2": "2.11,1.96"}],"collineations":{"0": "D###C##A","1": "F##D","2": "E##C","3": "B##E##F"}, "variable-equals": {}, "circles": [{"center": "O1", "pointincircle": "A##B##C##E"}, {"center": "O2", "pointincircle": "A##B##F##D"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: PointOnLineRelation{point=A, line=CD, isConstant=false, extension=false}, PointOnLineRelation{point=B, line=EF, isConstant=false, extension=false}, CircleCrossRelation{conic1=Circle[\$\odot O_1\$]{center=\$O_1\$, analytic=\$(x-x_{O_1})^2+(y-y_{O_1})^2=r_{O_1}^2\$}, conic2=Circle[\$\odot O_2\$]{center=\$O_2\$, analytic=\$(x-x_{O_2})^2+(y-y_{O_2})^2=r_{O_2}^2\$}, crossPoints=[A, B], crossPointNum=2}, LineCrossCircleRelation{line=CD, circle=\$\odot O_1\$, crossPoints=[C]}, crossPointNum=1}, LineCrossCircleRelation{line=CD, circle=\$\odot O_2\$, crossPoints=[D]}, crossPointNum=1}, LineCrossCircleRelation{line=EF, circle=\$\odot O_1\$, crossPoints=[E]}, crossPointNum=1}, LineCrossCircleRelation{line=EF, circle=\$\odot O_2\$, crossPoints=[F]}, crossPointNum=1}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=CE, iLine2=DF]]]

211、topic: 如图,AD=BC,AB=DC,求证:\$\angle A+\angle D=180^\circ\$.#%#



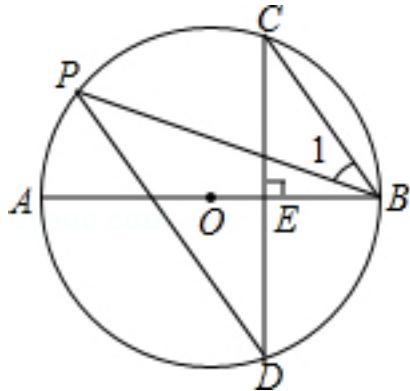
graph:

```
{"stem":{"pictures":[{"picturename":"1000030728_Q_1.jpg","coordinates":{"A": "-11.00,5.00","B": "-12.00,3.00","C": "-9.00,3.00","D": "-8.02,5.00"}],"collineations": {"0": "A##B","1": "B##C","2": "C##D","3": "A##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: EqualityRelation{AD=BC}, EqualityRelation{AB=CD}, ProveConclusionRelation:[证明: EqualityRelation{\$\angle BAD + \angle ADC = (\pi)\$}]

212、topic: 如图,AB是\$\odot O\$的直径,弦CD\$\perp\$AB于点E,点P在\$\odot O\$上,\$\angle 1=\angle C\$.#%#(1)求证:CB||PD;#%#(2)

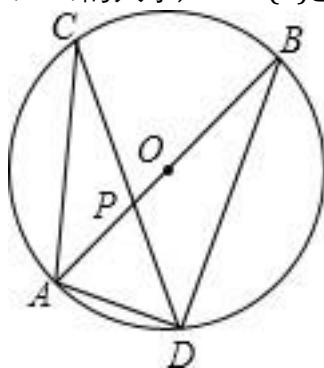
若 $BC=3$, $\sin \angle P=\frac{3}{5}$, 求 $\odot O$ 的直径.



graph:
 {"stem": {"pictures": [{"picturename": "1000080878_Q_1.jpg", "coordinates": {"A": "-2.50,0.00", "B": "2.50,0.00", "C": "0.70,2.40", "D": "0.70,-2.40", "E": "0.69,0.00", "O": "0.00,0.00", "P": "-2.11,1.35"}, "collineations": {"0": "B##C", "1": "A###O###E##B", "2": "P##B", "3": "P##D", "4": "C##E##D"}, "variable>equals": {"0": "\angle 1=\angle PBC"}, "circles": {}}, "appliedproblems": {}, "subsystems": []}}

NLP: ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, chordLength=null, straightLine=null}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=null}, LinePerpRelation{line1=CD, line2=AB, crossPoint=E}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[P]}, EqualityRelation{\mathbf{\angle CBP}=\mathbf{\angle BCE}}, EqualityRelation{BC=3}, EqualityRelation{\mathbf{\sin(\angle BPD)}=(3/5)}, 圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=CB, iLine2=PD]], SolutionConclusionRelation{relation=圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}}]}

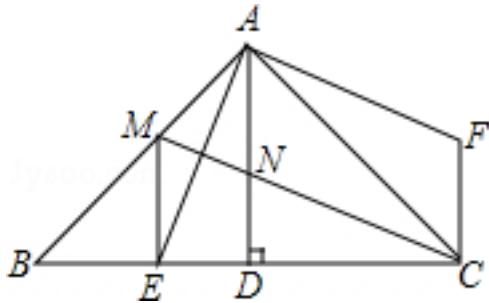
213、topic: 如图,在 $\odot O$ 中,直径AB与弦CD相交于点P, $\angle CAB=40^\circ$, $\angle APD=65^\circ$.?%#(1)求 $\angle B$ 的大小;?%#(2)已知圆心O到BD的距离为3,求AD的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000026040_Q_1.jpg", "coordinates": {"A": "-3.00,-4.00", "B": "3.00,4.00", "C": "-3.42,3.65", "D": "1.14,-4.87", "O": "0.00,0.00", "P": "-0.86,-1.14"}, "collineations": {"0": "P##C#D", "1": "B##O##P##A", "2": "D##B", "3": "D##A", "4": "C##A"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##D##A##B"}]}, "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=AB, iLine2=CD], ChordOfCircleRelation{chord=CD, circle=null, chordLength=null, straightLine=null}, EqualityRelation{ $\angle CAP = (2/9\pi)$ }, EqualityRelation{ $\angle APD = (13/36\pi)$ }, 求角的大小: AngleRelation{angle= $\angle DBO$ }, CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, EqualityRelation{AD=v_0}, PointToLineDistanceRelation{point=O, line=BD, distance=Express:[3]}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle DBO$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AD)}

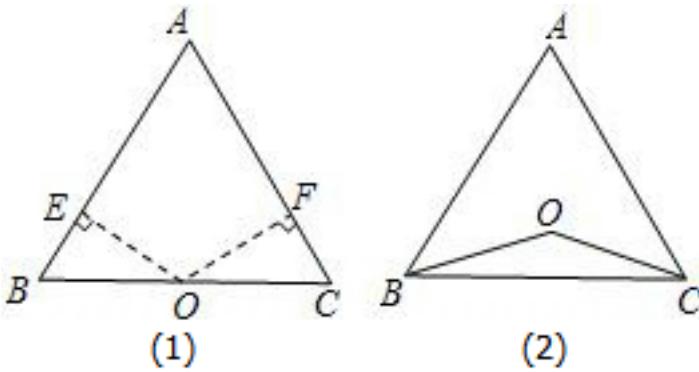
214、topic: 如图, $\triangle ABC$ 中, $\angle BAC = 90^\circ$, $AB = AC$, $AD \perp BC$, 垂足是 D, AE 平分 $\angle BAD$, 交 BC 于点 E, 在 $\triangle ABC$ 外有一点 F, 使 $FA \perp AE$, $FC \perp BC$. #%(1) 求证: $BE = CF$; #%(2) 在 AB 上取一点 M, 使 $BM = 2DE$, 连接 MC, 交 AD 于点 N, 连接 ME, 求证: ① $ME \perp BC$; ② $DE = DN$. #%#



graph:
{"stem": {"pictures": [{"picturename": "1000040428_Q_1.jpg", "coordinates": {"A": "2.00,3.00", "B": "-1.00, 0.00", "C": "5.00,0.00", "D": "2.00,0.00", "E": "0.76,0.00", "F": "5.00,1.76", "M": "0.76,1.76", "N": "2.00,1.24"}, "collinearities": {"0": "A##M##B", "1": "B##E##D##C", "2": "C##A", "3": "D##A", "4": "E##M", "5": "M##N##C", "6": "E##A", "7": "A##F", "8": "F##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle CAM = (1/2\pi)$ }, EqualityRelation{ $AB = AC$ }, LinePerpRelation [line1=AD, line2=BC, crossPoint=D], AngleBisectorRelation{line=AE, angle= $\angle DAM$, angle1= $\angle DAE$, angle2= $\angle EAM$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AE, iLine2=BC], PositionOfPoint2RegionRelation{point=F, region=EnclosedRegionRelation{name=ABC, closedShape= $\triangle ABC$ }, position=outer}, LinePerpRelation{line1=FA, line2=AE, crossPoint=A}, LinePerpRelation{line1=FC, line2=BC, crossPoint=C}, PointOnLineRelation{point=M, line=AB, isConstant=false, extension=false}, EqualityRelation{BM=2*DE}, SegmentRelation:MC, LineCrossRelation [crossPoint=Optional.of(N), iLine1=MC, iLine2=AD], SegmentRelation:ME, ProveConclusionRelation:[证明: EqualityRelation{BE=CF}]

215、topic: 如图, 点 O 到 $\triangle ABC$ 的两边 AB, AC 所在直线的距离相等, 且 $OB = OC$. #%(1) 如图(1), 若点 O 在边 BC 上, 请说明 $AB = AC$ 的理由; #%(2) 如图(2), 若点 O 在 $\triangle ABC$ 的内部, 请说明 $AB = AC$ 的理由; #%(3) 若点 O 在 $\triangle ABC$ 的外部, $AB = AC$ 成立吗? 请说明理由. #%#

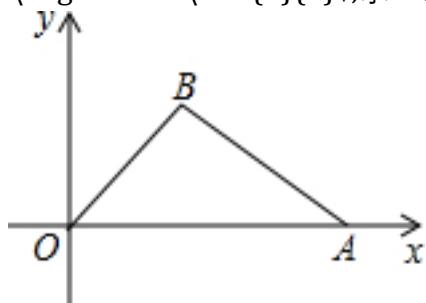


graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000063718_Q_1.jpg","coordinates":{"A":"4.68,3.28","B":"3.11,0.55","C":"6.26,0.55","O":"4.68,0.55","E":"3.50,1.24","F":"5.86,1.24"}, "collineations":{"0":"A###B##E","1":"A###C##F","2":"O##B##C","3":"O##E","4":"O##F"}, "variable-equals":{},"circles":[]}], "appliedproblems":{}}, {"substemid":"2","questionrelies":"","pictures": [{"picturename":"1000063718_Q_1.jpg","coordinates":{"A":"4.68,3.28","B":"3.11,0.55","C":"6.26,0.55","O":"4.68,1.00"}, "collineations":{"0":"A##B","1":"A##C","2":"C##B","3":"O##B","4":"O##C"}, "variable-equals":{},"circles":[]}], "appliedproblems":{}}]}
```

NLP: EqualityRelation{BO=CO}, PointOnLineRelation{point=O, line=BC, isConstant=false, extension=false}, TriangleRelation:△ABC, PositionOfPoint2RegionRelation{point=O, region=EnclosedRegionRelation{name=ABC, closedShape=△ABC}, position=inner}, TriangleRelation:△ABC, PositionOfPoint2RegionRelation{point=O, region=EnclosedRegionRelation{name=ABC, closedShape=△ABC}, position=outer}, ProveConclusionRelation:[证明:
EqualityRelation{AB=AC}], ProveConclusionRelation:[证明:
EqualityRelation{AB=AC}], ProveConclusionRelation:[ConstantCorrectRelation
[IExpressCompare=[AB=AC], identity_range=[], identity_judge_str=null, independent_var=[x], parameters=[AB, AC], conditionSet=null]]]

216、topic: 如图,在直角坐标平面内,O为原点,点A的坐标为(10,0),点B在第一象限内,BO=5,\$\sin \angle BOA=\frac{3}{5}\$,求:(1)点B的坐标;(2)cos∠BAO的值.



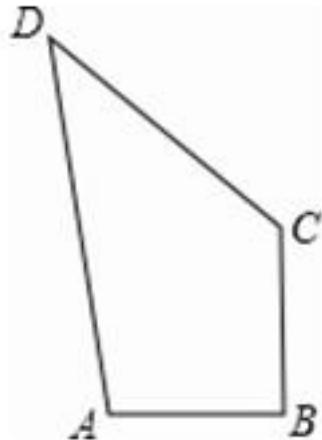
graph:

```
{"stem":{"pictures":[{"picturename":"1000060437_Q_1.jpg","coordinates":{"A":"10.00,0.00","B":"4.00,3.00","O":"0.00,0.00"}, "collineations":{"0":"A##B","1":"A##O","2":"B##O"}, "variable-equals":{},"circles":[]}], "appliedproblems":{},"substems":[]}}
```

NLP: PointRelation:O(0,0), PointRelation:A(10,0), PointInDomRelation [point=B, local=FIRST_QUADRANT], EqualityRelation{BO=5}, EqualityRelation{sin(∠AOB)=(3/5)}, 坐标 PointRelation:B, 求值(大小):

(ExpressRelation:[key:]cos($\angle BAO$)),SolutionConclusionRelation{relation=坐标
PointRelation:B},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]cos($\angle BAO$))}

217、topic: 如图,在四边形\$ABCD\$中,\$\angle ABC=90^\circ\$,\$AB=3\sqrt{2}\$,\$BC=\sqrt{7}\$,\$DC=12\$,\$AD=13\$,求四边形\$ABCD\$的面积.

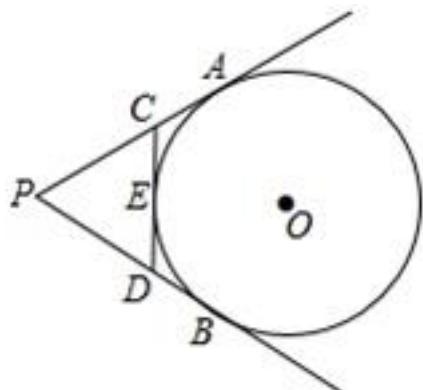


graph:
 {"stem": {"pictures": [{"picturename": "1000027618_Q_1.jpg", "coordinates": {"A": "-4.24,0.00", "B": "0.00,0.00", "C": "0.00,2.65", "D": "-6.35,12.83"}, "collineations": {"0": "B##C", "1": "A##B", "2": "D##C", "3": "A##D"}, "variable>equals": {}, "circles": {}, "appliedproblems": {}}, "substems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{S_ABCD=v_0},已知条件

QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{\$\angle ABC=(1/2*\pi)\$},EqualityRelation{AB=\$3*(2^{(1/2)})\$},EqualityRelation{BC=\$(\sqrt{7})\$},EqualityRelation{CD=12},EqualityRelation{AD=13},求值(大小): (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]S_ABCD)}

218、topic: 如图,PA、PB切\$\odot O\$于A、B两点,CD切\$\odot O\$于点E,交PA、PB于C、D.若\$\odot O\$的半径为r,\$\triangle PCD\$的周长等于3r,求\$\tan\angle APB\$的值.

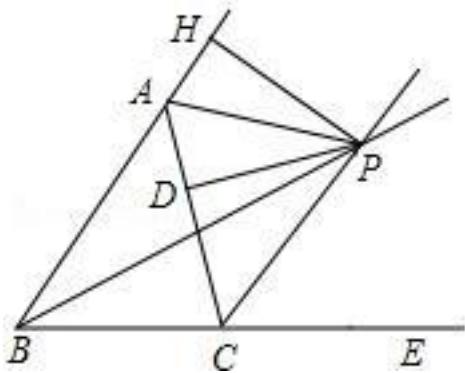


graph:
 {"stem": {"pictures": [{"picturename": "1000025033.jpg", "coordinates": {"A": "-2.22,3.33", "B": "-2.22,-3.33", "C": "0.0,0.0", "D": "0.0,0.0", "E": "0.0,0.0", "P": "-2.22,0.00"}}, "substems": []}}

3","C":"-4.00,2.14","D":"-4.00,-2.14","E":"-4.00,0.00","P":"-7.21,0.00","O":"0.00,0.00"},"collineations":{},"0":"P####C##A","1":"P###B###D","2":"D###E###C"},"variable-equals":{},"circles": [{"center": "O", "pointincircle": "A###B###E"}]}],"appliedproblems":{},"substems":[]}]

NLP: EqualityRelation{C_△CDP=v_0}, LineContactCircleRelation{line=PA},
 circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(A),
 outpoint=Optional.of(P)}, LineContactCircleRelation{line=PB, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(B), outpoint=Optional.of(P)}, LineContactCircleRelation{line=CD, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(E), outpoint=Optional.absent()}, LineCrossRelation [crossPoint=Optional.of(C), iLine1=CD, iLine2=PA], LineCrossRelation [crossPoint=Optional.of(D), iLine1=CD, iLine2=PB], RadiusRelation{radius=null, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, length=Express:[r]}, EqualityRelation{v_0=3*r}, 求值(大小): (ExpressRelation:[key:]tan(∠CPD)), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]tan(∠CPD))}

219、topic: 如图,△ABC中,∠ABC的平分线与∠ACB的外角平分线交于P点,PD⊥AC于点D,PH⊥BA于点H.
 H.%(1)若点P到直线BA的距离是5cm,求点P到直线BC的距离;%(2)求证:点P在∠HAC的平分线上.
 #%#

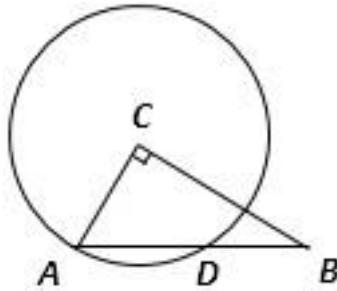


graph:
 {"stem": {"pictures": [{"picturename": "1000031272_Q_1.jpg", "coordinates": {"A": "-7.55,4.51", "B": "-9.00, 2.00", "C": "-6.83,2.00", "D": "-7.29,3.60", "E": "-4.00,2.00", "H": "-7.08,5.32", "P": "-5.16,4.22"}, "collineations": {"0": "H###A##B", "1": "B##C##E", "2": "A##D##C", "3": "H##P", "4": "A##P", "5": "D##P", "6": "B##P", "7": "C##P"}, "variable-equals": {}, "circles": {}}, "appliedproblems": {}, "substems": []}]}

NLP: AngleBisectorRelation{line=BP, angle=∠ABC, angle1=∠ABP, angle2=∠CBP}, AngleBisectorRelation{line=CP, angle=∠DCE, angle1=∠ECP, angle2=∠DCP}, LineRoleRelation{Segment=M_1N_1, roleType=ANGULAR_BISECTOR}, TriangleRelation:△ABC, LinePerpRelation{line1=PD, line2=AC, crossPoint=D}, LinePerpRelation{line1=PH, line2=BA, crossPoint=H}, PointToLineDistanceRelation{point=P, line=StraightLine[AB] analytic :y=k_BA*x+b_BA slope:null b:null isLinearFunction:false, distance=Express:[5]}, 距离,求距离: PointToLineDistanceRelation{point=P, line=BC, distance=null}, AngleBisectorRelation{line=AP, angle=∠DAH, angle1=∠DAP, angle2=∠HAP}, SolutionConclusionRelation{relation=距离,求距离: PointToLineDistanceRelation{point=P, line=BC, distance=null}}, ProveConclusionRelation:[证明: PointOnLineRelation{point=P, line=M_2N_2, isConstant=false, extension=false}]

220、topic: 如图,在\$Rt\vartriangle ABC\$中,\$\angle ACB=\{90\}^\circ\$, \$AC=3\$, \$BC=4\$, 以点C

为圆心,CA为半径的圆与AB交于点D,求AD的长度.

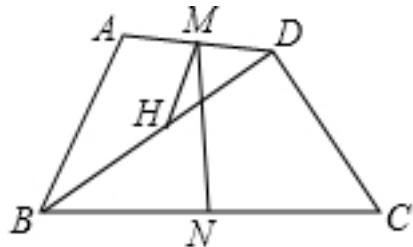


graph:

```
{"stem": {"pictures": [{"picturename": "B687E3B2D92F4B6C90A95FFD40B6FECD.jpg", "coordinates": {"A": "-12.35,2.32", "B": "-7.35,2.32", "C": "-11.00,5.00", "D": "-9.65,2.32"}, "collineations": {"0": "C###A", "1": "A###B###D", "2": "B###C"}, "variable>equals": {}, "circles": [{"center": "C", "pointincircle": "A###D"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: CircleCenterRelation{point=C, conic=Circle[$\odot O_0$]{center=O_0, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }}, RadiusRelation{radius=CA, circle=Circle[$\odot O_0$]{center=O_0, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$, length=null}}, EqualityRelation{AD=v_1}, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACB = (1/2\pi)$ }, EqualityRelation{AC=3}, EqualityRelation{BC=4}, LineCrossCircleRelation{line=AB, circle= $\odot O_0$, crossPoints=[D], crossPointNum=1}, 求值(大小): (ExpressRelation:[key]:v_1), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:AD)}

221、topic: 如图,四边形ABCD中,一组对边 $AB=DC=4$,另一组对边 $AD \neq BC$,对角线BD与边DC互相垂直,M,N,H分别是AD、BC、BD的中点,且 $\angle ABD=30^\circ$,求:(1)MH的长;(2)MN的长.

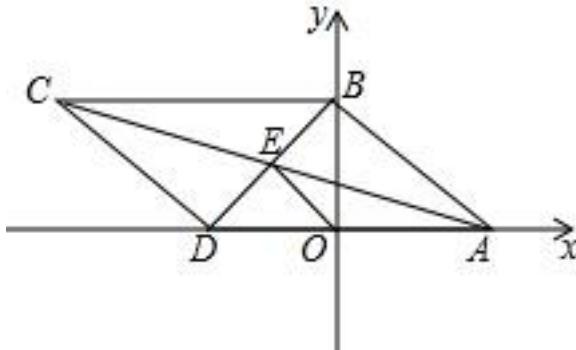


graph:

```
{"stem": {"pictures": [{"picturename": "1000034215_Q_1.jpg", "coordinates": {"A": "4.04,2.72", "B": "2.77,0.00", "C": "8.00,0.00", "D": "6.28,2.46", "M": "5.16,2.59", "N": "5.38,0.00", "H": "4.52,1.23"}, "collineations": {"0": "B###A", "1": "D###C", "2": "M##N", "3": "M##H", "4": "A##M##D", "5": "B##N##C", "6": "B##H##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LinePerpRelation{line1=BD, line2=DC, crossPoint=D},MiddlePointOfSegmentRelation{middlePoint=M,segment=AD},MiddlePointOfSegmentRelation{middlePoint=N,segment=BC},MiddlePointOfSegmentRelation{middlePoint=H,segment=BD}, EqualityRelation{ $\angle ABH = (1/6\pi)$ }, EqualityRelation{HM=v_0}, 求值(大小): (ExpressRelation:[key]:v_0), EqualityRelation{MN=v_1}, 求值(大小): (ExpressRelation:[key]:v_1), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:HM), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:MN)}

222、topic: 如图,在平面直角坐标系中,平行四边形ABCD的边AD在x轴上,点B在y轴上
 $\$AD \parallel BC$, $\$AD = BC$,AC、BD交于点E,且相互平分.若 $\$OA = OB$,点C的坐标为 $\$ \left(-\sqrt{3} - 1, \sqrt{3} \right)$.求:
(1)点E的坐标;
(2) $S_{\text{四边形ABEO}}$.

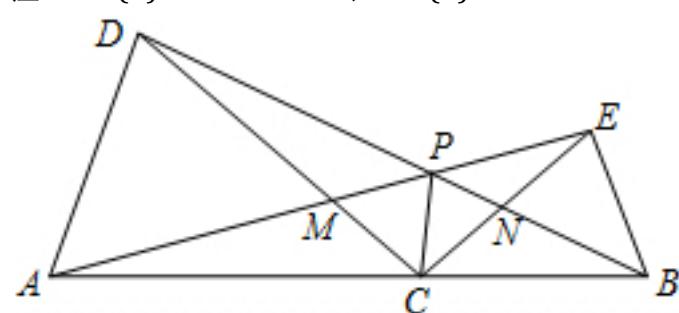


graph:
{"stem": {"pictures": [{"picturename": "1000006955_Q_1.jpg", "coordinates": {"A": "3.00,0.00", "B": "0.00,3.00", "C": "-6.00,3.00", "D": "-3.00,0.00", "E": "-1.5,1.5", "O": "0.00,0.00"}, "collineations": {"0": "C##D", "1": "D##A", "2": "A##B", "3": "C##B", "4": "C##A##E", "5": "D##B##E", "6": "E##O"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD},LineCoincideRelation[iLine1=AD, iLine2=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false], EqualityRelation{AD=BC}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD], EqualityRelation{AO=BO}, PointRelation:C(-3^(1/2))-1,(3^(1/2))), 坐标 PointRelation:E, 已知条件 QuadrilateralRelation{quadrilateral=ABEO}, 求值(大小): (ExpressRelation:[key:]S_(ABEO)), SolutionConclusionRelation{relation=坐标 PointRelation:E}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_(ABEO))}

223、topic: 如图,C为线段AB上任意一点(不与点A、B重合),分别以AC、BC为一边在AB的同侧作等腰三角形ACD和等腰三角形BCE,CA=CD,CB=CE, $\angle ACD$ 与 $\angle BCE$ 都是锐角,且 $\angle ACD=\angle BCE$,连接AE交CD于点M,连接BD交CE于点N,AE与BD交于点P,连接PC.求
证:(1) $\triangle ACE \cong \triangle DCB$;(2) $\angle APC = \angle BPC$.

证:(1) $\triangle ACE \cong \triangle DCB$;(2) $\angle APC = \angle BPC$.



graph:
{"stem": {"pictures": [{"picturename": "1000072758_Q_1.jpg", "coordinates": {"A": "-14.00,2.00", "B": "-6.02,2.00", "C": "-9.00,2.00", "D": "-12.83,5.21", "E": "-6.70,3.93", "M": "-10.20,3.00", "N": "-7.92,2.90", "P": "-8.88,3.35"}, "collineations": {"0": "A##D", "1": "C##P", "2": "B##E", "3": "D##M##C", "4": "E##N##C", "5": "A##C##B", "6": "D##P##N##B", "7": "A##M##P##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: PointRelation:A, PointRelation:B, PointOnLineRelation{point=C, line=AB, isConstant=false},

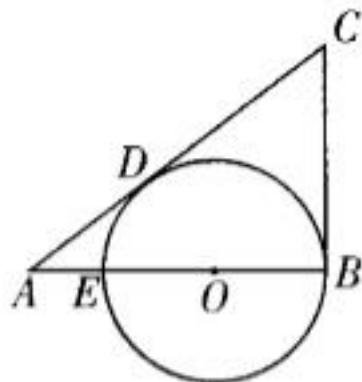
extension=false}, EqualityRelation{AC=CD}, EqualityRelation{BC=CE}, 已知条件
 AcuteAngleRelation: $\angle ACM$ /ACUTE_ANGLE, 已知条件
 AcuteAngleRelation: $\angle BCN$ /ACUTE_ANGLE, EqualityRelation{ $\angle ACM = \angle BCN$ }, LineCrossRelation
 [crossPoint=Optional.of(M), iLine1=AE, iLine2=CD], LineCrossRelation [crossPoint=Optional.of(N),
 iLine1=BD, iLine2=CE], LineCrossRelation [crossPoint=Optional.of(P), iLine1=AE,
 iLine2=BD], SegmentRelation:PC, ProveConclusionRelation:[证明:
 TriangleCongRelation{triangleA= $\triangle ACE$, triangleB= $\triangle DCB$ }], ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle CPM = \angle CPN$ }]

224、topic: 如图,P为 $\odot O$ 外一点,PA切 $\odot O$ 于A,PB切 $\odot O$ 于B,BC为直径,求证:AC||OP. # % #

graph:
 {"stem": {"pictures": [{"picturename": "1000083452_Q_1.jpg", "coordinates": {"A": "-0.38, 2.14", "B": "0.09, -1.56", "C": "1.34, 2.36", "P": "-3.84, -0.32", "O": "0.71, 0.40"}, "collineations": {"0": "O###A", "1": "O###P", "2": "A###C", "3": "A###P", "4": "B###P", "5": "B##O##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##A##B"}]}, "appliedproblems": {}, "substems": []}}

NLP: PointOutCircleRelation{point=Pcurve=Circle[$\odot O$]{center=O},
 analytic= $(x-x_0)^2 + (y-y_0)^2 = r_0^2$, points=[P]}, LineContactCircleRelation{line=PA,
 circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2 + (y-y_0)^2 = r_0^2$ }, contactPoint=Optional.of(A),
 outpoint=Optional.of(P)}, LineContactCircleRelation{line=PB, circle=Circle[$\odot O$]{center=O,
 analytic= $(x-x_0)^2 + (y-y_0)^2 = r_0^2$ }, contactPoint=Optional.of(B),
 outpoint=Optional.of(P)}, DiameterRelation{diameter=BC, circle=Circle[$\odot O$]{center=O,
 analytic= $(x-x_0)^2 + (y-y_0)^2 = r_0^2$ }, length=null}, ProveConclusionRelation:[证明:
 LineParallelRelation [iLine1=AC, iLine2=OP]]

225、topic: 如图,在 $\triangle ABC$ 中,已知 $\angle ABC=90^\circ$,在AB上取一点E,以BE为直径的 $\odot O$ 恰好与AC相切于点D,若 $AE=2\text{cm}$, $AD=4\text{cm}$.?%#①求 $\odot O$ 的直径BE的长;?%#②计算 $\triangle ABC$ 的面积.



graph:
 {"stem": {"pictures": [{"picturename": "C4102A2B0F8047D4AEBFCD994E5D7942.jpg", "coordinates": {"A": "-14.00, 5.00", "B": "-6.00, 5.00", "C": "-6.00, 11.00", "D": "-10.80, 7.40", "E": "-12.00, 5.00", "O": "-9.00, 5.00"}, "collineations": {"0": "B##O##A", "1": "A##D##C", "2": "B##C"}, "variable>equals": {}, "circle": [{"center": "O", "pointincircle": "B##D##E"}]}, "appliedproblems": {}, "substems": []}}

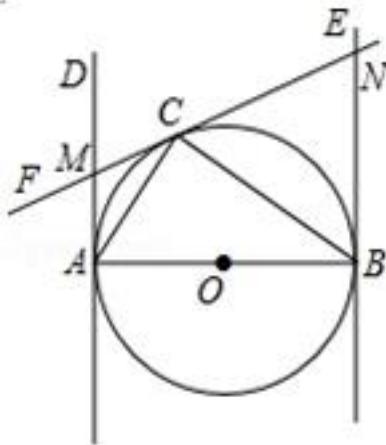
NLP: DiameterRelation{diameter=BE, circle=Circle[$\odot O$]{center=O},
 analytic= $(x-x_0)^2 + (y-y_0)^2 = r_0^2$,
 length=null}, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle CBO = (1/2 * \pi)$ }, PointOnLineRelation{point=E,
 line=AB, isConstant=false, extension=false}, LineContactCircleRelation{line=AC,
 circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2 + (y-y_0)^2 = r_0^2$ }, contactPoint=Optional.of(D),

outpoint=Optional.absent(), EqualityRelation{AE=2}, EqualityRelation{AD=4}, EqualityRelation{BE=v_0}, EqualityRelation{S_△ABC=v_1}, 求值(大小):

(ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]S_△ABC)}

226、topic: 如图,已知AB为 $\odot O$ 的直径, $AB=2$,AD和BE是圆O的两条切线,点A、B为切点,过圆上一点C作 $\odot O$ 的切线CF,分别交AD、BE于点M、N,连接AC、CB, $\angle ABC=30^\circ$.#%#(1)求AM的长; #%(2)求MN的长.

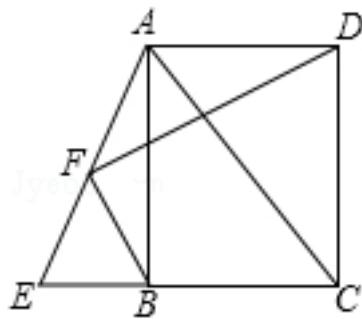


graph:

```
{"stem": {"pictures": [{"picturename": "C43D89C512B94B54A08EBDB96A4C4749.jpg", "coordinates": {"A": "-14.00,5.00", "B": "-10.00,5.00", "C": "-13.00,6.73", "D": "-14.00,7.75", "E": "-10.00,10.08", "F": "-15.58,5.24", "M": "-14.00,6.15", "N": "-10.00,8.46", "O": "-12.00,5.00"}, "collinearities": {"0": "B##O##A", "1": "A##D##M", "2": "A##C", "3": "B##C", "4": "B##N##E", "5": "F##C##N##M"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B##C##A"}]}, "appliedproblems": {}, "subsystems": []}}
```

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[C]}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, length=null}, EqualityRelation{AB=2}, LineContactCircleRelation{line=AD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(A), outpoint=Optional.of(D)}, LineContactCircleRelation{line=BE, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(B), outpoint=Optional.of(E)}, LineContactCircleRelation{line=CF, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(C), outpoint=Optional.of(F)}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=CF, iLine2=AD], LineCrossRelation [crossPoint=Optional.of(N), iLine1=CF, iLine2=BE], SegmentRelation:AC, SegmentRelation:CB, EqualityRelation{∠CBO=(1/6*Pi)}, EqualityRelation{AM=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{MN=v_1}, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AM)}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]MN)}

227、topic: 已知:如图,E是矩形ABCD的边CB延长线上的一点,CE=CA,F是AE的中点.#%#(1)求证: $BF \perp FD$;#%#(2)若 $AB=8$, $AD=6$,求DF的长.#%#

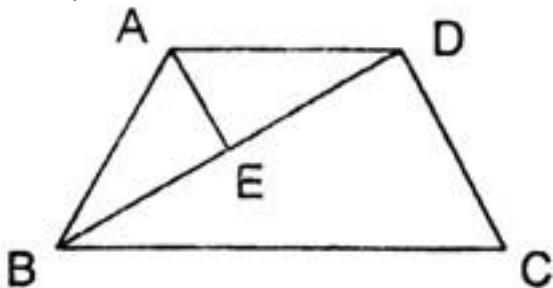


graph:

```
{"stem": {"pictures": [{"picturename": "1000040721_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "3.00,0.00", "D": "3.00,4.00", "E": "-2.00,0.00", "F": "-1.00,2.00"}, "collineations": {"0": "A##B", "1": "E##B##C", "2": "C##D", "3": "D##A", "4": "A##F##E", "5": "F##D", "6": "F##B", "7": "A##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=CB, isConstant=false, extension=false}, EqualityRelation{CE=AC}, MiddlePointOfSegmentRelation{middlePoint=F, segment=A E}, EqualityRelation{DF=v_0}, EqualityRelation{AB=8}, EqualityRelation{AD=6}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: LinePerpRelation{line1=BF, line2=FD, crossPoint=F}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DF)}

228、topic: 如图, 在梯形ABCD中, $AD \parallel BC$, $AB = DC = AD$, $\angle C = 60^\circ$, $AE \perp BD$ 于点E, $AE = 1$, 求梯形ABCD的高。



graph:

```
[{"variable>equals": {}, "picturename": "1000001091_Q_1.jpg", "collineations": {"5": "D##C", "4": "B##C", "3": "A##E", "2": "A##D", "1": "A##B", "0": "E##D##B"}, "coordinates": {"D": "0.11,5.05", "E": "-6.97,1.12", "A": "-9.23,5.19", "B": "-14.04,-2.82", "C": "4.69,-3.09"}]}
```

NLP: TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, LineParallelRelation[iLine1=AD, iLine2=BC], MultiEqualityRelation [multiExpressCompare=AB=CD=AD, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{∠BCD=((1/3*Pi))}, LinePerpRelation{line1=AE, line2=BD, crossPoint=E}, EqualityRelation{AE=1}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]v_0)}

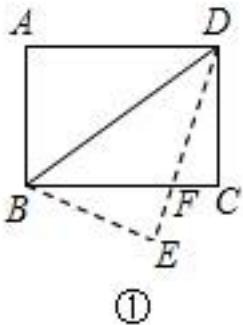
229、topic: 如图, AB是 $\odot O$ 的直径, 点D是 \widehat{AE} 上一点, 且 $\angle BDE = \angle CBE$, BD与AE交于点F. (1)求证: BC是 $\odot O$ 的切线; (2)若BD平分 $\angle ABE$, 求证: $\{DE\}^2 = DF \cdot DB$; (3)在(2)的条件下, 延长ED、BA交于点P, 若 $PA = AO$, $DE = 2$, 求PD的长和 $\odot O$ 的半径.

graph:

{"stem": {"pictures": [{"picturename": "1000025079.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,0.00", "C": "2.00,4.55", "D": "-1.50,1.32", "E": "-0.26,1.98", "F": "-1.00,1.13", "O": "0.00,0.00"}, "collineations": {"0": "A###F###E###C", "1": "A###O###B", "2": "B###C", "3": "E###D", "4": "D###F###B", "5": "E###B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###D###E###B"}]}, "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, PointOnArcRelation{point=D, arc=type:MAJOR_ARC \curvearrowright AE}, EqualityRelation{ $\angle EDF=\angle CBE$ }, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BD, iLine2=AE], AngleBisectorRelation{line=BD, angle= $\angle EBO$, angle1= $\angle DBE$, angle2= $\angle DBO$ }, RadiusRelation{radius=M_0N_0, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, EqualityRelation{DP=v_1}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=ED, iLine2=BA], EqualityRelation{AP=AO}, EqualityRelation{DE=2}, 求值(大小): (ExpressRelation:[key]:jv_1), 求值(大小): (ExpressRelation:[key]:M_0N_0), ProveConclusionRelation:[证明: LineContactCircleRelation{line=BC, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(B), outpoint=Optional.of(C)}}, ProveConclusionRelation:[证明: EqualityRelation{((DE)^2)=DF*BD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:DP)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:M_0N_0)}

230、topic: 在长方形纸片ABCD中,\$AB=12\$,\$BC=16\$.?%#(1)将长方形纸片沿BD折叠,使点A落在点E处(如图①),设DE与BC相交于点F,求BF的长;#%#(2)将长方形纸片如图②折叠,使点B与点D重合,折痕为GH,求GH的长.#%#



graph:

{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000008798_Q_1.jpg", "coordinates": {"A": "0.00,12.00", "B": "0.00,0.00", "C": "16.00,0.00", "D": "16.00,12.00", "E": "11.52,-3.36", "F": "12.50,0.00"}, "collineations": {"0": "A##D", "1": "B##C", "2": "B##D", "3": "B##E", "4": "C##D", "5": "F##D##E", "6": "A##B"}, "variable>equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000008798_Q_2.jpg", "coordinates": {"A": "0.00,12.00", "B": "0.00,0.00", "C": "16.00,0.00", "D": "16.00,12.00", "F": "4.48,15.36", "G": "3.50,12.00", "H": "12.50,0.00"}, "collineations": {"0": "A##G##D", "1": "F##D", "2": "C##D", "3": "H##D", "4": "F##G", "5": "B##H##C", "6": "A##B", "7": "G##H"}, "variable>equals": {}, "circles": []}]}], "appliedproblems": {}}}

NLP:

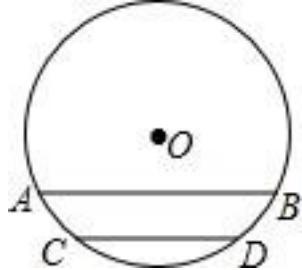
RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=12}, EqualityRelation{BC=16}, EqualityRelation{BF=v_0}, RectangleRelation{rectangle=Rectangle:ABCD}, 求值(大小): (ExpressRelation:[key]:v_0), EqualityRelation{GH=v_1}, RectangleRelation{rectangle=Rectangle:ABCD}

```

,SymmetricRelation{preData=B,afterData=D,symmetric=StraightLine[GH] analytic :y=k_GH*x+b_GH
slope:null b:null isLinearFunction:false, pivot=},求值(大小):
(ExpressRelation:[key:]v_1),SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]BF)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]GH)}

```

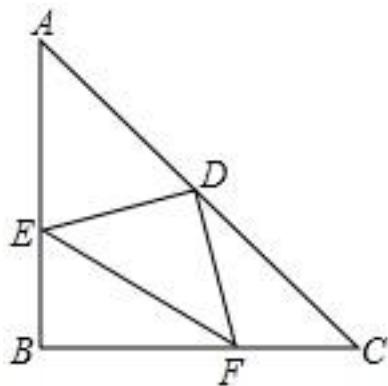
231、topic: 如图：已知在 $\odot O$ 中，弦 $AB \parallel CD$. 求证： $\widehat{AC} = \widehat{BD}$



graph:
{"stem": {"pictures": [{"picturename": "D3850F4228214910914091A5213D3ED5.jpg", "coordinates": {"A": "-15.46,4.00", "B": "-8.54,4.00", "C": "-14.65,3.00", "D": "-9.35,3.00", "O": "-12.00,6.00"}, "collinearations": {"0": "B##A", "1": "C##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##D##A##B"}]}, "appliedproblems": {}, "substems": []}}

NLP: ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, LineParallelRelation[iLine1=AB, iLine2=CD], ProveConclusionRelation:[证明: EqualityRelation{ $\widehat{AC} = \widehat{BD}$ }]]

232、topic: 如图,在等腰直角三角形ABC中, $\angle ABC=90^\circ$,点D为AC的中点,过点D作 $DE \perp DF$, DE 交 AB 于点E, DF 交 BC 于点F,若 $AE=4$, $FC=3$,求 EF 的长.

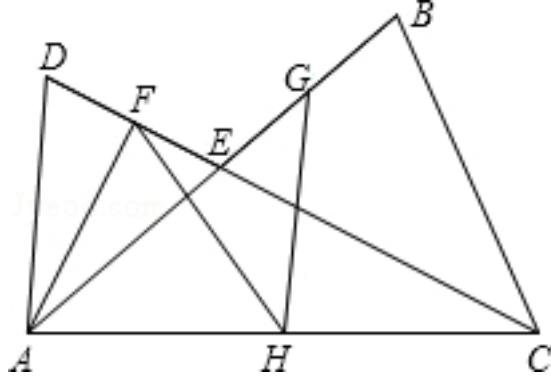


graph:
{"stem": {"pictures": [{"picturename": "1000006999_Q_1.jpg", "coordinates": {"A": "0.00,7.00", "B": "0.00,0.00", "C": "7.00,0.00", "D": "4.00,3.00", "E": "0.00,3.00", "F": "4.00,0.00"}, "collinearations": {"0": "E##D", "1": "A##E##B", "2": "E##F", "3": "A##C##D", "4": "F##B##C"}, "variable>equals": {}, "circles": []}}, "appliedproblems": {}, "substems": []]}

NLP:
EqualityRelation{EF=v_0}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$ [Optional.of(B)][Optional.of(B)], EqualityRelation{ $\angle EBF=(1/2\pi)$ }, MiddlePointOfSegmentRelation{middlePoint=D, segment=AC}, LinePerpRelation{line1=DE, line2=DF, crossPoint=D}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE,

iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF,
 iLine2=BC], EqualityRelation{AE=4}, EqualityRelation{CF=3}, 求值(大小):
 (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]EF)}

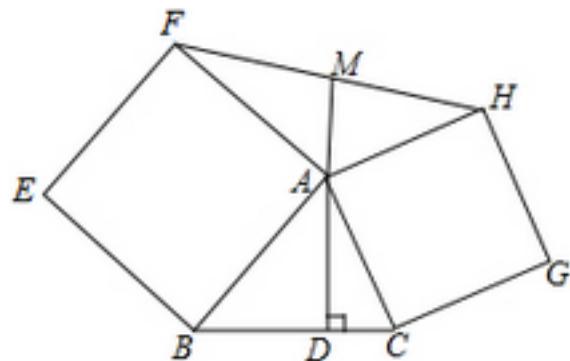
233、topic: 如图,AB、CD交于点E,AD=AE,CB=CE,F、G、H分别是DE、BE、AC的中点.#%#(1)求证:AF⊥DE;#%#(2)求证:FH=GK.



graph:
 {"stem": {"pictures": [{"picturename": "1000031289_Q_1.jpg", "coordinates": {"A": "-10.00,2.00", "B": "-4.72,5.96", "C": "-4.00,2.00", "D": "-10.00,5.00", "E": "-7.60,3.80", "F": "-8.80,4.40", "G": "-6.16,4.88", "H": "-7.00,2.00"}, "collineations": {"0": "A##D", "1": "A##F", "2": "A##E##G##B", "3": "F##H", "4": "H##G", "5": "D##F##E##C", "6": "B##C", "7": "A##H##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(E), iLine1=AB,
 iLine2=CD], EqualityRelation{AD=AE}, EqualityRelation{BC=CE}, MiddlePointOfSegmentRelation{middlePoint=F, segment=DE}, MiddlePointOfSegmentRelation{middlePoint=G, segment=BE}, MiddlePointOfSegmentRelation{middlePoint=H, segment=AC}, ProveConclusionRelation:[证明:
 LinePerpRelation{line1=AF, line2=DE, crossPoint=F}], ProveConclusionRelation:[证明:
 EqualityRelation{FH=GH}]

234、topic: 如图,分别以△ABC的边AB,AC为一边在三角形外作正方形ABEF和ACGH,M为FH的中点.求证:MA⊥BC.



graph:
 {"stem": {"pictures": [{"picturename": "1000040367_Q_1.jpg", "coordinates": {"A": "-2.38,3.92", "B": "-5.24,1.40", "C": "-1.42,1.40", "D": "-2.38,1.40", "E": "-7.94,4.45", "F": "-4.89,6.96", "G": "1.09,2.36", "H": "0.13,4.87"}]}, "appliedproblems": {}, "substems": []}}

"M": "-2.38,5.92"}, "collineations": {"0": "A###C", "1": "A###M###D", "2": "A###B", "3": "E###B", "4": "C##D##B", "5": "G###C", "6": "G###H", "7": "A###H", "8": "A###F", "9": "H###M###F", "10": "E###F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

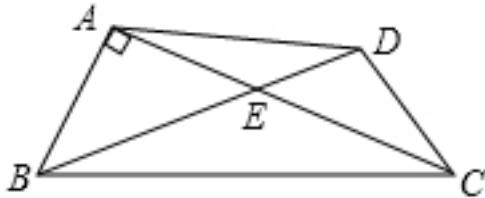
NLP:

TriangleRelation: $\triangle ABC$, SquareRelation{square=Square:ABEF}, SquareRelation{square=Square:ACGH},

MiddlePointOfSegmentRelation{middlePoint=M, segment=FH}, ProveConclusionRelation:[证明:

LinePerpRelation{line1=MA, line2=BC, crossPoint=D}]

235、topic: 如图,在四边形ABCD中,对角线AC、BD交于点E,
 $\angle BAC = 90^\circ$, $\angle CED = 45^\circ$, $\angle DCE = 30^\circ$, $DE = \sqrt{2}$, $BE = 2\sqrt{2}$.求CD的长和四边形ABCD的面
积.#%#



graph:

{"stem": {"pictures": [{"picturename": "DB46FB658B7D49A2AD61864C7B43B7C1.jpg", "coordinates": {"A": "-13.22,4.84", "B": "-14.00,3.00", "C": "-8.87,3.00", "D": "-10.07,4.59", "E": "-11.38,4.06"}, "collineations": {"0": "B##A", "1": "A##E##C", "2": "A##D", "3": "C##B", "4": "B##D##E", "5": "C##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{CD=v_0},已知条件

QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{S_ABCD=v_1},已知条件

QuadrilateralRelation{quadrilateral=ABCD}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD], EqualityRelation{ $\angle BAE = (1/2)\pi$ }, EqualityRelation{ $\angle CED = (1/4)\pi$ }, EqualityRelation{ $\angle DCE = (1/6)\pi$ }, EqualityRelation{ $DE = (2^{(1/2)})$ }, EqualityRelation{ $BE = 2 * (2^{(1/2)})$ },求值(大小):

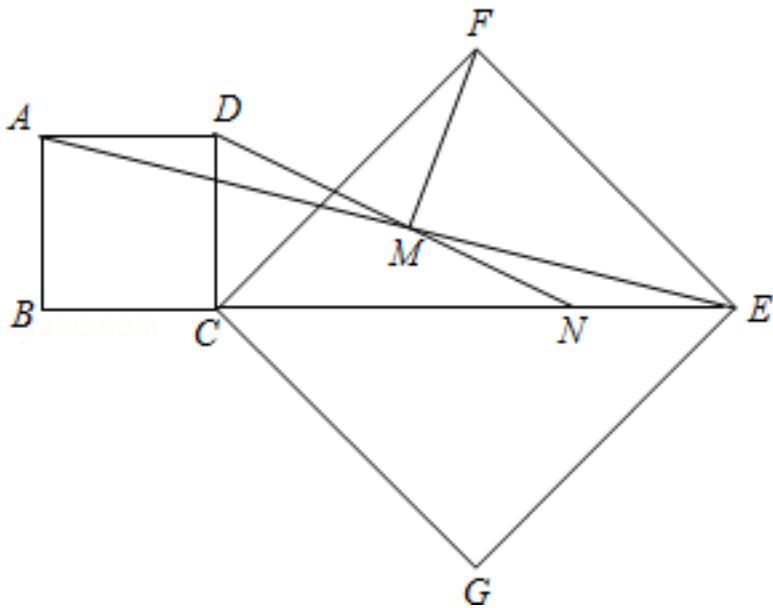
(ExpressRelation:[key:]v_0),求值(大小):

(ExpressRelation:[key:]v_1),SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]CD),SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]S_ABCD)}

236、topic: 如图,正方形CGEF的对角线CE在正方形ABCD的边BC的延长线上($CG > BC$),M是线段AE的中点,DM的延长线交CE于N.#%#(1)求证:AD=NE#%#(2)求证:① $DM = MF$;② $DM \perp MF$.#%#



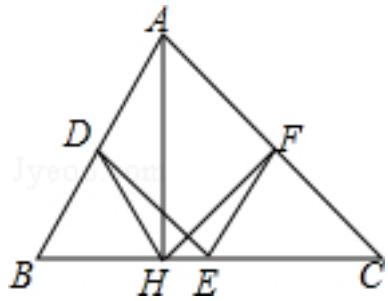
graph:

```
{"stem":{"pictures":[{"picturename":"1000041542_Q_1.jpg","coordinates":{"A": "-9.00,5.00","B": "-9.00,3.00","C": "-7.00,3.00","D": "-7.00,5.00","E": "-1.00,3.00","F": "-4.00,6.00","G": "-4.00,0.00","M": "-5.00,4.00","N": "-3.00,3.00"}, "collineations": {"0": "A###B", "1": "A###D", "2": "B##C##N##E", "3": "D##C", "4": "F##E", "5": "A##M##E", "6": "D##M##N", "7": "F##C", "8": "F##M", "9": "C##G", "10": "G##E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

InequalityRelation{CG>BC}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AE}, LineCrossRelation [crossPoint=Optional.of(N), iLine1=DM, iLine2=CE], ProveConclusionRelation:[证明:
EqualityRelation{AD=EN}]

237、topic: 已知:如图,在 $\triangle ABC$ 中,D、E、F分别是各边的中点,AH是高.#%#求
证: $\angle DHF = \angle DEF$.#%#



graph:

```
{"stem":{"pictures":[{"picturename":"1000081731_Q_1.jpg","coordinates":{"A": "0.00,3.00","B": "-2.00,0.00","C": "2.00,0.00","D": "-1.00,1.50","E": "0.50,0.00","F": "1.50,1.50","H": "0.00,0.00"}, "collineations": {"0": "A##D##B", "1": "A##F##C", "2": "B##E##C", "3": "D##H", "4": "D##E", "5": "F##H", "6": "F##E", "7": "A##H"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: TriangleRelation: $\triangle ABC$, PointRelation:D, LinePerpRelation{line1=AH, line2=BH, crossPoint=H}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle DHF = \angle DEF$ }]

238、topic: 如图,现有一张边长为\$4\$的正方形纸片\$ABCD\$,点\$P\$为正方形\$AD\$边上的一点(不与

点\$A\$、点\$D\$重合),将正方形纸片折叠,使点\$B\$落在\$P\$处,点\$C\$落在\$G\$处,\$PG\$交\$DC\$于\$H\$,折痕为\$EF\$,连接\$BP,BH\$.
 (1)求证:\$\angle APB=\angle BPH\$;
 (2)当点\$P\$在边\$AD\$上移动时,求证:\$\triangle PDH\$的周长是定值;
 (3)当\$BE+CF\$的长取最小值时,求\$AP\$的长.

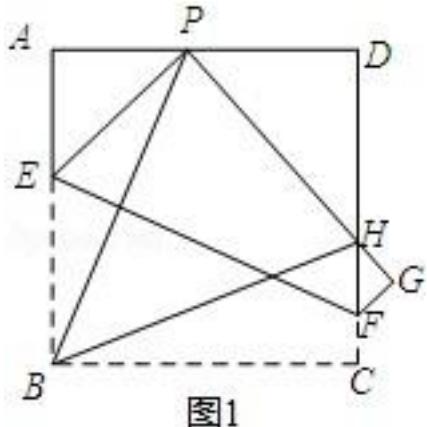


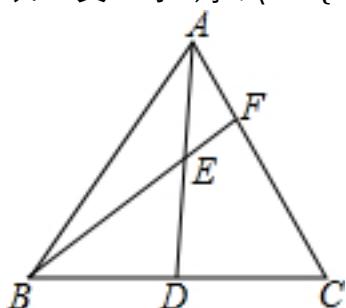
图1

graph:
 {"stem": {"pictures": [{"picturename": "1000027628_Q_1.jpg", "coordinates": {"A": "-4.00,4.00", "B": "-4.00,0.00", "C": "0.00,0.00", "D": "0.00,4.00", "E": "-4.00,2.43", "P": "-2.14,4.00", "F": "0.00,0.57", "G": "0.24,1.09", "H": "0.00,1.38"}, "collineations": {"0": "A###E##B", "1": "A##P##D", "2": "D##H##F##C", "3": "P##H##G", "4": "B##C", "5": "B##P", "6": "B##H", "7": "P##E", "8": "E##F", "9": "F##G"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

PointRelation:A,PointRelation:D,SquareRelation{square=Square:ABCD},PointCoincidenceRelation{point1=B, point2=P},PointCoincidenceRelation{point1=C, point2=G},LineCrossRelation[crossPoint=Optional.of(H), iLine1=PG, iLine2=DC],SegmentRelation:EF,SegmentRelation:BP,SegmentRelation:BH,EqualityRelation{C_△DHP=v_0},PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false},EqualityRelation{AP=v_1},求值(大小):
 (ExpressRelation:[key:]v_1),ProveConclusionRelation:[证明:
 EqualityRelation{∠APB=∠BPH}],ProveConclusionRelation:[证明: ConstantValueRelation[constantObject=Express:[v_0]]],SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AP)}

239、topic: 如图,在\$\triangle ABC\$中,D为边BC上一点,已知\$\frac{BD}{DC}=\frac{5}{3}\$,E为AD的中点,延长BE交AC于F,求\$\frac{BE}{EF}\$的值.

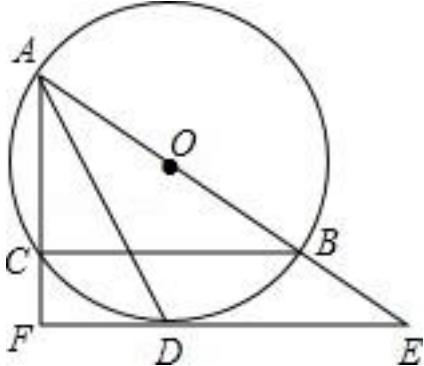


graph:
 {"stem": {"pictures": [{"picturename": "1000062208_Q_1.jpg", "coordinates": {"A": "-3.73,6.43", "B": "-7.99,0.00", "C": "0.00,0.00", "D": "-3.97,0.00", "E": "-3.85,3.21", "F": "-2.48,4.27"}, "collineations": {"0": "A##B", "1": "B##D##C", "2": "A##F##C", "3": "A##E##D", "4": "B##E##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

es":[]],"appliedproblems":{},"substems":[]}

NLP: TriangleRelation:△ABC,PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false},EqualityRelation{((BD)/(CD))=(5/3)},MiddlePointOfSegmentRelation{middlePoint=E,segment=AD},LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=AC],求值(大小): (ExpressRelation:[key:]((BE)/(EF))),SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]((BE)/(EF)))

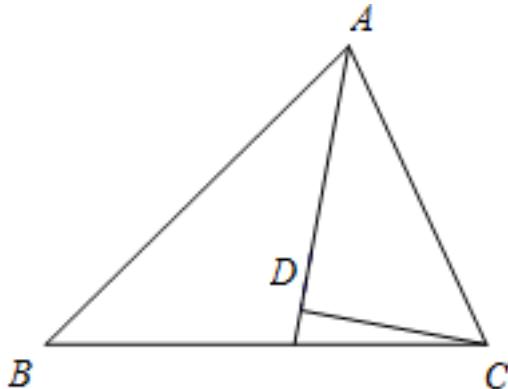
240、topic: 如图, $\odot O$ 是 $\triangle ABC$ 的外接圆,AB为直径, $\angle BAC$ 的平分线交 $\odot O$ 于点D,过点D的切线分别交AB、AC的延长线于点E、F.
#%#(1)求证: $AF \perp EF$.#%#(2)小强同学通过探究发现: $AF+CF=AB$,请你帮小强同学证明这一结论.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000008238_Q_1.jpg", "coordinates": {"A": "-2.00,3.00", "B": "2.00,0.00", "C": "-2.00,0.00", "D": "0.00,-1.00", "E": "3.33,-1.00", "F": "-2.00,-1.00", "O": "0.00,1.50"}, "collinearities": [{"O": "B##C", "1": "A##D", "2": "A##O##B##E", "3": "F##D##E", "4": "A##C##F"}], "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems": {}}, "substems": []}

NLP: AngleBisectorRelation{line=AD,angle= $\angle CAO$, angle1= $\angle CAD$, angle2= $\angle DAO$,InscribedShapeOfCircleRelation{closedShape=△ABC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }},DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null},ProveConclusionRelation:[证明: LinePerpRelation{line1=AF, line2=EF, crossPoint=F}]

241、topic: 如图, $\triangle ABC$ 中,AD平分 $\angle BAC$, $CD \perp AD$ 于D, $AB > AC$,求证: $\angle ACD > \angle ABC$.#%#

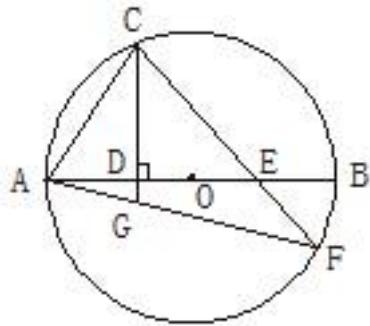


graph:
{"stem": {"pictures": [{"picturename": "1000051288_Q_1.jpg", "coordinates": {"A": "-4.00,6.00", "B": "-7.00,0.00", "C": "0.00,0.00", "D": "-2.00,3.00"}}, "appliedproblems": {}}, "substems": []}

3.05", "C": "-2.64,3.05", "D": "-4.48,3.39"}, "collineations": {"0": "A##B", "1": "A##C", "2": "C##B", "3": "D##C", "4": "D##A"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: TriangleRelation:△ABC, AngleBisectorRelation{line=AD, angle=∠BAC, angle1=∠BAD, angle2=∠CAD}, LinePerpRelation{line1=CD, line2=AD, crossPoint=D}, InequalityRelation{AB>AC}, ProveConclusionRelation:[证明: InequalityRelation{∠ACD>∠ABC}]

242、topic: 已知,如图,AB是 $\odot O$ 的直径,C是 $\odot O$ 上一点,连接AC,过点C作直线 $CD \perp AB$ 于D($AD < DB$),点E是DB上任意一点(点D、B除外),直线CE交 $\odot O$ 于点F,连接AF与直线CD交于点G.(1)求证: $(AC)^2 = AG \cdot AF$;(2)若点E是AD(点A除外)上任意一点,上述结论是否仍然成立? 若成立,请画出图形并给予证明;若不成立,请说明理由.

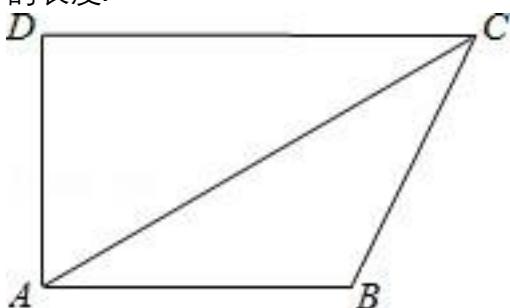


graph:

{"stem": {"pictures": [{"picturename": "1000026043_Q_1.jpg", "coordinates": {"A": "-6.00,0.00", "B": "6.00,0.00", "C": "-1.50,5.81", "D": "-1.50,0.00", "E": "2.17,0.00", "F": "4.60,-3.85", "G": "-1.50,-1.63", "O": "0.00,0.00"}, "collineations": {"0": "F##C##E", "1": "B##O##D##A##E", "2": "D##G##C", "3": "C##A", "4": "G##F##A"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C##F##A##B"}]}, "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: PointRelation:D, PointRelation:B, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, points=[C]}, SegmentRelation:AC, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, PointOnLineRelation{point=E, line=DB, isConstant=false, extension=false}, LineCrossCircleRelation{line=CE, circle= $\odot O$, crossPoints=[F], crossPointNum=1}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=AF, iLine2=CD], PointRelation:A, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{ $(AC)^2 = AG \cdot AF$ }]]

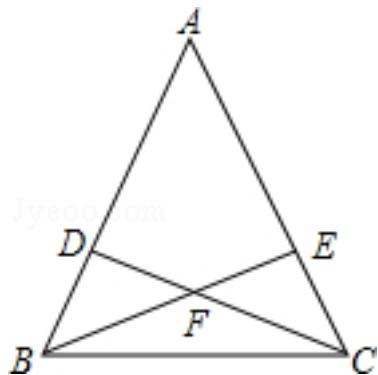
243、topic: 在四边形ABCD中,\$AB\parallel CD\$,\$\angle D=90^\circ\$,\$\angle DCA=30^\circ\$,CA平分\$\angle DCB\$,\$AD=4cm\$,求AB的长度.



graph:
 {"stem": {"pictures": [{"picturename": "1000026616_Q_1.jpg", "coordinates": {"A": "-3.85, -1.40", "B": "2.16, -1.39", "C": "5.16, 3.81", "D": "-3.85, 3.80"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##C", "3": "B##C", "4": "C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AB=v_0}, 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{∠ADC=(1/2*Pi)}, EqualityRelation{∠ACD=(1/6*Pi)}, AngleBisectorRelation{line=CA, angle=∠BCD, angle1=∠ACB, angle2=∠ACD}, EqualityRelation{AD=4}, 求值(大小):
 (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AB)}

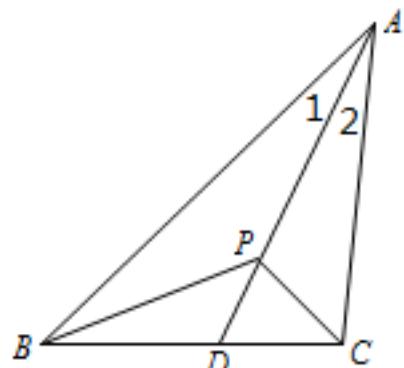
244、topic: 如图,在 $\triangle ABC$ 中,点D、E分别在AB、AC上,且CD与BE相交于点F.已知 $\triangle BDF$ 的面积为10, $\triangle BCF$ 的面积为20, $\triangle CEF$ 的面积为16,求四边形区域ADFE的面积.#%#



graph:
 {"stem": {"pictures": [{"picturename": "EEAB10F6444B47028439D7F839FADD1B.jpg", "coordinates": {"A": "-12.00, 8.00", "B": "-14.00, 3.00", "C": "-10.00, 3.00", "D": "-13.34, 4.65", "E": "-10.67, 4.68", "F": "-12.02, 4.00"}, "collineations": {"0": "B##D##A", "1": "A##C", "2": "B##C", "3": "B##E##F", "4": "C##F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation:△ABC, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=CD, iLine2=BE], EqualityRelation{S_△BDF=10}, EqualityRelation{S_△BCF=20}, EqualityRelation{S_△CEF=16}

245、topic: 如图,在 $\triangle ABC$ 中,\$AB>AC\$,AD是 $∠BAC$ 的平分线,P为AD上一点.求证:\$AB-AC>PB-PC\$.#%#



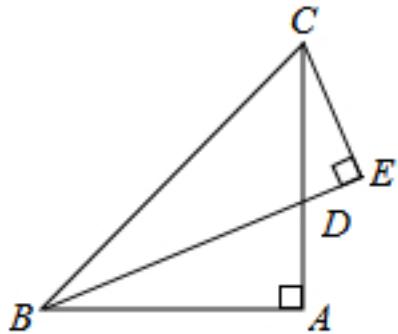
graph:

{"stem": {"pictures": [{"picturename": "EFEF89333CC14ECE978A33D52A48288E.jpg", "coordinates": {"A": "-11.00,7.00", "B": "-14.00,3.00", "C": "-10.00,3.00", "D": "-11.81,3.00", "P": "-11.51,4.49"}, "collineations": {"0": "B###A", "1": "A###C", "2": "A###D###P", "3": "B###D###C", "4": "B###P", "5": "C###P"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:

TriangleRelation: $\triangle ABC$, InequalityRelation{ $AB > AC$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false}, ProveConclusionRelation:[证明: InequalityRelation{ $AB - AC > BP - CP$ }]

246、topic: 如图,已知, $\angle BAC = 90^\circ$, $AB = AC$, BD 是 $\angle ABC$ 的平分线,且 $CE \perp BD$ 交 BD 延长线于点E.求证: $BD = 2CE$.#%#



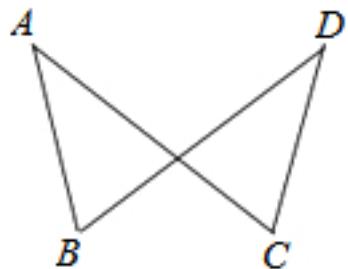
graph:

{"stem": {"pictures": [{"picturename": "F04029B98CA6483FB0FCE64B728FC0DC.jpg", "coordinates": {"A": "-10.00,3.00", "B": "-14.00,3.00", "C": "-10.00,7.00", "D": "-10.00,4.66", "E": "-9.17,5.00"}, "collineations": {"0": "D###C###A", "1": "B###A", "2": "B###C", "3": "B###D###E", "4": "C###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:

EqualityRelation{ $\angle BAD = (1/2 * \pi)$ }, EqualityRelation{ $AB = AC$ }, AngleBisectorRelation{line=BD, angle= $\angle ABC$, angle1= $\angle ABD$, angle2= $\angle CBD$ }, LinePerpRelation{line1=CE, line2=BD, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=CE, iLine2=BD], ProveConclusionRelation:[证明: EqualityRelation{ $BD = 2 * CE$ }]

247、topic: 如图, $AB = DC$, $DB = AC$.#%#求证: $\angle ABD = \angle DCA$.#%#

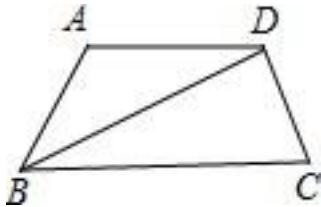


graph:

{"stem": {"pictures": [{"picturename": "1000072656_Q_1.jpg", "coordinates": {"A": "-11.00,8.00", "B": "-9.04,4.00", "C": "-6.00,4.00", "D": "-4.00,8.00"}, "collineations": {"0": "A###B", "1": "A###C", "2": "B###D", "3": "D###C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{AB=CD}, EqualityRelation{BD=AC}, ProveConclusionRelation:[证明:
EqualityRelation{ $\angle ABD = \angle ACD$ }]

248、topic: 如图,在梯形\$ABCD\$中,\$AD\parallel BC\$,\$AB=CD=AD\$,\$BD\perp CD\$.?(1)求\$\sin \angle DBC\$的值;(2)若\$BC\$长度为\$4cm\$,求梯形\$ABCD\$的面积.



graph:

{"stem": {"pictures": [{"picturename": "1000007551_Q_1.jpg", "coordinates": {"A": "1.00,1.73", "D": "3.00,1.73", "C": "4.00,0.00", "B": "0.00,0.00"}, "collineations": {"0": "B##A", "1": "D##A", "2": "D##B", "3": "D##C", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

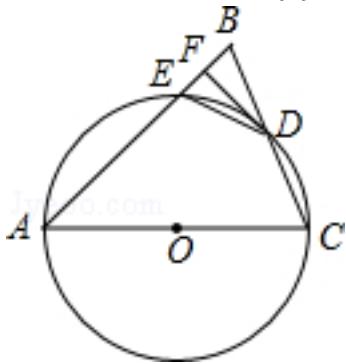
NLP: TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, LineParallelRelation [iLine1=AD, iLine2=BC], MultiEqualityRelation [multiExpressCompare=AB=CD=AD, originExpressRelationList=[], keyWord=null, result=null], LinePerpRelation{line1=BD, line2=CD, crossPoint=D}, 求值(大小):

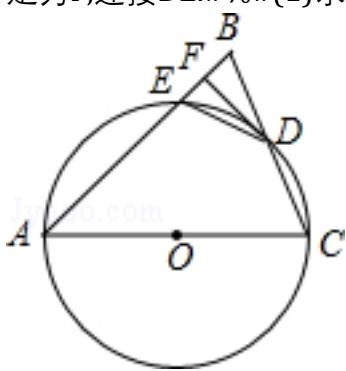
(ExpressRelation:[key:]sin($\angle CBD$)), TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, EqualityRelation{S_ABCD=v_0}, EqualityRelation{BC=4}, 求值(大小):

(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]sin($\angle CBD$))), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]S_ABCD})

249、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$,以AC为直径的 $\odot O$ 交BC于点D,交AB于点E,过点D作 $DF\perp AB$,垂足为F,连接DE.?(1)求证:直线DF与 $\odot O$ 相切;?(2)若 $AE=7$, $BC=6$,求AC的长.



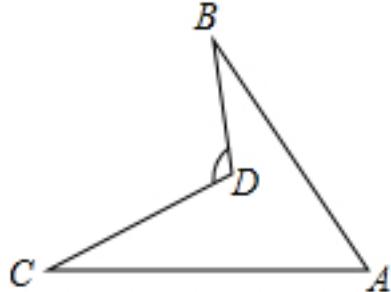
graph:

{"stem": {"pictures": [{"picturename": "1000040841_Q_1.jpg", "coordinates": {"A": "-2.09,0.00", "B": "0.92,2.90", "C": "2.09,0.00", "D": "1.50,1.45", "E": "0.08,2.09", "F": "0.50,2.50", "O": "0.00,0.00"}, "collineations": {"0": "A###E###F##B", "1": "B##D##C", "2": "C##O##A", "3": "D##E", "4": "D##F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##C##D##E"}]}, "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null}, TriangleRelation:△ABC, EqualityRelation{AB=AC}, LineCrossCircleRelation{line=BC, circle= $\odot O$, crossPoints=[D], crossPointNum=1}, LineCrossCircleRelation{line=AB, circle= $\odot O$,

crossPoints=[E], crossPointNum=1}, LinePerpRelation{line1=DF, line2=AB, crossPoint=F}, SegmentRelation:DE, EqualityRelation{AC=v_0}, EqualityRelation{AE=7}, EqualityRelation{BC=6}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: LineContactCircleRelation{line=DF, circle=Circle[\odot O]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(D), outpoint=Optional.of(F)}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AC)}

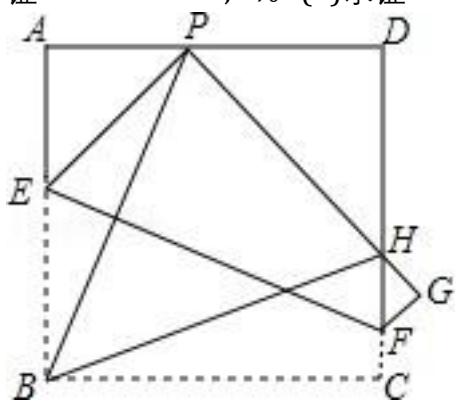
250、topic: 如图,求证:(1) $\angle BDC > \angle A$;(2) $\angle BDC = \angle B + \angle C + \angle A$.



graph:
 {"stem": {"pictures": [{"picturename": "1000073065_Q_1.jpg", "coordinates": {"A": "5.00,0.00", "B": "2.00,3.00", "C": "0.00,0.00", "D": "2.00,1.49"}, "collineations": {"0": "B##A", "1": "B##D", "2": "C##D", "3": "C##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}

NLP: ProveConclusionRelation:[证明:
 InequalityRelation{ $\angle BDC > \angle BAC$ }, ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle BDC = \angle ABD + \angle ACD + \angle BAC$ }]

251、topic: 如图,现有一张边长为4的正方形纸片ABCD,点P为AD边上的一点(不与点A、点D重合),将正方形纸片折叠,使点B落在P处,点C落在G处,PG交DC于H,折痕为EF,联结BP、BH.(1)求证: $\angle APB = \angle BPH$;(2)求证: $AP + HC = PH$;(3)当AP=1时,求PH的长.



graph:
 {"subsystems": [], "questionrelies": ["1", "2"], "stem": {"pictures": [{"variable>equals": {}, "picturename": "1000001148_Q_1.jpg", "coordinates": {"D": "6,6", "E": "0,3.33", "F": "6,1.33", "G": "6.8,2.4", "A": "0,6", "B": "0,0", "C": "6,0", "H": "6,3", "P": "2,6"}}]}

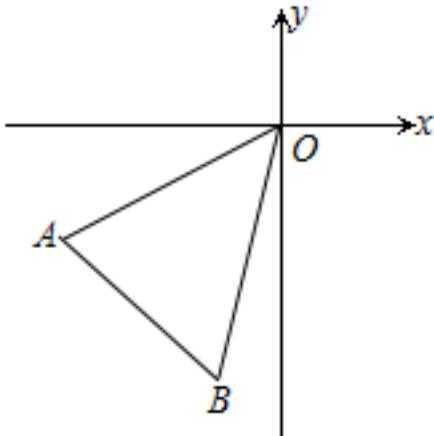
NLP: PointRelation:A, PointRelation:D, PointOnLineRelation{point=P, line=AD, isConstant=false,

```

extension=false},SquareRelation{square=Square:ABCD},PointCoincidenceRelation{point1=B,
point2=P},PointCoincidenceRelation{point1=C, point2=G},LineCrossRelation
[crossPoint=Optional.of(H), iLine1=PG,
iLine2=DC],SegmentRelation:EF,SegmentRelation:BH,EqualityRelation{HP=v_0},EqualityRelation{AP=
1},求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明:
EqualityRelation{∠APB=∠BPH}],ProveConclusionRelation:[证明:
EqualityRelation{AP+CH=HP}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]HP)}

```

252、topic: 如图,平面直角坐标系中,A(-3,-2),B(-1,-4)%(1)求 $\triangle OAB$ 的面积;(2)延长AB交y轴于点P,求点P的坐标;(3)点Q在y轴上,以A、B、O、Q为顶点的四边形面积为6,求点Q的坐标.%#



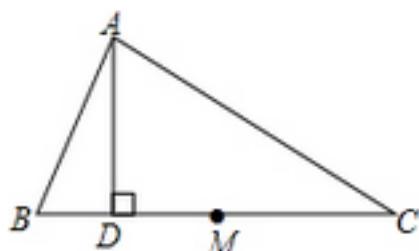
```

graph:
{"stem": {"pictures": [{"picturename": "1000080427_Q_1.jpg", "coordinates": {"A": "-3.00,-2.00", "B": "-1.00,-4.00", "O": "0.00,0.00"}, "collineations": {"0": "A##O", "1": "A##B", "2": "O##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}

```

NLP: CoorSysTypeRelation [name=xOy, types=直角坐标系],PointRelation:A(-3,-2),PointRelation:B(-1,-4),求值(大小): (ExpressRelation:[key:]S_△ABO)),坐标PointRelation:P,PointOnLineRelation{point=Q, line=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, isConstant:false, extension=false},已知条件QuadrilateralRelation{quadrilateral=ABOQ},EqualityRelation{S_ABOQ=6},坐标PointRelation:Q,SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_△ABO))},SolutionConclusionRelation{relation=坐标PointRelation:P},SolutionConclusionRelation{relation=坐标PointRelation:Q}

253、topic: 如图,在三角形ABC中, $\angle B = 2\angle C$,AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$.%#



graph:

```
{"stem":{"pictures":[{"picturename":"1000040694_Q_1.jpg","coordinates":{"A": "-9.03,4.35","B": "-11.0 0,2.00","C": "-4.00,2.00","D": "-9.03,2.00","M": "-7.50,2.00"}, "collineations":{"0": "A##D","1": "A##B","2": "A##C","3": "B##D##M##C"}, "variable-equals":{},"circles":[]}, "appliedproblems":{}}, "subsystems":[]}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ABD = 2 * \angle ACM\}$, MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation $\{DM = (1/2) * AB\}$]

254、topic: 如图,已知,在 $\triangle ABC$ 中, $AB=AC$,直线m经过点A. #%(1)如图1,若 $\angle BAC=90^\circ$, $BD \perp m$, $CE \perp m$,垂足分别为点D,E.求证: $\triangle ABD \cong \triangle CAE$. #%(2)如图2,若 $\angle BAC=90^\circ$,P为m上的点,且 $AP=10cm$, $\triangle PAC$ 、 $\triangle PAB$ 的面积分别为\$60c\{m\}^2\$和\$30c\{m\}^2\$,求 $\triangle ABC$ 的面积.#%(3)如图3,若D,E是m上的两点(D,A,E三点互不重合),F为 $\angle BAC$ 平分线上的一点,且 $\triangle ABF$ 和 $\triangle ACF$ 均为等边三角形,连接BD,CE.若 $\angle BDA=\angle AEC=\angle BAC$,试判断 $\triangle DEF$ 的形状,并证明你的结论.#%#

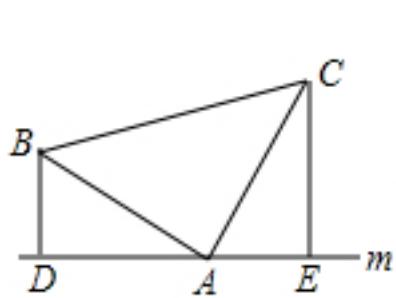


图 1

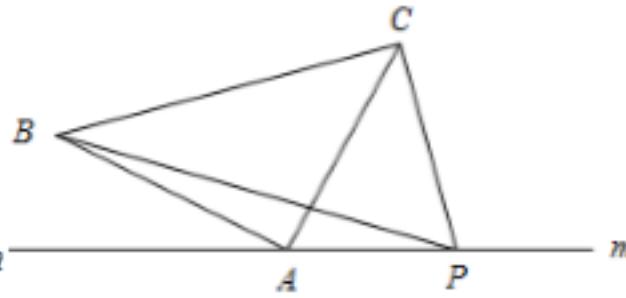


图 2

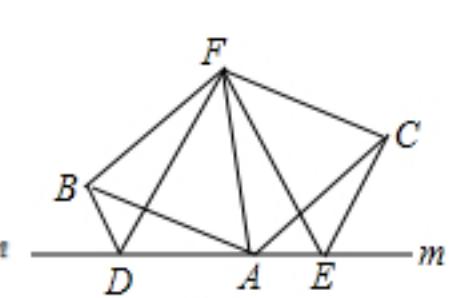


图 3

graph:

```
{"stem":{"pictures":[], "appliedproblems":{}}, "subsystems": [{"pictures": [{"picturename": "1000034354_Q_1.jpg", "coordinates": {"A": "-5.61,5.19", "B": "-8.23,6.56", "C": "-4.23,7.81", "D": "-8.23,5.19", "E": "-4.23,5.19"}, "collineations": {"0": "B##A", "1": "B##D", "2": "B##C", "3": "D##A##E", "4": "A##C", "5": "C##E"}, "variable-equals": {}, "circles": []}, {"pictures": [{"picturename": "1000034354_Q_2.jpg", "coordinates": {"A": "-5.56,5.19", "B": "-8.55,6.69", "C": "-4.05,8.18", "P": "-3.06,5.19"}, "collineations": {"0": "B##A", "1": "B##P", "2": "B##C", "3": "A##P", "4": "A##C", "5": "C##P"}, "variable-equals": {}, "circles": []}, {"pictures": [{"picturename": "1000034354_Q_3.jpg", "coordinates": {"A": "-4.07,3.65", "B": "-6.98,4.69", "C": "-1.73,5.64", "D": "-6.38,3.65", "E": "-2.88,3.65", "F": "-4.63,6.68"}, "collineations": {"0": "F##B", "1": "F##D", "2": "F##A", "3": "F##E", "4": "F##C", "5": "C##E", "6": "A##B", "7": "D##B", "8": "D##A##E", "9": "A##C", "10": "A##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, "subsystems": []}]}
```

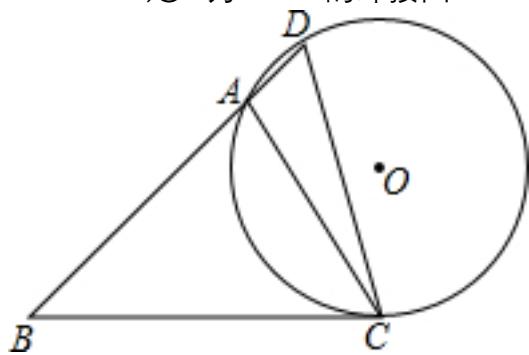
NLP: TriangleRelation: $\triangle ABC$, EqualityRelation $\{AB=AC\}$, PointOnLineRelation{point=A, line=StraightLine[m] analytic : $y=k_m*x+b_m$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false},(ExpressRelation:[key:]1), EqualityRelation $\{\angle BAC=(1/2*\pi)\}$, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, LinePerpRelation{line1=DE, line2=CE, crossPoint=E}, EqualityRelation $\{S_{\triangle ABC}=v_0\}$,(ExpressRelation:[key:]2), EqualityRelation $\{\angle BAC=(1/2*\pi)\}$, PointOnLineRelation{point=P, line=StraightLine[m] analytic : $y=k_m*x+b_m$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false}, EqualityRelation $\{AP=10\}$, EqualityRelation $\{S_{\triangle ACP}=60*c\}$, EqualityRelation $\{S_{\triangle ABP}=30*c\}$, 求值(大小): (ExpressRelation:[key:]v_0), AngleBisectorRelation{line=M_1N_1, angle= $\angle BAC$, angle1= $\angle BAM_1$, angle2= $\angle CAM_1$ }, NegativeRelation{relation=PointCoincidenceRelation{point1=D,

```

point2=A}},NegativeRelation{relation=PointCoincidenceRelation{point1=D,
point2=E}},NegativeRelation{relation=PointCoincidenceRelation{point1=A,
point2=E}},(ExpressRelation:[key:]3),PointOnLineRelation{point=D, line=StraightLine[m]
analytic :y=k_m*x+b_m slope:null b:null isLinearFunction:false, isConstant=false,
extension=false},PointOnLineRelation{point=E, line=StraightLine[m] analytic :y=k_m*x+b_m
slope:null b:null isLinearFunction:false, isConstant=false,
extension=false},RegularTriangleRelation:RegularTriangle:△ABF,RegularTriangleRelation:RegularTri
angle:△ACF,SegmentRelation:BD,SegmentRelation:CE,MultiEqualityRelation
[multiExpressCompare=∠ADB=∠AEC=∠BAC, originExpressRelationList=[], keyWord=null,
result=null],ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△ABD,
triangleB=△CAE}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]S_△ABC)},SolveGeoShapeConclusionRelation{iPolygon=△DEF,
iPolygonType=SOLVEENCLOSESHAPE}

```

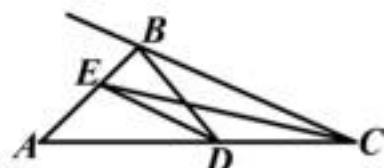
255、topic: 如图,在 $\triangle ABC$ 中, $\angle B=45^\circ$, $\angle ACB=60^\circ$, $AB=3\sqrt{2}$,点D为BA延长线上的一点,且 $\angle D=\angle ACB$, $\odot O$ 为 $\triangle ACD$ 的外接圆.
(1)求BC的长;
(2)求 $\odot O$ 的半径.



graph:
{"stem":{"pictures":[{"picturename":"1000080969_Q_1.jpg","coordinates":{"A": "-1.24,3.00","B": "-4.24,0.00","C": "0.49,0.00","D": "-0.51,3.73","O": "0.49,2.00"}, "collineations": {"0": "B##A##D", "1": "C##B", "2": "C##D", "3": "A##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##D##C"}]}, "appliedproblems": {}, "substems": []}]}

NLP:
TriangleRelation:△ABC, EqualityRelation{∠ABC=(1/4*Pi)}, EqualityRelation{∠ACB=(1/3*Pi)}, Equality
Relation{AB=3*(2^(1/2))}, PointOnLineRelation{point=D, line=BA, isConstant=false,
extension=true}, EqualityRelation{∠ADC=∠ACB}, InscribedShapeOfCircleRelation{closedShape=△ACD,
circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, EqualityRelation{BC=v_0}, 求值
(大小): (ExpressRelation:[key:]v_0), 圆的半径: CircleRelation{circle=Circle[○O]{center=O,
analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]BC)}, SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]AO)}

256、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC=100^\circ$, $\angle ACB=20^\circ$, CE平分 $\angle ACB$, D是AC上一点,若 $\angle CBD=20^\circ$,求 $\angle ADE$ 的度数.



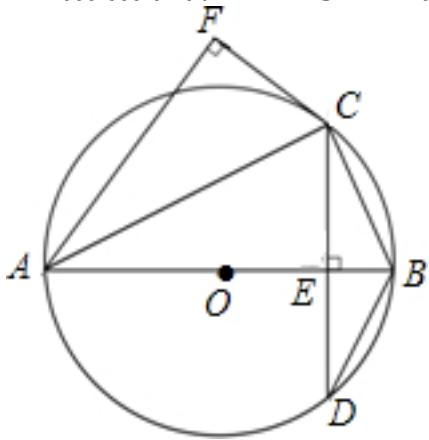
graph:

{"stem": {"pictures": [{"picturename": "1000021308_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "1.81,3.13", "C": "10.40,0.00", "D": "5.53,0.00", "E": "0.96,1.66"}, "collineations": {"0": "E###A###B", "1": "C##E", "2": "E###D", "3": "D###B", "4": "B###C", "5": "A###D###C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle CBE = (5/9\pi)$ }, EqualityRelation{ $\angle BCD = (1/9\pi)$ }, AngleBisectorRelation{line=CE, angle= $\angle BCD$, angle1= $\angle BCE$, angle2= $\angle DCE$ }, PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false}, EqualityRelation{ $\angle CBD = (1/9\pi)$ }, 求角的大小: AngleRelation{angle= $\angle ADE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ADE$)}

257、topic: 如图,AB为 $\odot O$ 的直径,弦CD \perp AB,垂足为点E,CF \perp AF,且CF=CE. #%(1)求证:CF是 $\odot O$ 的切线;#%(2)若 $\sin \angle BAC = \frac{2}{5}$,求 $\frac{\{S_{\triangle CBD}\}}{\{S_{\triangle ABC}\}}$ 的值.#%#



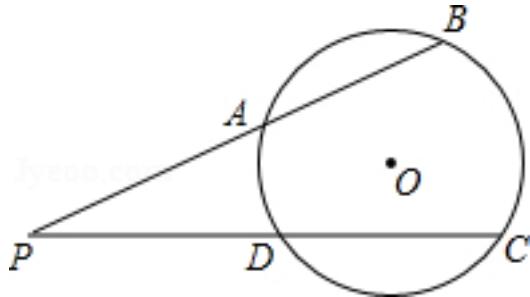
graph:

{"stem": {"pictures": [{"picturename": "1000060765_Q_1.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,0.00", "C": "1.14,1.64", "D": "1.14,-1.64", "E": "1.14,0.00", "F": "-0.32,2.59", "O": "0.00,0.00"}, "collineations": {"0": "A###F", "1": "A###C", "2": "D###B", "3": "C###F", "4": "C###B", "5": "C###E###D", "6": "A###O###E###B"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###D###C###B"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, chordLength=null, straightLine=null, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, length=null, LinePerpRelation{line1=CD, line2=AB, crossPoint=E}, LinePerpRelation{line1=CF, line2=AF, crossPoint=F}, EqualityRelation{CF=CE}, EqualityRelation{ $\sin(\angle CAO) = (2/5)$ }, 求值(大小): (ExpressRelation:[key:] $S_{\triangle BCD}/S_{\triangle ABC}$), ProveConclusionRelation:[证明: LineContactCircleRelation{line=CF, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, contactPoint=Optional.of(C), outpoint=Optional.of(F)}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $S_{\triangle BCD}/S_{\triangle ABC}$)}

258、topic: 如图, $\odot O$ 的半径为5,点P在 $\odot O$ 外,PB交 $\odot O$ 于A、B两点,PC交 $\odot O$ 于D、C两点.#%#(1)求证: $PA \cdot PB = PD \cdot PC$; #%(2)若 $PA = \frac{45}{4}$, $AB = \frac{19}{4}$, $PD = DC + 2$, 求

点O到PC的距离.#%#

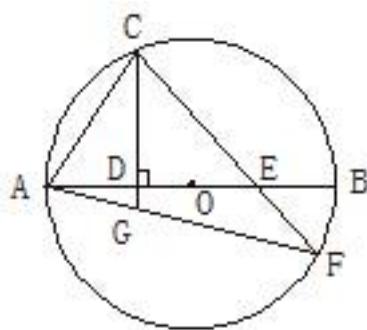


graph:

```
{"stem": {"pictures": [{"picturename": "1000040041_Q_1.jpg", "coordinates": {"A": "-4.98,0.48", "B": "0.98,4.90", "C": "3.00,-4.00", "D": "-3.00,-4.00", "P": "-11.00,-4.00", "O": "0.00,0.00"}, "collineations": {"0": "P###D###C", "1": "P###A##B"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "B###A###D##C"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=Express:[5], PointOutCircleRelation{point=Pcurve=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[P]}, LineCrossCircleRelation{line=PB, circle= $\odot O$, crossPoints=[A, B], crossPointNum=2}, LineCrossCircleRelation{line=PC, circle= $\odot O$, crossPoints=[D, C], crossPointNum=2}, EqualityRelation{AP=(45/4)}, EqualityRelation{AB=(19/4)}, EqualityRelation{DP=CD+2}, 距离,求距离: PointToLineDistanceRelation{point=O, line=PC, distance=null}, ProveConclusionRelation:[证明: EqualityRelation{AP*BP=DP*CP}], SolutionConclusionRelation{relation=距离,求距离: PointToLineDistanceRelation{point=O, line=PC, distance=null}}}

259、topic: 已知,如图,AB是 $\odot O$ 的直径,C是 $\odot O$ 上一点,连接AC,过点C作直线 $CD \perp AB$ 于D($AD < DB$),点E是DB上任意一点(点D、B除外),直线CE交 $\odot O$ 于点F,连接AF与直线CD交于点G.?(1)求证: $\{AC\}^2=AG \cdot AF$;(2)若点E是AD(点A除外)上任意一点,上述结论是否仍然成立?若成立,请画出图形并给予证明;若不成立,请说明理由.

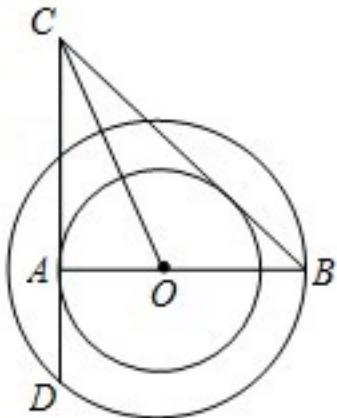


graph:

```
{"stem": {"pictures": [{"picturename": "1000026043_Q_1.jpg", "coordinates": {"A": "-6.00,0.00", "B": "6.00,0.00", "C": "-1.50,5.81", "D": "-1.50,0.00", "E": "2.17,0.00", "F": "4.60,-3.85", "G": "-1.50,-1.63", "O": "0.00,0.00"}, "collineations": {"0": "F###C##E", "1": "B###O##D##A##E", "2": "D###G##C", "3": "C###A", "4": "G###F##A"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C###F##A##B"}]}, "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP: PointRelation:D,PointRelation:B,DiameterRelation{diameter=AB},
 circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ },
 length=null},PointOnCircleRelation{circle=Circle[$\odot O$]{center=O,
 analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[C]},SegmentRelation:AC,LinePerpRelation{line1=CD,
 line2=AB, crossPoint=D},PointOnLineRelation{point=E, line=DB, isConstant=false,
 extension=false},LineCrossCircleRelation{line=CE, circle= $\odot O$, crossPoints=[F],
 crossPointNum=1},LineCrossRelation [crossPoint=Optional.of(G), iLine1=AF,
 iLine2=CD],PointRelation:A,PointOnLineRelation{point=E, line=AD, isConstant=false,
 extension=false},ProveConclusionRelation:[证明: EqualityRelation{ $((AC)^2)=AG*AF$ }]

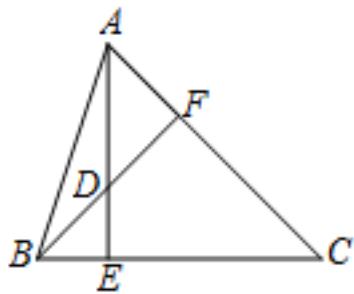
260、topic: 如图,在以O为圆心的两个同心圆中,AB经过圆心O,且与小圆相交于点A,与大圆相交于点B,小圆的切线AC与大圆相交于点D,且CO平分 $\angle ACB$.#%#(1)证明:BC所在直线与小圆相切.#%#(2)试判断AC、AD、BC之间的数量关系,并说明理由.#%#(3)若AB=8cm,BC=10cm,求大圆与小圆围成的圆环的面积(结果保留 π).#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060766_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "5.00,0.00", "C": "-2.99,6.01", "D": "-2.98,-4.01", "O": "0.00,0.00"}, "collinearities": {"0": "C###O", "1": "C###B", "2": "C###A##D", "3": "A##O##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "D##B"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O,
 analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }},PointOnLineRelation{point=O, line=AB, isConstant=false,
 extension=false},AngleBisectorRelation{line=CO,angle= $\angle ACB$, angle1= $\angle ACO$, angle2= $\angle BCO$ },求值(大小): (ExpressRelation:[key:] (AC/AD)),求值(大小):
 (ExpressRelation:[key:] (AD/BC)),EqualityRelation{AB=8},EqualityRelation{BC=10},SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] (AC/AD)),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] (AD/BC))

261、topic: 如图,在 $\triangle ABC$ 中,AF:FC=1:2,D是BF的中点,AD的延长线与BC交于点E,求BE:EC的值.#%#



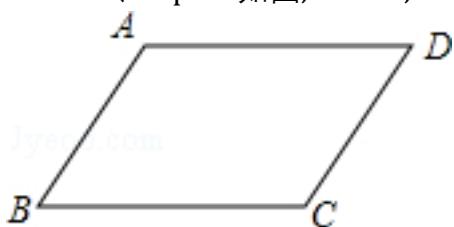
graph:

```
{"stem": {"pictures": [{"picturename": "1000041516_Q_1.jpg", "coordinates": {"A": "1.53,2.96", "B": "0.00,0.00", "C": "4.18,0.00", "D": "1.21,0.99", "E": "1.05,0.00", "F": "2.42,1.97"}, "collineations": {"0": "A###B", "1": "B###E##C", "2": "C###F##A", "3": "A###D###E", "4": "B###D##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{(AF)/(CF)=(1)/(2)\}$, MiddlePointOfSegmentRelation{middle Point=D, segment=BF}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AD, iLine2=BC], 求值(大小): (ExpressRelation:[key:]BE/CE), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BE/CE)}

262、topic: 如图,DA=BC,AB=CD,求证: $\angle A+\angle D=180^\circ$.#%#

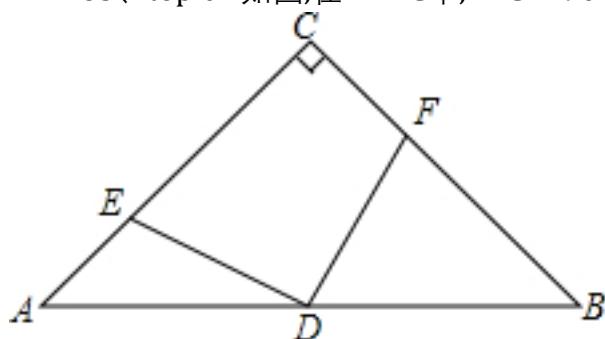


graph:

```
{"stem": {"pictures": [{"picturename": "1000030728_Q_1.jpg", "coordinates": {"A": "-11.00,5.00", "B": "-12.00,3.00", "C": "-9.00,3.00", "D": "-8.02,5.00"}, "collineations": {"0": "A###B", "1": "B###C", "2": "C###D", "3": "A###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: EqualityRelation{AD=BC}, EqualityRelation{AB=CD}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle BAD + \angle ADC = (\text{Pi})$ }]]

263、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=BC$,点D为AB的中点, $AE=CF$.求证: $DE\perp DF$.#%#



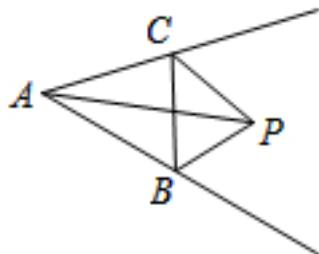
graph:

{"stem":{"pictures":[{"picturename":"1000035759_Q_1.jpg","coordinates":{"A":"0.00,0.00","B":"6.00,0.00","C":"3.00,3.00","D":"3.00,0.00","E":"1.00,1.00","F":"4.00,2.00"}],"collineations":{"0":"A###D###B","1":"A###E###C","2":"B###C##F","3":"D###E","4":"F###D"},"variable-equals":{},"circles":[]},"appliedproblems":{},"subsystems":[]}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ECF = (1/2 * \pi)\}$, EqualityRelation $\{AC = BC\}$, MiddlePointOfSegmentRelation $\{middlePoint = D, segment = AB\}$, EqualityRelation $\{AE = CF\}$, ProveConclusionRelation:[证明: LinePerpRelation $\{line1 = DE, line2 = DF, crossPoint = D\}$]

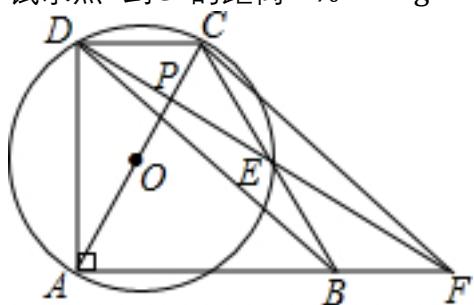
264、topic: 如图,PB、PC分别是 $\triangle ABC$ 的外角平分线,它们相交于点P,连接AP. #(1)求证:AP是 $\angle A$ 的平分线; #(2)若AB=6,AC=4,BC=3,求 $\{\{S}_{\{\vartriangle PAB\}}:\{S}_{\{\vartriangle PBC\}}:\{S}_{\{\vartriangle PAC\}}\}$ 的值.#%#



graph:
{"stem":{"pictures":[{"picturename":"1000031273_Q_1.jpg","coordinates":{"A": "-7.81,2.97","B": "-2.12,1.77","C": "-4.14,4.00","P": "-1.32,3.18"}],"collineations":{"0":"A###P","1":"A###B","2":"A###C","3":"B###C","4":"P###C","5":"P###B"},"variable-equals":{},"circles":[]},"appliedproblems":{},"subsystems":[]}

NLP: TriangleRelation: $\triangle ABC$, SegmentRelation:AP, AngleBisectorRelation $\{line = PB, angle = \angle APC, angle1 = \angle BPC, angle2 = \angle APB\}$, AngleBisectorRelation $\{line = PC, angle = \angle APB, angle1 = \angle APC, angle2 = \angle BPC\}$, EqualityRelation $\{AB = 6\}$, EqualityRelation $\{AC = 4\}$, EqualityRelation $\{BC = 3\}$, 求值(大小): (ExpressRelation:[key:]S $_{\triangle ABP}$):S $_{\triangle BCP}$):S $_{\triangle ACP}$), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S $_{\triangle ABP}$):S $_{\triangle BCP}$):S $_{\triangle ACP}$)}

265、topic: 如图,直角梯形ABCD中,AB||CD, $\angle DAB = 90^\circ$,且 $\angle ABC = 60^\circ$,AB=BC, $\triangle ACD$ 的外接圆 $\odot O$ 交BC于点E,连接DE并延长,交AC于点P,交AB延长线于点F.#%#(1)求证:CF=DB;#%#(2)当 $AD = \sqrt{3}$,试求点E到CF的距离.#%#

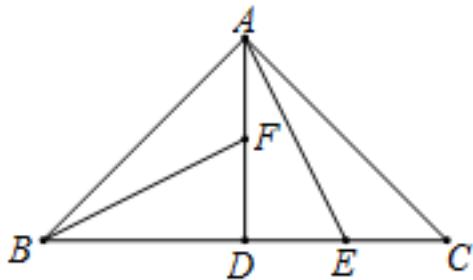


graph:
{"stem":{"pictures":[{"picturename":"1000060808_Q_1.jpg","coordinates":{"A": "5.00,4.27","B": "9.00,4.27","C": "7.00,7.73","D": "5.00,7.73","E": "8.00,6.00","F": "11.00,4.27","P": "6.50,6.87","O": "6.00,6.00"}],"collineations":{"0":"A###B###F","1":"F###C","2":"C###D","3":"D###A","4":"A###O###P###C","5":}}

"B###D","6":"B###E###C","7":"F###E###P###D"},"variable>equals":{},"circles":[{"center":"O","pointInCircle":"A###D###C##E"}]],"appliedproblems":{},"substems":[]}

NLP: InscribedShapeOfCircleRelation{closedShape=△ACD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, RightTrapezoidRelation{rightTrapezoid=RightTrapezoid:ABC D randomOrder:true}, LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{∠BAD=(1/2*Pi)}, EqualityRelation{∠ABE=(1/3*Pi)}, EqualityRelation{AB=BC}, LineCrossCircleRelation{line=BC, circle= $\odot O$, crossPoints=[E]}, crossPointNum=1}, SegmentRelation:DE, LineCrossRelation [crossPoint=Optional.of(P), iLine1=DE, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=AB], EqualityRelation{AD=(3^(1/2))}, 距离, 求距离: PointToLineDistanceRelation{point=E, line=CF, distance=null}, ProveConclusionRelation:[证明: EqualityRelation{CF=BD}], SolutionConclusionRelation{relation=距离, 求距离: PointToLineDistanceRelation{point=E, line=CF, distance=null}}

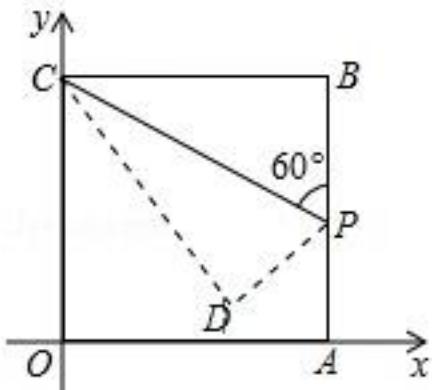
266、topic: 如图,在Rt△BAC中,已知AB=AC,∠BAC=90°,AD⊥BC于点D,点F、E分别在AD、DC上,且AF=CE,连结BF,AE. #%(1)求证:△ABF≌△CAE; #%(2)判断BF与AE具有怎样的位置关系?并说明理由.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000037589_Q_1.jpg", "coordinates": {"A": "-6.00, 8.00", "B": "-9.00, 5.00", "C": "-3.00, 5.00", "D": "-6.00, 5.00", "E": "-4.50, 5.00", "F": "-6.00, 6.50"}, "collinearities": {"0": "A###F##D", "1": "B###E##C", "2": "B##A", "3": "A##C", "4": "A##E", "5": "B##F"}, "variable>equals": {}, "circles": {}}, "appliedproblems": {}, "substems": []}}

NLP:
RightTriangleRelation:RightTriangle:△BAC[Optional.of(A)], EqualityRelation{AB=AC}, EqualityRelation{∠BAC=(1/2*Pi)}, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, PointOnLineRelation{point=F, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=DC, isConstant=false, extension=false}, EqualityRelation{AF=CE}, SegmentRelation:BF, SegmentRelation:AE, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△ABF, triangleB=△CAE}], JudgePostionConclusionRelation: [data1=BF, data2=AE]

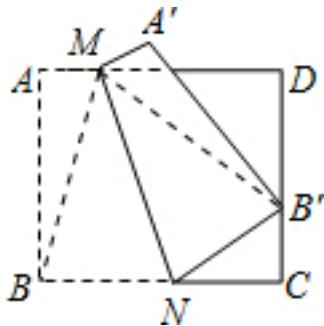
267、topic: 如图,在平面直角坐标系中,OABC是正方形,点A的坐标是\$(4,0)\$,点P在AB边上,且\$∠CPB=60^\circ\$,将\$△CPB\$沿CP折叠,使得点B落在点D处,求点D的坐标.



graph:
 {"stem": {"pictures": [{"picturename": "1000020089_Q_1.jpg", "coordinates": {"A": "4.00,0.00", "B": "4.00,4.00", "C": "0.00,4.00", "D": "2.00,0.54", "O": "0.00,0.00", "P": "4.00,1.69"}, "collineations": {"0": "C##B", "1": "C##O", "2": "O##A", "3": "A##P##B", "4": "C##D", "5": "P##C", "6": "D##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: SquareRelation{square=Square:ABCO}, PointRelation: A(4,0), PointOnLineRelation{point=P, line=AB, isConstant=false, extension=false}, EqualityRelation{∠BPC=(1/3*Pi)}, TurnoverRelation{start=B, segment=CP, target=D}, 坐标PointRelation:D, SolutionConclusionRelation{relation=坐标PointRelation:D}

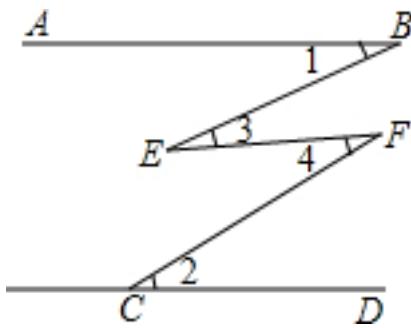
268、topic: 如图,四边形ABCD是边长为9的正方形纸片,将其沿MN折叠,使点B落在CD边上的B'处,点A的对应点为A',且B'C=3,求AM的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "10000802666_Q_1.jpg", "coordinates": {"A": "-2.0,3.00", "B": "-2.0,0.00", "C": "1.00,0.00", "D": "1.00,3.00", "M": "-1.33,3.00", "N": "-0.33,0.00", "A'": "-0.80,3.40", "B'": "1.00,1.00"}, "collineations": {"0": "A##M##D", "1": "A##B", "2": "B##N##C", "3": "C##B'##D", "4": "M##N", "5": "M##A", "6": "A##B'", "7": "N##B'"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}

NLP: EqualityRelation{AM=v_0}, SquareRelation{square=Square:ABCD, length=9}, SymmetricRelation{preData=B, afterData=B', symmetric=StraightLine[MN] analytic:y=k_MN*x+b_MN slope:null b:null isLinearFunction:false, pivot=}, PointOnLineRelation{point=B', line=CD, isConstant=false, extension=false}, EqualityRelation{B'C=3}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AM)}

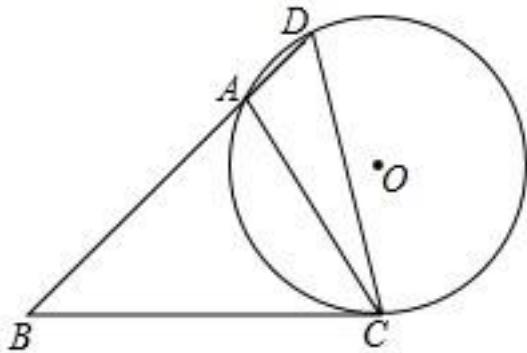
269、topic: 如图,已知AB||CD,∠1=∠2,求证:∠3=∠4.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1C404F4D5C3A476589A75E8C00B34F38.jpg", "coordinates": {"A": "-16.00,9.00", "B": "-10.00,9.00", "C": "-13.00,3.00", "D": "-6.00,3.00", "E": "-15.00,6.00", "F": "-8.00,6.00"}, "collineations": {"0": "A##B", "1": "F##E", "2": "B##E", "3": "D##C", "4": "F##C"}, "variable-equals": {"0": "\u03221=\u0322ABE", "1": "\u03222=\u0322DCF", "2": "\u03223=\u0322BEF", "3": "\u03224=\u0322EFC"}, "circles": "[]"}, "appliedproblems": "[]"}, "substems": "[]"}}

NLP: LineParallelRelation [iLine1=AB,
 iLine2=CD], EqualityRelation{ $\angle ABE = \angle DCF$ }, ProveConclusionRelation:[证明：
 EqualityRelation{ $\angle BEF = \angle CFE$ }]

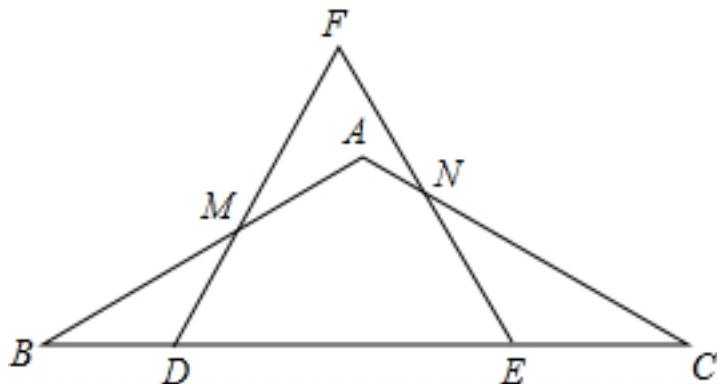
270、topic: 如图,在 $\triangle ABC$ 中, $\angle B=45^\circ$, $\angle ACB=60^\circ$, $AB=3\sqrt{2}$,点D为BA的延长线上的一点,且 $\angle D=\angle ACB$, $\odot O$ 为 $\triangle ACD$ 的外接圆.(1)求BC的长;(2)求 $\odot O$ 的半径.



graph:
 {"stem": {"pictures": [{"picturename": "1000060749_Q_1.jpg", "coordinates": {"A": "-1.73,1.00", "B": "-4.73, -2.00", "C": "0.00,-2.00", "D": "-1.00,1.73", "O": "0.00,0.00", "E": "-1.73,-2.00", "M": "1.73,-1.00", "H": "-0.63,0.37", "I": "-1.73,-1.00"}, "collineations": {"0": "B##A##D", "1": "B##C##E", "2": "A##O##M##H", "3": "D##H##C", "4": "A##E##I", "5": "A##C", "6": "C##M"}, "variable-equals": "[]", "circles": [{"center": "O", "pointincircle": "A##D##C##M##I"}]}, "appliedproblems": "[]"}, "substems": "[]"}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABE=(1/4*\pi)$ }, EqualityRelation{ $\angle ACE=(1/3*\pi)$ }, EqualityRelation{ $AB=3*(2^{(1/2)})$ }, PointOnLineRelation{point=D, line=BA, isConstant=false, extension=true}, EqualityRelation{ $\angle ADH=\angle ACE$ }, InscribedShapeOfCircleRelation{closedShape= $\triangle ACD$, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, EqualityRelation{ $BC=v_0$ }, 求值(大小): (ExpressRelation:[key:] v_0), 圆的半径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] BC)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] AO)}

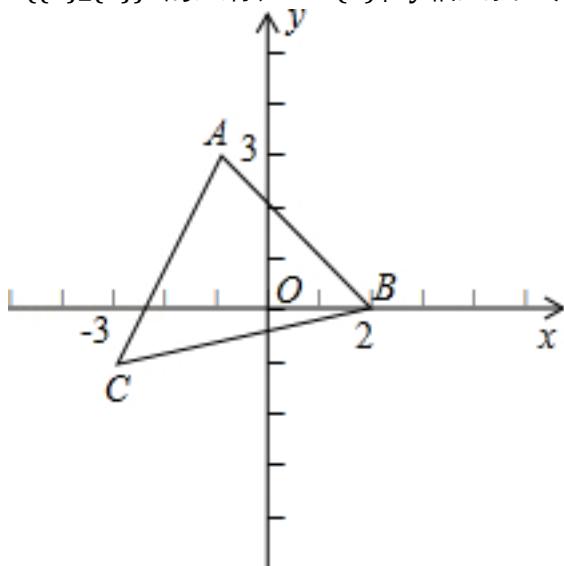
271、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, $\angle B=30^\circ$, $BC=8$,点D在边BC上,点E在线段DC上, $DE=4$, $\triangle DEF$ 是等边三角形,边DF交边AB于点M,边EF交边AC于点N.
(1)求证: $\triangle BMD \sim \triangle CNE$;
(2)设 $BD=x$,五边形ANEDM的面积为y,求y与x之间的函数解析式(要求写出自变量x的取值范围).#%#



graph:
{"stem": {"pictures": [{"picturename": "1E7FF655C60648BC9D52C93F12B70544.jpg", "coordinates": {"A": "-11.00,5.31", "B": "-15.00,3.00", "C": "-7.00,3.00", "D": "-13.00,3.00", "E": "-9.00,3.00", "F": "-11.00,6.46", "M": "-12.00,4.73", "N": "-10.00,4.73"}, "collinearities": {"0": "M##D##F", "1": "A##B##M", "2": "A##C##N", "3": "E##N##F", "4": "B##C##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=AC$ }, EqualityRelation{ $\angle DBM=(1/6\pi)$ }, EqualityRelation{ $BC=8$ }, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=DC, isConstant=false, extension=false}, EqualityRelation{ $DE=4$ }, RegularTriangleRelation:RegularTriangle: $\triangle DEF$, LineCrossRelation [crossPoint=Optional.of(M), iLine1=DF, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(N), iLine1=EF, iLine2=AC], EqualityRelation{ $BD=x$ }, 表达式之间的关系: DualExpressRelation{expresses=[Express:[y], Express:[x]]}, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle BMD$, triangleB= $\triangle CNE$ }], SolutionConclusionRelation{relation=表达式之间的关系: DualExpressRelation{expresses=[Express:[y], Express:[x]]}}}

272、topic: 如图,已知平面直角坐标系中 $A(-1,3)$, $B(2,0)$, $C(-3,-1)$.#%#
(1)在图中作出 $\triangle ABC$ 关于y轴的对称图形\$vartriangle {{A}_1}{{B}_1}{{C}_1}\$,并写出点\${{A}_1}\$、\${{B}_1}\$、\${{C}_1}\$的坐标;
(2)在y轴上找一点P,使PA+PC最短,并求出最短距离.#%#

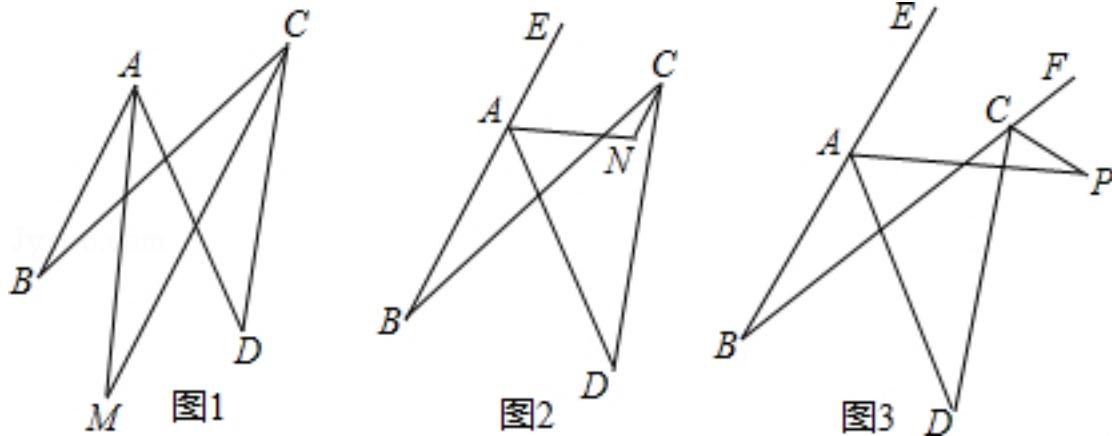


graph:

{"stem":{"pictures":[{"picturename":"1000081497_Q_1.jpg","coordinates":{"A": "-1.00,3.00","B": "2.00,0.00","C": "-3.00,-1.00","O": "0.00,0.00"}, "collineations": {"0": "B###C", "1": "A###B", "2": "A###C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}

NLP: PointRelation:A(-1,3),PointRelation:B(2,0),PointRelation:C(-3,-1),坐标PointRelation:A_1,坐标PointRelation:B_1,坐标PointRelation:C_1,PointOnLineRelation{point=P, line=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, isConstant=false, extension=false},(ExpressRelation:[key:]AP+CP),SolutionConclusionRelation{relation=坐标 PointRelation:A_1},SolutionConclusionRelation{relation=坐标 PointRelation:B_1},SolutionConclusionRelation{relation=坐标PointRelation:C_1}

273、topic: 如图,平面内,四条线段AB、BC、CD、DA首尾顺次相接, $\angle ABC=20^\circ$, $\angle ADC=40^\circ$.#%#(1)如图1, $\angle BAD$ 和 $\angle BCD$ 的角平分线交于点M,求 $\angle AMC$ 的大小; #%#(2)如图2,点E在BA的延长线上, $\angle DAE$ 的平分线和 $\angle BCD$ 的平分线交于点N,求 $\angle ANC$ 的度数; #%#(3)如图3,点E在BA的延长线上,点F在BC的延长线上, $\angle DAE$ 的平分线和 $\angle DCF$ 的平分线交于点P,请直接写出 $\angle APC$ 的度数.#%#



graph:

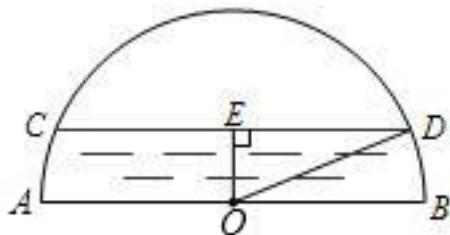
{"stem":{"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000038443_Q_1.jpg", "coordinates": {"A": "-5.54,5.34", "B": "-7.46,2.28", "C": "-2.25,6.35", "D": "-4.37,1.46", "M": "-6.07,1.41"}, "collineations": {"0": "A###B", "1": "A###D", "2": "A##M", "3": "B###C", "4": "C##M", "5": "C##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000038443_Q_2.jpg", "coordinates": {"A": "-5.54,5.34", "B": "-7.46,2.28", "C": "-2.25,6.35", "D": "-4.37,1.46", "E": "-4.50,7.01", "N": "-3.26,5.04"}, "collineations": {"0": "B###A###E", "1": "A###N", "2": "A###D", "3": "B##C", "4": "C##N", "5": "C##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000038443_Q_3.jpg", "coordinates": {"A": "-5.54,5.34", "B": "-7.46,2.28", "C": "-2.25,6.35", "D": "-4.37,1.46", "E": "-4.50,7.01", "F": "-0.70,7.56", "P": "0.01,4.61"}, "collineations": {"0": "B###A###E", "1": "A##P", "2": "A###D", "3": "B##C##F", "4": "C##P", "5": "C##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}}

NLP: MultiPointCollinearRelation:[A, B],MultiPointCollinearRelation:[B, C],MultiPointCollinearRelation:[C, D],MultiPointCollinearRelation:[D, A],EqualityRelation{ $\angle ABC=(1/9\pi)$ },EqualityRelation{ $\angle ADC=(2/9\pi)$ },AngleBisectorRelation{line=A M,angle= $\angle BAD$, angle1= $\angle BAM$, angle2= $\angle DAM$ },AngleBisectorRelation{line=C M,angle= $\angle BCD$, angle1= $\angle BCM$, angle2= $\angle DCM$ },(ExpressRelation:[key:]1),LineCrossRelation [crossPoint=Optional.of(M), iLine1=N_1M_2, iLine2=N_3M_4],求角的大小: AngleRelation{angle= $\angle AMC$ },AngleBisectorRelation{line=M_5N_5,angle= $\angle DAE$, angle1= $\angle DAM$, angle2= $\angle EAM$ },AngleBisectorRelation{line=C M,angle= $\angle BCD$, angle1= $\angle BCM$,

angle2= $\angle DCM$ },(ExpressRelation:[key:]2),PointOnLineRelation{point=E, line=BA, isConstant=false, extension=true},求角的大小:

AngleRelation{angle= $\angle ANC$ },AngleBisectorRelation{line=M_7N_7,angle= $\angle DAE$, angle1= $\angle DAM_7$, angle2= $\angle EAM_7$ },AngleBisectorRelation{line=M_8N_8,angle= $\angle DCF$, angle1= $\angle DCM_8$, angle2= $\angle FCM_8$ },(ExpressRelation:[key:]3),PointOnLineRelation{point=E, line=BA, isConstant=false, extension=true},PointOnLineRelation{point=F, line=BC, isConstant=false, extension=true},求角的大小: AngleRelation{angle= $\angle APC$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AMC$)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ANC$)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle APC$)}

274、topic: 如图是一个半圆形桥洞截面示意图,圆心为O,直径AB是河底线,弦CD是水位线,CD||AB,且AB=26m,OE \perp CD于点E.水位正常时测得OE:CD=5:24%(1)求CD的长;(2)现汛期来临,水面要以每小时4m的速度上升,则经过多长时间桥洞会刚刚被灌满?#%#

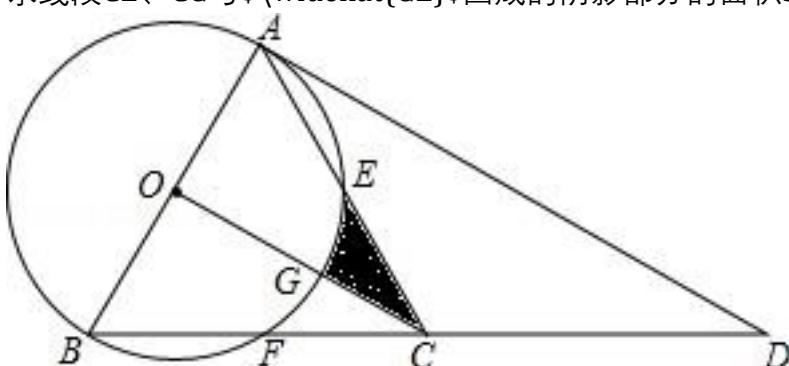


graph:

{"stem": {"pictures": [{"picturename": "1000052550_Q_1.jpg", "coordinates": {"A": "-9.62,-0.01", "B": "3.38,-0.09", "C": "-9.11,2.48", "D": "2.89,2.41", "E": "-3.11,2.45", "O": "-3.12,-0.05"}, "collinearities": {"0": "O##E", "1": "O##D", "2": "D##E##C", "3": "A##O##B"}, "variable>equals": {}, "circles": [{"center": "O", "points": ["A", "B", "C", "D"]}], "appliedproblems": {}, "substems": []}]}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}},ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null,straightLine=null}},CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }},LineParallelRelation [iLine1=CD, iLine2=AB],EqualityRelation{AB=26*m},LinePerpRelation{line1=OE, line2=CD, crossPoint=E},EqualityRelation{CD=v_0},求值(大小): (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CD)}

275、topic: 如图,点D是等边 $\triangle ABC$ 中BC边的延长线上一点,且 $AC=CD$,以AB为直径作 $\odot O$,分别交边AC、BC于点E、点F.(1)求证:AD是 $\odot O$ 的切线;(2)连接OC,交 $\odot O$ 于点G,若 $AB=4$,求线段CE、CG与 \widehat{GE} 围成的阴影部分的面积S.

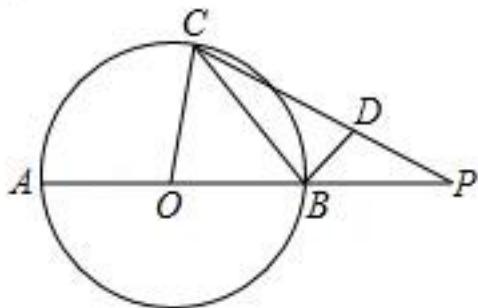


graph:

{"stem": {"pictures": [{"picturename": "1000026755_Q_1.jpg", "coordinates": {"A": "1.88,4.92", "B": "-0.62, 0.59", "C": "4.38,0.59", "D": "9.38,0.59", "E": "3.13,2.76", "F": "1.88,0.59", "G": "2.79,1.51", "O": "0.63,2.76"}, "collineations": {"0": "A##B", "1": "A##C", "2": "A##D", "3": "O##C", "4": "B##C##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##E##G##F"}]}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AC=CD}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LineCrossCircleRelation{line=AC, circle= $\odot O$, crossPoints=[E], crossPointNum=1}, LineCrossCircleRelation{line=BC, circle= $\odot O$, crossPoints=[F], crossPointNum=1}, SegmentRelation:OC, LineCrossCircleRelation{line=OC, circle= $\odot O$, crossPoints=[G], crossPointNum=1}, EqualityRelation{AB=4}, 求值(大小):
(ExpressRelation:[key:]S), ProveConclusionRelation:[证明: LineContactCircleRelation{line=AD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(A), outpoint=Optional.of(D)}], SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]S)}

276、topic: 如图,AB是 $\odot O$ 的直径,延长AB至点P,使 $BP=OB$,BD垂直于弦BC,垂足为点B,点D在PC上.设 $\angle PCB=\alpha$, $\angle POC=\beta$.?%#求证: $\tan \alpha \cdot \tan \frac{\beta}{2} = \frac{1}{3}$.

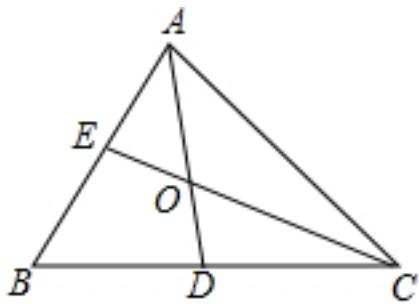


graph:

{"stem": {"pictures": [{"picturename": "1000025048.jpg", "coordinates": {"A": "-4.00,0.00", "B": "4.00,0.00", "C": "0.50,3.97", "D": "4.87,1.65", "P": "8.00,0.00", "O": "0.00,0.00"}, "collineations": {"0": "B##A##D##P", "1": "C##P##D", "2": "C##O", "3": "D##B"}, "variable>equals": {"0": "\alpha = \angle PCB", "1": "\beta = \angle POC"}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}, "appliedproblems": {}, "substems": []}}

NLP: ChordOfCircleRelation{chord=BC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, PointOnLineRelation{point=P, line=AB, isConstant=false, extension=true}, EqualityRelation{BP=BO}, LinePerpRelation{line1=BD, line2=BC, crossPoint=B}, PointOnLineRelation{point=D, line=PC, isConstant=false, extension=false}, EqualityRelation{ $\angle PCB = \alpha$ }, EqualityRelation{ $\angle POC = \beta$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\tan(\alpha) * \tan(\beta/2) = 1/3$ }]

277、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC=60^\circ$,AD,CE分别平分 $\angle BAC$, $\angle ACB$,AD,CE交于O.(1)求 $\angle AOC$ 的度数;(2)求证:AC=AE+CD.



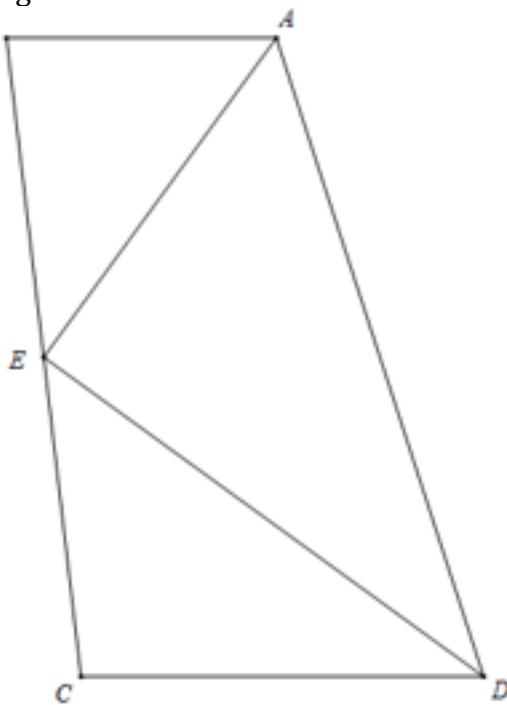
graph:

```
{"stem": {"pictures": [{"picturename": "24DDE33B3BDF4DB9AAA728CB9B09F930.jpg", "coordinates": {"A": "-11.08,9.05", "B": "-14.00,4.00", "C": "-6.00,4.00", "D": "-10.41,4.00", "E": "-12.46,6.66", "O": "-10.67,5.92"}, "collineations": {"0": "A###B##E", "1": "A##O##D", "2": "A##C", "3": "C##E##O", "4": "D##B##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionreplies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle DBE = (1/3\pi)\}$, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, AngleBisectorRelation{line=CE, angle= $\angle ACD$, angle1= $\angle ACE$, angle2= $\angle DCE$ }, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AD, iLine2=CE], 求角的大小: AngleRelation{angle= $\angle AOC$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOC$)}, ProveConclusionRelation:[证明: EqualityRelation{AC=AE+CD}]

278、topic: 如图,已知AB//CD,AE、DE分别平分 $\angle BAD$ 和 $\angle ADC$ 的平分线,求证: $AB+CD=AD$

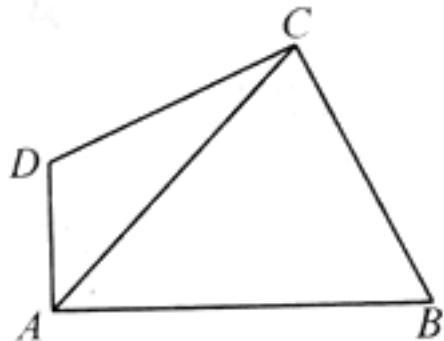


graph:

```
{"stem": {"pictures": [{"picturename": "1000040372_Q_1.jpg", "coordinates": {"A": "-2.73,10.08", "B": "-6.75,10.08", "C": "-5.64,0.56", "D": "0.36,0.56", "E": "-6.19,5.32"}, "collineations": {"0": "A##E", "1": "A##D", "2": "A##B", "3": "B##C", "4": "D##E", "5": "C##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], AngleBisectorRelation{line=AE, angle= $\angle BAD$, angle1= $\angle BAE$, angle2= $\angle DAE$ }, AngleBisectorRelation{line=DE, angle= $\angle ADC$, angle1= $\angle ADE$, angle2= $\angle CDE$ }, ProveConclusionRelation:[证明: EqualityRelation{AB+CD=AD}]

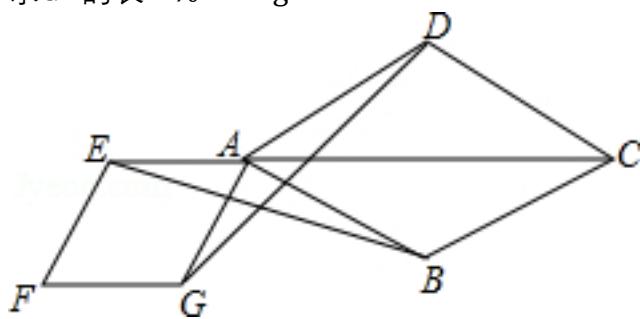
279、topic: 如图,四边形ABCD中,BC=DC,对角线AC平分 $\angle BAD$,且AB=21,AD=9,BC=DC=10,求AC的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000031261_Q_1.jpg", "coordinates": {"A": "-10.50,2.00", "B": "0.00,2.00", "C": "-3.00,6.00", "D": "-7.99,5.74"}, "collineations": {"0": "A###D", "1": "A###B", "2": "A###C", "3": "B##C", "4": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{AC=v_0},已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{BC=CD}, AngleBisectorRelation{line=AC, angle= $\angle BAD$, angle1= $\angle BAC$, angle2= $\angle CAD$ }, EqualityRelation{AB=21}, EqualityRelation{AD=9}, MultiEqualityRelation [multiExpressCompare=BC=CD=10, originExpressRelationList=[], keyWord=null, result=null], 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AC)}

280、topic: 如图,点E是菱形ABCD对角线CA的延长线上任意一点,以线段AE为边作一菱形AEFG,且菱形AEFG~菱形ABCD,连接EB、GD.#%#(1)求证:EB=GD;#%#(2)若 $\angle DAB=60^\circ$, $AB=2$, $AG=\sqrt{3}$,求GD的长.#%#

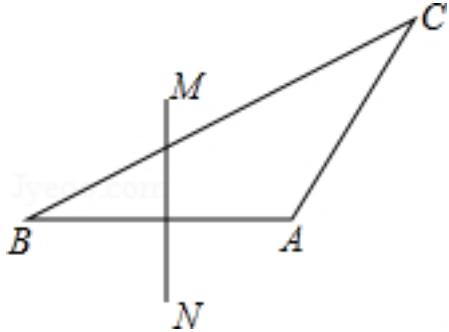


graph:
 {"stem": {"pictures": [{"picturename": "1000035296_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "2.33,-1.32", "C": "4.64,0.03", "D": "2.31,1.35", "E": "-2.47,-0.02", "F": "-3.68,-2.16", "G": "-1.22,-2.14"}, "collineations": {"0": "A###B", "1": "B###C", "2": "C###D", "3": "D###A", "4": "E###A###C", "5": "E###F", "6": "F###G", "7": "G###A", "8": "G###D", "9": "B###E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: QuadrilateralSimilarRelation [quadrilateralA=Rhombus:AEFG,

quadrilateralB=Rhombus:ABCD],SegmentRelation:EB,SegmentRelation:GD,EqualityRelation{DG=v_0}, EqualityRelation{ $\angle BAD = (1/3 * \pi)$ }, EqualityRelation{AB=2}, EqualityRelation{AG=(3^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{BE=DG}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DG)}

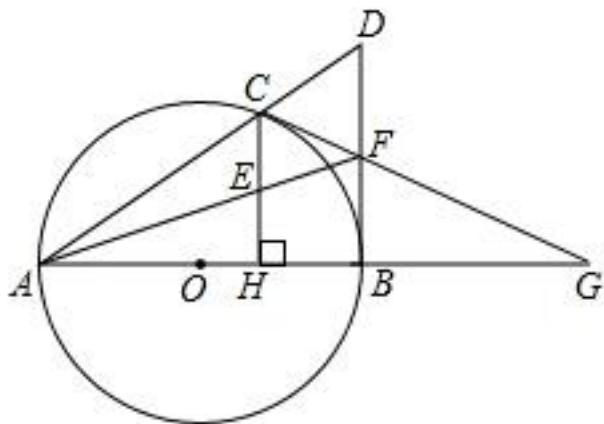
281、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, $\angle A=120^\circ$, AB 的垂直平分线MN分别交 BC 、 AB 于点M、N.求证: $CM=2BM$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041472_Q_1.jpg", "coordinates": {"A": "3.40,0.00", "B": "0.00,0.00", "C": "5.20,3.12", "M": "1.70,2.01", "N": "1.70,-0.98"}, "collineations": {"0": "A###B", "1": "A###C", "2": "C##B", "3": "M##N"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, EqualityRelation{ $\angle BAC = (2/3 * \pi)$ }, MiddlePerpendicularRelation [iLine1=AB, iLine2=MN, crossPoint=Optional.absent()], LineCrossRelation [crossPoint=Optional.of(M)], iLine1=MN, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(N)], iLine1=MN, iLine2=AB], ProveConclusionRelation:[证明: EqualityRelation{CM=2*BM}]

282、topic: 如图,已知点C是以AB为直径的 $\odot O$ 上一点,\$CH\bot AB\$于点H,过点B作 $\odot O$ 的切线交直线AC于点D,点E为CH的中点,连结并延长交BD于点F,直线CF交AB的延长线于点G.?(1)求证:\$AE\cdot FD=AF\cdot EC\$;(2)求证: \$FC=FB\$; (3)若\$FB=FE=2\$,求 $\odot O$ 的半径r的长.

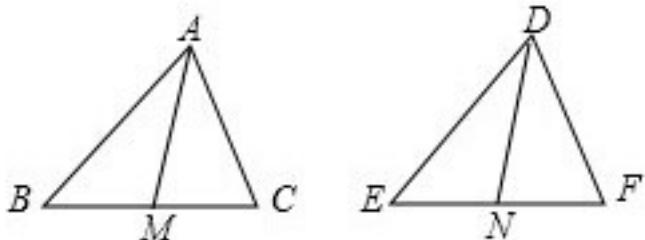


graph:
 {"stem": {"pictures": [{"picturename": "1000010785_Q_1.jpg", "coordinates": {"A": "-2.82,0.00", "B": "2.82,0.00", "C": "0.93,2.66", "D": "2.82,4.00", "E": "0.93,1.33", "F": "2.82,0.00", "G": "8.53,0.00", "H": "0.93,0.00", "O": "0.00,0.00"}, "collineations": {"0": "A###D##C", "1": "A###E##F", "2": "C##E##H", "3": "D##F##"}}, "appliedproblems": {}, "subsystems": []}}

```
#B","4":"C###F###G","5":"A###O###H###B###G}],"variable>equals":{},"circles":[]}], "appliedproblems":{}}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "2", "pictures": [], "appliedproblems": {}}]]
```

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[C]}, LinePerpRelation{line1=CH, line2=AB, crossPoint=H}, MiddlePointOfSegmentRelation{middlePoint=E, segment=CH}, LineCrossRelation[crossPoint=Optional.of(G), iLine1=CF, iLine2=AB], MultiEqualityRelation[multiExpressCompare=BF=EF=2, originExpressRelationList=[], keyWord=null, result=null], ProveConclusionRelation:[证明: EqualityRelation{AE*DF=AF*CE}], ProveConclusionRelation:[证明: EqualityRelation{CF=BF}]]

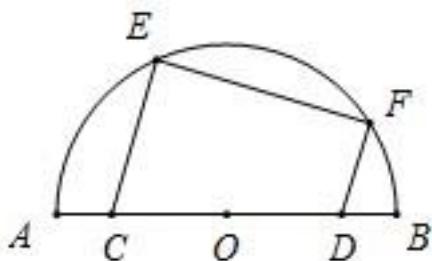
283、topic: 如图,在 $\triangle ABC, \triangle DEF$ 中,AM,DN分别是两三角形中线, $AB=DE, AC=DF, AM=DN$.求证: $\triangle ABC \cong \triangle DEF$.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000035725_Q_1.jpg", "coordinates": {"A": "0.00,2.04", "B": "-1.83,0.00", "C": "1.00,0.00", "M": "-0.41,0.00", "D": "0.00,-2.96", "E": "-1.83,-5.00", "F": "1.00,-5.00", "N": "-0.41,-5.00"}, "collineations": {"0": "A###B", "1": "B###M###C", "2": "C###A", "3": "M###A", "4": "D###E", "5": "E###N###F", "6": "F###D", "7": "N###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "substems": []}}

NLP:
TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle DEF$, EqualityRelation{AB=DE}, EqualityRelation{AC=DF}, EqualityRelation{AM=DN}, MidianLineOfTriangleRelation{midianLine=AM, triangle= $\triangle ABC$, top=A, bottom=BC}, MidianLineOfTriangleRelation{midianLine=DN, triangle= $\triangle DEF$, top=D, bottom=EF}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DEF$ }]

284、topic: 已知:如图,AB是直径,EF是弦,\$CE\perp EF\$,\$DF\perp EF\$,E,F为垂足.求证:\$AC=BD\$.



graph:
{"stem": {"pictures": [{"picturename": "1000025135.jpg", "coordinates": {"A": "-5.00,0.00", "B": "5.00,0.00", "C": "-4.00,1.00", "D": "4.00,1.00", "E": "-3.00,2.00", "F": "3.00,2.00", "O": "0.00,0.00"}}], "appliedproblems": {}}, "substems": []}}

,"C":"-4.00,0.00","D":"4.00,0.00","E":"-3.00,4.00","F":"4.53,2.12","O":"0.00,0.00"},"collineations":{"0":"E###C","1":"F###D","2":"E###F","3":"B###A###D###C###O"},"variable-equals":{},"circles": [{"center": "O","pointincircle": "B###A###E###F"}]}],"appliedproblems":{},"substems":[]}]

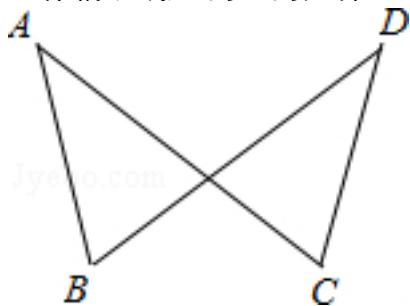
NLP: SegmentRelation:AB,ChordOfCircleRelation{chord=EF, circle=null, chordLength=null,straightLine=null},LinePerpRelation{line1=CE, line2=EF, crossPoint=E},LinePerpRelation{line1=DF, line2=EF, crossPoint=F},ProveConclusionRelation:[证明: EqualityRelation{AC=BD}]

285、topic: 如图\$P\$是正方形\$ABCD\$对角线\$BD\$上一点,\$PE\perp DC,PF\perp BC,E、F\$分别是垂足.求证:\$AP=EF\$.

graph:

NLP: SquareRelation{square=Square:ABCD},PointOnLineRelation{point=P, line=BD, isConstant=false, extension=false},LinePerpRelation{line1=PE, line2=DC, crossPoint=E},LinePerpRelation{line1=PF, line2=BC, crossPoint=F},ProveConclusionRelation:[证明: EqualityRelation{AP=EF}]

286、topic: 如图,已知\$AB=DC,BD=AC\$.#%#(1)试说明:\$\angle ABD=\angle DCA\$;#%#(2)在(1)的说明过程中,需要作辅助线,它的目的是什么?#%#

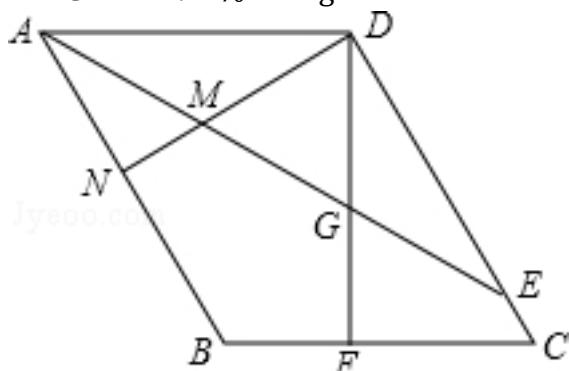


graph:

{"stem": {"pictures": [{"picturename": "1000029145_Q_1.jpg", "coordinates": {"A": "3.00,8.00", "B": "5.00,4.00", "C": "9.00,4.00", "D": "11.00,8.00"}, "collineations": {"0": "C##A", "1": "C##D", "2": "B##D", "3": "A##B"}, "variable-equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}}}

NLP: EqualityRelation{AB=CD},EqualityRelation{BD=AC},ProveConclusionRelation:[证明: EqualityRelation{\$\angle ABD=\angle ACD\$}]

287、topic: 如图,已知\$\square ABCD\$中,AE平分\$\angle BAD\$交DC于E,DF\$\perp BC\$于F,交AE于G,且AD=DF.过点D作DC的垂线,分别交AE、AB于点M、N. #%#(1)若M为AG中点,且DM=2,求DE的长; #%#(2)求证:\$AB=CF+DM\$. #%#

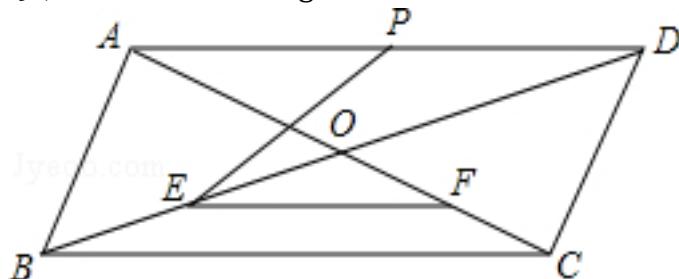


graph:
 {"stem": {"pictures": [{"picturename": "1000041890_Q_1.jpg", "coordinates": {"A": "0.21,3.36", "B": "2.73,-0.31", "C": "6.43,-0.26", "D": "3.92,3.41", "E": "6.01,0.36", "F": "3.97,-0.29", "G": "3.94,1.43", "M": "2.28,2.29", "N": "1.37,1.67"}, "collineations": {"0": "A###N###B", "1": "B###F###C", "2": "C###E###D", "3": "D###A", "4": "A###M###G###E", "5": "D###M###N", "6": "D###G###F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD},AngleBisectorRelation{line=AE,angle= $\angle D$ AN, angle1= $\angle DAE$, angle2= $\angle EAN$ },LineCrossRelation [crossPoint=Optional.of(E), iLine1=AE, iLine2=DC],LinePerpRelation{line1=DF, line2=BC, crossPoint=F},LineCrossRelation [crossPoint=Optional.of(G), iLine1=DF, iLine2=AE],EqualityRelation{AD=DF},LinePerpRelation{line1=ND, line2=DC, crossPoint=D},LineCrossRelation [crossPoint=Optional.of(N), iLine1=AB, iLine2=ND],LineCrossRelation [crossPoint=Optional.of(M), iLine1=AE, iLine2=ND],PointOnLineRelation{point=D, line=ND, isConstant=false, extension=false},EqualityRelation{DE=v_1},MiddlePointOfSegmentRelation{middlePoint=M,segment=AG},EqualityRelation{DM=2},求值(大小):
 (ExpressRelation:[key:v_1],SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:DE]),ProveConclusionRelation:[证明: EqualityRelation{AB=CF+DM}])

288、topic: 平行四边形ABCD的对角线相交于点O,E、F、P分别为OB、OC、AD的中点,且AC=2AB,求证:EP=EF.#%#

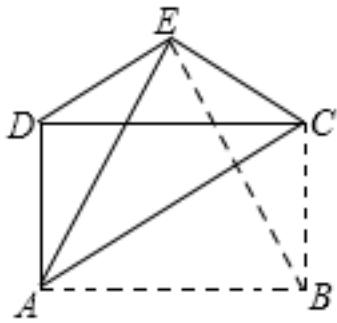


graph:
 {"stem": {"pictures": [{"picturename": "1000031978_Q_1.jpg", "coordinates": {"A": "-13.00,6.00", "B": "-15.00,3.00", "C": "-6.42,3.03", "D": "-4.42,6.03", "E": "-12.36,3.76", "F": "-8.07,3.77", "O": "-9.71,4.51", "P": "-8.71,6.01"}, "collineations": {"0": "A###O###F###C", "1": "B###E###O###D", "2": "P###E", "3": "E###F", "4": "A###B", "5": "D###P###A", "6": "C###D", "7": "C###B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD},MiddlePointOfSegmentRelation{middlePoint=E,segment=OB},MiddlePointOfSegmentRelation{middlePoint=F,segment=OC},MiddlePointOfSegmentRelation{middlePoint=P,segment=AD},EqualityRelation{AC=2*AB},ProveConclusionRelation:[证明: EqualityRelation{EP=EF}]

289、topic: 如图,已知在矩形ABCD中,AB=2a,把矩形沿直线AC折叠,点B落在点E处,连接DE、BE,△ABE是等边三角形.#%#(1)求点E到CD的距离:#%#(2)求\$ \frac{\{{\{S}\}_{\backslash vartriangle DCE}}{\{{\{S}\}_{\backslash vartriangle ABE}} \$的值.#%#



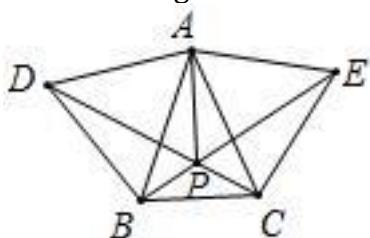
graph:

```
{"stem": {"pictures": [{"picturename": "1000027669_Q_1.jpg", "coordinates": {"A": "-5.79,-0.79", "B": "-0.79,-0.79", "C": "-0.79,2.21", "D": "-5.79,2.21", "E": "-3.29,3.54"}, "collineations": {"0": "D##A", "1": "D##C", "2": "E##D", "3": "A##E", "4": "A##C", "5": "A##B", "6": "C##B", "7": "E##C", "8": "E##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=2*a}, RectangleRelation{rectangle=Rectangle:ABCD}, TurnoverRelation{start=B, segment=AC, target=E}, SegmentRelation:DE, SegmentRelation:BE, RegularTriangleRelation:RegularTriangle:△ABE, 距离, 求距离: PointToLineDistanceRelation{point=E, line=CD, distance=null}, 求值(大小): (ExpressRelation:[key:]S_△CDE)/S_△ABE), SolutionConclusionRelation{relation=距离, 求距离: PointToLineDistanceRelation{point=E, line=CD, distance=null}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_△CDE)/S_△ABE)}

290、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$,分别以AB和AC为边向三角形外作等边三角形ABD和等边三角形ACE,连接BE和CD.?(1)求证: $BE=CD$?#%(2)设CD与BE交于点P,连接AP,求证:AP平分 $\angle DPE$.



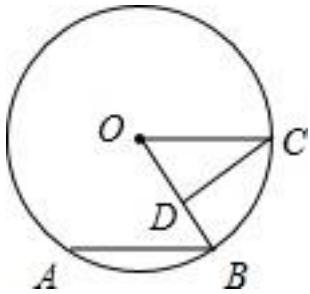
graph:

```
{"stem": {"pictures": [{"picturename": "1000021372_Q_1.jpg", "coordinates": {"A": "1.00,2.00", "B": "0.00,0.00", "C": "2.00,0.00", "D": "-1.23,1.87", "E": "3.23,1.87", "P": "1.00,0.58"}, "collineations": {"0": "E##P##B", "1": "A##P", "2": "D##A", "3": "A##B", "4": "A##C", "5": "P##C##D", "6": "B##C", "7": "D##B", "8": "A##E", "9": "C##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation:△ABC, EqualityRelation{AB=AC}, RegularTriangleRelation:RegularTriangle:△ABD, RegularTriangleRelation:RegularTriangle:△ACE, SegmentRelation:AB, SegmentRelation:AC, SegmentRelation:BE, SegmentRelation:CD, LineCrossRelation [crossPoint=Optional.of(P), iLine1=CD, iLine2=BE], SegmentRelation:AP, ProveConclusionRelation:[证明: EqualityRelation{BE=CD}], ProveConclusionRelation:[证明: AngleBisectorRelation{line=AP, angle=∠DPE, angle1=∠APD, angle2=∠APE}]]

291、topic: 如图,已知点A、B、C在 $\odot O$ 上, $CD \perp OB$ 于D, $AB=2OD$,若 $\angle C=40^\circ$,求 $\angle B$ 的度数.

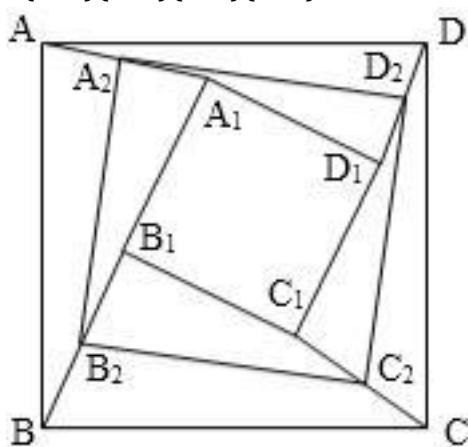


graph:

```
{"stem": {"pictures": [{"picturename": "1000024902_Q_1.jpg", "coordinates": {"A": "-7.38,2.23", "B": "-4.57, 2.27", "C": "-3.76,3.97", "D": "-5.07,2.88", "O": "-6.00,4.00"}, "collineations": {"0": "O###D##B", "1": "A##B", "2": "C##D", "3": "O##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[A, B, C]}, LinePerpRelation{line1=CD, line2=OB, crossPoint=D}, EqualityRelation{AB=2*DO}, EqualityRelation{ $\angle DCO=(2/9\pi)$ }, 求角的大小: AngleRelation{angle= $\angle ABD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ABD$)}

292、topic: 如图,已知四边形ABCD、 $\{A_1\}\{B_1\}\{C_1\}\{D_1\}$ 都是正方形, $\{A_2\}$ 、 $\{B_2\}$ 分别是 $A\{A_1\}$ 、 $B\{B_1\}$ 、 $C\{C_1\}$ 、 $D\{D_1\}$ 的中点.#%#求证:四边形 $\{A_2\}\{B_2\}\{C_2\}\{D_2\}$ 是正方形.



graph:

```
{"stem": {"pictures": [{"picturename": "1000010819_Q_1.jpg", "coordinates": {"A": "1.00,7.00", "B": "1.00,0.00", "C": "8.00,0.00", "D": "8.00,7.00", "A1": "4.00,6.00", "B1": "3.00,3.00", "C1": "6.00,2.00", "D1": "7.00,5.00", "A2": "2.50,6.50", "B2": "2.00,1.50", "C2": "7.00,1.00", "D2": "7.50,6.00"}, "collineations": {"0": "B[2]##A[2]", "1": "C[2]##B[2]", "2": "D[2]##A[2]", "3": "C[2]##D[2]", "4": "B[1]##A[1]", "5": "C[1]##B[1]", "6": "D[1]##A[1]", "7": "C[1]##D[1]", "8": "B##A", "9": "C##B", "10": "D##A", "11": "C##D", "12": "A##A[1]##A[2]", "13": "B##B[1]##B[2]", "14": "C##C[1]##C[2]", "15": "D##D[1]##D[2}"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "substems": []}}
```

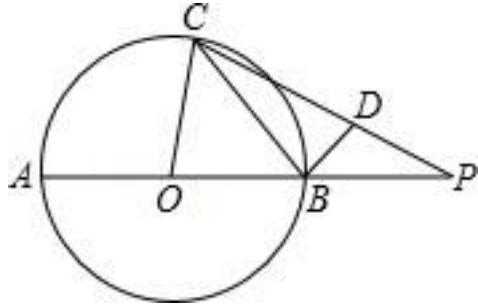
NLP:

SquareRelation{square=Square:ABCD}, SquareRelation{square=Square:A_1B_1C_1D_1}, PointRelation: A_2, PointRelation:B_2, SegmentRelation:CC_1, ProveConclusionRelation:[证明]: SquareRelation{square=Square:A_2B_2C_2D_2}]

293、topic: 如图,AB是 $\odot O$ 的直径,延长AB至P,使\$BP=OB\$,

BD垂直于弦BC,垂足为点B,点D在PC上.设\$\angle PCB=\alpha\$,\$\angle POC=\beta\$.

求证\$\tan \alpha \cdot \tan \frac{\beta}{2} = \frac{1}{3}\$.



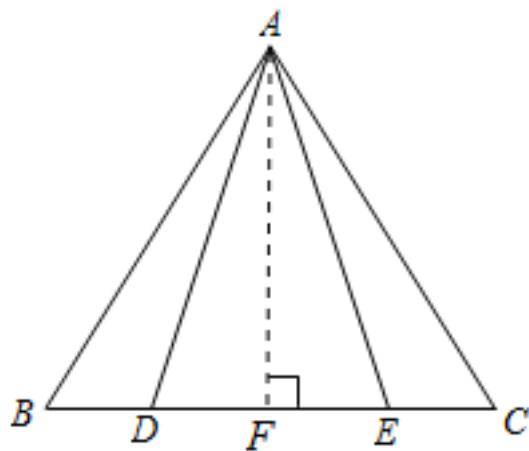
graph:

```
{"stem": {"pictures": [{"picturename": "1000010396_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "5.00,0.00", "C": "0.45,4.98", "D": "6.07,2.05", "O": "0.00,0.00", "P": "10.00,0.00"}, "collineations": {"0": "B###A###D##P", "1": "C##O", "2": "D##B", "3": "C##D##P", "4": "C##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}], "appliedproblems": {}, "substems": []}
```

NLP: ChordOfCircleRelation{chord=BC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, chordLength=null, straightLine=null}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=null}, PointOnLineRelation{point=P, line=AB, isConstant=false, extension=true}, EqualityRelation{BP=BO}, LinePerpRelation{line1=BD, line2=BC, crossPoint=B}, PointOnLineRelation{point=D, line=PC, isConstant=false, extension=false}, EqualityRelation{ $\angle BCD=\alpha$ }, EqualityRelation{ $\angle POC=\beta$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\tan(\alpha) \cdot \tan(\beta/2) = 1/3$ }]]

294、topic: 如图,点D和点E在BC上,AB=AC,AD=AE,试说明BD=CE成立的理由.(请按提示的思路完成)

解:过点A作AF \perp BC,垂足为F.%#

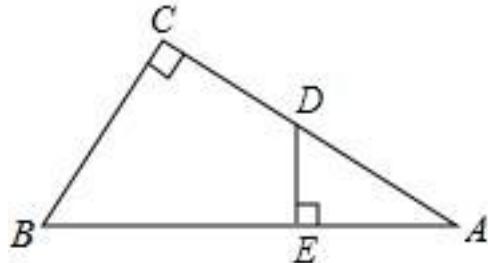


graph:

```
{"stem": {"pictures": [{"picturename": "1000063611_Q_1.jpg", "coordinates": {"A": "4.00,4.00", "B": "0.00,0.00", "C": "8.00,0.00", "D": "2.00,0.00", "E": "6.00,0.00", "F": "4.00,0.00"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##F", "3": "A##E", "4": "A##C", "5": "B##D##F##E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}
```

NLP: PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{AB=AC}, EqualityRelation{AD=AE}, LinePerpRelation{line1=AF, line2=BC, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{BD=CE}]

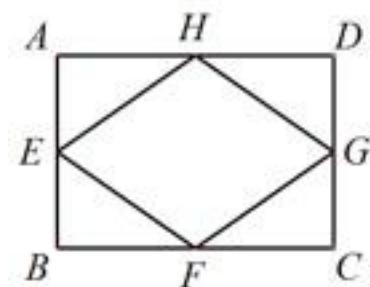
295、topic: 如图,在 $\triangle ABC$ 中,已知 $\angle C=90^\circ$,D是AC边上的中点, $DE \perp AB$ 于点E.求证: $BC^2=BE^2-AE^2$.



graph:
 {"stem": {"pictures": [{"picturename": "1000006749_Q_1.jpg", "coordinates": {"A": "5.00,0.00", "B": "0.00,0.00", "C": "1.80,2.40", "D": "3.40,1.20", "E": "3.40,0.00"}, "collineations": {"0": "A###B###E", "1": "A###D##C", "2": "B##C", "3": "E##D"}, "variable-equals": {}, "circles": [], "appliedproblems": {}, "substems": []}]}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle BCD=(1/2\pi)$ }, MiddlePointOfSegmentRelation{middlePoint=D, segment=AC}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, ProveConclusionRelation:[证明: EqualityRelation{(BC) 2 =(BE) 2 -(AE) 2 }]

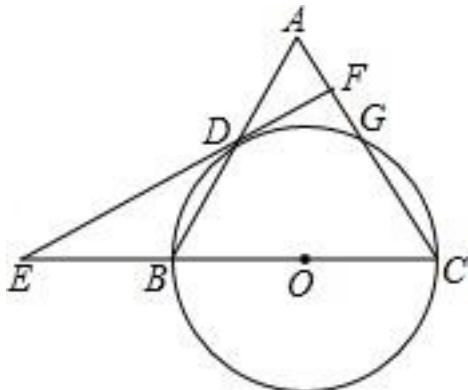
296、topic: 如图,已知点E、F、G、H分别是矩形ABCD的边AB、BC、CD、DA的中点.求证:四边形EFGH是菱形.??



graph:
 {"stem": {"pictures": [{"picturename": "1000005408_Q_1.jpg", "coordinates": {"A": "-5.50,5.77", "B": "-5.50,1.01", "C": "1.34,1.01", "D": "1.34,5.77", "E": "-5.50,3.39", "F": "-2.08,1.01", "G": "1.34,3.39", "H": "-2.08,5.77"}, "collineations": {"0": "A###E###B", "1": "C###F###B", "2": "A###H###D", "3": "C###G###D", "4": "F##E", "5": "E##H", "6": "H##G", "7": "F##G"}, "variable-equals": {}, "circles": [], "appliedproblems": {}, "substems": []}]}}

NLP:
 RectangleRelation{rectangle=Rectangle:ABCD}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=F, segment=BC}, MiddlePointOfSegmentRelation{middlePoint=G, segment=CD}, MiddlePointOfSegmentRelation{middlePoint=H, segment=DA}, ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:EFGH}]

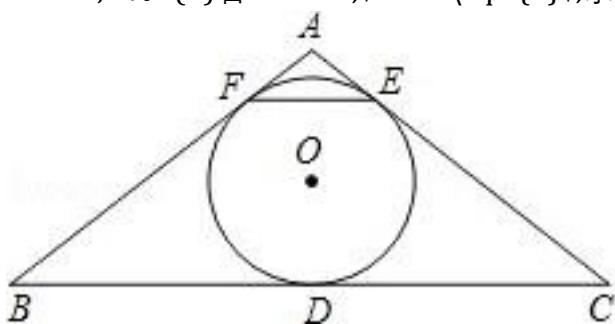
297、topic: 如图,等腰三角形ABC中,\$AC=BC=10\$,\$AB=12\$.以BC为直径作\$\odot O\$交AB于点D,交AC于点G,\$DF\perp AC\$,垂足为F,交CB的延长线于点E.?(1)求证:直线EF是\$\odot O\$的切线;?(2)求\$\cos\angle E\$的值.



graph:
 {"stem": {"pictures": [{"picturename": "1000026226_Q_1.jpg", "coordinates": {"A": "2.20,9.60", "B": "-5.00,0.00", "C": "5.00,0.00", "D": "-1.40,4.80", "E": "-17.86,0.00", "F": "3.21,6.14", "G": "4.22,2.69", "O": "0.00,0.00"}, "collineations": {"0": "C##O###E##B", "1": "C##G##A##F", "2": "B##A##D", "3": "E##F##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B##C##D##G"}]}, "appliedproblems": {}, "substems": []}}

NLP: IsoscelesTriangleRelation:IsoscelesTriangle:\$\triangle ABC\$[Optional.of(C)], MultiEqualityRelation [multiExpressCompare=AC=BC=10, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AB=12}, DiameterRelation{diameter=BC, circle=Circle[\$\odot O\$]{center=0, analytic=\$(x-x_0)^2+(y-y_0)^2=r_0^2\$}, length=null}, LineCrossCircleRelation{line=AB, circle=\$\odot O\$, crossPoints=[D], crossPointNum=1}, LineCrossCircleRelation{line=AC, circle=\$\odot O\$, crossPoints=[G], crossPointNum=1}, LinePerpRelation{line1=DF, line2=AC, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DF, iLine2=CB], 求值(大小):
 (ExpressRelation:[key:]\$\cos(\angle BED)\$), ProveConclusionRelation:[证明:
 LineContactCircleRelation{line=EF, circle=Circle[\$\odot O\$]{center=0, analytic=\$(x-x_0)^2+(y-y_0)^2=r_0^2\$}, contactPoint=Optional.of(D), outpoint=Optional.absent()}], SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]\$\cos(\angle BED)\$)}

298、topic: 如图,在\$\triangle ABC\$中, \$AB=AC\$, 内切圆O与边BC、AC、AB分别切于D、E、F.?(1)求证: \$BF=CE\$;?(2)若\$\angle C=30^\circ\$, \$CE=2\sqrt{3}\$, 求AC.



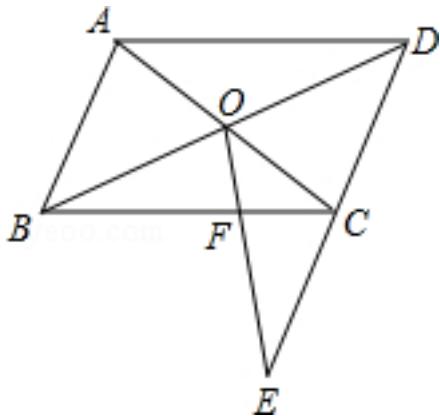
graph:
 {"stem": {"pictures": [{"picturename": "1000008275_Q_1.jpg", "coordinates": {"A": "0.00,2.00", "B": "-3.46,0.00", "C": "3.46,0.00", "D": "0.00,0.00", "E": "0.46,1.73", "F": "-0.46,1.73", "O": "0.00,0.93"}, "collineations": {"0": "A##E##C", "1": "A##B##F", "2": "B##D##C", "3": "E##F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B##C"}]}, "appliedproblems": {}, "substems": []}}

center": "O", "pointincircle": "D###E###F"}]]}, "appliedproblems": {}, "substems": []}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, PointRelation:E, PointRelation:F, EqualityRelation{ $\angle DCE = (1/6 * \pi)$ }, EqualityRelation{CE=2*(3^(1/2))}, 求值(大小):
(ExpressRelation:[key:]AC), ProveConclusionRelation:[证明:
EqualityRelation{BF=CE}], SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AC)}

299、topic: 如图,在 $\square ABCD$ 中,对角线AC与BD相交于点O,在DC的延长线上取一点E,连接OE交BC于点F.已知AB=a,BC=b,CE=c,求CF的长.#%#



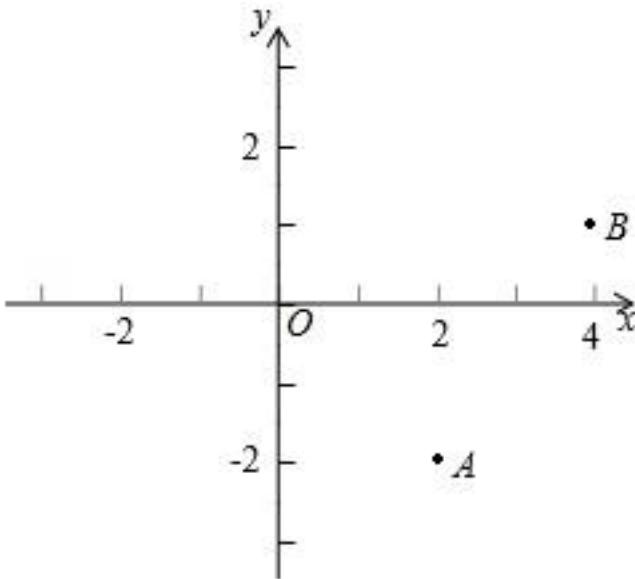
graph:

{"stem": {"pictures": [{"picturename": "1000050808_Q_1.jpg", "coordinates": {"A": "-6.00,6.00", "B": "-8.00,3.00", "C": "-4.00,3.00", "D": "-2.00,6.00", "E": "-4.83,1.76", "F": "-4.91,3.00", "O": "-5.00,4.50"}, "collinearations": {"0": "B###A", "1": "A###D", "2": "A###C##O", "3": "B##O##D", "4": "O##E##F", "5": "B##C##F", "6": "E##D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{CF=v_0}, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD], PointOnLineRelation{point=E, line=DC, isConstant=false, extension=true}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=OE, iLine2=BC], EqualityRelation{AB=a}, EqualityRelation{BC=b}, EqualityRelation{CE=c}, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]CF)}

300、topic: 如图,已知两点\$A(2,-2)\$、\$B(4,1)\$,点P是y轴上一点,求\$PA+PB\$的最小值.

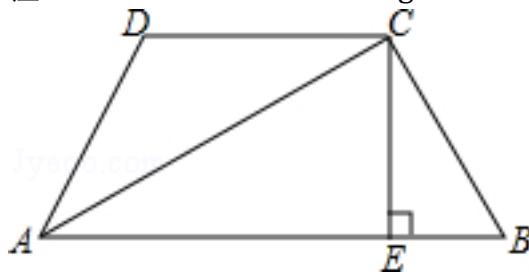


graph:

```
{"stem": {"pictures": [{"picturename": "1000006956_Q_1.jpg", "coordinates": {"A": "2.00,-2.00", "B": "4.00,1.00", "O": "0.00,0.00"}, "collinear": {}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: PointRelation:A(2,-2),PointRelation:B(4,1),PointOnLineRelation{point=P, line=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, isConstant=false, extension=false},最小值: (ExpressRelation:[key:]AP+BP),SolutionConclusionRelation{relation=最小值: (ExpressRelation:[key:]AP+BP)}

301、topic: 如图,四边形ABCD中,AC平分 $\angle BAD$, $CE \perp AB$ 于点E, $AD+AB=2AE$.求证: $\angle B+\angle ADC=180^\circ$.



graph:

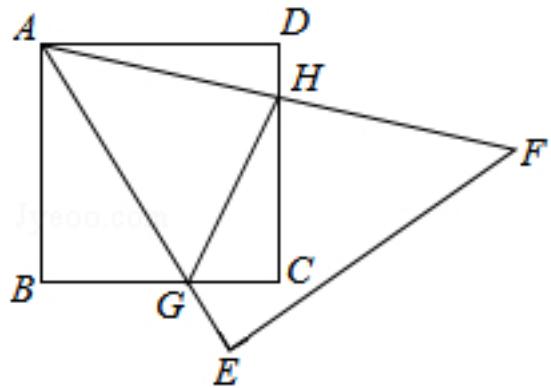
```
{"stem": {"pictures": [{"picturename": "1000031277_Q_1.jpg", "coordinates": {"A": "-10.50,2.00", "B": "0.00,2.00", "C": "-3.00,6.00", "D": "-7.99,5.74", "E": "-3.00,2.00"}, "collinear": {"0": "A##D", "1": "A##E##B", "2": "A##C", "3": "B##C", "4": "D##C", "5": "E##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD},AngleBisectorRelation{line=AC,angle= $\angle DAE$, angle1= $\angle CAD$, angle2= $\angle CAE$ },LinePerpRelation{line1=CE, line2=AB, crossPoint=E},EqualityRelation{AD+AB=2*AE},ProveConclusionRelation:[证明: EqualityRelation{ $\angle CBE+\angle ADC=(\text{Pi})$ }]

302、topic: 如图,已知正方形ABCD和等腰直角三角形AEF, $\angle E=90^\circ$,AE和BC交于点G,AF和CD交于点

H,正方形ABCD的面积为 1cm^2 ,求 $\triangle CGH$ 的周长.#%#

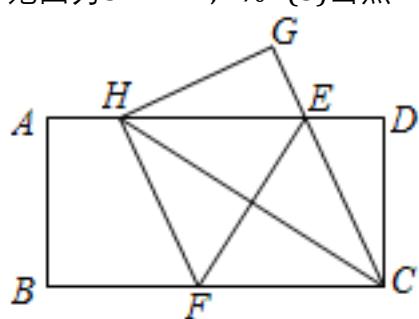


graph:
{"stem": {"pictures": [{"picturename": "1000030833_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-13.00,0.00", "C": "-9.00,0.00", "D": "-9.00,4.00", "E": "-9.00,-2.00", "F": "-3.00,2.00", "G": "-10.33,0.00", "H": "-9.00,3.20"}, "collineations": {"0": "A###B", "1": "B###C##G", "2": "D###H##C", "3": "A##D", "4": "A##G#E", "5": "E##F", "6": "A##H##F", "7": "G##H"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{C_△CGH=v_0}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: △AEF[Optional.of(E)][Optional.of(E)], SquareRelation{square=Square:ABCD}, EqualityRelation{∠FEG=(1/2*Pi)}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=AE, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(H), iLine1=AF, iLine2=CD], SquareRelation{square=Square:ABCD}, EqualityRelation{S_ABCD=1}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]C_△CGH)}

303、topic: 如图,在一张矩形纸片ABCD中,AB=4,BC=8,点E,F分别在AD,BC上,将纸片ABCD沿直线EF折叠,点C落在AD上的一点H处,点D落在点G处,求证:#%#(1)四边形CFHE是菱形;#%#(2)线段BF的取值范围为 $3 \leq BF \leq 4$;#%#(3)当点H与点A重合时,\$EF=2\sqrt{5}\$.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000061936_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "8.00,0.00", "D": "8.00,4.00", "E": "6.00,4.00", "F": "3.53,0.00", "G": "5.11,5.79", "H": "1.53,4.00"}, "collineations": {"0": "A###B", "1": "C##D", "2": "H##F", "3": "E##F", "4": "H##C", "5": "H##G", "6": "G##E##C", "7": "B##F##C", "8": "A##H##E##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

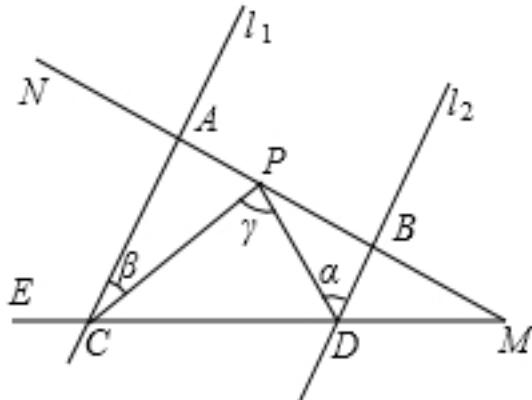
NLP: EqualityRelation{AB=4}, EqualityRelation{BC=8}, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=H, line=AD, isConstant=false,

```

extension=false},SymmetricRelation{preData=C,afterData=H,symmetric=StraightLine[EF]
analytic :y=k_EF*x+b_EF slope:null b:null isLinearFunction:false, pivot=},已知条件
QuadrilateralRelation{quadrilateral=ABCD},PointCoincidenceRelation{point1=D,
point2=G},PointCoincidenceRelation{point1=H, point2=A},ProveConclusionRelation:[证明:
RhombusRelation{rhombus=Rhombus:CFHE}],ProveConclusionRelation:[证明:
EqualityRelation{EF=2*(5^(1/2))}]}

```

304、topic: 如图,已知 $l_1 \parallel l_2$,MN分别和直线 l_1 、 l_2 交于点A、B,ME分别和直线 l_1 、 l_2 交于点C、D.点P在MN上(P点与A、B、M三点不重合).#%(1)如果点P在A、B两点之间运动时, $\angle\alpha$ 、 $\angle\beta$ 、 $\angle\gamma$ 之间有何数量关系? 请说明理由.#%(2)如果点P在A、B两点外侧运动时, $\angle\alpha$ 、 $\angle\beta$ 、 $\angle\gamma$ 有何数量关系? (只须写出结论)##



graph:
{"stem": {"pictures": [{"picturename": "1000051252_Q_1.jpg", "coordinates": {"A": "-7.37,4.70", "B": "-5.69,3.35", "C": "-8.00,2.00", "D": "-6.00,2.00", "E": "-9.00,2.00", "M": "-4.00,2.00", "N": "-9.00,6.00", "P": "-6.46,3.97"}, "collinearities": {"0": "C##A", "1": "C##P", "2": "N##A##P##B##M", "3": "P##D", "4": "B##D", "5": "E##C##D##M"}, "variable>equals": {"0": "\u03b1=\u03b1_PDB", "1": "\u03b2=\u03b2_ACP", "2": "\u03b3=\u03b3_CPD"}, "circle": "s": []}, "appliedproblems": {}, "substems": []}}

NLP:
PointRelation:P,PointRelation:A,NegativeRelation{relation=PointCoincidenceRelation{point1=B, point2=M}},LineParallelRelation [iLine1=StraightLine[l_1] analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false, iLine2=StraightLine[l_2] analytic :y=k_l_2*x+b_l_2 slope:null b:null isLinearFunction:false],LineCrossRelation [crossPoint=Optional.of(A), iLine1=MN, iLine2=StraightLine[l_1] analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false],LineCrossRelation [crossPoint=Optional.of(B), iLine1=MN, iLine2=StraightLine[l_2] analytic :y=k_l_2*x+b_l_2 slope:null b:null isLinearFunction:false],LineCrossRelation [crossPoint=Optional.of(C), iLine1=ME, iLine2=StraightLine[l_1] analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false],LineCrossRelation [crossPoint=Optional.of(D), iLine1=ME, iLine2=StraightLine[l_2] analytic :y=k_l_2*x+b_l_2 slope:null b:null isLinearFunction:false],PointOnLineRelation{point=P, line=MN, isConstant=false, extension=false},PointOnLineRelation{point=P, line=AB, isConstant=false, extension=false},求值(大小): (ExpressRelation:[key:](\u03b1/\u03b2)),求值(大小): (ExpressRelation:[key:](\u03b2/\u03b3)),求值(大小): (ExpressRelation:[key:](\u03b1/\u03b2)),求值(大小): (ExpressRelation:[key:](\u03b2/\u03b3)),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](\u03b1/\u03b2))},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](\u03b2/\u03b3))},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](\u03b1/\u03b2))},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](\u03b1/\u03b2))}

{ExpressRelation:[key:] $(\angle \beta / \angle \gamma)$ }

305、topic: 已知:如图,Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$,D为AB的中点,DE,DF分别交AC于点E,交BC于点F,且 $DE \perp DF$.
(1)如图1,如果 $CA=CB$,求证: $\{AE\}^2 + \{BF\}^2 = \{EF\}^2$
(2)如图2,如果 $CA < CB$,(1)中结论还成立吗?若成立,请证明;若不成立,请说明理由.

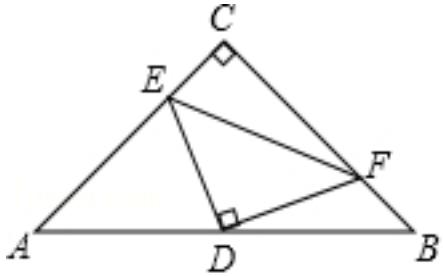


图1

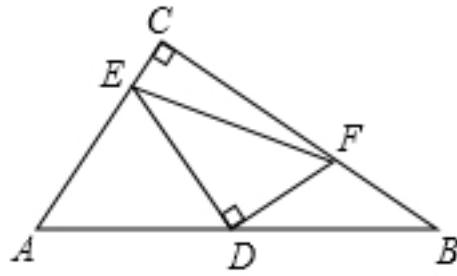


图2

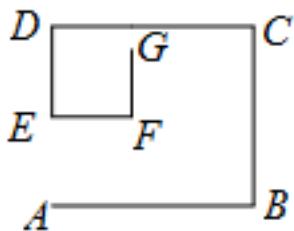
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000031541_Q_1.jpg","coordinates":{"A": -13.00, "B": -5.00, "C": -9.00, "D": -9.00, "E": -10.00, "F": -6.00}, "collineations": {"0": "A##D##B", "1": "A##E##C", "2": "B##F##C", "3": "E##D", "4": "F##E", "5": "F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000031541_Q_2.jpg", "coordinates": {"A": 0.00, "B": 7.00, "C": 2.73, "D": 3.50, "E": 2.00, "F": 5.50}, "collineations": {"0": "A##D##B", "1": "A##E##C", "2": "B##F##C", "3": "E##D", "4": "F##E", "5": "F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}], "appliedproblems": {}}}
```

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation $\{\angle ECF=(1/2*\pi)\}$, MiddlePointOfSegmentRelation[middlePoint=D,segment=AB], LineCrossRelation[crossPoint=Optional.of(F), iLine1=DE, iLine2=BC], LinePerpRelation[line1=DE, line2=DF], crossPoint=D], (ExpressRelation:[key:]1), EqualityRelation{AC=BC}, (ExpressRelation:[key:]2), InequalityRelation{AC<BC}, ProveConclusionRelation:[证明: EqualityRelation{((AE)^2)+((BF)^2)=((EF)^2)}]

306、topic: 已知:如图,DE \parallel GF,BC \parallel DE,EF \parallel DC,DC \parallel AB,求证: $\angle B=\angle F$.

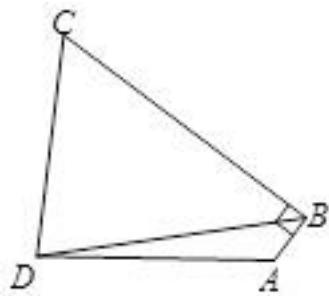


graph:

```
{"stem":{"pictures": [{"picturename": "1000051247_Q_1.jpg", "coordinates": {"A": -5.00, "B": -2.00, "C": -2.00, "D": -5.00, "E": -5.00, "F": -3.81}, "collineations": {"0": "D##C", "1": "F##G", "2": "E##D", "3": "E##F", "4": "A##B", "5": "C##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "subsystems": {}}
```

NLP: LineParallelRelation [iLine1=DE, iLine2=GF], LineParallelRelation [iLine1=BC, iLine2=DE], LineParallelRelation [iLine1=EF, iLine2=DC], LineParallelRelation [iLine1=DC, iLine2=AB], ProveConclusionRelation:[证明: EqualityRelation{ $\angle ABC = \angle EFG$ }]

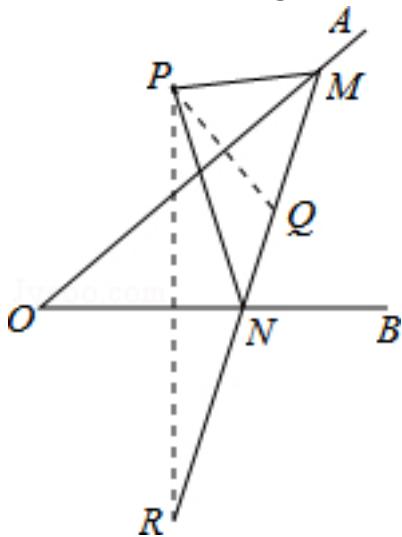
307、topic: 如图, BD 是四边形ABCD的对角线, $AB \perp BC$, $\angle C=60^\circ$, $AB=1$, $BC=3+\sqrt{3}$, $CD=2\sqrt{3}$.
 求 $\angle ABD$ 的度数;
 求AD的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000025919_Q_1.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,0.00", "C": "5.00,0.00", "D": "0.00,6.00"}, "collineations": {"0": "D##A", "1": "C##D", "2": "B##C", "3": "B##A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LinePerpRelation{line1=AB, line2=BC, crossPoint=B},EqualityRelation{ $\angle BCD=(1/3*\pi)$ },EqualityRelation{AB=1},EqualityRelation{BC=3+(3^(1/2))},EqualityRelation{CD=2*(3^(1/2))},求角的大小:
 AngleRelation{angle= $\angle ABD$ },EqualityRelation{AD=v_0},求值(大小):
 (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle ABD$),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AD)}

308、topic: 如图,点P是 $\angle AOB$ 外的一点,点M、N分别是 $\angle AOB$ 两边上的点,点P关于OA的对称点Q恰好落在线段MN上,点P关于OB的对称点R落在MN的延长线上.若 $PM=2.5\text{cm}$, $PN=3\text{cm}$, $MN=4\text{cm}$,则线段QR的长为.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030910_Q_1.jpg", "coordinates": {"A": "-2.83,9.74", "B": "-2.14,5.00", "M": "-3.70,8.78", "N": "-5.00,5.00", "O": "-6.98,5.00", "P": "-6.01,7.83", "Q": "-4.52,6.42", "R": "-5.98,2.16"}, "collineations": {"0": "P##R", "1": "P##N", "2": "P##Q", "3": "P##M", "4": "O##N##B", "5": "R##N##Q##M", "6": "O##M##A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

ms":[]}

NLP: EqualityRelation{QR=v_0}, PointOnLineRelation{point=M, line=AO, isConstant=false, extension=false}, PointOnLineRelation{point=N, line=OB, isConstant=false, extension=false}, SymmetricRelation{preData=P, afterData=Q, symmetric=StraightLine[AO] analytic :y=k_OA*x+b_OA slope:null b:null isLinearFunction:false, pivot=}, PointOnLineRelation{point=Q, line=OA, isConstant=false, extension=false}, SymmetricRelation{preData=P, afterData=R, symmetric=StraightLine[BO] analytic :y=k_OB*x+b_OB slope:null b:null isLinearFunction:false, pivot=}, PointOnLineRelation{point=R, line=OB, isConstant=false, extension=false}, EqualityRelation{MP=2.5}, EqualityRelation{NP=3}, EqualityRelation{MN=4}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]QR)}

309、topic: 如图1,在 $\triangle ABC$ 中, $\angle A=45^\circ$,延长CB至点D,使得 $BD=BC$.#%#(1)若 $\angle ACB=90^\circ$,求证: $BD=AC$;#%#(2)如图2,分别过点D和点C作AB所在直线的垂线,垂足分别为点E、F,求证: $DE=AF$;#%#(3)如图3,若将(1)中“ $\angle ACB=90^\circ$ ”改为“ $\angle ACB=m^\circ$,并在AB延长线上取点G,使得 $\angle 1=\angle A$.试探究线段AC、DG的数量与位置关系.#%#

Jyeoo.com

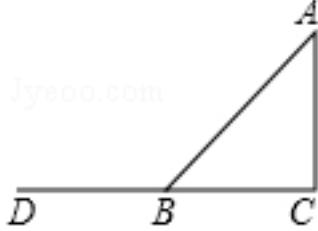


图1

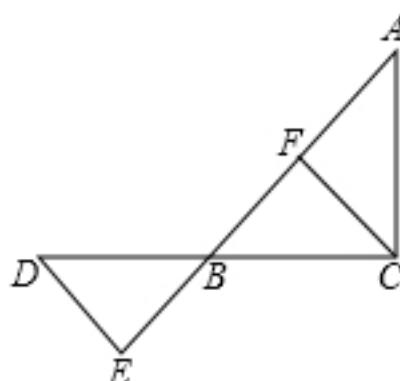


图2

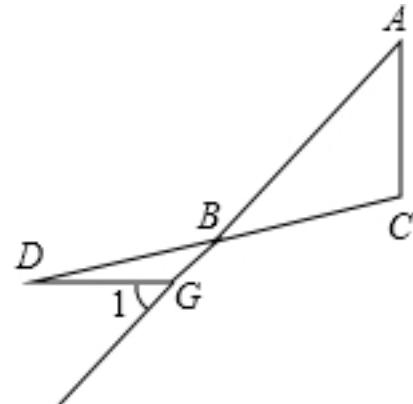


图3

graph:

{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000031165_Q_1.jpg","coordinates":{"A": "-8.00,5.00","B": "-10.00,3.00","C": "-8.00,3.00","D": "-12.00,3.00"}, "collineations": {"0": "C##A", "1": "A##B", "2": "C##B##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [{"picturename": "1000031165_Q_2.jpg", "coordinates": {"E": "-11.05,1.95", "F": "-9.00,4.00"}, "collineations": {"0": "A####F####B###E", "1": "D###E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000031165_Q_3.jpg", "coordinates": {"A": "-9.00,-2.00", "B": "-11.56,-4.56", "C": "-9.00,-4.00", "D": "-14.11,-5.11", "G": "-12.11,-5.11", "I": "-13.00,-6.00"}, "collineations": {"0": "A###B###G##I", "1": "D###B###C", "2": "D###G", "3": "A###C"}, "variable>equals": {"0": "\angle 1=\angle DGI"}}, {"circles": []}], "appliedproblems": {}}]}}

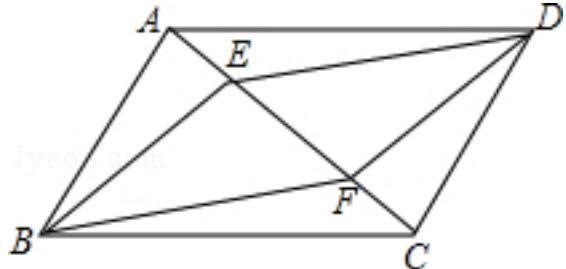
NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle A=(1/4\pi)$ }, PointOnLineRelation{point=D, line=CB, isConstant=false, extension=true}, EqualityRelation{BD=BC}, EqualityRelation{ $\angle ACB=(1/2\pi)$ }, (ExpressRelation:[key:]2), LinePerpRelation{line1=AB, line2=DE, crossPoint=E}, LinePerpRelation{line1=AB, line2=CF, crossPoint=F}, PointOnLineRelation{point=D, line=DE, isConstant=false, extension=false}, PointOnLineRelation{point=C, line=CF, isConstant=false, extension=false}, (ExpressRelation:[key:]3), PointOnLineRelation{point=G, line=AB, isConstant=false, extension=false}, EqualityRelation{ $\angle 1=\angle A$ }, 求值(大小): (ExpressRelation:[key:](AC/DG)), ProveConclusionRelation:[证明]:

EqualityRelation{BD=AC}],ProveConclusionRelation:[证明：

EqualityRelation{DE=AF}],SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:](AC/DG))), JudgePostionConclusionRelation: [data1=AC, data2=DG]

310、topic: 已知:如图,在平行四边形ABCD中,点E、F在AC上,且 $AE=CF$.求证:四边形BEDF是平行四边形.

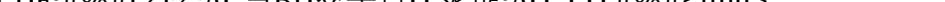


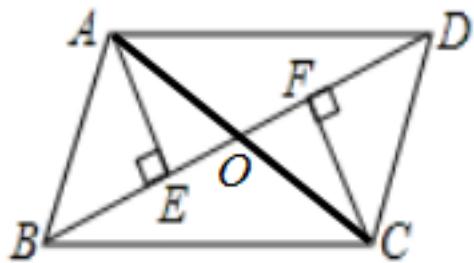
graph:

```
{"stem":{"pictures":[{"picturename":"1000031889_Q_1.jpg","coordinates":{"A":-7.00,5.00,"B":-9.00,2.00,"C":-4.00,2.00,"D":-2.00,5.00,"E":-6.25,4.25,"F":-4.75,2.75}),"collineations":{"0": "A##D","1": "A##B","2": "A##C","3": "B##C","4": "C##D","5": "B##E","6": "B##F","7": "E##D","8": "F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, EqualityRelation{AE=CF}, ProveConclusionRelation:[证明:

ParallelogramRelation{parallelogram=Parallelogram:BEDF}]

311、topic: 如图,在四边形ABCD中,AB=CD,BF=DE,AE \perp BD,CF \perp BD,垂足分别为E,F.(1)求证: $\triangle ABE \cong \triangle CDF$;(2)若AC与BD交于点O,求证: $AO=CO$.



graph:

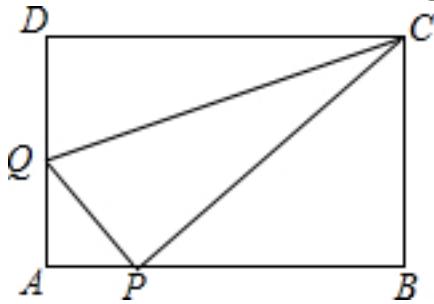
```
{"stem":{"pictures":[{"picturename":"1000034181_Q_1.jpg","coordinates":{"A":-14.00,6.00,"B":-16.00,3.00,"C":-12.00,3.00,"D":-10.00,6.00,"E":-13.20,4.40,"F":-12.80,4.60}],"collineations":{"0":"B####E###F##D","1":"A###E","2":"E###C","3":"A###F","4":"F###C","5":"A###B","6":"A###D","7":"C##D","8":"B##C"},"variable>equals":{},"circles":[]}},"appliedproblems":{},"substems":[{"subste mid":"1","questionrelies":"","pictures":[{"picturename":"1000034181_Q_1.jpg","coordinates":{"O":-13.00,4.50}],"collineations":{"0":"A###O###C"},"variable>equals":{},"circles":[]}]}, "appliedproblems":{} }]
```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{AB=CD}, EqualityRelation{BF=DE}, LinePerpRelation{line1=AE, line2=BD, crossPoint=E}, LinePerpRelation{line1=CF, line2=BD, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD], ProveConclusionRelation:[**证明：** TriangleCongRelation{triangleA= \triangle ABE},

triangleB=△CDF}],ProveConclusionRelation:[证明： EqualityRelation{AO=CO}]

312、topic: 如图,在矩形ABCD中,AB=5,AD=3,点P是AB边上一点(不与A,B重合),连接CP,过点P作PQ⊥CP交AD边于点Q,连接CQ. #%(1)当△CDQ≌△CPQ时,求AQ的长;#%(2)取CQ的中点M,连接MD,MP,若MD⊥MP,求AQ的长.#%#



graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000061895_Q_1.jpg","coordinates":{"A":"4.00,3.00","B":"9.00,3.00","C":"9.00,6.00","D":"4.00,6.00","P":"5.00,3.00","Q":"4.00,4.33"}, "collineations": {"0": "A###P##B", "1": "B##C", "2": "C##D", "3": "D##Q##A", "4": "C##Q", "5": "C##P", "6": "Q##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000061895_Q_1.jpg", "coordinates": {"A": "12.00,3.00", "B": "17.00,3.00", "C": "17.00,6.00", "D": "12.00,6.00", "M": "14.50,5.50", "P": "14.00,3.00", "Q": "12.00,5.00"}, "collineations": {"0": "A##P##B", "1": "B##C", "2": "C##D", "3": "D##Q##A", "4": "C##M##Q", "5": "C##P", "6": "D##M", "7": "Q##P", "8": "P##M"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}
```

NLP:

PointRelation:A,PointRelation:B,RectangleRelation{rectangle=Rectangle:ABCD},EqualityRelation{AB=5},EqualityRelation{AD=3},PointOnLineRelation{point=P, line=AB, isConstant=false, extension=false},SegmentRelation:CP,LineCrossRelation [crossPoint=Optional.of(Q), iLine1=PQ, iLine2=AD],LinePerpRelation{line1=PQ, line2=CP, crossPoint=P},SegmentRelation:CQ,EqualityRelation{AQ=v_0},TriangleCongRelation{triangleA=△CDQ, triangleB=△CPQ},求值(大小):

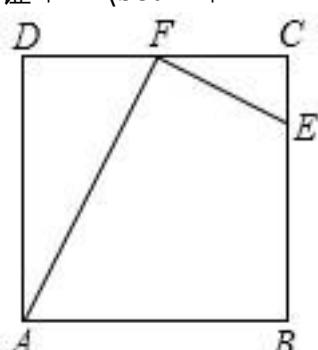
(ExpressRelation:[key]:v_0),MiddlePointOfSegmentRelation{middlePoint=M,segment=CQ},EqualityRelation{AQ=v_1},PointRelation:M,SegmentRelation:MD,SegmentRelation:MP,LinePerpRelation{line1=MD, line2=MP, crossPoint=M},求值(大小):

(ExpressRelation:[key]:v_1),SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key]:AQ)},SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key]:AQ)}

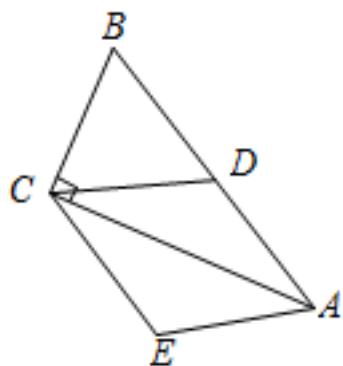
313、topic: 如图,在正方形ABCD中,点F为DC的中点,E为BC边上一点,且\$EC = \frac{1}{4}BC\$,求证:\$AF \bot EF\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000007025_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "4.00,4.00", "D": "0.00,4.00", "E": "4.00,3.00", "F": "2.00,4.00"}, "collineations": {"0": "A###F", "1": "D##C##F", "2": "C##E##B", "3": "A##B", "4": "E##F"}, "variable-equals": {}, "circles": []}], "applied_problems": {}, "substems": []}}

NLP:
 SquareRelation{square=Square:ABCD},MiddlePointOfSegmentRelation{middlePoint=F,segment=DC},
 PointOnLineRelation{point=E, line=BC, isConstant=false,
 extension=false},EqualityRelation{CE=(1/4)*BC},ProveConclusionRelation:[证明:
 LinePerpRelation{line1=AF, line2=EF, crossPoint=F}]

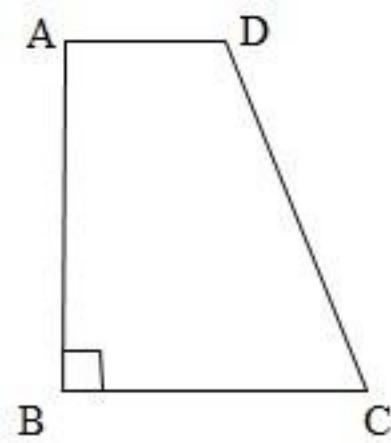
314、topic: 如图,在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$,D为AB的中点,且 $AE \parallel CD, CE \parallel AB$.#%#(1)证明:四边形ADCE是菱形;#%#(2)若 $\angle B=60^\circ, BC=6$,求菱形ADCE的高.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000061883_Q_1.jpg", "coordinates": {"A": "10.65,2.67", "B": "7.34,7.68", "C": "6.00,5.00", "D": "9.00,5.18", "E": "7.65,2.50"}, "collineations": {"0": "A###D##B", "1": "B##C", "2": "C##E", "3": "E##A", "4": "C##D", "5": "C##A"}, "variable-equals": {}, "circles": []}], "applied_problems": {}, "substems": []}}

NLP:
 RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)],EqualityRelation{ $\angle ACB=(1/2*\pi)$ },Middle
 PointOfSegmentRelation{middlePoint=D,segment=AB},LineParallelRelation [iLine1=AE,
 iLine2=CD],LineParallelRelation [iLine1=CE,
 iLine2=AB],EqualityRelation{ $\angle CBD=(1/3*\pi)$ },EqualityRelation{BC=6},求值(大小):
 (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明:
 RhombusRelation{rhombus=Rhombus:ADCE}],SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]v_0)}

315、topic: 如图,在直角梯形ABCD中,\$AD \parallel BC\$,\$AB \perp BC\$,\$AD=1\$,\$BC=3\$,\$CD=4\$.求证:以CD为直径的圆与AB相切.

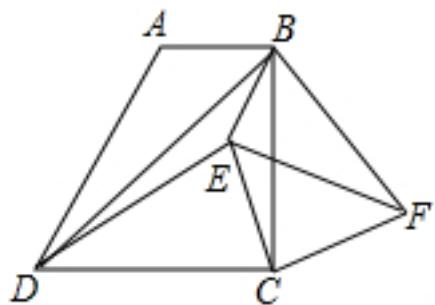


graph:

```
{"stem":{"pictures":[{"picturename":"1000008246_Q_1.jpg","coordinates":{"A":"0.00,3.46","B":"0.00,0.00","C":"3.00,0.00","D":"1.00,3.46"},"collineations":{"0":"D##C","1":"D##A","2":"A##B","3":"B##C"},"variable-equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}}
```

NLP: DiameterRelation{diameter=CD, circle=Circle[$\odot O_0$]{center=O_0, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$, length=null}, RightTrapezoidRelation{rightTrapezoid=RightTrapezoid:ABCD randomOrder:true}, LineParallelRelation [iLine1=AD, iLine2=BC], LinePerpRelation{line1=AB, line2=BC, crossPoint=B}, EqualityRelation{AD=1}, EqualityRelation{BC=3}, EqualityRelation{CD=4}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=AB, circle=Circle[$\odot O_0$]{center=O_0, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }, contactPoint=Optional.absent(), outpoint=Optional.absent()}]

316、topic: 如图,在四边形ABCD中, $AB \parallel CD$, $\angle ECF = \angle BCD = 90^\circ$, $CE = CF = 5$, $BC = 7$, BD 平分 $\angle ABC$.#%#E是 $\triangle BCD$ 内一点,F是四边形ABCD外一点(E可以在 $\triangle BCD$ 的边上).#%#(1)求证: $DC = BC$.#%#(2)若 $\angle BEC = 135^\circ$,设 $BE = a$, $DE = b$,求a与b满足的关系式.#%#(3)当E落在线段BD上时,求DE的长.#%#



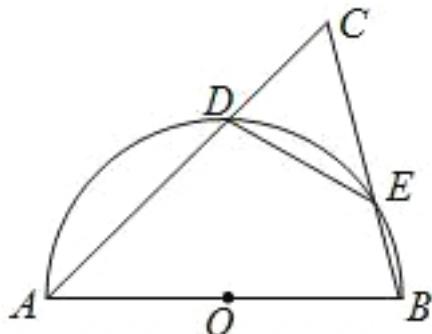
graph:

```
{"stem":{"pictures":[{"picturename":"1000042327.jpg","coordinates":{"A":"3.00,7.00","B":"7.00,7.00","C":"7.00,0.00","D":"0.00,0.00","E":"4.00,4.00","F":"11.00,3.00"},"collineations":{"0":"A##B","1":"D##C","2":"C##B","3":"A##D","4":"B##D","5":"B##E","6":"C##E","7":"D##E","8":"B##F","9":"F##E","10":"C##F"},"variable-equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}}
```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, LineParallelRelation [iLine1=AB, iLine2=CD], MultiEqualityRelation [multiExpressCompare= $\angle ECF = \angle BCD = (1/2\pi)$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare= $CE = CF = 5$, originExpressRelationList=[], keyWord=null,

result=null], EqualityRelation{BC=7}, AngleBisectorRelation{line=BD, angle= $\angle ABC$, angle1= $\angle ABD$, angle2= $\angle CBD$ }, PositionOfPoint2RegionRelation{point=E, region=EnclosedRegionRelation{name=BCD, closedShape= $\triangle BCD$ }, position=border}, TriangleRelation: $\triangle BCD$, PositionOfPoint2RegionRelation{point=E, region=EnclosedRegionRelation{name=BCD, closedShape= $\triangle BCD$ }, position=inner}, PositionOfPoint2RegionRelation{point=F, region=EnclosedRegionRelation{name=ABCD, closedShape=ABCD}, position=outer}, EqualityRelation{ $\angle BEC = (3/4 * \pi)$ }, EqualityRelation{BE=a}, EqualityRelation{DE=b}, 表达式之间的关系: DualExpressRelation{expresses=[Express:[a], Express:[b]]}, EqualityRelation{CD=BC}], SolutionConclusionRelation{relation=表达式之间的关系: DualExpressRelation{expresses=[Express:[a], Express:[b]]}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:DE)}]

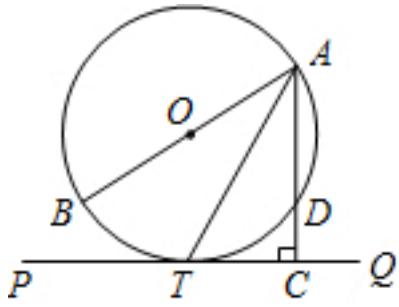
317、topic: 如图,在 $\triangle ABC$ 中, $\angle C=60^\circ$,以AB为直径的半圆O分别交AC、BC于点D、E,已知 $\odot O$ 的半径为 $\sqrt{3}$.(1)求证: $\triangle CDE \sim \triangle CBA$;(2)求DE的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000080953_Q_1.jpg", "coordinates": {"A": "-4.13, -0.43", "B": "2.78, 0.06", "C": "1.48, 5.08", "D": "-0.37, 3.26", "E": "2.46, 1.27", "O": "-0.68, -0.19"}, "collinearities": {"0": "A##O##B", "1": "A###D##C", "2": "C##E##B", "3": "D##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##E##D"}]}, "appliedproblems": {}, "subsystems": []}]

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null}, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle DCE = (1/3 * \pi)$ }, LineCrossCircleRelation{line=AC, circle= $\odot O$, crossPoints=[D], crossPointNum=1}, LineCrossCircleRelation{line=BC, circle= $\odot O$, crossPoints=[E], crossPointNum=1}, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=Express:[$2 * (3^{(1/2)})$]], EqualityRelation{DE=v_0}, 求值(大小): (ExpressRelation:[key]:v_0), ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle CDE$, triangleB= $\triangle CBA$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:DE)}]

318、topic: 如图,AB为 $\odot O$ 的直径,PQ切 $\odot O$ 于点T,AC \perp PQ于点C,交 $\odot O$ 于点D.(1)求证:AT平分 $\angle BAC$;(2)若AD=2,\$TC=\sqrt{3}\$,求 $\odot O$ 的半径.

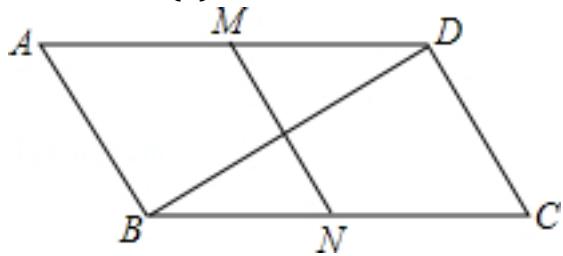


graph:

```
{"stem": {"pictures": [{"picturename": "1000060755_Q_1.jpg", "coordinates": {"A": "1.74,3.01", "B": "-1.74,1.00", "C": "1.75,0.00", "D": "1.75,1.01", "T": "0.00,0.00", "O": "0.00,2.01", "P": "-3.00,0.00", "Q": "3.00,0.00"}, "collinearities": {"0": "A###O##B", "1": "A##D##C", "2": "P##T##C##Q", "3": "A##T"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##D##T##B"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LineContactCircleRelation{line=PQ, circle=Circle[\odot O]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(T), outpoint=Optional.absent()}, LinePerpRelation{line1=AC, line2=PQ, crossPoint=C}, LineCrossCircleRelation{line=AC, circle= \odot O, crossPoints=[D]}, crossPointNum=1}, EqualityRelation{AD=2}, EqualityRelation{CT= $(3^{(1/2)})$ }, 圆的半径: CircleRelation{circle=Circle[\odot O]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, ProveConclusionRelation:[证明: AngleBisectorRelation{line=AT, angle= $\angle DAO$, angle1= $\angle DAT$, angle2= $\angle OAT$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AO)}

319、topic: 如图,在平行四边形ABCD中,\$\angle C = 60^\circ\$,M、N分别是AD、BC的中点,\$BC = 2CD\$.?#%#(1)求证:四边形MNCD是平行四边形;?#%#(2)求证: \$BD = \sqrt{3} MN\$.



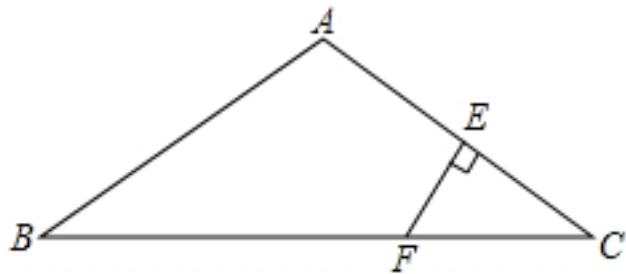
graph:

```
{"stem": {"pictures": [{"picturename": "1000010825_Q_1.jpg", "coordinates": {"A": "-1.50,4.33", "B": "1.00,0.00", "C": "11.00,0.00", "D": "8.50,4.33", "M": "3.50,4.33", "N": "6.00,0.00"}, "collinearities": {"0": "A##B", "1": "D##B", "2": "N##M", "3": "B##N##C", "4": "D##M##A", "5": "C##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{ $\angle DCN = (1/3\pi)$ }, MiddlePointOfSegmentRelation{middlePoint=M, segment=AD}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BC}, EqualityRelation{BC=2*CD}, ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:CDMN}], ProveConclusionRelation:[证明: EqualityRelation{BD= $(3^{(1/2)}) * MN$ }]

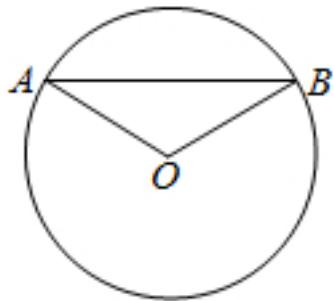
320、topic: 如图,已知在 $\triangle ABC$ 中, $AB=AC$, $\angle BAC=120^\circ$, AC 的垂直平分线 EF 交 AC 于点 E ,交 BC 于点 F ,求证: $BF=2CF$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000028103_Q_1.jpg", "coordinates": {"A": "4.00,2.31", "B": "0.00,0.00", "C": "8.00,0.00", "E": "6.00,1.16", "F": "5.32,0.00"}, "collineations": {"0": "A##B", "1": "A##E##C", "2": "B##F##C", "3": "E##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: MiddlePerpendicularRelation [iLine1=EF, iLine2=AC, crossPoint=Optional.of(E)], TriangleRelation:△ABC, EqualityRelation{AB=AC}, EqualityRelation{∠BAE=(2/3*Pi)}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{BF=2*CF}]

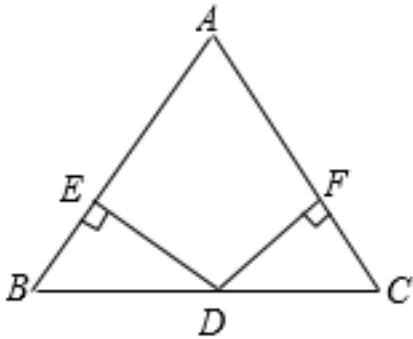
321、topic: 如图,已知 AB 是 $\odot O$ 的弦,半径 $OA=20cm$, $\angle AOB=120^\circ$,求 $\triangle AOB$ 的面积.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000083396_Q_1.jpg", "coordinates": {"A": "-1.73,1.00", "B": "1.73,1.00", "O": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "A##O", "2": "B##O"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B"}]}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{S_△ABO=v_0}, ChordOfCircleRelation{chord=AB, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, chordLength=null, straightLine=null}, RadiusRelation{radius=OA, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=Express:[20]}, EqualityRelation{∠AOB=(2/3*Pi)}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_△ABO)}

322、topic: 如图:已知在 $\triangle ABC$ 中, $\angle B=\angle C$, D 为 BC 边的中点,过点 D 作 $DE \bot AB$, $DF \bot AC$ 垂足分别为 E,F .#%#(1)求证: $\triangle BED \cong \triangle CFD$;#%#(2)点 D 在 $\angle A$ 的平分线上吗? 若在请说明理由.#%#



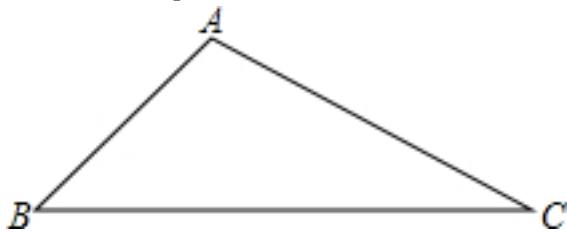
graph:

```
{"stem": {"pictures": [{"picturename": "1000040794_Q_1.jpg", "coordinates": {"A": "-2.27,3.39", "B": "-5.27, -1.01", "C": "0.73,-1.01", "D": "-2.27,-1.01", "E": "-4.31,0.39", "F": "-0.22,0.39"}, "collineations": {"0": "A##E", "1": "F##C##A", "2": "E##D", "3": "B##D##C", "4": "F##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

EqualityRelation{ $\angle DBE = \angle DCF$ }, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=AC, crossPoint=F}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BED$, triangleB= $\triangle CFD$ }], ProveConclusionRelation:[AngleBisectorRelation{line=DA, angle= $\angle EAF$, angle1= $\angle DAE$, angle2= $\angle DAF$ }]

323、topic: 如图,在 $\triangle ABC$ 中, $\angle B=45^\circ$, $\angle C=30^\circ$, $AB=\sqrt{2}$,求AC的长.#%#



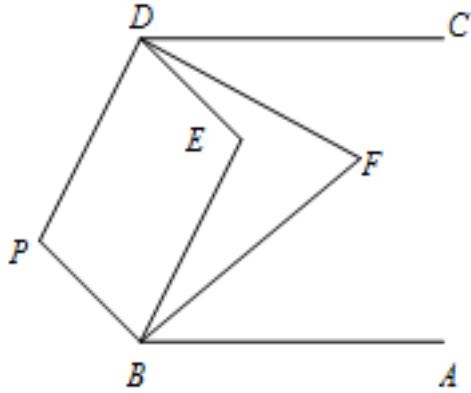
graph:

```
{"stem": {"pictures": [{"picturename": "1000063685_Q_1.jpg", "coordinates": {"A": "0.00,1.00", "B": "-1.00, 0.00", "C": "1.73,0.00"}, "collineations": {"0": "B##A", "1": "C##A", "2": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []]}
```

NLP:

EqualityRelation{AC=v_0}, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABC=(1/4*\pi)$ }, EqualityRelation{ $\angle ACB=(1/6*\pi)$ }, EqualityRelation{ $AB=(2^{(1/2)})$ }, 求值(大小):
(ExpressRelation:[key:]v_0[v_0=v_0]), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AC)}

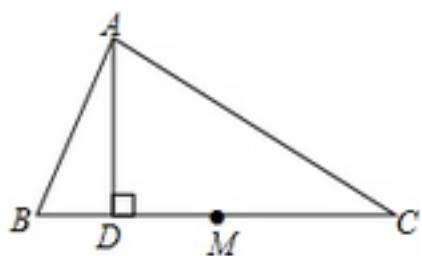
324、topic: 如图,已知 $AB \parallel CD$, $\angle ABP$ 和 $\angle CDP$ 的平分线相交于点E, $\angle ABE$ 和 $\angle CDE$ 的平分线相交于点F.
(1)若 $\angle CDF=21^\circ$, $\angle ABF=33^\circ$,求 $\angle DPB$ 的度数;
(2)若 $\angle BFD=54^\circ$,求 $\angle BPD$ 和 $\angle BED$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000037547_Q_1.jpg", "coordinates": {"A": "-4.00,2.00", "B": "-9.00,2.00", "C": "-4.00,6.00", "D": "-11.11,6.00", "E": "-8.33,3.50", "F": "-5.91,4.00", "P": "-10.91,4.12"}, "collineations": {"0": "C##D", "1": "D##P", "2": "P##B", "3": "B##A", "4": "E##D", "5": "B##E", "6": "F##D", "7": "B##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: AngleBisectorRelation{line=BE,angle= $\angle ABP$, angle1= $\angle ABE$, angle2= $\angle EBP$ },AngleBisectorRelation{line=DE,angle= $\angle CDP$, angle1= $\angle CDE$, angle2= $\angle EDP$ },AngleBisectorRelation{line=BF,angle= $\angle ABE$, angle1= $\angle ABF$, angle2= $\angle EBF$ },AngleBisectorRelation{line=DF,angle= $\angle CDE$, angle1= $\angle CDF$, angle2= $\angle EDF$ },LineParallelRelation [iLine1=AB, iLine2=CD],EqualityRelation{ $\angle CDF = (7/60\pi)$ },EqualityRelation{ $\angle ABF = (11/60\pi)$ },求角的大小: AngleRelation{angle= $\angle BPD$ },EqualityRelation{ $\angle BFD = (3/10\pi)$ },求角的大小: AngleRelation{angle= $\angle BPD$ },求角的大小: AngleRelation{angle= $\angle BED$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BPD$)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BPD$)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BED$)}

325、topic: 如图,在三角形ABC中, $\angle B = 2\angle C$,AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$.#%#

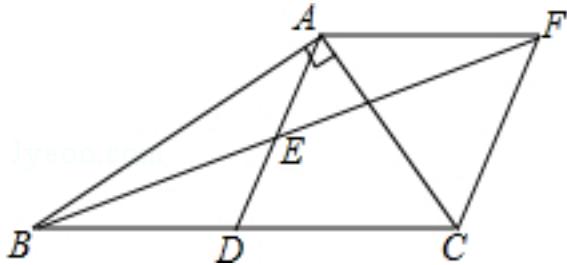


graph:
 {"stem": {"pictures": [{"picturename": "1000040694_Q_1.jpg", "coordinates": {"A": "-9.03,4.35", "B": "-11.0,2.00", "C": "-4.00,2.00", "D": "-9.03,2.00", "M": "-7.50,2.00"}, "collineations": {"0": "A##D", "1": "A##B", "2": "A##C", "3": "B##D##M##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
 TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle ABD = 2 * \angle ACM$ },MiddlePointOfSegmentRelation{middlePoint=M,segment=BC},LinePerpRelation{line1=AD, line2=BD},

crossPoint=D},ProveConclusionRelation:[证明: EqualityRelation{DM=(1/2)*AB}]

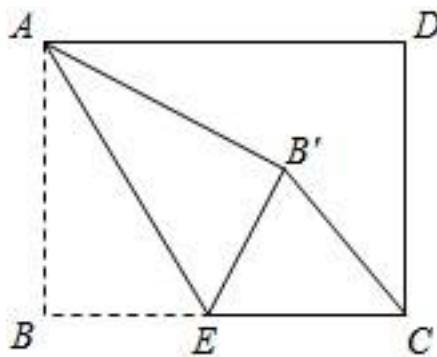
326、topic: 在Rt $\triangle ABC$ 中,\$\angle BAC=90^\circ\$,D是BC的中点,E是AD的中点,过点A作AF\$\parallel BC\$交BE的延长线于点F.#%#(1)求证:\$\triangle AEF \cong \triangle DEB\$;(2)证明四边形ADCF是菱形;(3)若AC=4,AB=5,则菱形ADCF的面积.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041054_Q_1.jpg", "coordinates": {"A": "-6.00,3.73", "B": "-9.00, 2.00", "C": "-5.00,2.00", "D": "-7.00,2.00", "E": "-6.50,2.87", "F": "-4.00,3.73"}, "collineations": {"0": "A##B", "1": "B###D##C", "2": "C##F", "3": "F##A", "4": "A##E##D", "5": "B##E##F", "6": "A##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 RightTriangleRelation:RightTriangle:\$\triangle ABC\$[Optional.of(A)],EqualityRelation{\$\angle BAC=(1/2*\Pi)\$},MiddlePointOfSegmentRelation{middlePoint=D,segment=BC},MiddlePointOfSegmentRelation{middlePoint=E,segment=AD},PointOnLineRelation{point=A, line=AF, isConstant=false, extension=false},LineParallelRelation [iLine1=AF, iLine2=BC],LineCrossRelation [crossPoint=Optional.of(F), iLine1=AF, iLine2=BE],RhombusRelation{rhombus=Rhombus:ADCF},EqualityRelation{S_ADCF=v_0},EqualityRelation{AC=4},EqualityRelation{AB=5},(ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=\$\triangle AEF\$, triangleB=\$\triangle DEB\$}],ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:ADCF}]]

327、topic: 如图,在矩形ABCD中,\$AB=3\$,\$BC=4\$,点E是BC边上一点,连接AE,把\$\angle B\$沿AE折叠,使点B落在点B'处,当\$\triangle CEB'\$为直角三角形时,求BE的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000007014_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,3.00", "E": "1.50,0.00", "B'": "2.40,1.20"}, "collineations": {"0": "A##C##B'", "1": "D##C", "2": "C##D", "3": "A##D", "4": "B##C##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

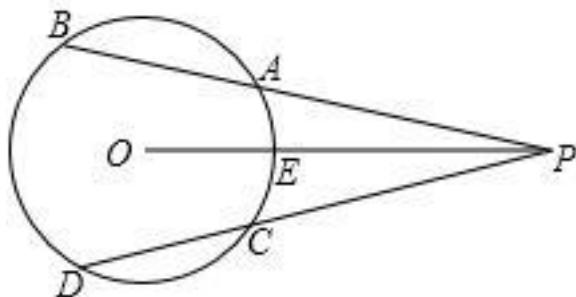
EqualityRelation{BE=v_0}, RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=3}, EqualityRelation{BC=4}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, SegmentRelation:AE, PointCoincidenceRelation{point1=B, point2=B'}, RightTriangleRelation:RightTriangle: $\triangle CEB$ [Optional.of(B')], 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BE)

328、topic: 如图,O是 $\triangle ABC$ 的内心,BO的延长线和 $\triangle ABC$ 的外接圆相交于点D,连接DC,DA,OA,OC,四边形OADC为平行四边形.?(1)求证: $\triangle BOC \cong \triangle CDA$?#%(2)若 $AB=2$,求 \widehat{AB} 的长度.

graph:
 {"stem": {"pictures": [{"picturename": "1000026756_Q_1.jpg", "coordinates": {"A": "-0.42,3.15", "B": "-3.52, -3.12", "C": "5.58,-3.52", "D": "4.75,1.77", "O": "0.14,-0.95"}, "collineations": {"0": "B###A", "1": "A###O", "2": "A###C", "3": "A###D", "4": "B###O##D", "5": "B###C", "6": "O##C", "7": "C##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C##D"}]}, "appliedproblems": {}, "substems": []}}

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O_0$]{center=O_0, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }}, CoreAndShapeRelation:O/ $\triangle ABC$ /InnerCentre, LineCrossCircleRelation{line=BO, circle= $\odot O_0$, crossPoints=[D]}, crossPointNum=1, MultiPointCollinearRelation:[D, C], MultiPointCollinearRelation:[D, A], MultiPointCollinearRelation:[O, A], MultiPointCollinearRelation:[O, C], ParallelogramRelation{parallelogram=Parallelogram:ADCO}, EqualityRelation{AB=2}, 求值(大小): (ExpressRelation:[key:] $\sim AB$), ProveConclusionRelation:[证明]: TriangleCongRelation{triangleA= $\triangle BOC$, triangleB= $\triangle CDA$ }, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\sim AB$)

329、topic: 如图所示,已知点P是 $\odot O$ 外的一点,PB与 $\odot O$ 相交于点A、B,PD与 $\odot O$ 相交于C、D, $AB=CD$.求证:(1)PO平分 $\angle BPD$;(2) $PA=PC$;(3) $\widehat{AE}=\widehat{CE}$

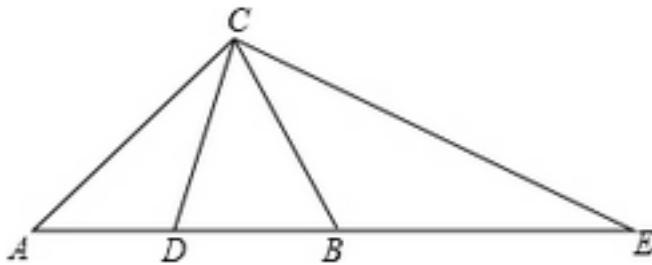


graph:
 {"stem": {"pictures": [{"picturename": "1000024892_Q_1.jpg", "coordinates": {"A": "-3.38,2.10", "B": "-5.48, 2.38", "C": "-3.36,1.00", "D": "-5.46,0.66", "O": "-4.52,1.53", "P": "0.32,1.61"}, "collineations": {"0": "B###A##P", "1": "D###C##P", "2": "O##P"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "P"}]}, "appliedproblems": {}, "substems": []}}

NLP: PointOutCircleRelation{point=Pcurve=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[P]}, LineCrossCircleRelation{line=PB, circle= $\odot O$, crossPoints=[A, B], crossPointNum=2}, LineCrossCircleRelation{line=PD, circle= $\odot O$, crossPoints=[C, D], crossPointNum=2}, EqualityRelation{AB=CD}, ProveConclusionRelation:[证明]: AngleBisectorRelation{line=PO, angle= $\angle APC$, angle1= $\angle APO$,

angle2= $\angle CPO$ },ProveConclusionRelation:[证明:
EqualityRelation{AP=CP}],ProveConclusionRelation:[证明: EqualityRelation{ $\sim AE = \sim CE$ }]

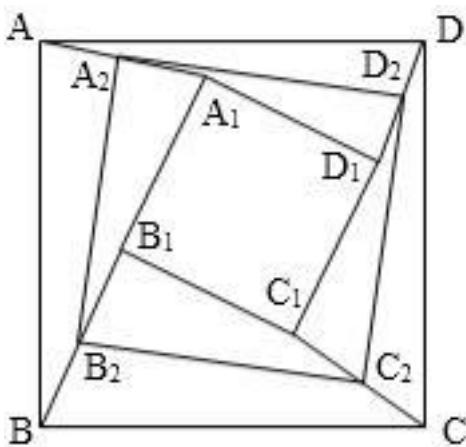
330、topic: CB,CD分别是钝角 $\triangle AEC$ 和锐角 $\triangle ABC$ 的中线,且AC=AB.求证:CE=2CD.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040366_Q_1.jpg", "coordinates": {"A": "-6.91,2.17", "B": "-2.91,2.17", "C": "-4.33,5.23", "D": "-4.19,2.17", "E": "1.09,2.17"}, "collineations": {"0": "A###C", "1": "C##D", "2": "C##B", "3": "E##C", "4": "A##D##E##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 ObtuseTriangleRelation:ObtuseTriangle: $\triangle AEC$ [Optional.absent()],AcuteTriangleRelation:AcuteTriangle: $\triangle ABC$,LineRoleRelation{Segment=CD,
 roleType=CENTRAL_LINE},EqualityRelation{AC=AB},MidianLineOfTriangleRelation{midianLine=CB,
 triangle= $\triangle CAE$, top=C, bottom=AE},ProveConclusionRelation:[证明: EqualityRelation{CE=2*CD}]

331、topic: 如图,已知四边形ABCD、 $\{A_1\}$ $\{B_1\}$ $\{C_1\}$ $\{D_1\}$ 都是正方形, $\{A_2\}$ 、 $\{B_2\}$ 、 $\{C_2\}$ 、 $\{D_2\}$ 分别是 $\{A\}$ $\{A_1\}$ 、 $\{B\}$ $\{B_1\}$ 、 $\{C\}$ $\{C_1\}$ 、 $\{D\}$ $\{D_1\}$ 的中点.#%#求证:四边形 $\{A_2\}$ $\{B_2\}$ $\{C_2\}$ $\{D_2\}$ 是正方形.



graph:
 {"stem": {"pictures": [{"picturename": "1000010819_Q_1.jpg", "coordinates": {"A": "1.00,7.00", "B": "1.00,0.00", "C": "8.00,0.00", "D": "8.00,7.00", "A1": "4.00,6.00", "B1": "3.00,3.00", "C1": "6.00,2.00", "D1": "7.00,5.00", "A2": "2.50,6.50", "B2": "2.00,1.50", "C2": "7.00,1.00", "D2": "7.50,6.00"}, "collineations": {"0": "B[2]##A[2]", "1": "C[2]##B[2]", "2": "D[2]##A[2]", "3": "C[2]##D[2]", "4": "B[1]##A[1]", "5": "C[1]##B[1]", "6": "D[1]##A[1]", "7": "C[1]##D[1]", "8": "B##A", "9": "C##B", "10": "D##A", "11": "C##D", "12": "A##A[1]##A[2]", "13": "B##B[1]##B[2]", "14": "C##C[1]##C[2]", "15": "D##D[1]##D[2]"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

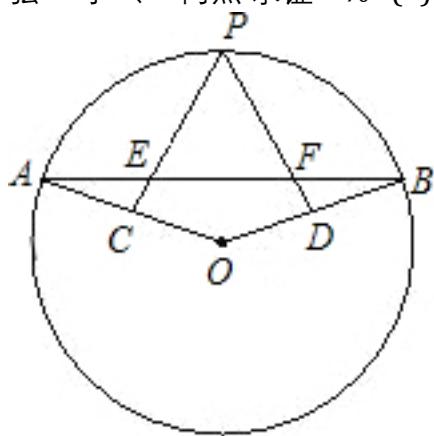
SquareRelation{square=Square:ABCD},SquareRelation{square=Square:A_1B_1C_1D_1},PointRelation:
A_2,PointRelation:B_2,SegmentRelation:CC_1,ProveConclusionRelation:[证明:
SquareRelation{square=Square:A_2B_2C_2D_2}]

332、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$,以AB为直径作圆O,分别交BC于点D,交CA的延长线于点E,过点D作 $DH \perp AC$ 于点H,连接DE交线段OA于点F. #(1)求证:DH是圆O的切线; #(2)若A为EH的中点,求 $\frac{EF}{FD}$ 的值.

graph:

NLP: TriangleRelation:△ABC,EqualityRelation{AB=AC},DiameterRelation{diameter=AB, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null},LineCrossCircleRelation{line=BC, circle=○O, crossPoints=[D], crossPointNum=1},LineCrossCircleRelation{line=CA, circle=○O, crossPoints=[E], crossPointNum=1},LinePerpRelation{line1=DH, line2=AC, crossPoint=H},LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=OA],MiddlePointOfSegmentRelation{middlePoint=A,segment=EH},求值(大小): (ExpressRelation:[key:]((EF)/(DF))),ProveConclusionRelation:[证明: LineContactCircleRelation{line=DH, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.absent(), outpoint=Optional.absent()}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]((EF)/(DF)))}

333、topic: 如图, $\widehat{PA}=\widehat{PB}$,C、D分别是半径OA、OB的中点,连接PC、PD交弦AB于E、F两点.求证:#%(1)PC=PD;#%(2)PE=PF.



graph:

{"stem": {"pictures": [{"picturename": "1000080914_Q_1.jpg", "coordinates": {"A": "-10.79,0.87", "B": "-1.83,1.13", "C": "-8.52,-0.29", "D": "-4.04,-0.16", "O": "-6.24,-1.46", "E": "-7.85,0.96", "F": "-4.78,1.04", "P": "-6.39,3.65"}, "collinearities": {"0": "O##C##A", "1": "O##D##B", "2": "A##E##F##B", "3": "C##E##P", "4": "D##F##P"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##P##B"}]}, "appliedproblems": {}, "substems": []}}

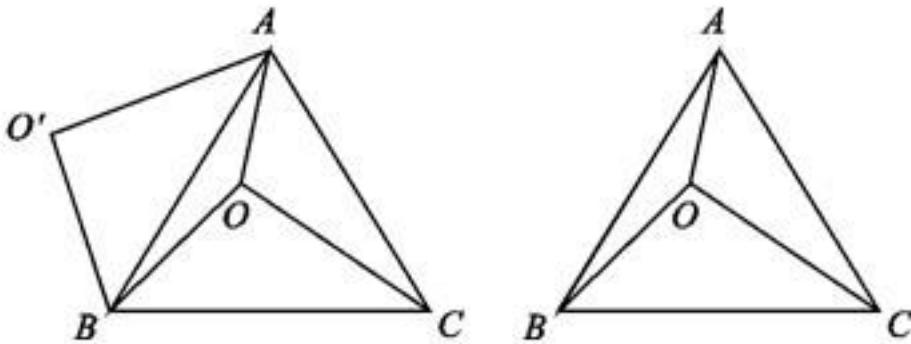
NLP:

MiddlePointOfSegmentRelation{middlePoint=C,segment=OA},MiddlePointOfSegmentRelation{middle Point=D,segment=OB},LineCrossRelation [crossPoint=Optional.of(E), iLine1=PC, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(F), iLine1=PD, iLine2=AB],ProveConclusionRelation:[证明: EqualityRelation{CP=DP}],ProveConclusionRelation:[证

明: EqualityRelation{EP=FP}]

334、topic: 如图,O是等边 $\triangle ABC$ 内一点, $OA=3$, $OB=4$, $OC=5$,将线段BO绕点B逆时针旋转 60° 得到线段 BO' .?

- (1)求点O与 O' 的距离;?
- (2)证明: $\angle AOB=150^\circ$?;
- (3)求四边形 $AOBO'$ 的面积?.
- (4)直接写出 $\triangle AOC$ 与 $\triangle AOB$ 的面积和为____.



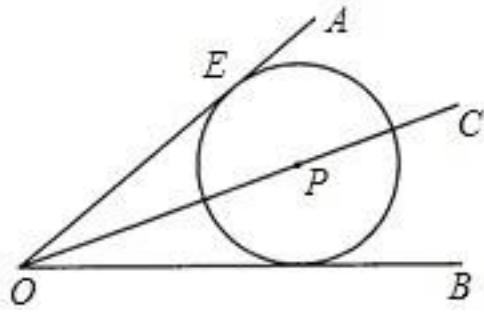
graph:

```
{"stem": {"pictures": [{"picturename": "1000027560_Q_1.jpg", "coordinates": {"A": "0.91,2.86", "B": "-2.65,-3.00", "C": "4.00,-3.00", "B'": "-3.92,0.79", "O": "0.00,0.00"}, "collinearations": {"0": "B##O", "1": "B##B'", "2": "A##B'", "3": "A##O", "4": "C##O", "5": "C##B", "6": "A##C", "7": "A##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "4", "questionrelies": "3", "pictures": [], "appliedproblems": {}}]}}
```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=AOBO'}, EqualityRelation{S_AOBO'=v_0}, RegularTriangleRelation :RegularTriangle: $\triangle ABC$, PositionOfPoint2RegionRelation{point=O, region=EnclosedRegionRelation{name=ABC, closedShape= $\triangle ABC$ }, position=inner}, EqualityRelation{AO=3}, EqualityRelation{BO=4}, EqualityRelation{CO=5}, RotateRelation{preData=BO, afterData=BO', rotatePoint=B, rotateDegree='(1/3*Pi)', rotateDirection=ANTICLOCKWISE}, 坐标PointRelation:O, EqualityRelation{O'=v_1}, 求值(大小): (ExpressRelation:[key]:v_1), 求值(大小): (ExpressRelation:[key]:v_0), SolutionConclusionRelation{relation=坐标 PointRelation:O}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:O')}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle AOB=(5/6*\pi)$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:S_AOBO')}}

335、topic: 如图,已知:OC平分 $\angle AOB$,P是OC上任意一点, $\odot P$ 与OA相切于点E.求证:OB与 $\odot P$ 相切.

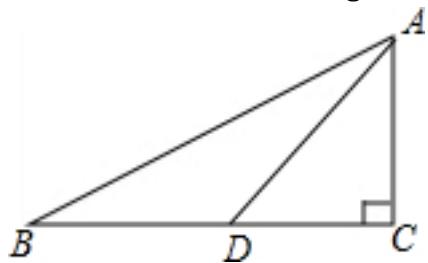


graph:

{"stem": {"pictures": [{"picturename": "1000008245_Q_1.jpg", "coordinates": {"A": "7.03,8.81", "B": "10.00,0.00", "C": "12.69,6.11", "P": "5.87,2.83", "E": "3.66,4.59", "O": "0.00,0.00"}, "collineations": {"0": "O###A###E", "1": "P###C##O", "2": "O###B"}, "variable-equals": {}, "circles": [{"center": "P", "pointincircle": "E"}]}, {"appliedproblems": {}, "substems": []}]}

NLP: AngleBisectorRelation{line=OC,angle= $\angle BOE$, angle1= $\angle BOC$, angle2= $\angle COE$ }, PointOnLineRelation{point=P, line=OC, isConstant=false, extension=false}, LineContactCircleRelation{line=OA, circle=Circle[$\odot P$]{center=P, analytic= $(x-x_P)^2+(y-y_P)^2=r_P^2$ }, contactPoint=Optional.of(E), outpoint=Optional.absent()}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=OB, circle=Circle[$\odot P$]{center=P, analytic= $(x-x_P)^2+(y-y_P)^2=r_P^2$ }, contactPoint=Optional.absent(), outpoint=Optional.absent()}]

336、topic: 如图,在Rt $\triangle ABC$ 中, $\angle C=90^\circ$, $\sin B=\frac{3}{5}$,点D在BC上,且 $\angle ADC=45^\circ$, $DC=6$,求 $\angle BAD$ 的正切值.#%#



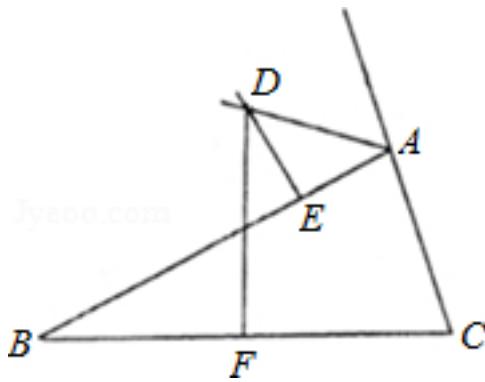
graph:

{"stem": {"pictures": [{"picturename": "1000080828.jpg", "coordinates": {"A": "4.00,3.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "1.00,0.00"}, "collineations": {"0": "B###D##C", "1": "A##B", "2": "A##D", "3": "A##C"}, "variable-equals": {}, "circles": []}, {"appliedproblems": {}, "substems": []}]}

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACD=(1/2*\pi)$ }, EqualityRelation{ $\sin(\angle ABD)=(3/5)$ }, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, EqualityRelation{ $\angle ADC=(1/4*\pi)$ }, EqualityRelation{CD=6}, 求角的正切值: CalculateTrigonometricOfAngleRelation{angle= $\angle BAD$, trigonometricType=TAN}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]tan($\angle BAD$))}

337、topic: 如图, $\triangle ABC$ 的边BC的中垂线DF交 $\triangle BAC$ 的外角平分线AD于点D,F为垂足,DE $\perp AB$ 于点E,且 $AB > AC$,求证: $BE-AC=AE$.#%#

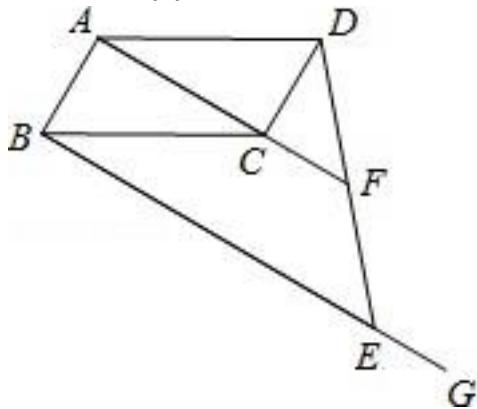


graph:

```
{"stem": {"pictures": [{"picturename": "1000031243_Q_1.jpg", "coordinates": {"A": "-5.00,5.00", "B": "-9.00, 2.00", "C": "-4.00,2.00", "D": "-6.50,5.49", "E": "-5.74,4.45", "F": "-6.50,2.00"}, "collineations": {"0": "D###F", "1": "A###E###B", "2": "A###C", "3": "B###F###C", "4": "D###E", "5": "D###A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: TriangleRelation:△BAC, TriangleRelation:△ABC, MiddlePerpendicularRelation [iLine1=DF, iLine2=BC, crossPoint=Optional.of(F)], LineCrossRelation [crossPoint=Optional.of(D), iLine1=DF, iLine2=AD], LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, InequalityRelation{AB>AC}, AngleBisectorRelation{line=AD, angle=∠CAE, angle1=∠DAE, angle2=∠CAD}, ProveConclusionRelation:[证明: EqualityRelation{BE-AC=AE}]

338、topic: 如图,在平行四边形ABCD中,过点B作\$BG\parallel AC\$,在BG上取点E,连接DE交AC的延长线于点F.?#%#(1)求证:\$DF=EF\$;?#%#(2)如果\$AD=2\$,\$\angle ADC=60^\circ\$,\$AC\perp DC\$于点C\$,AC=2CF\$,求BE的长.



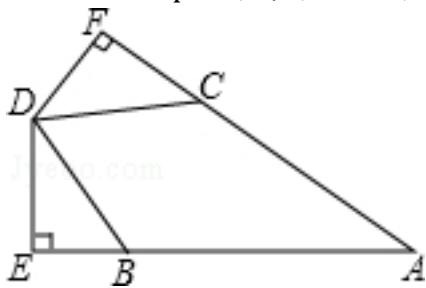
graph:

```
{"stem": {"pictures": [{"picturename": "1000026586_Q_1.jpg", "coordinates": {"A": "-6.50,0.86", "B": "-7.00, 0.00", "C": "-5.00,0.00", "D": "-4.50,0.86", "E": "-4.00,-1.72", "F": "-4.25,-0.43"}, "collineations": {"0": "A###B", "1": "A###D", "2": "B###C", "3": "D###C", "4": "A###C###F", "5": "B###E", "6": "D###E###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LineParallelRelation [iLine1=BG, iLine2=AC], PointOnLineRelation{point=B, line=BG, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BG, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=AC], EqualityRelation{BE=v_0}, EqualityRelation{AD=2}, EqualityRelation{∠ADC=(1/3*Pi)}, LinePerpRelation{line1=AC, line2=DC, crossPoint=C}, EqualityRelation{AC=2*CF}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{DF=EF}], SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key:]BE)}

339、topic: 如图,AB=AC,BD=CD,DE \perp AB于点E,DF \perp AC于点F,试说明:DE=DF.#%#

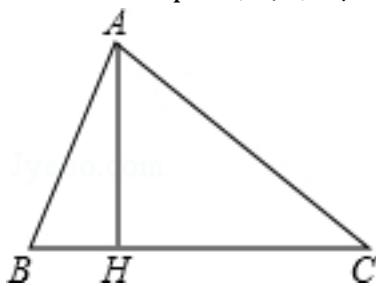


graph:

{"stem": {"pictures": [{"picturename": "1000029142_Q_1.jpg", "coordinates": {"A": "10.00,2.00", "B": "4.00,2.00", "C": "4.71,4.83", "D": "2.00,4.00", "E": "2.00,2.00", "F": "2.94,5.77"}, "collineations": {"0": "F###D", "1": "E##D", "2": "C##D", "3": "D##B", "4": "F##C##A", "5": "E##B##A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AB=AC}, EqualityRelation{BD=CD}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=AC, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{DE=DF}]

340、topic: 如图,已知 $\triangle ABC$ 中,AH $\perp BC$ 于H, $\angle C=35^\circ$,且 $AB+BH=HC$,求 $\angle B$ 的度数.#%#

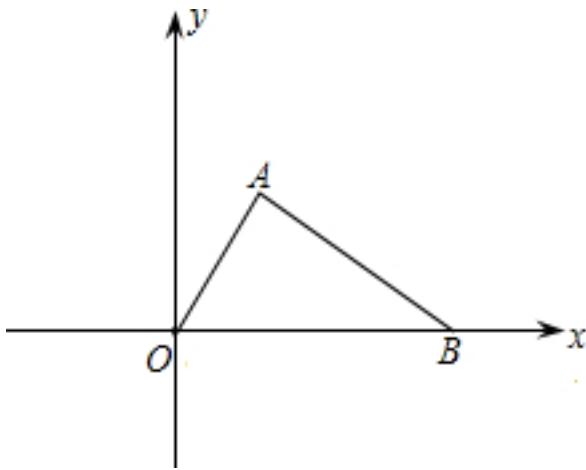


graph:

{"stem": {"pictures": [{"picturename": "8F3DB04F266D4E70BD140F338FFAF1CB.jpg", "coordinates": {"A": "-12.38,7.46", "B": "-14.00,3.00", "C": "-6.00,3.00", "H": "-12.38,3.00"}, "collineations": {"0": "A##B", "1": "C##A", "2": "A##H", "3": "B##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=AH, line2=BC, crossPoint=H}, EqualityRelation{ $\angle ACH=(7/36\pi)$ }, EqualityRelation{ $AB+BH=CH$ }, 求角的大小: AngleRelation{angle= $\angle ABH$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ABH$)}

341、topic: 在平面直角坐标系中,点A在第一象限,点B的坐标为(3,0), $OA=2$, $\angle AOB=60^\circ$.#%#(1)求点A的坐标及线段AB的长;#%#(2)若在x轴上有一点P,使得 $\triangle PAB$ 为等腰三角形,请你直接写出点P的坐标.#%#

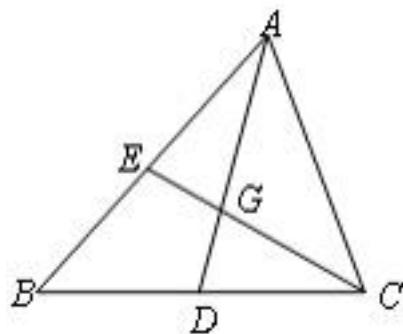


graph:

{"stem": {"pictures": [{"picturename": "1000081496_Q_1.jpg", "coordinates": {"A": "1.00,1.73", "B": "3.00,0.00", "O": "0.00,0.00"}, "collineations": {"0": "B##O", "1": "A##B", "2": "A##O"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: PointInDomRelation [point=A,
 local=FIRST_QUADRANT],PointRelation:B(3,0),EqualityRelation{AO=2},EqualityRelation{ $\angle AOB=(1/3 * \pi)$ },EqualityRelation{AB=v_0},坐标PointRelation:A,求值(大小):
 (ExpressRelation:[key:]v_0),PointOnLineRelation{point=P, line=StraightLine[X] analytic :y=0
 slope:0 b:0 isLinearFunction:false, isConstant=false,
 extension=false},IsoscelesTriangleRelation:IsoscelesTriangle: $\triangle PAB$ [Optional.absent()],坐标
 PointRelation:P,SolutionConclusionRelation{relation=坐标
 PointRelation:A},SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AB)},SolutionConclusionRelation{relation=坐标PointRelation:P}

342、topic: 如图,\$\vartriangle ABC\$中,\$D\$、\$E\$分别是边\$BC\$、\$AB\$的中点,\$AD\$、\$CE\$相交于\$G\$.#%#求证: \$\frac{GE}{GC}=\frac{GD}{GA}=\frac{1}{2}\$



graph:

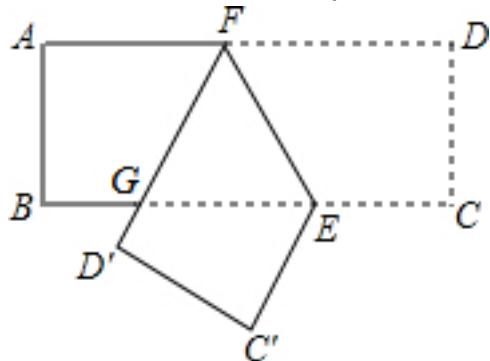
{"stem": {"pictures": [{"picturename": "1000010780_Q_1.jpg", "coordinates": {"A": "0.00,6.03", "B": "-5.00,0.00", "C": "2.00,0.00", "D": "-1.50,0.00", "E": "-2.50,3.02", "G": "-1.00,2.01"}, "collineations": {"0": "B##A##E", "1": "C##G##E", "2": "D##A##G", "3": "B##C##D", "4": "C##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=BC},MiddlePointOfSegmentRelation{middlePoint=E,segment=AB},LineCrossRelation [crossPoint=Optional.of(G),

iLine1=AD, iLine2=CE], ProveConclusionRelation:[证明： MultiEqualityRelation [multiExpressCompare=((EG)/(CG))=((DG)/(AG))=(1/2), originExpressRelationList=[], keyWord=null, result=null]]

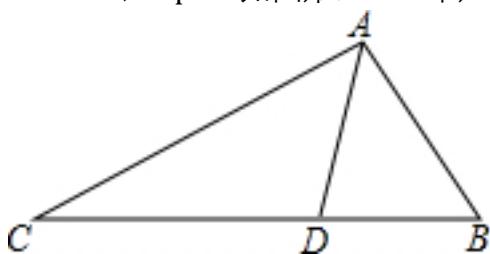
343、topic: 如图,已知在矩形ABCD中,点E在边BC上,BE=2CE,将矩形沿着过点E的直线翻折后,点C、D分别落在BC下方的点C'、D'处,且点C'、D'、B在同一条直线上,折痕与边AD交于点F,D'F与BE交于点G.设AB=t,求 $\triangle EFG$ 的周长(用含t的代数式表示).#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000061934_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "0.00,0.00", "C": "9.00,0.00", "D": "9.00,3.00", "E": "6.00,0.00", "F": "4.27,3.00", "G": "2.54,0.00", "C'": "4.50,-2.60", "D'": "1.90,-1.10"}, "collineations": {"0": "A###B", "1": "C##D", "2": "E###F", "3": "E###C'", "4": "D'##C'", "5": "A##F##D'", "6": "F##G##D'", "7": "B##G##E##C'"}, "variable>equals": {}, "circles": []}, "applied problems": {}, "substems": []}}

NLP:
 EqualityRelation{C_△EFG=v_2},(ExpressRelation:[key:]t), RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{BE=2*CE}, PointRelation:D', LineCrossRelation[crossPoint=Optional.of(G), iLine1=D'F, iLine2=BE], EqualityRelation{AB=t}, 求值(大小): (ExpressRelation:[key:]v_2), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]C_△EFG)}

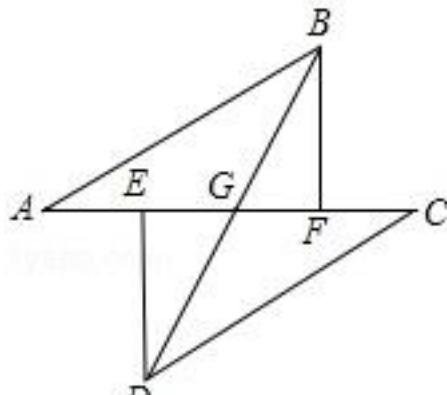
344、topic: 如图,在 $\triangle ABC$ 中, $\angle B=2\angle C$,AD是 $\angle CAB$ 平分线.求证: $AC=AB+BD$.#%#



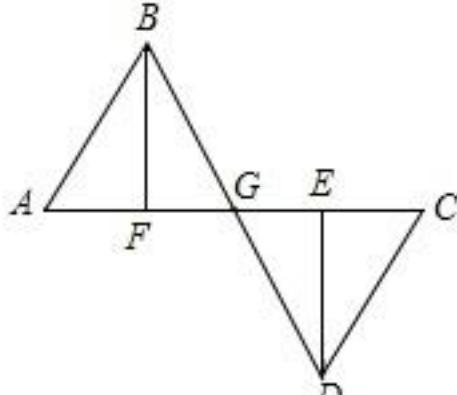
graph:
 {"stem": {"pictures": [{"picturename": "1000063622_Q_1.jpg", "coordinates": {"A": "-1.08,0.00", "B": "0.15,-2.14", "C": "-4.79,-2.14", "D": "-1.66,-2.14"}, "collineations": {"0": "A##B", "1": "A##C", "2": "C##D##B", "3": "A##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation:△ABC, EqualityRelation{∠ABD=2*∠ACD}, AngleBisectorRelation{line=AD, angle=∠BAC, angle1=∠BAD, angle2=∠CAD}, ProveConclusionRelation:[证明： EqualityRelation{AC=AB+BD}]

345、topic: 如图(1),A、E、F、C在一条直线上,AE=CF,过E、F分别作DE \perp AC,BF \perp AC. #%(1)若AB=CD,求证:BD平分EF. #%(2)若将 $\triangle DEC$ 的边EC沿AC方向移动变为图(2)时,其余条件不变,上述结论是否成立?请说明理由.#%#



图(1)

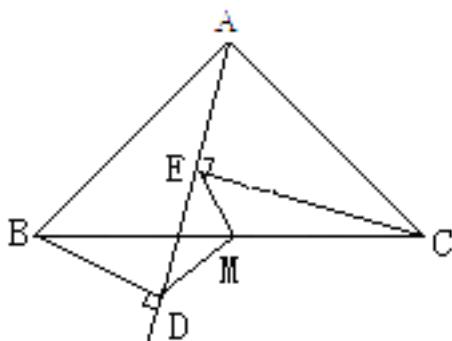


图(2)

```
graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000031207_Q_1.jpg", "coordinates": {"A": "-11.00,3.00", "B": "-7.00,5.00", "C": "-6.00,3.00", "D": "-10.00,1.00", "E": "-10.00,3.00", "F": "-7.00,3.00", "G": "-8.50,3.00"}, "collineations": {"0": "B##A", "1": "B###G##D", "2": "B###F", "3": "D##E", "4": "C##D", "5": "A###E###G###F###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [{"picturename": "1000031207_Q_2.jpg", "coordinates": {"A": "-11.00,-4.00", "B": "-10.00,-2.00", "C": "-6.00,-4.00", "D": "-7.00,-6.00", "E": "-7.00,-4.00", "F": "-10.00,-4.00", "G": "-8.50,-4.00"}, "collineations": {"0": "A##B", "1": "B##F", "2": "B##G##D", "3": "D##C", "4": "D##E", "5": "A##F##G##E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}
```

NLP: MultiPointCollinearRelation:[A, E, F, C], EqualityRelation{AE=CF}, LinePerpRelation{line1=BF, line2=AC, crossPoint=F}, EqualityRelation{AB=CD}, ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=BD, iLine2=EF, crossPoint=Optional.of(G)]]]

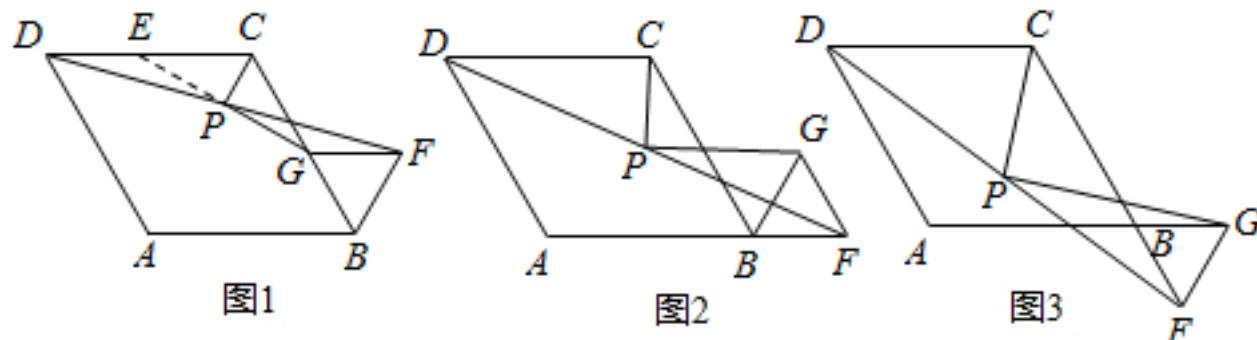
346、topic: 如图,已知, $\triangle ABC$ 中,CE \perp AD于E,BD \perp AD于D,BM=CM.求证:ME=MD. #%#



```
graph:
{"stem": {"pictures": [{"picturename": "1000040695_Q_1.jpg", "coordinates": {"A": "-6.35,5.21", "B": "-9.00,2.00", "C": "-4.00,2.00", "D": "-7.26,1.57", "E": "-6.97,2.74", "M": "-6.50,2.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##M##C", "3": "A##E##D", "4": "D##B", "5": "D##M", "6": "M##E", "7": "E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "subsystems": []}
```

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=CE, line2=AD, crossPoint=E}, LinePerpRelation{line1=BD, line2=AD, crossPoint=D}, EqualityRelation{BM=CM}, ProveConclusionRelation:[证明: EqualityRelation{EM=DM}]

347、topic: 在菱形ABCD和正三角形BGF中, $\angle ABC=60^\circ$,点P是DF的中点,连接PG、PC. #%(1)如图1,当点G在BC边上时,求证:\$PG=\sqrt{3}PC\$. #%(2)如图2,当点F在AB的延长线上时,线段PC、PG有怎样的数量关系?写出你的猜想,并证明.#%#(3)如图3,当点F在CB的延长线上时,线段PC、PG又有怎样的数量关系?写出你的猜想.(不必证明) #%#

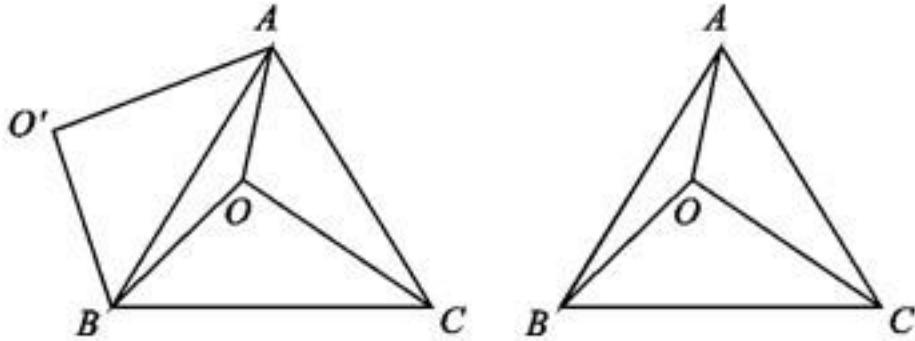


graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"pictures": [{"picturename": "1000034589_Q_1.jpg", "coordinates": {"A": "-4.26,-0.90", "B": "-0.26,-0.90", "C": "-2.26,2.56", "D": "-6.26,2.56", "F": "0.51,0.43", "G": "-1.03,0.43", "P": "-2.88,1.50"}, "collineations": {"0": "A##D", "1": "C##D", "2": "P##D##F", "3": "A##B", "4": "B##G##C", "5": "B##F", "6": "P##G", "7": "P##C", "8": "G##F"}, "variable>equals": {}, "circles": []}, {"picturename": "1000034589_Q_2.jpg", "coordinates": {"A": "-4.26,-0.90", "B": "-0.26,-0.90", "C": "-2.26,2.56", "D": "-6.26,2.56", "F": "1.28,-0.90", "G": "0.51,0.43", "P": "-2.49,0.83"}, "collineations": {"0": "A##D", "1": "C##D", "2": "P##D##F", "3": "A##B##F", "4": "B##G", "5": "G##F", "6": "B##C", "7": "P##G", "8": "P##C"}, "variable>equals": {}, "circles": []}, {"picturename": "1000034589_Q_3.jpg", "coordinates": {"A": "-4.26,-0.90", "B": "-0.26,-0.90", "C": "-2.26,2.56", "D": "-6.26,2.56", "F": "0.51,-2.23", "G": "1.28,-0.90", "P": "-2.88,0.17"}, "collineations": {"0": "A##D", "1": "C##D", "2": "P##D##F", "3": "A##B##G", "4": "B##C##F", "5": "G##F", "6": "P##G", "7": "P##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}

NLP:
 RegularTriangleRelation:RegularTriangle: $\triangle BGF$, RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{ $\angle ABG=(1/3\pi)$ }, MiddlePointOfSegmentRelation{middlePoint=P, segment=DF}, SegmentRelation:PG, SegmentRelation:PC, (ExpressRelation:[key:]1), PointOnLineRelation{point=G, line=BC, isConstant=false, extension=false}, (ExpressRelation:[key:]2), PointOnLineRelation{point=F, line=AB, isConstant=false, extension=true}, 求值(大小):

(ExpressRelation:[key:] (CP/GP)), PointOnLineRelation{point=F, line=CB, isConstant=false, extension=true}, 求值(大小): (ExpressRelation:[key:] (CP/GP)), ProveConclusionRelation:[证明: EqualityRelation{ $GP=(3^{(1/2)})*CP$ }], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] (CP/GP)), ProveConclusionRelation:[证明: ExpressRelation:[key:]3], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] (CP/GP))}

348、topic: 如图,O是等边 $\triangle ABC$ 内一点,\$OA=3\$,\$OB=4\$,\$OC=5\$,将线段BO绕点B逆时针旋转\$60^\circ\$得到线段\$BO'\$(1)求点O与\$O'\$的距离;(2)证明:\$\angle AOB=150^\circ\$(3)求四边形\$AOBO'\$的面积.(4)直接写出\$\triangle AOC\$与\$\triangle AOB\$的面积和为____.



graph:

```
{"stem": {"pictures": [{"picturename": "1000027560_Q_1.jpg", "coordinates": {"A": "0.91,2.86", "B": "-2.65,-3.00", "C": "4.00,-3.00", "B'": "-3.92,0.79", "O": "0.00,0.00"}, "collineations": {"0": "B##O", "1": "B##B'", "2": "A##B'", "3": "A##O", "4": "C##O", "5": "C##B", "6": "A##C", "7": "A##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "4", "questionrelies": "3", "pictures": [], "appliedproblems": {}}]}}
```

NLP: RegularTriangleRelation:RegularTriangle: $\triangle ABC$, PositionOfPoint2RegionRelation{point=O, region=EnclosedRegionRelation{name= $\triangle ABC$, closedShape= $\triangle ABC$ }, position=inner}, EqualityRelation{AO=3}, EqualityRelation{BO=4}, EqualityRelation{CO=5}, RotateRelation{preData=BO, afterData=BO', rotatePoint=B, rotateDegree='(1/3*Pi)', rotateDirection=ANTICLOCKWISE}, 坐标PointRelation:O, EqualityRelation{O'=v_1}, 求值(大小):

(ExpressRelation:[key:]v_1), 已知条件

QuadrilateralRelation{quadrilateral=AOBO'}, EqualityRelation{S_AOBO'=v_0}, 求值(大小):

(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=坐标}

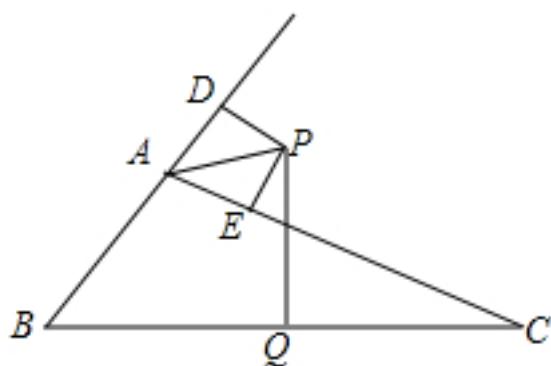
PointRelation:O, SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key:]O'), ProveConclusionRelation:[证明:

EqualityRelation{ $\angle AOB = (5/6 * \pi)$ }, SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key:]S_AOBO')}

349、topic: 如图, $\triangle ABC$ 的外角 $\angle DAC$ 的平分线交BC边的垂直平分线于P点,PD $\perp AB$ 于D,PE $\perp AC$ 于E. #%(1)求证:BD=CE; #%(2)若AB=6cm,AC=10cm,求AD的长.#%#



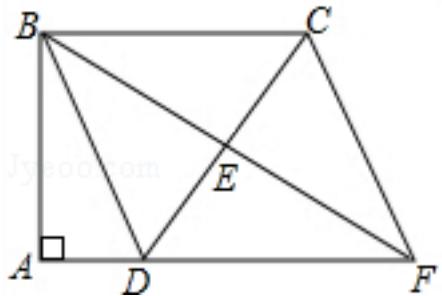
graph:

```
{"stem": {"pictures": [{"picturename": "1000031011_Q_1.jpg", "coordinates": {"A": "-11.00,4.00", "B": "-13.00,2.00", "C": "-7.00,2.00", "D": "-10.42,4.58", "E": "-10.26,3.63", "P": "-10.00,4.16", "Q": "-10.00,2.00"}, "collineations": {"0": "D##A##B", "1": "A##E##C", "2": "B##Q##C", "3": "P##Q", "4": "P##D", "5": "P##Q"}]}}
```

###E","6":"A###P"},"variable>equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}]

NLP: LinePerpRelation{line1=PD, line2=AB, crossPoint=D},LinePerpRelation{line1=PE, line2=AC, crossPoint=E},EqualityRelation{AD=v_1},EqualityRelation{AB=6},EqualityRelation{AC=10},求值(大小): (ExpressRelation:[key:]v_1),ProveConclusionRelation:[证明: EqualityRelation{BD=CE}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}

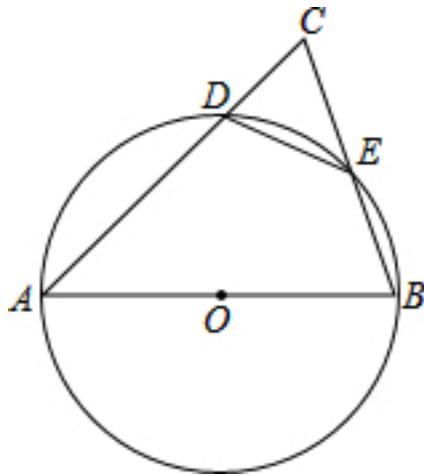
350、topic: 如图,四边形ABCD中, $\angle A = \angle ABC = 90^\circ$, $AD = 1$, $BC = 3$, E是边CD的中点,连接BE并延长与AD的延长线相交于点F. #%(1)求证:四边形BDFC是平行四边形; #%(2)若 $\triangle BCD$ 是等腰三角形,求四边形BDFC的面积.#%#



graph:
{"stem": {"pictures": [{"picturename": "A1AEFF80AD0F4B48860835EB0452987.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-14.00,5.80", "C": "-11.00,5.80", "D": "-13.00,3.00", "E": "-12.00,4.40", "F": "-10.00,3.00"}, "collineations": {"0": "B##A", "1": "A##D##F", "2": "B##F##E", "3": "B##C", "4": "B##D", "5": "D##E##C", "6": "C##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},MultiEqualityRelation [multiExpressCompare= $\angle BAD = \angle ABC = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null],EqualityRelation{AD=1},EqualityRelation{BC=3},MiddlePointOfSegmentRelation{middlePoint=E,segment=CD},LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=AD],已知条件 QuadrilateralRelation{quadrilateral=BCFD},EqualityRelation{S_BCFD=v_0},IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle BCD$ [Optional.of(B)],求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BCFD}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_BCFD)}

351、topic: 如图,AB是 $\odot O$ 的直径,且弦BE=DE,AD、BE的延长线交于点C,求证:AC=AB.#%#

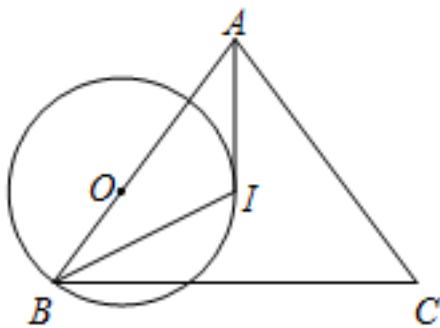


graph:

```
{"stem": {"pictures": [{"picturename": "1000060739_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "4.00,0.00", "C": "2.32,4.91", "D": "0.99,3.88", "E": "3.16,2.45", "O": "0.00,0.00"}, "collineations": {"0": "B##C##E", "1": "C##A##D", "2": "A##O##B", "3": "E##D"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##E##D"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: ChordOfCircleRelation{chord=BE, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}}, DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, SegmentRelation{BE, EqualityRelation{BE=DE}}, LineCrossRelation[crossPoint=Optional.of(C), iLine1=AD, iLine2=BE], ProveConclusionRelation:[证明: EqualityRelation{AC=AB}]]

352、topic: 如图,在 $\triangle ABC$ 中,I是内心,O是AB边上一点, $\odot O$ 经过B点且与AI相切于I点.#%#(1)求证:AB=AC;#%#(2)若BC=16, $\odot O$ 的半径是5,求AI的长.#%#



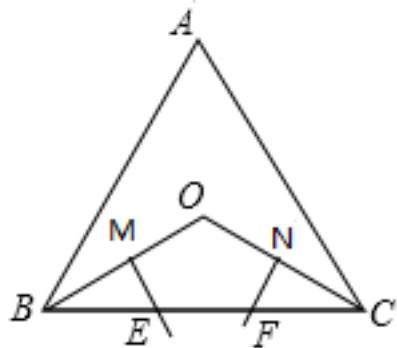
graph:

```
{"stem": {"pictures": [{"picturename": "1000052561_Q_1.jpg", "coordinates": {"A": "3.20,6.96", "B": "-0.66,1.10", "C": "7.33,1.28", "O": "0.71,3.18", "I": "3.29,3.28"}, "collineations": {"0": "A##C", "1": "B##C", "2": "A##I", "3": "B##I", "4": "A##O##B"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "B##I"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: TriangleRelation: $\triangle ABC$, PointRelation:I, PointOnLineRelation{point=O, line=AB, isConstant=false, extension=false}, PointOnCircleRelation{circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, points=[B]}}, LineContactCircleRelation{line=AI, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(I), outpoint=Optional.of(A)}}, EqualityRelation{AI=v_0}, EqualityRelation{BC=16}, RadiusRelation{radius=}

null, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=Express:[5]},求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: EqualityRelation{AB=AC}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AI)}

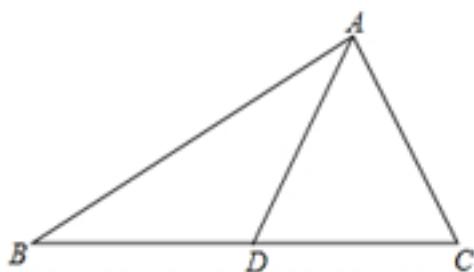
353、topic: 如图, $\triangle ABC$ 为等边三角形, $\angle ABC$ 、 $\angle ACB$ 的平分线相交于点O, BO 、 CO 的垂直平分线交BC于点E、F,垂足分别为M、N,求证: $BE=EF=FC$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030979_Q_1.jpg", "coordinates": {"A": "-10.00,5.46", "B": "-12.00,2.00", "C": "-8.00,2.00", "M": "-11.00,2.58", "N": "-9.00,2.58", "E": "-10.67,2.00", "F": "-9.33,2.00", "O": "-10.00,3.15"}, "collineations": {"0": "B##M##O", "1": "O##N##C", "2": "B##E##F##C", "3": "A##B", "4": "A##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=BO, angle= $\angle ABE$, angle1= $\angle ABO$, angle2= $\angle EBO$ }, AngleBisectorRelation{line=CO, angle= $\angle ACF$, angle1= $\angle ACO$, angle2= $\angle FCO$ }, RegularTriangleRelation:RegularTriangle: $\triangle ABC$, LineCrossRelation [crossPoint=Optional.of(E), iLine1=BO, iLine2=BC], ProveConclusionRelation:[证明: MultiEqualityRelation [multiExpressCompare=BE=EF=CF, originExpressRelationList=[], keyWord=null, result=null]]]

354、topic: 如图, $\triangle ABC$ 中,D是BC的中点,求证:#%#(1) $AB+AC>2AD$;#%#(2)若 $AB=5, AC=3$,求AD的范围.#%#



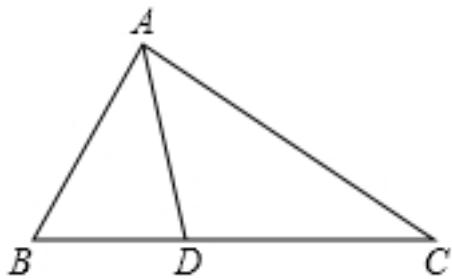
graph:
 {"stem": {"pictures": [{"picturename": "A831C413A2FD4ECC9D15C5AA78B28282.jpg", "coordinates": {"A": "-9.69,5.49", "B": "-14.00,3.00", "C": "-8.00,3.00", "D": "-11.00,3.00"}, "collineations": {"0": "B##A", "1": "A##D", "2": "C##A", "3": "B##D##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": []}]}}

NLP:
 TriangleRelation: $\triangle ABC$, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, EqualityRelatio

n{AC=3},ProveConclusionRelation:[证明:

InequalityRelation{AB+AC>2*AD}],ProveConclusionRelation:[证明: EqualityRelation{AB=5}]

355、topic: 已知在 $\triangle ABC$ 中, $\angle B=2\angle C$, $\angle BAC$ 的平分线AD交BC边于点D.求证: $AC=AB+BD$.#%#

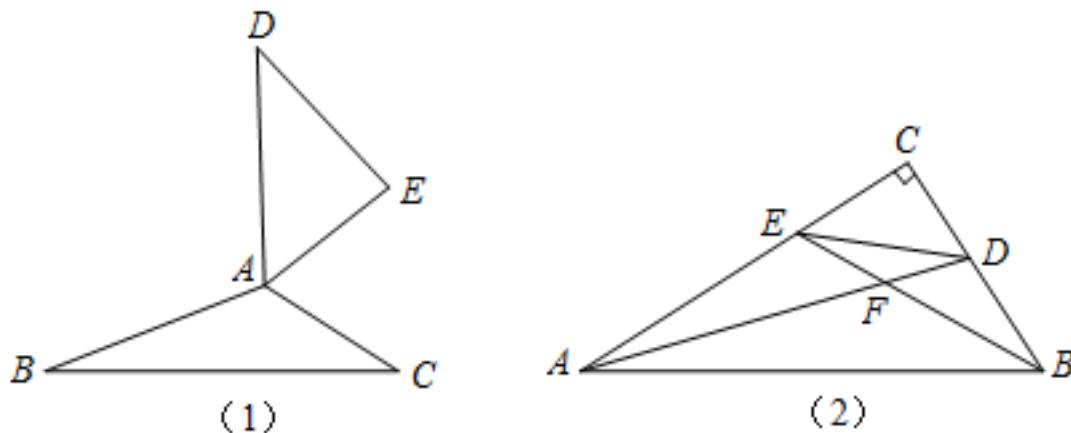


graph:

```
{"stem":{"pictures":[{"picturename":"AAB91CE259F8473CA2B71E934869E8F2.jpg","coordinates":{"A": "-11.05,6.38","B": "-13.00,3.00","C": "-5.19,3.00","D": "-10.14,3.00"},"collineations":{"0": "B###A","1": "A##D","2": "B##C##D","3": "A##C"},"variable>equals":{},"circles":[]},"appliedproblems":{},"substems":[]}}
```

NLP: AngleBisectorRelation{line=AD,angle= $\angle BAC$, angle1= $\angle BAD$,
 angle2= $\angle CAD$ },TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle ABD = 2 * \angle ACD$ },LineCrossRelation
 [crossPoint=Optional.of(D), iLine1=AD, iLine2=BC],ProveConclusionRelation:[证明:
 EqualityRelation{ $AC = AB + BD$ }]

356、topic: (1)如图(1),在 $\triangle BAC$ 和 $\triangle DAE$ 中, $BA=AD,CA=EA,\angle BAC+\angle DAE=180^\circ$.求证: $\triangle BAC$ 和 $\triangle DAE$ 的面积相等.#%#(2)如图(2),在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$, AD,BE 分别平分 $\angle CAB,\angle CBA$,且 AD,BE 交于点F.求证:四边形ABDE的面积是 $\triangle AFB$ 面积的2倍.#%#



graph:

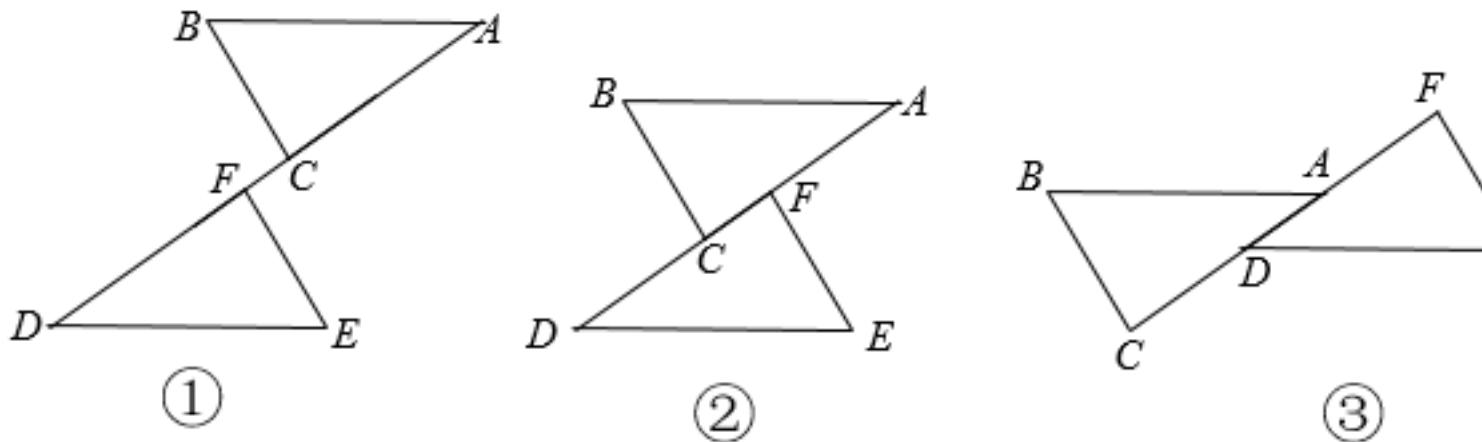
```
{"stem":{"pictures":[],"appliedproblems":{}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000063728_Q_1.jpg", "coordinates": {"A": "6.72,0.00", "B": "4.47,-0.98", "C": "7.88,-0.98", "D": "6.57,2.45", "E": "8.04,0.76"}, "collineations": {"0": "A###D", "1": "A###C", "2": "B###C", "3": "A##E", "4": "A##B", "5": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000063728_Q_1.jpg", "coordinates": {"A": "1.77,2.78", "B": "5.21,2.78", "C": "4.09,4.39", "D": "4.59,3.66", "E": "3.25,3.80", "F": "3.92,3.45"}, "collineations": {"0": "A###D###F", "1": "A###E###C", "2": "B###D###C", "3": "F###B###E", "4": "A##B", "5": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}
```

NLP:

EqualityRelation{S_△ABC=v_0}, EqualityRelation{S_△ADE=v_1}, TriangleRelation:△BAC, TriangleRelation:△DAE, EqualityRelation{AB=AD}, EqualityRelation{AC=AE}, EqualityRelation{∠BAC+∠DAE=(Pi)}, 已知条件

QuadrilateralRelation{quadrilateral=ABDE}, EqualityRelation{S_ABDE=v_2}, EqualityRelation{S_△ABF=v_3}, RightTriangleRelation:RightTriangle:△ABC[Optional.of(A)], EqualityRelation{∠ACB=(1/2*Pi)}, AngleBisectorRelation{line=AD, angle=∠BAC, angle1=∠BAD, angle2=∠CAD}, AngleBisectorRelation{line=BE, angle=∠ABC, angle1=∠ABE, angle2=∠CBE}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AD, iLine2=BE], ProveConclusionRelation:[证明: EqualityRelation{v_0=v_1}], ProveConclusionRelation:[证明: EqualityRelation{v_2=2*v_3}]

357、topic: 如图①,点C、F在直线AD上,且AF=DC,AB=DE,BC=EF. #%#(1)试证明AB||DE; #%#(2)观察图②、③,指出它们是怎样由图①变换得到的?#%#(3)在满足已知条件下,根据图②,试证明BC//EF. #%#

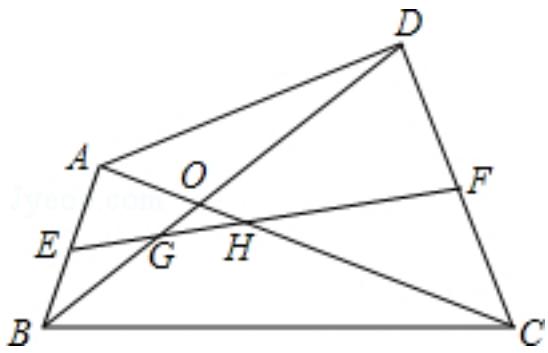


graph:

{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "AC4AD65E96AC4C509ADA0319536CAF53_1.jpg", "coordinates": {"A": "-8.00, 8.00", "B": "-12.00, 8.00", "C": "-10.44, 5.96", "D": "-14.00, 3.00", "E": "-10.00, 3.00", "F": "-11.56, 5.04"}, "collinearations": [{"0": "B##A", "1": "A##D##F##C", "2": "C##B", "3": "E##D", "4": "E##F"}], "variable>equals": {}, "circles": []}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "AC4AD65E96AC4C509ADA0319536CAF53_2.jpg", "coordinates": {"A": "-10.00, 5.00", "B": "-14.00, 5.00", "C": "-13.00, 2.00", "D": "-11.00, 4.00", "E": "-7.00, 4.00", "F": "-8.00, 7.00"}, "collinearations": [{"0": "B##A", "1": "A##D##F##C", "2": "C##B", "3": "E##D", "4": "E##F"}], "variable>equals": {}, "circles": []}], "appliedproblems": {}}}

NLP: PointOnLineRelation{point=C, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AD, isConstant=false, extension=false}, EqualityRelation{AF=CD}, EqualityRelation{AB=DE}, EqualityRelation{BC=EF}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=DE]], ProveConclusionRelation:[证明: LineParallelRelation [iLine1=BC, iLine2=EF]]

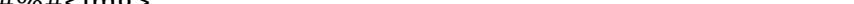
358、topic: 已知:如图,在四边形ABCD中,对角线AC、BD相交于点O,且AC=BD,E、F分别是AB、CD的中点,EF分别交BD、AC于点G、H. #%#求证:OG=OH. #%#

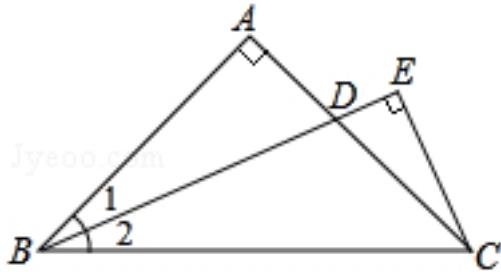


graph:

```
{"stem":{"pictures":[{"picturename":"1000081738_Q_1.jpg","coordinates":{"A":-3.46,3.38,"B":-3.82,1.14,"C":-0.13,1.27,"D":-0.65,3.48,"E":-3.64,2.26,"F":-0.39,2.38,"G":-2.23,2.31,"H":-1.80,2.33,"O":-2.02,2.47}),"collineations":{"0":"A###E##B","1":"A###D","2":"A###O###H##C","3":"B##C","4":"C###F###D","5":"B###G###O###D","6":"E###G###H###F"},"variable-equals":{},"circles":[]],"appliedproblems":{},"substems":[]}}
```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LineCrossRelation
[crossPoint=Optional.of(O), iLine1=AC,
iLine2=BD],EqualityRelation{AC=BD},MiddlePointOfSegmentRelation{middlePoint=E,segment=AB},M
iddlePointOfSegmentRelation{middlePoint=F,segment=CD},LineCrossRelation
[crossPoint=Optional.of(G), iLine1=EF, iLine2=BD],LineCrossRelation [crossPoint=Optional.of(H),
iLine1=EF, iLine2=AC],ProveConclusionRelation:[证明: EqualityRelation{GO=HO}]

359、topic: 如图,在Rt $\triangle ABC$ 中,AB=AC, $\angle BAC=90^\circ$, $\angle 1=\angle 2$,CE $\perp BD$ 的延长线于点E.求证:BD=2CE.

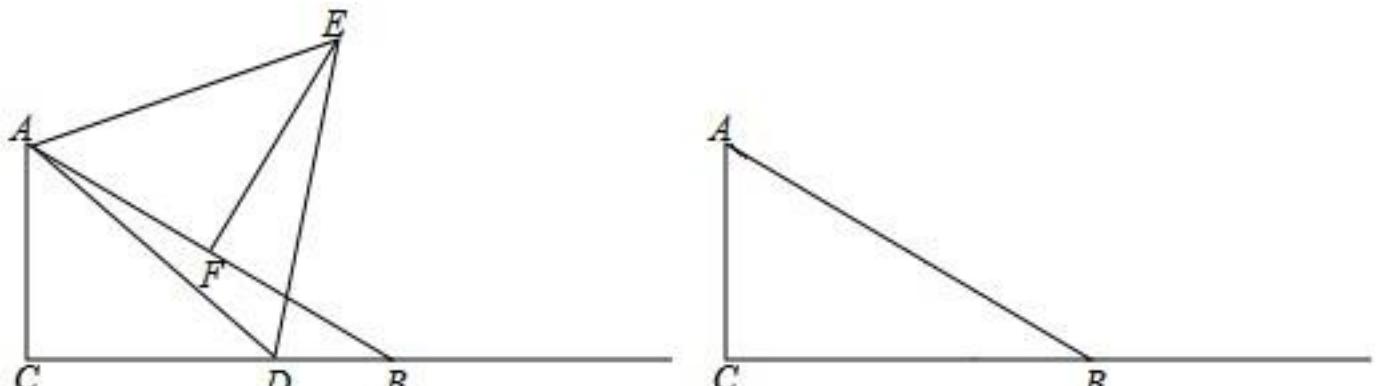


graph:

```
{"stem":{"pictures":[{"picturename":"1000027208_Q_1.jpg","coordinates":{"A":"3.00,3.00","B":"0.00,0.00","C":"6.00,0.00","D":"4.24,1.76","E":"5.12,2.12"},"collineations":{"0":"B###A","1":"B##C","2":"E##C","3":"A###D##C","4":"B##D##E"},"variable>equals":{"0":"∠1=∠ABD","1":"∠2=∠CBD"},"circles":[]}], "appliedproblems":{}}, "substems":[]}
```

NLP:
RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)],EqualityRelation{AB=AC},EqualityRelation{ $\angle BAD = (1/2 * \pi)$ },EqualityRelation{ $\angle ABD = \angle CBD$ },ProveConclusionRelation:[证明:
EqualityRelation{BD=2*CE}]]

360、topic: 在 $\triangle ABC$ 中, $\angle C=90^\circ$, $\angle B=30^\circ$, $AB=10$, 点D是射线CB上的一个动点, $\triangle ADE$ 是等边三角形, 点F是AB的中点, 联结EF.(1)如图, 当点D在线段CB上时, #①求证: $\triangle AEF \cong \triangle ADC$; #②连接BE, 设线段 $CD=x$, 线段 $BE=y$, 求 $\{y\}^2 - \{x\}^2$ 的值;(2)当 $\angle DAB=15^\circ$ 时, 求 $\triangle ADE$ 的面积.

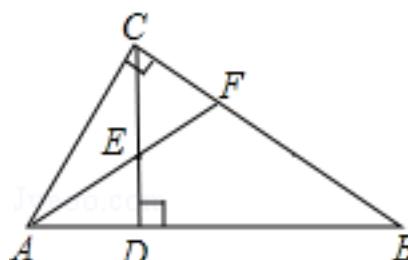


(备用图)

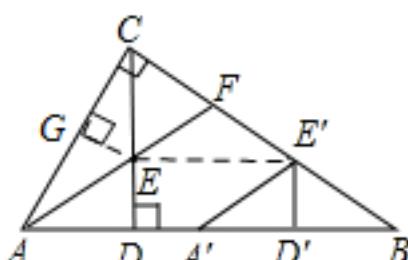
graph:
 {"stem": {"pictures": [{"picturename": "1000026737_Q_1.jpg", "coordinates": {"A": "0.00,5.00", "B": "8.66,0.00", "C": "0.00,0.00", "D": "5.00,0.00", "E": "6.83,6.84", "F": "4.33,2.50"}, "collineations": {"0": "C###D##B", "1": "C##A", "2": "A##F##B", "3": "E##F", "4": "A##E", "5": "D##E", "6": "A##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], EqualityRelation{∠ACD=(1/2*Pi)}, EqualityRelation{∠DBF=(1/6*Pi)}, EqualityRelation{AB=10}, PointOnLineRelation{point=D, line=CB, isConstant=false}, RegularTriangleRelation:RegularTriangle:△ADE, MiddlePointOfSegmentRelation{middlePoint=F, segment=AB}, PointOnLineRelation{point=D, line=CB, isConstant=false}, SegmentRelation:BE, EqualityRelation{CD=x}, EqualityRelation{BE=y}, 求值(大小): (ExpressRelation:[key:](y^2)-(x^2)), EqualityRelation{S_△ADE=v_0}, EqualityRelation{∠DAF=(1/12*Pi)}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△AEF, triangleB=△ADC}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](y^2)-(x^2))}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_△ADE)}

361、topic: 如图(1),Rt△ABC中,∠ACB=90°,CD⊥AB,垂足为D,AF平分∠CAB,交CD于点E,交CB于点F. #%(1)求证:CE=CF.#%(2)将△ADE沿AB向右平移到△A'D'E'的位置,使点E'落在BC边上,其他条件不变,如图(2)所示,试猜:BE'与CF有怎样的数量关系?请证明你的结论.#%#



(1)



(2)

graph:
 {"stem": {"pictures": [{"picturename": "1000050464_Q_1.jpg", "coordinates": {"A": "-5.40,-2.06", "B": "1.81,-2.06", "C": "-3.55,1.08", "D": "-3.55,-2.06", "E": "-3.55,-1.00", "F": "-1.74,0.03"}, "collineations": {"0": "A##D##B", "1": "F##E##A", "2": "C##A", "3": "C##D", "4": "C##F##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

]], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000050464_Q_1.jpg", "coordinates": {"A": "-1.85,-2.06", "D": "0.01,-2.06", "E": "0.01,-1.00"}, "collineations": {"0": "C###F###E###B", "1": "D###A###D###A###B", "2": "A###E", "3": "E###D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}]]

NLP:

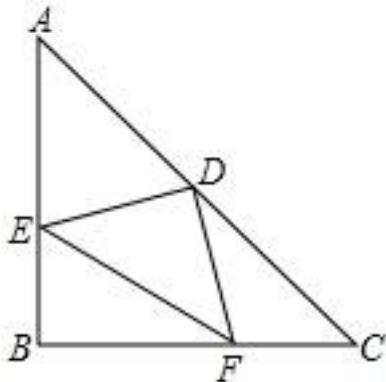
RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation $\{\angle ACF = (1/2 * \pi)\}$, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, AngleBisectorRelation{line=AF, angle= $\angle CAD$, angle1= $\angle CAF$, angle2= $\angle DAF$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AF, iLine2=CD], LineCrossRelation [crossPoint=Optional.of(F), iLine1=AF, iLine2=CB], TranslateRelation{preData= $\triangle ADE$, afterData= $\triangle A'D'E'$, translateInfos='[TranslateInfo{rotateUnit="", translateDirection=null, lineDirection=AB}]'}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, 求值(大小):

(ExpressRelation:[key:]BE'/CF)), ProveConclusionRelation:[证明:

EqualityRelation{CE=CF}], SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]BE'/CF))}

362、topic: 如图,在等腰三角形ABC中,\$\angle ABC=90^\circ\$,D为AC边上中点,过点D作\$DE\perp DF\$,交AB于点E,交BC于点F,若\$AE=4\$,\$FC=3\$,求EF的长.



graph:

{ "stem": {"pictures": [{"picturename": "1000006999_Q_1.jpg", "coordinates": {"A": "0.00,7.00", "B": "0.00,0.00", "C": "7.00,0.00", "D": "4.00,3.00", "E": "0.00,3.00", "F": "4.00,0.00"}, "collineations": {"0": "E##D", "1": "A###E###B", "2": "E##F", "3": "A###C###D", "4": "F##B##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{EF=v_0}, IsoscelesTriangleRelation:IsoscelesTriangle: $\triangle ABC$ [Optional.of(B)], EqualityRelation $\{\angle EBF = (1/2 * \pi)\}$, MiddlePointOfSegmentRelation{middlePoint=D, segment=AC}, LinePerpRelation{line1=DE, line2=DF, crossPoint=D}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=BC], EqualityRelation{AE=4}, EqualityRelation{CF=3}, 求值(大小):

(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]EF)}

363、topic: 阅读下面的材料,先完成阅读填空,再将要求答题:#%#\$\sin 30^\circ\circ

$=\frac{1}{2}\circ\circ\cos 30^\circ\circ=\frac{\sqrt{3}}{2}\circ\circ$ 则

$\{\sin\}^2\{\{30\}^{\circ}\}+\{\cos\}^2\{\{30\}^{\circ}\}=1$; ① #%#\$\sin 45^\circ\circ

$=\frac{\sqrt{2}}{2}\circ\circ\cos 45^\circ\circ=\frac{\sqrt{2}}{2}\circ\circ$ 则

$\sin^2 45^\circ + \cos^2 45^\circ = \frac{\sin 60^\circ}{\cos 60^\circ}$; (2) $\sin 60^\circ / \cos 60^\circ$ 则
 $\sin^2 60^\circ + \cos^2 60^\circ = \frac{\sin 30^\circ}{\cos 30^\circ}$. (3) 观察上述等式, 猜想: 对任意锐角 A , 都有 $\sin^2 A + \cos^2 A = 1$. (4) 如图, 在锐角三角形 ABC 中, 利用三角函数的定义及勾股定理

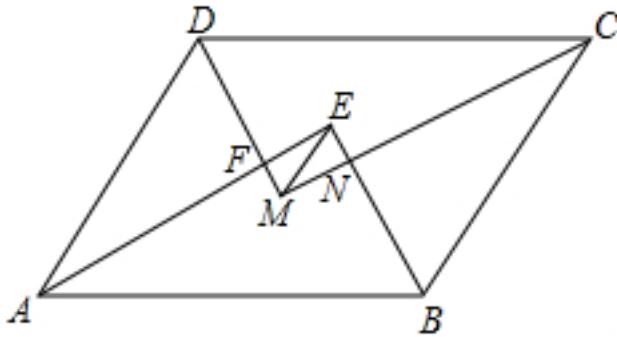
对 $\angle A$ 证明你的猜想; (2) 已知: $\angle A$ 为锐角 ($\cos A > 0$) 且 $\sin A = \frac{3}{5}$, 求 $\cos A$.

graph:
 {"stem": {"pictures": [{"picturename": "1000010426_Q_1.jpg", "coordinates": {"A": "3.00,4.00", "B": "3.00,-4.00", "C": "-3.00,4.00", "D": "3.00,0.00", "E": "5.00,0.00", "F": "-5.00,0.00", "P": "8.33,0.00", "O": "0.00,0.00"}, "collineations": {"0": "B##F", "1": "P##A", "2": "F##B", "3": "C##A", "4": "P##B", "5": "D##O##P##E##F", "6": "A##D##B##C##E##F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##E##F"}]}, "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "2", "pictures": [], "appliedproblems": {}}], "knowledgeWord": KNOWLEDGE_WORD, "knowledgeDesc": "勾股定理", "knowledgeId": "330303"}], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "2", "pictures": [], "appliedproblems": {}}]}

NLP:

EqualityRelation{ $(\sin^2 A + \cos^2 A) = 1$ }, KnowledgePointWordRelation{knowledgeWord=KNOWLEDGE_WORD, knowledgeDesc='勾股定理', knowledgeId='330303'}, AcuteTriangleRelation:AcuteTriangle:△ABC, InequalityRelation{ $\cos(\angle CAD) > 0$ }, 已知条件AcuteAngleRelation:∠BAC/ACUTE_ANGLE, EqualityRelation{ $\sin(\angle CAD) = \frac{3}{5}$ }, 求值(大小): (ExpressRelation:[key:]cos(∠CAD)), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]cos(∠CAD))}

364、topic: 如图, 在 $\square ABCD$ 中, $AB > AD$, AE 、 BE 、 CM 、 DM 分别为 $\angle DAB$ 、 $\angle ABC$ 、 $\angle BCD$ 、 $\angle CDA$ 的平分线, AE 与 DM 相交于点 F , BE 与 CM 相交于点 N , 连接 EM . (1) 求证: 四边形 $EFMN$ 是矩形; (2) 若 $\square ABCD$ 的周长为 42cm , $FM=3\text{cm}$, $EF=4\text{cm}$, 求 AB 的长度.



graph:
 {"stem": {"pictures": [{"picturename": "BD50FEABFD894828A3D377632D8749F8.jpg", "coordinates": {"A": "-14.00,6.00", "B": "-7.50,3.00", "C": "-5.45,6.44", "D": "-11.95,6.44", "E": "-9.09,5.79", "F": "-10.98,4.72", "M": "-10.37,3.64", "N": "-8.48,4.72"}, "collineations": {"0": "B##A", "1": "F##E##A", "2": "D##A", "3": "B##C", "4": "B##E##N", "5": "C##D", "6": "C##M##N", "7": "D##M##F", "8": "M##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}], "knowledgeWord": KNOWLEDGE_WORD, "knowledgeDesc": "平行四边形的性质", "knowledgeId": "330303"}]

NLP: AngleBisectorRelation{line=DM, angle=∠ADC, angle1=∠ADM, angle2=∠CDM}, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, InequalityRelation{AB>AD}, SegmentRelation:AE, SegmentRelation:BE, AngleRelation{angle=∠ABC}, AngleRelation{angle=∠BCD}, MultiLineCrossRelation{lines=[M_0N_0, DM, AE], crossPoint=Optional.of(F)}, LineCrossRelation

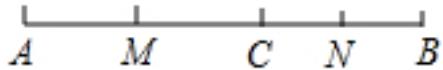
[crossPoint=Optional.of(N), iLine1=BE, iLine2=CM], SegmentRelation{EM}, EqualityRelation{AB=v_1}, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{C_ABCD=42}, EqualityRelation{FM=3}, EqualityRelation{EF=4}, 求值(大小): (ExpressRelation:[key:]v_1), ProveConclusionRelation:[证明: RectangleRelation{rectangle=Rectangle:EFMN}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AB)}

365、topic: 在 $\triangle ABC$ 中, $AB \neq AC$, D 在 BC 上, 且 $DE = EC$, 过点 D 作 $DF \parallel BA$ 交 AE 于点 F , $DF = AC$, 求证: AE 平分 $\angle BAC$. #%#

graph:
 {"stem": {"pictures": [{"picturename": "1000029498_Q_1.jpg", "coordinates": {"A": "-1.64,2.01", "B": "-4.15,0.32", "C": "-0.77,0.29", "D": "-3.40,0.31", "E": "-2.08,0.30", "F": "-1.80,1.39"}, "collineations": {"0": "A###B", "1": "B###D###E##C", "2": "C###A", "3": "A###F###E", "4": "D###F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation{ $\triangle ABC$, InequalityRelation{ $AB \neq AC$ }, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{ $DE = EC$ }, PointOnLineRelation{point=D, line=DF, isConstant=false, extension=false}, LineParallelRelation [iLine1=DF, iLine2=BA], LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=AE], EqualityRelation{ $DF = AC$ }, ProveConclusionRelation:[证明: AngleBisectorRelation{line=AE, angle= $\angle BAC$, angle1= $\angle BAE$, angle2= $\angle CAE$ }]

366、topic: 已知: 点M、N分别是线段AC, BC的中点. #%(1)如图, 点C在线段AB上, 且 $AC=9cm$, $CB=6cm$, 求线段MN的长; #%(2)若点C为线段AB上任一点, 且 $AC=acm$, $CB=bcm$, 用含有a,b的代数式表示线段MN的长度. #%(3)若点C在线段AB的延长线上, 且 $AC=acm$, $CB=bcm$, 请你画出图形, 并且用含有a,b的代数式表示线段MN的长度. #%#

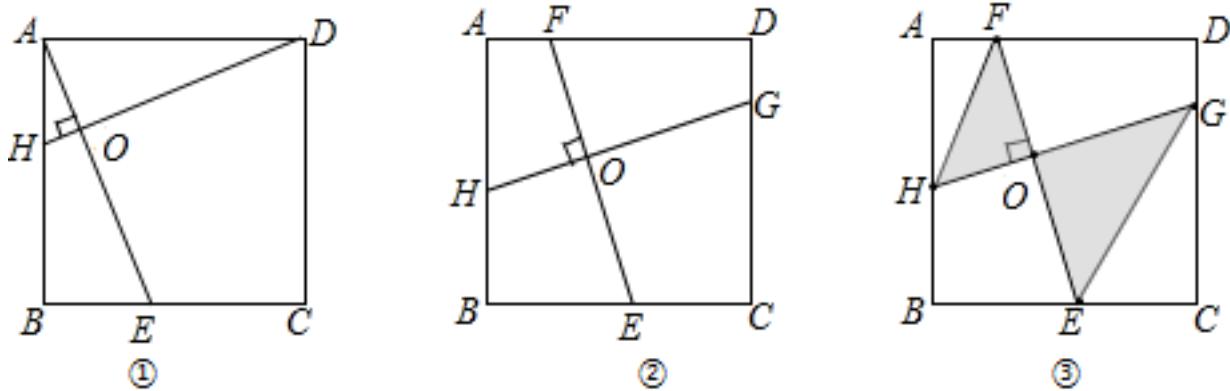


graph:
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NLP:
 MiddlePointOfSegmentRelation{middlePoint=M, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BC}, EqualityRelation{ $MN=v_0$ }, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{ $AC=9$ }, EqualityRelation{ $BC=6$ }, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{ $MN=v_1$ }, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{ $AC=a*c*m$ }, EqualityRelation{ $BC=b*c*m$ }, EqualityRelation{ $MN=v_2$ }, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{ $AC=a*c*m$ }, EqualityRelation{ $BC=b*c*m$ }, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]MN), ProveConclusionRelation:[ExpressAndExpressSetRelation{y=Express:[v_1], vars=[Express:[a], Express:[b]]}],

originFunctionType=null}],ProveConclusionRelation:[ExpressAndExpressSetRelation{y=Express:[v_2]}, vars=[Express:[a], Express:[b]], originFunctionType=null}]

367、topic: 提出问题:#%#(1)如图①,在正方形ABCD中,点E,H分别在BC,AB上,若 $AE \perp DH$ 于点O,求证: $AE=DH$;%#类比探究:#%#(2)如图②,在正方形ABCD中,点H,E,G,F分别在AB,BC,CD,DA上,若 $EF \perp HG$ 于点O,探究线段EF与HG的数量关系,并说明理由;%#综合运用:#%#(3)在(2)的条件下, $HF \parallel GE$,如图③所示,已知 $BE=EC=2$, $EO=2FO$,求图中阴影部分的面积.%#

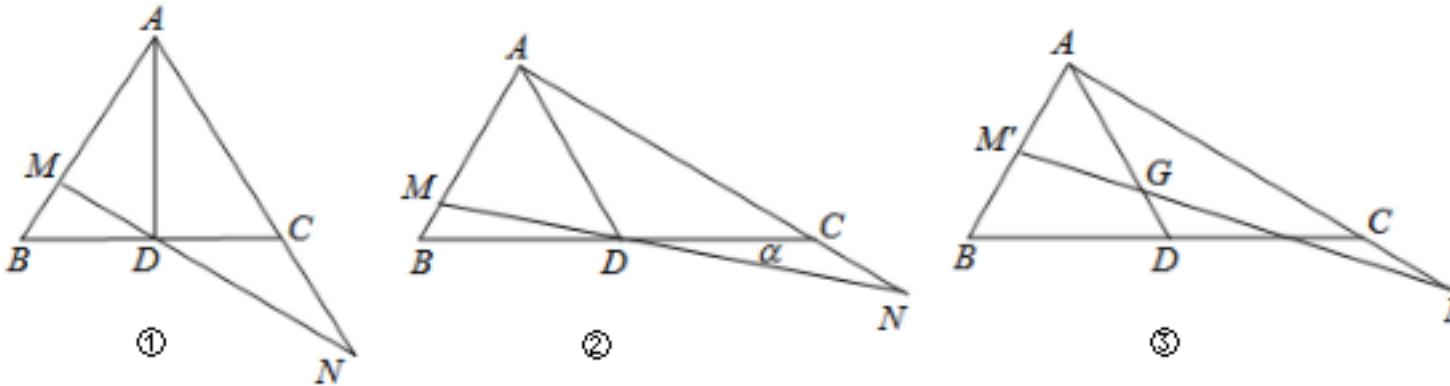


```
graph:
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```

NLP: SquareRelation{square=Square:ABCD},PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=H, line=AB, isConstant=false, extension=false},LinePerpRelation{line1=AE, line2=DH, crossPoint=O},SquareRelation{square=Square:ABCD},PointOnLineRelation{point=H, line=AB, isConstant=false, extension=false},PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=G, line=CD, isConstant=false, extension=false},PointOnLineRelation{point=F, line=DA, isConstant=false, extension=false},LinePerpRelation{line1=EF, line2=HG, crossPoint=O},求值(大小):
(ExpressRelation:[key:](EF/GH)),SubStemReliedRelation{selfDivideId=-1, reliedDivideId=2},LineParallelRelation [iLine1=HF, iLine2=GE],MultiEqualityRelation [multiExpressCompare=BE=CE=2, originExpressRelationList=[], keyWord=null, result=null],EqualityRelation{EO=2*FO},ProveConclusionRelation:[证明:
EqualityRelation{AE=DH}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:](EF/GH))}

368、topic: 如图,AD是 $\triangle ABC$ 的中线,将BC边所在直线绕点D顺时针旋转 α 角,交边AB于点M,交射

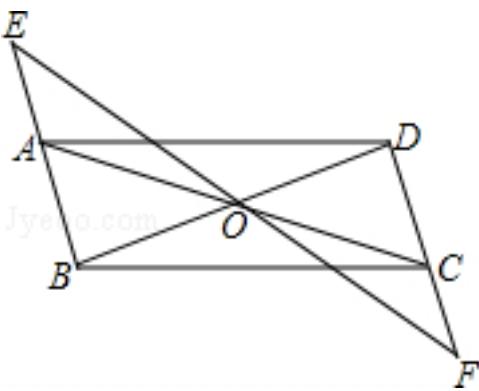
线AC于点N,设AM=xAB,AN=yAC(x,y≠0).#%#(1)如图①,当△ABC为等边三角形且 $\alpha=30^\circ$ 时,证明 $\triangle AMN \sim \triangle DMA$;#%#(2)如图②,证明: $\frac{1}{x} + \frac{1}{y} = 2$;#%#(3)如图③,当G是AD上任意一点时(点G不与A重合),过点G的直线交边AB于M',交射线AC于点N',设 $AG=nAD,AM'=x'AB,AN'=y'AC(x',y'≠0)$,猜想: $\frac{1}{x'} + \frac{1}{y'} = \frac{2}{n}$ 是否成立?并说明理由.#%#



```
graph:
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```

NLP: TriangleRelation:△ABC,LineCrossRelation [crossPoint=Optional.of(M), iLine1=BC, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(N), iLine1=BC, iLine2=AC],EqualityRelation{AM=x*AB},EqualityRelation{AN=y*AC, Condition: [[y≠0]]},MidianLineOfTriangleRelation{midianLine=AD, triangle=△ABC, top=A, bottom=BC},RegularTriangleRelation:RegularTriangle:△ABC,EqualityRelation{α=(1/6*Pi)},PointCoincidenceRelation{point1=G, point2=A},PointOnLineRelation{point=G, line=StraightLine[l_0] analytic :y=k_l_0*x+b_l_0 slope:null b:null isLinearFunction:false, isConstant:false, extension=false},LineCrossRelation [crossPoint=Optional.of(M'), iLine1=StraightLine[l_0] analytic :y=k_l_0*x+b_l_0 slope:null b:null isLinearFunction:false, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(N'), iLine1=StraightLine[l_0] analytic :y=k_l_0*x+b_l_0 slope:null b:null isLinearFunction:false, iLine2=AC],EqualityRelation{AG=n*AD},EqualityRelation{AM'=x'AB},EqualityRelation{AN'=y'AC, Condition: [[y'≠0]]},ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA=△AMN, triangleB=△DMA}],ProveConclusionRelation:[证明: EqualityRelation{(1/x)+(1/y)=2}],ProveConclusionRelation:[证明: EqualityRelation{(1/(x'))+(1/(y'))=(2/n)}]

369、topic: 如图,平行四边形ABCD中,点O是AC与BD的交点,过点O的直线与BA、DC的延长线分别交于点E、F.#%#(1)求证: $\triangle AOE \cong \triangle COF$;%#(2)求证:四边形AECF是平行四边形.%#

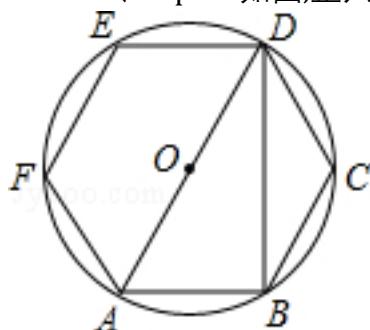


graph:

```
{"stem": {"pictures": [{"picturename": "1000031896_Q_1.jpg", "coordinates": {"A": "-9.67,4.00", "B": "-9.00,2.00", "C": "-5.00,2.00", "D": "-5.67,4.00", "E": "-10.00,5.00", "F": "-4.67,1.00", "O": "-7.33,3.00"}, "collineations": {"0": "E###A##B", "1": "B##C", "2": "D##C##F", "3": "A##D", "4": "A##O##C", "5": "B##O##D", "6": "E##O##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD},LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD],LineCrossRelation [crossPoint=Optional.of(F), iLine1=DC, iLine2=FE],LineCrossRelation [crossPoint=Optional.of(E), iLine1=BA, iLine2=FE],PointOnLineRelation{point=O, line=FE, isConstant=false, extension=false},ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle AOE$, triangleB= $\triangle COF$ }],ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:AECF}]

370、topic: 如图,正六边形ABCDEF内接于 $\odot O$,求 $\angle ADB$ 的度数.#%#

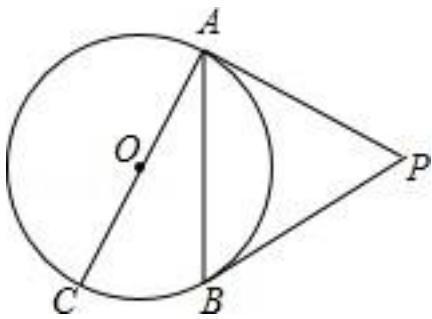


graph:

```
{"stem": {"pictures": [{"picturename": "1000083408_Q_1.jpg", "coordinates": {"A": "-1.03,-1.83", "B": "1.07,-1.81", "C": "2.10,0.02", "D": "1.03,1.83", "E": "-1.07,1.81", "F": "-2.10,-0.02", "O": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "D##E", "4": "E##F", "5": "A##F", "6": "A##O##D", "7": "D##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D##E##F"}}], "appliedproblems": {}, "subsystems": []}}
```

NLP: 求角的大小: AngleRelation{angle= $\angle BDO$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BDO$)}

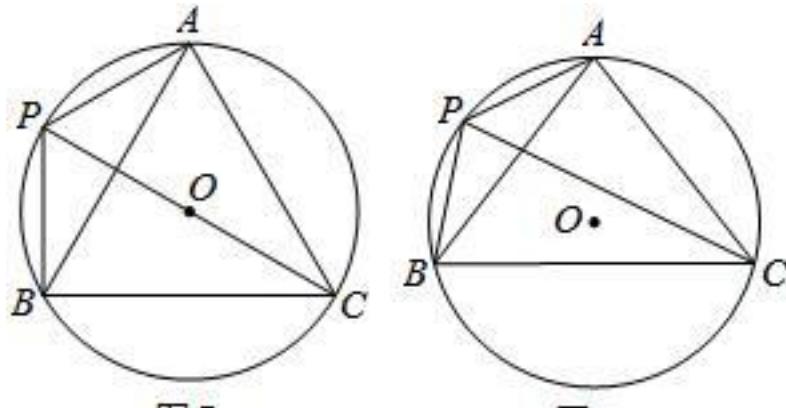
371、topic: 如图,PA、PB是 $\odot O$ 的两条切线,切点分别为点A、B,若直径 $AC=12$, $\angle P=60^\circ$,求弦AB的长.



graph:
 {"stem": {"pictures": [{"picturename": "C9EA8987467F4BB386C0EF25979A6AAE.jpg", "coordinates": {"A": "-8.50,9.60", "B": "-8.50,4.40", "C": "-11.50,4.40", "O": "-10.00,7.00", "P": "-4.00,7.00"}, "collineations": {"0": "B###A", "1": "C##O##A", "2": "A##P", "3": "P##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##A##B"}]}, "appliedproblems": {}, "substems": []}}

NLP: LineContactCircleRelation{line=PA, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(A), outpoint=Optional.of(P)}, LineContactCircleRelation{line=PB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(B), outpoint=Optional.of(P)}, DiameterRelation{diameter=AC, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=Express:[AC=12]}, EqualityRelation{ $\angle APB=(1/3\pi)$ }, 求值(大小): (ExpressRelation:[key:]AB), ChordOfCircleRelation{chord=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, chordLength=null, straightLine=null}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)}

372、topic: 如图,\$\triangle ABC\$是\$\odot O\$的内接三角形,\$AB=AC\$,点P是\$\widehat{AB}\$的中点,连接PA、PB、PC.(1)如图①,若\$\angle BPC = 60^\circ\$,求证:\$AC=\sqrt{3}AP\$;(2)如图②,若\$\sin \angle BPC=\frac{24}{25}\$,求\$\tan \angle PAB\$的值.

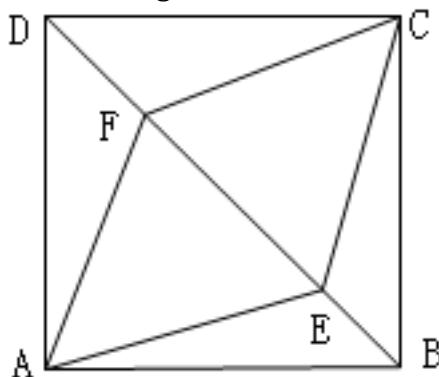


graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000024972(1).jpg", "coordinates": {"A": "2.50,4.33", "B": "0.00,0.00", "C": "5.00,0.00", "O": "2.50,1.44", "P": "0.00,2.89"}, "collineations": {"0": "P##A", "1": "P##B", "2": "P##O##C", "3": "C##B", "4": "B##A", "5": "A##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##P"}]}, {"picturename": "1000024972(2).jpg", "coordinates": {"A": "0.00,16.00", "B": "-12.00,0.00", "C": "12.00,0.00", "O": "0.00,3.5", "P": "-10.00,11.00"}, "collineations": {"0": "P##A", "1": "P##B", "2": "C##B", "3": "B##A", "4": "A##B##P"}]}], "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000024972(2).jpg", "coordinates": {"A": "0.00,16.00", "B": "-12.00,0.00", "C": "12.00,0.00", "O": "0.00,3.5", "P": "-10.00,11.00"}, "collineations": {"0": "P##A", "1": "P##B", "2": "C##B", "3": "B##A", "4": "A##B##P"}]}]}}

C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C##P"}]]}, "appliedproblems": {}}]

NLP: InscribedShapeOfCircleRelation{closedShape=△ABC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, EqualityRelation{AB=AC}, MiddlePointOfArcRelation:P/type:M AJOR_ARC \curvearrowright AB, SegmentRelation:PA, SegmentRelation:PB, SegmentRelation:PC, EqualityRelation{∠BPO=(1/3*Pi)}, EqualityRelation{sin(∠BPO)=(24/25)}, 求值(大小): (ExpressRelation:[key:]tan(∠BAP)), ProveConclusionRelation:[证明: EqualityRelation{AC=(3^(1/2))*AP}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]tan(∠BAP))}

373、topic: 已知:如图,E,F是正方形ABCD的对角线BD上的两点,且BE=DF.求证:四边形AECF是菱形.



graph:
{"stem": {"pictures": [{"picturename": "1000050594_Q_1.jpg", "coordinates": {"A": "-7.00,3.00", "B": "-3.00,3.00", "C": "-3.00,7.00", "D": "-7.00,7.00", "E": "-4.00,4.00", "F": "-6.00,6.00"}, "collinearities": {"0": "D##F#E##B", "1": "C##D", "2": "B##C", "3": "A##D", "4": "A##E", "5": "A##B", "6": "A##F", "7": "C##E", "8": "C##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=BD, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BD, isConstant=false, extension=false}, EqualityRelation{BE=DF}, ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:AECF}]

374、topic: 小丽参加数学兴趣小组活动,提供了下面3个有联系的问题,请你帮助解决:#%#(1)如图1,正方形ABCD中,作AE交BC于E,DF⊥AE交AB于F,求证:AE=DF;#%#(2)如图2,正方形ABCD中,点E,F分别在AD,BC上,点G,H分别在AB,CD上,且EF⊥GH,求 $\frac{EF}{GH}$ 的值;#%#(3)如图3,矩形ABCD中,AB=a,BC=b,点E,F分别在AD,BC上,且EF⊥GH,求 $\frac{EF}{GH}$ 的值.#%#

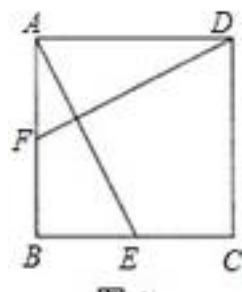


图 1

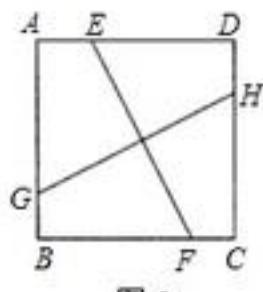


图 2

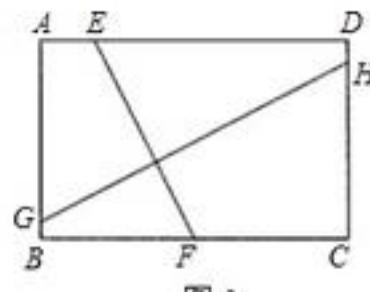


图 3

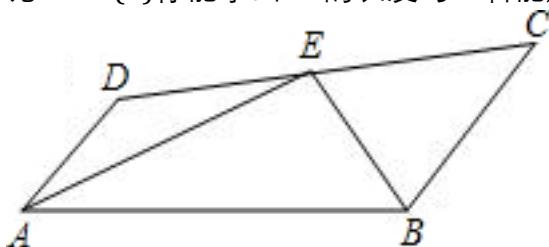
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000041810_Q_1.jpg","coordinates":{"A": "-7.00,6.00","B": "-7.00,3.00","C": "-4.00,3.00","D": "-4.00,6.00","E": "-5.60,3.00","F": "-7.00,4.58"}, "collineations": {"0": "A###F###B","1": "B###E###C","2": "A###D","3": "D###F","4": "A###E","5": "D###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000041810_Q_2.jpg", "coordinates": {"A": "-7.00,1.00", "B": "-7.00,-2.00", "C": "-4.00,-2.00", "D": "-4.00,1.00", "E": "-6.00,1.00", "F": "-5.00,-2.00", "H": "-4.00,0.00", "G": "-7.00,-1.00"}, "collineations": {"0": "A###E###D","1": "D###H###C","2": "B###F###C","3": "A###G###B","4": "E###F","5": "G###H"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000041810_Q_3.jpg", "coordinates": {"A": "-7.00,-5.00", "B": "-7.00,-8.00", "C": "-3.00,-8.00", "D": "-3.00,-5.00", "E": "-6.29,-5.00", "F": "-5.00,-8.00", "G": "-7.00,-7.34", "H": "-3.00,-5.66"}, "collineations": {"0": "A###E###D","1": "D###H###C","2": "B###F###C","3": "A###G###B","4": "E###F","5": "G###H"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}
```

NLP:

(ExpressRelation:[key:]1),SquareRelation{square=Square:ABCD},LinePerpRelation{line1=DF, line2=AE, crossPoint=},LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=AB],(ExpressRelation:[key:]2),SquareRelation{square=Square:ABCD},PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false},PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=G, line=AB, isConstant=false, extension=false},PointOnLineRelation{point=H, line=CD, isConstant=false, extension=false},LinePerpRelation{line1=EF, line2=GH, crossPoint=},求值(大小):
(ExpressRelation:[key:]((EF)/(GH))), (ExpressRelation:[key:]3), RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=a}, EqualityRelation{BC=b}, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false}, LinePerpRelation{line1=EF, line2=GH, crossPoint=},求值(大小):
(ExpressRelation:[key:]((EF)/(GH))), ProveConclusionRelation:[证明:
EqualityRelation{AE=DF}], SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]((EF)/(GH))), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]((EF)/(GH)))

375、topic: 如图,E在线段CD上,AE、BE分别平分 $\angle DAB$ 、 $\angle CBA$, $\angle AEB=90^\circ$.设 $AD=x$, $BC=y$,且 $\{(x-3)^2+|y-4|=0\}$.(1)求AD和BC的长.(2)你认为AD和BC还有什么关系?并验证你的结论.(3)你能求出AB的长度吗?若能,请写出推理过程;若不能,请说明理由.



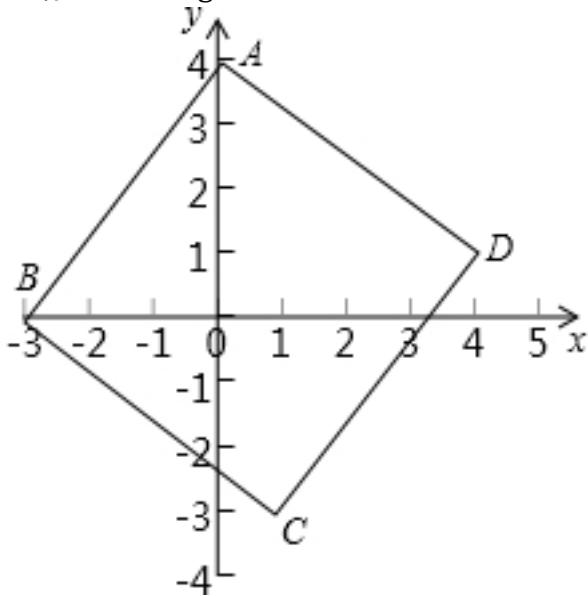
graph:

```
{"stem":{"pictures": [{"picturename": "CC7C7051D87C463686BEEE9C76F4F82E.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-7.00,3.00", "C": "-4.92,6.41", "D": "-12.44,5.56", "E": "-8.68,5.99"}, "collineations": {"0": "B###A","1": "E###A","2": "A###D","3": "B###C","4": "B###E","5": "C###D###E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"subsystems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}
```

NLP: PointOnLineRelation{point=E, line=CD, isConstant=false, extension=false}, AngleBisectorRelation{line=AE, angle= $\angle DAB$, angle1= $\angle BAE$, angle2= $\angle DAE$ }, AngleBisectorRelation{line=BE, angle= $\angle ABC$, angle1= $\angle ABE$,

angle2=∠CBE}, EqualityRelation{∠AEB=(1/2*Pi)}, EqualityRelation{AD=x}, EqualityRelation{BC=y}, EqualityRelation{((x-3)^2)+abs(y-4)=0}, 求值(大小): (ExpressRelation:[key:]AD), 求值(大小): (ExpressRelation:[key:]BC), 求值(大小): (ExpressRelation:[key:](AD/BC)), EqualityRelation{AB=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AD)}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BC)}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:](AD/BC))), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AB)}

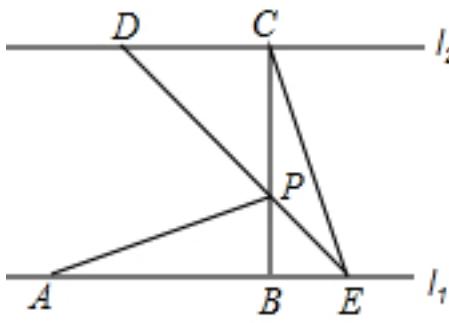
376、topic: 正方形ABCD在平面直角坐标系中的位置如图,已知A点坐标(0,4),B点坐标(-3,0),求C点坐标.%#



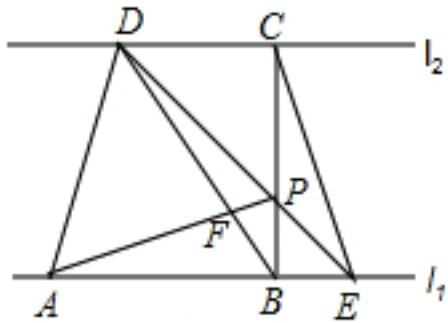
graph:
 {"stem": {"pictures": [{"picturename": "1000071172_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "-3.00,0.00", "C": "1.00,-3.00", "D": "4.00,1.00"}, "collinearities": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "A##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: SquareRelation{square=Square:ABCD}, PointRelation:A(0,4), PointRelation:B(-3,0), 坐标
PointRelation:C, SolutionConclusionRelation{relation=坐标}PointRelation:C}

377、topic: 如图,已知直线\$\{l\}_1\parallel\{l\}_2\$,线段AB在直线\$\{l\}_1\$上,BC垂直于\$\{l\}_1\$交\$\{l\}_2\$于点C,且AB=BC,P是线段BC上异于两端点的一点,过点P的直线分别交\$\{l\}_2\$于点D、E(点A、E位于点B的两侧),满足BP=BE,连接AP、CE.#%#(1)求证:\$\triangle ABP\cong\triangle CBE\$.#%#(2)连接AD、BD,BD与AP相交于点F.如图2.#%#①当\$\frac{BC}{BP}=2\$时,求证:AP\$\perp\$BD;#%#②当\$\frac{BC}{BP}=n(n>1)\$时,设\$\triangle PAD\$的面积为\$\{S\}_1\$, \$\triangle PCE\$的面积为\$\{S\}_2\$,求\$\frac{\{S\}_1}{\{S\}_2}\$的值.%#



1



2

```
graph: [{"stem": {"pictures": [{"picturename": "CD93591A85714CE598CDA550B4465F6F.jpg", "coordinates": {"A": "-12.00,3.00", "B": "-8.00,3.00", "C": "-8.00,7.00", "D": "-10.00,7.00", "E": "-6.00,3.00", "F": "-8.80,4.60", "P": "-8.00,5.00"}, "collineations": {"0": "B###E##A", "1": "E##A###P", "2": "A###D", "3": "B###D###F", "4": "B###P###C", "5": "C###E", "6": "E###D###P", "7": "C###D"}, "variable>equals": {}, "circles": []}, "app liedproblems": {}, "subsystems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": []}]}]}
```

NLP: PointRelation:A,LineParallelRelation [iLine1=StraightLine[l_1] analytic :y=k_l_1*x+b_l_1
 slope:null b:null isLinearFunction:false, iLine2=StraightLine[l_2] analytic :y=k_l_2*x+b_l_2
 slope:null b:null isLinearFunction:false],LineCoincideRelation [iLine1=AB,
 iLine2=AE],LinePerpRelation{line1=AB, line2=BC,
 crossPoint=B},EqualityRelation{AB=BC},PointInsideSegmentRelation{point=P,
 segment=BC},EqualityRelation{BP=BE},SegmentRelation:AP,SegmentRelation:CE,PointOnLineRelatio
 n{point=P, line=ED, isConstant=false, extension=false},MultiPointCollinearRelation:[A,
 D],MultiPointCollinearRelation:[B, D],LineCrossRelation [crossPoint=Optional.of(F), iLine1=AP,
 iLine2=BD],(ExpressRelation:[key:]J2),EqualityRelation{((BC)/(BP))=2},EqualityRelation{((BC)/(BP))
 =n, Condition: [[n>1]]},EqualityRelation{S_△ADP=S_1},EqualityRelation{S_△CEP=S_2},求值(大小):
 (ExpressRelation:[key:](S_1/S_2)),ProveConclusionRelation:[证明:
 TriangleCongRelation{triangleA=△ABP, triangleB=△CBE}],ProveConclusionRelation:[证明:
 LinePerpRelation{line1=AP, line2=BD, crossPoint=}],SolutionConclusionRelation{relation=求值(大
 小): (ExpressRelation:[key:](S_1/S_2))}]

378、topic: 如图1,点O是正方形ABCD两对角线的交点,分别延长OD到G,OC到点E,使 $OG=2OD$, $OE=2OC$,然后以OG、OE为邻边作正方形OEGF,连接AG,DE.(1)求证: $DE \perp AG$;(2)正方形ABCD固定,将正方形OEGF绕点O逆时针旋转 α 角($0^\circ < \alpha < 360^\circ$)得到正方形OE'F'G',如图2.①在旋转过程中,当 $\angle OAG'$ 是直角时,求 α 的度数;②若正方形ABCD的边长为1,在旋转过程中,求AF'长的最大值和此时 α 的度数,直接写出结果不必说明理由.

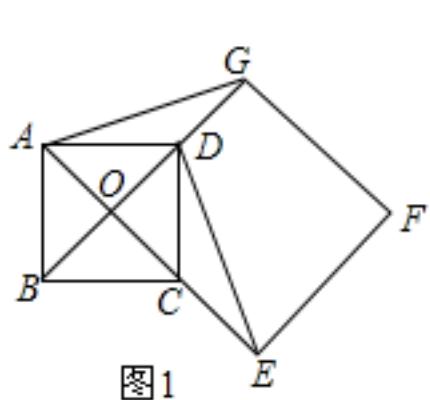
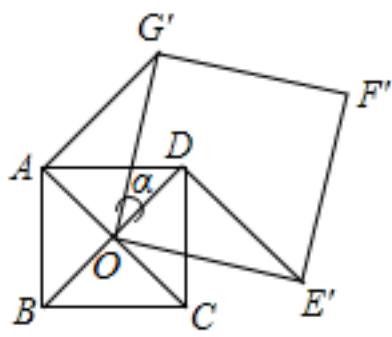


图 1 E

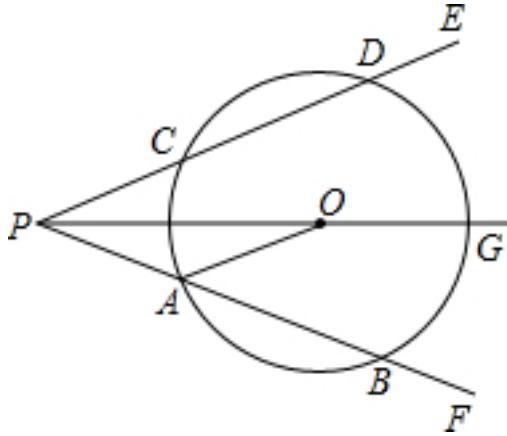


2

graph:

```
{"stem":{"pictures":[{"picturename":"1000061933_Q_1.jpg","coordinates":{"A":"0.00,4.00","B":"0.00,0.00","C":"4.00,0.00","D":"4.00,4.00","E":"6.00,-2.00","F":"10.00,2.00","G":"6.00,6.00","O":"2.00,2.00"}],"collineations":{"0":"A##B","1":"B##C","2":"A##G","3":"A##D","4":"D##E","5":"G##F","6":"F##E","7":"D##C","8":"A##O##C##E","9":"B##O##D##G"}],"variable>equals":{},"circles":[]}, "appliedproblems":{},"substems": [{"substemid": "2","questionrelies": "", "pictures": [{"picturename": "1000061933_Q_1.jpg", "coordinates": {"A": "12.00,4.00", "B": "12.00,0.00", "C": "16.00,0.00", "D": "16.00,4.00", "E": "19.46,0.54", "F": "20.93,6.00", "G": "15.46,7.46", "O": "14.00,2.00"}}, "collineations": {"0": "A##B", "1": "B##C", "2": "A##G", "3": "A##D", "4": "D##E", "5": "G##F", "6": "F##E", "7": "D##C", "8": "O##G", "9": "O##E", "10": "A##O##C", "11": "B##O##D"}], "variable>equals": {"0": "\angle \alpha = \angle DOG"}, "circles": []}], "appliedproblems": {}}]}
```

NLP: SquareRelation{square=Square:ABCDintersection : O}, PointOnLineRelation{point=E, line=OC, isConstant=false, extension=false}, EqualityRelation{GO=2*DO}, EqualityRelation{EO=2*CO}, SquareRelation{square=Square:EFGO}, SegmentRelation:AG, SegmentRelation:DE, ThreeItemsInequalityRelation{multiExpressCompare:(0*Pi)<\alpha<(2*Pi)}, SquareRelation{square=Square:ABCD}, 求值(大小): (ExpressRelation:[key:]\alpha), EqualityRelation{AF=v_0}, SquareRelation{square=Square:ABCD, length=1}, ProveConclusionRelation:[证明: LinePerpRelation{line1=DE, line2=AG, crossPoint=}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]\alpha)}

379、topic: 如图,射线PG平分 $\angle EPF$,O为射线PG上一点,以O为圆心,10为半径作 $\odot O$,分别与 $\angle EPF$ 两边相交于A、B和C、D,连结OA,此时有 $OA \parallel PE$.
 (1)求证: $AP=AO$;
 (2)若 $\tan \angle OPB = \frac{1}{2}$,求弦AB的长.


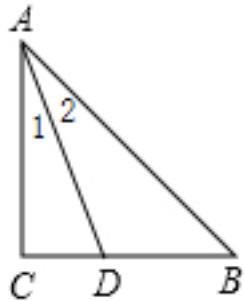
graph:

```
{"stem":{"pictures":[{"picturename":"1000060823_Q_1.jpg","coordinates":{"A": "-4.47,-2.24","B": "0.88,-4.92","C": "-4.47,2.24","D": "0.88,4.92","O": "0.00,0.00","E": "2.40,5.68","F": "2.50,-5.73","G": "5.99,0.00","P": "-8.94,0.00"}],"collineations":{"0": "P##C##D##E","1": "P##O##G","2": "A##F##P##B","3": "A##O"}, "variable>equals":{},"circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems":{},"substems":[]}]
```

NLP: AngleBisectorRelation{line=PG, angle=\angle APC, angle1=\angle APG, angle2=\angle CPG}, PointOnLineRelation{point=O, line=PG, isConstant=false, extension=false}, CircleRelation{circle=Circle[\odot O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2, radiusLength=Express:[10], diameterLength=Express:[20]}}, SegmentRelation:OA, LineParallelRelation [iLine1=OA, iLine2=PE], EqualityRelation{\tan(\angle APO)=(1/2)}, 求值(大小): (ExpressRelation:[key:]AB), ProveConclusionRelation:[证明: (ExpressRelation:[key:]AB)]}

EqualityRelation{AP=AO}], SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]AB)}

380、topic: 如图,在Rt $\triangle ABC$ 中, $\angle C=90^\circ$, $BC=AC$, $\angle B=\angle CAB=45^\circ$,AD平分 $\angle BAC$ 交BC于D,求证: $AB=AC+CD$.#%#



graph:

```
{"stem": {"pictures": [{"picturename": "CFF155B37D724B559C24B879D0188E70.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-10.00,3.00", "C": "-14.00,3.00", "D": "-12.34,3.00"}, "collineations": {"0": "B###A", "1": "A##C", "2": "A##D", "3": "B##D##C"}, "variable>equals": {"0": "\u03311=\u0331DAC", "1": "\u03312=\u0331DAB"}, "circles": []}, "appliedproblems": {}, "subsystems": []}}
```

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{ $\angle ACD=(1/2*\pi)$ }, EqualityRelation{ $BC=AC$ }, MultiEqualityRelation [multiExpressCompare= $\angle ABD=\angle BAC=(1/4*\pi)$, originExpressRelationList=[], keyWord=null, result=null], AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, LineCrossRelation [crossPoint=Optional.of(D), iLine1=AD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{ $AB=AC+CD$ }]

381、topic: 已知,如图,直线MN交 $\odot O$ 于A,B两点,AC是直径,AD平分 $\angle CAM$ 交 $\odot O$ 于D,过D作 $DE \perp MN$ 于E . ?%#(1)求证:DE是 $\odot O$ 的切线;?%#(2)若 $DE=6cm$, $AE=3cm$,求 $\odot O$ 的半径 .

graph:

```
{"stem": {"pictures": [{"picturename": "1000008333_Q_1.jpg", "coordinates": {"A": "-4.50,-6.00", "B": "4.50,-6.00", "C": "4.50,6.00", "D": "-7.50,0.00", "E": "-7.50,-6.00", "M": "-12.61,-6.00", "N": "13.15,-6.00", "O": "0.00,0.00"}, "collineations": {"0": "D###A", "1": "A###E###B###M###N", "2": "E##D", "3": "O###A##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##B##A##D"}]}, "appliedproblems": {}, "subsystems": []}}
```

NLP: LineCrossCircleRelation{line=MN, circle= $\odot O$, crossPoints=[A, B], crossPointNum=2}, DiameterRelation{diameter=AC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null}, AngleBisectorRelation{line=AD, angle= $\angle EAO$, angle1= $\angle DAE$, angle2= $\angle DAO$ }, LineCrossCircleRelation{line=AD, circle= $\odot O$, crossPoints=[D], crossPointNum=1}, LinePerpRelation{line1=DE, line2=MN, crossPoint=E}, AngleBisectorRelation{line=AD, angle= $\angle EAO$, angle1= $\angle DAE$, angle2= $\angle DAO$ }, EqualityRelation{DE=6}, EqualityRelation{AE=3}, 圆的半径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=DE, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(D)},

outpoint=Optional.of(E)],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]CO)}

382、topic: 如图,已知 $\triangle ABC$ 和 $\triangle ADE$ 都是等腰直角三角形, $\angle BAC=\angle DAE=90^\circ$, $AB=AC$, $AD=AE$,连接 BD 交 AE 于 M ,连接 CE 交 AB 于 N , BD 与 CE 交点为 F ,连接 AF .#%#(1)如图1,求证: $BD \perp CE$;<#%#(2)如图1,求证: FA 是 $\angle CFD$ 的平分线;#%#(3)如图2,当 $AC=2\sqrt{3}$, $\angle BCE=15^\circ$ 时,求 CF 的长.#%#

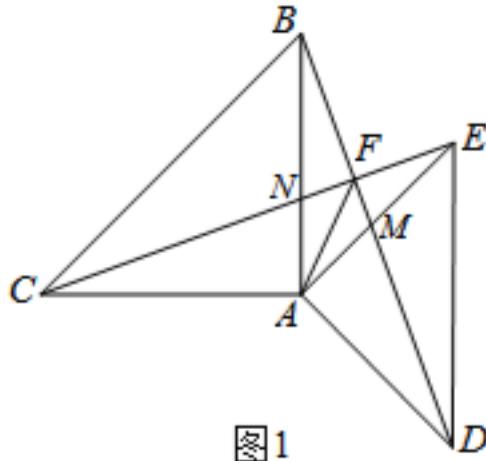


图1

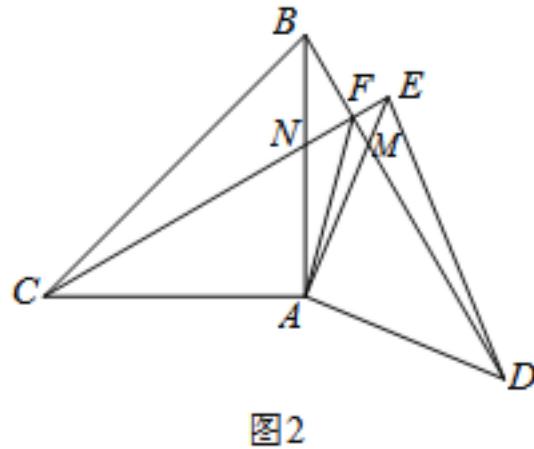


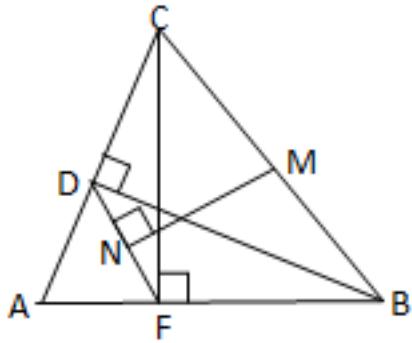
图2

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000080097_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "0.00,3.00", "C": "-3.00,0.00", "D": "1.50,-1.50", "E": "1.50,1.50", "F": "0.60,1.20", "M": "0.75,0.75", "N": "0.00,1.00"}, "collineations": {"0": "C###N##F##E", "1": "B##F##M##D", "2": "B##N##A", "3": "A##M##E", "4": "A##C", "5": "A##D", "6": "A##F", "7": "C##B", "8": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblem": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000080097_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "0.00,3.00", "C": "-3.00,0.00", "D": "2.27,-0.92", "E": "0.92,2.27", "F": "0.55,2.05", "M": "0.71,1.77", "N": "0.00,1.74"}, "collineations": {"0": "C##N##F##E", "1": "B##F##M##D", "2": "B##N##A", "3": "A##M##E", "4": "A##C", "5": "A##D", "6": "A##F", "7": "C##B", "8": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblem": {}}}}

NLP:

IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$ [Optional.of(A)][Optional.of(A)], IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ADE$ [Optional.of(A)][Optional.of(A)], MultiEqualityRelation [multiExpressCompare= $\angle CAN = \angle DAM = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AB=AC}, EqualityRelation{AD=AE}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=BD, iLine2=AE], LineCrossRelation [crossPoint=Optional.of(N), iLine1=CE, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=BD, iLine2=CE], SegmentRelation: AF, (ExpressRelation:[key:]1), (ExpressRelation:[key:]1), EqualityRelation {CF=v_0}, (ExpressRelation:[key:]2), EqualityRelation{AC=2*(3^(1/2))}, EqualityRelation{ $\angle BCN = (1/12 * \pi)$ }, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: LinePerpRelation{line1=BD, line2=CE, crossPoint=F}], ProveConclusionRelation:[证明: AngleBisectorRelation{line=FA, angle= $\angle MFN$, angle1= $\angle AFM$, angle2= $\angle AFN$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CF)}

383、topic: 如图,在 $\triangle ABC$ 中, BD 、 CF 分别是 AC 、 AB 边上的高, M 为 BC 的中点, N 为 DF 的中点.求证: $MN \perp DF$.#%#

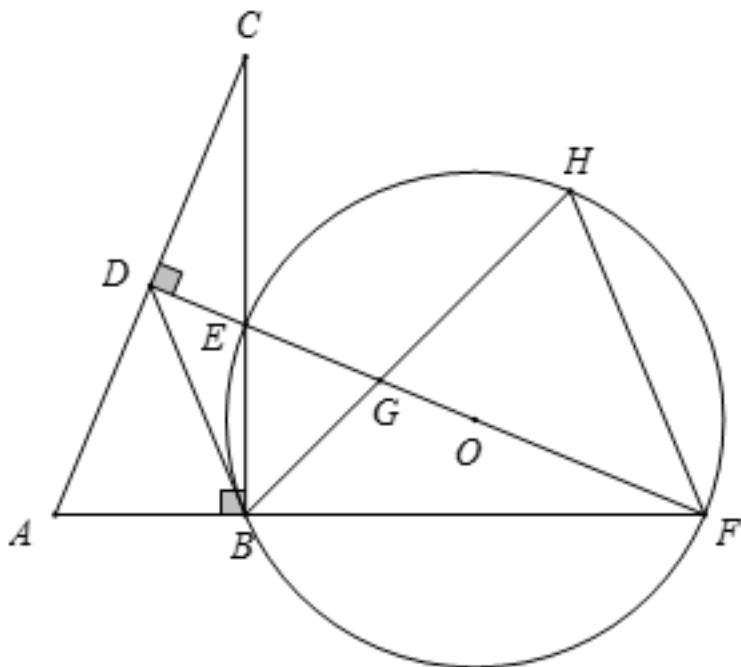


graph:

```
{"stem": {"pictures": [{"picturename": "D72C1680DB3C4C0193DC1ADB93AACDFD.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-9.00,3.00", "C": "-12.00,7.00", "D": "-13.00,5.00", "F": "-12.00,3.00", "M": "-10.50,5.00", "N": "-12.5,4.00"}, "collinearities": {"0": "B###F###A", "1": "A###D##C", "2": "B##D", "3": "C##B# ##M", "4": "C##F", "5": "N##F##D", "6": "M##N"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=BD, line2=AC, crossPoint=D}, LinePerpRelation{line1=CF, line2=AB, crossPoint=F}, MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, MiddlePointOfSegmentRelation{middlePoint=N, segment=DF}, ProveConclusionRelation:[证明: LinePerpRelation{line1=MN, line2=DF, crossPoint=N}]

384、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC=90^\circ$, AC 的垂直平分线分别与 AC , BC 及 AB 的延长线相交于点 D , E , F ,且 $BF=BC$. $\odot O$ 是 $\triangle BEF$ 的外接圆, $\angle EBF$ 的平分线交 EF 于点 G ,交 $\odot O$ 于点 H ,连接 BD , FH .#%(1)求证: $\triangle ABC \cong \triangle EBF$;%#(2)试判断 BD 与 $\odot O$ 的位置关系,并说明理由;%#(3)若 $AB=1$,求 $HG \cdot HB$ 的值.%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000039748_Q_1.jpg", "coordinates": {"A": "-2.25,0.00", "B": "0.00,0.00", "C": "0.00,2.00", "D": "-1.5,1.5", "E": "-1.0,1.0", "F": "0.0,1.5", "G": "-0.75,1.25", "H": "0.75,1.25", "O": "0.75,0.75"}}, "appliedproblems": {}, "substems": []}}
```

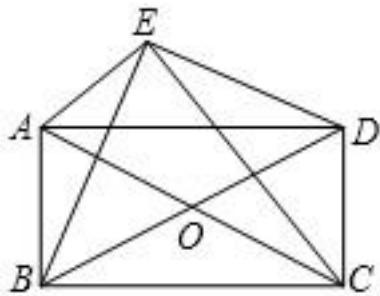
```

0.00","C":"0.00,5.00","D": "-1.03,2.71","E": "0.00,2.25","F": "5.00,0.00","G": "1.55,1.55","H": "3.62,3.62","O
":"2.50,1.12"},"collineations": [{"0": "A###B###F", "1": "A###D###C", "2": "C###E###B", "3": "D###B", "4": "D###E###G###O##F", "5": "B###G###H", "6": "H###F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "E###B###F###H"}]], "appliedproblems": {}, "substems": []}

```

NLP: MiddlePerpendicularRelation [iLine1=ED, iLine2=AC, crossPoint=Optional.of(D)], AngleBisectorRelation{line=BH, angle= $\angle EBF$, angle1= $\angle EBH$, angle2= $\angle FBH$ }, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(B)], EqualityRelation{ $\angle ABE = (1/2\pi)$ }, PointRelation:E, PointRelation:F, EqualityRelation{BF=BC}, InscribedShapeOfCircleRelation{closedShape= $\triangle BEF$, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2 + (y-y_0)^2 = r_0^2$ }}, SegmentRelation:BD, PointRelation:F, EqualityRelation{AB=1}, 求值(大小): (ExpressRelation:[key:]GH*BH), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle EBF$ }], JudgePostionConclusionRelation: [data1=BD, data2=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2 + (y-y_0)^2 = r_0^2$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]GH*BH)}

385、topic: 已知:如图,AC、BD相交于点O,且O是AC、BD的中点,点E在四边形ABCD外,且 $\angle AEC = \angle BED = 90^\circ$.#%#求证:四边形ABCD是矩形.#%#



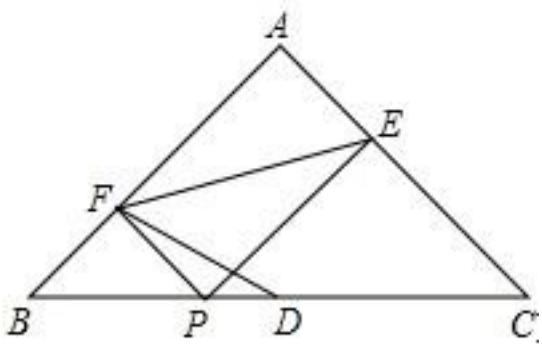
```

graph:
{"stem": {"pictures": [{"picturename": "1000081634_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "6.00,4.00", "E": "2.31,5.54", "O": "3.00,2.00"}, "collineations": [{"0": "A##D", "1": "B##O##D", "2": "A##O##C", "3": "D##C", "4": "B##A", "5": "B##C", "6": "E##A", "7": "E##D", "8": "E##B", "9": "E##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

```

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD], MiddlePointOfSegmentRelation{middlePoint=O, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=O, segment=BD}, PositionOfPoint2RegionRelation{point=E, region=EnclosedRegionRelation{name=ABCD, closedShape=ABCD}, position=outer}, MultiEqualityRelation [multiExpressCompare= $\angle AEC = \angle BED = (1/2\pi)$, originExpressRelationList=[], keyWord=null, result=null], ProveConclusionRelation:[证明: RectangleRelation{rectangle=Rectangle:ABCD}]

386、topic: 如图,在等腰\$Rt\vartriangle ABC\$中,\$\angle A=90^\circ\$,\$D\$为\$BC\$的中点.在\$DB\$上任取一点\$P\$,过\$P\$作两腰的垂线段\$PF\$、\$PE\$,连接\$EF\$.求证:\$\{EF\}^2=2\{DF\}^2\$.



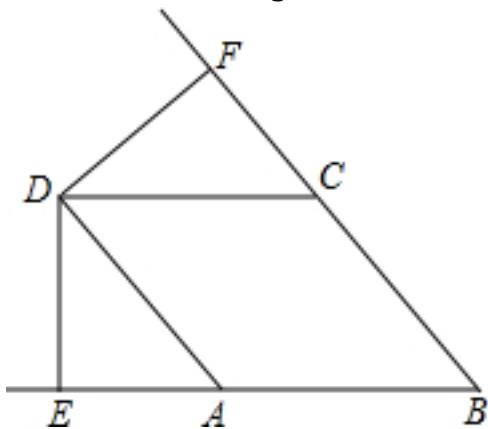
graph:

```
{"stem": {"pictures": [{"picturename": "1000005497_Q_1.jpg", "coordinates": {"A": "-6.61,4.00", "B": "-12.65,-2.41", "C": "-0.21,-2.04", "D": "-6.43,-2.22", "E": "-4.20,1.72", "F": "-10.37,0.00", "P": "-7.96,-2.27"}, "collinearities": {"0": "A###F###B", "1": "B###P###D###C", "2": "A###E###C", "3": "E###F", "4": "F###P", "5": "F###D", "6": "E###P"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

```
IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: △ABC[Optional.of(A)][Optional.of(A)], EqualityRelation{∠EAF=(1/2*Pi)}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, PointOnLineRelation{point=P, line=DB, isConstant=false, extension=false}, SegmentRelation:PE, SegmentRelation:EF, ProveConclusionRelation:[证明: EqualityRelation{(EF)^2=2*(DF)^2}]
```

387、topic: 如图,四边形ABCD是菱形,DE⊥AB交BA的延长线于点E,DF⊥BC交BC的延长线于点F.求证:DE=DF.#%#

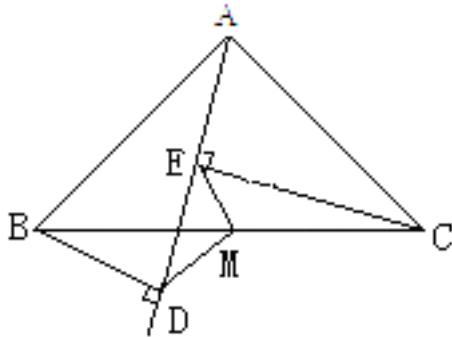


graph:

```
{"stem": {"pictures": [{"picturename": "1000040921_Q_1.jpg", "coordinates": {"A": "-3.02,0.00", "B": "0.00,0.00", "C": "-1.51,2.61", "D": "-4.52,2.61", "E": "-4.52,0.00", "F": "-2.26,3.92"}, "collinearities": {"0": "E###A##B", "1": "B###C###F", "2": "C##D", "3": "D##A", "4": "D##E", "5": "D##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: RhombusRelation{rhombus=Rhombus:ABCD}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=BA], LinePerpRelation{line1=DF, line2=BC, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{DE=DF}]

388、topic: 如图,已知, $\triangle ABC$ 中,CE $\perp AD$ 于E,BD $\perp AD$ 于D,BM=CM.求证:ME=MD.



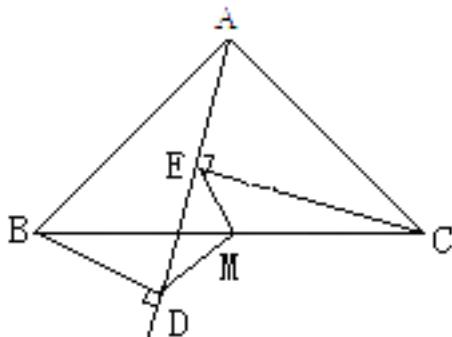
```

graph:
{"stem": {"pictures": [{"picturename": "1000040695_Q_1.jpg", "coordinates": {"A": "-6.35,5.21", "B": "-9.00, 2.00", "C": "-4.00,2.00", "D": "-7.26,1.57", "E": "-6.97,2.74", "M": "-6.50,2.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##M##C", "3": "A##E##D", "4": "D##B", "5": "D##M", "6": "M##E", "7": "E##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

```

NLP: TriangleRelation: $\triangle ABC$,LinePerpRelation{line1=CE, line2=AD, crossPoint=E},LinePerpRelation{line1=BD, line2=AD, crossPoint=D},EqualityRelation{BM=CM},ProveConclusionRelation:[证明: EqualityRelation{EM=DM}]

389、topic: 如图,已知, $\triangle ABC$ 中,CE $\perp AD$ 于E,BD $\perp AD$ 于D,BM=CM.求证:ME=MD.



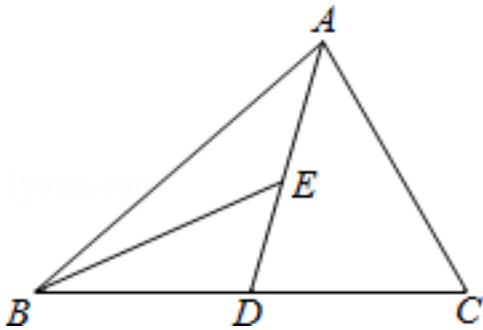
```

graph:
{"stem": {"pictures": [{"picturename": "1000040695_Q_1.jpg", "coordinates": {"A": "-6.35,5.21", "B": "-9.00, 2.00", "C": "-4.00,2.00", "D": "-7.26,1.57", "E": "-6.97,2.74", "M": "-6.50,2.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##M##C", "3": "A##E##D", "4": "D##B", "5": "D##M", "6": "M##E", "7": "E##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

```

NLP: TriangleRelation: $\triangle ABC$,LinePerpRelation{line1=CE, line2=AD, crossPoint=E},LinePerpRelation{line1=BD, line2=AD, crossPoint=D},EqualityRelation{BM=CM},ProveConclusionRelation:[证明: EqualityRelation{EM=DM}]

390、topic: 如图,AD为 $\triangle ABC$ 的中线,BE为 $\triangle ABD$ 的中线.(1) $\angle ABE=15^\circ$, $\angle BAD=35^\circ$,求 $\angle BED$ 的度数;(2)在 $\triangle BED$ 中作BD边上的高;(3)若 $\triangle ABC$ 的面积为60, $BD=5$,求点E到BC边的距离.



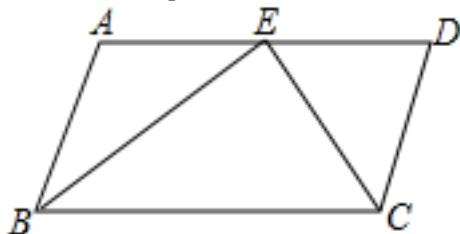
graph:

```
{"stem":{"pictures":[{"picturename":"E98182335CBC4D6F94BF02FCD7004D48.jpg","coordinates":{"A": "-10.00,7.00","B": "-14.00,3.00","C": "-8.00,3.00","D": "-11.00,3.00","E": "-10.50,5.00"},"collineations": {"0": "B##A","1": "D##E##A","2": "B##D##C","3": "B##E","4": "A##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle ABD$, MidianLineOfTriangleRelation{midianLine=AD, triangle= $\triangle ABC$, top=A, bottom=BC}, MidianLineOfTriangleRelation{midianLine=BE, triangle= $\triangle BDA$, top=B, bottom=DA}, EqualityRelation{ $\angle ABE = (1/12\pi)$ }, EqualityRelation{ $\angle BAE = (7/36\pi)$ }, 求角的大小: AngleRelation{angle= $\angle BED$ }, LineRoleRelation{Segment=M_0N_0, roleType=HEIGHT}, PointToLineDistanceRelation{point=E, line=BC, distance=Express:[v_1]}, EqualityRelation{S $_{\triangle ABC} = 60$ }, EqualityRelation{BD=5}, 求值(大小): (ExpressRelation:[key]:v_1), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]: $\angle BED$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:v_1)}

391、topic: 如图,AB||CD,CE,BE分别平分 $\angle BCD$ 和 $\angle CBA$,点E在AD上,求证:BC=AB+CD. #%#



graph:

```
{"stem":{"pictures":[{"picturename":"20A7BB2E2B444A19AD663B9D6E2A8E49.jpg","coordinates":{"A": "-12.51,5.98","B": "-14.00,3.00","C": "-8.00,3.00","D": "-6.81,5.39","E": "-9.66,5.68"},"collineations": {"0": "A##E##D","1": "B##A","2": "C##E","3": "B##C","4": "B##E","5": "C##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], AngleBisectorRelation{line=CE, angle= $\angle BCD$, angle1= $\angle BCE$, angle2= $\angle DCE$ }, AngleBisectorRelation{line=BE, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{BC=AB+CD}]

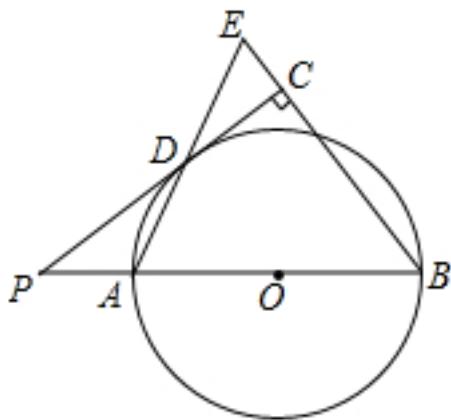
392、topic: 如图,AB是 $\odot O$ 的直径,CB、CD分别切 $\odot O$ 于B、D两点,点E在CD的延长线上,且 $CE=AE+BC$;?%#(1)求证:AE是 $\odot O$ 的切线;?%#(2)过点D作 $DF \perp AB$ 于点F,连接BE交DF于点M,求证: $DM=MF$.

graph:

```
{"stem": {"pictures": [{"picturename": "1000008338_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "5.00,0.00", "C": "5.00,6.10", "D": "-0.98,4.90", "E": "-5.00,4.10", "F": "-0.98,0.00", "M": "-0.98,2.45", "O": "0.00,0.00"}, "collineations": {"0": "D###E###C", "1": "A###E", "2": "M###D###F", "3": "E###M###B", "4": "C###B", "5": "A###F###O###B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B###A##D"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LineContactCircleRelation{line=CB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(B), outpoint=Optional.of(C)}, LineContactCircleRelation{line=CD, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.of(C)}, PointOnLineRelation{point=E, line=CD, isConstant=false, extension=true}, EqualityRelation{CE=AE+BC}, LinePerpRelation{line1=DF, line2=AB, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=BE, iLine2=DF], ProveConclusionRelation:[证明: LineContactCircleRelation{line=AE, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(A), outpoint=Optional.of(E)}], ProveConclusionRelation:[证明: EqualityRelation{DM=FM}]}

393、topic: 如图,已知AB是 \odot O的直径,点P在BA的延长线上,PD切 \odot O于点D,过点B作BE垂直于PD,交PD的延长线于点C,连接AD并延长,交BE于点E. #%(1)求证:AB=BE; #%(2)若PA=2,\$\cos B=\frac{3}{5}\$,求 \odot O半径的长.#%#



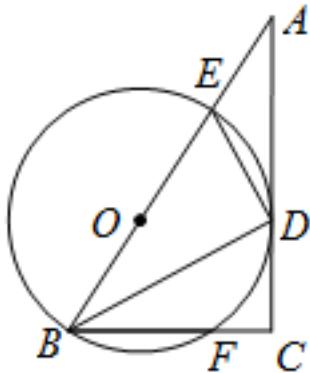
graph:

```
{"stem": {"pictures": [{"picturename": "1000052553_Q_1.jpg", "coordinates": {"A": "-5.17,-0.66", "B": "0.83,-0.66", "C": "-2.07,3.18", "D": "-3.97,1.74", "E": "-2.78,4.13", "O": "-2.17,-0.66", "P": "-7.17,-0.66"}, "collineations": {"0": "A###D###E", "1": "B###C###E", "2": "P###D###C", "3": "P###A###O###B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###D"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, PointOnLineRelation{point=P, line=BA, isConstant=false, extension=true}, LineContactCircleRelation{line=PD, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.of(P)}, LinePerpRelation{line1=BE, line2=PD, crossPoint=C}, LineCrossRelation [crossPoint=Optional.of(C), iLine1=BE, iLine2=PD], SegmentRelation:AD, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AD, iLine2=BE], EqualityRelation{AP=2}, EqualityRelation{cos(∠CBO)=(3/5)}, 圆的半径: CircleRelation{circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, ProveConclusionRelation:[证明:]}

EqualityRelation{AB=BE}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]AO)}

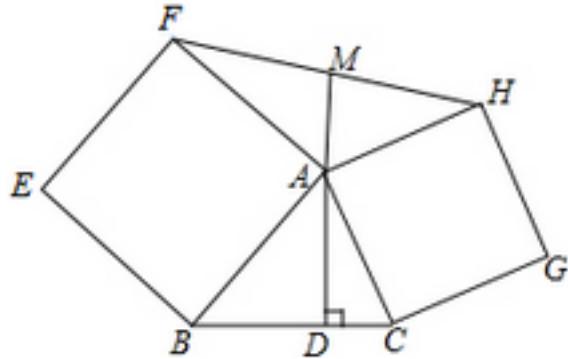
394、topic: 如图,在 $\triangle ABC$ 中, $BC=9, CA=12, AB=15, \angle ABC$ 的平分线BD交AC于点D, $DE \perp DB$ 交AB于点E. 求证:(1) $\triangle ABC$ 是直角三角形;(2)设 $\odot O$ 是 $\triangle BDE$ 的外接圆,求证:AC是 $\odot O$ 的切线;(3)在(2)的条件下,设 $\odot O$ 交BC于点F,连接EF,求AE的长和 $EF:AC$ 的值.



graph:
 {"stem": {"pictures": [{"picturename": "1000060814_Q_1.jpg", "coordinates": {"A": "6.00,4.00", "B": "3.00,0.00", "C": "6.00,0.00", "D": "6.00,1.50", "E": "5.25,3.00", "F": "5.25,0.00", "O": "4.13,1.50"}, "collineations": {"0": "A###E###O###B", "1": "B###F###C", "2": "C###D###A", "3": "B###D", "4": "D###E"}, "variable-equations": {}, "circles": [{"center": "O", "pointincircle": "B###F###D###E"}]}, "appliedproblems": {}, "substems": "[]"}}

NLP: AngleBisectorRelation{line=BD, angle= $\angle FBO$, angle1= $\angle DBF$, angle2= $\angle DBO$ }, TriangleRelation: $\triangle ABC$, EqualityRelation{BC=9}, EqualityRelation{AC=12}, EqualityRelation{AB=15}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=BD, iLine2=AC], LinePerpRelation{line1=DE, line2=DB, crossPoint=D}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AB], EqualityRelation{AE=v_0}, LineCrossCircleRelation{line=BC, circle= $\odot O$, crossPoints=[F], crossPointNum=1}, SegmentRelation:EF, 求值(大小): (ExpressRelation:[key:]v_0), 求值(大小): (ExpressRelation:[key:]EF/AC), ProveConclusionRelation:[证明: RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)]], ProveConclusionRelation:[InscribedShapeOfCircleRelation[closedShape= $\triangle BDE$, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }]], ProveConclusionRelation:[证明: LineContactCircleRelation[line=AC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(D), outpoint=Optional.absent()]], ProveConclusionRelation:[SubStemReliedRelation{selfDivideId=-1, reliedDivideId=2}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AE)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]EF/AC)}]

395、topic: 如图,分别以 $\triangle ABC$ 的边AB,AC为一边在三角形外作正方形ABEF和ACGH,M为FH的中点. 求证: $MA \perp BC$.



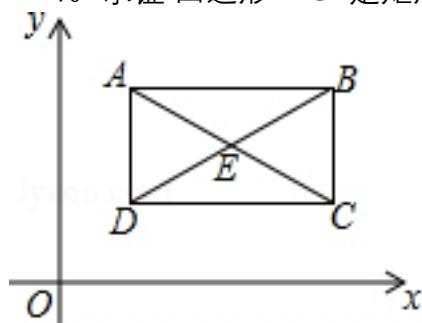
graph:

```
{"stem":{"pictures":[{"picturename":"1000040367_Q_1.jpg","coordinates":{"A": "-2.38,3.92","B": "-5.24,1.40","C": "-1.42,1.40","D": "-2.38,1.40","E": "-7.94,4.45","F": "-4.89,6.96","G": "1.09,2.36","H": "0.13,4.87","M": "-2.38,5.92"}, "collineations": {"0": "A##C", "1": "A##M##D", "2": "A##B", "3": "E##B", "4": "C##D##B", "5": "G##C", "6": "G##H", "7": "A##H", "8": "A##F", "9": "H##M##F", "10": "E##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, SquareRelation{square=Square:ABEF}, SquareRelation{square=Square:ACGH}, MiddlePointOfSegmentRelation{middlePoint=M, segment=FH}, ProveConclusionRelation:[证明:
LinePerpRelation{line1=MA, line2=BC, crossPoint=D}]

396、topic: 如图,在平面直角坐标系中,点A(2,n),B(m,n)(m > 2),D(p,q)(q < n),点B,D在直线 $y=\frac{1}{2}x+1$ 上.四边形ABCD的对角线AC,BD相交于点E,且 $AB \parallel CD$, $CD=4$, $BE=DE$, $\triangle AEB$ 的面积是2.求证:四边形ABCD是矩形.



graph:

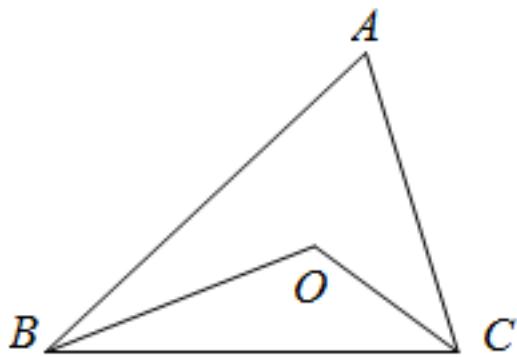
```
{"stem":{"pictures":[{"picturename":"1000040723_Q_1.jpg","coordinates":{"A": "0.00,1.72","B": "2.96,1.72","C": "2.96,0.00","D": "0.00,0.00","E": "1.48,0.86"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "D##A", "4": "A##E##C", "5": "B##E##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}
```

NLP:

InequalityRelation{m>2}, PointRelation:A(2,n), PointRelation:B(m,n), PointRelation:D(p,q)*(q<n), PointOnLineRelation{point=B, line=StraightLine[n_0] analytic : $y=1/2*x+1$ slope:1/2 b:1 isLinearFunction:true, isConstant=false, extension=false}, PointOnLineRelation{point=D, line=StraightLine[n_0] analytic : $y=1/2*x+1$ slope:1/2 b:1 isLinearFunction:true, isConstant=false, extension=false}, 已知条件QuadrilateralRelation{quadrilateral=ABCD}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD], LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{CD=4}, EqualityRelation{BE=DE}, EqualityRelation{S $\triangle ABE=2$ }, ProveCon

clusionRelation:[证明: RectangleRelation{rectangle=Rectangle:ABCD}]

397、topic: 如图,已知点O为 $\triangle ABC$ 中的一点,连BO、CO,求证: $AB+AC > BO+CO$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060374_Q_1.jpg", "coordinates": {"A": "3.17,3.57", "B": "0.00,0.00", "C": "4.36,0.00", "O": "2.69,1.21"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##C", "3": "B##O", "4": "C##O"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: SegmentRelation:BO,SegmentRelation:CO,ProveConclusionRelation:[证明:
 InequalityRelation{AB+AC>BO+CO}]

398、topic: 如图1,点O是正方形ABCD两对角线的交点,分别延长OD到G,OC到点E,使 $OG=2OD,OE=2OC$,然后以OG、OE为邻边作正方形OEFG,连接AG,DE.#%#(1)求证: $DE \perp AG$;(2)正方形ABCD固定,将正方形OEFG绕点O逆时针旋转 α 角($0^\circ < \alpha < 360^\circ$)得到正方形OE'F'G',如图2,在旋转过程中,当 $\angle OAG'$ 是直角时,求 α 的度数.

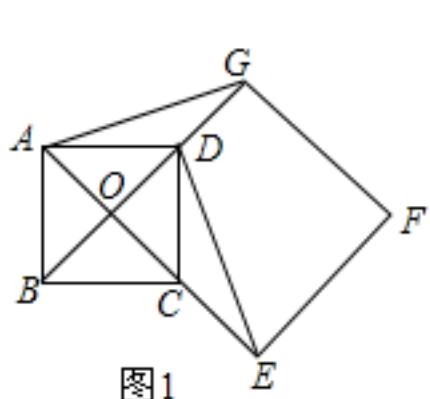


图1

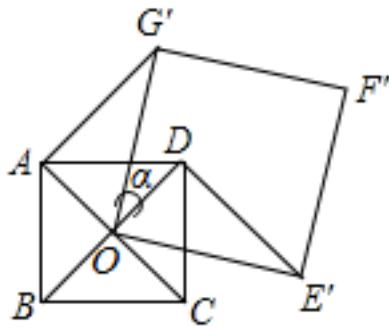
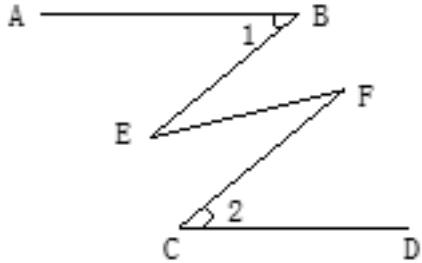


图2

graph:
 {"stem": {"pictures": [{"picturename": "1000061933_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "6.00,-2.00", "F": "10.00,2.00", "G": "6.00,6.00", "O": "2.00,2.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "A##G", "3": "A##D", "4": "D##E", "5": "G##F", "6": "F##E", "7": "D##C", "8": "A##O##C##E", "9": "B##O##D##G"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000061933_Q_1.jpg", "coordinates": {"A": "12.00,4.00", "B": "12.00,0.00", "C": "16.00,0.00", "D": "16.00,4.00", "E": "19.46,0.54", "F": "20.93,6.00", "G": "15.46,7.46", "O": "14.00,2.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "A##G", "3": "A##D", "4": "D##E", "5": "G##F", "6": "F##E", "7": "D##C", "8": "O##G", "9": "O##E"}, "variable>equals": {"0": "\u03b1=\u03d5OG"}, "circles": []}, {"picturename": "1000061933_Q_2.jpg", "coordinates": {"A": "12.00,4.00", "B": "12.00,0.00", "C": "16.00,0.00", "D": "16.00,4.00", "E": "19.46,0.54", "F": "20.93,6.00", "G": "15.46,7.46", "O": "14.00,2.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "A##G", "3": "A##D", "4": "D##E", "5": "G##F", "6": "F##E", "7": "D##C", "8": "O##G", "9": "O##E"}, "variable>equals": {"0": "\u03b1=\u03d5OG"}, "circles": []}]}], "appliedproblems": {}}}

NLP: SquareRelation{square=Square:ABCDintersection : O}, PointOnLineRelation{point=E, line=OC, isConstant=false, extension=false}, EqualityRelation{GO=2*DO}, EqualityRelation{EO=2*CO}, SquareRelation{square=Square:ABCD}, SegmentRelation:AG, SegmentRelation:DE, ThreeItemsInequalityRelation{multiExpressCompare:(0*Pi)<α<(2*Pi)}, SquareRelation{square=Square:ABCD}, 求值(大小): (ExpressRelation:[key:]α), ProveConclusionRelation:[证明: LinePerpRelation{line1=DE, line2=AG, crossPoint=}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]α)}

399、topic: 如图 $AB \parallel CD$, $\angle 1 = \angle 2$, 试说明 $\angle BEF$ 和 $\angle EFC$ 的大小关系. #%%

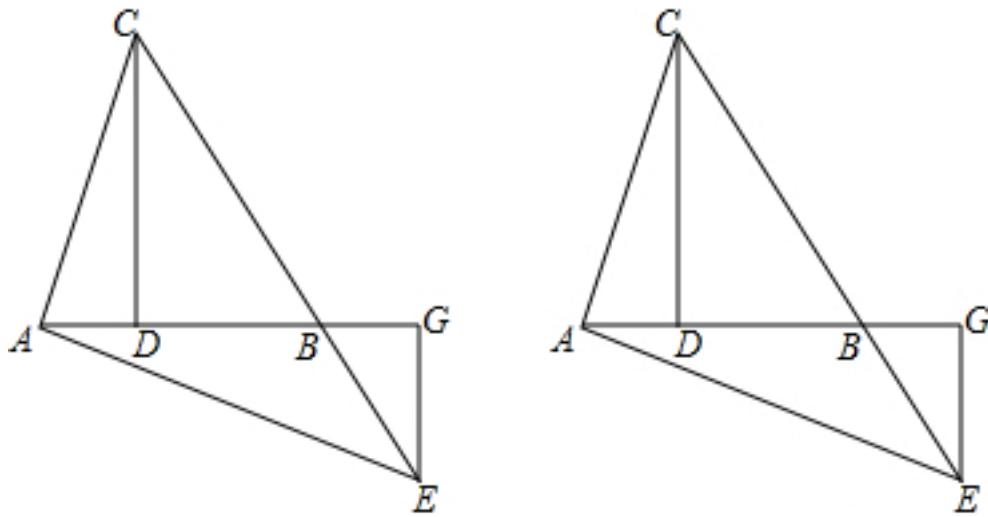


graph:

{"stem": {"pictures": [{"picturename": "1000035800_Q_1.jpg", "coordinates": {"A": "0.46,3.02", "B": "3.00,3.00", "C": "1.94,0.00", "D": "4.81,-0.02", "E": "1.19,1.22", "F": "3.99,2.02"}, "collineations": {"0": "A##B", "1": "B##E", "2": "E##F", "3": "F##C", "4": "C##D"}, "variable>equals": {"0": "\u00b21=\u00b2ABE", "1": "\u00b22=\u00b2DCF"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{ $\angle ABE = \angle DCF$ }, 数字比较大小: DualExpressRelation{expresses=[Express:[$\angle CFE$], Express:[$\angle BEF$]}, SolutionConclusionRelation{relation=数字比较大小: DualExpressRelation{expresses=[Express:[$\angle CFE$], Express:[$\angle BEF$]}}}

400、topic: 已知:如图,在 $\triangle ABC$ 中, $AC=AB$, $CD \perp AB$ 于点D,过点A作 $AE \perp AC$ 交CB的延长线于点E, $EG \perp AB$ 交AB的延长线于点G.求证:#%##%#(1)EC平分 $\angle AEG$ #%#(2)AD=BG



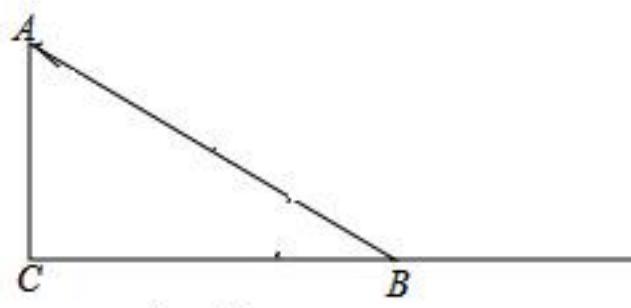
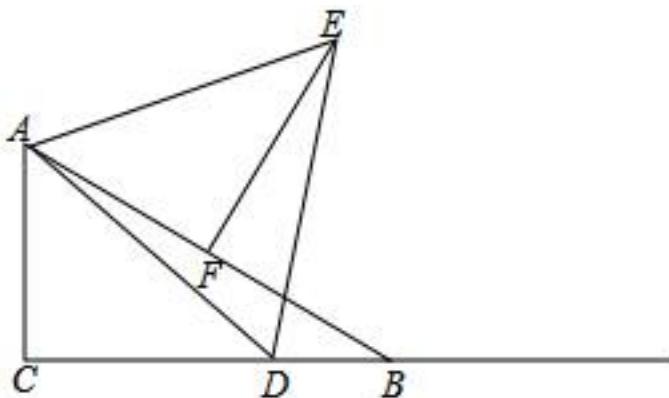
graph:

{"stem": {"pictures": [{"picturename": "1000038099_Q_1.jpg", "coordinates": {"A": "-4.34,-0.66", "B": "-0.61,-0.66", "C": "-2.91,2.78", "D": "-2.91,-0.66", "E": "0.81,-2.80", "G": "0.81,-0.66"}, "collineations": {"0": "A##B", "1": "B##D", "2": "C##E", "3": "E##G"}}, "appliedproblems": {}, "substems": []}}

D####B####G","1":"C##B##E","2":"C##A","3":"D##C","4":"E##G","5":"A##E}),"variable-equals":{},"circles":[]],"appliedproblems":{},"substems":[]}]

NLP: TriangleRelation:△ABC, EqualityRelation{AC=AB}, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, LinePerpRelation{line1=AE, line2=AC, crossPoint=A}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AE, iLine2=CB], PointOnLineRelation{point=A, line=AE, isConstant=false, extension=false}, LinePerpRelation{line1=EG, line2=AB, crossPoint=G}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=EG, iLine2=AB], ProveConclusionRelation:[证明: AngleBisectorRelation{line=EC, angle=∠AEG, angle1=∠AEC, angle2=∠CEG}], ProveConclusionRelation:[证明: EqualityRelation{AD=BG}]

401、topic: 在\$Rt\triangle ABC\$中,\$\angle C=90^\circ\$,\$\angle B=30^\circ\$,\$AB=10\$,点D是射线CB上的一个动点,\$\triangle ADE\$是等边三角形,点F是AB的中点,联结EF.(1)如图,当点D在线段CB上时,#%#①求证:\$\triangle AEF \cong \triangle ADC\$;(2)连接BE,设线段\$CD=x\$,线段\$BE=y\$,求\$\{y\}^2-\{x\}^2\$的值#%#(2)当\$\angle DAB=15^\circ\$时,求\$\triangle ADE\$的面积.



(备用图)

graph:
 {"stem": {"pictures": [{"picturename": "1000026737_Q_1.jpg", "coordinates": {"A": "0.00,5.00", "B": "8.66,0.00", "C": "0.00,0.00", "D": "5.00,0.00", "E": "6.83,6.84", "F": "4.33,2.50"}, "collinearities": {"0": "C##D##B", "1": "C##A", "2": "A##F##B", "3": "E##F", "4": "A##E", "5": "D##E", "6": "A##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}

NLP:
 RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], EqualityRelation{∠ACD=(1/2*Pi)}, EqualityRelation{∠DBF=(1/6*Pi)}, EqualityRelation{AB=10}, PointOnLineRelation{point=D, line=CB, isConstant=false, extension=false}, RegularTriangleRelation:RegularTriangle:△ADE, MiddlePointOfSegmentRelation{middlePoint=F, segment=AB}, PointOnLineRelation{point=D, line=CB, isConstant=false, extension=false}, SegmentRelation:BE, EqualityRelation{CD=x}, EqualityRelation{BE=y}, 求值(大小): (ExpressRelation:[key:](y^2)-(x^2)), EqualityRelation{S_△ADE=v_0}, EqualityRelation{∠DAF=(1/12*Pi)}, 求值(大小): (ExpressRelation:[key:]:v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△AEF, triangleB=△ADC}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](y^2)-(x^2))}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]:S_△ADE)}

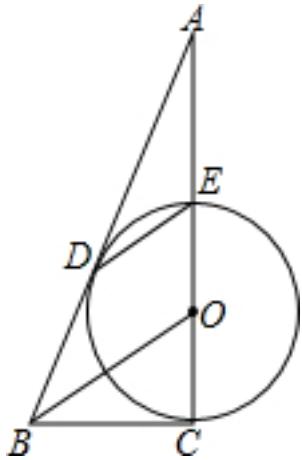
402、topic: 如图,已知\$O\$的直径AB垂直于弦CD,过点C的切线与直径AB的延长线相交于点P,连结PD.?(1)求证:PD是\$O\$的切线;?(2)求证:\$\{PD\}^2=PB\cdot PA\$;?(3)若\$PD=4\$,\$\tan \angle CDB=\frac{1}{2}\$,求直径AB的长.

graph:

{"stem": {"pictures": [{"picturename": "1000025078.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "1.80,-2.40", "D": "1.80,2.40", "P": "5.00,0.00", "O": "0.00,0.00"}, "collineations": {"0": "A###O###P###B", "1": "A###D", "2": "B###D", "3": "P###D", "4": "D###C", "5": "C###P"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###D###B###C"}]}], "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LinePerpRelation{line1=AB, line2=CD, crossPoint=}, SegmentRelation:PD, PointOnLineRelation{point=C, line=PC, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=AB, iLine2=PC], EqualityRelation{AB=v_1}, EqualityRelation{DP=4}, EqualityRelation{tan($\angle BDC$)=(1/2)}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=PD, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.of(P)}], ProveConclusionRelation:[证明: EqualityRelation{((DP)^2)=BP*AP}]

403、topic: 如图,CE是 $\odot O$ 的直径,BD切 $\odot O$ 于点D,DE \parallel BO,CE的延长线交BD于点A. #(1)求证: 直线BC是 $\odot O$ 的切线; #(2)若AE=2,\$\tan \angle DEO=\sqrt{2}\$,求AO的长.#%#



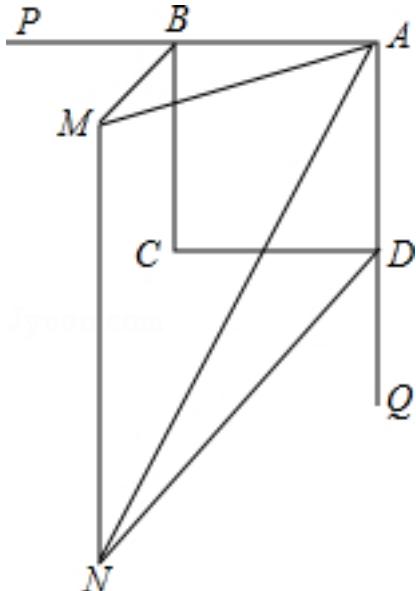
graph:

{"stem": {"pictures": [{"picturename": "1000080992_Q_1.jpg", "coordinates": {"A": "-6.27,5.42", "B": "-8.92, -2.64", "C": "-6.09,-2.58", "D": "-8.04,0.05", "E": "-6.18,1.42", "O": "-6.14,-0.58"}, "collineations": {"0": "A###E ####O###C", "1": "A###D###B", "2": "E###D", "3": "B###C", "4": "B###O"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "E###D###C"}]}], "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=CE, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LineContactCircleRelation{line=BD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(D), outpoint=Optional.of(B)}, LineParallelRelation [iLine1=DE, iLine2=BO], LineCrossRelation [crossPoint=Optional.of(A), iLine1=CE, iLine2=BD], EqualityRelation{AO=v_0}, EqualityRelation{AE=2}, EqualityRelation{tan($\angle DEO$)=(2^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: LineContactCircleRelation{line=BC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(C), outpoint=Optional.of(B)}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AO)}

404、topic: 已知:如图,正方形ABCD,BM、DN分别平分正方形的两个外角,且满足\$\angle MAN = 45^\circ\$,连结MN.(1)若正方形的边长为a,求\$BM \cdot DN\$的值.#%#(2)若以BM,DN,MN为三边围成

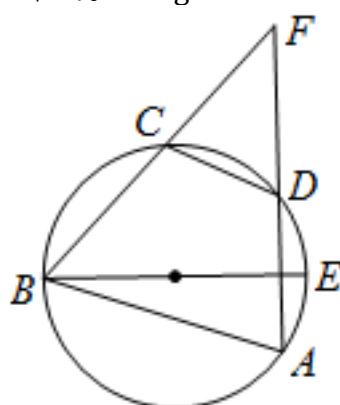
三角形,试猜想三角形的形状,并证明你的结论.



graph:
 {"stem": {"pictures": [{"picturename": "1000010830_Q_1.jpg", "coordinates": {"A": "15.00,5.00", "B": "10.0,5.00", "C": "10.00,0.00", "D": "15.00,0.00", "M": "8.19,3.19", "N": "8.19,-6.74", "P": "6.00,5.00", "Q": "15.00,-4.00"}, "collineations": {"0": "B###P###A", "1": "B##M", "2": "D##Q##A", "3": "A##M", "4": "N##M", "5": "C##D", "6": "A##N", "7": "D##N", "8": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP:
 SquareRelation{square=Square:ABCD}, EqualityRelation{ $\angle MAN = (1/4)\pi$ }, SegmentRelation:MN, SquareRelation{square=Square:ABCD, length=a}, 求值(大小):
 (ExpressRelation:[key:]BM*DN), SegmentRelation:BM, SegmentRelation:DN, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BM*DN)}}

405、topic: 如图所示,已知四边形ABCD是圆内接四边形,EB是 $\odot O$ 的直径,\$\widehat{EA}=\widehat{DE}\$,AD与BC的延长线交于F,求证:\$AB\cdot DC=FD\cdot BC\$.

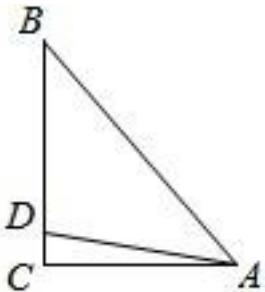


graph:
 {"stem": {"pictures": [{"picturename": "1000060807_Q_1.jpg", "coordinates": {"A": "7.73,5.00", "B": "4.00,6.00", "C": "5.81,7.99", "D": "7.73,7.00", "E": "8.00,6.00", "F": "7.73,10.10", "O": "6.00,6.00"}, "collineations": {"0": "0"}}, "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

:"A##B","1":"B###C###F","2":"F###D###A","3":"B###O###E","4":"B###D","5":"D###C"},"variable-equals":{},"circles":[{"center": "O","pointincircle": "A###E###D###C###B"}],"appliedproblems":{},"subsystems":[]}

NLP: InscribedShapeOfCircleRelation{closedShape=ABCD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, DiameterRelation{diameter=EB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, EqualityRelation{ $\sim AE = \sim DE$ }, LineCrossRelation[crossPoint=Optional.of(F), iLine1=AD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{ $AB*CD = DF*BC$ }]

406、topic: 如图,在\$Rt\triangle ABC\$中,已知\$\angle C=90^\circ\$, \$\angle CAD=\angle BAD\$, \$DC=3\$, \$BD=5\$,求AC的长.



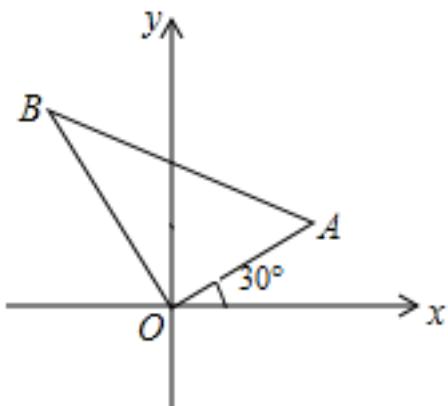
graph:

{"stem": {"pictures": [{"picturename": "1000006716_Q_1.jpg", "coordinates": {"A": "1.00,0.00", "B": "-5.00, 8.00", "C": "-5.00,0.00", "D": "-5.00,3.00"}, "collineations": {"1": "B###C###D", "2": "A###C", "3": "A###B", "4": "A###D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:

EqualityRelation{AC=v_0}, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACD = (1/2 * \pi)$ }, EqualityRelation{ $\angle CAD = \angle BAD$ }, EqualityRelation{CD=3}, EqualityRelation{BD=5}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AC)}

407、topic: 如图,Rt $\triangle ABO$ 的顶点在原点,OA=12,AB=20, $\angle AOb=30^\circ$,求A、B两点的坐标,并求 $\triangle ABO$ 的面积.#%#



graph:

{"stem": {"pictures": [{"picturename": "1000082388_Q_1.jpg", "coordinates": {"A": "5.20,3.00", "B": "-4.00, 6.93", "O": "0.00,0.00"}, "collineations": {"0": "A###B", "1": "A###O", "2": "B###O"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:

EqualityRelation{S_△ABO=v_0}, EqualityRelation{AO=12}, EqualityRelation{AB=20}, EqualityRelation{ $\angle AOB=(1/6\pi)$ }, 坐标PointRelation:A, 坐标PointRelation:B, 求值(大小):
 (ExpressRelation:[key:v_0]), SolutionConclusionRelation{relation=坐标
 PointRelation:A}, SolutionConclusionRelation{relation=坐标
 PointRelation:B}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:S_△ABO])

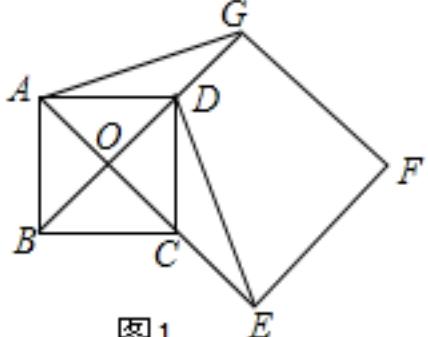
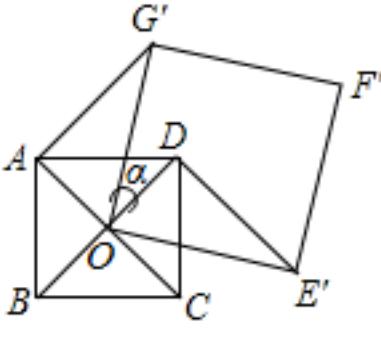
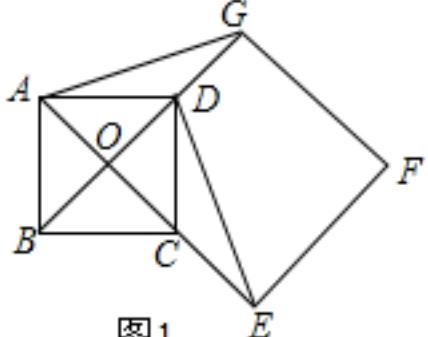
408、topic: 如图1,点O是正方形ABCD两对角线的交点,分别延长OD到点G,OC到点E,使OG=2OD,OE=2OC,然后以OG、OE为邻边作正方形OEFG,连接AG,DE.(1)求证:DE⊥AG;(2)正方形ABCD固定,将正方形OEFG绕点O逆时针旋转 α 角($0^\circ < \alpha < 360^\circ$)得到正方形OE'F'G',如图2,在旋转过程中,当 $\angle OAG'$ 是直角时,求 α 的度数.



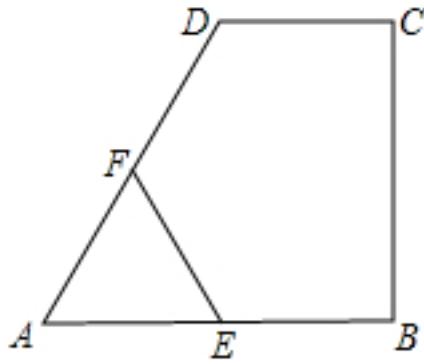
图1

图2

graph:
 {"stem": {"pictures": [{"picturename": "1000061933_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "6.00,-2.00", "F": "10.00,2.00", "G": "6.00,6.00", "O": "2.00,2.00"}, "collinearities": {"0": "A##B", "1": "B##C", "2": "A##G", "3": "A##D", "4": "D##E", "5": "G##F", "6": "F##E", "7": "D##C", "8": "A##O##C##E", "9": "B##O##D##G"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000061933_Q_1.jpg", "coordinates": {"A": "12.00,4.00", "B": "12.00,0.00", "C": "16.00,0.00", "D": "16.00,4.00", "E": "19.46,0.54", "F": "20.93,6.00", "G": "15.46,7.46", "O": "14.00,2.00"}, "collinearities": {"0": "A##B", "1": "B##C", "2": "A##G", "3": "A##D", "4": "D##E", "5": "G##F", "6": "F##E", "7": "D##C", "8": "O##G", "9": "O##E", "10": "A##O##C", "11": "B##O##D"}, "variable>equals": {"0": "\u03b1=\u03d5OG"}, "circles": []}], "appliedproblems": {}}]}

NLP: SquareRelation{square=Square:ABCDintersection : O}, PointOnLineRelation{point=E, line=OC, isConstant=false, extension=false}, EqualityRelation{GO=2*DO}, EqualityRelation{EO=2*CO}, SquareRelation{square=Square:EFGO}, SegmentRelation:AG, SegmentRelation:DE, ThreeItemsInequalityRelation{multiExpressCompare:(0*Pi)<\alpha<(2*Pi)}, SquareRelation{square=Square:ABCD}, 求值(大小):
 (ExpressRelation:[key:\alpha]), ProveConclusionRelation:[证明: LinePerpRelation{line1=DE, line2=AG, crossPoint=}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:\alpha])

409、topic: 如图,在四边形ABCD中,DC||AB,CB⊥AB,AB=AD,\$CD=\frac{1}{2}AB\$,点E、F分别为AB、AD的中点,求 $\triangle AEF$ 与多边形BCDFE的面积之比.


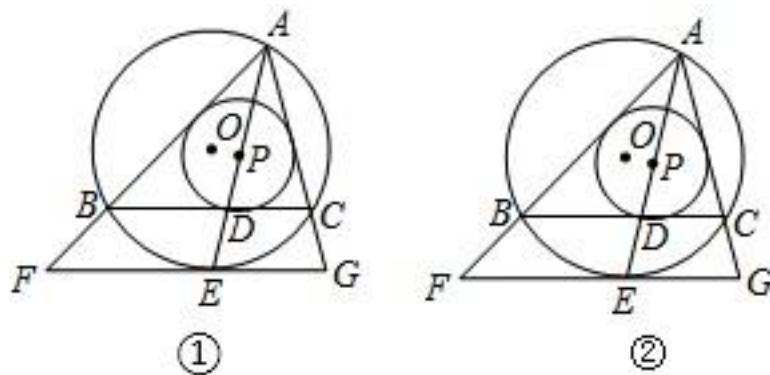


graph:

```
{"stem": {"pictures": [{"picturename": "1000036751_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "4.00,3.00", "D": "2.00,3.00", "E": "2.00,0.00", "F": "1.00,1.50"}, "collineations": {"0": "A###E###B", "1": "A###F###D", "2": "C###D", "3": "C###B", "4": "E###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "substems": []}}
```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LineParallelRelation [iLine1=DC,iLine2=AB],LinePerpRelation{line1=CB, line2=AB,crossPoint=B},EqualityRelation{AB=AD},EqualityRelation{CD=(1/2)*AB},MiddlePointOfSegmentRelation{middlePoint=E,segment=AB},MiddlePointOfSegmentRelation{middlePoint=F,segment=AD}

410、topic: 如图①, $\triangle ABC$ 内接于 $\odot O$,点P是 $\triangle ABC$ 的内切圆的圆心,AP交边BC于点D,交 $\odot O$ 于点E,经过点E作 $\odot O$ 的切线分别交AB、AC延长线于点F、G.?(1)求证: $BC \parallel FG$?#%(2)探究:PE与DE和AE之间的关系;?(3)当图①中的 $FE=AB$ 时,如图②,若 $FB=3$, $CG=2$,求AG的长.



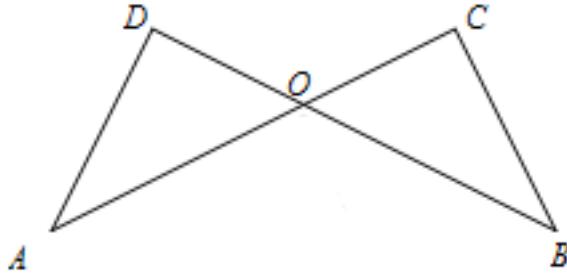
graph:

```
{"stem": {"pictures": [{"picturename": "1000008296_Q_1.jpg", "coordinates": {"A": "0.00,3.74", "B": "-3.00,1.51", "C": "1.11,1.51", "D": "-0.53,1.54", "E": "-0.95,-0.21", "F": "-5.31,-0.20", "G": "1.97,-0.22", "O": "-0.95,1.88", "P": "-0.32,2.40"}, "collineations": {"0": "F###A###B", "1": "G###C###A", "2": "B###C###D", "3": "G##F###E", "4": "A###P###D###E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C###E"}]}], "appliedproblems": {}}, "substems": []}}
```

NLP: CircumscribedShapeOfCircleRelation: $\triangle ABC/\text{Circle}[\odot O_1\{\text{center}=O_1, \text{analytic}=(x-x_{O_1})^2+(y-y_{O_1})^2=r_{O_1}^2\}\text{Points}[], \text{InscribedShapeOfCircleRelation}\{\text{closedShape}=\triangle ABC, \text{circle}=\text{Circle}[\odot O]\{\text{center}=O, \text{analytic}=(x-x_O)^2+(y-y_O)^2=r_O^2\}\}, \text{LineCrossRelation}\{\text{crossPoint}=\text{Optional.of}(D), \text{iLine1}=AP, \text{iLine2}=BC\}, \text{LineCrossCircleRelation}\{\text{line}=AP, \text{circle}=\odot O, \text{crossPoints}=[E], \text{crossPointNum}=1\}, \text{PointRelation}:G, \text{求值(大小)}: (\text{ExpressRelation}:[\text{key}]:(\text{EP}/\text{DE})), \text{求值(大小)}: \text{求值(大小)}\]: (\text{ExpressRelation}:[\text{key}]:(\text{EP}/\text{DE}))]$

(ExpressRelation:[key:](DE/AE)), EqualityRelation{AG=v_2}, EqualityRelation{BF=3}, EqualityRelation{CG=2}, 求值(大小): (ExpressRelation:[key:]v_2), ProveConclusionRelation:[证明: LineParallelRelation [iLine1=BC, iLine2=FG]], SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:](EP/DE))), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:](DE/AE))), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AG)}

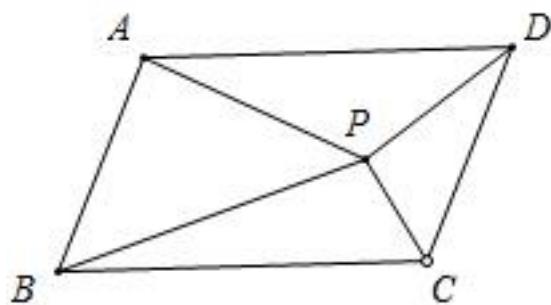
411、topic: 如图,AD=BC,AC=BD,试说明 $\angle DAO = \angle CBO$. #%%



graph:
 {"stem": {"pictures": [{"picturename": "1000035458_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "5.00,0.00", "C": "4.00,2.00", "D": "1.00,2.00", "O": "2.50,1.25"}, "collineations": {"0": "O###A##C", "1": "B##O##D", "2": "C##B", "3": "A##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AD=BC}, EqualityRelation{AC=BD}, ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle DAO = \angle CBO$ }]

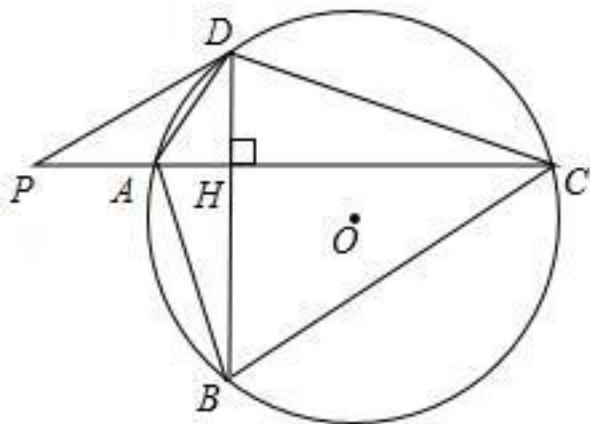
412、topic: 设P是平行四边形\$ABCD\$内部的一点,且 $\angle PBA = \angle PDA$,求证: $\angle PAB = \angle PCB$



graph:
 {"stem": {"pictures": [{"picturename": "1000011150_Q_1.jpg", "coordinates": {"A": "-4.00,7.00", "B": "-5.00,0.00", "C": "5.00,0.00", "D": "6.00,7.00", "P": "4.00,3.00"}, "collineations": {"0": "B##C", "1": "C##D", "2": "A##D", "3": "B##A", "4": "D##P", "5": "C##P", "6": "B##P", "7": "A##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: PositionOfPoint2RegionRelation{point=P, region=EnclosedRegionRelation{name=ABCD, closedShape=Parallelogram:ABCD}, position=inner}, EqualityRelation{ $\angle ABP = \angle ADP$ }, ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle BAP = \angle BCP$ }]

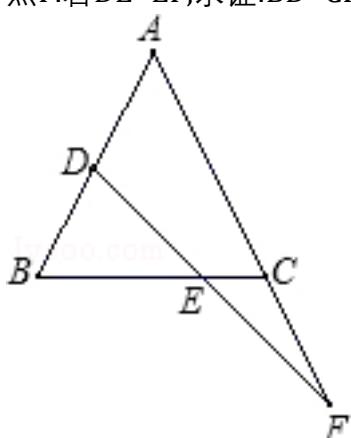
413、topic: 如图, $\odot O$ 的半径 $r=25$,四边形\$ABCD\$内接于 $\odot O$, $AC \perp BD$ 于点H,P为CA延长线上的一点,且 $\angle PDA=\angle ABD$.?%#(1)试判断PD与 $\odot O$ 的位置关系,并说明理由;?%#(2)若 $\tan \angle ADB=\frac{3}{4}$, $PA=\frac{4\sqrt{3}-3}{3}AH$,求BD的长;?%#(3)在(2)的条件下,求四边形\$ABCD\$的面积.



graph:
{"stem": {"pictures": [{"picturename": "1000026292_Q_1.jpg", "coordinates": {"A": "-4.86, 1.17", "B": "-2.50, -4.33", "C": "4.86, 1.17", "D": "-2.50, 4.33", "P": "-7.96, 1.17", "H": "-2.50, 1.17", "O": "0.00, 0.00"}, "collinearities": [{"0": "P###D", "1": "D###B##H", "2": "P###H##A##C", "3": "D##C", "4": "A##D", "5": "A##B", "6": "C##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B##C##D##A"}]}, "appliedproblems": {}, "substems": []}]}

NLP: RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=0, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=Express:[25]}, InscribedShapeOfCircleRelation{closedShape=ABCD, circle=Circle[$\odot O$]{center=0, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, LinePerpRelation{line1=AC, line2=BD, crossPoint=H}, PointOnLineRelation{point=P, line=CA, isConstant=false, extension=true}, EqualityRelation{ $\angle ADP=\angle ABH$ }, EqualityRelation{BD=v_0}, EqualityRelation{ $\tan(\angle ADB)=\frac{3}{4}$ }, EqualityRelation{AP=[$(4*(3^{(1/2)})-3)/3$]*AH}, 求值(大小): (ExpressRelation:[key]:v_0), 已知条件QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{S_ABCD=v_1}, 求值(大小): (ExpressRelation:[key]:v_1), JudgePostionConclusionRelation: [data1=PD, data2=Circle[$\odot O$]{center=0, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:BD)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:S_ABCD)}

414、topic: 如图,在 $\triangle ABC$ 中,AB=AC,D、E分别是AB和BC上的点,连接DE并延长与AC的延长线交于点F.若 $DE=EF$,求证:BD=CF. #%#

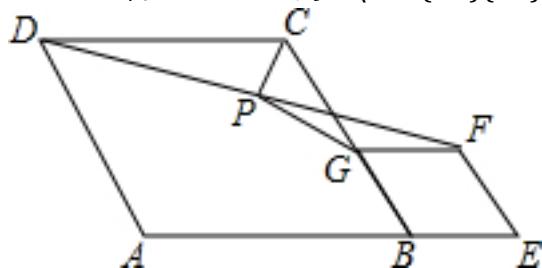


graph:

{"stem": {"pictures": [{"picturename": "1000031148_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-10.0,3.00", "C": "-6.00,3.00", "D": "-8.94,4.59", "E": "-6.95,3.00", "F": "-4.97,1.43"}, "collineations": {"0": "A##B", "1": "A###C###F", "2": "D###E###F", "3": "B###E###C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=AC], EqualityRelation{DE=EF}, ProveConclusionRelation:[证明: EqualityRelation{BD=CF}]

415、topic: 如图,在菱形ABCD和菱形BEFG中,点A、B、E在同一直线上,点P是线段DF的中点,连接PG、PC.若 $\angle ABC=60^\circ$,求 $\frac{PG}{PC}$ 的值.#%#



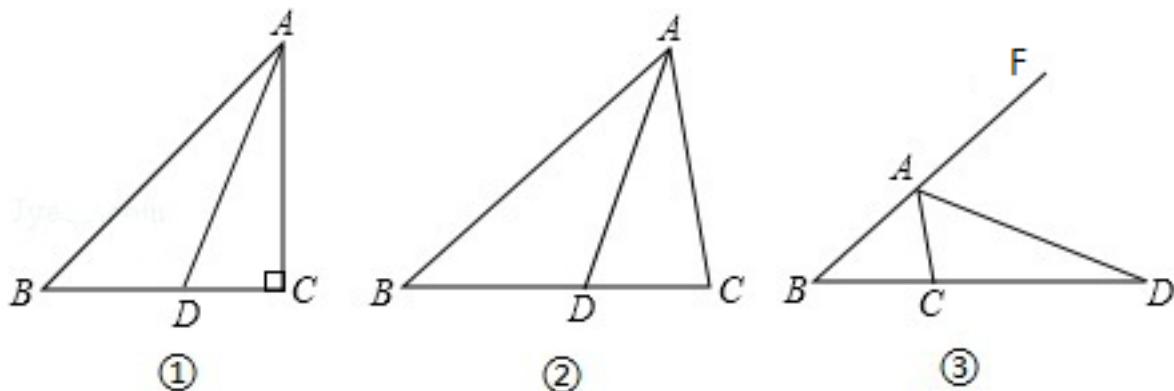
graph:

{"stem": {"pictures": [{"picturename": "1000036602_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "4.00,6.93", "D": "-4.00,6.93", "E": "12.00,0.00", "F": "10.00,3.46", "G": "6.00,3.46", "P": "3.00,5.20"}, "collineations": {"0": "B###G###C", "1": "C###D", "2": "D###A", "3": "A###B###E", "4": "E###F", "5": "F##G", "6": "G###P", "7": "P###C", "8": "D###P###F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

RhombusRelation{rhombus=Rhombus:ABCD}, RhombusRelation{rhombus=Rhombus:BEFG}, MiddlePointOfSegmentRelation{middlePoint=P, segment=DF}, SegmentRelation: PG, SegmentRelation: PC, EqualityRelation{ $\angle ABG = (1/3)\pi$ }, 求值(大小):
(ExpressRelation:[key]: $((GP)/(CP))$), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key]: $((GP)/(CP))$)}

416、topic: 在 $\triangle ABC$ 中, $\angle ACB=2\angle B$.#%#(1)如图①,当 $\angle C=90^\circ$,AD为 $\angle BAC$ 的平分线时,求证: $AB=AC+CD$ #%#(2)如图②,当 $\angle C \neq 90^\circ$,AD为 $\angle BAC$ 的平分线时,线段AB、AC、CD又有怎样的数量关系? 不需要证明,请直接写出你的猜想:#%#(3)如图③,当AD为 $\triangle ABC$ 的外角平分线时,线段AB、AC、CD又有怎样的数量关系? 请写出你的猜想,并对你的猜想给予证明.#%#



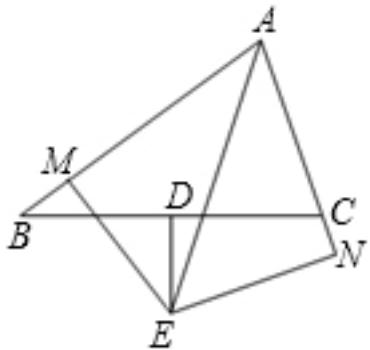
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":1,"questionrelies":1,"picturees":[{"picturename":"1000027251_Q_1.jpg","coordinates":{"A":"4.00,5.00","B":"0.00,0.00","C":"4.00,0.00","D":"2.25,0.00"},"collineations":{"0":"C###D###B","1":"A###C","2":"A###B","3":"D##A"}, "variable-equals":{},"circles":[]}]}, {"substemid":2,"questionrelies":2,"pictures":[{"picturename":"1000027251_Q_2.jpg","coordinates":{"A":"4.00,4.00","B":"0.00,0.00","C":"6.00,0.00","D":"3.36,0.00"},"collineations":{"0":"C###D###B","1":"A###B","2":"D##A","3":"A###C"}, "variable-equals":{},"circles":[]}]}, {"substemid":3,"questionrelies":3,"pictures":[{"picturename":"1000027251_Q_3.jpg","coordinates":{"A":"2.00,1.00","B":"0.00,0.00","C":"2.47,0.00","D":"4.89,0.00","E":"3.00,1.50"},"collineations":{"0":"C###D###B","1":"A###B###E","2":"D##A","3":"A###C"}, "variable-equals":{},"circles":[]}]}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ACD=2*\angle ABD\}$, EqualityRelation $\{\angle ACD=(1/2*\pi)\}$, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, 求值(大小): (ExpressRelation:[key:](AB/AC)), 求值(大小): (ExpressRelation:[key:](AC/CD)), 求值(大小): (ExpressRelation:[key:](AB/AC)), 求值(大小): (ExpressRelation:[key:](AC/CD)), ProveConclusionRelation:[证明: EqualityRelation{AB=AC+CD}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:](AB/AC)), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:](AC/CD)), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:](AB/AC)), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:](AC/CD))}

417、topic: 如图,BD=DC,DE $\perp BC$,交 $\angle BAC$ 的平分线于点E,EM $\perp AB$,EN $\perp AC$,垂足分别为M、N.求证:BM=CN.#%#

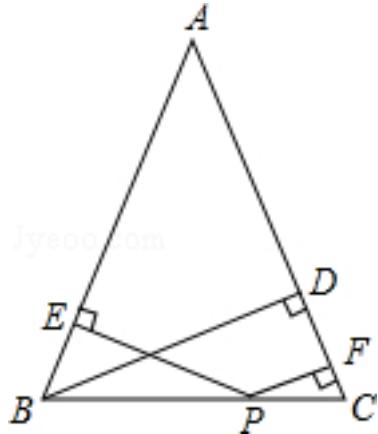


graph:

```
{"stem":{"pictures":[{"picturename":"1000072674_Q_1.jpg","coordinates":{"A":"4.00,3.00","B":"0.00,0.00","C":"5.00,0.00","D":"2.50,0.00","E":"2.50,-1.80","M":"0.74,0.55","N":"5.29,-0.87"},"collineations":{"0":"A###M###B","1":"A##E","2":"A##C##N","3":"B##D##C","4":"E##M","5":"E##D","6":"E##N"}, "variable-equals":{},"circles":[]}]}, "appliedproblems":{},"subsystems":[]}}
```

NLP: AngleBisectorRelation{line=AE, angle= $\angle CAM$, angle1= $\angle CAE$, angle2= $\angle EAM$ }, EqualityRelation{BD=CD}, LinePerpRelation{line1=DE, line2=BC, crossPoint=D}, LinePerpRelation{line1=EM, line2=AB, crossPoint=M}, LinePerpRelation{line1=EN, line2=AC, crossPoint=N}, ProveConclusionRelation:[证明: EqualityRelation{BM=CN}]

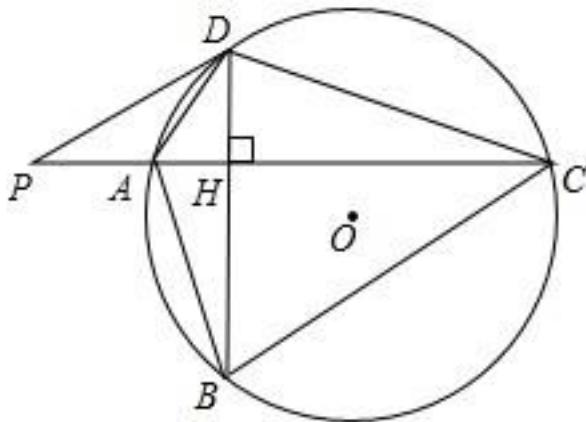
418、topic: 已知:如图,在等腰三角形ABC中,AB=AC,P是底边BC上任意一点,过点P作PE \perp AB,PF \perp AC,垂足分别为E,F,过点B作BD \perp AC,垂足为D.试说明:PE+PF=BD.



graph:
 {"stem": {"pictures": [{"picturename": "1000029258_Q_1.jpg", "coordinates": {"A": "2.00,5.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "3.45,1.38", "E": "0.41,1.03", "F": "3.86,0.34", "P": "3.00,0.00"}, "collineations": [{"0": "A###B###E", "1": "B###P###C", "2": "A###D###F###C", "3": "E###P", "4": "P###F", "5": "B###D"}], "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###D###C###B"}]}, "appliedproblems": {}, "subsystems": []}}

NLP:
 IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{AB=AC}, LinePerpRelation{line1=PE, line2=AB, crossPoint=E}, LinePerpRelation{line1=PF, line2=AC, crossPoint=F}, LinePerpRelation{line1=BD, line2=AC, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{EP+FP=BD}]

419、topic: 如图,\$\odot O\$的半径\$ r=25 \$,四边形\$ABCD\$内接于圆\$\odot O\$, \$AC \perp BD\$于点H,P为CA延长线上的一点,且\$\angle PDA=\angle ABD\$. ?%#(1)试判断PD与\$\odot O\$的位置关系,并说明理由;?%#(2)若\$\tan \angle ADB = \frac{3}{4}\$, \$\frac{PA}{AC} = \frac{4\sqrt{3}-3}{3}AH\$, 求BD的长;?%#(3)在(2)的条件下,求四边形\$ABCD\$的面积 .



graph:
 {"stem": {"pictures": [{"picturename": "1000008339_Q_1.jpg", "coordinates": {"A": "-4.87,1.01", "B": "-3.00,-3.97", "C": "4.88,0.98", "D": "-2.98,3.98", "P": "-6.99,0.97", "H": "-2.99,1.00", "O": "0.00,0.00"}, "collineations": [{"0": "P###A###H###C", "1": "D###H###B", "2": "D###C", "3": "A###D", "4": "A###B", "5": "C###B", "6": "P###D"}], "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###D###C###B"}]}, "appliedproblems": {}, "subsystems": []}}

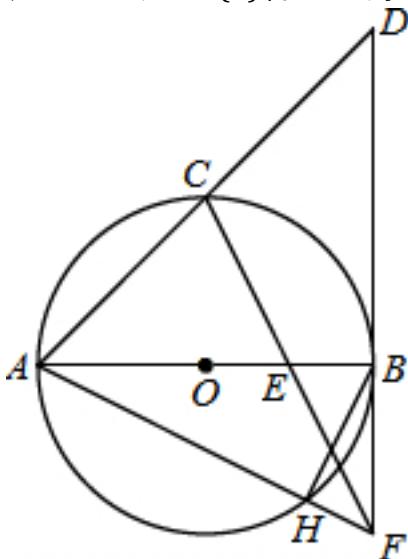
NLP: RadiusRelation{radius=null, circle=Circle[\$\odot O\$]{center=O,

```

analytic=(x-x_0)^2+(y-y_0)^2=r_0^2},
length=Express:[25}],InscribedShapeOfCircleRelation{closedShape=ABCD,
circle=Circle[O]{center=O, analytic=(x-x_0)^2+(y-y_0)^2=r_0^2},LinePerpRelation{line1=AC,
line2=BD, crossPoint=H},PointOnLineRelation{point=P, line=CA, isConstant=false,
extension=true},EqualityRelation{∠ADP=∠ABH},EqualityRelation{BD=v_0},EqualityRelation{tan(∠AD
H)=(3/4)},EqualityRelation{(AP)=(((4*(3^(1/2))-3))/3)*AH},求值(大小): (ExpressRelation:[key:]v_0),
已知条件QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{S_ABCD=v_1},求值(大小):
(ExpressRelation:[key:]v_1),JudgePostionConclusionRelation: [data1=PD, data2=Circle[O]{center=O,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]BD)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]S_ABCD)}

```

420、topic: 如图,AB是 $\odot O$ 的直径,C是 \widehat{AB} 的中点, $\odot O$ 的切线BD交AC的延长线于点D,E是OB的中点,CE的延长线交切线BD于点F,AF交 $\odot O$ 于点H,连接BH.
#%#(1)求证:AC=CD;
#%#(2)若OB=2,求BH的长.#%#



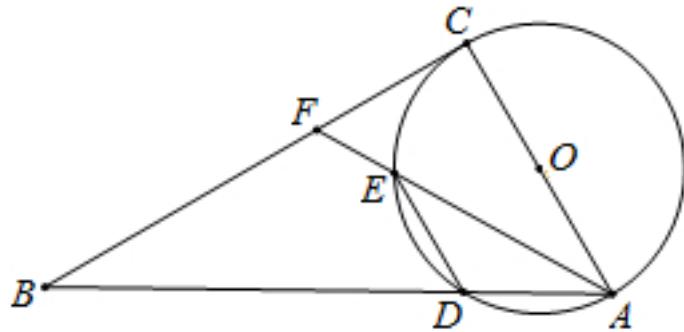
```

graph:
{"stem": {"pictures": [{"picturename": "1000060760_Q_1.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,0.00", "C": "0.00,2.00", "D": "2.01,4.00", "E": "1.00,0.00", "F": "2.01,-2.01", "H": "1.20,-1.60", "O": "0.00,0.00"}, "collinearities": {"0": "A##C##D", "1": "A##H##F", "2": "D##B##F", "3": "C##E##F", "4": "H##B", "5": "A##O##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##C##H##B"}]}, "appliedproblems": {}, "substems": []}}

```

NLP: LineContactCircleRelation{line=BD, circle=Circle[O]{center=O, analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, contactPoint=Optional.of(B), outpoint=Optional.of(D)}, DiameterRelation{diameter=AB, circle=Circle[O]{center=O, analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, length=null}, MiddlePointOfArcRelation:C/type:MAJOR_ARC~AB, LineCrossRelation[crossPoint=Optional.of(D), iLine1=BD, iLine2=AC], MiddlePointOfSegmentRelation{middlePoint=E, segment=OB}, LineCrossRelation[crossPoint=Optional.of(F), iLine1=CE, iLine2=BD], LineCrossCircleRelation{line=AF, circle=O, crossPoints=[H]}, crossPointNum=1}, SegmentRelation:BH, EqualityRelation{BH=v_0}, EqualityRelation{BO=2}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{AC=CD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BH)}

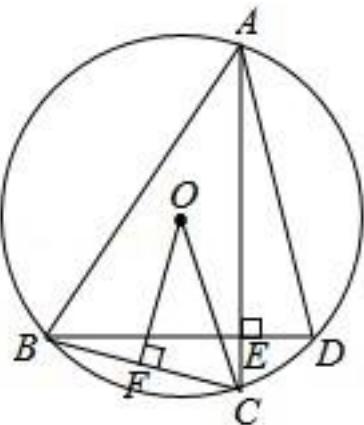
421、topic: 如图,以Rt $\triangle ABC$ 的边AC为直径的 $\odot O$ 交斜边AB于点D,点F为BC上一点,AF交 $\odot O$ 于点E,且 $DE \parallel AC$.#%#(1)求证: $\angle CAF = \angle B$ #%#(2)若 $\odot O$ 的半径为4,AE=2AD,求DE的长.#%#



```
graph
{"stem": {"pictures": [{"picturename": "1000052509_Q_1.jpg", "coordinates": {"A": "1.03,-1.68", "B": "-6.67,-1.75", "C": "-1.09,1.73", "D": "-1.06,-1.70", "E": "-2.03,-0.14", "F": "-3.17,0.43", "O": "-0.03,0.02"}, "collinearities": {"0": "A##D##B", "1": "A##O##C", "2": "C##F##B", "3": "A##E##F", "4": "D##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##D##E##C"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)],LineCrossCircleRelation{line=AB,circle= $\odot O$,crossPoints=[D],crossPointNum=1},DiameterRelation{diameter=AC,circle=Circle[$\odot O$]{center=O,analytic=(x-x_O)^2+(y-y_O)^2=r_O^2},length=null},PointOnLineRelation{point=F,line=BC,isConstant=false,extension=false},LineCrossCircleRelation{line=AF,circle= $\odot O$,crossPoints=[E],crossPointNum=1},LineParallelRelation[iLine1=DE,iLine2=AC],EqualityRelation{DE=v_0},RadiusRelation{radius=null,circle=Circle[$\odot O$]{center=O,analytic=(x-x_O)^2+(y-y_O)^2=r_O^2},length=Express:[4]},EqualityRelation{AE=2*AD},求值(大小):(ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明:EqualityRelation{ $\angle EAO = \angle DBF$ }],SolutionConclusionRelation{relation=求值(大小):(ExpressRelation:[key:]DE)}

422、topic: 如图,点A、B、C、D在 $\odot O$ 上, $AC \perp BD$ 于点E,过点O作 $OF \perp BC$ 于F,求证:#%#(1) $\triangle AEB \sim \triangle OFC$?#%#(2) $AD = 2FO$.

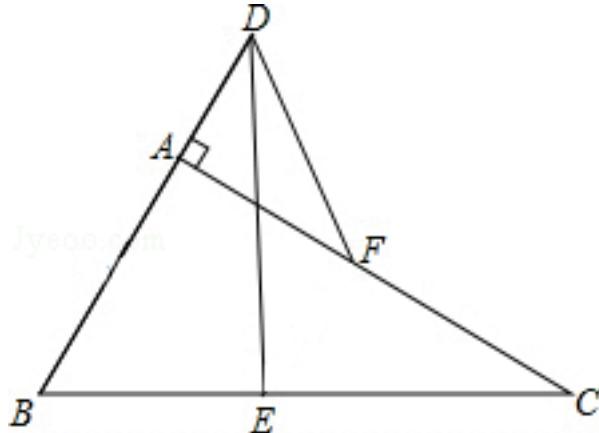


```
graph
{"stem": {"pictures": [{"picturename": "1000008182_Q_1.jpg", "coordinates": {"A": "2.02,5.65", "B": "-4.41,-1.75", "C": "-1.09,1.73", "D": "-1.06,-1.7", "E": "-2.03,-0.14", "F": "-3.17,0.43", "O": "-0.03,0.02"}]}, "appliedproblems": {}, "substems": []}}
```

4.07", "C": "2.02,-5.65", "D": "4.41,-4.07", "E": "2.02,-4.07", "F": "-1.19,-4.86", "O": "0.00,0.00"}, "collineations": [{"0": "B##A", "1": "A##D", "2": "B##C##F", "3": "C##A##E", "4": "O##F", "5": "O##C", "6": "E#D##B"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]], "appliedproblems": {}, "substems": []}

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[A, B, C, D]}, LinePerpRelation{line1=AC, line2=BD, crossPoint=E}, LinePerpRelation{line1=OF, line2=BC, crossPoint=F}, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle AEB$, triangleB= $\triangle OFC$ }], ProveConclusionRelation:[证明: EqualityRelation{AD=2*FO}]

423、topic: 如图,在Rt $\triangle ABC$ 中, $\angle BAC=90^\circ$,E、F分别是BC、AC的中点,延长BA到点D,使 $AD=\frac{1}{2}AB$,连接DE、DF.求证:AF与DE互相平分.



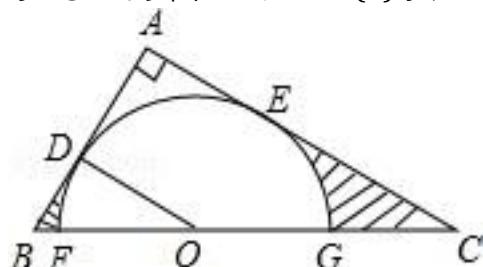
graph:

{"stem": {"pictures": [{"picturename": "1000031962_Q_1.jpg", "coordinates": {"A": "-12.00,5.00", "B": "-13.20,2.00", "C": "-4.50,2.00", "D": "-11.40,6.50", "E": "-8.85,2.00", "F": "-8.25,3.50"}, "collineations": {"0": "D##A##B", "1": "A##F##C", "2": "B##E##C", "3": "D##F", "4": "D##E"}, "variable-equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}}]

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{ $\angle BAF=(1/2\pi)$ }, MiddlePointOfSegmentRelation{middlePoint=E, segment=BC}, MiddlePointOfSegmentRelation{middlePoint=F, segment=AC}, PointOnLineRelation{point=D, line=BA, isConstant=false, extension=true}, EqualityRelation{AD=(1/2)*AB}, SegmentRelation:DE, SegmentRelation:DF, ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=AF, iLine2=DE, crossPoint=Optional.absent()]], ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=DE, iLine2=AF, crossPoint=Optional.absent()]]]

424、topic: 如图,在Rt $\triangle ABC$ 中, $\angle A = 90^\circ$,O是BC边上一点,以O为圆心的半圆与AB边相切于点D,与AC、BC边分别交于点E、F、G,连接OD,已知 $BD = 2$, $AE = 3$, $\tan \angle BOD = \frac{2}{3}$.(1)求 $\odot O$ 的半径OD;(2)求证:AE是 $\odot O$ 的切线;(3)求图中两部分阴影面积的和 .

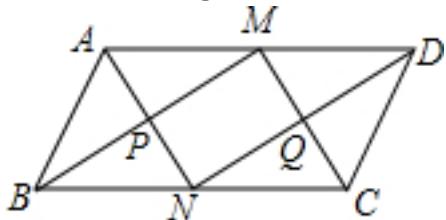


graph:

```
{"stem": {"pictures": [{"picturename": "1000008324_Q_1.jpg", "coordinates": {"A": "-0.45,4.22", "B": "-3.86,0.00", "C": "4.77,0.00", "D": "-2.33,1.89", "E": "1.89,2.33", "F": "-3.00,0.00", "G": "3.00,0.00", "O": "0.00,0.00"}, "collineations": {"0": "D###B###A", "1": "D##O", "2": "E###C###A", "3": "B###F###O###G###C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "E###D###F###G"}]}], "appliedproblems": {}}, "substems": []}
```

NLP: CircleCenterRelation{point=O, conic=Circle[\odot O]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{ $\angle DAE=(1/2\pi)$ }, PointOnLineRelation{point=O, line=BC, isConstant=false, extension=false}, LineContactCircleRelation{line=AB, circle=Circle[\odot O]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.absent()}, SegmentRelation:AB, PointRelation:F, PointRelation:G, SegmentRelation:O D, EqualityRelation{BD=2}, EqualityRelation{AE=3}, EqualityRelation{tan($\angle DOF)=(2/3)$ }, ProveConclusionRelation:[证明: LineContactCircleRelation{line=AE, circle=Circle[\odot O]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(E), outpoint=Optional.of(A)}]

425、topic: 如图所示,M、N分别是 $\square ABCD$ 的对边AD、BC的中点,且 $AD=2AB$,求证:四边形PMQN为矩形.#%#



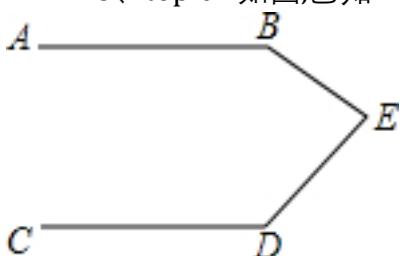
graph:

```
{"stem": {"pictures": [{"picturename": "1000061891_Q_1.jpg", "coordinates": {"A": "6.49,10.61", "B": "5.00,8.00", "C": "11.00,8.00", "D": "12.49,10.61", "M": "9.49,10.61", "N": "8.00,8.00", "P": "7.24,9.30", "Q": "10.24,9.30"}, "collineations": {"0": "A##B", "1": "B##N##C", "2": "C##D", "3": "D##M##A", "4": "A##P##N", "5": "N##Q##D", "6": "B##P##M", "7": "M##Q##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "substems": []}
```

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AD}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BC}, EqualityRelation{AD=2*AB}, ProveConclusionRelation:[证明: RectangleRelation{rectangle=Rectangle:PMQN}]

426、topic: 如图,已知 $AB \parallel CD$,那么 $\angle B+\angle BED+\angle D$ 等于多少度?为什么?#%#



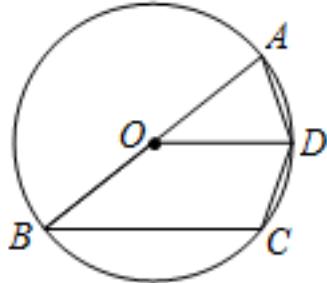
graph:

```
{"stem": {"pictures": [{"picturename": "41D26106C74E45BABD3364FDEFA6C062.jpg", "coordinates": {}}]}, "appliedproblems": {}}, "substems": []}
```

A": "-14.00,5.00", "B": "-9.00,5.00", "C": "-14.00,2.00", "D": "-9.00,2.00", "E": "-6.00,4.00"}, "collineations": {"0": "B###A", "1": "C###D", "2": "B###E", "3": "E###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {"": {}}, "substems": []}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], 求值(大小):
 (ExpressRelation:[key:] $\angle ABE + \angle BED + \angle CDE$), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle ABE + \angle BED + \angle CDE$)

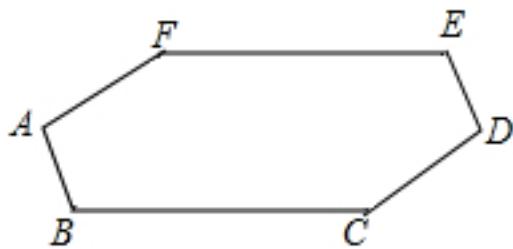
427、topic: 如图,C、D是以AB为直径的 $\odot O$ 上的两点,且OD||BC.求证:AD=DC. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000080913_Q_1.jpg", "coordinates": {"A": "-3.64,3.40", "B": "-9.91, -1.81", "C": "-3.64,-1.81", "D": "-2.70,0.79", "O": "-6.77,0.79"}, "collineations": {"0": "B##O##A", "1": "O##D", "2": "A##D", "3": "C##D", "4": "B##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[C, D]}}, LineParallelRelation [iLine1=OD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{AD=CD}]

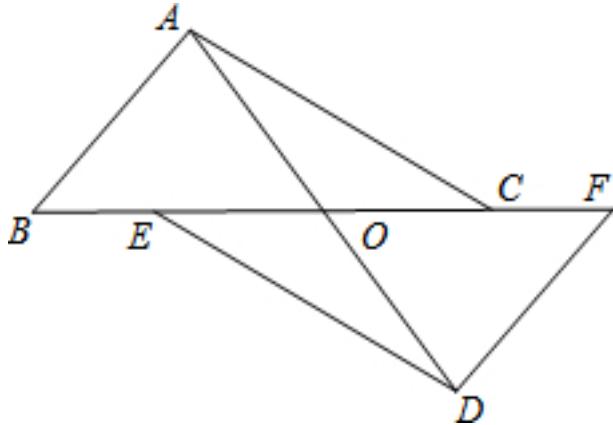
428、topic: 已知:如图,AB=DE,BC=EF,CD=FA, $\angle A=\angle D$.求证: $\angle B=\angle E$. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030751_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-12.00,2.00", "C": "-6.00,2.00", "D": "-4.00,4.00", "E": "-5.00,6.00", "F": "-11.00,6.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "D##E", "4": "E##F", "5": "A##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{AB=DE}, EqualityRelation{BC=EF}, EqualityRelation{CD=AF}, EqualityRelation{ $\angle BAF = \angle CDE$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\angle ABC = \angle DEF$ }]

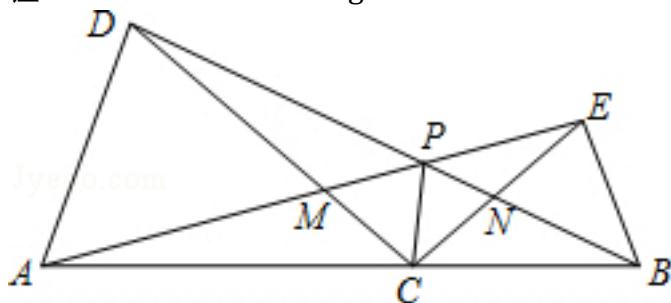
429、topic: 已知:如图,AD、BF相交于点O,点E、C在BF上,BE=FC,AC=DE,AB=DF.求证:OA=OD,OB=OF.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000061418_Q_1.jpg", "coordinates": {"A": "5.00,8.00", "B": "3.00,5.00", "C": "9.00,5.00", "D": "9.00,2.00", "E": "5.00,5.00", "F": "11.00,5.00", "O": "7.00,5.00"}, "collineations": {"0": "A###B", "1": "B###E###C##F", "2": "F##D", "3": "D##E", "4": "A##C", "5": "A##O##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AD, iLine2=BF], PointOnLineRelation{point=E, line=BF, isConstant=false, extension=false}, PointOnLineRelation{point=C, line=BF, isConstant=false, extension=false}, EqualityRelation{BE=CF}, EqualityRelation{AC=DE}, EqualityRelation{AB=DF}, EqualityRelation{BO=FO}, ProveConclusionRelation:[证明: EqualityRelation{AO=DO}]

430、topic: 如图,点C为线段AB上任意一点(不与点A、B重合)分别以AC、BC为一腰在AB的同侧作等腰 $\triangle ACD$ 和等腰 $\triangle BCE$, $CA=CD, CB=CE,\angle ACD=\angle BCE$,连接AE交CD于点M,连接BD交CE于点N,AE与BD交于点P,连接PC.(1)求证: $\triangle ACE\cong\triangle DCB$;(2)求证: $\angle APC=\angle BPC$.#%#



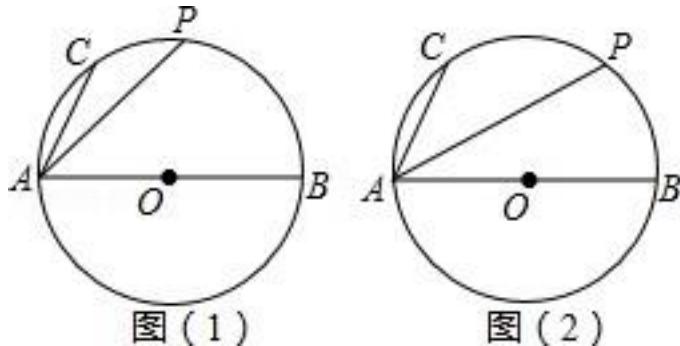
graph:
{"stem": {"pictures": [{"picturename": "48543683E4D8491D8721087C3027BEEA.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-5.00,3.00", "C": "-8.00,3.00", "D": "-12.91,6.44", "E": "-5.54,4.72", "M": "-9.35,3.95", "N": "-6.85,3.80", "P": "-7.87,4.25"}, "collineations": {"0": "C##A##B", "1": "A##M##P##E", "2": "D##A", "3": "D##B##P##N", "4": "B##E", "5": "D##M##C", "6": "E##N##C", "7": "P##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: PointRelation:A,PointRelation:B,EqualityRelation{AC=CD},EqualityRelation{BC=CE},已知条件AcuteAngleRelation: $\angle ACM/\text{ACUTE_ANGLE}$,已知条件

AcuteAngleRelation: $\angle BCN/\text{ACUTE_ANGLE}$,EqualityRelation{ $\angle ACM=\angle BCN$ },LineCrossRelation [crossPoint=Optional.of(M), iLine1=AE, iLine2=CD],LineCrossRelation [crossPoint=Optional.of(N),

iLine1=BD, iLine2=CE], LineCrossRelation [crossPoint=Optional.of(P), iLine1=AE, iLine2=BD], ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ACE$, triangleB= $\triangle DCB$ }], ProveConclusionRelation:[证明: EqualityRelation{ $\angle CPM = \angle CPN$ }]]

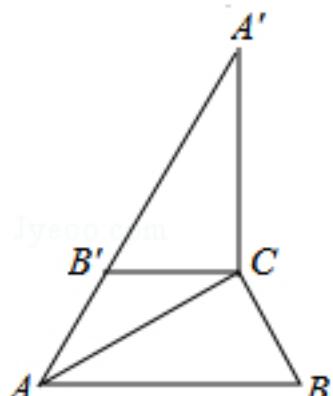
431、topic: 如图,AB是 $\odot O$ 的直径,C、P是 \widehat{AB} 上两点, $AB=13$, $AC=5$. ?%#(1)如图(1),若点P是 \widehat{AB} 的中点,求PA的长;?(2)如图(2),若点P是 \widehat{BC} 的中点,求PA的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000024956.jpg", "coordinates": {"A": "0.00,0.00", "B": "13.00,0.00", "C": "1.92,4.62", "O": "6.50,0.00"}, "collineations": {"0": "B###A##O", "1": "C##A"}, "variable>equals": {}}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}, "appliedproblems": {}, "substems": [{"substmid": "1", "questionrelies": "", "pictures": [{"picturename": "1000024956.jpg", "coordinates": {"P": "6.50,6.50"}, "collineations": {"0": "A##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000024956.jpg", "coordinates": {"P": "9.00,6.00"}, "collineations": {"0": "A##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, PointOnArcRelation{point=C, arc=type:MAJOR_ARC \cap AB}, PointOnArcRelation{point=P, arc=type:MAJOR_ARC \cap AB}, EqualityRelation{AB=13}, EqualityRelation{AC=5}, EqualityRelation{AP=v_0}, MiddlePointOfArcRelation:P/type:MAJOR_ARC \cap AB, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{AP=v_1}, MiddlePointOfArcRelation:P/type:MAJOR_ARC \cap BC, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AP)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AP)}

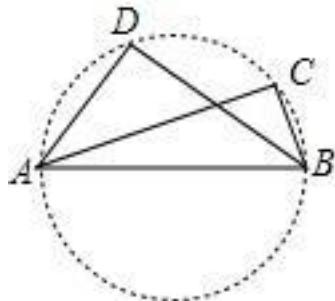
432、topic: 如图,在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$, $\angle B=60^\circ$, $BC=2$, $\triangle A'B'C$ 可以由 $\triangle ABC$ 绕点C顺时针旋转得到,其中点A'与点A是对应点,点B'与点B是对应点,连接AB',且A、B'、A'在同一直线上,求AA'的长度.%#



graph:
 {"stem": {"pictures": [{"picturename": "1000031476_Q_1.jpg", "coordinates": {"A": "-11.00,3.00", "B": "-7.0 0,3.00", "C": "-8.00,4.73", "A)": "-8.00,8.20", "B)": "-10.00,4.73"}, "collineations": {"0": "A###B", "1": "B###B", "2": "C##A", "3": "B'##C", "4": "A'##C", "5": "A##A'##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{AA'=v_1}, RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], EqualityRelation{∠ACB=(1/2*Pi)}, EqualityRelation{∠ABB=(1/3*Pi)}, EqualityRelation{BC=2}, SegmentRelation:AB', PointRelation:A, PointRelation:B', 求值(大小):
 (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AA')}

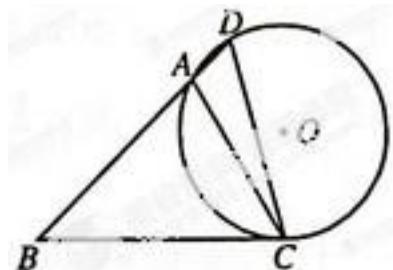
433、topic: 如图,\$\triangle ABC\$和\$\triangle ABD\$都为直角三角形,且\$\angle C=\angle D=90^{\circ}\$.求证:A、B、C、D四点在同一个圆上.



graph:
 {"stem": {"pictures": [{"picturename": "1000024874_Q_1.jpg", "coordinates": {"A": "-10.93,4.18", "B": "-0.9 8,4.07", "C": "-1.99,7.13", "D": "-9.22,7.13"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##C", "3": "B##D", "4": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], RightTriangleRelation:RightTriangle:△ABD[Optional.of(D)], PointRelation:B, PointRelation:C

434、topic: 如图,在\$\vartriangle ABC\$中,\$\angle B=45^\circ\$,\$\angle ACB=60^\circ\$,\$AB=3\sqrt{2}\$,点\$D\$为\$BA\$延长线上的一点,且\$\angle D=\angle ACB\$,\$\odot O\$为\$\vartriangle ACD\$的外接圆.(1)求\$BC\$的长; #(2)求\$\odot O\$的半径.



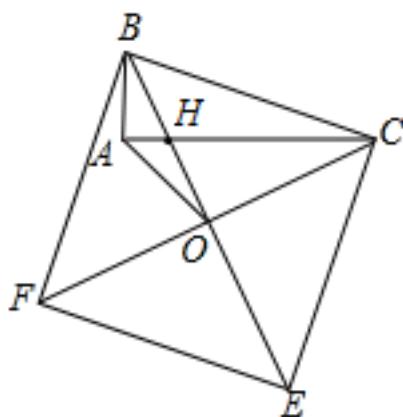
graph:
 {"stem": {"pictures": [{"picturename": "1000010402_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "-3.00,3.00", "C": "0.00,-3.00", "D": "-3.00,-3.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "D##A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

0.00","C":"1.73,0.00","D":"0.73,0.73","O":"1.73,2.00"},"collineations":[{"0":"B###A###D","1":"C###A","2":"C##D","3":"C##B"}],"variable-equals":{},"circles":[{"center":O,"pointincircle":C##D##A}]}],"appliedproblems":{},"substems":[]}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ABC = (1/4\pi)\}$, EqualityRelation $\{\angle ACB = (1/3\pi)\}$, EqualityRelation $\{AB = 3 * (2^{(1/2)})\}$, PointOnLineRelation $\{point=D, line=BA, isConstant=false, extension=true\}$, EqualityRelation $\{\angle ADC = \angle ACB\}$, InscribedShapeOfCircleRelation $\{closedShape=\triangle ACD, circle=Circle[\odot O]\{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2\}\}$, EqualityRelation $\{BC=v_0\}$, 求值(大小): (ExpressRelation:[key:]v_0), 圆的半径: CircleRelation{circle=Circle[\odot O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CO)}

435、topic: 如图,以Rt $\triangle ABC$ 的斜边BC为一边在 $\triangle ABC$ 的同侧作正方形BCEF,设正方形的中心为点O,连接AO.如果 $AB=4$, $AO=6\sqrt{2}$,求AC的长.#%#

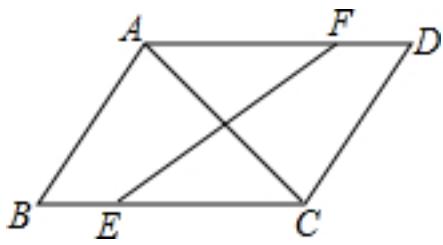


graph:
{"stem":{"pictures":[{"picturename":"1000034724_Q_1.jpg","coordinates":{"A":"5.00,0.00","B":"4.52,1.94","C":"12.76,1.94","E":"12.76,-6.31","F":"4.51,-6.31","O":"8.64,-2.19","H":"6.16,0.29"},"collineations":[{"0":"B###A","1":"O###A","2":"B##F","3":"B##C","4":"C##E","5":"E##F","6":"F##O##C","7":"A##H##C","8":"B##H##O##E"}],"variable-equals":{},"circles":[]},"appliedproblems":{},"substems":[]}}

NLP:

EqualityRelation $\{AC=v_0\}$, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], SquareRelation{square=Square:BCE}, SegmentRelation:BC, SquareRelation{square=Square:BCE}intersection : O, SegmentRelation:AO, EqualityRelation $\{AB=4\}$, EqualityRelation $\{AO=6*(2^{(1/2)})\}$, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AC)}

436、topic: 已知:如图,在 $\square ABCD$ 中,点E、F分别在BC、AD上,且 $BE=DF$.#%#求证:AC、EF互相平分.#%#

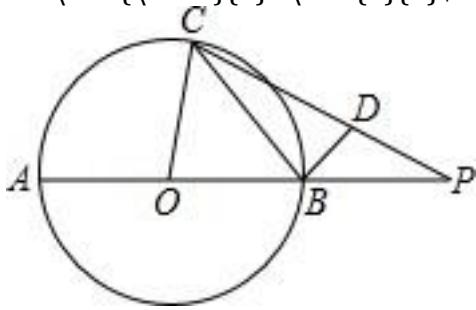


graph:

```
{"stem": {"pictures": [{"picturename": "1000081625_Q_1.jpg", "coordinates": {"A": "1.00,4.00", "B": "0.00,0.00", "C": "5.00,0.00", "D": "6.00,4.00", "E": "1.00,0.00", "F": "5.00,4.00"}, "collineations": {"0": "A###F##D", "1": "B###E###C", "2": "B###A", "3": "D###C", "4": "E###F", "5": "C###A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AD, isConstant=false, extension=false}, EqualityRelation{BE=DF}, ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=AC, iLine2=EF, crossPoint=Optional.absent()]], ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=EF, iLine2=AC, crossPoint=Optional.absent()]]

437、topic: 如图,AB是 $\odot O$ 的直径,延长AB至P,使\$BP=OB\$,#%#BD垂直于弦BC,垂足为点B,点D在PC上.设\$\angle PCB=\alpha \$,\$\angle POC=\beta \$.求证\$\tan \alpha \cdot \tan \frac{\beta }{2}=\frac{1}{3}\$.

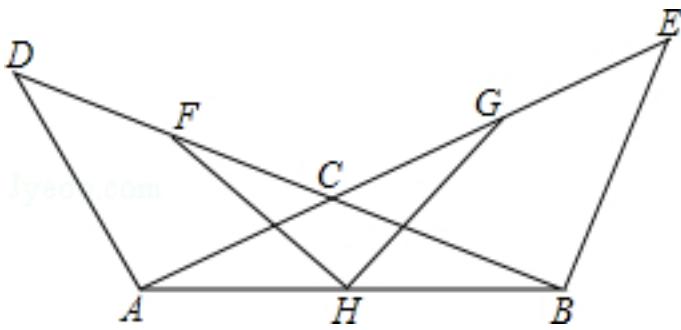


graph:

```
{"stem": {"pictures": [{"picturename": "1000010396_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "5.00,0.00", "C": "0.45,4.98", "D": "6.07,2.05", "O": "0.00,0.00", "P": "10.00,0.00"}, "collineations": {"0": "B###A##D##P", "1": "C##O", "2": "D##B", "3": "C##D##P", "4": "C##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: DiameterRelation{diameter=AB, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, length=null}, PointOnLineRelation{point=P, line=AB, isConstant=false, extension=true}, EqualityRelation{BP=BO}, ChordOfCircleRelation{chord=BC, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, chordLength=null, straightLine=null}, LinePerpRelation{line1=BD, line2=BC, crossPoint=B}, PointOnLineRelation{point=D, line=PC, isConstant=false, extension=false}, EqualityRelation{\$\angle BCD=\alpha\$}, EqualityRelation{\$\angle POC=\beta\$}, ProveConclusionRelation:[证明: EqualityRelation{\$\tan(\alpha) * \tan(\beta/2) = (1/3)\$}]}

438、topic: 如图,已知AE、BD相交于点C,AC=AD,BC=BE,F、G、H分别是DC、CE、AB的中点.求证:#%#(1)HF=HG;#%#(2)\$\angle FHG=\angle DAC\$.#%#

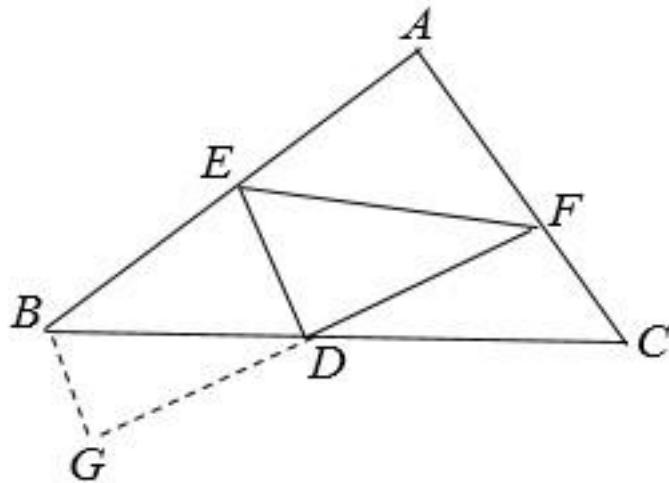


graph:

{"stem": {"pictures": [{"picturename": "1000041565_Q_1.jpg", "coordinates": {"A": "-9.97,2.04", "B": "-5.98,2.04", "C": "-7.98,2.86", "D": "-10.80,4.03", "E": "-5.16,4.03", "F": "-9.39,3.45", "G": "-6.57,3.45", "H": "-7.98,2.04"}, "collineations": {"0": "A###H##B", "1": "A##D", "2": "B##E", "3": "D##F##C##B", "4": "A##C##G##E", "5": "F##H", "6": "G##H"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}

NLP: LineCrossRelation [crossPoint=Optional.of(C), iLine1=AE, iLine2=BD], EqualityRelation{AC=AD}, EqualityRelation{BC=BE}, MiddlePointOfSegmentRelation{middlePoint=F, segment=DC}, MiddlePointOfSegmentRelation{middlePoint=G, segment=CE}, MiddlePointOfSegmentRelation{middlePoint=H, segment=AB}, ProveConclusionRelation:[证明: EqualityRelation{FH=GH}], ProveConclusionRelation:[证明: EqualityRelation{∠FHG=∠CAD}]

439、topic: 如图,\$\triangle ABC\$中,E、F分别在AB、AC上,\$DE \perp DF\$,D是BC的中点,延长FD到G,使\$DG=DF\$,连接BG.?(1)求证:\$\triangle BGD \cong \triangle CFD\$;?(2)试比较\$BE+CF\$与\$EF\$的大小.



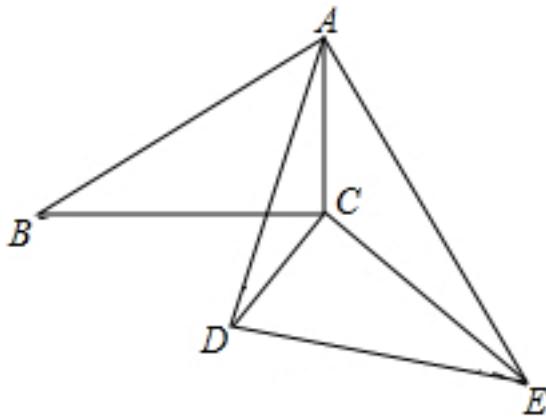
graph:

{"stem": {"pictures": [{"picturename": "1000026552_Q_1.jpg", "coordinates": {"A": "0.49,2.53", "B": "-2.50,0.00", "C": "2.99,0.00", "D": "0.00,0.00", "E": "-0.74,1.49", "F": "2.00,1.00", "G": "-2.00,-1.00"}, "collineations": {"0": "B##D##C", "1": "G##F##D", "2": "F##A##C", "3": "B##A##E", "4": "F##E", "5": "B##G", "6": "D##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}

NLP: TriangleRelation:△ABC, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, LinePerpRelation{line1=DE, line2=DF, crossPoint=D}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, PointOnLineRelation{point=G, line=FD, isConstant=false, extension=true}, EqualityRelation{DG=DF}, SegmentRelation:BG, 数字比较大小: DualExpressRelation{expresses=[Express:[EF],

Express:[BE+CF]],ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△BGD, triangleB=△CFD}],SolutionConclusionRelation{relation=数字比较大小: DualExpressRelation{expresses=[Express:[EF], Express:[BE+CF]]}}

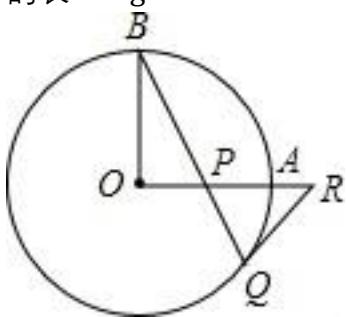
440、topic: 如图,已知 $\angle ACB = \angle DCE = 90^\circ$, $\angle ABC = \angle CED = \angle CAE = 30^\circ$, $AC = 3$, $AE = 8$,求AD的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000081327_Q_1.jpg", "coordinates": {"A": "0.00,1.50", "B": "-2.60, 0.00", "C": "0.00,0.00", "D": "-1.14,-1.15", "E": "2.00,-1.96"}, "collineations": {"0": "A###D", "1": "A###C", "2": "A###B", "3": "A###E", "4": "B###C", "5": "C###E", "6": "E###D", "7": "C###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AD=v_0},MultiEqualityRelation
 [multiExpressCompare= $\angle ACB = \angle DCE = (1/2\pi)$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare= $\angle ABC = \angle CED = \angle CAE = (1/6\pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AC=3}, EqualityRelation{AE=8}, 求值(大小): (ExpressRelation:[key:v_0]), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:AD])}

441、topic: 如图,OA和OB是 $\odot O$ 的半径,并且 $OA \perp OB$,P是OA上任一点,BP的延长线交 $\odot O$ 于点Q,过点Q的 $\odot O$ 的切线交OA延长线于点R.?#%#(1)求证: $RP = RQ$?#%#(2)若 $OP = PA = 1$,试求PQ的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000008294_Q_1.jpg", "coordinates": {"A": "2.00,0.00", "B": "0.00,2.00", "P": "1.00,0.00", "Q": "1.60,-1.20", "R": "2.50,0.00", "O": "0.00,0.00"}, "collineations": {"0": "Q###P##B", "1": "B##O", "2": "O###P##A##R", "3": "Q##R"}, "variable>equals": {}, "circles": [{"center": "O", "poi": "Q"}]}}}

ntincircle": "A###B###Q"}]}], "appliedproblems": {}, "substems": []}

NLP: RadiusRelation{radius=OA, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, RadiusRelation{radius=OB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LinePerpRelation{line1=OA, line2=OB, crossPoint=O}, PointOnLineRelation{point=P, line=OA, isConstant=false, extension=false}, LineCrossCircleRelation{line=BP, circle= $\odot O$, crossPoints=[Q], crossPointNum=1}, LineCrossRelation [crossPoint=Optional.of(R), iLine1=OA, iLine2=RQ], PointOnLineRelation{point=Q, line=RQ, isConstant=false, extension=false}, EqualityRelation{PQ=v_1}, MultiEqualityRelation [multiExpressCompare=OP=AP=1, originExpressRelationList=[], keyWord=null, result=null], 求值(大小): (ExpressRelation:[key:]v_1), ProveConclusionRelation:[证明: EqualityRelation{PR=QR}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]PQ)}

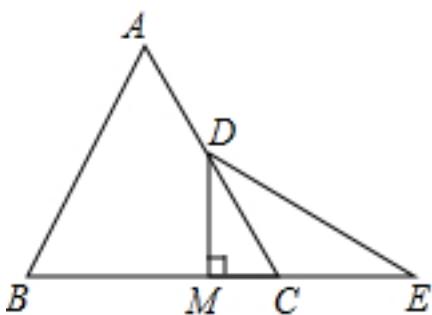
442、topic: 如图,已知线段AB.#%#(1)作图:延长线段AB到C,使得AC=3AB;#%#(2)当AB的长等于2cm时,求线段BC的长.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000081104_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "2.00,0.00", "C": "6.00,0.00"}, "collineations": {"0": "A###B###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: SegmentRelation:AB, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=true}, EqualityRelation{AC=3*AB}, EqualityRelation{AB=v_0}, EqualityRelation{BC=v_1}, EqualityRelation{v_0=2}, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}

443、topic: 如图,在等边三角形ABC中,D是AC的中点,E是BC延长线上一点,且CE=CD,DM \perp BC,垂足为M.求证:M是BE的中点.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000072715_Q_1.jpg", "coordinates": {"A": "2.00,3.46", "B": "0.00,0.00", "C": "4.00,0.00", "D": "3.00,1.73", "E": "6.00,0.00", "M": "3.00,0.00"}, "collineations": {"0": "B###M###C", "1": "A###D###C", "2": "B###A", "3": "D###E", "4": "D###M"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}

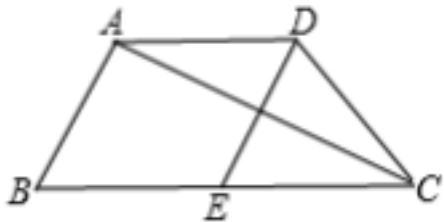
NLP:
RegularTriangleRelation:RegularTriangle: $\triangle ABC$, MiddlePointOfSegmentRelation{middlePoint=D, segment=AC}, PointOnLineRelation{point=E, line=BC, isConstant=false},

```

extension=true},EqualityRelation{CE=CD},LinePerpRelation{line1=DM, line2=BC,
crossPoint=M},ProveConclusionRelation:[证明:
MiddlePointOfSegmentRelation{middlePoint=M,segment=BE}]

```

444、topic: 已知:如图,在四边形ABCD中,AD||BC,CA平分 $\angle DCE$,AB \perp AC,E为BC的中点.试说明:DE、AC互相垂直平分.#%#



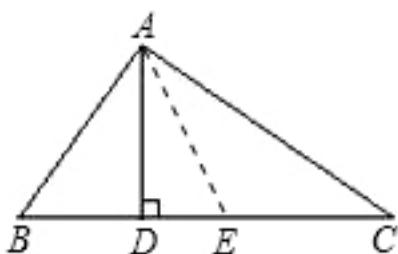
```

graph:
{"stem": {"pictures": [{"picturename": "1000041786_Q_1.jpg", "coordinates": {"A": "-12.50,7.60", "B": "-14.00,5.00", "C": "-8.00,5.00", "D": "-9.50,7.60", "E": "-11.00,5.00"}, "collinearities": {"0": "A##D", "1": "A##C", "2": "A##B", "3": "B##E##C", "4": "D##E", "5": "D##C"}, "variable>equals": {}, "circles": []}], "applied problems": {}, "substems": []}

```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LineParallelRelation [iLine1=AD, iLine2=BC],AngleBisectorRelation{line=CA,angle= $\angle DCE$, angle1= $\angle ACD$, angle2= $\angle ACE$ },LinePerpRelation{line1=AB, line2=AC, crossPoint=A},MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},ProveConclusionRelation :[MiddlePerpendicularRelation [iLine1=DE, iLine2=AC, crossPoint=Optional.absent()]],ProveConclusionRelation:[MiddlePerpendicularRelation [iLine1=AC, iLine2=DE, crossPoint=Optional.absent()]]]

445、topic: 如图,AD是 $\triangle ABC$ 的高, $\angle B=2\angle C$, $BD=5$, $BC=20$,求AB的长.#%#



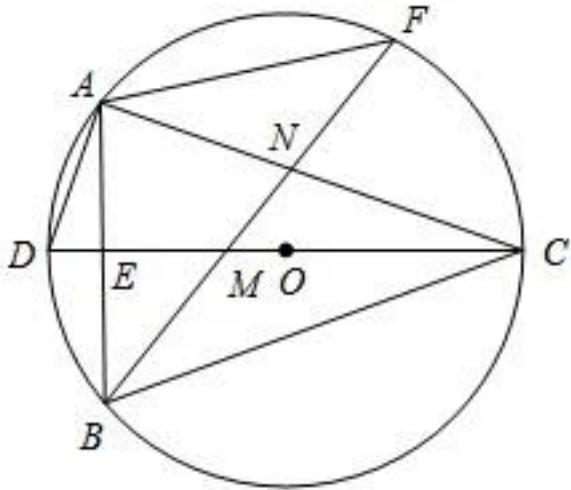
```

graph:
{"stem": {"pictures": [{"picturename": "1000080525_Q_1.jpg", "coordinates": {"A": "-1.75,2.17", "B": "-3.00,0.00", "C": "2.00,0.00", "D": "-1.75,0.00", "E": "-0.50,0.00"}, "collinearities": {"0": "B##D##E##C", "1": "A##B", "2": "A##D", "3": "A##E", "4": "A##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}

```

NLP:
EqualityRelation{AB=v_0},TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle ABD=2*\angle ACE$ },EqualityRelation {BD=5},EqualityRelation{BC=20},求值(大小): (ExpressRelation:[key:]v_0),LinePerpRelation{line1=AD, line2=BD, crossPoint=D},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)}

446、topic: 已知:如图,\$\triangle ABC\$内接于\$\odot O\$,直径\$CD\perp AB\$,垂足为E,弦BF交CD于点M,交AC于点N,且\$BF=AC\$,连结AD.?%#(1)求证:\$AD\cdot BE=DE\cdot BC\$;?%#(2)请判断线段BM、MN、MF之间有怎样的等量关系,并给予证明;?%#(3)当\$\angle ACB=30^\circ\$,\$\odot O\$半径为4时,求\$\frac{\{S_{\triangle ABF}}{\{S_{\triangle ANF}}\$的值.

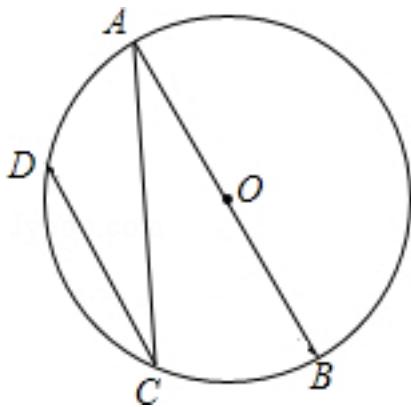


graph:

```
{"stem":{"pictures":[{"picturename":"1000027090_Q_1.jpg","coordinates":{"A":"2.54,8.00","B":"2.54,4.00","C":"10.00,6.00","D":"2.00,6.00","E":"2.54,6.00","F":"8.00,9.46","M":"4.54,6.00","N":"5.69,7.16","O":"6.00,6.00"}],"collinearities":{"0":"D##A","1":"A##E##B","2":"A##N##C","3":"A##F","4":"B##F","5":"B##C","6":"C##O##M##D"}, "variable>equals":{}, "circles":[]}, "appliedproblems":{}}, "subsystems":[]}
```

NLP: DiameterRelation{diameter=CD, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, length=null}, ChordOfCircleRelation{chord=BF, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, chordLength=null, straightLine=null}, InscribedShapeOfCircleRelation{closedShape=\$\triangle ABC\$, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}}, LinePerpRelation{line1=CD, line2=AB, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=BF, iLine2=CD], LineCrossRelation [crossPoint=Optional.of(N), iLine1=BF, iLine2=AC], EqualityRelation{BF=AC}, SegmentRelation:AD, 求值(大小):
 (ExpressRelation:[key:]\$(BM/MN)\$), 求值(大小):
 (ExpressRelation:[key:]\$(MN/FM)\$), EqualityRelation{\$\angle BCN=(1/6\pi)\$}, RadiusRelation{radius=null, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, length=Express:[4]}}, 求值(大小):
 (ExpressRelation:[key:]\$S_{\triangle AFN}/S_{\triangle ABF}\$), ProveConclusionRelation:[证明:
 EqualityRelation{AD*BE=DE*BC}], SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]\$(BM/MN)\$), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]\$(MN/FM)\$), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]\$S_{\triangle AFN}/S_{\triangle ABF}\$)}

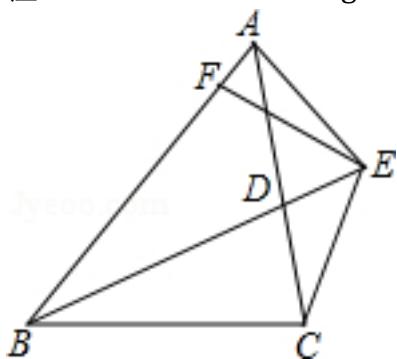
447、topic: 如图,已知\$\odot O\$的直径\$AB=d\$,弦\$AC=a\$, \$\widehat{AD}=\widehat{BC}\$,求A,D两点间的距离.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000083426_Q_1.jpg", "coordinates": {"A": "-1.11,1.66", "B": "1.11,-1.66", "C": "0.00,-2.00", "D": "-1.85,0.77", "O": "0.00,0.00"}, "collineations": {"0": "B###O###A", "1": "A###C", "2": "D###C"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C##D"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: DistanceOfDualPointsRelation{pointA=A, pointB=D, distance=Express:[v_0]}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=Express:[AB=d]}, ChordOfCircleRelation{chord=AC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, chordLength=null, straightLine=null}, EqualityRelation{AC=a}, EqualityRelation{ $\cap AD = \cap BC$ }, 求值(大小): (ExpressRelation:[key:v_0]), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:v_0])}

448、topic: 已知:如图,BD为 $\triangle ABC$ 的角平分线,且 $BD=BC$,E为BD延长线上的一点, $BE=BA$,过E作 $EF \perp AB$,F为垂足.
 #%(1)求证: $\triangle ABD \cong \triangle EBC$;
 #%(2)求证: $\angle BCE + \angle BCD = 180^\circ$;
 #%(3)求证: $BA+BC=2BF$.#%#

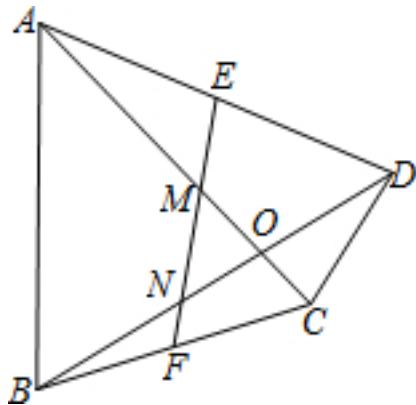


graph:
 {"stem": {"pictures": [{"picturename": "D7F4F9174E4E4BF0A503FD15B81F0662.jpg", "coordinates": {"A": "-10.20,8.07", "B": "-14.00,3.00", "C": "-9.00,3.00", "D": "-9.53,5.24", "E": "-8.33,5.83", "F": "-10.60,7.54"}, "collineations": {"0": "B###F###A", "1": "A###D###C", "2": "A###E", "3": "C##B", "4": "B##D##E", "5": "C##E", "6": "F##E"}, "variable-equals": {}, "circles": [], "appliedproblems": {}, "subsystems": [{"subste": "mid", "2": "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"subste": "3", "3": "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{BD=BC}, PointOnLineRelation{point=E, line=BD, isConstant=false, extension=true}, EqualityRelation{BE=AB}, LinePerpRelation{line1=EF, line2=AB, crossPoint=F}, PointOnLineRelation{point=E, line=EF, isConstant=false, extension=false}, AngleBisectorRelation{line=BD, angle= $\angle CBF$, angle1= $\angle DBF$,

angle2=∠CBD},ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△ABD, triangleB=△EBC}],ProveConclusionRelation:[证明: EqualityRelation{∠BCE+∠BCD=(Pi)}],ProveConclusionRelation:[证明: EqualityRelation{AB+BC=2*BF}]

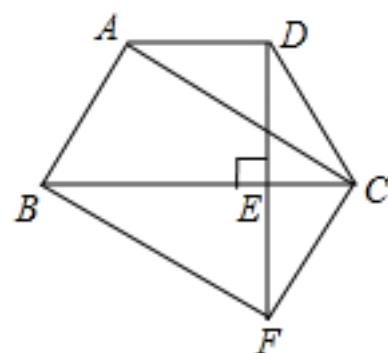
449、topic: 如图,在四边形ABCD中,AC、BD相交于点O,E、F是AD、BC的中点,EF分别交AC、BD于M、N,且OM=ON.求证:AC=BD.



graph:
 {"stem": {"pictures": [{"picturename": "1000034245_Q_1.jpg", "coordinates": {"A": "-13.00,7.00", "B": "-12.00,2.00", "C": "-8.00,3.00", "D": "-8.00,5.00", "E": "-10.50,6.00", "F": "-10.00,2.50", "M": "-10.34,4.87", "N": "-10.13,3.40", "O": "-9.29,4.03"}}, "collinearities": {"0": "A##B", "1": "B##F##C", "2": "C##D", "3": "A##E##D", "4": "A##M##O##C", "5": "E##M##N##F", "6": "B##N##O##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LineCrossRelation[crossPoint=Optional.of(O), iLine1=AC, iLine2=BD],MiddlePointOfSegmentRelation{middlePoint=E,segment=AD},MiddlePointOfSegmentRelation{middlePoint=F,segment=BC},LineCrossRelation [crossPoint=Optional.of(M), iLine1=EF, iLine2=AC],LineCrossRelation [crossPoint=Optional.of(N), iLine1=EF, iLine2=BD],EqualityRelation{MO=NO},ProveConclusionRelation:[证明: EqualityRelation{AC=BD}]

450、topic: 如图,在四边形ABCD中,AD||BC,AB=DC,过点D作DE⊥BC,垂足为E,并延长DE至F,使EF=DE.连结BF、CF、AC.(1)求证:四边形ABFC是平行四边形;(2)如果 $\{(DE)^2\}=BE \cdot CE$,求证四边形ABFC是矩形.



graph:
 {"stem": {"pictures": [{"picturename": "1000062130_Q_1.jpg", "coordinates": {"A": "-3.00,2.00", "B": "-4.00,2.00", "C": "-4.00,-2.00", "D": "-3.00,-2.00", "E": "-3.00,0.00", "F": "-2.00,0.00"}}, "collinearities": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "D##A", "4": "A##E", "5": "E##F", "6": "B##F", "7": "C##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

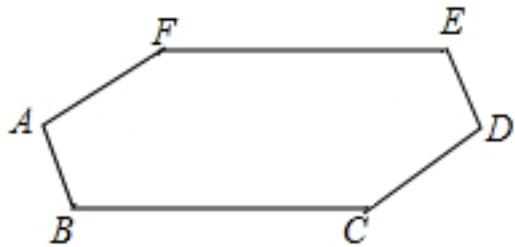
```

0.00","C":"1.00,0.00","D":"0.00,2.00","E":"0.00,0.00","F":"0.00,-2.00"},"collineations":{"0":"B###C###E","1":"F###E###D","2":"A###B","3":"A###C","4":"A###D","5":"F###B","6":"D###C","7":"F###C"}, "variable-equals":{},"circles":[]],"appliedproblems":{},"substems":[]}

```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LineParallelRelation [iLine1=AD,iLine2=BC],EqualityRelation{AB=CD},LinePerpRelation{line1=DE, line2=BC,crossPoint=E},PointOnLineRelation{point=F, line=DE, isConstant=false,extension=true},EqualityRelation{EF=DE},SegmentRelation:BF,SegmentRelation:CF,SegmentRelation:AC,EqualityRelation{((DE)^2)=BE*CE},ProveConclusionRelation:[证明:ParallelogramRelation{parallelogram=Parallelogram:ABFC}],ProveConclusionRelation:[证明:RectangleRelation{rectangle=Rectangle:ABFC}]]

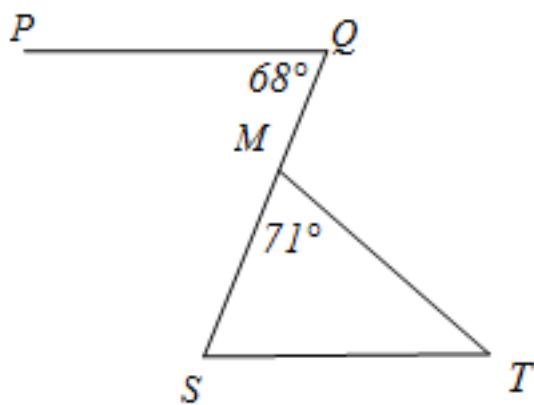
451、topic: 已知:如图,AB=DE,BC=EF,CD=FA,∠A=∠D.求证:∠ABC=∠DEF.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000030751_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-12.00,2.00", "C": "-6.00,2.00", "D": "-4.00,4.00", "E": "-5.00,6.00", "F": "-11.00,6.00"}, "collineations": {"0": "A#B", "1": "B###C", "2": "C###D", "3": "D###E", "4": "E###F", "5": "A###F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
EqualityRelation{AB=DE},EqualityRelation{BC=EF},EqualityRelation{CD=AF},EqualityRelation{∠BAF=∠CDE},ProveConclusionRelation:[证明: EqualityRelation{∠ABC=∠DEF}]]

452、topic: 如图,PQ||ST,∠PQS=68°,∠SMT=71°,求∠S与∠T的度数.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000051258_Q_1.jpg", "coordinates": {"P": "-9.00,5.00", "Q": "-6.00,5.00", "M": "-6.48,3.82", "S": "-7.22,1.98", "T": "-4.39,2.00"}, "collineations": {"0": "P###Q", "1": "S###T", "2": "Q###M###S", "3": "M###T"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=PQ,

iLine2=ST],EqualityRelation{ $\angle MQP=(17/45*\pi)$ },EqualityRelation{ $\angle SMT=(71/180*\pi)$ },求角的大小:
AngleRelation{angle= $\angle MST$ },求角的大小:

AngleRelation{angle= $\angle MTS$ },SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle MST$)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle MTS$)}

453、topic: (1)某学习小组在探究三角形全等时,发现了下面这种典型的基本图形.如图1,在 $\triangle ABC$ 中, $\angle BAC=90^\circ$, $AB=AC$,直线 l 经过点A, $BD \perp l$, $CE \perp l$,垂足分别为点D、E.求证: $DE=BD+CE$.#%(2)组员小刘想,如果三个角不是直角,那结论是否会成立呢?如图2,将(1)中的条件改为:在 $\triangle ABC$ 中, $AB=AC$,D、A、E三点都在直线 l 上,并且有 $\angle BDA=\angle AEC=\angle BAC=\alpha$,其中 α 为任意锐角或钝角.请问结论 $DE=BD+CE$ 是否成立?若成立,请你给出证明;若不成立,请说明理由.#%(3)数学老师赞赏了他们的探索精神,并鼓励他们运用这个知识来解决问题:如图3,过 $\triangle ABC$ 的边AB、AC向外作正方形ABDE和正方形ACFG,AH是BC边上的高,延长HA交EG于点I,求证:I是EG的中点.#%#

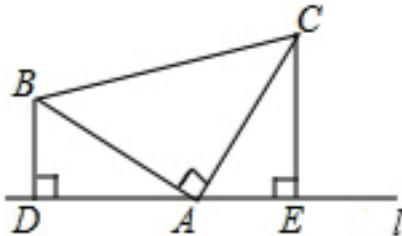


图1

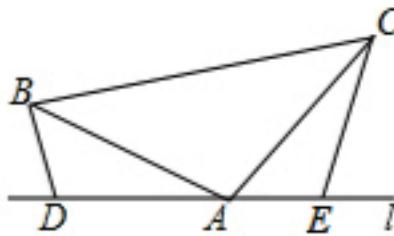


图2

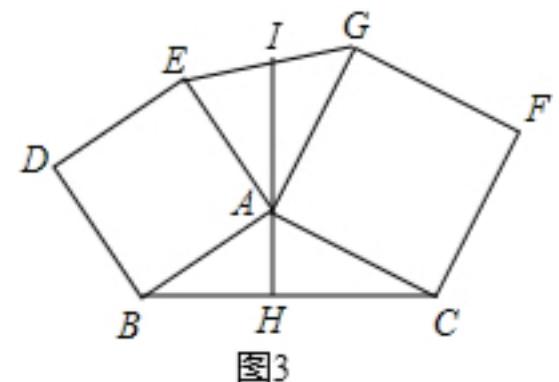


图3

graph:
{ "stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000038138_Q_1.jpg", "coordinates": {"A": "-6.00,7.00", "B": "-9.00,9.00", "C": "-4.00,10.00", "D": "-9.00,7.00", "E": "-4.00,7.00"}, "collineations": {"0": "B##A", "1": "A##C", "2": "B##C", "3": "D##A##E", "4": "C##E", "5": "B##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000038138_Q_2.jpg", "coordinates": {"A": "-4.56,14.98", "B": "-7.01,16.19", "C": "-2.29,16.50", "D": "-6.42,14.99", "E": "-3.02,14.96"}, "collineations": {"0": "B##A", "1": "A##C", "2": "B##C", "3": "D##A##E", "4": "C##E", "5": "B##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000038138_Q_3.jpg", "coordinates": {"A": "8.00,19.00", "B": "6.00,17.00", "C": "11.00,17.00", "D": "4.00,19.00", "E": "6.00,21.00", "F": "13.00,20.00", "G": "10.00,22.00", "H": "8.00,17.00", "I": "8.00,21.50"}, "collineations": {"0": "I##A##H", "1": "E##I##G", "2": "B##H##C", "3": "D##E", "4": "D##B", "5": "A##E", "6": "A##B", "7": "A##C", "8": "F##C", "9": "A##G", "10": "G##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}]}

NLP:

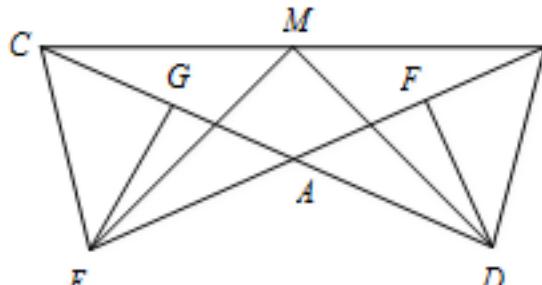
(ExpressRelation:[key:]1),TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle BAC=(1/2*\pi)$ },EqualityRelation{ $AB=AC$ },PointOnLineRelation{point=A, line=StraightLine[1]} analytic : $y=k_1*x+b_1$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false},LinePerpRelation{line1=AD, line2=BD, crossPoint=D},LinePerpRelation{line1=DE, line2=CE, crossPoint=E},(ExpressRelation:[key:]2),EqualityRelation{ $AB=AC$ },PointOnLineRelation{point=D, line=StraightLine[1]} analytic : $y=k_1*x+b_1$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false},PointOnLineRelation{point=A, line=StraightLine[1]} analytic : $y=k_1*x+b_1$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false},PointOnLineRelation{point=E, line=StraightLine[1]} analytic : $y=k_1*x+b_1$ slope:null b:null isLinearFunction:false, isConstant:false,

```

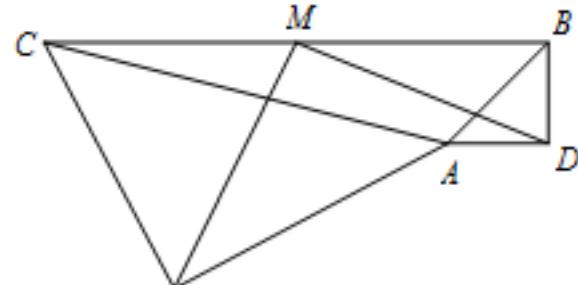
extension=false},MultiEqualityRelation [multiExpressCompare= $\angle ADB = \angle AEC = \angle BAC = \alpha$ ,
originExpressRelationList=[], keyWord=null, result=null],LinePerpRelation{line1=AH, line2=BC,
crossPoint=},LineCrossRelation [crossPoint=Optional.of(I), iLine1=HA,
iLine2=EG],LinePerpRelation{line1=AH, line2=BH, crossPoint=H},ProveConclusionRelation:[证明:
EqualityRelation{DE=BD+CE}],ProveConclusionRelation:[证明:
EqualityRelation{DE=BD+CE}],ProveConclusionRelation:[证明:
MiddlePointOfSegmentRelation{middlePoint=I,segment=EG}]

```

454、topic: (1)如图(1),在等腰 $\triangle ABC$ 中,已知 $AB=AC$,分别以 AB 和 AC 为斜边,向 $\triangle ABC$ 的外侧作等腰 $Rt\triangle ABD$ 、等腰 $Rt\triangle ACE$,作 $DF \perp AB$ 于点 F , $EG \perp AC$ 于点 G , M 是 BC 的中点,连结 MD 和 ME .求证: $ME=MD$;(2)如图(2),在任意 $\triangle ABC$ 中,若分别以 AB 和 AC 为斜边,向 $\triangle ABC$ 的外侧作等腰 $Rt\triangle ABD$ 、等腰 $Rt\triangle ACE$, M 是 BC 的中点,连结 MD 和 ME ,则 MD 和 ME 具有怎样的数量关系?请给出证明过程.#%#



图(1)



图(2)

```

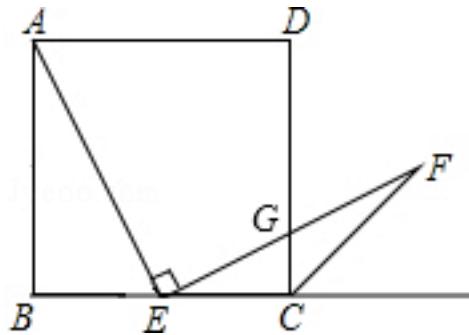
graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000036921_Q_1.jpg", "coordinates": {"A": "-6.00,3.74", "B": "-3.00,4.97", "C": "-9.00, 4.97", "D": "-3.87,2.86", "E": "-8.12,2.86", "F": "-4.49,4.36", "G": "-7.50,4.36", "M": "-6.00,4.97"}, "collineations": {"0": "C##E", "1": "E##G", "2": "E##M", "3": "E##A##F##B", "4": "C##G##A##D", "5": "D##M", "6": "D##F", "7": "D##B", "8": "C##M##B"}, "variable>equals": {}, "circles": []}], "appliedproblem": {}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000036921_Q_1.jpg", "coordinates": {"A": "-5.00,3.00", "B": "-4.00,4.00", "C": "-9.00,4.00", "D": "-4.00,3.00", "E": "-7.50,1.50", "M": "-6.50,4.00"}, "collineations": {"0": "C##E", "1": "A##C", "2": "A##E", "3": "B##D", "4": "A##B", "5": "A##D", "6": "E##M", "7": "M##D", "8": "C##M##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}

```

NLP:

IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{ $AB=AC$ }, LineRoleRelation{Segment=AB, roleType=HYPOTENUSE}, LineRoleRelation{Segment=AC, roleType=HYPOTENUSE}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ACE$ [Optional.of(E)] [Optional.of(E)], LinePerpRelation{line1=DF, line2=AB, crossPoint=F}, LinePerpRelation{line1=EG, line2=AC, crossPoint=G}, MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, SegmentRelation: MD, SegmentRelation: ME, LineRoleRelation{Segment=AB, roleType=HYPOTENUSE}, LineRoleRelation{Segment=AC, roleType=HYPOTENUSE}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ACE$ [Optional.of(E)] [Optional.of(E)], MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, SegmentRelation: MD, SegmentRelation: ME, 求值(大小): (ExpressRelation:[key:](DM/EM)), ProveConclusionRelation:[证明: EqualityRelation{EM=DM}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](DM/EM))}

455、topic: 如图,在正方形ABCD中,点E是边BC的中点,直线EF交正方形外角的平分线于点F,交DC于点G,且 $AE \perp EF$.求证: $AE = EF$.

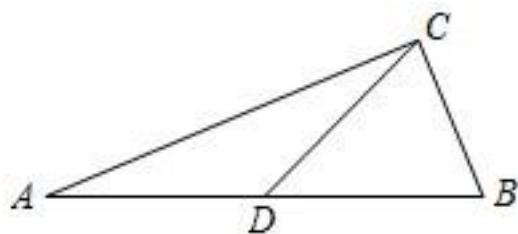


graph:

```
{"stem": {"pictures": [{"picturename": "1000030867_Q_1.jpg", "coordinates": {"A": "-10.00,4.00", "B": "-10.00,0.00", "C": "-6.00,0.00", "D": "-6.00,4.00", "E": "-8.00,0.00", "F": "-4.00,2.00", "G": "-6.00,1.00"}, "collinearities": {"0": "A##B", "1": "B##E##C", "2": "D##C##G", "3": "A##D", "4": "E##A", "5": "E##G##F", "6": "C##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: AngleBisectorRelation{line=M_0N_0,angle= $\angle\alpha$,angle1=null,angle2=null},SquareRelation{square=Square:ABCD},MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},LineCrossRelation [crossPoint=Optional.of(G), iLine1=EF, iLine2=DC],LinePerpRelation{line1=AE, line2=EF, crossPoint=E},ProveConclusionRelation:[证明: EqualityRelation{AE=EF}]

456、topic: 如图,在 $\triangle ABC$ 中,点D是AB的中点, $AC=12$, $BC=5$, $CD=\frac{13}{2}$.求证: $\triangle ABC$ 为直角三角形.



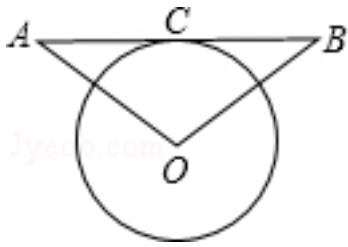
graph:

```
{"stem": {"pictures": [{"picturename": "1000007055_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "13.00,0.00", "C": "10.15,6.40", "D": "6.50,0.00", "E": "2.80,-6.37"}, "collinearities": {"0": "A##C", "1": "D##A##B", "2": "B##C", "3": "A##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=AB},EqualityRelation{AC=12},EqualityRelation{BC=5},EqualityRelation{CD=(13/2)},ProveConclusionRelation:[证明: RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)]]

457、topic: 如图,AB与 $\odot O$ 相切于点C,OA=OB, $\odot O$ 的直径为8cm,AB=10cm,求OA的长.

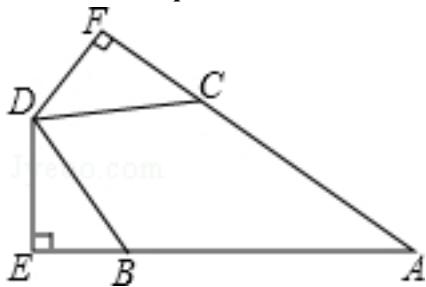


graph:

{"stem": {"pictures": [{"picturename": "1000083405_Q_1.jpg", "coordinates": {"A": "-2.50,2.00", "B": "2.50,2.00", "C": "0.00,2.00", "O": "0.00,0.00"}, "collineations": {"0": "A###C##B", "1": "B##O", "2": "A##O"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C"}]}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AO=v_0}, LineContactCircleRelation{line=AB, circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(C), outpoint=Optional.absent()}, EqualityRelation{AO=BO}, DiameterRelation{diameter=null, circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=Express:[8]}, EqualityRelation{AB=10}, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AO)}

458、topic: 如图,AB=AC,BD=CD,DE⊥AB于点E,DF⊥AC于点F,求证:DE=DF.#%#

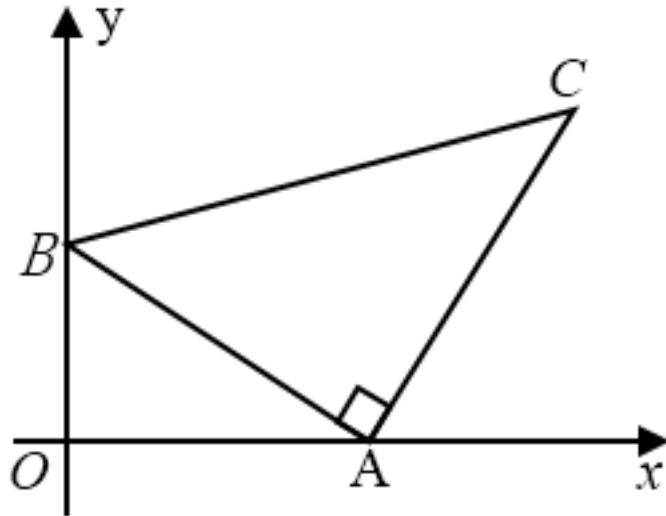


graph:

{"stem": {"pictures": [{"picturename": "1000029142_Q_1.jpg", "coordinates": {"A": "10.00,2.00", "B": "4.00,2.00", "C": "4.71,4.83", "D": "2.00,4.00", "E": "2.00,2.00", "F": "2.94,5.77"}, "collineations": {"0": "F##D", "1": "E##D", "2": "C##D", "3": "D##B", "4": "F##C##A", "5": "E##B##A"}, "variable-equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}}}

NLP: EqualityRelation{AB=AC}, EqualityRelation{BD=CD}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=AC, crossPoint=F}, ProveConclusionRelation:[证明:
EqualityRelation{DE=DF}]

459、topic: 如图,点A、B分别是x轴正半轴、y轴正半轴上的点,以AB为直角边构造等腰
\$Rt\triangle ABC\$, \$\angle BAC=90^\circ\$.?%#(1)若点C的坐标为\$(6,4)\$,求点A、点B的坐标; ?%#(2)若
\$\angle OAB=30^\circ\$, \$A\left(\sqrt{3}, 0\right)\$,求点C的坐标.

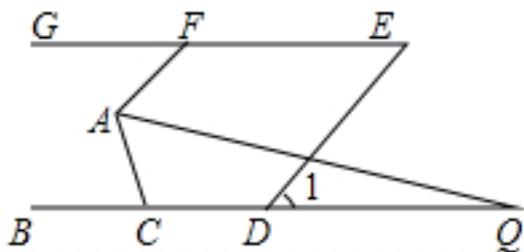


graph:

```
{"stem":{"pictures":[{"picturename":"1000020104_Q_1.jpg","coordinates":{"A":"4.00,0.00","B":"0.00,2.00","C":"6.00,4.00","O":"0.00,0.00"}, "collineations":{"0":"B##O","1":C##A,"2":C##B,"3":B##A,"4":O##A}, "variable>equals":{}, "circles":[]}, "appliedproblems":{}, "substems": [{"substemid":2,"questionrelies":"","pictures":[{"picturename":"3.2.2_15.jpg","coordinates":{"A":1.73,0.00,"B":0.0,1.00,"C":2.73,1.73,"D":0.00,0.00}}, "collineations":{"0":B##O,"1":C##A,"2":C##B,"3":B##A,"4":O##A}, "variable>equals":{}, "circles":[]}], "appliedproblems":{}}}}
```

NLP: PointOnLineRelation{point=A, line=StraightLine[X] analytic :y=0[x>0] slope:0 b:0
 isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=B, line=StraightLine[Y] analytic :x=0[y>0] slope: b: isLinearFunction:false, isConstant=false, extension=false}, IsoscelesRightTriangleRelation:IsoscelesRightTriangle:IsoscelesTriangle: $\triangle ABC$ [Optional.of(C)][Optional.of(C)], EqualityRelation{ $\angle BAC = (1/2 * \pi)$ }, PointRelation:C(6,4), 坐标
 PointRelation:A, 坐标
 PointRelation:B, EqualityRelation{ $\angle BAO = (1/6 * \pi)$ }, PointRelation:A(((3^(1/2)),0)), 坐标
 PointRelation:C, SolutionConclusionRelation{relation=坐标
 PointRelation:A}, SolutionConclusionRelation{relation=坐标
 PointRelation:B}, SolutionConclusionRelation{relation=坐标 PointRelation:C}

460、topic: 如图,已知BC||GE,AF||DE, $\angle 1=50^\circ$.#%#(1)求 $\angle AFG$ 的度数;#%#(2)若AQ平分 $\angle FAC$,交BC于点Q,且 $\angle Q=15^\circ$,求 $\angle ACB$ 的度数.#%#



graph:

```
{"stem":{"pictures":[{"picturename":"1000032976_Q_1.jpg","coordinates":{"A":0.02,1.60,"B":-1.56,0.00,"C":0.30,0.00,"D":2.50,0.00,"E":5.02,3.00,"F":1.19,3.00,"G":-1.53,3.00,"Q":6.00,0.00}, "collineations":{"0":B##C##D##Q,"1":G##F##E,"2":A##F,"3":A##C,"4":A##Q,"5":D##E}, "variable>equals": {"0": " $\angle 1 = \angle EDQ$ "}, "circles":[]}, "appliedproblems":{}, "substems":[]}}
```

NLP: LineParallelRelation [iLine1=BC, iLine2=GE], LineParallelRelation [iLine1=AF, iLine2=DE], EqualityRelation{ $\angle EDQ = (5/18\pi)$ }, 求角的大小:

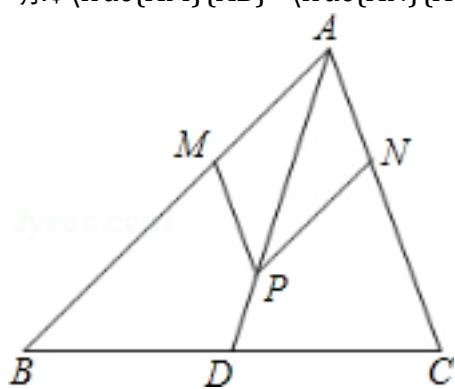
AngleRelation{angle= $\angle AFG$ }, AngleBisectorRelation{line=AQ, angle= $\angle CAF$, angle1= $\angle CAQ$, angle2= $\angle FAQ$ }, LineCrossRelation [crossPoint=Optional.of(Q), iLine1=AQ, iLine2=BC], EqualityRelation{ $\angle AQD = (1/12\pi)$ }, 求角的大小:

AngleRelation{angle= $\angle ACB$ }, SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] $\angle AFG$), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] $\angle ACB$)

461、topic: 如图,在 $\triangle ABC$ 中,点D为BC上一点,点P在AD上,过点P作 $PM \parallel AC$ 交AB于点M,作 $PN \parallel AB$ 交AC于点N.
 (1)若点D是BC的中点,且 $AP:PD=2:1$,求 $AM:AB$ 的值;
 (2)若点D是BC的中点,试证明: $\frac{AM}{AB} = \frac{AN}{AC}$;
 (3)若点D是BC上任意一点,试证明: $\frac{AM}{AB} + \frac{AN}{AC} = \frac{AP}{AD}$.



graph:

```
{"stem": {"pictures": [{"picturename": "1000041520_Q_1.jpg", "coordinates": {"A": "0.00,3.15", "B": "-2.86,0.00", "C": "1.00,0.00", "D": "-0.93,0.00", "M": "-0.95,2.10", "N": "0.33,2.10", "P": "-0.62,1.05"}, "collineations": {"0": "A###M###B", "1": "B###D###C", "2": "C##N##A", "3": "A##P##D", "4": "P##M", "5": "P##N"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=P, line=PM, isConstant=false, extension=false}, LineParallelRelation [iLine1=PM, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(M), iLine1=PM, iLine2=AB], LineParallelRelation [iLine1=PN, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(N), iLine1=PN, iLine2=AC], MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, EqualityRelation{ $(AP)/(DP) = (2)/(1)$ }, 求值(大小):

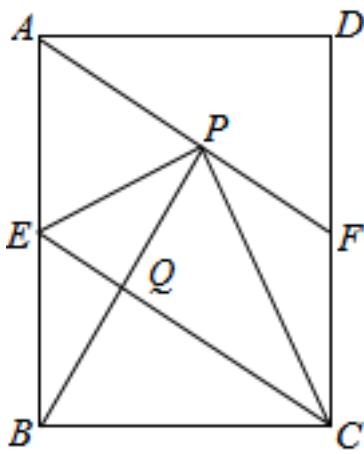
(ExpressRelation:[key:] AM/AB), MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] AM/AB), ProveConclusionRelation:[证明:

EqualityRelation{ $((AM)/(AB)) = ((AN)/(AC))$ }, ProveConclusionRelation:[证明:

EqualityRelation{ $((AM)/(AB)) + ((AN)/(AC)) = ((AP)/(AD))$ }]

462、topic: 如图,在矩形ABCD中,点E是AB边的中点,沿EC对折矩形ABCD,使点B落在点P处,折痕为EC,连接AP并延长AP交CD于点F.
 (1)求证:四边形AECF为平行四边形;
 (2)若 $\triangle AEP$ 是等边三角形,连接BP,求证: $\triangle APB \cong \triangle EPC$;
 (3)若矩形ABCD的边 $AB=6, BC=4$,求 $\triangle CPF$ 的面积.

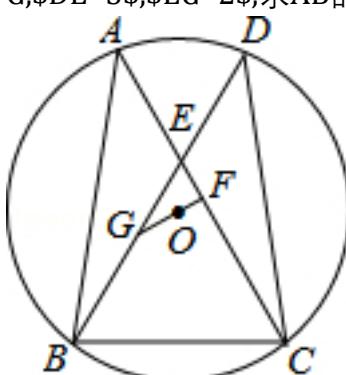


graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000036739_Q_1.jpg", "coordinates": {"A": "-9.02,3.75", "B": "-9.02,-0.87", "C": "-5.02,-0.87", "D": "-5.02,3.75", "E": "-9.02,1.44", "F": "-5.02,1.44", "P": "-7.02,2.59"}, "collineations": {"0": "A###E##B", "1": "A###D", "2": "A###P###F", "3": "E###P", "4": "E###C", "5": "B###C", "6": "C###P", "7": "F###D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "1"}, {"pictures": [{"picturename": "1000036739_Q_1.jpg", "coordinates": {"Q": "-8.02,0.86"}, "collineations": {"0": "E###Q###C", "1": "B###Q###P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "3", "questionrelies": ""}, {"picturename": "1000036739_Q_2.jpg", "coordinates": {"A": "-9.02,5.13", "B": "-9.02,-0.87", "C": "-5.02,-0.87", "D": "-5.02,5.13", "E": "-5.02,2.13", "F": "-9.02,2.13", "P": "-6.14,2.97"}, "collineations": {"0": "A###E###B", "1": "A###D", "2": "A###P###F", "3": "E###P", "4": "E###C", "5": "B###C", "6": "C###P", "7": "F###D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}}

NLP:

RectangleRelation{rectangle=Rectangle:ABCD},MiddlePointOfSegmentRelation{middlePoint=E,segment=AB},PointCoincidenceRelation{point1=B, point2=P},SegmentRelation:EC,LineCrossRelation[crossPoint=Optional.of(F), iLine1=CD, iLine2=AP],RegularTriangleRelation:RegularTriangle:△AEP,SegmentRelation:BP,EqualityRelation{S_△CFP=v_0},RectangleRelation{rectangle=Rectangle:ABCD},EqualityRelation{AB=6},EqualityRelation{BC=4},求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:AECF}],ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△APB, triangleB=△EPC}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_△CFP)}

463、topic: 如图,\$\odot O\$是\$\triangle ABC\$的外接圆,弦BD交AC于点E,连接CD,且\$AE=DE\$,\$BC=CE\$.?(1)求\$\angle ACB\$的度数;?(2)过点O作\$OF\perp AC\$于点F,延长FO交BE于点G,\$DE=3\$,\$EG=2\$,求AB的长.

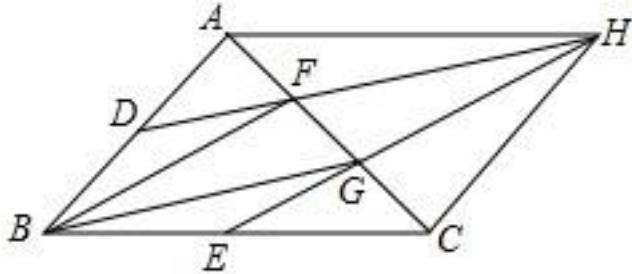


graph:

{"stem": {"pictures": [{"picturename": "1000024983.jpg", "coordinates": {"A": "1.00,6.93", "B": "0.00,0.00", "C": "5.00,0.00", "D": "4.00,6.93", "E": "2.50,4.33", "O": "2.50,3.18"}, "collineations": {"0": "B###C", "1": "B###A", "2": "A###E###C", "3": "E###B###D", "4": "C###D"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###C###B###D"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: ChordOfCircleRelation{chord=BD, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null, straightLine=null}, InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=BD, iLine2=AC], SegmentRelation:CD, EqualityRelation{AE=DE}, EqualityRelation{BC=CE}, 求角的大小: AngleRelation{angle= $\angle BCE$ }, EqualityRelation{AB=v_0}, LinePerpRelation{line1=OF, line2=AC, crossPoint=F}, EqualityRelation{DE=3}, EqualityRelation{EG=2}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle BCE$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AB)}

464、topic: 如图,在 $\triangle ABC$ 中,点D、E分别是边AB、BC的中点,点F、G是边AC的三等分点,DF、EG的延长线相交于点H.求证:(1)四边形FBGH是平行四边形;(2)四边形ABCH是平行四边形.



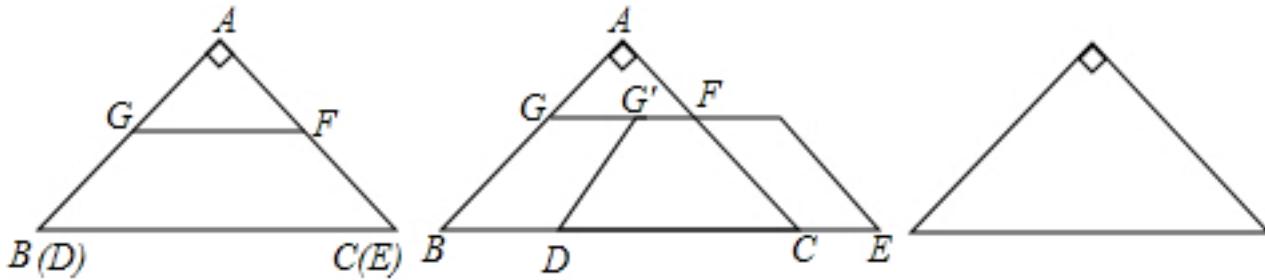
graph:

{"stem": {"pictures": [{"picturename": "1000023709.jpg", "coordinates": {"A": "4.00,5.00", "B": "0.00,0.00", "C": "10.00,0.00", "D": "2.00,2.50", "E": "5.00,0.00", "F": "6.00,3.33", "G": "8.06,1.62", "H": "14.00,5.00"}, "collineations": {"0": "A###D##B", "1": "A###H", "2": "H###C", "3": "B###F", "4": "G###B", "5": "F###A###G", "6": "F###H###D", "7": "E###G###H", "8": "E###C###B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:

TriangleRelation: $\triangle ABC$, MiddlePointOfSegmentRelation{middlePoint=D, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=E, segment=BC}, SegmentAliquotsPointRelation{aliqoutsNum='3', points=[F, G], segment=AC}, LineCrossRelation [crossPoint=Optional.of(H), iLine1=DF, iLine2=EG], ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BFHG}], ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:ABCH}]

465、topic: 如图①,在Rt $\triangle ABC$ 中,已知 $\angle A=90^\circ$, $AB=AC$,G、F分别是AB、AC上的两点,且 $GF \parallel BC$, $AF=2$, $BG=4$.(1)求梯形BCFG的面积;(2)有一梯形DEFG与梯形BCFG重合,固定 $\triangle ABC$,将梯形DEFG向右运动,直到点D与点C重合为止,如图②.(1)若某时段运动后形成的四边形 $BDG'G$ 中, $DG \perp BG'$,求运动路程BD的长,并求此时 $\{G'B\}^2$ 的值;(2)设运动中BD的长度为x,试用含x的代数式表示出梯形DEFG与Rt $\triangle ABC$ 重合部分的面积S.



图①

图②

备用图

graph:
 {"stem": {"pictures": [{"picturename": "1000070211_Q_1.jpg", "coordinates": {"A": "2.00,3.00", "B": "0.00,1.00", "C": "4.00,1.00", "D": "1.00,1.00", "E": "5.00,1.00", "F": "2.67,2.33", "G": "1.33,2.33", "G'": "2.33,2.33", "H": "3.67,2.33"}, "collineations": {"0": "G###G###F###H", "1": "A###F###C", "2": "A###G###B", "3": "G##D", "4": "B##D###C###E", "5": "E###H", "6": "D###F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
 RightTriangleRelation:RightTriangle:△ABC[Optional.of(A)], EqualityRelation{∠FAG=(1/2*Pi)}, EqualityRelation{AB=AC}, PointOnLineRelation{point=G, line=AB, isConstant=false, extension=false}, LineParallelRelation [iLine1=GF, iLine2=BC], EqualityRelation{AF=2}, EqualityRelation{BG=4}, TrapezoidRelation{trapezoid=Trapezoid:BCFG, isRandomOrder:true}, EqualityRelation{S_BCFG=v_0}, 求值(大小):
 (ExpressRelation:[key:]v_0), EqualityRelation{BD=v_1}, LinePerpRelation{line1=DG, line2=BG', crossPoint=}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_BCFG)}

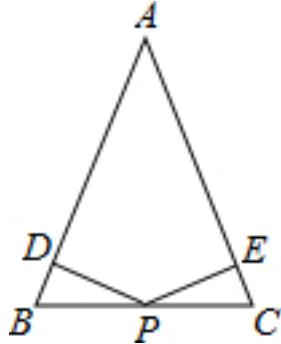
466、topic: 解答:#%#(1)如图1,正方形ABCD中,点E,F分别在边BC,CD上,\$∠EAF=45°\$,延长CD到点G,使\$DG=BE\$,连结EF,AG.求证:\$EF=FG\$.#%#(2)如图2,等腰直角三角形ABC中,\$∠BAC=90°\$,\$AB=AC\$,点M,N在边BC上,且\$∠MAN=45°\$,若\$BM=1\$,\$CN=3\$,求MN的长.

graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000010197_Q_1.jpg", "coordinates": {"A": "8.00,8.00", "B": "0.00,8.00", "C": "0.00,0.00", "D": "8.00,0.00", "E": "0.00,6.00", "F": "3.20,0.00", "G": "10.00,0.00"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##G", "3": "C##D##F##G", "4": "A##E", "5": "A##F", "6": "B##C##E", "7": "E##F"}, "variable-equals": {}, "circles": []}], "substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000010197_Q_2.jpg", "coordinates": {"A": "8.00,8.00", "B": "0.00,8.00", "C": "0.00,0.00", "M": "8.00,0.00", "N": "0.00,6.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "A##M", "3": "B##M##N##C", "4": "A##N"}, "variable-equals": {}, "circles": []}]}], "appliedproblems": {}, "subsystems": []}}

NLP:
 (ExpressRelation:[key:]1), SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, EqualityRelation{∠EAF=(1/4*Pi)}, PointOnLineRelation{point=G, line=CD, isConstant=false, extension=true}, EqualityRelation{DG=BE}, SegmentRelation:EF, SegmentRelation:AG, EqualityRelation{MN=v_0}, (ExpressRelation:[key:]2), IsoscelesRightTriangleRelation:IsoscelesRightTriangle:IsoscelesTriangle:△ABC[Optional.of(B)][Optional.of(B)], EqualityRelation{∠BAC=(1/2*Pi)}, EqualityRelation{AB=AC}, PointOnLineRelation{point=M, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=N, line=BC, isConstant=false, extension=false}, EqualityRelation{∠MAN=(1/4*Pi)}, EqualityRelation{BM=1}, EqualityRelation{CN=3},

求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明:
EqualityRelation{EF=FG}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]MN)}

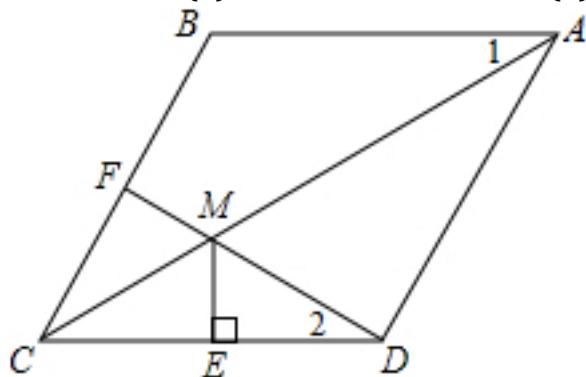
467、topic: 已知:如图,在等腰 $\triangle ABC$ 中, $AB=AC$, P 为 BC 的中点, $PD \perp AB$ 于点 D , $PE \perp AC$ 于点 E ,求证: $PD=PE$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "866E9800D164426292FC081E4F84F7E2.jpg", "coordinates": {"A": "-14.00,4.00", "B": "-7.00,4.00", "C": "-13.60,2.44", "D": "-8.41,5.55", "E": "-9.58,6.67", "P": "-12.45,6.41"}, "collinearations": {"0": "D###B###A", "1": "C###A###E", "2": "B###P###C", "3": "P###D", "4": "P###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
 IsoscelesTriangleRelation:IsoscelesTriangle: $\triangle ABC$ [Optional.of(B)],EqualityRelation{AB=AC},MiddlePointOfSegmentRelation{middlePoint=P,segment=BC},LinePerpRelation{line1=PD, line2=AB, crossPoint=D},LinePerpRelation{line1=PE, line2=AC, crossPoint=E},ProveConclusionRelation:[证明:
EqualityRelation{DP=EP}]

468、topic: 如图,在菱形ABCD中,点F为边BC的中点,DF与对角线AC交于点M,过点M作ME $\perp CD$ 于点E, $\angle 1=\angle 2$.#%#(1)若CE=1,求BC的长;#%#(2)求证:AM=DF+ME.#%#

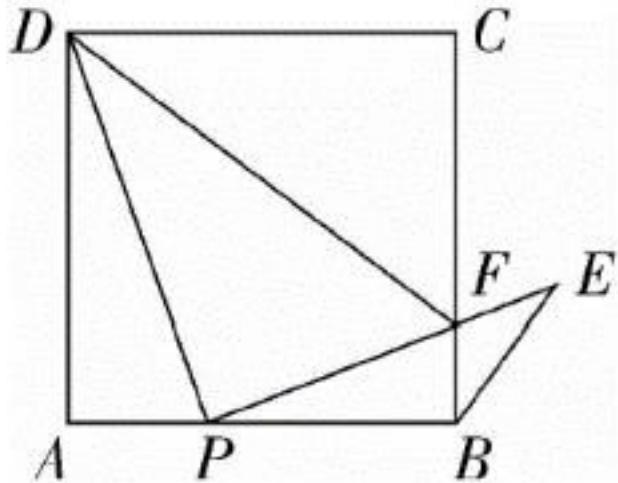


graph:
 {"stem": {"pictures": [{"picturename": "1000034573_Q_1.jpg", "coordinates": {"A": "3.67,1.16", "B": "-0.33,1.16", "C": "-2.33,-2.30", "D": "1.67,-2.30", "E": "-0.33,-2.30", "F": "-1.33,-0.57", "M": "-0.33,-1.15"}, "collinearations": {"0": "B##A", "1": "B##F##C", "2": "F##M##D", "3": "A##M##C", "4": "C##E##D", "5": "M##E", "6": "D##A"}, "variable>equals": {"0": "\u03b71=\u03b7BAC", "1": "\u03b72=\u03b7FDC"}, "circles": []}, "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [], "appliedproblems": {}}]}}

NLP:

RhombusRelation{rhombus=Rhombus:ABCD},MiddlePointOfSegmentRelation{middlePoint=F,segment=BC},LineCrossRelation [crossPoint=Optional.of(M), iLine1=DF, iLine2=AC],LinePerpRelation{line1=ME, line2=CD, crossPoint=E},EqualityRelation{ $\angle BAM = \angle EDM$ }, EqualityRelation{BC=v_0}, EqualityRelation{CE=1}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}, ProveConclusionRelation:[证明: EqualityRelation{AM=DF+EM}]

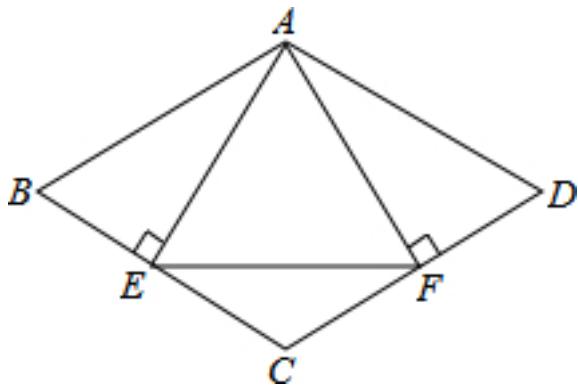
469、topic: 如图,已知点P是正方形ABCD边上一点(不与点A、B重合),连结PD并将PD绕点P顺时针旋转\$90^{\circ}\$得到线段PE,PE交边BC于点F,连结BE、DF.(1)求证:\$\angle ADP=\angle EPB\$;(2)求\$\angle CBE\$的度数;(3)当\$\frac{AP}{AB}\$的值是多少时,\$\triangle PFD \sim \triangle BFP\$?请说明理由.



graph:
 {"stem": {"pictures": [{"picturename": "1000004773_Q_1.jpg", "coordinates": {"A": "-6.56,0.21", "B": "-0.95,0.21", "C": "-0.95,5.82", "D": "-6.56,5.82", "E": "1.32,2.49", "F": "-0.95,1.56", "P": "-4.29,0.21"}, "collinearations": {"0": "P##F##E", "1": "A##P##B", "2": "C##F##B", "3": "A##D", "4": "D##C", "5": "D##F", "6": "D##P", "7": "B##E"}, "variable>equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}]}

NLP: PointRelation:A, PointRelation:B, SegmentRelation:PD, RotateRelation{preData=PD, afterData=PE, rotatePoint=P, rotateDegree='(1/2*Pi)', rotateDirection=CLOCKWISE}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=PE, iLine2=BC], SegmentRelation:BE, SegmentRelation:DF, 求角的大小: AngleRelation{angle= $\angle EBF$ }, 求值(大小): (ExpressRelation:[key:]((AP)/(AB))), ProveConclusionRelation:[证明: EqualityRelation{ $\angle ADP = \angle BPF$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle EBF$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]((AP)/(AB)))}

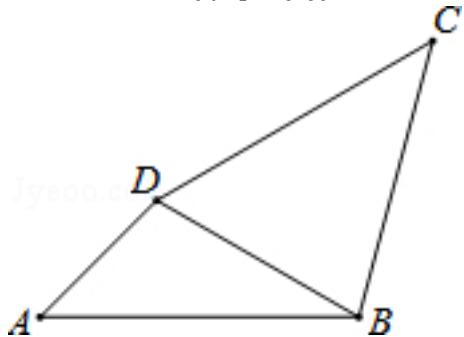
470、topic: 如图,在菱形ABCD中,AB=4, $\angle B=60^{\circ}$,AE \perp BC,AF \perp CD,垂足分别为点E、F,连接EF,求 $\triangle AEF$ 的面积.%#



graph:
 {"stem": {"pictures": [{"picturename": "918C95650B6448828F001FA56A4C2C05.jpg", "coordinates": {"A": "-12.00,8.00", "B": "-15.46,6.00", "C": "-12.00,4.00", "D": "-8.54,6.00", "E": "-13.73,5.00", "F": "-10.27,5.00"}, "collineations": {"0": "A##B", "1": "D##A", "2": "E##A", "3": "F##A", "4": "B###E##C", "5": "D##F##C", "6": "F##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{S_△AEF=v_0}, RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{AB=4},
 EqualityRelation{∠ABE=(1/3*Pi)}, LinePerpRelation{line1=AE, line2=BC, crossPoint=E}, LinePerpRelation{line1=AF, line2=CD, crossPoint=F}, SegmentRelation:EF, 求值(大小):
 (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]S_△AEF)}

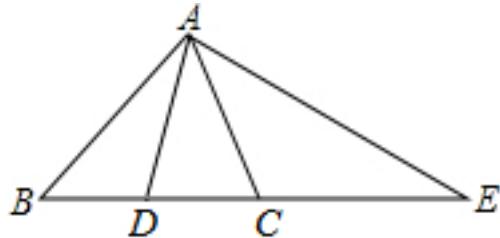
471、topic: 如图,在四边形ABCD中, $\angle A=\angle C=45^\circ$, $\angle ADB=\angle ABC=105^\circ$.#%#(1)若AD=2,求AB; #%#(2)若 $AB+CD=2\sqrt{3}+2$,求AB.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000027196_Q_1.jpg", "coordinates": {"A": "1.00,1.00", "B": "7.00,1.00", "C": "8.39,6.20", "D": "3.20,3.20"}, "collineations": {"0": "A##B", "1": "A##D", "2": "B##D", "3": "B##C", "4": "D##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, MultiEqualityRelation
 [multiExpressCompare= $\angle BAD = \angle BCD = (1/4\pi)$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare= $\angle ADB = \angle ABC = (7/12\pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AD=2}, 求值(大小):
 (ExpressRelation:[key:]AB), EqualityRelation{AB+CD=2*((3^(1/2))+2)}, 求值(大小):
 (ExpressRelation:[key:]AB), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AB), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AB)}

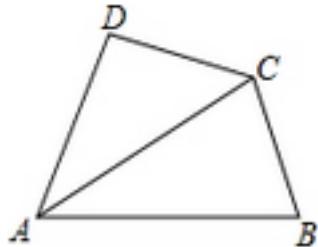
472、topic: 如图,AD是 $\triangle ABC$ 的中线,点E在BC的延长线上, $CE=AB$, $\angle BAC=\angle BCA$.#%#求证: $AE=2AD$.#%#



graph:
{"stem": {"pictures": [{"picturename": "97CACE941AD44F868A2DAC8CED773397.jpg", "coordinates": {"A": "-10.38,6.02", "B": "-13.00,3.00", "C": "-9.00,3.00", "D": "-11.00,3.00", "E": "-5.00,3.00"}, "collineations": {"0": "A##B", "1": "D##A", "2": "A##C", "3": "A##E", "4": "B##C##D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation:△ABC,PointOnLineRelation{point=E, line=BC, isConstant=false, extension=true},EqualityRelation{CE=AB},EqualityRelation{∠BAC=∠ACD},MidianLineOfTriangleRelation{midianLine=AD, triangle=△ABC, top=A, bottom=BC},ProveConclusionRelation:[证明: EqualityRelation{AE=2*AD}]

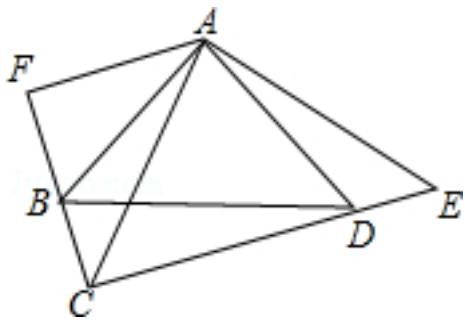
473、topic: 四边形ABCD中,已知 $AB=a$, $AD=b$,且 $a>b$,对角线AC平分 $\angle BAD$, $DC=BC$,求证: $\angle B+\angle D=180^\circ$ #%#



graph:
{"stem": {"pictures": [{"picturename": "1000040373_Q_1.jpg", "coordinates": {"A": "-5.95,-2.51", "B": "-0.95,-2.51", "C": "-1.80,0.58", "D": "-4.52,2.27"}, "collineations": {"0": "A##C", "1": "A##D", "2": "A##B", "3": "B##C", "4": "C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: 已知条件
QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{AB=a},EqualityRelation{AD=b},InequalityRelation{a>b},AngleBisectorRelation{line=AC,angle=∠BAD, angle1=∠BAC, angle2=∠CAD},EqualityRelation{CD=BC},ProveConclusionRelation:[证明: EqualityRelation{∠ABC+∠ADC=(Pi)}]

474、topic: 如图, $\triangle ABD$ 和 $\triangle ACE$ 均为等腰直角三角形,A为公共直角顶点,过A作AF垂直CB交CB的延长线于F.#%#(1)求证: $\triangle ABC \cong \triangle ADE$;%#(2)求证: $CE=2AF$.#%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000041867_Q_1.jpg", "coordinates": {"A": "-4.00,5.00", "B": "-6.00, 3.00", "C": "-4.87,1.19", "D": "-2.00,3.00", "E": "0.20,4.14", "F": "-6.34,3.53"}, "collineations": {"0": "A##B", "1": "B##D", "2": "D##A", "3": "A##C", "4": "C##E", "5": "E##A", "6": "A##F", "7": "F##B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABD$ [Optional.of(A)][Optional.of(A)], IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ACE$ [Optional.of(A)][Optional.of(A)], LinePerpRelation{line1=AF, line2=CB, crossPoint=F}, LineCrossRelation[crossPoint=Optional.of(F), iLine1=AF, iLine2=CB], PointOnLineRelation{point=A, line=AF, isConstant=false, extension=false}, ProveConclusionRelation:[证明:
TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle ADE$ }], ProveConclusionRelation:[证明:
EqualityRelation{CE=2*AF}]

475、topic: 如图(1),在矩形ABCD中,把 $\angle B$ 、 $\angle D$ 分别翻折,使点B、D恰好落在对角线AC上的点E、F处,折痕分别为CM、AN.%(1)求证: $\angle DAN = \angle BCM$;%#(2)请连接MF、NE,证明四边形MFNE是平行四边形;%#(3)P、Q是矩形的边CD、AB上的两点,连接PQ、CQ、MN,如图(2)所示,若 $PQ=CQ$, $PQ \parallel MN$,且 $AB=4cm$, $BC=3cm$,求PC的长度.%#

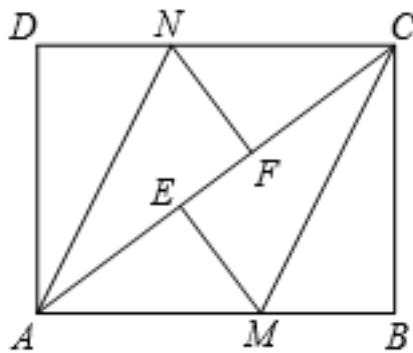


图 (1)

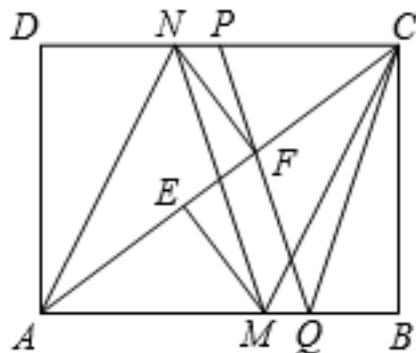


图 (2)

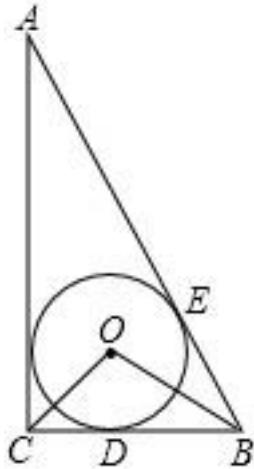
graph:

```
{"stem": {"pictures": [{"picturename": "1000050139_Q_1.jpg", "coordinates": {"A": "-9.00,2.00", "B": "-4.00,2.00", "C": "-4.00,6.00", "D": "-9.00,6.00", "E": "-7.02,3.58", "F": "-5.79,4.60", "M": "-5.90,2.00", "N": "-7.09,6.00"}, "collineations": {"0": "A##M##B", "1": "D##N##C", "2": "A##E##F##C", "3": "A##D", "4": "A##N", "5": "N##F", "6": "E##M", "7": "M##C", "8": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000001262_Q_1.jpg", "coordinates": {"P": "-6.16,6.00", "Q": "-5.08,2.00"}}, "collineations": {"0": "M##N", "1": "Q##C", "2": "P##F##Q"}], "variable>equals": {}, "circles": []}], "appliedproblems": {}}}
```

NLP:

RectangleRelation{rectangle=Rectangle:ABCD}, PointRelation:B, PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false}, PointCoincidenceRelation{point1=D, point2=E}, PointRelation:F, SegmentRelation:MF, SegmentRelation:NE, EqualityRelation{CP=v_0}, PointRelation:P, SegmentRelation:PQ, SegmentRelation:CQ, SegmentRelation:MN, EqualityRelation{PQ=CQ}, LineParallelRelation[iLine1=PQ, iLine2=MN], EqualityRelation{AB=4}, EqualityRelation{BC=3}, 求值(大小): (ExpressRelation:[key]:v_0), ProveConclusionRelation:[证明: EqualityRelation{∠DAN=∠BCM}], ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:EMFN}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:CP)}

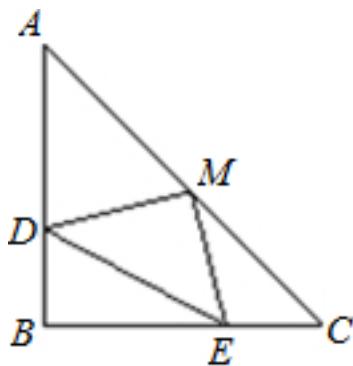
476、topic: 如图,已知\$Rt\triangle ABC\$中, \$∠ACB=90°\$, \$O\$是\$Rt\triangle ABC\$的内切圆,其半径为1,E,D是切点,若\$∠BOC=105°\$,求AE的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000008280_Q_1.jpg", "coordinates": {"A": "-2.73,4.73", "B": "0.00, 0.00", "C": "-2.73,0.00", "E": "-0.87,1.50", "D": "-1.73,0.00", "O": "-1.73,1.00"}, "collinearities": {"0": "A###C", "1": "A###B###E", "2": "O##C", "3": "O##B", "4": "C##D##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "D##E"}]}, "appliedproblems": {}, "substems": []}}

NLP: CircumscribedShapeOfCircleRelation:△ABC/Circle[O_0]{center=O_0, analytic=(x-x_O_0)^2+(y-y_O_0)^2=r_O_0^2}Points[], EqualityRelation{AE=v_1}, RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], EqualityRelation{∠ACD=(1/2*Pi)}, RadiusRelation{radius=null, circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, length=Express:[1], PointRelation:E, PointRelation:D, EqualityRelation{∠BOC=(7/12*Pi)}, 求值(大小): (ExpressRelation:[key]:v_1), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:AE)}

477、topic: 如图,在\$△ABC\$中,\$∠B=90°\$,\$AB=BC\$,\$BD=CE\$,\$M\$是边\$AC\$的中点.求证:\$△DEM\$是等腰三角形.%#



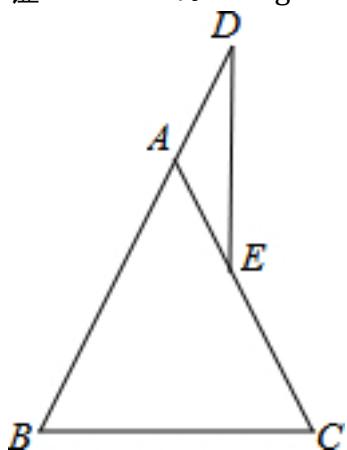
graph:

```
{"stem":{"pictures":[{"picturename":"1000052825_Q_1.jpg","coordinates":{"A": "-10.72,8.63","B": "-10.66,0.85","C": "-2.88,0.90","D": "-10.68,2.83","E": "-4.87,0.89","M": "-6.80,4.76"},"collinearations":{"0": "D##M","1": "M###E","2": "D###E","3": "A###D###B","4": "B###E###C","5": "C###M###A"},"variable-equals":{},"circles":[]}]}, "appliedproblems":{},"substems":[]}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle DBE = (1/2 * \pi)\}$, EqualityRelation $\{AB = BC\}$, EqualityRelation $\{BD = CE\}$, MiddlePointOfSegmentRelation $\{middlePoint = M, segment = AC\}$, ProveConclusionRelation:[IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle DEM$ [Optional.of(M)]]]

478、topic: 已知:如图,在 $\triangle ABC$ 中, $AB=AC$, E 在 AC 上, D 在 BA 的延长线上, $AD=AE$,连结 DE ,求证: $DE \perp BC$.%#



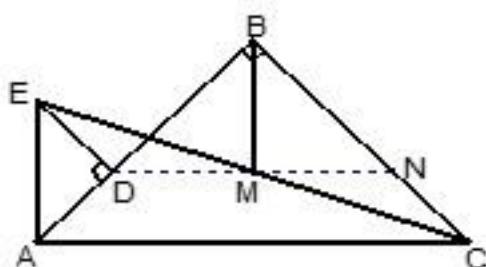
graph:

```
{"stem":{"pictures":[{"picturename":"1000040425_Q_1.jpg","coordinates":{"A": "0.00,3.00","B": "-1.56,0.00","C": "1.56,0.00","D": "0.63,4.20","E": "0.63,1.80"},"collinearations":{"0": "D##A##B","1": "B##C","2": "C##E##A","3": "D##E"},"variable-equals":{},"circles":[]}]}, "appliedproblems":{},"substems":[]}
```

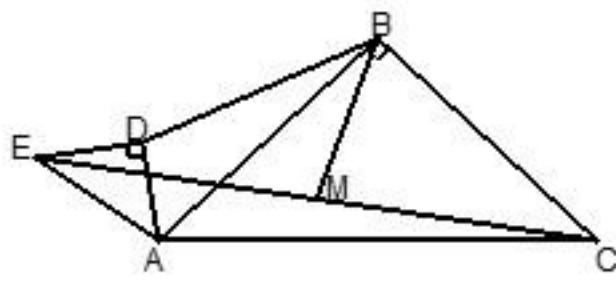
NLP: TriangleRelation: $\triangle ABC$, EqualityRelation $\{AB = AC\}$, PointOnLineRelation $\{point = E, line = AC, isConstant = false, extension = false\}$, PointOnLineRelation $\{point = D, line = BA, isConstant = false, extension = true\}$, EqualityRelation $\{AD = AE\}$, SegmentRelation: DE , ProveConclusionRelation:[证明: LinePerpRelation $\{line1 = DE, line2 = BC, crossPoint = P\}$]

479、topic: 已知:\$\triangle ABC\$和\$\triangle ADE\$都是等腰直角三角形,\$\angle ABC=\angle ADE=90^\circ\$,点M是CE的中点,连接BM.(1)如图①,点D在AB上,连接DM,并延长DM交BC于点N. 求证:\$\triangle EDM \cong \triangle CNM\$;(2)在(1)的条件下,试探究BD与BM之间存在什么样的数量关系,并给予证明;(3)如图②,点D不在AB上,(2)

中的结论还成立吗？如果成立，请证明；如果不成立，说明理由。



图①



图②

```

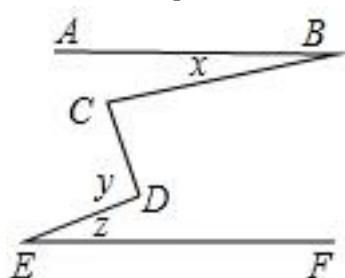
graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000027835_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,4.00", "C": "4.00,0.00", "D": "-2.00,2.00", "E": "-4.00,4.00", "M": "0.00,2.00", "N": "2.00,2.00"}, "collineations": {"0": "B###D##A", "1": "B##N##C", "2": "M##B", "3": "D##M##N", "4": "E##D", "5": "C##M##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "", "picture": [{"picturename": "3A_20(2).jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,4.00", "C": "4.00,0.00", "D": "-5.00,3.00", "E": "-8.00,2.00", "M": "-2.00,1.00"}, "collineations": {"0": "B##D", "1": "E##D", "2": "A##D", "3": "A##B", "4": "A##C", "5": "E##A", "6": "B##M", "7": "C##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "appliedproblems": {}}

```

NLP:

IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$ [Optional.of(B)][Optional.of(B)], IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ADE$ [Optional.of(D)][Optional.of(D)], MultiEqualityRelation [multiExpressCompare= $\angle DBN = \angle ADE = (1/2\pi)$], originExpressRelationList=[], keyWord=null, result=null], MiddlePointOfSegmentRelation{middlePoint=M, segment=CE}, SegmentRelation: BM, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, LineCrossRelation[crossPoint=Optional.of(N), iLine1=BC, iLine2=DM], 求值(大小): (ExpressRelation:[key:](BD/BM)), NegativeRelation{relation=PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle EDM$, triangleB= $\triangle CNM$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](BD/BM))}

480、topic: 如图,已知 $AB \parallel EF$, $\angle C=90^\circ$,求证: $x+y-z=90^\circ$.



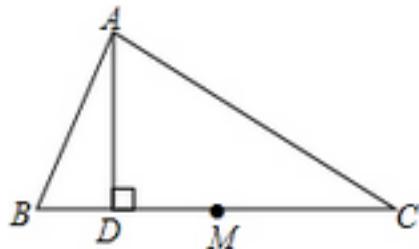
```

graph:
{"stem": {"pictures": [{"picturename": "1000022479_Q_1.jpg", "coordinates": {"A": "-10.00,8.00", "B": "0.00,8.00", "C": "-3.00,5.00", "D": "0.00,2.00", "E": "-10.00,0.00", "F": "4.00,0.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "D##C", "3": "D##E", "4": "E##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}

```

NLP: LineParallelRelation [iLine1=AB, iLine2=EF], EqualityRelation{ $\angle BCD = (1/2 * \pi)$ }, ProveConclusionRelation:[证明: EqualityRelation{x+y-z=(1/2 * \pi)}]

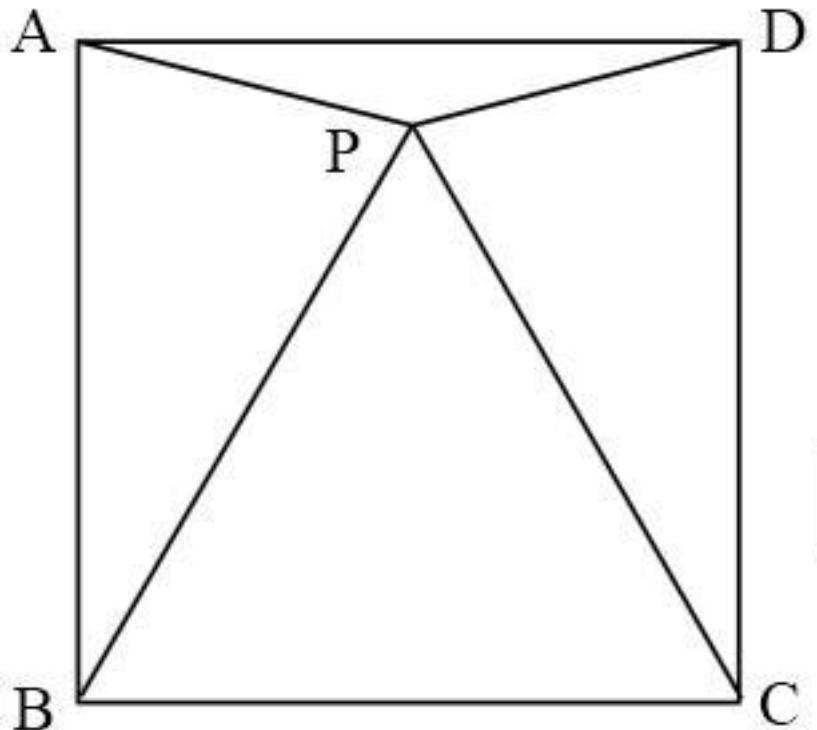
481、topic: 如图,在三角形ABC中, $\angle B = 2\angle C$,AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$.



graph:
 {"stem": {"pictures": [{"picturename": "1000040694_Q_1.jpg", "coordinates": {"A": "-9.03,4.35", "B": "-11.0", "C": "-4.00,2.00", "D": "-9.03,2.00", "M": "-7.50,2.00"}, "collinearations": {"0": "A##D", "1": "A##B", "2": "A##C", "3": "B##D##M##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsheets": []}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABD = 2 * \angle ACM$ }, MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{ $DM = (1/2) * AB$ }]

482、topic: 已知:如图,P是正方形ABCD内点, $\angle PAD = \angle PDA = 15^\circ$.求证: $\triangle PBC$ 是正三角形.

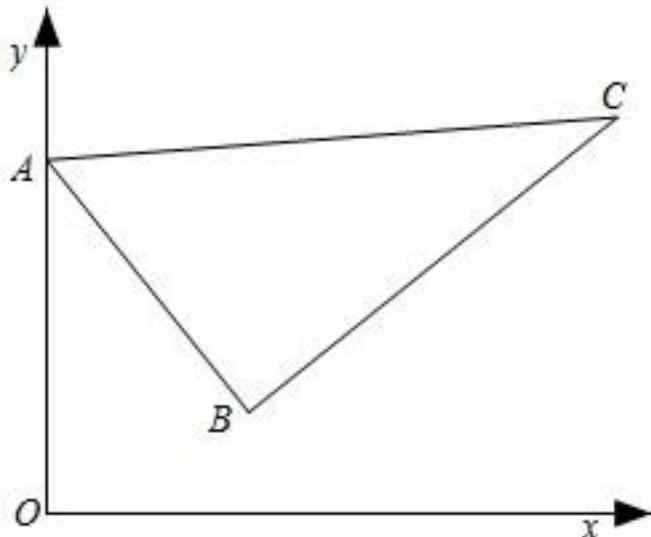


graph:

{"stem":{"pictures":[{"picturename":"1000010818_Q_1.jpg","coordinates":{"A":"0.00,6.00","B":"0.00,0.00","C":"6.00,0.00","D":"6.00,6.00","P":"3.00,5.20"}],"collineations":{"0":"B##A","1":"C##B","2":"C#D","3":"D##A","4":"P##A","5":"P##D","6":"B##P","7":"C##P"},"variable-equals":{},"circles":[]},"appliedproblems":{},"substems":[]}

NLP: PositionOfPoint2RegionRelation{point=P, region=EnclosedRegionRelation{name=ABCD, closedShape=Square:ABCD}, position=inner}, MultiEqualityRelation [multiExpressCompare= $\angle DAP = \angle ADP = (1/12\pi)$, originExpressRelationList=[], keyWord=null, result=null], ProveConclusionRelation:[证明: RegularTriangleRelation:RegularTriangle: $\triangle PBC$]

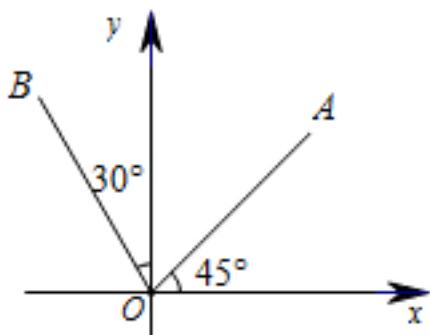
483、topic: 如图,将等腰直角 $\triangle ABC$ 放在直角坐标系中,其中 $\angle B=90^\circ$, $A(0,10)$, $B(8,4)$,求 AB 的长及点C的坐标.#%#



graph:
{"stem":{"pictures":[{"picturename":"1000080426_Q_1.jpg","coordinates":{"A":"0.00,10.00","B":"8.00,4.00","C":"14.00,12.00"}],"collineations":{"0":"A##B","1":"A##C","2":"B##C"},"variable-equals":{},"circles":[]},"appliedproblems":{},"substems":[]}

NLP:
EqualityRelation{AB=v_0}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$ [Optional.of(B)][Optional.of(B)], EqualityRelation{ $\angle ABC = (1/2\pi)$ }, PointRelation:A(0,10), PointRelation:B(8,4), 求值(大小): (ExpressRelation:[key:]v_0[v_0=v_0]), 坐标
PointRelation:C, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AB), SolutionConclusionRelation{relation=坐标} PointRelation:C}

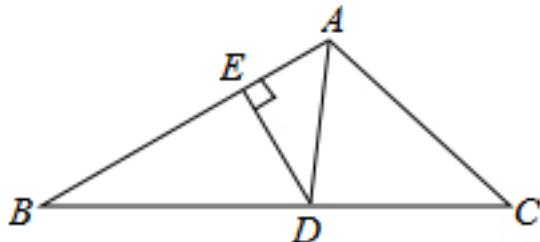
484、topic: 如图所示,在直角坐标系中,线段OA的长度为6,OB的长度为8,求点A,点B的坐标.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000082372_Q_1.jpg", "coordinates": {"A": "2.12,2.12", "B": "-2.00, 3.46", "O": "0.00,0.00"}, "collineations": {"0": "A###O", "1": "B###O"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: CoorSysTypeRelation [name=xOy, types=直角坐标系], EqualityRelation{AO=6}, EqualityRelation{BO=8}, 坐标PointRelation:A, 坐标PointRelation:B, SolutionConclusionRelation{relation=坐标PointRelation:A}, SolutionConclusionRelation{relation=坐标PointRelation:B}

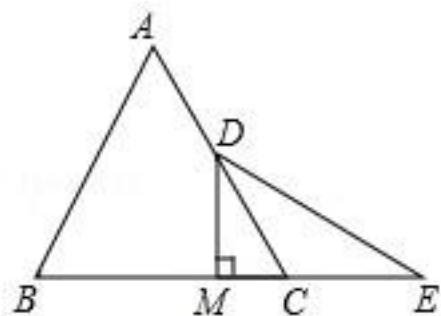
485、topic: 如图,AD是 $\triangle ABC$ 中 $\angle BAC$ 的角平分线, $DE \perp AB$ 于点E, $\{S\}_{\triangle ABC}=7$, $DE=2$, $AB=4$, 求AC的长度.#%#



graph:
 {"stem": {"pictures": [{"picturename": "B8F2039A4B2644D7B9C33F3803D7F646.jpg", "coordinates": {"A": "-11.00,6.00", "B": "-14.11,3.49", "C": "-9.36,3.49", "D": "-11.40,3.49", "E": "-12.47,4.82"}, "collineations": {"0": "B###E###A", "1": "A###C", "2": "A###D", "3": "D###E", "4": "B###C###D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AC=v_0}, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, EqualityRelation{ $S_{\triangle ABC}=7$ }, EqualityRelation{DE=2}, EqualityRelation{AB=4}, 求值(大小): (ExpressRelation:[key:v_0]), AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:AC])}

486、topic: 如图,已知等边三角形ABC中,D是AC的中点,E是BC延长线上的一点,且 $CE=CD$, $DM \perp BC$, 垂足为M. 求证:M是BE的中点.#%#



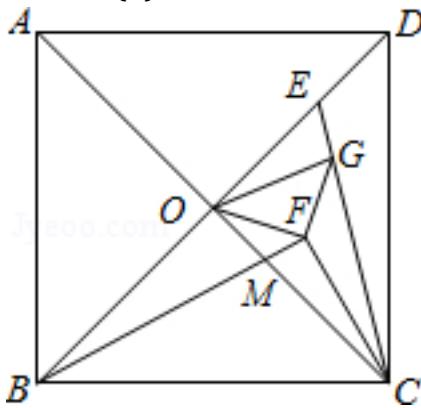
graph:
 {"stem": {"pictures": [{"picturename": "1000027156_Q_1.jpg", "coordinates": {"A": "3.00##5.20", "B": "0.00##0.00", "C": "6.00##0.00", "D": "4.50##2.60", "E": "9.00##0.00"}, "collineations": {}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

"M":"4.50##0.00"}#%"collineations":{"0":"A###B##%#"1":"C###M###B###E##%"2":"D##M##%"3":"D###E##%"4":"A###D###C"}#%"variable-equals":{}#%"circles":[]}]#%"appliedproblems":{}#%"substems":[]}

NLP:

RegularTriangleRelation:RegularTriangle: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=AC},PointOnLineRelation{point=E, line=BC, isConstant=false, extension=true},EqualityRelation{CE=CD},LinePerpRelation{line1=DM, line2=BC, crossPoint=M},ProveConclusionRelation:[证明:
MiddlePointOfSegmentRelation{middlePoint=M,segment=BE}]

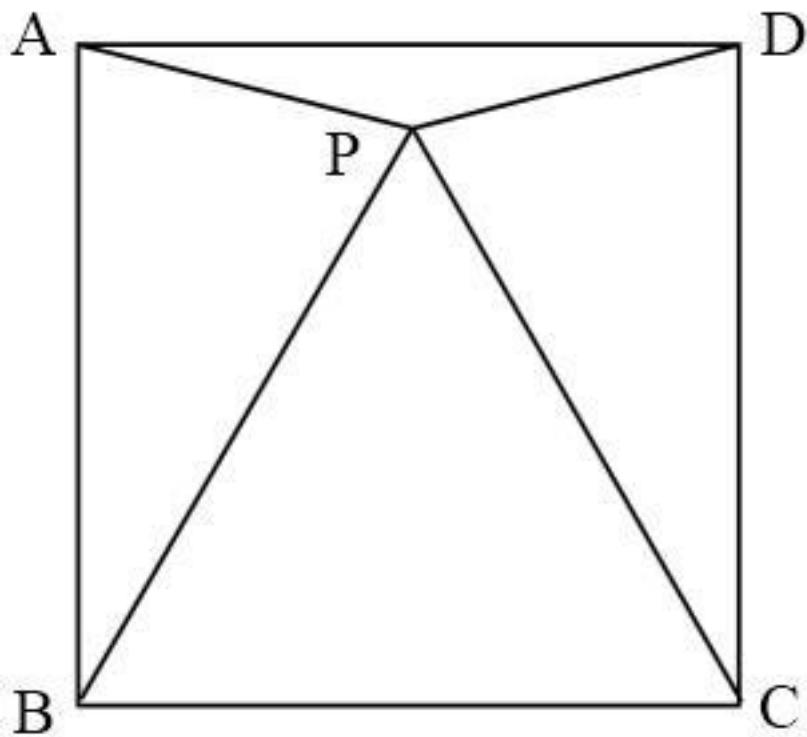
487、topic: 如图,正方形ABCD的对角线相交于点O.点E是线段DO上一点,连接CE.点F是 $\angle OCE$ 的平分线上一点,且 $BF \perp CF$ 与CO相交于点M.点G是线段CE上一点,且 $CO=CG$.#%(1)若 $OF=4$,求FG的长;#%(2)求证: $BF=OG+CF$.#%#



graph:
{ "stem": { "pictures": [{ "picturename": "1000041984_Q_1.jpg", "coordinates": { "A": "-14.00,5.00", "B": "-14.03,1.14", "C": "-10.17,1.11", "D": "-10.14,4.97", "E": "-10.96,4.16", "F": "-11.12,2.79", "G": "-10.85,3.75", "M": "-11.57,2.53", "O": "-12.08,3.05" }, "collineations": { "0": "A###O###M###C", "1": "D###E###O###B", "2": "E###G###C", "3": "B###M###F", "4": "O###F", "5": "F###G", "6": "A###D", "7": "A###B", "8": "B###C", "9": "D###C", "10": "O###G" }, "variable-equals": {}, "circles": [], "appliedproblems": {}, "substems": [] }}

NLP: AngleBisectorRelation{line=M_ON_0,angle= $\angle GCM$, angle1= $\angle GCM_0$, angle2= $\angle MCM_0$ },SquareRelation{square=Square:ABCDintersection : O},PointOnLineRelation{point=E, line=DO, isConstant=false, extension=false},SegmentRelation:CE,LinePerpRelation{line1=BF, line2=CF, crossPoint=F},LineCrossRelation [crossPoint=Optional.of(M), iLine1=BF, iLine2=CO],PointOnLineRelation{point=G, line=CE, isConstant=false, extension=false},EqualityRelation{CO=CG},EqualityRelation{FG=v_1},EqualityRelation{FO=4},求值(大小): (ExpressRelation:[key:]v_1),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]FG)},ProveConclusionRelation:[证明: EqualityRelation{BF=GO+CF}]

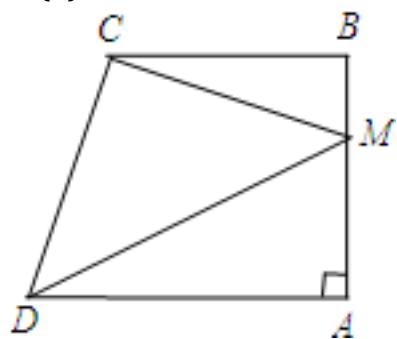
488、topic: 已知:如图,P是正方形ABCD内点,\$\angle PAD = \angle PDA = 15^\circ\$#求证:\$\triangle PBC\$是正三角形.



graph:
 {"stem": {"pictures": [{"picturename": "1000010818_Q_1.jpg", "coordinates": {"A": "0.00,6.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "6.00,6.00", "P": "3.00,5.20"}, "collineations": {"0": "B###A", "1": "C##B", "2": "C#D", "3": "D##A", "4": "P##A", "5": "P##D", "6": "B##P", "7": "C##P"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: PositionOfPoint2RegionRelation{point=P, region=EnclosedRegionRelation{name=ABCD, closedShape=Square:ABCD}, position=inner}, MultiEqualityRelation [multiExpressCompare= $\angle DAP = \angle ADP = (1/12 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], ProveConclusionRelation:[证明: RegularTriangleRelation:RegularTriangle: $\triangle PBC$]

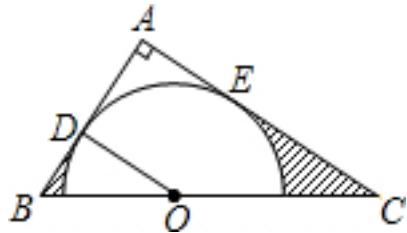
489、topic: 如图,在四边形ABCD中,已知 $AD \parallel BC$, $\angle BAD = 90^\circ$,点M为AB上一点,连接CM,DM. #%(1)
 求证: $\angle CMD = \angle BCM + \angle ADM$; #%(2)若 $AD = 8$, $AM = 6$, $CD = CM = 5\sqrt{2}$,求四边形AMCD的面积; #%(3)
 在(2)的情况下,连接AC,求AC的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000062466_Q_1.jpg", "coordinates": {"A": "8.00,0.00", "B": "8.00,7.00", "C": "1.00,7.00", "D": "0.00,0.00", "M": "8.00,6.00"}, "collineations": {"0": "B###A##M", "1": "B##C", "2": "D##C", "3": "C##M", "4": "A##D", "5": "M##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LineParallelRelation [iLine1=AD, iLine2=BC],EqualityRelation{ $\angle DAM = (1/2 * \pi)$ },PointOnLineRelation{point=M, line=AB, isConstant=false, extension=false},SegmentRelation:CM,SegmentRelation:DM,已知条件QuadrilateralRelation{quadrilateral=ADCM},EqualityRelation{S_ADCM=v_0},EqualityRelation{AD=8}, EqualityRelation{AM=6},MultiEqualityRelation [multiExpressCompare=CD=CM=5*(2^(1/2))], originExpressRelationList=[], keyWord=null, result=null].求值(大小):
 (ExpressRelation:[key:]v_0),EqualityRelation{AC=v_1},SegmentRelation:AC,求值(大小):
 (ExpressRelation:[key:]v_1),ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle CMD = \angle BCM + \angle ADM$ }],SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]S_ADCM}),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AC)}

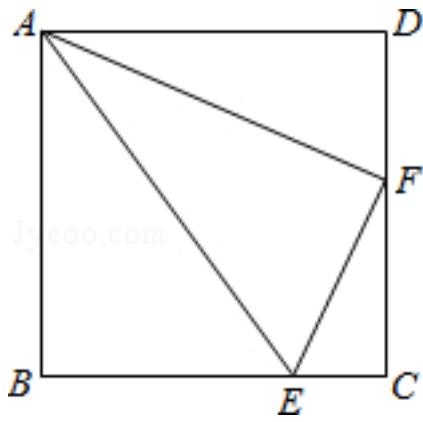
490、topic: 如图,在 $\triangle ABC$ 中, $\angle A=90^\circ$,O是BC边上一点,以O为圆心的半圆分别与AB、AC边相切于D、E两点,连接OD.已知BD=2,AD=3,求:(1) $\tan C$;(2)图中两部分阴影面积的和.



graph:
 {"stem": {"pictures": [{"picturename": "1000060798_Q_1.jpg", "coordinates": {"A": "4.75,5.05", "B": "2.61,1.00", "C": "12.43,1.00", "D": "3.35,2.40", "E": "7.40,3.65", "O": "6.00,1.00"}, "collinearities": {"0": "A###D##B", "1": "B##O##C", "2": "C##E##A", "3": "O##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "D##E"}}], "appliedproblems": {}, "substems": []}}

NLP: CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }},TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle DAE = (1/2 * \pi)$ },PointOnLineRelation{point=O, line=BC, isConstant=false, extension=false},LineContactCircleRelation{line=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(D), outpoint=Optional.absent()},LineContactCircleRelation{line=AC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(E), outpoint=Optional.absent()},SegmentRelation:OD,EqualityRelation{BD=2},EqualityRelation{AD=3},求值(大小): (ExpressRelation:[key:]tan($\angle ECO$)),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]tan($\angle ECO$)))

491、topic: 如图,在正方形ABCD中,F是CD的中点,E是BC边上的一点,且AF平分 $\angle DAE$ 若正方形ABCD的边长为4,BE=3,求EF的长?



graph:

{"stem": {"pictures": [{"picturename": "1000041832_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "3.00,0.00", "F": "4.00,2.00"}, "collineations": {"0": "A##B", "1": "B###E##C", "2": "C##F##D", "3": "D##A", "4": "A##E", "5": "E##F", "6": "F##A"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

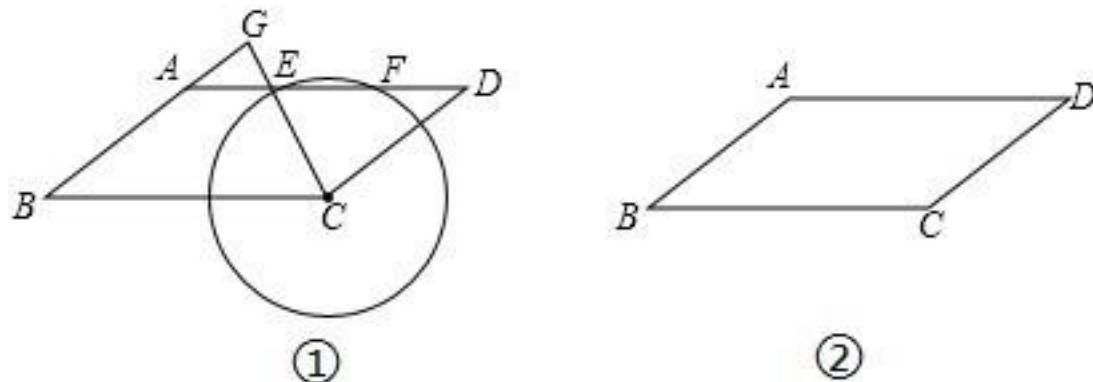
NLP:

SquareRelation{square=Square:ABCD}, MiddlePointOfSegmentRelation{middlePoint=F, segment=CD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, AngleBisectorRelation{line=AF, angle= $\angle DAE$, angle1= $\angle DAF$, angle2= $\angle EAF$ }, EqualityRelation{EF=v_0}, SquareRelation{square=Square:ABCD}, EqualityRelation{AB=4}, EqualityRelation{BE=3}, 求值(大小):

(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key:]EF)}, ProveConclusionRelation:[证明: EqualityRelation{AE=CE+CD}]

492、topic: 如图,已知在平行四边形ABCD中,\$AB=5\$,\$BC=8\$,\$\cos B = \frac{4}{5}\$,点P是边BC上的动点,以CP为半径的圆C与边AD交于点E、F(点F在点E的右侧),射线CE与射线BA交于点G.(1)当圆C经过点A时,求CP的长;(2)连接AP,当\$AP\parallel CG\$时,求弦EF的长;(3)当\$\triangle AGE\$是等腰三角形时,求圆C的半径长.



graph:

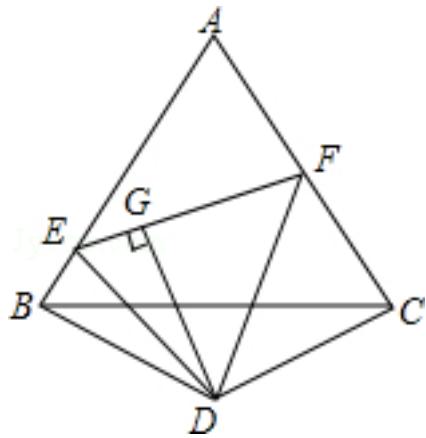
{"stem": {"pictures": [{"picturename": "1000008154_Q_1.jpg", "coordinates": {"A": "1.56,4.75", "B": "0.00,0.00", "C": "8.00,0.00", "D": "9.56,4.75"}, "collineations": {"0": "B##A", "1": "C##D", "2": "A##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: RadiusRelation{radius=CP, circle=Circle[$\odot C$]{center=C, analytic=(x-x_C)^2+(y-y_C)^2=r_C^2}, length=null}, PositionRelation [F在E的右方], ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{AB=5}, EqualityRela

analytic=(x-x_C)^2+(y-y_C)^2=r_C^2}, length=null}, PositionRelation [F在E的右方], ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{AB=5}, EqualityRela

tion{BC=8}, EqualityRelation{cos($\angle B$)=(4/5)}, PointOnLineRelation{point=P, line=BC, isConstant=false, extension=false}, LineCrossCircleRelation{line=AD, circle= $\odot C$, crossPoints=[E, F], crossPointNum=2}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=CE, iLine2=BA], EqualityRelation{CP=v_0}, PointOnCircleRelation{circle=Circle[$\odot C$]{center=C, analytic=(x-x_C)^2+(y-y_C)^2=r_C^2}, points=[A]}, 求值(大小):
 (ExpressRelation:[key:v_0]), SegmentRelation:AP, LineParallelRelation [iLine1=AP, iLine2=CG], 求值(大小):
 (ExpressRelation:[key:EF]), ChordOfCircleRelation{chord=EF, circle=Circle[$\odot C$]{center=C, analytic=(x-x_C)^2+(y-y_C)^2=r_C^2}, chordLength=null, straightLine=null}, IsoscelesTriangleRelation:IsoscelesTriangle: $\triangle AGE$ [Optional.abs ent[]], 圆的半径: CircleRelation{circle=Circle[$\odot C$]{center=C, analytic=(x-x_C)^2+(y-y_C)^2=r_C^2}}, SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:CP]), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:EF]), SolutionConclusionRelation{relation=圆的半径:
 CircleRelation{circle=Circle[$\odot C$]{center=C, analytic=(x-x_C)^2+(y-y_C)^2=r_C^2}}}

493、topic: 已知 $\triangle ABC$ 为等边三角形, $\triangle BCD$ 为等腰三角形, $\angle BDC=120^\circ$,E、F分别为AB和AC上任一点,且 $\angle EDF=60^\circ$, $DG \perp EF$,求证: $\triangle BED \cong \triangle GED$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "C2CB0F00182247F8A6326917D981A306.jpg", "coordinates": {"A": "-11.50,9.33", "B": "-14.00,5.00", "C": "-9.00,5.00", "D": "-11.50,3.56", "E": "-13.57,5.75", "F": "-9.93,6.61", "G": "-12.10,6.10"}, "collineations": {"0": "B###E##A", "1": "A###F##C", "2": "B##D", "3": "B##C", "4": "C##D", "5": "D##E", "6": "D##F", "7": "D##G", "8": "F##E##G"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

RegularTriangleRelation:RegularTriangle: $\triangle ABC$, RegularTriangleRelation:RegularTriangle: $\triangle BCD$, EqualityRelation{ $\angle BDC=(2/3*\pi)$ }, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, EqualityRelation{ $\angle EDF=(1/3*\pi)$ }, LinePerpRelation{line1=DG, line2=EF, crossPoint=G}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BED$, triangleB= $\triangle GED$ }]

494、topic: #(1)如图1,已知 $\angle ACB=\angle DCE=90^\circ$, $AC=BC=6$, $CD=CE$, $AE=3$, $\angle CAE=45^\circ$,求AD的长;#%(2)如图2,已知 $\angle ACB=\angle DCE=90^\circ$, $\angle ABC=\angle CED=\angle CAE=30^\circ$, $AC=3$, $AE=8$,求AD的长 . #%#

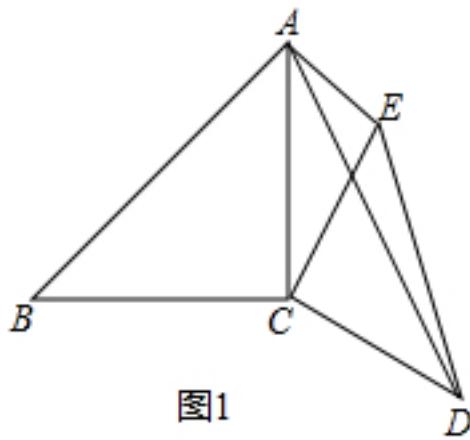


图1

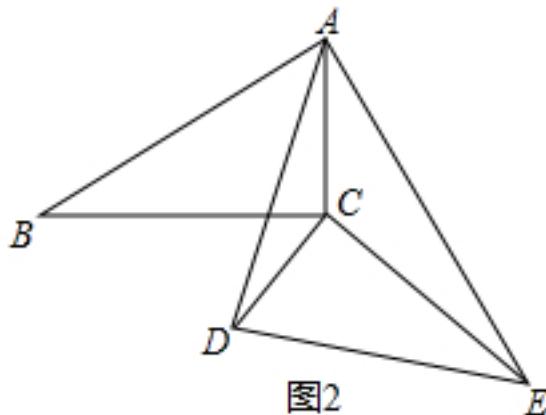


图2

```
graph:
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"C66C1EFB965F4C9EA1CA822B7AA1004B_1.jpg","coordinates":{"A": "-8.00,9.00", "B": "-14.00,3.00", "C": "-8.00,3.00", "D": "-4.12,0.88", "E": "-5.88,6.88"}, "collineations": {"0": "B###A", "1": "A###D", "2": "C###A", "3": "A###E", "4": "B###C", "5": "C###D", "6": "C###E", "7": "E###D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "C66C1EFB965F4C9EA1CA822B7AA1004B_2.jpg", "coordinates": {"A": "-10.00,7.00", "B": "-15.20,4.00", "C": "-10.00,4.00", "D": "-12.27,1.69", "E": "-6.00,0.07"}, "collineations": {"0": "B###A", "1": "A###D", "2": "C###A", "3": "A###E", "4": "B###C", "5": "C###D", "6": "C###E", "7": "E###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}]
```

NLP: EqualityRelation{AD=v_0},(ExpressRelation:[key:]1),MultiEqualityRelation
[multiExpressCompare= $\angle ACB = \angle DCE = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare=AC=BC=6, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{CD=CE}, EqualityRelation{AE=3}, EqualityRelation{ $\angle CAE = (1/4 * \pi)$ }, 求值(大小):

(ExpressRelation:[key:]v_0), EqualityRelation{AD=v_1}, (ExpressRelation:[key:]2), MultiEqualityRelation [multiExpressCompare= $\angle ACB = \angle DCE = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare= $\angle ABC = \angle CED = \angle CAE = (1/6 * \pi)$, originExpressRelationList=[], keyWord=null,

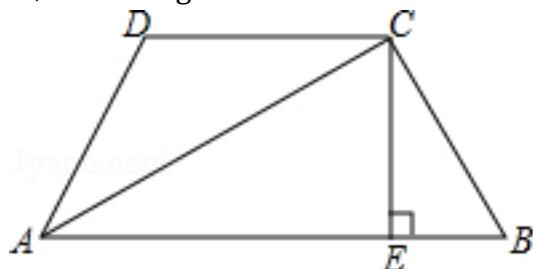
result=null], EqualityRelation{AC=3}, EqualityRelation{AE=8}, 求值(大小):

(ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]AD), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]AD)}

495、topic: 如图,四边形ABCD中,AC平分 $\angle BAD$, $CE \perp AB$ 于点E, $AD+AB=2AE$,则 $\angle B$ 与 $\angle ADC$ 互补.为什么?#%#



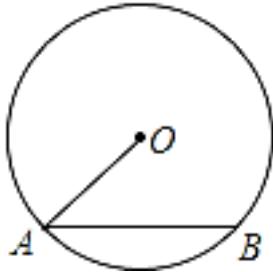
graph:

{"stem": {"pictures": [{"picturename": "1000031277_Q_1.jpg", "coordinates": {"A": "-10.50,2.00", "B": "0.00,2.00", "C": "-3.00,6.00", "D": "-7.99,5.74", "E": "-3.00,2.00"}, "collineations": {"0": "A##D", "1": "A##E##B", "2": "A##C", "3": "B##C", "4": "D##C", "5": "E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, AngleBisectorRelation{line=AC, angle= $\angle DAE$, angle1= $\angle CAD$, angle2= $\angle CAE$ }, LinePerpRelation{line1=CE, line2=AB, crossPoint=E}, EqualityRelation{AD+AB=2*AE}, AngleSupplementRelation: $\angle CBE/\angle ADC$

496、topic: 如图,已知 $\odot O$ 的半径为30mm,弦AB=36mm,求点O到AB的距离及 $\angle OAB$ 的余弦值.#%#

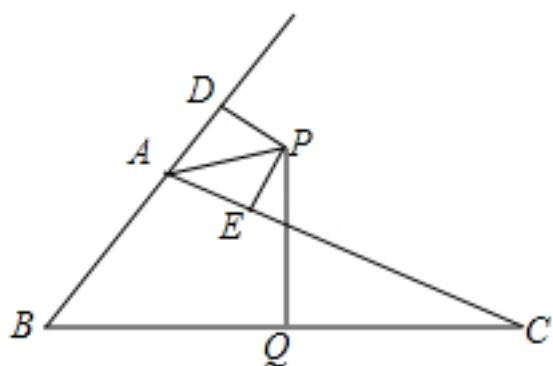


graph:

{"stem": {"pictures": [{"picturename": "1000083361_Q_1.jpg", "coordinates": {"A": "-1.77,-2.42", "B": "1.83,-2.38", "O": "0.00,0.00"}, "collineations": {"0": "A##O", "1": "A##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B"}]}, "appliedproblems": {}, "subsystems": []]}

NLP: RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=Express:[30]}, ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null, straightLine=null}, EqualityRelation{AB=36}, 距离, 求距离: PointToLineDistanceRelation{point=O, line=AB, distance=null}, 求角的余弦值: CalculateTrigonometricOfAngleRelation{angle= $\angle BAO$, trigonometricType=COS}, SolutionConclusionRelation{relation=距离, 求距离: PointToLineDistanceRelation{point=O, line=AB, distance=null}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]cos($\angle BAO$))}

497、topic: 如图, $\triangle ABC$ 的外角 $\angle DAC$ 的平分线交BC边的垂直平分线于P点,PD $\perp AB$ 于D,PE $\perp AC$ 于E.#%#(1)求证:BD=CE;#%#(2)若AB=6cm,AC=10cm,求AD的长.#%#

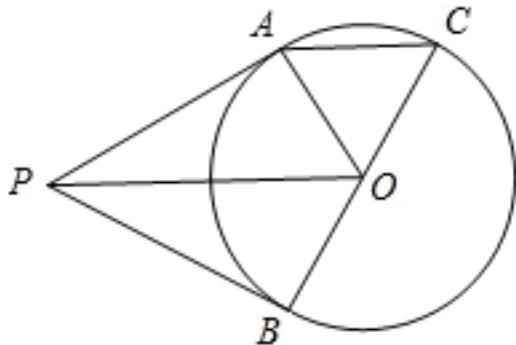


graph:

{"stem": {"pictures": [{"picturename": "1000031011_Q_1.jpg", "coordinates": {"A": "-11.00,4.00", "B": "-13.00,2.00", "C": "-7.00,2.00", "D": "-10.42,4.58", "E": "-10.26,3.63", "P": "-10.00,4.16", "Q": "-10.00,2.00"}, "collinearities": {"0": "D###A##B", "1": "A###E##C", "2": "B##Q##C", "3": "P##Q", "4": "P##D", "5": "P##E", "6": "A##P"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: LinePerpRelation{line1=PD, line2=AB, crossPoint=D}, LinePerpRelation{line1=PE, line2=AC, crossPoint=E}, EqualityRelation{AD=v_1}, EqualityRelation{AB=6}, EqualityRelation{AC=10}, 求值(大小): (ExpressRelation:[key:]v_1), ProveConclusionRelation:[证明: EqualityRelation{BD=CE}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}

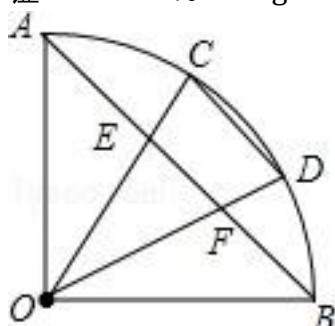
498、topic: 已知:如图,P为 $\odot O$ 外一点,PA,PB为 $\odot O$ 的两条切线,A和B为切点,BC为直径.求证: $AC \parallel OP$.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000083452_Q_1.jpg", "coordinates": {"A": "-0.38,2.14", "B": "0.09,-1.56", "C": "1.34,2.36", "P": "-3.84,-0.32", "O": "0.71,0.40"}, "collinearities": {"0": "O###A", "1": "O###P", "2": "A##C", "3": "A##P", "4": "B##P", "5": "B##O##C"}, "variable>equals": {}, "circles": [{"center": "O", "points": ["C##A##B"]}], "appliedproblems": {}, "subsystems": []}}

NLP: PointOutCircleRelation{point=P, curve=Circle[$\odot O$], center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, points=[P]}, LineContactCircleRelation{line=PA, circle=Circle[$\odot O$], center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(A), outpoint=Optional.of(P)}, LineContactCircleRelation{line=PB, circle=Circle[$\odot O$], center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(B), outpoint=Optional.of(P)}, DiameterRelation{diameter=BC, circle=Circle[$\odot O$], center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AC, iLine2=OP]]]

499、topic: 如图, $\angle AOB=90^\circ$,C、D是 \widehat{AB} 的三等分点,AB分别交OC、OD于点E、F,求证: $AE=CD$.#%#

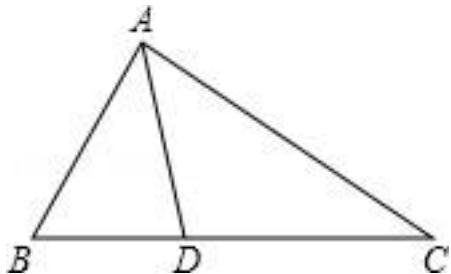


graph:

{"stem": {"pictures": [{"picturename": "1000052548_Q_1.jpg", "coordinates": {"A": "-8.15,3.47", "B": "-5.23,1.00", "C": "-6.77,3.22", "D": "-5.70,2.32", "E": "-7.08,2.56", "F": "-6.30,1.90", "O": "-7.92,0.77"}, "collineations": {"0": "O###A", "1": "O###B", "2": "C###D", "3": "O###E###C", "4": "O###F###D", "5": "A###E###F##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C###D"}]}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{ $\angle AOB = (1/2 * \pi)$ }, PointRelation:C, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AB, iLine2=OC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=AB, iLine2=OD], ProveConclusionRelation:[证明: EqualityRelation{AE=CD}]

500、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC = 2\angle C$,AD平分 $\angle BAC$ 交BC于点D.求证: $AB+BD=AC$.



graph:

{"stem": {"pictures": [{"picturename": "1000026825_Q_1.jpg", "coordinates": {"A": "0.00,5.00", "B": "-3.00,1.00", "C": "5.00,1.00", "D": "0.51,1.00"}, "collineations": {"0": "B###C###D", "1": "C###A", "2": "A###B", "3": "A###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []]}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABD = 2 * \angle ACD$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, LineCrossRelation [crossPoint=Optional.of(D), iLine1=AD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{AB+BD=AC}]

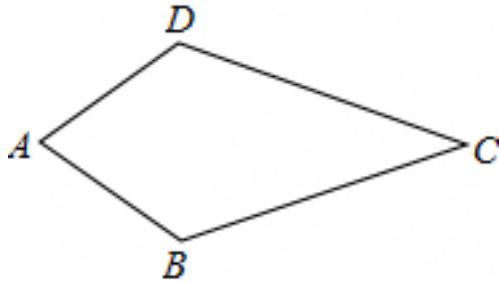
501、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC = 90^\circ$,以AB的中点O为圆心、OA为半径的圆交AC于点D,E是BC的中点,连接DE,OE.求证: $CD \cdot 2OE = BC^2$

graph:

NLP:

MiddlePointOfSegmentRelation{middlePoint=O, segment=AB}, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABC = (1/2 * \pi)$ }, CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2 + (y-y_O)^2 = r_O^2$ }}, MiddlePointOfSegmentRelation{middlePoint=E, segment=BC}, SegmentRelation:DE, SegmentRelation:OE, ProveConclusionRelation:[证明: EqualityRelation{ $CD \cdot 2OE = BC^2$ }]

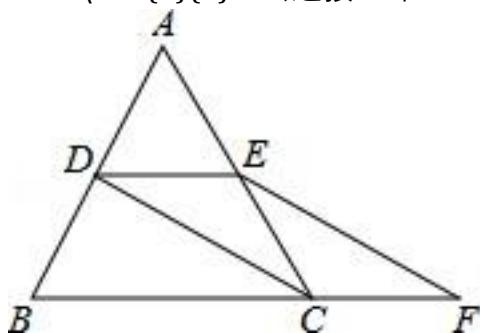
502、topic: 如图,在四边形ABCD中,AB=AD,CB=CD,试说明 $\angle B = \angle D$.



graph:
 {"stem": {"pictures": [{"picturename": "1000029143_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "2.00,-2.00", "C": "6.00,0.00", "D": "2.00,2.00"}, "collineations": {"0": "D##A", "1": "C##D", "2": "A##B", "3": "B##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{AB=AD}, EqualityRelation{BC=CD}, Prove ConclusionRelation:[证明: EqualityRelation{∠ABC=∠ADC}]

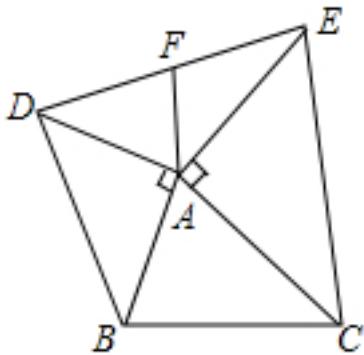
503、topic: 如图,等边三角形\$ABC\$的边长是2,D、E分别为AB、AC的中点,延长BC至点F,使\$CF=\frac{1}{2}BC\$,连接CD和EF.(1)求证: \$DE=CF\$;(2)求EF的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000026643_Q_1.jpg", "coordinates": {"A": "-2.50,4.33", "B": "-5.00,0.00", "C": "0.00,0.00", "D": "-3.75,2.17", "E": "-1.25,2.17", "F": "2.50,0.00"}, "collineations": {"0": "C##B##F", "1": "A##B##D", "2": "C##E##A", "3": "D##C", "4": "D##E", "5": "E##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
 RegularTriangleRelation:RegularTriangle:△ABC, EqualityRelation{AB=2}, MiddlePointOfSegmentRelation{middlePoint=D, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AC}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=true}, EqualityRelation{CF=(1/2)*BC}, SegmentRelation:CD, SegmentRelation:EF, EqualityRelation{EF=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{DE=CF}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]EF)}

504、topic: 如图,AB=AD,AC=AE, ∠BAD=∠CAE=90°,点F为DE的中点,求证;BC=2AF.#%#

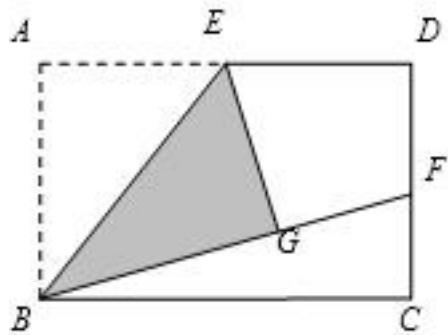


graph:

{"stem": {"pictures": [{"picturename": "E076CDA9E8264D5B93D9239E86CD9B98.jpg", "coordinates": {"A": "-12.00,6.00", "B": "-13.00,4.00", "C": "-10.00,4.00", "D": "-14.00,7.00", "E": "-10.00,8.00", "F": "-12.00,7.50"}, "collineations": {"0": "B###A", "1": "A###D", "2": "E###A", "3": "A###C", "4": "A###F", "5": "B###C", "6": "E###C", "7": "B###D", "8": "D###E###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AB=AD}, EqualityRelation{AC=AE}, MultiEqualityRelation [multiExpressCompare= $\angle BAD = \angle CAE = (1/2\pi)$, originExpressRelationList=[], keyWord=null, result=null], MiddlePointOfSegmentRelation{middlePoint=F, segment=DE}, ProveConclusionRelation:[
证明： EqualityRelation{BC=2*AF}]

505、topic: 如图所示,在矩形ABCD中,点E是AD的中点,将 $\triangle ABE$ 沿BE折叠后得到 $\triangle GBE$,且点G在矩形ABCD内部,将BG延长交DC于点F.?%#(1)连接EF,求证: $GF=DF$?%#(2)保持题中的条件不变,若 $DF=\frac{1}{2}DC$,求证: $\frac{AD}{AB}=\sqrt{2}$?%#(3)保持题中的条件不变,若 $DF=\frac{1}{n}DC$,探究求出: $\frac{AD}{AB}$ 的值.



graph:

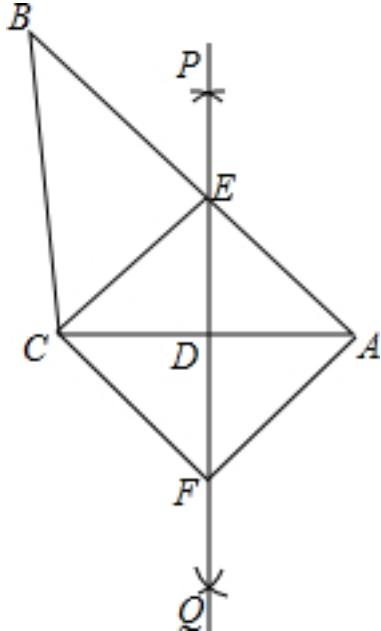
{"stem": {"pictures": [{"picturename": "1000027805_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "0.00,0.00", "C": "4.24,0.00", "D": "4.24,3.00", "E": "2.12,3.00", "F": "4.24,1.50", "G": "2.83,1.00"}, "collineations": {"0": "B###G##F", "1": "D##F##C", "2": "A##E##D", "3": "B##A", "4": "E##B", "5": "E##G", "6": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

RectangleRelation{rectangle=Rectangle:ABCD}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AD}, SymmetricRelation{preData= $\triangle ABE$, afterData= $\triangle GBE$, symmetric=BE, pivot=}, PositionOfPoint2RegionRelation{point=G, region=EnclosedRegionRelation{name=ABCD, closedShape=Rectangle:ABCD}, position=inner}, SegmentRelation:EF, EqualityRelation{DF=(1/2)*CD}, EqualityRelation{DF=(1/n)*CD}, 求值(大小): (ExpressRelation:[key:]((AD)/(AB))), ProveConclusionRelation:[证明:

EqualityRelation{FG=DF}],ProveConclusionRelation:[证明:
 EqualityRelation{((AD)/(AB))=(2^(1/2))}],SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]((AD)/(AB)))}

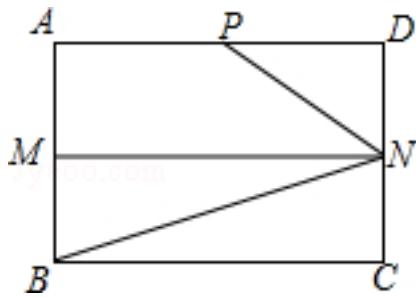
506、topic: 如图,已知 $\triangle ABC$,直线PQ垂直平分AC,与边AB交于点E,连接CE,过点C作 $CF \parallel BA$ 交PQ于点F,连接AF.
 (1)求证:\$\triangle AED \cong \triangle CFD\$;(2)求证:四边形AECF是菱形;
 (3)若 $AD=3, AE=5$,则菱形AECF的面积是多少? #



graph:
 {"stem": {"pictures": [{"picturename": "1000041053_Q_1.jpg", "coordinates": {"A": "-3.00,3.00", "B": "-9.54, 11.72", "C": "-9.00,3.00", "D": "-6.00,3.00", "E": "-6.00,7.00", "F": "-6.00,-1.00", "P": "-6.00,9.00", "Q": "-6.00,-2.00"}, "collineations": {"0": "P###E###D###F##Q", "1": "C##D##A", "2": "C##F", "3": "A##F", "4": "A##E##B", "5": "B##C", "6": "E##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$,MiddlePerpendicularRelation [iLine1=PQ, iLine2=AC, crossPoint=Optional.of(D)],SegmentRelation:AB,LineCrossRelation [crossPoint=Optional.of(E), iLine1=PQ, iLine2=AB],SegmentRelation:CE,PointOnLineRelation{point=C, line=CF, isConstant=false, extension=false},LineParallelRelation [iLine1=CF, iLine2=BA],LineCrossRelation [crossPoint=Optional.of(F), iLine1=CF, iLine2=PQ],SegmentRelation:AF,RhombusRelation{rhombus=Rhombus:AECF},EqualityRelation{S_AE CF=v_0},EqualityRelation{AD=3},EqualityRelation{AE=5},求值(大小):
 (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle AED$, triangleB= $\triangle CFD$ }],ProveConclusionRelation:[证明:
 RhombusRelation{rhombus=Rhombus:AECF}],SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]S_AECF)}

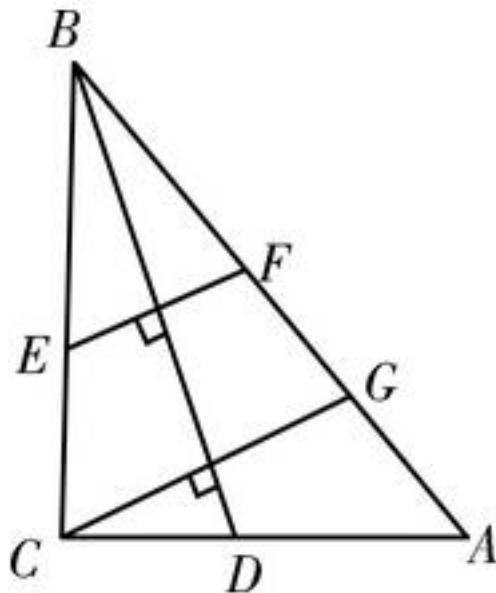
507、topic: 如图,在矩形ABCD中, $AB=4, AD=6$.M、N分别是AB、CD的中点,P是AD上的点,且 $\angle PNB=3\angle CBN$.#(1)求证:\$\angle PNM=2\angle CBN\$;(2)求线段AP的长.#



graph:
 {"stem": {"pictures": [{"picturename": "1000041068_Q_1.jpg", "coordinates": {"A": "-9.00,5.00", "B": "-9.00,1.00", "C": "-3.00,1.00", "D": "-3.00,5.00", "M": "-9.00,3.00", "N": "-3.00,3.00", "P": "-5.67,5.00"}, "collineations": [{"0": "A##P##D", "1": "A##M##B", "2": "D##N##C", "3": "C##B", "4": "M##N", "5": "N##P", "6": "B##N"}], "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
 RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=4}, EqualityRelation{AD=6}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=N, segment=CD}, PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false}, EqualityRelation{∠BNP=3*∠CBN}, EqualityRelation{AP=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
 EqualityRelation{∠MNP=2*∠CBN}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AP)}

508、topic: 如图,等腰直角 $\triangle ABC$, $\angle ACB=90^\circ$, $CE=CD$, $EF\perp BD$ 交 AB 于 F , $CG\perp BD$ 交 AB 于 G .
 求证 $:AG=GF$.

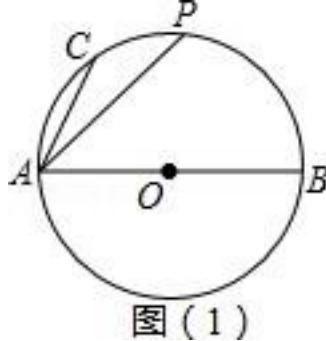


graph:
 {"stem": {"pictures": [{"picturename": "1000023380_Q_1.jpg", "coordinates": {"A": "6.00,0.00", "B": "0.00,6.00", "C": "0.00,0.00", "D": "3.00,0.00", "E": "0.00,3.00", "F": "2.00,4.00", "G": "4.00,2.00"}, "collineations": {"0": "C##E##B", "1": "A##D##C", "2": "F##G##B##A", "3": "B##D", "4": "F##E", "5": "C##G"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

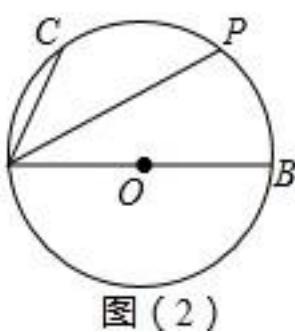
NLP:
 IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$ [Optional.of(C)] [Optional.of(B)] [Optional.of(A)]

nal.of(C)], EqualityRelation{ $\angle DCE = (1/2 * \pi)$ }, EqualityRelation{CE=CD}, LinePerpRelation{line1=EF, line2=BD, crossPoint=}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=AB], LinePerpRelation{line1=CG, line2=BD, crossPoint=}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=CG, iLine2=AB], ProveConclusionRelation:[证明: EqualityRelation{AG=FG}]

509、topic: 如图,AB是 $\odot O$ 的直径,C、P是 \widehat{AB} 上两点, $AB=13$, $AC=5$. (1)如图(1),若点P是 \widehat{AB} 的中点,求PA的长;#%#(2)如图(2),若点P是 \widehat{BC} 的中点,求PA的长.



图(1)



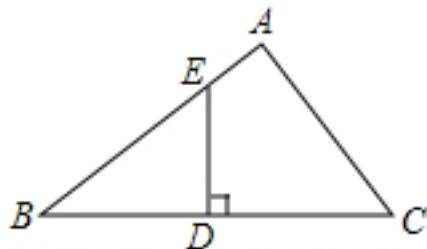
图(2)

graph:

{"stem": {"pictures": [{"picturename": "1000024956.jpg", "coordinates": {"A": "0.00,0.00", "B": "13.00,0.00", "C": "1.92,4.62", "O": "6.50,0.00"}, "collineations": {"0": "B###A##O", "1": "C###A"}, "variable>equals": {}}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}, "appliedproblems": {}, "substems": [{"substmid": "1", "questionrelies": "", "pictures": [{"picturename": "1000024956.jpg", "coordinates": {"P": "6.50,6.50"}, "collineations": {"0": "A##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000024956.jpg", "coordinates": {"P": "9.00,6.00"}, "collineations": {"0": "A##P"}, "variable>equals": {}, "circles": []}]}]}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}, PointOnArcRelation{point=C, arc=type:MAJOR_ARC \curvearrowright AB}, PointOnArcRelation{point=P, arc=type:MAJOR_ARC \curvearrowright AB}, EqualityRelation{AB=13}, EqualityRelation{AC=5}, EqualityRelation{AP=v_0}, MiddlePointOfArcRelation:P/type:MAJOR_ARC \curvearrowright AB, 求值(大小): (ExpressRelation:[key]:v_0), EqualityRelation{AP=v_1}, MiddlePointOfArcRelation:P/type:MAJOR_ARC \curvearrowright BC, 求值(大小): (ExpressRelation:[key]:v_1), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:AP)}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:AP)}

510、topic: 已知:如图,在 $\triangle ABC$ 中,D是BC的中点,DE $\perp BC$,垂足为D,交AB于点E,且 $\{BE\}^2 - \{EA\}^2 = \{AC\}^2$. 求证: $\angle A = 90^\circ$. #%#



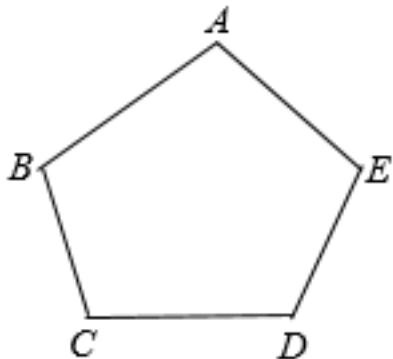
graph:

{"stem":{"pictures":[{"picturename":"1000080248_Q_1.jpg","coordinates":{"A": "-10.42,1.53","B": "-14.68,-1.01","C": "-8.96,-0.92","D": "-11.82,-0.97","E": "-11.84,0.69"}],"collineations":{"0": "A###E###B","1": "A###C","2": "B###D###C","3": "D###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP:

TriangleRelation: $\triangle ABC$, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, LinePerpRelation{line1=DE, line2=BC, crossPoint=D}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AB], EqualityRelation{(BE)²-(AE)²=(AC)²}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle CAE = (1/2 * \pi)$ }]]

511、topic: 在图中,探求 $\angle A + \angle B + \angle C + \angle D + \angle E$ 的度数.#%#



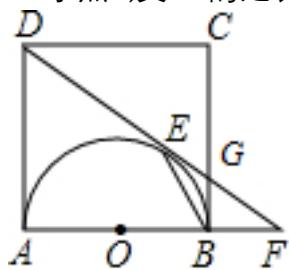
graph:

{"stem":{"pictures":[{"picturename":"1000082697_Q_1.jpg","coordinates":{"A": "0.64,1.69","B": "-0.85,0.64","C": "-0.45,-0.82","D": "1.30,-0.95","E": "1.85,0.53"}],"collineations":{"0": "A##B","1": "A##E","2": "B##C","3": "D##E","4": "D##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: 求值(大小):

(ExpressRelation:[key:] $\angle BAE + \angle ABC + \angle BCD + \angle CDE + \angle AED$), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BAE + \angle ABC + \angle BCD + \angle CDE + \angle AED$)}

512、topic: 如图,以正方形ABCD的边AB为直径,在正方形内部作半圆,圆心为O,DF切半圆于点E,交BC于点G,交AB的延长线于点F.#%#(1)求证:BG:AD=1:4;#%#(2)若BF=4cm,求BE的长.#%#



graph:

{"stem":{"pictures":[{"picturename":"1000080889_Q_1.jpg","coordinates":{"A": "0.00,0.00","B": "4.00,0.00","C": "4.00,4.00","D": "0.00,4.00","E": "3.20,1.60","F": "5.33,0.00","G": "4.00,1.00","O": "2.00,0.00"}],"collineations":{"0": "A##D","1": "D##E##G##F","2": "D##C","3": "C##G##B","4": "A##O##B##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

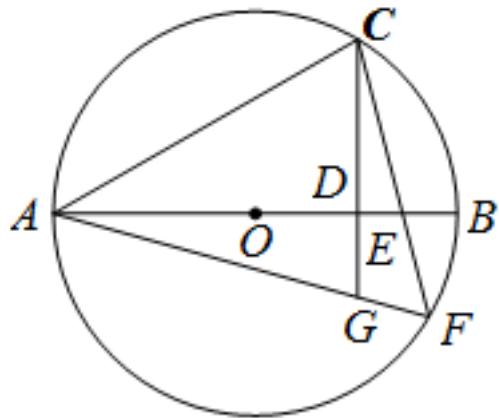
NLP: SquareRelation{square=Square:ABCD}, CircleCenterRelation{point=O,

```

conic=Circle[○O_0]{center=O_0,
analytic=(x-x_O_0)^2+(y-y_O_0)^2=r_O_0^2},LineContactCircleRelation{line=DF,
circle=Circle[○O_0]{center=O_0, analytic=(x-x_O_0)^2+(y-y_O_0)^2=r_O_0^2},
contactPoint=Optional.of(E), outpoint=Optional.absent()},LineCrossRelation
[crossPoint=Optional.of(G), iLine1=DF, iLine2=BC],LineCrossRelation [crossPoint=Optional.of(F),
iLine1=DF, iLine2=AB],EqualityRelation{BE=v_1},EqualityRelation{BF=4},求值(大小):
(ExpressRelation:[key:]v_1),ProveConclusionRelation:[证明:
EqualityRelation{(BG)/(AD)=(1)/(4)}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]BE)}

```

513、topic: 如图,已知AB是 $\odot O$ 的直径,C是 $\odot O$ 上任一点,连接AC,过点C作直线CD $\perp AB$ 于D,且 $AD > DB$,点E是DB上任一点(除D、B外),直线CE交 $\odot O$ 于点F,连接AF与直线CD交于点G.
(1)求证: $\{AC\}^2=AG \cdot AF$;
(2)若点E是AD(点A除外)上任一点,上述结论是否成立?
若成立,请画出图形给予证明;若不成立,请说明理由.



graph:

```

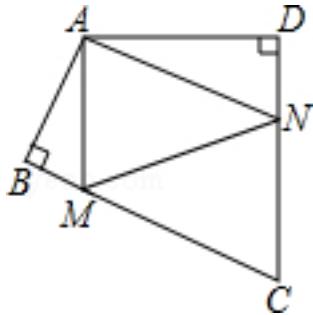
{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000060740_Q_1.jpg","coordinates":{"A": -4.00, "B": 4.00, "C": 2.00, "D": 2.00, "E": 3.00, "F": 3.54, "G": 2.00, "O": 0.00}, "collinearities": {"0": "B###E###D###O##A", "1": "C##D##G", "2": "E##F##C", "3": "A##G##F", "4": "A##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##F"}]}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000060740_Q_1.jpg", "coordinates": {"A": 6.00, "B": 14.00, "C": 12.00, "D": 12.00, "E": 11.00, "F": 9.85, "G": 12.00, "O": 10.00, "R": 12.00, "S": 3.46}, "collinearities": {"0": "B##E##D##O##A", "1": "C##D##G##R", "2": "E##F##C", "3": "A##G##F", "4": "A##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##R"}]}], "appliedproblems": {}}}}

```

NLP: PointOnLineRelation{point=C, line=CD, isConstant=false, extension=false}, PointRelation:D, PointRelation:B, DiameterRelation{diameter=AB, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, PointOnCircleRelation{circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, points=[C]}, SegmentRelation:AC, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, InequalityRelation{AD>BD}, PointOnLineRelation{point=E, line=DB, isConstant=false, extension=false}, LineCrossCircleRelation{line=CE, circle=○O, crossPoints=[F], crossPointNum=1}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=AF, iLine2=CD], PointRelation:A, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{((AC)^2)=AG*AF}]

514、topic: 如图,在四边形ABCD中, $\angle BAD=120^\circ$, $\angle B=\angle D=90^\circ$,在BC,CD上分别找一点M,N,当 $\triangle AMN$

周长最小时,试求 $\angle AMN + \angle ANM$ 的度数.#%#



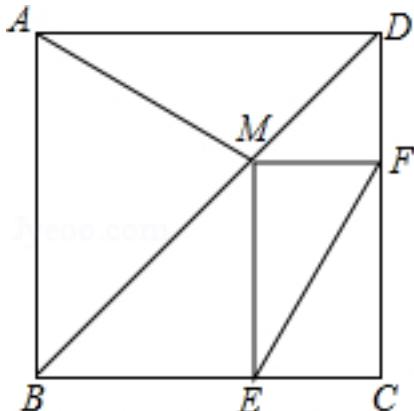
graph:

```
{"stem": {"pictures": [{"picturename": "1000029271_Q_1.jpg", "coordinates": {"A": "2.00,3.00", "B": "0.00,0.00", "C": "5.62,-3.74", "D": "6.04,2.74", "M": "2.06,-1.38", "N": "5.83,-0.42"}, "collineations": {"0": "A##B", "1": "B##M##C", "2": "C##N##D", "3": "A##D", "4": "A##M", "5": "A##N", "6": "N##M"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: EqualityRelation{C_△AMN=v_0},已知条件

QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{∠BAD=(2/3*Pi)},MultiEqualityRelation [multiExpressCompare=∠ABM=∠ADN=(1/2*Pi), originExpressRelationList=[], keyWord=null, result=null],PointOnLineRelation{point=M, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=N, line=CD, isConstant=false, extension=false},ExtremumRelation [key=Express:[v_0], value=null, extremumType=MIN],求值(大小): (ExpressRelation:[key:]∠AMN+∠ANM),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠AMN+∠ANM)}

515、topic: 如图,在正方形ABCD中,点M是对角线BD上的一点,过点M作ME||CD交BC于点E,作MF||BC交CD于点F.求证:AM=EF.#%#



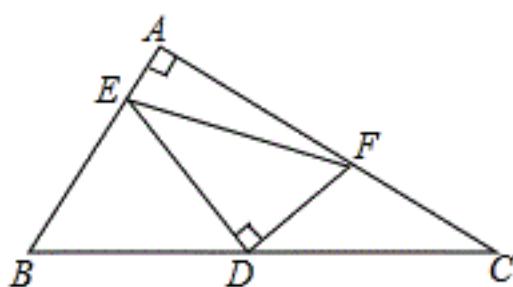
graph:

```
{"stem": {"pictures": [{"picturename": "1000035175_Q_1.jpg", "coordinates": {"A": "-7.83,6.69", "B": "-7.83,1.48", "C": "-2.59,1.48", "D": "-2.62,6.69", "M": "-4.35,4.96", "E": "-4.33,1.48", "F": "-2.61,4.96"}, "collineations": {"0": "D##F##C", "1": "B##E##C", "2": "B##M##D", "3": "B##A", "4": "A##D", "5": "A##M", "6": "E##M", "7": "F##M", "8": "E##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

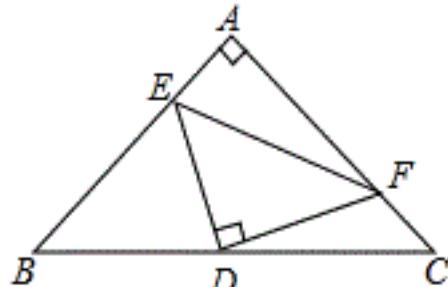
NLP: SquareRelation{square=Square:ABCD},PointOnLineRelation{point=M, line=BD, isConstant=false, extension=false},PointOnLineRelation{point=M, line=ME, isConstant=false, extension=false},LineParallelRelation [iLine1=ME, iLine2=CD],LineCrossRelation [crossPoint=Optional.of(E), iLine1=ME, iLine2=BC],LineParallelRelation [iLine1=MF,

iLine2=BC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=MF,
 iLine2=CD], ProveConclusionRelation:[证明： EqualityRelation{AM=EF}]

516、topic: 如图,已知 $\triangle ABC$ 是直角三角形, $\angle BAC=90^\circ$,D是斜边BC的中点,E、F分别是AB、AC边上的点,且 $DE \perp DF$.#%#(1)如图(1),试说明 $\{BE\}^2 + \{CF\}^2 = \{EF\}^2$;#%#(2)如图(2)若 $AB=AC$, $BE=12$, $CF=5$,求 $\triangle DEF$ 的面积.#%#



图(1)



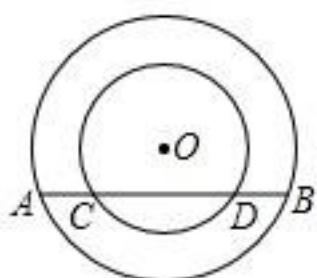
图(2)

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000062299_Q_1.jpg", "coordinates": {"A": "-11.07,4.62", "B": "-13.00,0.00", "C": "0.0,0.00", "D": "-6.50,0.00", "E": "-11.44,3.75", "F": "-4.93,2.06"}, "collineations": {"0": "A###E##B", "1": "B##D##C", "2": "C##F##A", "3": "F##E", "4": "D##E", "5": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000062299_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "-4.00,0.00", "C": "4.00,0.00", "D": "0.00,0.00", "E": "-1.23,2.77", "F": "2.77,1.23"}, "collineations": {"0": "A##E##B", "1": "B##D##C", "2": "C##F##A", "3": "F##E", "4": "D##E", "5": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}], "appliedproblems": {}}}

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{ $\angle EAF=(1/2*\pi)$ }, Middle
 PointOfSegmentRelation{middlePoint=D, segment=BC}, PointOnLineRelation{point=E, line=AB,
 isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false,
 extension=false}, LinePerpRelation{line1=DE, line2=DF},
 crossPoint=D}, EqualityRelation{ $S_{\triangle DEF}=v_0$ }, EqualityRelation{AB=AC}, EqualityRelation{BE=12}, EqualityRelation{CF=5}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明：
 EqualityRelation{ $((BE)^2 + (CF)^2 = (EF)^2)$ }], SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]S_{\triangle DEF})}

517、topic: 已知:如图,在以O为圆心的两个同心圆中,大圆的弦AB交小圆于C、D两点,?%#(1)试猜想AC与BD的大小关系,并说明理由;?%#(2)若\$AB=24\$,\$CD=10\$,小圆的半径为\$5\sqrt{2}\$,求大圆的半径.



graph:
 {"stem": {"pictures": [{"picturename": "1000008161_Q_1.jpg", "coordinates": {"A": "-12.00, -5.00", "B": "12.00, -5.00", "C": "-5.00, -5.00", "D": "5.00, -5.00", "O": "0.00, 0.00"}, "collineations": {"0": "B###A###C##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##D"}, {"center": "O", "pointincircle": "A#B"}]}, "subsystems": []}}

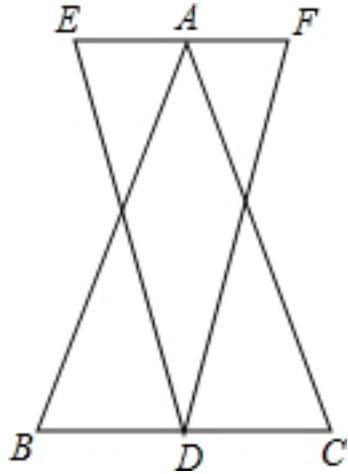
NLP: ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O_0$]{center=O_0, analytic= $(x-x_{O_0})^2 + (y-y_{O_0})^2 = r_{O_0}^2$ }, chordLength=null, straightLine=null}, PointRelation:D, 数字比较大/小: DualExpressRelation{expresses=[Express:[AC], Express:[BD]]}, RadiusRelation{radius=M_1N_1, circle=Circle[$\odot O_0$]{center=O_0, analytic= $(x-x_{O_0})^2 + (y-y_{O_0})^2 = r_{O_0}^2$ }, length=null}, EqualityRelation{AB=24}, EqualityRelation{CD=10}, SolutionConclusionRelation{relation=数字比较大/小: DualExpressRelation{expresses=[Express:[AC], Express:[BD]]}}}

518、topic: 已知,线段\$AB=10cm\$,直线AB上有一点C,且\$BC=4cm\$,M是线段AC的中点,求AM的长.

graph:
 {"stem": {"pictures": [{"picturename": "1000010199_Q_1.jpg", "coordinates": {"A": "0.00, 0.00", "B": "10.00, 0.00", "C": "6.00, 0.00", "M": "3.00, 0.00"}, "collineations": {"0": "B###A###M##C"}, "variable>equals": {}, "circles": []}, "subsystems": []}}

NLP: EqualityRelation{AM=v_0}, EqualityRelation{AB=10}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{BC=4}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AC}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AM)}

519、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, D 是 BC 的中点,过 A 点的直线 $EF \parallel BC$,且 $AE=AF$,求证: $DE=DF$.#%#

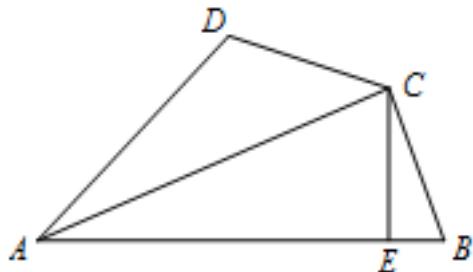


graph:
 {"stem": {"pictures": [{"coordinates": {"A": "0,2", "B": "-1,0", "C": "1,0", "D": "0.00,0.00", "E": "1,2", "F": "-1,2"}, "collineations": {"0": "B###D##C", "1": "A###B", "2": "A##C", "3": "F##A##E", "4": "F##D", "5": "D##E"}}], "subsystems": []}}

NLP: PointOnLineRelation{point=A, line=EF, isConstant=false, extension=false}, TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, MiddlePointOfSegmentRelation{mi

ddlePoint=D,segment=BC},LineParallelRelation [iLine1=EF, iLine2=BC],EqualityRelation{AE=AF},ProveConclusionRelation:[证明： EqualityRelation{DE=DF}]

520、topic: 如图,在四边形ABCD中,AC平分 $\angle BAD$,过C作 $CE \perp AB$ 于E,并且 $AE = \frac{1}{2}(AB+AD)$,则 $\angle ABC + \angle ADC$ 等于多少?#%#

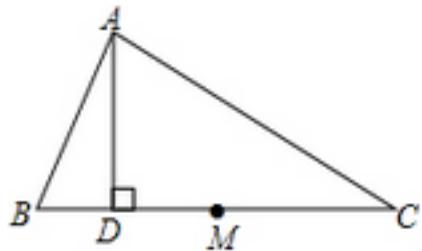


graph:

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD},AngleBisectorRelation{line=AC,angle= $\angle BAD$, angle1= $\angle BAC$, angle2= $\angle CAD$ },LinePerpRelation{line1=CE, line2=AB, crossPoint=E},EqualityRelation{AE=(1/2)*(AB+AD)},求值(大小):
(ExpressRelation:[key:] $\angle ABC + \angle ADC$),SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:] $\angle ABC + \angle ADC$)}

521、topic: 如图,在三角形ABC中, $\angle B = 2\angle C$,AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$.#%#



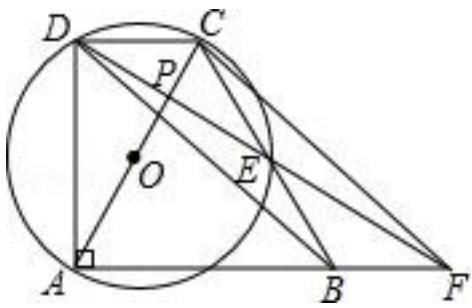
graph:

{"stem":{"pictures":[{"picturename":"1000040694_Q_1.jpg","coordinates":{"A": "-9.03,4.35","B": "-11.0 0,2.00","C": "-4.00,2.00","D": "-9.03,2.00","M": "-7.50,2.00"}, "collinearities": {"0": "A##D", "1": "A##B", "2": "A##C", "3": "B##D##M##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subs": []}}

NLP:

TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle ABD = 2 * \angle ACM$ },MiddlePointOfSegmentRelation{middlePoint=M,segment=BC},LinePerpRelation{line1=AD, line2=BD, crossPoint=D},ProveConclusionRelation:[证明： EqualityRelation{DM=(1/2)*AB}]

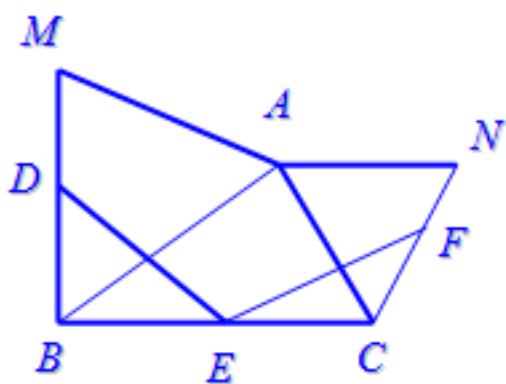
522、topic: 如图,直角梯形ABCD中,\$AB \parallel CD\$,\$\angle DAB=90^\circ\$,且\$\angle ABC=60^\circ\$,\$AB=BC\$,\$\triangle ACD\$的外接圆\$\odot O\$交BC于点E,连接DE并延长,交AC于P点,交AB的延长线于点F. ?%#(1)求证:\$CF=DB\$;(2)当\$AD=\sqrt{3}\$时,试求点E到CF的距离 .



graph:
 {"stem": {"pictures": [{"picturename": "1000024955.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "2.00,3.46", "D": "0.00,3.46", "E": "3.00,1.73", "F": "6.00,0.00", "P": "1.50,2.59", "O": "1.00,1.73"}, "collineations": {"0": "B##A##F", "1": "A##O##P##C", "2": "B##D", "3": "P##D##E##F", "4": "F##C", "5": "C##D", "6": "C##B##E", "7": "A##D"}, "variable>equals": {}, "circles": [{"center": "A", "pointincircle": "C##D"}]}, {"subsystems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}], "appliedproblems": {}}, {"appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ACD$, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, RightTrapezoidRelation{rightTrapezoid=RightTrapezoid:ABC D randomOrder:true}, LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{ $\angle BAD = (1/2\pi)$ }, EqualityRelation{ $\angle ABE = (1/3\pi)$ }, EqualityRelation{AB = BC}, LineCrossCircleRelation{line=BC, circle= $\odot O$, crossPoints=[E], crossPointNum=1}, SegmentRelation:DE, LineCrossRelation [crossPoint=Optional.of(P), iLine1=DE, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=AB], 距离, 求距离: PointToLineDistanceRelation{point=E, line=CF, distance=null}, EqualityRelation{AD= $(3^{(1/2)})$ }, ProveConclusionRelation:[证明: EqualityRelation{CF=BD}], SolutionConclusionRelation{relation=距离, 求距离: PointToLineDistanceRelation{point=E, line=CF, distance=null}}}

523、topic: 已知:如图, $\triangle ABC$ 是锐角三角形.分别以AB,AC为边向外侧作等边三角形ABM和等边三角形CAN.D、E、F分别是MB,BC,CN的中点,连结DE,EF.#%#求证:DE=EF.#%#

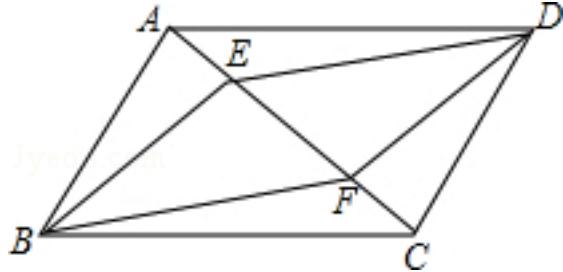


graph:
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NLP:

AcuteTriangleRelation:AcuteTriangle: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=MB},MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},MiddlePointOfSegmentRelation{middlePoint=F,segment=CN},SegmentRelation:DE,SegmentRelation:EF,ProveConclusionRelation:[证明: EqualityRelation{DE=EF}]

524、topic: 已知:如图,在平行四边形ABCD中,点E、F在AC上,且AE=CF.求证:四边形BEDF是平行四边形.

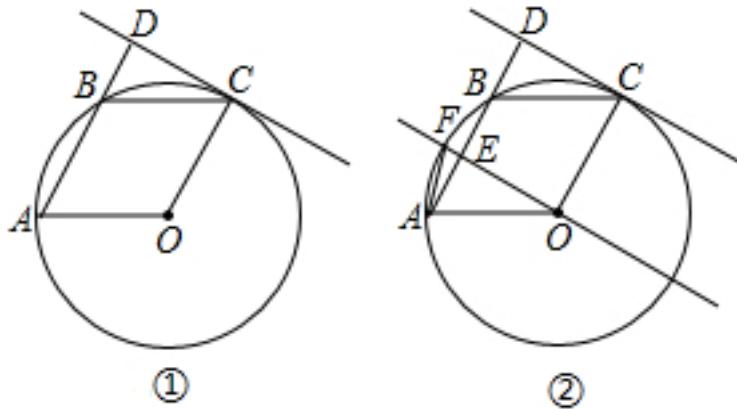


graph:

{"stem": {"pictures": [{"picturename": "1000041501_Q_1.jpg", "coordinates": {"A": "-7.00, 4.00", "B": "-8.00, 2.00", "C": "-4.00, 2.00", "D": "-3.00, 4.00", "E": "-6.22, 3.48", "F": "-4.78, 2.52"}, "collineations": {"0": "A##D", "1": "D##C", "2": "C##B", "3": "B##A", "4": "B##E", "5": "E##D", "6": "D##F", "7": "F##B", "8": "A##E##F##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, EqualityRelation{AE=CF}, ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BEDF}]

525、topic: 已知A、B、C是 $\odot O$ 上的三个点.四边形OABC是平行四边形,过点C作 $\odot O$ 的切线,交AB的延长线于点D.(1)如图①,求 $\angle ADC$ 的大小;(2)如图②,经过点O作CD的平行线,与AB交于点E,与 \widehat{AB} 交于点F,连接AF,求 $\angle FAB$ 的大小.



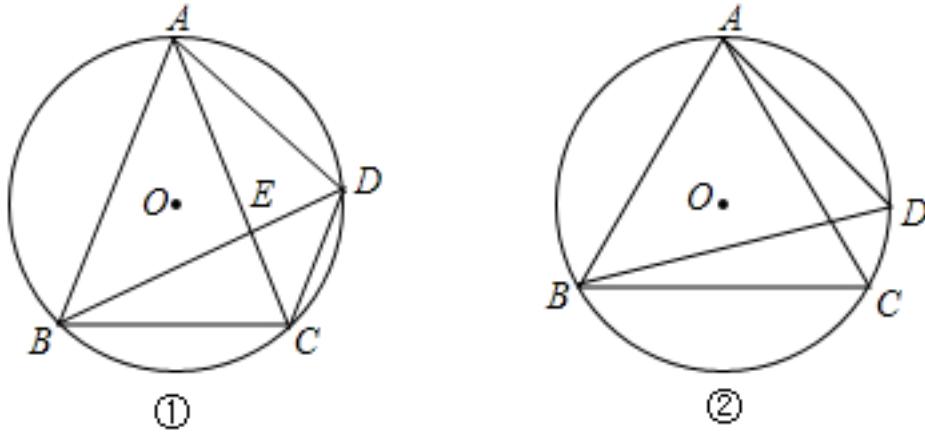
graph:

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D","1":"O###E###F"},"variable>equals":{},"circles":[{"center":"O","pointincircle":"F"}]}],"appliedproblems":{}}]}

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[A, B], C}, ParallelogramRelation{parallelogram=Parallelogram:ABCO}, LineContactCircleRelation{line=StraightLine[n_0] analytic : $y=k_n_0*x+b_n_0$ slope:null b:null isLinearFunction:false, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(C), outpoint=Optional.absent()}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=StraightLine[n_0] analytic : $y=k_n_0*x+b_n_0$ slope:null b:null isLinearFunction:false, iLine2=AB], 求角的大小: AngleRelation{angle= $\angle BDC$ }, SegmentRelation:AF, 求角的大小: AngleRelation{angle= $\angle BAF$ }, PointOnLineRelation{point=O, line=E0, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AB, iLine2=E0], LineParallelRelation [iLine1=CD, iLine2=E0], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BDC$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BAF$)}

526、topic: 如图,△ABC内接于 $\odot O$, $AB=AC$, D 在劣弧 AC 上, $\angle ABD=45^\circ$.#%#(1)如图①,BD交 AC 于点E,连接 AD 、 CD ,若 $AB=BD$,求证: $CD=\sqrt{2}DE$;%#(2)如图②,连接 AD 、 CD ,已知 $\tan \angle CAD=\frac{1}{5}$,求 $\sin \angle BDC$.%#



```

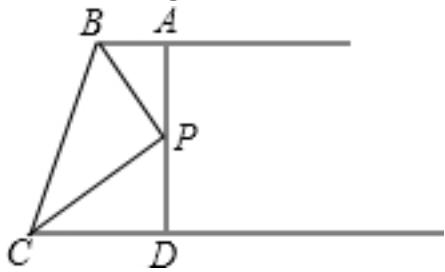
graph:
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```

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, EqualityRelation{AB=AC}, PointOnArcRelation{point=D, arc=type:MINOR_ARC \cap AC}, EqualityRelation{ $\angle ABE = (1/4\pi)$ }, LineCrossRelation[crossPoint=Optional.of(E), iLine1=BD, iLine2=AC], SegmentRelation:AD, SegmentRelation:CD, EqualityRelation{AB=BD}, SegmentRelation:AD, SegmentRelation:CD, EqualityRelation{ $\tan(\angle DAE) = (1/5)$ }, 求值(大小): (ExpressRelation:[key:]sin($\angle CDE$)), ProveConclusionRelation:[证明: EqualityRelation{CD=($2^{(1/2)}$)*DE}], SolutionConclusionRelation{relation=求值(大小)}:

{ExpressRelation:[key:]sin($\angle CDE$)}{}

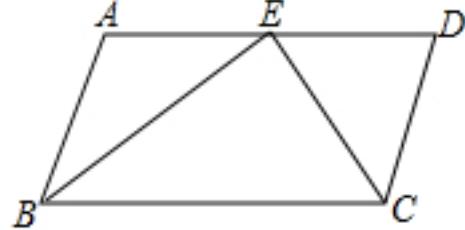
527、topic: 如图,已知 $AB \parallel CD$, BP 和 CP 分别平分 $\angle ABC$ 和 $\angle DCB$, AD 过点 P 与 AB 垂直,求证: P 是 AD 的中点.#%#



graph:
 {"stem": {"pictures": [{"picturename": "20586E62156944A28A2C929700DDB35B.jpg", "coordinates": {"A": "-10.92,5.00", "B": "-12.00,5.00", "C": "-13.00,2.00", "D": "-10.92,2.00", "P": "-10.92,3.50"}, "collineations": [{"0": "A###P##D", "1": "B##A", "2": "B##C", "3": "B##P", "4": "C##D", "5": "P##C"}], "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], AngleBisectorRelation{line=BP, angle= $\angle ABC$, angle1= $\angle ABP$, angle2= $\angle CBP$ }, AngleBisectorRelation{line=CP, angle= $\angle BCD$, angle1= $\angle BCP$, angle2= $\angle DCP$ }, ProveConclusionRelation:[证明:
 MiddlePointOfSegmentRelation{middlePoint=P, segment=AD}]

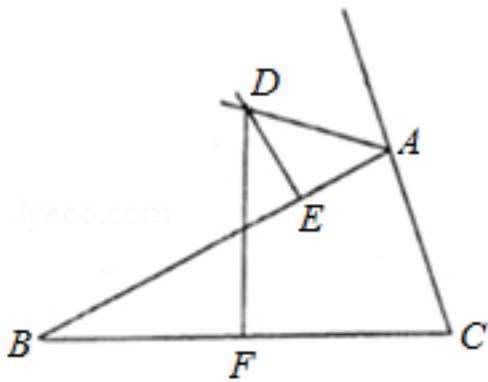
528、topic: 如图, $AB \parallel CD$, BE,CE 分别是 $\angle ABC$ 和 $\angle BCD$ 的平分线,点 E 在 AD 上,求证: $BC = AB + CD$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "20A7BB2E2B444A19AD663B9D6E2A8E49.jpg", "coordinates": {"A": "-12.51,5.98", "B": "-14.00,3.00", "C": "-8.00,3.00", "D": "-6.81,5.39", "E": "-9.66,5.68"}, "collineations": [{"0": "A###E##D", "1": "B##A", "2": "C##E", "3": "B##C", "4": "B##E", "5": "C##D"}], "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], AngleBisectorRelation{line=BE, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, AngleBisectorRelation{line=CE, angle= $\angle BCD$, angle1= $\angle BCE$, angle2= $\angle DCE$ }, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{BC=AB+CD}]

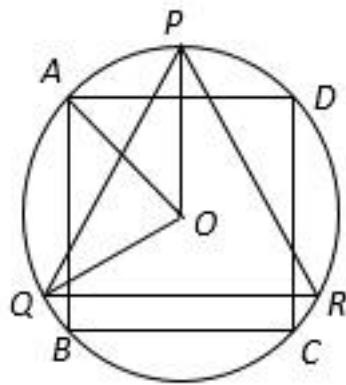
529、topic: 如图,\$\triangle ABC\$的边BC的中垂线DF交\$\triangle BAC\$的外角平分线AD于D,F为垂足,\$DE \perp AB\$于E,且\$AB > AC\$,求证:\$BE-AC=AE\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000026434_Q_1.jpg", "coordinates": {"A": "8.00,3.00", "B": "0.00,0.00", "C": "9.00,0.00", "D": "4.50,4.67", "E": "5.48,2.06", "F": "4.50,0.00"}, "collineations": {"0": "B###F##C", "1": "A##E###B", "2": "A##C", "3": "D##F", "4": "D##E", "5": "A##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle BAC$, TriangleRelation: $\triangle ABC$, MiddlePerpendicularRelation [iLine1=DF, iLine2=BC, crossPoint=Optional.of(F)], LineCrossRelation [crossPoint=Optional.of(D), iLine1=DF, iLine2=AD], LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, InequalityRelation{AB>AC}, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle DAE$, angle2= $\angle CAD$ }, ProveConclusionRelation:[证明: EqualityRelation{BE-AC=AE}]

530、topic: 如图,\$\triangle PQR\$是\$\odot O\$的内接正三角形,四边形ABCD是\$\odot O\$的内接正方形,\$BC//QR\$,求\$\angle AOP\$的度数.

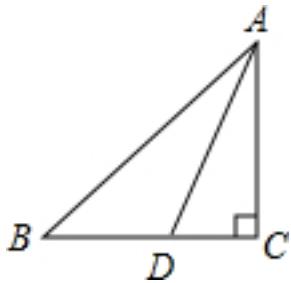


graph:
 {"stem": {"pictures": [{"picturename": "1000025043.jpg", "coordinates": {"A": "0.92,6.97", "B": "0.92,-1.20", "C": "9.08,-1.20", "D": "9.08,6.97", "P": "5.00,8.66", "Q": "0.00,0.00", "R": "10.00,0.00", "O": "5.00,2.89"}, "collineations": {"0": "B##A", "1": "B##C", "2": "C##D", "3": "D##A", "4": "P##Q", "5": "Q##R", "6": "P##R", "7": "O##Q", "8": "O##P", "9": "O##A"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D##P##Q##R"}]}, {"appliedproblems": {}, "substems": []}]}

NLP: InscribedShapeOfCircleRelation{closedShape=ABCD, circle=Circle[\$\odot O\$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, LineParallelRelation [iLine1=BC, iLine2=QR], 求角的大小: AngleRelation{angle= $\angle AOP$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOP$)}

531、topic: 如图,在\$\triangle ABC\$中,已知\$\angle C=90^\circ\$, \$AC=BC\$, \$AD\$是\$\triangle ABC\$的角平分线,求

证: $AB = AC + CD$. # % #



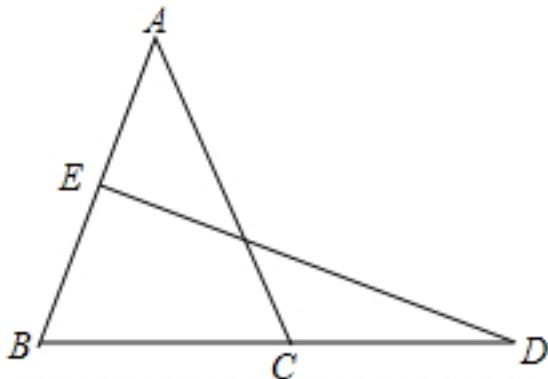
graph:

```
{"stem":{"pictures":[{"picturename":"1000035765_Q_1.jpg","coordinates":{"A": "-2.00,4.00","B": "-5.00,1.00","C": "-2.00,1.00","D": "-3.24,1.00"}, "collineations":{"0": "A###B", "1": "D###A", "2": "C###A", "3": "C###D###B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ACD = (1/2\pi)$ }, EqualityRelation{ $AC = BC$ }, TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle CAD$, angle2= $\angle BAD$ }, ProveConclusionRelation:[证明: EqualityRelation{ $AB = AC + CD$ }]

532、topic: 已知:如图,在 $\triangle ABC$ 中, $AB=AC=6$, $BC=4$, AB 的垂直平分线交 AB 于点 E ,交 BC 的延长线于点 D . # % #(1)求 $\angle D$ 的正弦值; # % #(2)求点 C 到直线 DE 的距离. # % #

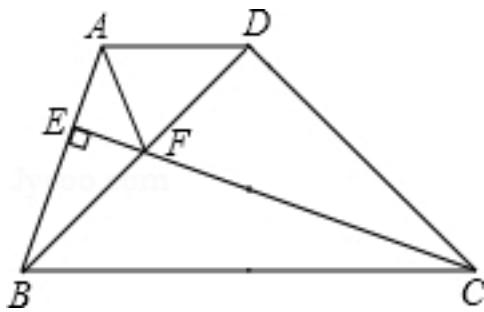


graph:

```
{"stem":{"pictures":[{"picturename":"1000052309_Q_1.jpg","coordinates":{"A": "-6.00,7.66","B": "-8.00,2.00","C": "-4.00,2.00","D": "1.00,2.00","E": "-7.00,4.83"}, "collineations":{"0": "A###E###B", "1": "E##D", "2": "B###C###D", "3": "A###C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}
```

NLP: MiddlePerpendicularRelation [iLine1=DE, iLine2=AB, crossPoint=Optional.of(E)], TriangleRelation: $\triangle ABC$, MultiEqualityRelation [multiExpressCompare=AB=AC=6, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BC=4}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AB, iLine2=DE], LineCrossRelation [crossPoint=Optional.of(D), iLine1=BC, iLine2=DE], 距离, 求距离: PointToLineDistanceRelation{point=C, line=DE, distance=null}, SolutionConclusionRelation{relation=距离, 求距离: PointToLineDistanceRelation{point=C, line=DE, distance=null}}

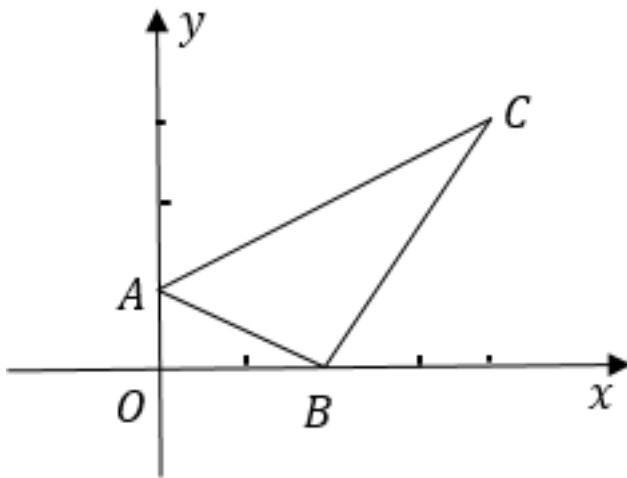
533、topic: 如图,在梯形ABCD中, $AD \parallel BC$, $CE \perp AB$ 于E,交梯形的对角线BD于F,连接AF.若 $\triangle BDC$ 为等腰直角三角形,且 $\angle BDC=90^\circ$. # % # 求证: $CF=AB+AF$. # % #



graph:
 {"stem": {"pictures": [{"picturename": "1000030949_Q_1.jpg", "coordinates": {"A": "-8.57,5.00", "B": "-9.00,3.00", "C": "-5.00,3.00", "D": "-7.00,5.00", "E": "-8.81,3.89", "F": "-8.25,3.75"}, "collineations": {"0": "D##A", "1": "A###E##B", "2": "C##F##E", "3": "A##F", "4": "C##D", "5": "B##F##D", "6": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}

NLP: TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, LineParallelRelation [iLine1=AD, iLine2=BC], LinePerpRelation{line1=CE, line2=AB, crossPoint=E}, TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=CE, iLine2=BD], SegmentRelation:AF, IsoscelesRightTriangleRelation:IsoscelesRightTriangle:IsoscelesTriangle:△BDC[Optional.of(D)][Optional.of(D)], EqualityRelation{∠CDF=(1/2*Pi)}, ProveConclusionRelation:[证明: EqualityRelation{CF=AB+AF}]

534、topic: 如图,在平面直角坐标系中, \$A(0,1)\$、\$B(2,0)\$、\$C(4,3)\$.?#%#(1)求\$△ABC\$的面积; ?#%#(2)设点P在坐标轴上,且\$△APB\$与\$△ABC\$的面积相等,求点P的坐标.

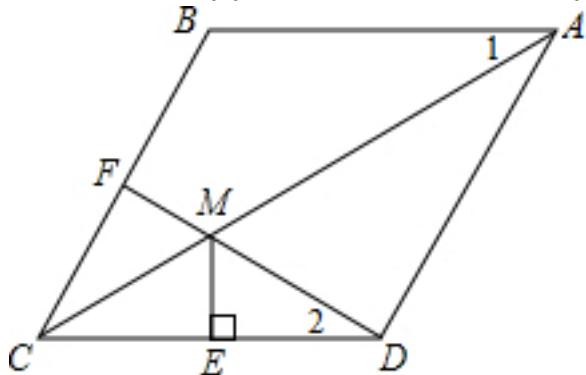


graph:
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NLP:
 PointRelation:A(0,1), PointRelation:B(2,0), PointRelation:C(4,3), EqualityRelation{S_△ABC=v_0}, 求值(大小):
 (ExpressRelation:[key:]v_0), EqualityRelation{S_△ABP=v_1}, EqualityRelation{S_△ABC=v_2}, {OrRelation:PointOnLineRelation{point=P, line=StraightLine[X] analytic:y=0 slope:0 b:0 isLinearFunction:false, isConstant:false, extension:false} OR PointOnLineRelation{point=P, line=StraightLine[Y] analytic:x=0 slope: b: isLinearFunction:false, isConstant:false,

extension=false}}, EqualityRelation{v_1=v_2}, 坐标
 PointRelation:P, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]S_△ABC)}, SolutionConclusionRelation{relation=坐标PointRelation:P}

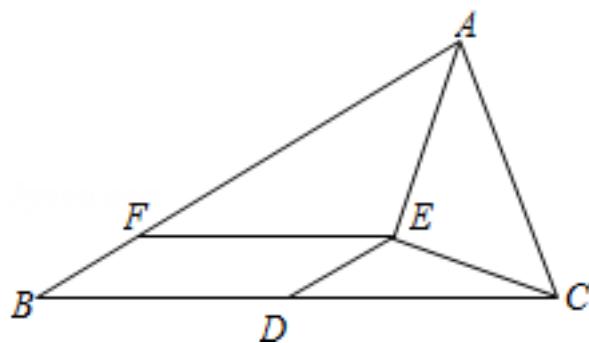
535、topic: 如图,在菱形ABCD中,F为边BC的中点,DF与对角线AC交于点M,过点M作ME⊥CD于点E,∠1=∠2. #%(1)若CE=1,求BC的长; #%(2)求证:AM=DF+ME. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040925_Q_1.jpg", "coordinates": {"A": "5.20,3.00", "B": "1.73,3.00", "C": "0.00,0.00", "D": "3.47,0.00", "E": "1.73,0.00", "F": "0.87,1.50", "M": "1.73,1.00"}, "collineations": {"0": "A###B", "1": "B###F###C", "2": "C###E###D", "3": "D###A", "4": "A###M###C", "5": "D###M###F", "6": "M###E"}, "variable>equals": {"0": "\u03b71=\u03b7BAC", "1": "\u03b72=\u03b7CDF"}, "circles": []}], "appliedproblems": {}}, "substems": []}}

NLP:
 RhombusRelation{rhombus=Rhombus:ABCD}, MiddlePointOfSegmentRelation{middlePoint=F, segment=BC}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=DF, iLine2=AC], LinePerpRelation{line1=ME, line2=CD, crossPoint=E}, EqualityRelation{∠BAM=∠EDM}, EqualityRelation{BC=v_0}, EqualityRelation{CE=1}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}, ProveConclusionRelation:[证明: EqualityRelation{AM=DF+EM}]

536、topic: 如图,在△ABC中,点D是边BC的中点,点E在△ABC内,AE平分∠BAC,CE⊥AE,点F在边AB上,EF||BC. #%(1)求证:四边形BDEF是平行四边形; #%(2)线段BF、AB、AC之间具有怎样的数量关系? 证明你所得到的结论. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000031929_Q_1.jpg", "coordinates": {"A": "0.50,7.20", "B": "-8.68,3.12", "C": "1.53,3.10", "D": "-1.49,3.10", "E": "-0.91,4.29", "F": "-6.01,4.31"}, "collineations": {"0": "B###F##A", "1": "A###C", "2": "E###F", "3": "B###D###C", "4": "D###E###A", "5": "C###E"}, "variable>equals": {}}]}

),"circles":[]],"appliedproblems":{},"subsystems":[]}

NLP:

TriangleRelation: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=BC},TriangleRelation{n: $\triangle ABC$,PositionOfPoint2RegionRelation{point=E,region=EnclosedRegionRelation{name=ABC,closedShape= $\triangle ABC$ },position=inner},AngleBisectorRelation{line=AE,angle= $\angle CAF$,angle1= $\angle CAE$,angle2= $\angle EAF$ },LinePerpRelation{line1=CE,line2=AE,crossPoint=E},PointOnLineRelation{point=F,line=AB,isConstant=false,extension=false},LineParallelRelation[iLine1=EF,iLine2=BC],求值(大小):

(ExpressRelation:[key:] (BF/AB)),求值(大小):

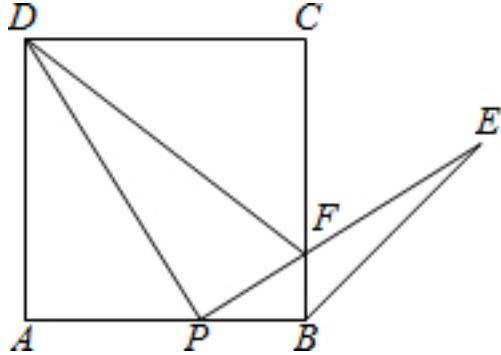
(ExpressRelation:[key:] (AB/AC)),ProveConclusionRelation:[证明:

ParallelogramRelation{parallelogram=Parallelogram:BDEF}],SolutionConclusionRelation{relation=求

值(大小): (ExpressRelation:[key:] (BF/AB))},SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:] (AB/AC))}

537、topic: 如图,点P是正方形ABCD边AB上一点(不与点A、B重合),连接PD并将线段PD绕点P顺时针方向旋转90°得到线段PE,PE交边BC于点F,连接BE、DF.#%#(1)求证: $\angle ADP=\angle EPB$ #%#(2)求 $\angle CBE$ 的度数;#%#(3)当 $\frac{AP}{AB}$ 的值等于多少时, $\triangle PFD \sim \triangle BFP$?并说明理由.#%#



graph:

{"stem":{"pictures":[{"picturename":"1000062197_Q_1.jpg","coordinates":{"A": "-11.03,-4.02","B": "-6.01,-4.02","C": "-6.01,1.01","D": "-11.03,1.01","E": "-2.70,-0.71","F": "-6.01,-2.89","P": "-7.73,-4.02"}, "collinearities": {"0": "D##A", "1": "B##E", "2": "C##D", "3": "D##F", "4": "A##P##B", "5": "B##F##C", "6": "D##P", "7": "P##E"}, "variable>equals": {}}, "circles": [], "appliedproblems": {}, "subsystems": []}}

NLP:

PointRelation:A,PointRelation:B,SquareRelation{square=Square:ABCD},PointOnLineRelation{point=P,line=AB,isConstant=false,extension=false},SegmentRelation:PD,RotateRelation{preData=PD,afterData=PE,rotatePoint=P,rotateDegree='(1/2*Pi)',rotateDirection=CLOCKWISE},LineCrossRelation[crossPoint=Optional.of(F),iLine1=PE,iLine2=BC],SegmentRelation:BE,SegmentRelation:DF,求角的大小:

AngleRelation{angle= $\angle EBF$ },TriangleSimilarRelation{triangleA= $\triangle PFD$,triangleB= $\triangle BFP$ },求值(大小):

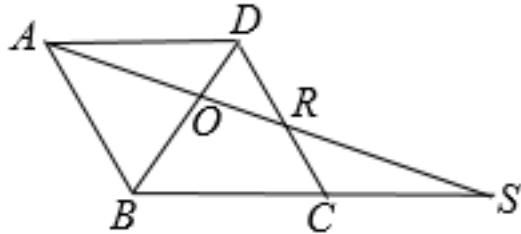
(ExpressRelation:[key:] $((AP)/(AB))$),ProveConclusionRelation:[证明:

EqualityRelation{ $\angle ADP=\angle BPE$ },SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:] $\angle EBF$),SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:] $((AP)/(AB)))$ }}

538、topic: 已知如图:在菱形ABCD中,O是对角线BD上的一点.连接AO并延长,与DC交于点R,与BC的延长线交于点S.若AD=4, $\angle DCB=60^\circ$,BS=10.#%#(1)求AS的长度;#%#(2)求OR的长度.#%#

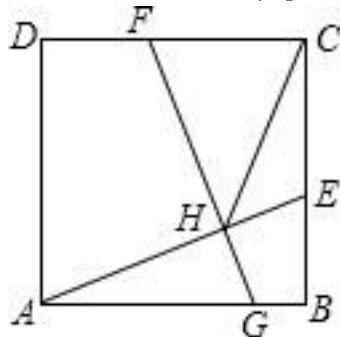


graph:

```
{"stem": {"pictures": [{"picturename": "1000040744_Q_1.jpg", "coordinates": {"A": "-1.00,1.73", "B": "0.00, 0.00", "C": "2.00,0.00", "D": "1.00,1.73", "O": "0.71,1.24", "R": "1.40,1.04", "S": "5.00,0.00"}, "collineations": {"0": "A###B", "1": "B###C##S", "2": "C##R##D", "3": "D##A", "4": "A##O##R##S", "5": "B##O##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: RhombusRelation{rhombus=Rhombus:ABCD}, PointOnLineRelation{point=O, line=BD, isConstant=false, extension=false}, SegmentRelation:AO, LineCrossRelation [crossPoint=Optional.of(R), iLine1=AO, iLine2=DC], LineCrossRelation [crossPoint=Optional.of(S), iLine1=AO, iLine2=BC], EqualityRelation{AD=4}, EqualityRelation{ $\angle BCR = (1/3\pi)$ }, EqualityRelation{BS=10}, EqualityRelation{AS=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{OR=v_1}, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AS)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]OR)}

539、topic: 如图,正方形\$ABCD\$中,E、F分别为边BC、DC上的点,且\$BE=FD\$,连接AE,过点F作\$FH \perp AE\$,交AB于点G,连接CH.(1)若\$DF=2\$, \$\tan \angle EAB = \frac{1}{3}\$,求\$AE\$的值.(2)求证: \$EH + FH = \sqrt{2} CH\$.

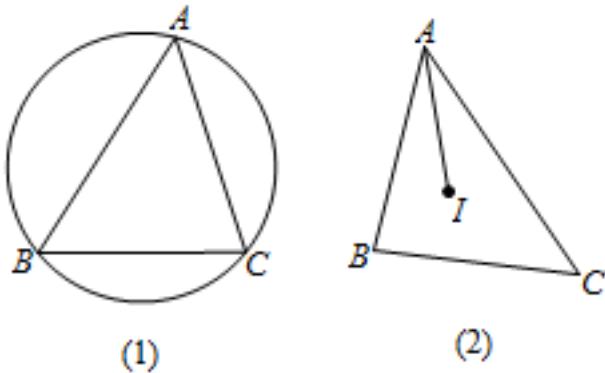


graph:

```
{"stem": {"pictures": [{"picturename": "1000007583_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.00,0.00", "C": "6.00,6.00", "D": "0.00,6.00", "E": "6.00,2.00", "F": "2.00,6.00", "G": "4.00,0.00", "H": "3.60,1.20"}, "collineations": {"0": "A##H##E", "1": "F##D", "2": "E##B", "3": "F##H##G", "4": "C##H", "5": "A##D", "6": "A##G##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=DC, isConstant=false, extension=false}, EqualityRelation{BE=DF}, SegmentRelation:AE, LinePerpRelation{line1=FH, line2=AE, crossPoint=H}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=FH, iLine2=AB], SegmentRelation:CH, EqualityRelation{DF=2}, EqualityRelation{\$\tan(\angle GAH) = (1/3)\$}, 求值(大小): (ExpressRelation:[key:]AE), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AE)}, ProveConclusionRelation:[证明: EqualityRelation{EH+FH=(2^(1/2))*CH}]

540、topic: 已知:如图,在锐角三角形ABC中,BC=5,\$\sin \angle BAC=\frac{4}{5}\$(1)如图(1),求 $\triangle ABC$ 外接圆的直径;(2)如图(2),点I为 $\triangle ABC$ 的内心,若BA=BC,求 AI 的长.



graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "10000060770_Q_1.jpg", "coordinates": {"A": "0.52,1.93", "B": "-1.48,-1.34", "C": "1.48,-1.34", "O": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##C"}, "variable>equals": {}}, {"circles": [{"center": "O", "pointincircle": "A##B##C"}]}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "10000060770_Q_1.jpg", "coordinates": {"A": "-10.00,3.12", "B": "-11.35,0.00", "C": "-8.07,-0.40", "I": "-9.93,0.87"}, "collineations": {"0": "A##B", "1": "A##C", "2": "A##I", "3": "B##C"}, "variable>equals": {}}, {"circles": []}], "appliedproblems": {}}}

NLP:

AcuteTriangleRelation:AcuteTriangle: $\triangle ABC$, EqualityRelation{BC=5}, EqualityRelation{ $\sin(\angle BAC)=\frac{4}{5}$ }, InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O_0$]{center= O_0 , analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }}, 圆的直径:

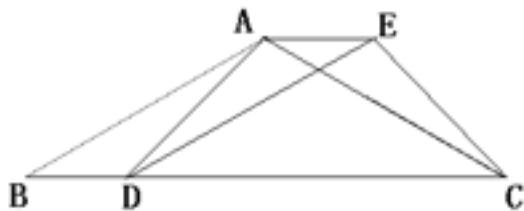
CircleRelation{circle=Circle[$\odot O_0$]{center= O_0 , analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }}, EqualityRelation{AI=v_1}, CoreAndShapeRelation:I/ $\triangle ABC$ /InnerCentre, EqualityRelation{AB=BC}, 求值(大小):

(ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=圆的直径}:

CircleRelation{circle=Circle[$\odot O_0$]{center= O_0 , analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }}, SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]AI)}

541、topic: 如图,已知四边形ABDE是平行四边形,C为边BD延长线上一点,连结AC、CE,使AB=AC.(1)求证:\$\triangle BAD \cong \triangle AEC\$;(2)若\$\angle B=30^\circ, \angle ADC=45^\circ, BD=10\$,求平行四边形ABDE的面积.



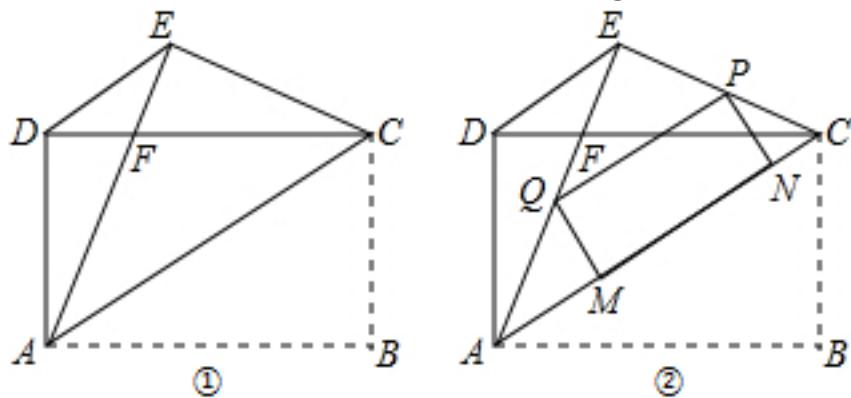
第 18 题

graph:

```
{"stem":{"pictures":[{"picturename":"1000040204_Q_1.jpg","coordinates":{"A":"2.37,1.37","B":"0.00,0.00","C":"4.74,0.00","D":"1.00,0.00","E":"3.37,1.37"},"collineations":{"0":"A###B","1":"A##D","2":"A##E","3":"A##C","4":"D##E","5":"D##C##B","6":"C##E"},"variable-equals":{},"circles":[]}], "appliedproblems":{},"substems":[]}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABDE}, PointOnLineRelation{point=C, line=BD, isConstant=false, extension=true}, SegmentRelation:AC, SegmentRelation:CE, EqualityRelation{AB=AC}, ParallelogramRelation{parallelogram=Parallelogram:ABDE}, EqualityRelation{S_ABDE=v_0}, EqualityRelation{∠ABD=(1/6*Pi)}, EqualityRelation{∠ADC=(1/4*Pi)}, EqualityRelation{BD=10}, 求值(大小):
 (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△BAD, triangleB=△AEC}], SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]S_ABDE)}

542、topic: 如图①,矩形ABCD中,AB=4,AD=3,把矩形沿直线AC折叠,使点B落在点E处,AE交CD于点F,连接DE.
 (1)求证: $\triangle DEC \cong \triangle EDA$;
 (2)求DF的值;
 (3)如图②,若P为线段EC上一动点,过点P作 $\triangle AEC$ 的内接矩形,使其顶点Q落在线段AE上,顶点M、N落在线段AC上,当线段PE的长为何值时,矩形PQMN的面积最大?并求出其最大值.

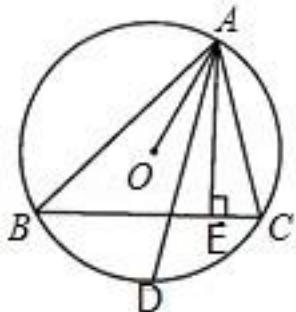
```
graph: [{"stem": {"pictures": [{"picturename": "1000050484_Q_1.jpg", "coordinates": {"A": -9.00, "B": -5.00, "C": -5.00, "D": -9.00, "E": -7.88, "F": -8.13}, "collineations": {"0": "B###A", "1": "C###F###D", "2": "D###A", "3": "B###C", "4": "A###C", "5": "D###E", "6": "E###C", "7": "A###F###E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000050484_Q_1.jpg", "coordinates": {"P": -6.51, "Q": -8.42, "R": 8.0, "S": -7.68, "T": -5.77}, "collineations": {"0": "C###N###M###A", "1": "E###F###Q###A", "2": "E###P###C", "3": "Q###M", "4": "P###Q", "5": "P###N"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}]}
```

NLP:
RectangleRelation{rectangle=Rectangle:ABCD},EqualityRelation{AB=4},EqualityRelation{AD=3},RectangleRelation{rectangle=Rectangle:ABCD},TurnoverRelation{start=B, segment=AC,target=E},LineCrossRelation [crossPoint=Optional.of(F), iLine1=AE, iLine2=CD],SegmentRelation:DE,求值(大小):

(ExpressRelation:[key:]DF), EqualityRelation{EP=v_0}, RectangleRelation{rectangle=Rectangle:PQMN}, EqualityRelation{S_MNPQ=v_1}, PointOnLineRelation{point=P, line=EC, isConstant=false, extension=false}, ParabolaVertexRelation{point=M, conic=Parabola[]:[y^2=2*x[x>0]], positionType=}, PointOnLineRelation{point=N, line=AC, isConstant=false, extension=false}, ExtremumRelation [key=Express:[v_1], value=null, extremumType=MAX], 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△DEC, triangleB=△EDA}], SolutionConclusionRelation{relation=求值}

(大小): (ExpressRelation:[key:]DF},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]EP})

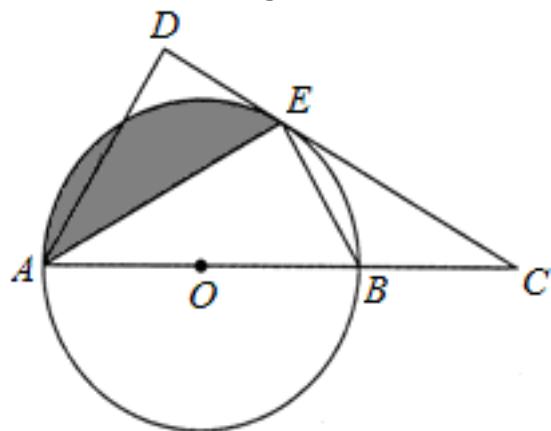
543、topic: 已知:如图,\$\triangle ABC\$内接于\$\odot O\$,D为\$\widehat{BC}\$的中点,\$AE \perp BC\$于E.求证:AD平分\$\angle OAE\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000025138.jpg", "coordinates": {"A": "1.00,6.00", "B": "-5.00,0.00", "C": "3.00,0.00", "D": "-1.00,-2.47", "E": "1.00,0.00", "O": "-1.00,2.00"}, "collineations": {"0": "E###B##C", "1": "A##B", "2": "C##A", "3": "A##D", "4": "A##E", "5": "O##A"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B##A##C##D"}]}, "appliedproblems": {}, "substems": []}}

NLP: InscribedShapeOfCircleRelation{closedShape=\$\triangle ABC\$, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}},MiddlePointOfArcRelation:D/type:MAJOR_ARC\$\curvearrowright\$BC,LinePerp Relation{line1=AE, line2=BC, crossPoint=E},ProveConclusionRelation:[证明:
 AngleBisectorRelation{line=AD, angle=\$\angle EAO\$, angle1=\$\angle DAE\$, angle2=\$\angle DAO\$}]

544、topic: 如图,AB是\$\odot O\$的直径,C是AB延长线上一点,CD与\$\odot O\$相切于点E,AD\$\perp\$CD于点D.#%#(1)求证:AE平分\$\angle DAC\$;#%#(2)若AB=3,\$\angle ABE=60^\circ\$:#%#①求AD的长;#%#②求出图中阴影部分的面积.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060829_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "6.00,0.00", "D": "-0.75,3.90", "E": "0.00,0.00", "F": "1.50,2.60", "O": "0.00,0.00"}, "collineations": {"0": "B##C##A##O", "1": "C##D##E", "2": "A##F##D", "3": "E##A", "4": "E##A", "5": "E##O"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##E##F"}]}, "appliedproblems": {}, "substems": []}}

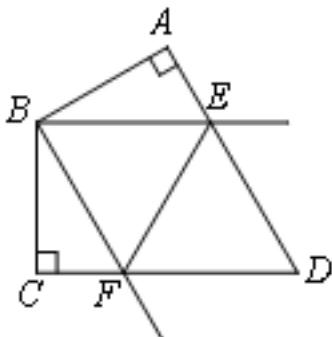
NLP: DiameterRelation{diameter=AB, circle=Circle[\$\odot O\$]{center=O,

```

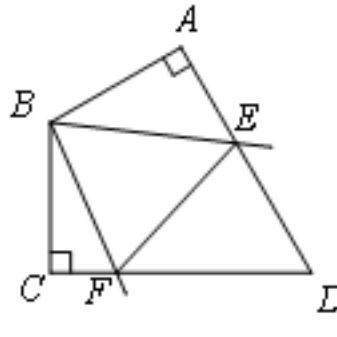
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, length=null}, PointOnLineRelation{point=C, line=AB,
isConstant=false, extension=true}, LineContactCircleRelation{line=CD, circle=Circle[O]{center=0,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, contactPoint=Optional.of(E),
outpoint=Optional.absent()}, LinePerpRelation{line1=AD, line2=CD,
crossPoint=D}, EqualityRelation{AB=3}, EqualityRelation{∠ABE=(1/3*Pi)}, EqualityRelation{AD=v_0},
求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
AngleBisectorRelation{line=AE, angle=∠FAO, angle1=∠EAF,
angle2=∠EAO}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}

```

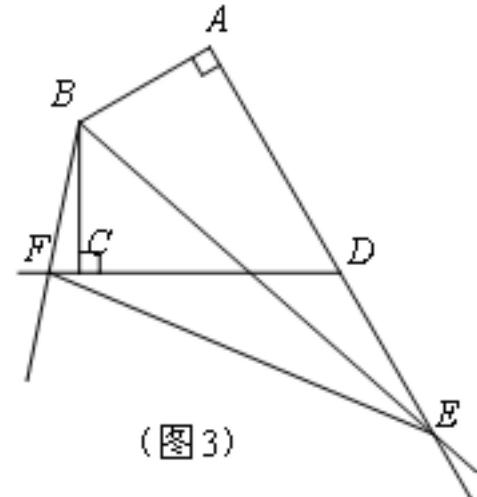
545、topic: 已知四边形ABCD中, $BA \perp AD$ 于A, $BC \perp CD$ 于C, $BA = BC$, $\angle ABC = 120^\circ$, $\angle EBF = 60^\circ$. 现将 $\angle EBF$ 绕B点旋转, 它的两边分别交直线AD, CD于E, F. #%(1)当 $\angle EBF$ 绕B点旋转到 $AE = CF$ 时(如图1), 求证: $\angle ABE = \angle CBF = 30^\circ$; #%(2)当 $\angle EBF$ 绕B点旋转到 $AE \neq CF$ 时, #%(1)在图2的情况下, 请探究AE、CF、EF之间满足怎样的数量关系, 并说明理由; #%(2)在图3的情况下, 请继续探究AE、CF、EF之间又满足怎样的数量关系, 并说明理由. #%#



(图1)



(图2)



(图3)

```

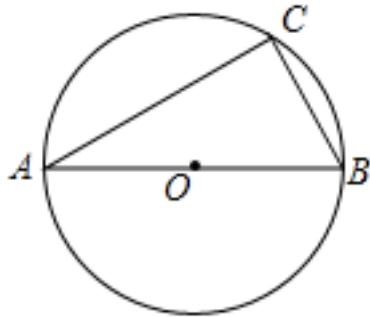
graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": "1000050258_Q_1.jpg", "coordinates": {"A": "-4.09,5.04", "B": "-7.09,3.31", "C": "-7.09,-0.16", "D": "-1.09,-0.16", "E": "-3.09,3.31", "F": "-5.09,-0.16"}, "collineations": {"0": "A###D##E", "1": "A##B", "2": "E##B", "3": "B##F", "4": "B##C", "5": "C##F##D", "6": "E##F"}, "variable>equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "", "picture": "1000050258_Q_2.jpg", "coordinates": {"A": "-4.09,5.04", "B": "-7.09,3.31", "C": "-7.09,-0.16", "D": "-1.09,-0.16", "E": "-2.70,2.63", "F": "-5.74,-0.16"}, "collineations": {"0": "A##D##E", "1": "A##B", "2": "E##B", "3": "B##F", "4": "B##C", "5": "C##F##D", "6": "E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}

```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, LinePerpRelation{line1=BA, line2=AD, crossPoint=A}, LinePerpRelation{line1=BC, line2=CD, crossPoint=C}, EqualityRelation{AB=BC}, EqualityRelation{∠ABC=(2/3*Pi)}, EqualityRelation{∠EBF=(1/3*Pi)}, PointOnLineRelation{point=E, line=CD, isConstant=false, extension=false}, PointRelation:F, (ExpressRelation:[key:]2), 求值(大小): (ExpressRelation:[key:])(AE/CF)), 求值(大小): (ExpressRelation:[key:])(CF/EF)), (ExpressRelation:[key:]3), 求值(大小): (ExpressRelation:[key:])(AE/CF)), 求值(大小): (ExpressRelation:[key:])(CF/EF)), ProveConclusionRelation:[证明: MultiEqualityRelation [multiExpressCompare=∠ABE=∠CBF=(1/6*Pi), originExpressRelationList=[], keyWord=null, result=null]], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}

(ExpressRelation:[key:](AE/CF))},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:](CF/EF))},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:](AE/CF))},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:](CF/EF))}

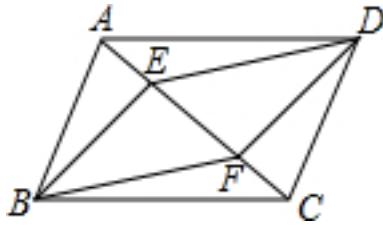
546、topic: 如图,AB是 $\odot O$ 的直径,弦 $BC=2\text{cm}$, $\angle ABC=60^\circ$.#%#(1)求 $\odot O$ 的直径;#%#(2)
 若D是AB的延长线上一点,连接CD,当BD长为多少时,CD与 $\odot O$ 相切?#%#(3)若动点E以 2cm/s 的速度从A点出发沿着AB方向运动,同时动点F以 1cm/s 的速度从B点出发沿BC方向运动,设运动时间为t(s)
 $(0 < t < 2)$,连接EF,当t为何值时, $\triangle BEF$ 为直角三角形?#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060821_Q_1.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,0.00", "C": "1.00,1.73", "O": "0.00,0.00"}, "collinearities": {"0": "A##C", "1": "B##A##O", "2": "B##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##A##B"}]}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000060821_Q_1.jpg", "coordinates": {"D": "4.00,0.00"}, "collinearities": {"0": "D##C", "1": "A##D##O##B", "2": "C##O"}, "variable>equals": {}, "circles": []}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000060821_Q_1.jpg", "coordinates": {"E": "0.00,0.00", "F": "1.50,0.87"}, "collinearities": {"0": "F##E", "1": "A##E##O##B", "2": "C##F##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"appliedproblems": {}}]}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}}, ChordOfCircleRelation{chord=BC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, chordLength=null, straightLine=null}}, EqualityRelation{BC=2}, EqualityRelation{ $\angle CBO=(1/3\pi)$ }, 圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, EqualityRelation{BD=v_0}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, SegmentRelation:CD, LineContactCircleRelation{line=CD, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, contactPoint=Optional.of(C), outpoint=Optional.of(D)}}, 求值(大小):
 (ExpressRelation:[key:v_0]), ThreeItemsInequalityRelation{multiExpressCompare:0<t<2}, RightTriangleRelation:RightTriangle: $\triangle BEF$ [Optional.absent()], SegmentRelation:EF, 求值(大小):
 (ExpressRelation:[key:t]), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:AB]), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:BD]), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:t])

547、topic: 如图,在 $\square ABCD$ 中,点E、F在直线AC上(点E在点F左侧), $BE \parallel DF$.#%#(1)求证:四边形BEDF是平行四边形;#%#(2)若 $AB \perp AC$, $AB=4$, $BC=2\sqrt{13}$,当四边形BEDF为矩形时,求线段AE的长.#%#



graph:

{"stem": {"pictures": [{"picturename": "4111B94343AF4BF3BFB281A0CA3BDA0F.jpg", "coordinates": {"A": "-12.99,6.33", "B": "-15.21,3.00", "C": "-8.00,3.00", "D": "-5.78,6.33", "E": "-14.66,7.44", "F": "-6.34,1.89"}, "collineations": {"0": "A##B", "1": "A##D", "2": "E##A##C##F", "3": "B##C", "4": "B##F", "5": "B##E", "6": "C##D", "7": "D##F", "8": "D##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: PositionRelation [E在F的左方], ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, LineParallelRelation [iLine1=BE, iLine2=DF], EqualityRelation{AE=v_0}, LinePerpRelation{line1=AB, line2=AC, crossPoint=A}, EqualityRelation{AB=4}, EqualityRelation{BC=2*(13^(1/2))}, RectangleRelation{rectangle=Rectangle:BEDF}, 求值(大小): (ExpressRelation:[key]:v_0), ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BEDF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:AE)}

548、topic: 已知在四边形ABCD中, $\angle ABC + \angle ADC = 180^\circ$, $\angle BAD + \angle BCD = 180^\circ$, $AB = BC$.#%#(1)如图1,连接BD,若 $\angle BAD = 90^\circ$, $AD = 7$,求DC的长度;#%#(2)如图2,点P、Q分别在线段AD、DC上,满足 $PQ = AP + CQ$,求证: $\angle PBQ = \angle ABP + \angle QBC$;#%#(3)若点Q在DC的延长线上,点P在DA的延长线上,如图3所示,仍然满足 $PQ = AP + CQ$,请写出 $\angle PBQ$ 与 $\angle ADC$ 的数量关系,并给出证明过程.#%#

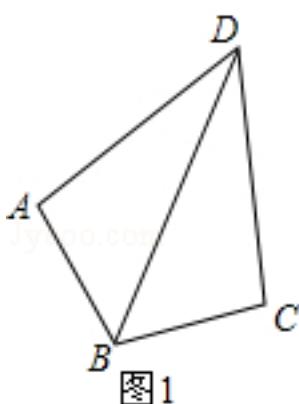


图1

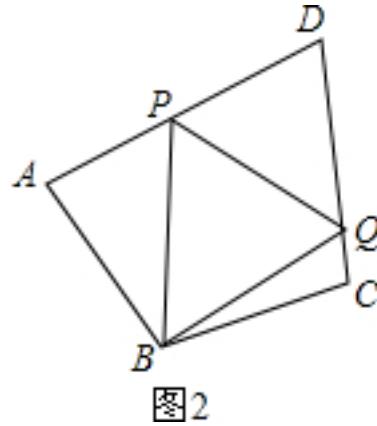


图2

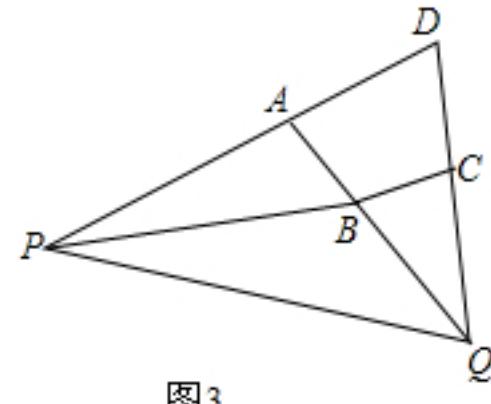


图3

graph:

{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000080155_Q_1.jpg", "coordinates": {"A": "-2.15,5.60", "B": "-0.92,3.85", "C": "1.20,4.15", "D": "0.71,7.62"}, "collineations": {"0": "D##A", "1": "A##B", "2": "D##B", "3": "B##C", "4": "D##C"}, "variable>equals": {}, "circles": []}, {"picturename": "1000080155_Q_1.jpg", "coordinates": {"A": "-6.00,2.47", "B": "-5.00,0.47", "C": "-2.78,0.72", "D": "-3.14,3.89", "P": "-4.63,3.15", "Q": "-2.87,1.56"}, "collineations": {"0": "A##B", "1": "A##P##D", "2": "D##Q##C", "3": "B##C", "4": "B##P", "5": "P##Q", "6": "B##Q"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000080155_Q_1.jpg", "coordinates": {"A": "-4.06,-1.86", "B": "-3.35,-2.63", "C": "-2.33,-2.40", "D": "-2.73,-0.63", "P": "-4.63,3.15", "Q": "-2.87,1.56"}, "collineations": {"0": "A##B", "1": "A##P##D", "2": "D##Q##C", "3": "B##C", "4": "B##P", "5": "P##Q", "6": "B##Q"}, "variable>equals": {}, "circles": []}], {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000080155_Q_1.jpg", "coordinates": {"A": "-4.06,-1.86", "B": "-3.35,-2.63", "C": "-2.33,-2.40", "D": "-2.73,-0.63", "P": "-4.63,3.15", "Q": "-2.87,1.56"}, "collineations": {"0": "A##B", "1": "A##P##D", "2": "D##Q##C", "3": "B##C", "4": "B##P", "5": "P##Q", "6": "B##Q"}, "variable>equals": {}, "circles": []}]}]}

```

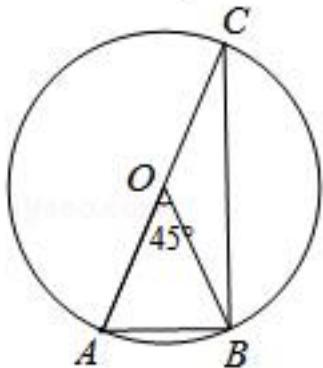
": "-7.06,-4.61","Q": "-1.94,-4.17}),"collineations": {"0": "P###Q","1": "P###A###D","2": "D###C###Q","3": "B###C","4": "B###P","5": "A###B###Q}),"variable-equals": {},"circles": []}], "appliedproblems": {}}
}

```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{ $\angle ABC + \angle ADC = (\text{Pi})$ }, EqualityRelation{ $\angle B AD + \angle BCD = (\text{Pi})$ }, EqualityRelation{AB=BC}, EqualityRelation{CD=v_0}, (ExpressRelation:[key:]1), SegmentRelation:BD, EqualityRelation{ $\angle BAD = (1/2 * \text{Pi})$ }, EqualityRelation{AD=7}, 求值(大小): (ExpressRelation:[key:]v_0), (ExpressRelation:[key:]2), PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=Q, line=DC, isConstant=false, extension=false}, EqualityRelation{PQ=AP+CQ}, PointOnLineRelation{point=Q, line=DC, isConstant=false, extension=true}, PointOnLineRelation{point=P, line=DA, isConstant=false, extension=true}, 已知条件AbsFunctionRelation{AbsFunction=AbsFunction[]:[y=3]定义域:R}, JudgeTwoAnglesConnectRelation{ [$\angle PBQ, \angle ADC$]}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CD)}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle PBQ = \angle ABP + \angle QBC$ }], ProveConclusionRelation:[证明: JudgeTwoAnglesConnectRelation{ [$\angle PBQ, \angle ADC$]}}]

549、topic: 如图,在半径为1的 $\odot O$ 中, $\angle AOB=45^\circ$,求 $\sin C$ 的值.



graph:

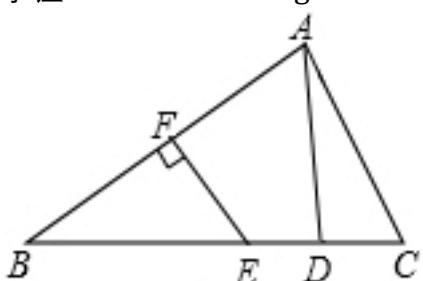
```

{"stem": {"pictures": [{"picturename": "1000025044.jpg", "coordinates": {"A": "-1.53, -3.70", "B": "1.53, -3.70", "C": "1.53, 3.70", "O": "0.00, 0.00"}, "collineations": {"0": "A###O###C", "1": "C###B", "2": "B###A", "3": "O###B"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C"}]}, "appliedproblems": {}, "substems": []}}

```

NLP: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, radiusLength=Express:[1], diameterLength=Express:[2]}}, EqualityRelation{ $\angle AOB = (1/4 * \text{Pi})$ }, 求值(大小): (ExpressRelation:[key:]sin($\angle BCO$)), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]sin($\angle BCO$))}

550、topic: 如图,在 $\triangle ABC$ 中,AB的垂直平分线EF交BC于点E,交AB于点F,D是线段CE的中点,AD \perp BC. 求证:BE=AC.#%#



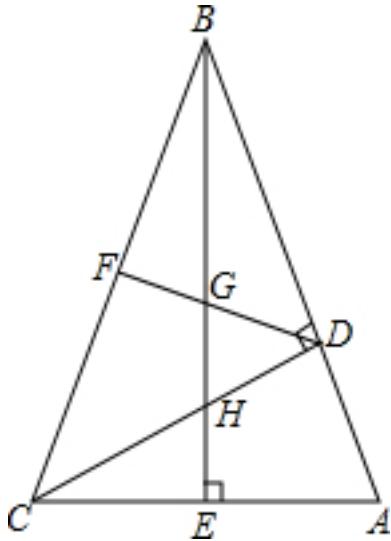
graph:

```
{"stem": {"pictures": [{"picturename": "1000072737_Q_1.jpg", "coordinates": {"A": "-7.67,8.60", "B": "-14.23,4.00", "C": "-6.00,4.00", "D": "-7.67,4.00", "E": "-9.34,4.00", "F": "-10.95,6.30"}, "collineations": {"0": "A##C", "1": "A##D", "2": "E##F", "3": "A##F##B", "4": "C##D##E##B"}, "variable-equals": {}, "circles": "[]"}, "appliedproblems": {}, "substems": "[]"]}
```

NLP: MiddlePerpendicularRelation [iLine1=EF, iLine2=AB, crossPoint=Optional.of(F)], TriangleRelation:△ABC, LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=AB], MiddlePointOfSegmentRelation{middlePoint=D, segment=CE}, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{BE=AC}]

551、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC=45^\circ$, $CD \perp AB$, $BE \perp AC$,垂足分别为D、E,F为BC的中点,BE与DF、DC分别交于点G、H, $\angle ABE=\angle CBE$.求

证:#%#(1) $BH=CA$;#%#(2) $\{(BG)^2\} - \{(GE)^2\} = \{(EA)^2\}$.#%#

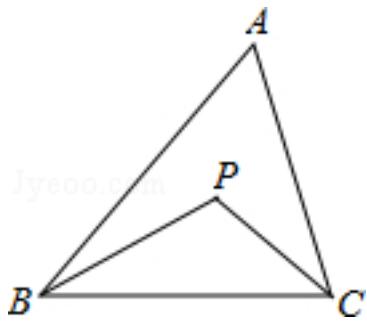


graph:

```
{"stem": {"pictures": [{"picturename": "1000080241_Q_1.jpg", "coordinates": {"A": "-7.25,-1.32", "B": "-9.42,3.44", "C": "-11.25,-1.46", "D": "-7.89,0.07", "E": "-9.25,-1.39", "F": "-10.34,0.99", "G": "-9.32,0.61", "H": "-9.28,-0.56"}, "collineations": {"0": "B##G##E", "1": "B##F##C", "2": "B##D##A", "3": "A##E##C", "4": "D##G##F", "5": "D##H##C"}, "variable-equals": {}, "circles": "[]"}, "appliedproblems": {}, "substems": "[]"]}
```

NLP: TriangleRelation:△ABC, EqualityRelation{ $\angle DBF=(1/4*\pi)$ }, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, LinePerpRelation{line1=BE, line2=AC, crossPoint=E}, MiddlePointOfSegmentRelation{middlePoint=F, segment=BC}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=BE, iLine2=DF], LineCrossRelation [crossPoint=Optional.of(H), iLine1=BE, iLine2=DC], EqualityRelation{ $\angle DBG=\angle FBG$ }, ProveConclusionRelation:[证明: EqualityRelation{BH=AC}], ProveConclusionRelation:[证明: EqualityRelation{((BG)^2) - ((EG)^2) = ((AE)^2)}]

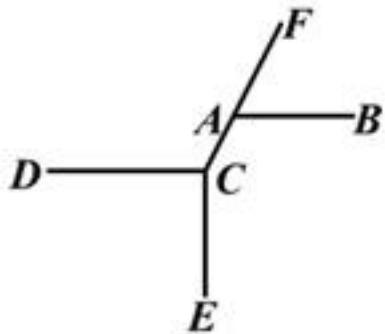
552、topic: 如图,点P是 $\triangle ABC$ 内一点.试说明 $AB+AC > PB+PC$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "44E6EA235B2B4A55A6597EED52B75865.jpg", "coordinates": {"A": "-10.00,7.00", "B": "-14.00,3.00", "C": "-9.00,9.00", "P": "-10.56,4.63"}, "collineations": {"0": "A###C", "1": "A##B", "2": "B##C", "3": "C##P", "4": "B##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation:△ABC,PositionOfPoint2RegionRelation{point=P, region=EnclosedRegionRelation{name=ABC, closedShape=△ABC}, position=inner},ProveConclusionRelation:[证明: InequalityRelation{AB+AC>BP+CP}]

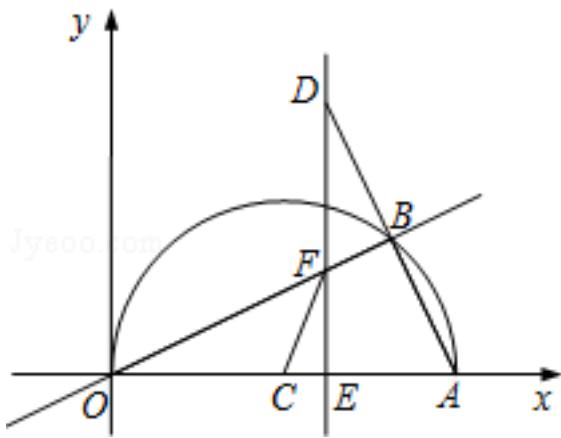
553、topic: 如图,已知 $\angle BAF=46^\circ$, $\angle ACE=136^\circ$, $CE \perp CD$.求证: $CD \parallel AB$.



graph:
 {"stem": {"pictures": [{"picturename": "1000022467_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "5.00,0.00", "C": "-2.95,-3.05", "D": "-7.00,-3.05", "E": "-2.95,-7.29", "F": "3.47,3.60"}, "collineations": {"0": "A##F#C", "1": "A##B", "2": "D##C", "3": "C##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{ $\angle BAF=(23/90\pi)$ }, EqualityRelation{ $\angle ACE=(34/45\pi)$ }, LinePerpRelation{line1=CE, line2=CD, crossPoint=C}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=CD, iLine2=AB]]]

554、topic: 如图,在平面直角坐标系中,点A(10,0),以OA为直径在第一象限内作半圆C,点B是该半圆周上一动点,连接OB、AB,并延长AB至点D,使DB=AB,过点D作x轴垂线,分别交x轴、直线OB于点E、F,点E为垂足,连结CF.
 (1)当 $\angle AOB=30^\circ$ 时,求 \widehat{AB} 的长度;
 (2)当DE=8时,求线段EF的长;
 (3)在点B运动过程中,且交点E在O,C之间时是否存在以点E、C、F为顶点的三角形与 $\triangle AOB$ 相似,若存在,请求出此时点E的坐标,若不存在,请说明理由.



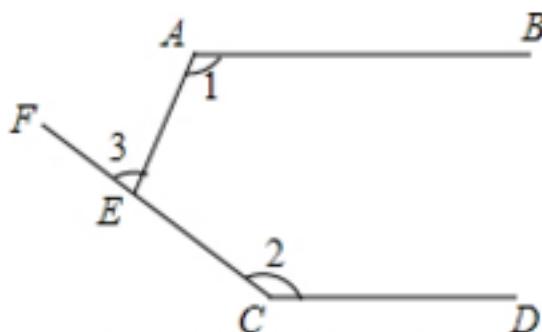
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000080891_Q_1.jpg","coordinates":{"A":"5.00,0.00","B":"3.75,2.17","C":"2.50,0.00","D":"2.50,4.33","F":"2.50,1.44","O":"0.00,0.00","E":"2.50,0.00"}, "collinearities":{"0":"C##F##D","1":"B##F##O","2":"O##C##A","3":"D##B##A","4":"D##F##E","5":"A##E##O"}, "variable>equals":{}, "circles":[]}, {"substemid":"2","questionrelies":"","pictures": [{"picturename":"1000080891_Q_1.jpg","coordinates":{"A":"5.00,0.00","B":"4.00,2.00","C":"2.50,0.00","D":"3.00,4.00","E":"3.00,0.00","F":"3.00,1.50","O":"0.00,0.00"}, "collinearities":{"0":"F##C","1":"O##C##E##A","2":"D##B##A","3":"D##F##E","4":"O##F##B"}, "variable>equals":{}, "circles":[]}, {"substemid":"3","questionrelies":"","pictures": [{"picturename":"1000080891_Q_1.jpg","coordinates":{"A":"5.00,0.00","B":"2.99,2.45","C":"2.50,0.00","D":"1.00,4.91","E":"1.00,0.00","F":"1.00,0.82","O":"0.00,0.00"}, "collinearities":{"0":"D##F##E","1":"O##F##B","2":"O##E##C##A","3":"A##B##D"}, "variable>equals":{}, "circles":[]}], "appliedproblems":{}}], "appliedproblems":{}}]
```

NLP:

PointRelation:A(10,0),SegmentRelation:OB,SegmentRelation:AB,PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, EqualityRelation{BD=AB}, LinePerpRelation{line1=StraightLine[n_0] analytic :x=x_n_0 slope:null b:null isLinearFunction:false, line2=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, crossPoint=}, PointOnLineRelation{point=D, line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=OB, isConstant=false, extension=false}, PointRelation:F, SegmentRelation:CF, EqualityRelation{ $\angle COF = (1/6\pi)$ }, 求值(大小): (ExpressRelation:[key:]~AB), EqualityRelation{EF=v_1}, EqualityRelation{DE=8}, 求值(大小): (ExpressRelation:[key:]v_1), PointRelation:B, CircleRelation{circle=Circle[$\odot C$]{center=C, analytic=(x-x_C)^2+(y-y_C)^2=r_C^2}}, 坐标PointRelation:E, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]~AB)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]EF)}, SolutionConclusionRelation{relation=坐标PointRelation:E}

555、topic: 如图,AB||CD, $\angle 1=115^\circ$, $\angle 2=140^\circ$,求 $\angle 3$ 的度数.#%#



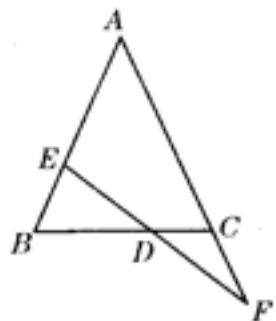
```

graph:
{"stem":{"pictures":[{"picturename":"48EC7F7CB20F47659D5657F6DAF38493.jpg","coordinates":{"A":-14.00,6.00,"B":-8.00,6.00,"C":-13.00,3.00,"D":-7.00,3.00,"E":-14.72,4.45,"F":-15.97,5.49}),"collineations":{"0":"A###B","1":"A###E","2":"D###C","3":"F###E###C"},"variable-equals":{"0":"∠1=∠BAE","1":"∠2=∠ECD","2":"∠3=∠AEF"},"circles":[]}, "appliedproblems":{}}, "substems":[]}

```

NLP: LineParallelRelation [iLine1=AB,
iLine2=CD], EqualityRelation{ $\angle BAE = (23/36 * \pi)$ }, EqualityRelation{ $\angle DCE = (7/9 * \pi)$ }, 求角的大小:
(ExpressRelation:[key:] $\angle AEF$), SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle AEF$)}

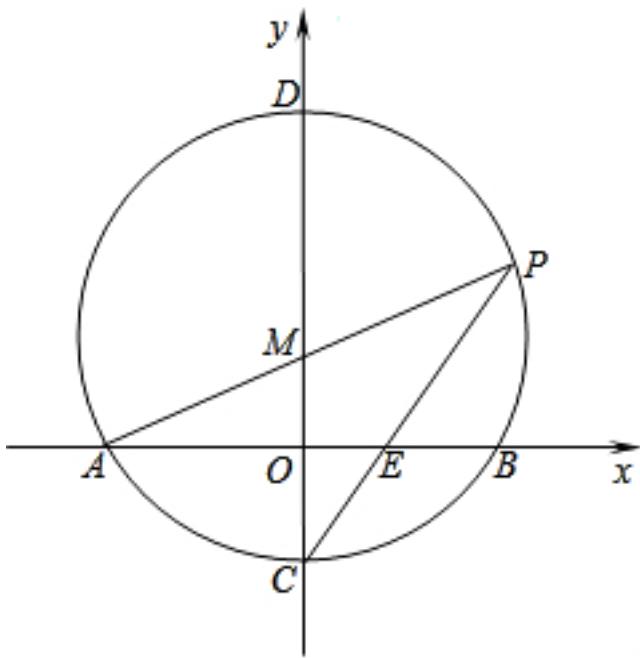
556、topic: 如图,已知 $\angle B=\angle ACB$, $DE=DF$,求证: $BE=CF$.#%#



```
graph: {"stem":{"pictures":[{"picturename":"1000040001_Q_1.jpg","coordinates":{"A":-8.00,6.00,"B":-10.0,2.00,"C":-6.00,2.00,"D":-7.36,2.01,"E":-9.36,3.29,"F":-5.36,0.73}, "collineations":{"0": "A##C##F", "1": "B##D##C", "2": "E##D##F", "3": "A##E##B"}, "variable-equals":{}, "circles":[]}], "appliedproblems":{}}, "substems":[]}
```

NLP: EqualityRelation{ $\angle DBE = \angle ACD$ }, EqualityRelation{ $DE = DF$ }, ProveConclusionRelation:[证明:
EqualityRelation{ $BE = CF$ }]

557、topic: 如图,在平面直角坐标系中,以点\$M(0,\sqrt{3})\$为圆心,以\$2\sqrt{3}\$长为半径作\$\odot M\$交x轴于A、B两点,交y轴于C、D两点,连接AM并延长交\$\odot M\$于P点,连接PC交x轴于E. #%(1)求点C、P的坐标;#%(2)求证:BE=2OE. #%(#

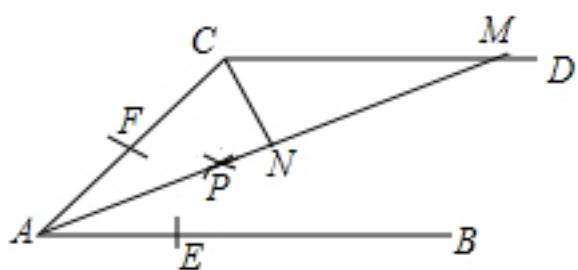


graph:

```
{"stem":{"pictures":[{"picturename":"1000052507_Q_1.jpg","coordinates":{"A":"-3.00,0.00","B":"3.00,0.00","C":"0.00,-1.73","D":"0.00,5.19","E":"1.00,0.00","P":"3.00,3.46","O":"0.00,0.00","M":"0.00,1.73"}],"collineations":{},"variable>equals":{},"circles":[{"center":M,"pointincircle":A###C###B###P##D"}]}],"applied problems":{},"substems":[]}
```

NLP: CoorSysTypeRelation [name=xOy, types=直角坐标系], CircleCenterRelation{point=M(0,(3^(1/2))), conic=Circle[\odot M]{center=M, analytic=(x-x_M)^2+(y-y_M)^2=r_M^2}}, LineCrossCircleRelation{line=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, circle= \odot M, crossPoints=[C], crossPointNum=1}, LineCrossCircleRelation{line=AM, circle= \odot M, crossPoints=[P], crossPointNum=1}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=PC, iLine2=StraightLine[X] analytic :y=0 slope:0 isLinearFunction:false], 坐标PointRelation:C, 坐标PointRelation:P, SolutionConclusionRelation{relation=坐标 PointRelation:C}, SolutionConclusionRelation{relation=坐标 PointRelation:P}, ProveConclusionRelation:[证明: EqualityRelation{BE=2*EO}]

558、topic: 如图,AB||CD,以A为圆心,小于AC的长为半径画弧,分别交AB、AC于点E、F两点,再分别以点E、F为圆心,大于 $\frac{1}{2}EF$ 长为半径作圆弧,两条圆弧交于点P,作射线AP,交CD于点M.(1)若 $\angle ACD=114^\circ$,求 $\angle MAB$ 的度数;(2)若 $CN \perp AM$,垂足为N,求证: $\triangle CAN \cong \triangle CMN$.



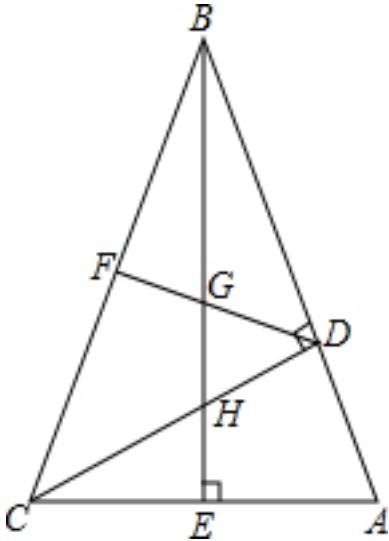
graph:

{"stem": {"pictures": [{"picturename": "1000072666_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "5.00,0.00", "C": "1.34,3.00", "D": "6.00,3.00", "E": "1.00,0.00", "F": "0.41,0.91", "M": "4.63,3.00", "N": "2.31,1.50", "P": "1.63,1.06"}, "collineations": {"0": "B###E###A", "1": "A###F###C", "2": "C###M###D", "3": "C##N", "4": "A###P###N###M"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: RadiusRelation{radius=M_1N_1, circle=Circle[$\odot O_0$]{center=O_0}, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$, length=null}, EqualityRelation{AC=v_2}, LineParallelRelation [iLine1=AB, iLine2=CD], CircleCenterRelation{point=A, conic=Circle[$\odot O_0$]{center=O_0}, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }, CircleCenterRelation{point=F, conic=Circle[$\odot O_0$]{center=O_0}, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }, SegmentRelation:AP, LineCrossRelation [crossPoint=Optional.of(M), iLine1=AP, iLine2=CD], EqualityRelation{ $\angle FCM=(19/30\pi)$ }, 求角的大小: AngleRelation{angle= $\angle EAP$ }, LinePerpRelation{line1=CN, line2=AM, crossPoint=N}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle EAP$)}, ProveConclusionRelation: [证明: TriangleCongRelation{triangleA= $\triangle CAN$, triangleB= $\triangle CMN$ }]

559、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC=45^\circ$, $CD \perp AB$, $BE \perp AC$,垂足分别为点D、E,点F为BC的中点, BE与DF、DC分别交于点G、H, $\angle ABE=\angle CBE$.求

证:#%#(1) $BH=CA$;#%#(2) $\{(BG)^2-(GE)^2\}=\{(EA)^2\}$.#%#



graph:

{"stem": {"pictures": [{"picturename": "1000080241_Q_1.jpg", "coordinates": {"A": "-7.25,-1.32", "B": "-9.42,3.44", "C": "-11.25,-1.46", "D": "-7.89,0.07", "E": "-9.25,-1.39", "F": "-10.34,0.99", "G": "-9.32,0.61", "H": "-9.28,-0.56"}, "collineations": {"0": "B###G###H###E", "1": "B###F###C", "2": "B###D###A", "3": "A###E#C", "4": "D###G###F", "5": "D###H###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle DBF=(1/4\pi)$ }, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, LinePerpRelation{line1=BE, line2=AC, crossPoint=E}, MiddlePointOfSegmentRelation{middlePoint=F, segment=BC}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=BE, iLine2=DF], LineCrossRelation [crossPoint=Optional.of(H), iLine1=BE, iLine2=DC], EqualityRelation{ $\angle DBG=\angle FBG$ }, ProveConclusionRelation: [证明: EqualityRelation{BH=AC}], ProveConclusionRelation: [证明: EqualityRelation{ $((BG)^2 - (EG)^2) = ((AE)^2)$ }]]

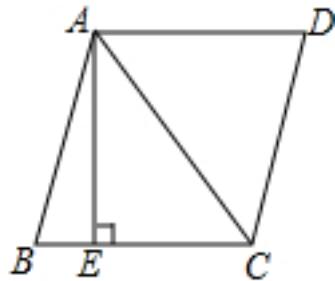
560、topic: 已知,线段 $AB=10\text{cm}$,直线 AB 上有一点 C ,且 $BC=4\text{cm}$, M 是线段 AC 的中点,求线段 AM 的长.



```
graph:
{"stem": {"pictures": [{"picturename": "1000010199_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "10.00,0.00", "C": "6.00,0.00", "M": "3.00,0.00"}, "collineations": {"0": "B##A##M##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}
```

NLP: EqualityRelation{AM=v_0}, EqualityRelation{AB=10}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{BC=4}, MiddlePointOfSegmentRelation{middlePoint=M, segment=A C}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AM)}

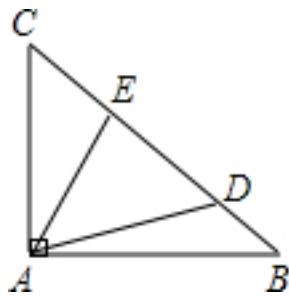
561、topic: 如图,在菱形 $ABCD$ 中, $AB=5$,对角线 $AC=6$.若过点 A 作 $AE \perp BC$,垂足为点 E ,求 AE 的长.%#



```
graph:
{"stem": {"pictures": [{"picturename": "1000034572_Q_1.jpg", "coordinates": {"A": "-3.03,3.64", "B": "-4.34,-1.08", "C": "0.66,1.08", "D": "1.93,3.64", "E": "-3.03,-1.08"}, "collineations": {"0": "B##A", "1": "A##D", "2": "A##C", "3": "A##E", "4": "B##E##C", "5": "D##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}
```

NLP:
EqualityRelation{AE=v_0}, RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{AB=5}, EqualityRelation{AC=6}, LinePerpRelation{line1=AE, line2=BC, crossPoint=E}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AE)}

562、topic: 如图,在 $\text{Rt}\triangle ABC$ 中,已知 $\angle BAC=90^\circ$, $AC=AB$, $\angle DAE=45^\circ$,且 $BD=3$, $CE=4$,求 DE 的长.%#



graph:
 {"stem": {"pictures": [{"picturename": "1000062494_Q_1.jpg", "coordinates": {"A": "-9.00,0.00", "B": "0.00, 0.00", "C": "-9.00,8.94", "D": "-2.12,2.11", "E": "-5.69,5.65"}, "collineations": {"0": "A###B", "1": "C##A", "2": "A##E", "3": "A##D", "4": "B##D##E##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
 EqualityRelation{DE=v_0}, RightTriangleRelation:RightTriangle:△ABC[Optional.of(A)], EqualityRelation{n<∠BAC=(1/2*Pi)}, EqualityRelation{AC=AB}, EqualityRelation{∠DAE=(1/4*Pi)}, EqualityRelation{BD=3}, EqualityRelation{CE=4}, 求值(大小):
 (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]DE)}

563、topic: 如图,已知 $\angle MAN = 120^\circ$,AC平分 $\angle MAN$,B、D分别在射线AN、AM上.(1)在图1中,当 $\angle ABC = \angle ADC = 90^\circ$ 时,求证: $AD + AB = AC$.(2)若把(1)中的条件“ $\angle ABC = \angle ADC = 90^\circ$ ”改为“ $\angle ABC + \angle ADC = 180^\circ$ ”,其他条件不变,如图2所示,则(1)中的结论是否仍然成立?若成立,请给出证明;若不成立,请说明理由.

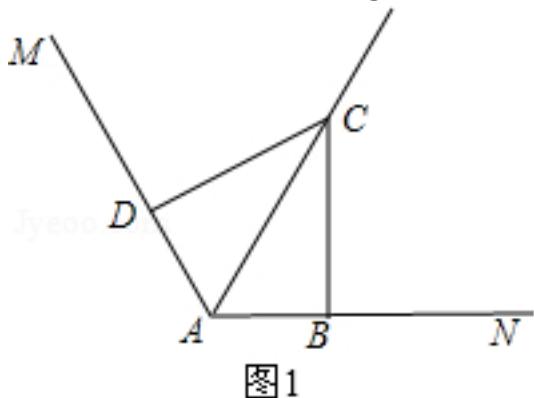


图1

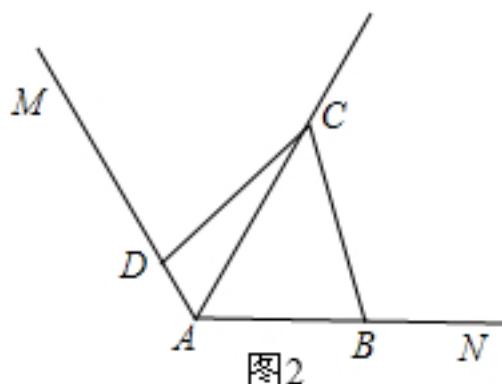


图2

graph:
 {"stem": {"pictures": [{"picturename": "1000031262_Q_1.jpg", "coordinates": {"A": "-9.00,2.00", "N": "-4.00,2.00", "M": "-11.50,6.33"}, "collineations": {"0": "M##A", "1": "N##A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000031262_Q_1.jpg", "coordinates": {"B": "-7.28,2.00", "C": "-7.28,4.98", "D": "-9.86,3.49"}, "collineations": {"0": "M##D##A", "1": "A##B##N", "2": "C##D", "3": "C##B", "4": "C##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000031262_Q_1.jpg", "coordinates": {"B": "-6.32,2.00", "C": "-7.36,4.84", "D": "-9.30,2.53"}, "collineations": {"0": "M##D##A", "1": "A##B##N", "2": "C##D", "3": "C##B", "4": "C##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}], "appliedproblems": {}, "subsystems": []}}

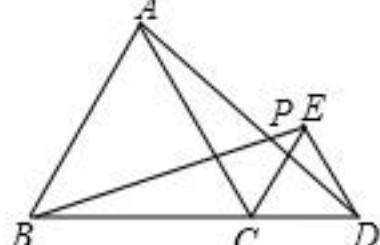
NLP: EqualityRelation{∠MAN=(2/3*Pi)}, AngleBisectorRelation{line=AC, angle=∠MAN, angle1=∠CAM, angle2=∠CAN}, PointOnLineRelation{point=B, line=AN, isConstant=false},

```

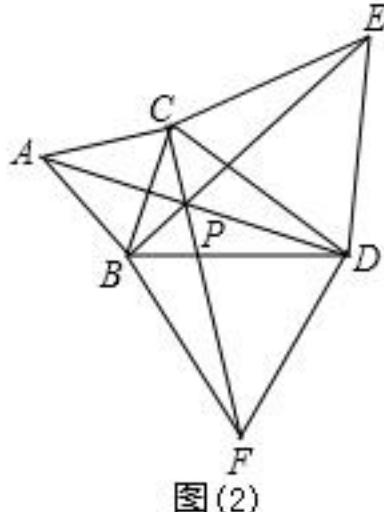
extension=false},PointOnLineRelation{point=D, line=AM, isConstant=false,
extension=false},(ExpressRelation:[key:]1),MultiEqualityRelation
[multiExpressCompare= $\angle ABC = \angle ADC = (1/2\pi)$ , originExpressRelationList=[], keyWord=null,
result=null],已知条件AbsFunctionRelation{AbsFunction=AbsFunction[]:[y=2]定义
域:R},ProveConclusionRelation:[证明: EqualityRelation{AD+AB=AC}]

```

564、topic: (1)如图(1), $\triangle ABC$ 和 $\triangle CDE$ 都是等边三角形,且B、C、D三点共线,连接AD、BE交于点P,求证: $BE=AD$;(2)如图(2),在 $\triangle BCD$ 中, $\angle BCD < 120^\circ$,分别以BC、CD和BD为边在 $\triangle BCD$ 外部作等边三角形ABC、等边三角形CDE和等边三角形BDF,连结AD、BE和CF交于点P,下列结论中正确的是____(填序号);① $AD=BE=CF$;② $\angle BEC = \angle ADC$;③ $\angle DPE = \angle EPC = \angle CPA = 60^\circ$;(3)如图(2)在(2)的条件下,求证: $PB+PC+PD=BE$.#%#



图(1)



图(2)

graph:

```

{"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000037192_Q_1.jpg", "coordinates": {"A": "-11.50,5.60", "B": "-13.00,3.00", "C": "-10.00,3.00", "D": "-8.00,3.00", "E": "-9.00,4.73", "P": "-9.84,4.37"}, "collineations": {"0": "B##P##E", "1": "B##C##D", "2": "A##B", "3": "A##C", "4": "A##P##D", "5": "E##C", "6": "E##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000037192_Q_1.jpg", "coordinates": {"A": "-14.05,-2.80", "B": "-13.00,-5.00", "C": "-11.62,-2.99", "D": "-9.00,-5.00", "E": "-8.57,-1.73", "F": "-11.00,-8.46", "P": "-11.51,-3.90"}, "collineations": {"0": "A##P##D", "1": "C##P##F", "2": "B##P##E", "3": "A##B", "4": "C##A", "5": "C##B", "6": "C##D", "7": "C##E", "8": "E##D", "9": "D##B", "10": "F##B", "11": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]

```

NLP:

RegularTriangleRelation:RegularTriangle: $\triangle ABC$,RegularTriangleRelation:RegularTriangle: $\triangle CDE$,MultiPointCollinearRelation:[B, C, D],LineCrossRelation [crossPoint=Optional.of(P), iLine1=AD, iLine2=BE],TriangleRelation: $\triangle BCD$,InequalityRelation{ $\angle BCD < (2/3\pi)$ },RegularTriangleRelation:RegularTriangle: $\triangle CDE$,RegularTriangleRelation:RegularTriangle: $\triangle BDF$,SegmentRelation:AD,LineCrossRelation [crossPoint=Optional.of(P), iLine1=BE, iLine2=CF],SubStemReliedRelation{selfDivideId=-1, reliedDivideId=2},MultiEqualityRelation [multiExpressCompare=AD=BE=CF*, $\angle CEP = \angle CDP = \angle DPE = \angle EPC = \angle CPA = (1/3\pi)$, originExpressRelationList=[], keyWord=null, result=null],SubStemReliedRelation{selfDivideId=-1, reliedDivideId=2},ProveConclusionRelation:[证明: EqualityRelation{BE=AD}],ProveConclusionRelation:[证明: EqualityRelation{BP+CP+DP=BE}]

565、topic: 已知点P是Rt \triangle ABC斜边AB上一动点(不与A、B重合),分别过A、B向直线CP作垂线,垂足分别为E、F.
 (1)当点P为AB的中点时,如图1,连接AE、BF.证明:四边形AEBF是平行四边形.
 (2)当点P不是AB的中点时,如图2,Q是AB的中点.证明: \triangle QEF为等腰三角形.

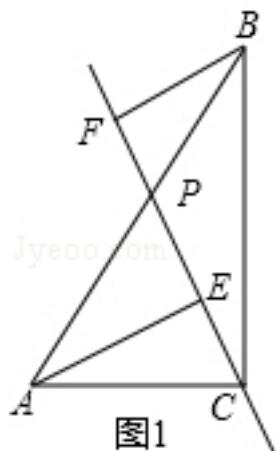


图1

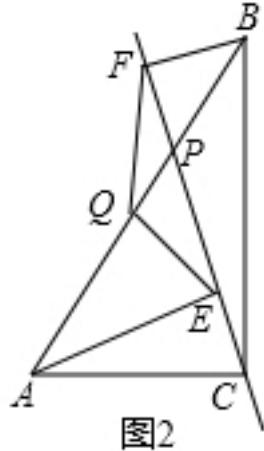


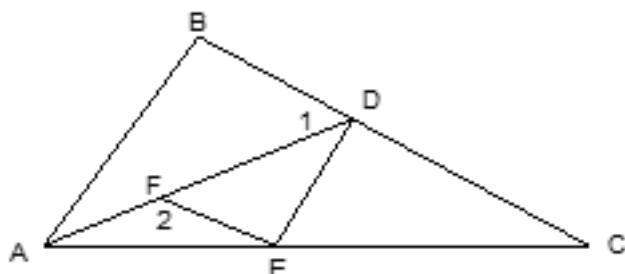
图2

graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000031963_Q_1.jpg", "coordinates": {"A": "-13.00,3.00", "B": "-10.00,8.00", "C": "-10.00,3.00", "E": "-10.79,4.32", "F": "-12.21,6.68", "P": "-11.50,5.50"}, "collineations": {"0": "F##P##E##C", "1": "B##P##A", "2": "B##F", "3": "B##C", "4": "A##E", "5": "A##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000031963_Q_1.jpg", "coordinates": {"A": "-13.00,3.00", "B": "-10.00,8.00", "C": "-10.00,3.00", "E": "-10.20,3.75", "F": "-11.24,7.67", "P": "-10.92,6.46", "Q": "-11.50,5.50"}, "collineations": {"0": "B##P##Q##A", "1": "F##P##E##C", "2": "F##Q", "3": "F##B", "4": "B##C", "5": "Q##E", "6": "A##E", "7": "A##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}]}

NLP:

PointRelation:A,PointRelation:B,RightTriangleRelation:RightTriangle: \triangle ABC[Optional.of(C)],PointOnLineRelation{point=P, line=AB, isConstant=false, extension=false},MiddlePointOfSegmentRelation{middlePoint=P, segment=AB},(ExpressRelation:[key: 1]),SegmentRelation:AE,SegmentRelation:BF,MiddlePointOfSegmentRelation{middlePoint=Q_0, segment=AB},NegativeRelation{relation=PointCoincidenceRelation{point1=P, point2=Q_0}},(ExpressRelation:[key: 2]),MiddlePointOfSegmentRelation{middlePoint=Q, segment=AB},ProveConclusionRelation:[证明:
 ParallelogramRelation{parallelogram=Parallelogram:AEBF}],ProveConclusionRelation:[IsoscelesTriangleRelation:IsoscelesTriangle: \triangle QEF[Optional.absent()]]

566、topic: 如图, $\angle 1 + \angle 2 = 180^\circ$, $\angle B = \angle DEF$, $\angle BAC = 55^\circ$,求 $\angle DEC$ 的度数.



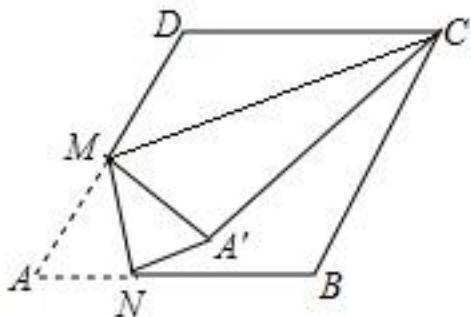
graph:
 {"stem": {"pictures": [{"picturename": "1000035801_Q_1.jpg", "coordinates": {"A": "-4.29,-1.64", "B": "-2.4", "C": "0,0", "D": "-1.64,-1.64", "E": "-2.4,-1.64", "F": "-3.14,-1.64"}}], "appliedproblems": {}}}

1,1.04","C":"1.71,-1.64","D":"-0.35,-0.30","E":"-1.29,-1.64","F":"-2.32,-0.97"},"collineations":{"0":"A###E##C","1":"A###F###D","2":"A###B","3":"E###D","4":"F###E","5":"C###B###D"},"variable-equals": {"0":" $\angle 1 = \angle BDA$ ","1":" $\angle 2 = \angle AFE$ "},"circles":[]],"appliedproblems":{},"substems":[]}

NLP:

EqualityRelation{ $\angle BDF + \angle AFE = (\text{Pi})$ }, EqualityRelation{ $\angle ABD = \angle DEF$ }, EqualityRelation{ $\angle BAE = (11/36 * \text{Pi})$ }, 求角的大小: AngleRelation{angle= $\angle CED$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CED$)}

567、topic: 如图,在边长为2的菱形ABCD中, $\angle A=60^\circ$,点M是AD边的中点,点N是AB边上的一动点,将 $\triangle AMN$ 沿MN所在直线翻折得到 $\triangle A'MN$,连接 $A'C$ 、 MC .#%#(1)求 MC 的长度;#%#(2)求 $A'C$ 长度的最小值.#%#



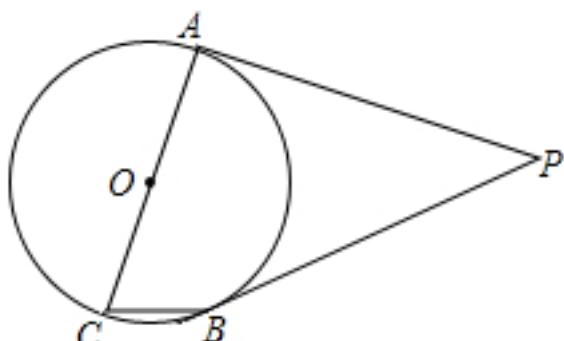
graph:

{"stem": {"pictures": [{"picturename": "1000034738_Q_1.jpg", "coordinates": {"A": "1.00,0.00", "B": "9.00,0.00", "C": "13.00,6.93", "D": "5.00,6.93", "M": "3.00,3.46", "N": "5.86,0.00", "A_1": "6.78,4.78"}, "collineations": {"0": "D###C", "1": "B###C", "2": "N###A_1", "3": "A###M###D", "4": "A###N###B", "5": "M###A_1", "6": "A_1###C", "7": "M###N"}, "conic": {"sureCoor": "A#0#0#B#2#0#C#3#3^(1/2)#D#1#3^(1/2)#M#1/2#3^(1/2)/2#N#t_0#0"}, "variable-equals": {}}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP:

RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{AB=2}, EqualityRelation{ $\angle MAN = (1/3 * \text{Pi})$ }, MiddlePointOfSegmentRelation{middlePoint=M, segment=AD}, PointOnLineRelation{point=N, line=AB, isConstant=false, extension=false}, TurnoverRelation{start=A, segment=MN, target=A'}, SegmentRelation:A'C, SegmentRelation:MC, EqualityRelation{CM=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{A'C=v_1}, 最小值: (ExpressRelation:[key:]v_1[v_1=v_1]), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CM)}, SolutionConclusionRelation{relation=最小值: (ExpressRelation:[key:]v_1[v_1=v_1])}

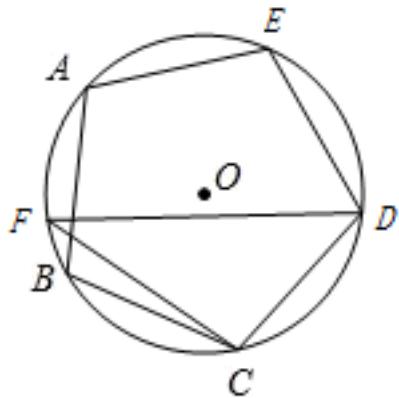
568、topic: 如图,PA、PB是 $\odot O$ 的切线,点A、B为切点,AC是 $\odot O$ 的直径, $\angle ACB=70^\circ$,求 $\angle P$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000081004_Q_1.jpg", "coordinates": {"A": "-5.82,3.10", "B": "-5.52, -3.41", "C": "-7.88,-3.52", "P": "3.27,0.26", "O": "-6.85,-0.21"}, "collineations": {"0": "C##O##A", "1": "C##B", "2": "A##P", "3": "B##P"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}]}, "appliedproblems": {}, "substems": []}}

NLP: LineContactCircleRelation{line=PA, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(A), outpoint=Optional.of(P)}, LineContactCircleRelation{line=PB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(B), outpoint=Optional.of(P)}, PointRelation:A, PointRelation:B, DiameterRelation{diameter=AC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, EqualityRelation{ $\angle BCO=(7/18\pi)$ }, 求角的大小: AngleRelation{angle= $\angle APB$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle APB$)}

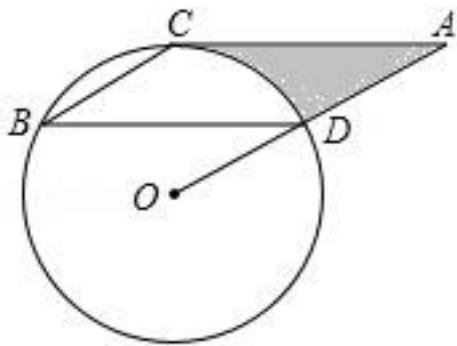
569、topic: 如图,正五边形ABCDE内接于 $\odot O$,点F在 \widehat{AB} 上,求 $\angle CFD$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000083453_Q_1.jpg", "coordinates": {"A": "-0.67,3.72", "B": "-1.81, 0.23", "C": "1.16,-1.94", "D": "4.14,0.22", "E": "3.00,3.72", "F": "-1.95,0.88", "O": "1.16,1.19"}, "collineations": {"0": "B##A", "1": "B##C", "2": "C##D", "3": "D##E", "4": "E##A", "5": "D##F", "6": "C##F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D##E"}]}, "appliedproblems": {}, "substems": []}}

NLP: PointOnArcRelation{point=F, arc=type:MAJOR_ARC \cap AB},求角的大小: AngleRelation{angle= $\angle CFD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CFD$)}

570、topic: 如图,点B、C、D都在 $\odot O$ 上,过点C作 $CA \parallel BD$ 交OD的延长线于点A,连接BC, $\angle B=\angle A=30^\circ$, $BD=2\sqrt{3}$.?#%(1)求证:AC是 $\odot O$ 的切线;?#%(2)求由线段AC、AD与弧CD所围成的阴影部分的周长.(结果保留 π)

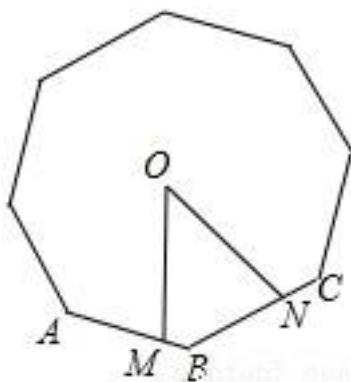


graph:

```
{"stem": {"pictures": [{"picturename": "1000025058.jpg", "coordinates": {"A": "3.46,2.00", "B": "-1.73,1.00", "C": "0.00,2.00", "D": "1.73,1.00", "O": "0.00,0.00"}, "collineations": {"0": "B###C", "1": "B###D", "2": "A###C", "3": "A###D###O"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C###D##B"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: PointOnCircleRelation{circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[B]}, PointOnCircleRelation{circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[C]}, PointOnCircleRelation{circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[D]}, PointOnLineRelation{point=C, line=CA, isConstant=false, extension=false}, LineParallelRelation [iLine1=CA, iLine2=BD], LineCrossRelation [crossPoint=Optional.of(A), iLine1=CA, iLine2=OD], SegmentRelation:BC, MultiEqualityRelation [multiExpressCompare= $\angle CBD = \angle CAD = (1/6\pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BD= $2(3^{1/2})$ }, ProveConclusionRelation:[证明: LineContactCircleRelation{line=AC, circle=Circle[\odot O]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(C), outpoint=Optional.of(A)}]

571、topic: 如图,点M、N分别是正八边形相邻的边AB、BC上的点,切\$ AM=BN \$,点O是正八边形的中心,求\$ \angle MON \$的度数.

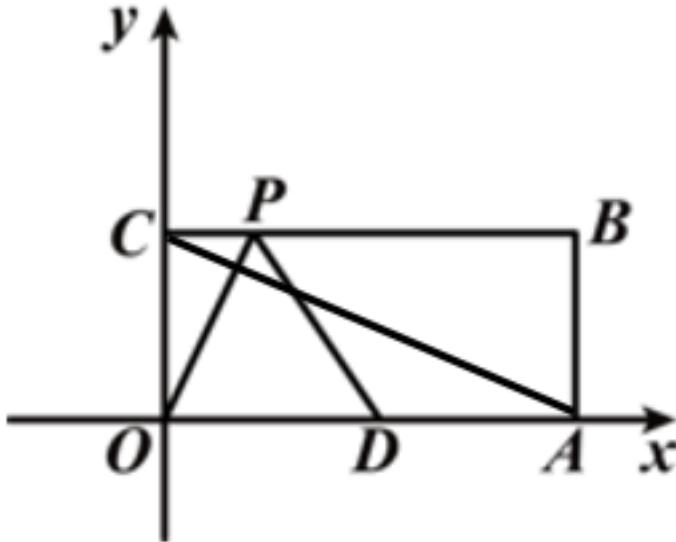


graph:

```
{"stem": {"pictures": [{"picturename": "1000008305_Q_1.jpg", "coordinates": {"A": "-2.83,-2.83", "B": "0.00, -4.00", "C": "2.83,-2.83", "M": "-0.98,-3.60", "N": "1.85,-3.23", "O": "0.00,0.00"}, "collineations": {"0": "M##A##B", "1": "N##C##B", "2": "O##M", "3": "N##O"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: PointOnLineRelation{point=M, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=N, line=BC, isConstant=false, extension=false}, 求角的大小: AngleRelation{angle= $\angle MON$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle MON$)}

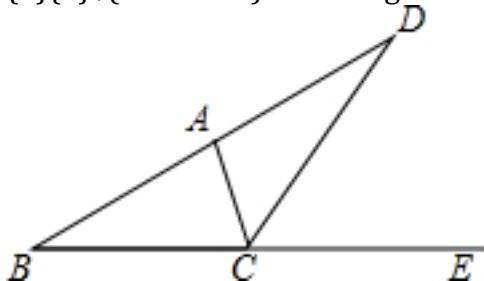
572、topic: 如图,在平面直角坐标系中,点O为坐标原点,四边形OABC是长方形,点A、C的坐标分别为\$(10,0)\$、\$(0,4)\$.
 (1)求线段AC的长及AC的中点坐标.
 (2)点D是OA的中点,点P在BC边上运动.当\$\triangle ODP\$是腰长为5的等腰三角形时,求点P的坐标.



graph:
 {"stem": {"pictures": [{"picturename": "1000020120_Q_1.jpg", "coordinates": {"A": "10.00,0.00", "B": "10.04,0.00", "C": "0.00,4.00", "D": "5.00,0.00", "P": "2.00,4.00", "O": "0.00,0.00"}, "collineations": {"0": "C##A", "1": "C##B##P", "2": "B##A", "3": "P##B", "4": "P##O", "5": "O##D##A", "6": "P##D", "7": "C##O"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 PointRelation:O(0,0), RectangleRelation{rectangle=Rectangle:OABC}, PointRelation:A(10,0), PointRelation:O(0,0), PointRelation:C(0,4), MiddlePointOfSegmentRelation{middlePoint=Q_0, segment=AC}, EqualityRelation{AC=v_1},
 求值(大小): (ExpressRelation:[key:]v_1), 坐标
 PointRelation:Q_0, MiddlePointOfSegmentRelation{middlePoint=D, segment=OA}, PointOnLineRelation{point=P, line=BC, isConstant=false, extension=false}, IsoscelesTriangleRelation: IsoscelesTriangle:\$\triangle ODP\$[Optional.of(D)], 坐标
 PointRelation:P, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AC)}, SolutionConclusionRelation{relation=坐标}
 PointRelation:Q_0, SolutionConclusionRelation{relation=坐标}, PointRelation:P}

573、topic: 已知:如图,D是\$\triangle ABC\$的外角平分线CD与BA延长线的交点.求证:\$\angle ECD=90^\circ+\frac{1}{2}(\angle B-\angle CAD)\$

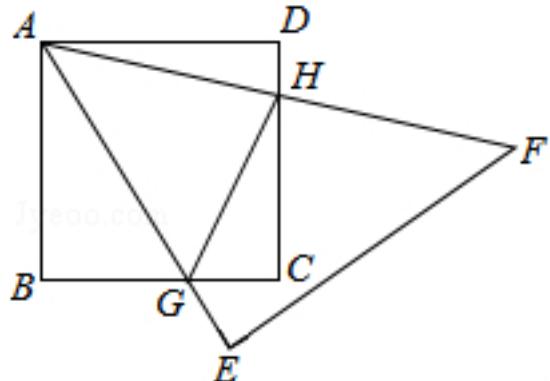


graph:
 {"stem": {"pictures": [{"picturename": "1000082702_Q_1.jpg", "coordinates": {"A": "-3.86,1.85", "B": "-5.48,1.85", "C": "-4.00,-0.50", "D": "-2.00,-0.50", "E": "-2.00,1.85"}}, "appliedproblems": {}, "substems": []}}

0.64", "C": "-3.31,0.65", "D": "-1.31,3.77", "E": "0.16,0.66"}, "collineations": {"0": "B###A###D", "1": "B##C###E", "2": "D###C", "3": "A###C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: TriangleRelation:△ABC, LineCrossRelation [crossPoint=Optional.of(D), iLine1=CD, iLine2=BA], AngleBisectorRelation{line=CD, angle=∠ACE, angle1=∠ACD, angle2=∠DCE}, ProveConclusionRelation:[证明:
EqualityRelation{∠DCE=(1/2*Pi)+(1/2)*(∠ABC-∠CAD)}]

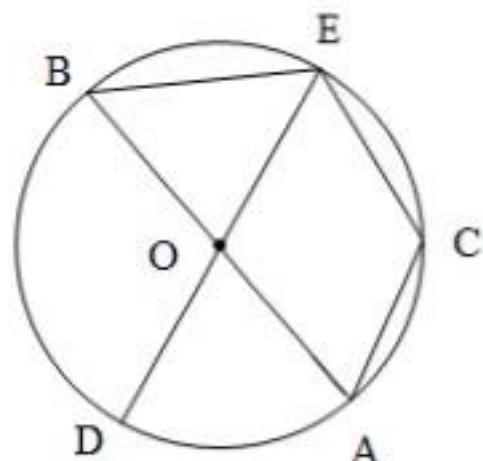
574、topic: 如图,已知正方形ABCD和等腰直角三角形△AEF,∠E=90°,AE和BC交于点G,AF和CD交于点H,正方形ABCD的面积为\$1{{cm}^2}\$,求△CGH的周长.



graph:
 {"stem": {"pictures": [{"picturename": "1000030833_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-13.00,0.00", "C": "-9.00,0.00", "D": "-9.00,4.00", "E": "-9.00,-2.00", "F": "-3.00,2.00", "G": "-10.33,0.00", "H": "-9.00,3.20"}, "collineations": {"0": "A###B", "1": "B###C##G", "2": "D###H##C", "3": "A##D", "4": "A##G#E", "5": "E##F", "6": "A##H##F", "7": "G##H"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{C_△CGH=v_0}, EqualityRelation{∠FEG=(1/2*Pi)}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=AE, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(H), iLine1=AF, iLine2=CD], SquareRelation{square=Square:ABCD}, EqualityRelation{S_ABCD=1}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]C_△CGH)}

575、topic: 已知:如图,AB、DE是\$O\$的直径,\$AC\parallel DE\$,交\$O\$于点C,求证:\$BE=CE\$.



graph:

```
{"stem": {"pictures": [{"picturename": "1000008149_Q_1.jpg", "coordinates": {"O": "-4.95,0.93", "A": "-3.45, -2.23", "B": "-6.44,4.08", "D": "-6.46,-2.22", "C": "-1.55,1.73", "E": "-3.99,3.99"}, "collineations": {"0": "O##B##A", "1": "O###D###E", "2": "A##C", "3": "E##C"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D##E"}]}, "appliedproblems": {}, "substems": []}}
```

```
NLP: DiameterRelation{diameter=AB, circle=Circle[O]{center=0, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, DiameterRelation{diameter=DE, circle=Circle[O]{center=0, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, LineParallelRelation[iLine1=AC, iLine2=DE], LineCrossCircleRelation{line=AC, circle=O, crossPoints=[C], crossPointNum=1}, ProveConclusionRelation:[证明: EqualityRelation{BE=CE}]}
```

576、topic: 已知,线段\$AB=10cm\$,直线AB上有一点C,且\$BC=4cm\$,M是线段AC的中点,求线段AM的长.

graph:

```
{"stem": {"pictures": [{"picturename": "1000010199_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "10.00, 0.00", "C": "6.00,0.00", "M": "3.00,0.00"}, "collineations": {"0": "B##A##M##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []]}
```

```
NLP: EqualityRelation{AM=v_0}, EqualityRelation{AB=10}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{BC=4}, MiddlePointOfSegmentRelation{middlePoint=M, segment=A C}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AM)}
```

577、topic: 如图1,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $\angle BAC=60^\circ$,点E是 $\angle BAC$ 的角平分线上一点,过点E作AE的垂线,过点A作AB的线段,两垂线交于点D,连接DB,点F是BD的中点,DH \perp AC,垂足为H,连接EF,HF.(1)如图1,若点H是AC的中点,\$AC=2\sqrt{3}\$,求AB,BD的长.(2)如图1,求证:HF=EF.(3)如图2,连接CF,CE,猜想: $\triangle CEF$ 是否是等边三角形?若是,请证明;若不是,请说明理由.

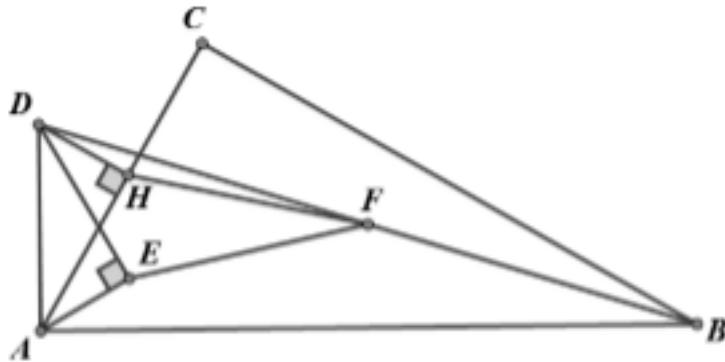


图 1

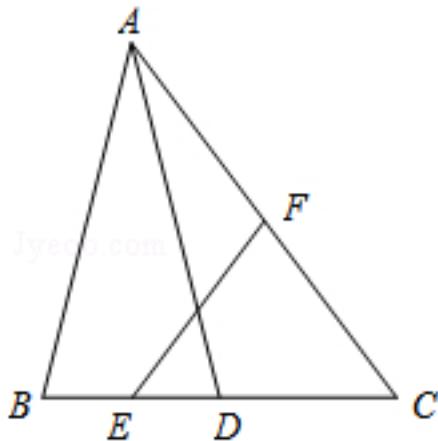
graph:

```
{"stem": {"pictures": [{"picturename": "1000038411_Q_1.jpg", "coordinates": {"A": "-8.68,2.03", "B": "0.74, 1.30", "C": "-6.01,5.93", "D": "-7.89,5.54", "E": "-6.66,2.99", "F": "-3.57,3.42", "H": "-6.79,4.78"}, "collineations": {"0": "D##F##B", "1": "A##H##C", "2": "E##F", "3": "A##E", "4": "E##D", "5": "D##H", "6": "H##F", "7": "B##A", "8": "C##B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000038411_Q_1.jpg", "coordinates": {}}, {"collineations": {"0": "C##F", "1": "E##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}]}
```

}

NLP: AngleBisectorRelation{line=AE,angle= $\angle BAH$, angle1= $\angle BAE$, angle2= $\angle EAH$ },TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle BCH=(1/2\pi)$ },EqualityRelation{ $\angle BAH=(1/3\pi)$ },LinePerpRelation{line1=DE, line2=AE, crossPoint=E},SegmentRelation:DB,MiddlePointOfSegmentRelation{middlePoint=F,segment=BD},LinePerpRelation{line1=DH, line2=AC, crossPoint=H},SegmentRelation:EF,SegmentRelation:HF,[ExpressRelation:[key:]1],MiddlePointOfSegmentRelation{middlePoint=H,segment=AC},EqualityRelation{AC=2*(3^(1/2))},求值(大小):[ExpressRelation:[key:]AB],求值(大小):[ExpressRelation:[key:]BD],[ExpressRelation:[key:]1],[ExpressRelation:[key:]2],SegmentRelation:CF,SegmentRelation:CE,SolutionConclusionRelation{relation=求值(大小):[ExpressRelation:[key:]AB]},SolutionConclusionRelation{relation=求值(大小):[ExpressRelation:[key:]BD]},ProveConclusionRelation:[证明:EqualityRelation{FH=EF}],ProveConclusionRelation:[RegularTriangleRelation:RegularTriangle: $\triangle CEF$]

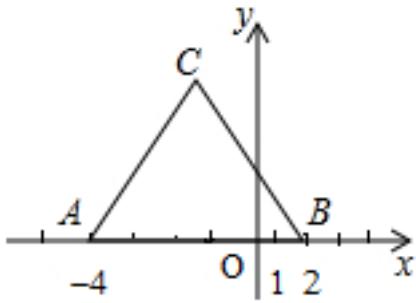
578、topic: 如图,已知在 $\triangle ABC$ 中,点D是边BC的中点,点E、F分别是BD、AC的中点,且 $AB=AD, AC=10, \sin C=\frac{4}{5}$ (1)求线段EF的长;(2)求 $\angle B$ 的余弦值.



graph:
{"stem": {"pictures": [{"picturename": "1000039075_Q_1.jpg", "coordinates": {"A": "0.00,8.00", "B": "-2.00,0.00", "C": "6.00,0.00", "D": "2.00,0.00", "E": "0.00,0.00", "F": "3.00,4.00"}, "collinearations": {"0": "E##B###D##C", "1": "A###F##C", "2": "D##A", "3": "E##F", "4": "A##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
TriangleRelation: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=BC},MiddlePointOfSegmentRelation{middlePoint=E,segment=BD},MiddlePointOfSegmentRelation{middlePoint=F,segment=AC},EqualityRelation{AB=AD},EqualityRelation{AC=10},EqualityRelation{ $\sin(\angle DCF)=\frac{4}{5}$ },EqualityRelation{EF=v_0},求值(大小):[ExpressRelation:[key:]v_0],SolutionConclusionRelation{relation=求值(大小):[ExpressRelation:[key:]EF]}

579、topic: 如图,已知等边 $\triangle ABC$ 的两个顶点的坐标为A(-4,0),B(2,0).试求:(1)点C的坐标;(2) $\triangle ABC$ 的面积.

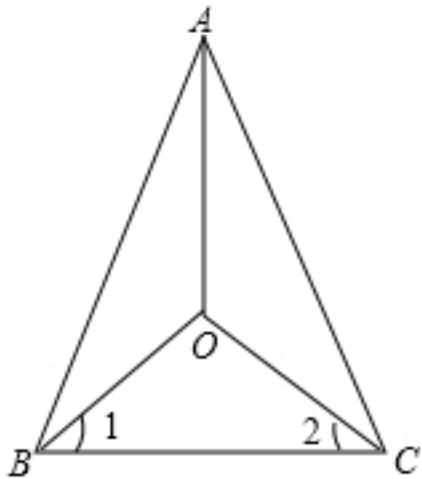


graph:

{"stem":{"pictures":[{"picturename":"1000082376_Q_1.jpg","coordinates":{"A":"-4.00,0.00","B":"2.00,0.00","C":"-1.00,5.20"}, "collineations":{"0":"A##C","1":"B##C","2":"B##A"}, "variable-equals":{},"circles":[]}], "appliedproblems":{},"substems":[]}

NLP: PointRelation:B(2,0),坐标PointRelation:C,EqualityRelation{S_△ABC=v_0},求值(大小):
(ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=坐标
PointRelation:C},SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]S_△ABC)}

580、topic: 如图,OA平分∠BAC,∠1=∠2.求证:△ABC是等腰三角形.#%#

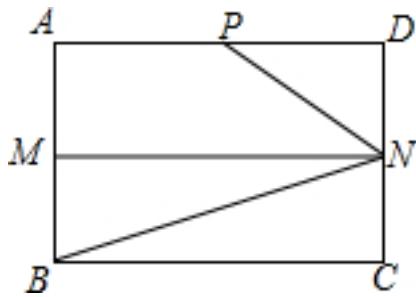


graph:

{"stem":{"pictures":[{"picturename":"1000031005_Q_1.jpg","coordinates":{"A":"-11.00,6.00","B":"-13.00,2.00","C":"-9.00,2.00","O":"-11.00,3.00"}, "collineations":{"0":"A##B","1":"A##C","2":"C##B","3":"O##A","4":"B##O","5":"O##C"}, "variable-equals":{"0":"∠1=∠OBC","1":"∠2=∠OCB"}, "circles":[]}], "appliedproblems":{},"substems":[]}

NLP: AngleBisectorRelation{line=OA,angle=∠BAC, angle1=∠BAO,
angle2=∠CAO},EqualityRelation{∠CBO=∠BCO},ProveConclusionRelation:[IsoscelesTriangleRelation:Is
oscelesTriangle:△ABC[Optional.of(A)]]]

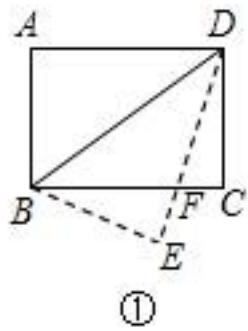
581、topic: 如图,在矩形ABCD中,AB=4,AD=6,点M、N分别是AB、CD的中点,P是AD上的点,且
∠PNB=3∠CBN.#%#(1)求证:∠PNM=2∠CBN;#%#(2)求线段AP的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000036624_Q_1.jpg", "coordinates": {"A": "-4.21,4.58", "B": "-4.21,0.58", "C": "1.79,0.58", "D": "1.79,4.58", "M": "-4.21,2.58", "N": "1.79,2.58", "P": "-0.69,4.58"}, "collineations": {"0": "A###M###B", "1": "A###P##D", "2": "M###N", "3": "B###N", "4": "B###C", "5": "C###N###D", "6": "P###N"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
 RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=4}, EqualityRelation{AD=6}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=N, segment=CD}, PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false}, EqualityRelation{∠BNP=3*∠CBN}, EqualityRelation{AP=v_0}, 求值(大小): (ExpressRelation:[key]:v_0), ProveConclusionRelation:[证明:
 EqualityRelation{∠MNP=2*∠CBN}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:AP)}

582、topic: 如图,在矩形纸片ABCD中,AB=12,BC=16.?(1)将矩形纸片沿BD折叠,使点A落在点E处(如图①),设DE与BC相交于点F,求BF的长;?(2)将矩形纸片如图②折叠,使点B与点D重合,折痕为GH,求GH的长.<#%#

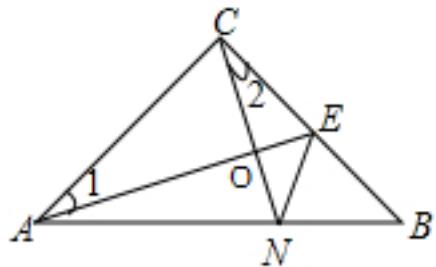


graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000008798_Q_1.jpg", "coordinates": {"A": "0.00,12.00", "B": "0.00,0.00", "C": "16.00,0.00", "D": "16.00,12.00", "E": "11.52,-3.36", "F": "12.50,0.00"}, "collineations": {"0": "A##D", "1": "B##C", "2": "B##D", "3": "B##E", "4": "C##D", "5": "F##D##E", "6": "A##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": [{"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000008798_Q_2.jpg", "coordinates": {"A": "0.00,12.00", "B": "0.00,0.00", "C": "16.00,0.00", "D": "16.00,12.00", "F": "4.48,15.36", "G": "3.50,12.00", "H": "12.50,0.00"}, "collineations": {"0": "A##G##D", "1": "F##D", "2": "C##D", "3": "H##D", "4": "F##G", "5": "B##H##C", "6": "A##B", "7": "G##H"}, "variable>equals": {}, "circles": []}]}]}

NLP:
 RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=12}, EqualityRelation{BC=16}, Eq

ualityRelation{BF=v_0},RectangleRelation{rectangle=Rectangle:ABCD},求值(大小):
 (ExpressRelation:[key:]v_0),EqualityRelation{GH=v_1},RectangleRelation{rectangle=Rectangle:ABCD}
 ,SymmetricRelation{preData=B,afterData=D,symmetric=StraightLine[GH] analytic :y=k_GH*x+b_GH
 slope:null b:null isLinearFunction:false, pivot=},求值(大小):
 (ExpressRelation:[key:]v_1),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]BF}),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]GH})

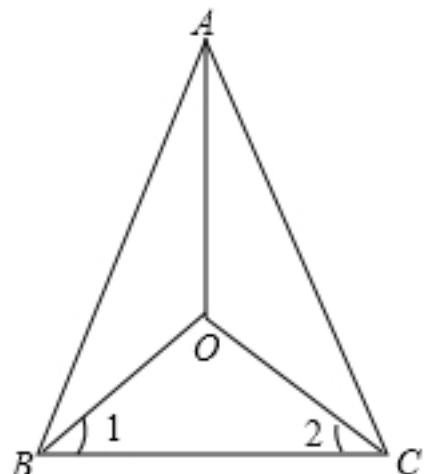
583、topic: 如图,△ABC中, $\angle CAB = \angle CBA = 45^\circ$, $CA = CB$,点E为BC的中点, $CN \perp AE$,交AB于N,交AE于O.连接EN,求证: $AE = CN + EN$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000035729_Q_1.jpg", "coordinates": {"A": "-8.60,3.33", "B": "-3.33,3.40", "C": "-6.00,6.00", "E": "-4.67,4.70", "N": "-5.08,3.38", "O": "-5.45,4.43"}, "collineations": {"0": "A##N#B#", "1": "B##E##C", "2": "C##O##N", "3": "A##O##E", "4": "A##C", "5": "E##N"}, "variable-equals": {"0": "\u00b21=\u00b2CAE", "1": "\u00b22=\u00b2BCN"}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation:△ABC,MultiEqualityRelation
 [multiExpressCompare= $\angle CAN = \angle EBN = (1/4\pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AC=BC}, MiddlePointOfSegmentRelation{middlePoint=E, segment=BC}, LinePerpRelation{line1=CN, line2=AE, crossPoint=O}, LineCrossRelation [crossPoint=Optional.of(N), iLine1=CN, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(O), iLine1=CN, iLine2=AE], SegmentRelation:EN, ProveConclusionRelation:[证明: EqualityRelation{AE=CN+EN}]]

584、topic: 如图,OA平分 $\angle BAC$, $\angle 1 = \angle 2$.求证:△ABC是等腰三角形.#%#

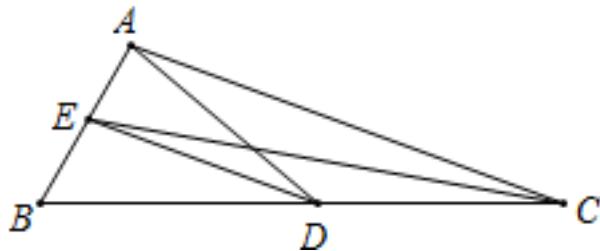


graph:

{"stem": {"pictures": [{"picturename": "1000031005_Q_1.jpg", "coordinates": {"A": "-11.00,6.00", "B": "-13.00,2.00", "C": "-9.00,2.00", "O": "-11.00,3.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "C##B", "3": "O##A", "4": "B##O", "5": "O##C"}, "variable>equals": {"0": "\u03291=\u0329OBC", "1": "\u03292=\u0329OCB"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=OA,angle=\u0329BAC, angle1=\u0329BAO, angle2=\u0329CAO}, EqualityRelation{\u0329CBO=\u0329BCO}, ProveConclusionRelation:[IsoscelesTriangleRelation: IsoscelesTriangle:\u0329ABC[Optional.of(A)]]]

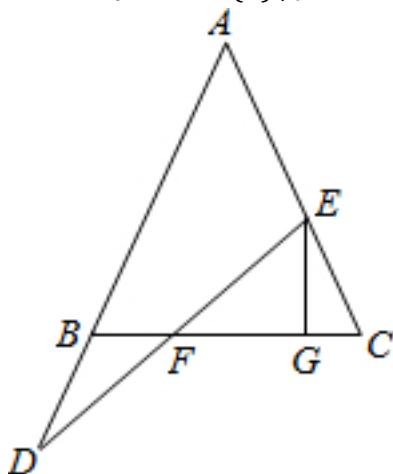
585、topic: 如图,在\u0329ABC中,\u0329BAC=100\u00b0,\u0329ACB=20\u00b0,CE是\u0329ACB的平分线,D是BC上一点,若\u0329DAC=20\u00b0,求\u0329CED的度数.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000081420_Q_1.jpg", "coordinates": {"A": "-2.39,1.89", "B": "-3.73,-0.40", "C": "3.92,-0.45", "D": "0.34,-0.43", "E": "-3.02,0.82"}, "collineations": {"0": "A###E##B", "1": "B##D##C", "2": "A##C", "3": "E##C", "4": "E##D", "5": "A##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
TriangleRelation:\u0329ABC, EqualityRelation{\u0329CAE=(5/9*\u03c0)}, EqualityRelation{\u0329ACD=(1/9*\u03c0)}, AngleBisectorRelation{line=CE, angle=\u0329ACD, angle1=\u0329ACE, angle2=\u0329DCE}, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, EqualityRelation{\u0329CAD=(1/9*\u03c0)}, 求角的大小:
AngleRelation{angle=\u0329CED}, SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]\u0329CED)}

586、topic: 如图,在\u0329ABC中,AB=AC,E在线段AC上,D在AB的延长线上,连DE交BC于F,过点E作EG\u2225BC于G.#%#(1)若\u0329A=50\u00b0,\u0329D=30\u00b0,求\u0329GEF的度数;(2)若BD=CE,求证:FG=BF+CG.#%#

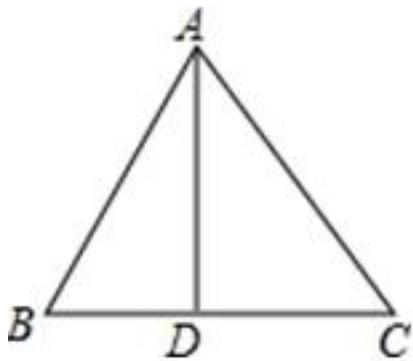


graph:
{"stem": {"pictures": [{"picturename": "1000060075_Q_1.jpg", "coordinates": {"A": "2.86,6.12", "B": "0.00,0.00", "C": "5.72,0.00", "D": "-0.98,-2.09", "E": "4.80,1.95", "F": "2.01,0.00", "G": "4.80,0.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "C##B", "3": "O##A", "4": "B##O", "5": "O##C"}, "variable>equals": {"0": "\u03291=\u0329OBC", "1": "\u03292=\u0329OCB"}, "circles": []}, "appliedproblems": {}, "substems": []}}

0": "D###B###A", "1": "A###E###C", "2": "E###F###D", "3": "E###G", "4": "B###F###G###C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: TriangleRelation:△ABC, EqualityRelation{AB=AC}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=BC], LinePerpRelation{line1=EG, line2=BC, crossPoint=G}, EqualityRelation{∠BAE=(5/18*Pi)}, EqualityRelation{∠BDF=(1/6*Pi)}, 求角的大小: AngleRelation{angle=∠FEG}, EqualityRelation{BD=CE}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠FEG)}, ProveConclusionRelation:[证明: EqualityRelation{FG=BF+CG}]

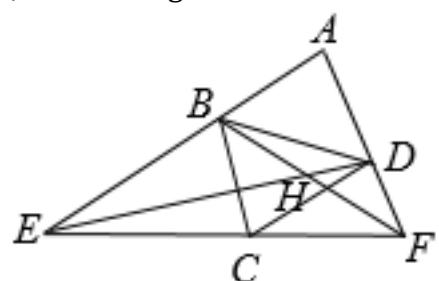
587、topic: 如图, 在 $\triangle ABC$ 中, D为BC边上的一点, 已知 $AB=13$, $AD=12$, $AC=15$, $BD=5$?#%(1)求证: $\triangle ABD$ 是直角三角形?#%(2)求CD的长及点D到AC的距离



graph:
[{"variable>equals": {}, "picturename": "1000001335_Q_1.jpg", "collineations": {"0": "B###D###C"}, "coordinates": {"D": "-1.36,1.30", "A": "-1.32,5.48", "B": "-3.92,1.32", "C": "2.46,1.27"}}]

NLP: TriangleRelation:△ABC, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, EqualityRelation{AB=13}, EqualityRelation{AD=12}, EqualityRelation{AC=15}, EqualityRelation{BD=5}, EqualityRelation{CD=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), 距离, 求距离: PointToLineDistanceRelation{point=D, line=AC, distance=null}, ProveConclusionRelation:[证明: RightTriangleRelation:RightTriangle:△ABD[Optional.of(D)]], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CD)}, SolutionConclusionRelation{relation=距离, 求距离: PointToLineDistanceRelation{point=D, line=AC, distance=null}}]

588、topic: 已知:如图,四边形ABCD是菱形, $∠A=60^\circ$,直线EF经过点C,分别交AB、AD的延长线于E、F两点,连接ED、FB相交于点H.#%#(1)如果菱形的边长是3,DF=2,求BE的长;#%#(2)除△AEF外,△BEC与图中哪一个三角形相似,找出来并证明;#%#(3)请说明 $\{B\}^2 \cdot \{D\} = DH \cdot DE$ 的理由.#%#



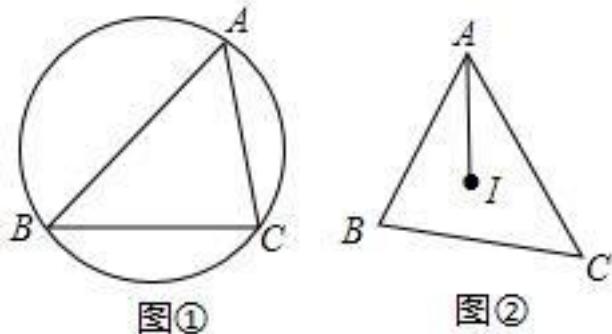
graph:

```
{"stem":{"pictures":[{"picturename":"1000040745_Q_1.jpg","coordinates":{"A":"3.89,1.85","B":"2.43,0.49","C":"2.88,-1.46","D":"4.34,-0.10","E":"0.23,-1.57","F":"4.65,-1.39","H":"3.48,-0.41"}],"collineations":{ "0":"A###B###E","1":"E###C###F","2":"F###D###A","3":"B###C","4":"C###D","5":"B###D","6":"B###H###F","7":"D###H###E"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{}, "substems":[]}}
```

NLP:

RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{ $\angle BAD = (1/3\pi)$ }, PointOnLineRelation {point=C, line=EF, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=AD], LineCrossRelation [crossPoint=Optional.of(H), iLine1=ED, iLine2=FB], EqualityRelation{BE=v_0}, RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{AB=3}, EqualityRelation{DF=2}, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]BE)}, ProveConclusionRelation:[证明: EqualityRelation{((BD)^2)=DH*DE}]

589、topic: 在锐角三角形\$ABC\$中, \$BC=5\$, \$\sin A=\frac{4}{5}\$,(1)如图①,求三角形\$ABC\$外接圆的直径;(2)如图②,点\$I\$为三角形\$ABC\$的内心, \$BA=BC\$,求\$AI\$的长.



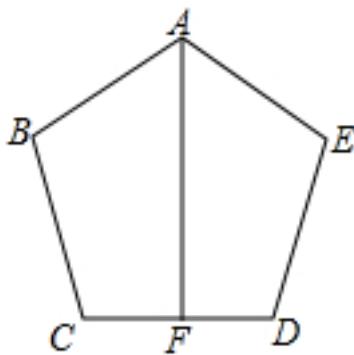
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":1,"questionrelies":"","picture":{},"collineations":{ "0":"A###C","1":"B###A","2":"B###C"}, "variable-equals":{}, "circles": [{"center": "O", "pointincircle": "B###C##A"}]}, {"substemid":2,"questionrelies":"","picture":{},"collineations":{ "0":"A###C","1":"B###A","2":"B###C"}, "variable-equals":{}, "circles": []}], "appliedproblems":{}}}
```

NLP:

AcuteTriangleRelation:AcuteTriangle:\$\triangle ABC\$, EqualityRelation{BC=5}, EqualityRelation{\$\sin(\angle BAC)=(4/5)\$}, InscribedShapeOfCircleRelation{closedShape=\$\triangle ABC\$, circle=Circle[\$\odot O_0\$]{center=\$O_0\$}}, analytic=\$(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2\$, 圆的直径:
CircleRelation{circle=Circle[\$\odot O_0\$]{center=\$O_0\$}}, analytic=\$(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2\$, EqualityRelation{AI=v_1}, CoreAndShapeRelation:I/\$\triangle ABC\$/InnerCentre, EqualityRelation{AB=BC}, 求值(大小):
(ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=圆的直径:
CircleRelation{circle=Circle[\$\odot O_0\$]{center=\$O_0\$}}, analytic=\$(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2\$}, SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AI)}

590、topic: 如图,AB=AE,BC=ED,∠B=∠E,AF⊥CD,垂足为F,求证:F是CD的中点.#%#



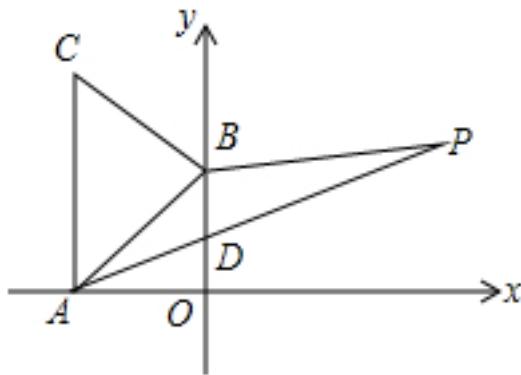
graph:

```
{"stem":{"pictures":[{"picturename":"1000072669_Q_1.jpg","coordinates":{"A":"3.50,5.00","B":"1.00,3.00","C":"2.00,0.00","D":"5.00,0.00","E":"6.00,3.00","F":"3.50,0.00"},"collineations":{"0":"F##A","1":"A##B","2":"B##C","3":"C##F##D","4":"D##E","5":"E##A"},"variable-equals":{},"circles":[]}]}, "appliedproblems":{}}, "substems":[]}
```

NLP:

EqualityRelation{AB=AE}, EqualityRelation{BC=DE}, EqualityRelation{∠ABC=∠AED}, LinePerpRelation {line1=AF, line2=CD, crossPoint=F}, ProveConclusionRelation:[证明:
MiddlePointOfSegmentRelation{middlePoint=F,segment=CD}]

591、topic: 如图所示,\$A\left(-\sqrt{3},0 \right)\$、\$B(0,1)\$分别为x轴、y轴上的点,△ABC为等边三角形,点P(3,a)在第一象限内.#%#(1)求△ABC的面积;#%#(2)用含a的代数式表示△ABP的面积;#%#(3)若\$2S_{\triangle ABP}=S_{\triangle ABC}\$,AP交y轴于点D,求点D的坐标.#%#



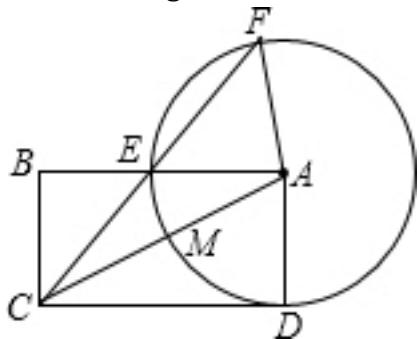
graph:

```
{"stem":{"pictures":[],"appliedproblems":{}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000070687_Q_1.jpg", "coordinates": {"A": "-1.73,0.00", "B": "0.00,1.00", "C": "-1.73,2.00", "O": "0.00,0.00"}, "collineations": {"0": "A##O", "1": "A##B", "2": "A##C", "3": "C##B", "4": "B##O"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "picture": [{"picturename": "1000070687_Q_2.jpg", "coordinates": {"D": "0.00,0.64", "P": "3.00,1.75"}, "collineations": {"0": "A##D", "1": "B##P", "2": "A##D##P", "3": "B##D##O"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}], "appliedproblems": {}}}
```

NLP: PointOnLineRelation{point=A(-3^(1/2),0), line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=B(0,1), line=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, isConstant=false, extension=false}, RegularTriangleRelation:RegularTriangle:△ABC, PointInDomRelation [point=P(3,a), local=FIRST_QUADRANT], EqualityRelation{S_△ABC=v_0}, 求值(大小):

(ExpressRelation:[key:]v_0), EqualityRelation{S_△ABP=v_1}, 表达式之间的关系:
 DualExpressRelation{expresses=[Express:[v_1], Express:[a]]}, EqualityRelation{2*S*(*(△ABP))=S_△ABC}, LineCrossRelation
 [crossPoint=Optional.of(D), iLine1=AP, iLine2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false], 坐标PointRelation:D, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_△ABC)}, SolutionConclusionRelation{relation=表达式之间的关系:
 DualExpressRelation{expresses=[Express:[v_1], Express:[a]]}}, SolutionConclusionRelation{relation=坐标PointRelation:D}

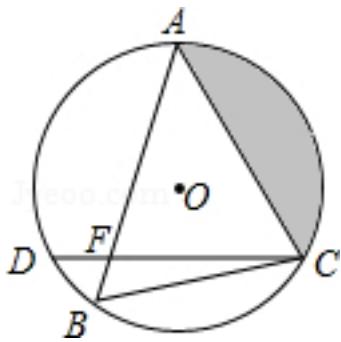
592、topic: 如图,已知在矩形ABCD中,以点A为圆心,AD为半径作圆并交边AC、AB于点M、E,CE的延长线交\$\odot A\$于点F,且CM=2,AB=4.(1)求\$\odot A\$的半径;(2)连接AF,求弦EF的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000060719_Q_1.jpg", "coordinates": {"A": "4.00,3.00", "B": "0.00,3.00", "C": "0.00,0.00", "D": "4.00,0.00", "E": "1.00,3.00", "F": "1.60,4.80", "M": "1.60,1.20"}, "collinearities": {"0": "E##C##F", "1": "C##A##M", "2": "A##B##E", "3": "A##F", "4": "A##D", "5": "C##D", "6": "B##C"}, "variable>equals": {}, "circles": [{"center": "A", "pointincircle": "E##F##M##D"}]}, "appliedproblems": {}, "subsystems": []}}

NLP: RadiusRelation{radius=AD, circle=Circle[○A]{center=A, analytic=(x-x_A)^2+(y-y_A)^2=r_A^2}, length=null}, RectangleRelation{rectangle=Rectangle:ABCD}, LineCrossCircleRelation{line=AC, circle=○O_0, crossPoints=[M], crossPointNum=1}, LineCrossCircleRelation{line=AB, circle=○O_0, crossPoints=[E], crossPointNum=1}, LineCrossCircleRelation{line=CE, circle=○A, crossPoints=[F], crossPointNum=1}, EqualityRelation{CM=2}, EqualityRelation{AB=4}, 圆的半径:
 CircleRelation{circle=Circle[○A]{center=A, analytic=(x-x_A)^2+(y-y_A)^2=r_A^2}}, SegmentRelation:AF, 求值(大小):
 (ExpressRelation:[key:]EF), ChordOfCircleRelation{chord=EF, circle=Circle[○A]{center=A, analytic=(x-x_A)^2+(y-y_A)^2=r_A^2}, chordLength=null, straightLine=null}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AE)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]EF)}

593、topic: 如图,在○O中,\$\widehat{AD}=\widehat{AC}\$,弦AB与弦AC交于点A,弦CD与AB交于点F,连接BC.(1)求证:\$\{\{AC\}^2\}=AB\cdot AF\$;(2)若○O的半径长为2cm,\$\angle B=60^\circ\$,求图中阴影部分面积.

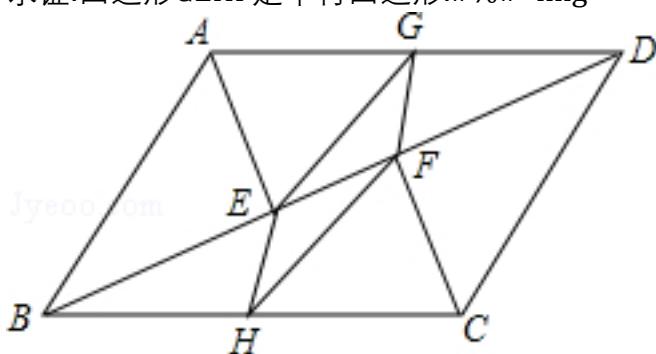


graph:

```
{"stem": {"pictures": [{"picturename": "1000080880_Q_1.jpg", "coordinates": {"A": "0.05,2.00", "B": "-1.43,-1.40", "C": "1.71,-1.04", "D": "-1.72,-0.97", "F": "-1.24,-0.98", "O": "0.00,0.00"}, "collineations": {"0": "A##C", "1": "D##F##C", "2": "B##C", "3": "A##F##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: ChordOfCircleRelation{chord=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null,straightLine=null},ChordOfCircleRelation{chord=AC, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null,straightLine=null},ChordOfCircleRelation{chord=CD, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null,straightLine=null},CircleRelation{circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }},EqualityRelation{ \sim AD= \sim AC},LineCrossRelation [crossPoint=Optional.of(A), iLine1=AB, iLine2=AC],LineCrossRelation [crossPoint=Optional.of(F), iLine1=CD, iLine2=AB],SegmentRelation:BC,RadiusRelation{radius=M_0N_0, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null},EqualityRelation{M_0N_0=2},EqualityRelation{ $\angle CBF = (1/3 \cdot \pi)$ },ProveConclusionRelation :[证明: EqualityRelation{((AC) 2)=AB*AF}]

594、topic: 已知:如图,在 $\square ABCD$ 中,G、H分别是AD、BC的中点, $AE \perp BD$, $CF \perp BD$,垂足分别为E、F.求证:四边形GEHF是平行四边形.



graph:

```
{"stem": {"pictures": [{"picturename": "1000081736_Q_1.jpg", "coordinates": {"A": "-2.00,3.00", "B": "-4.00,0.00", "C": "1.00,0.00", "D": "3.00,3.00", "E": "-1.22,1.19", "F": "0.22,1.81", "G": "0.50,3.00", "H": "-1.50,0.00"}, "collineations": {"0": "A##B", "1": "A##G##D", "2": "B##H##C", "3": "A##E", "4": "C##D", "5": "E##H", "6": "F##C", "7": "E##G", "8": "F##G", "9": "F##H", "10": "B##E##F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD},MiddlePointOfSegmentRelation{middleP

oint=G,segment=AD},MiddlePointOfSegmentRelation{middlePoint=H,segment=BC},LinePerpRelation{
 line1=AE, line2=BD, crossPoint=E},LinePerpRelation{line1=CF, line2=BD,
 crossPoint=F},ProveConclusionRelation:[证明:
 ParallelogramRelation{parallelogram=Parallelogram:EGFH}]

595、topic: 如图,\$\triangle ABC\$内接于圆O,\$AB=AC\$,点D在劣弧AC上,\$\angle ABD=45^\circ\$.?(1)如图1,BD交AC于点E,连接AD、CD,若\$AB=BD\$.求:\$\angle CDB\$的度数.(2)如图2,连接AD,CD.若\$CD=\sqrt{2}\$,\$AD=\sqrt{26}\$.求\$\triangle ABC\$的外接圆半径及BC的长.

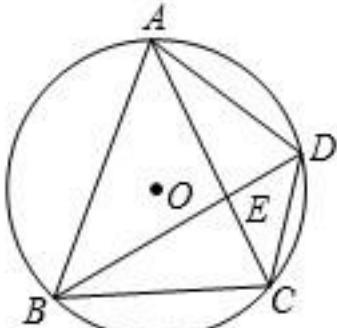


图1

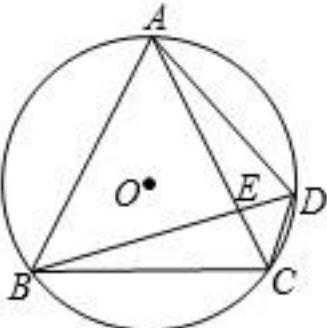
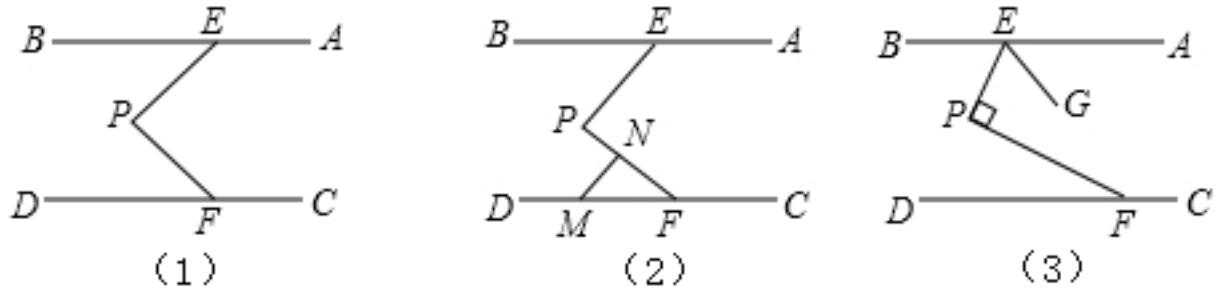


图2

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000027467_Q_1.jpg", "coordinates": {"A": "-15.16,8.42", "B": "-19.71,-2.30", "C": "-10.79,-2.38", "D": "-8.91,2.06", "E": "-12.07,0.78", "O": "-15.21,2.12"}, "collineations": {"0": "B##E##D", "1": "B##A", "2": "B##C", "3": "C##E##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "3A_20(2).jpg", "coordinates": {"A": "0.00, 7.21", "B": "-6.66, -2.77", "C": "6.66, -2.77", "D": "7.21, 0.00", "E": "5.09, -0.42", "O": "0.00, 0.00"}, "collineations": {"0": "B##E##D", "1": "B##A", "2": "B##C", "3": "C##E##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}}

NLP: InscribedShapeOfCircleRelation{closedShape=\$\triangle ABC\$, circle=Circle[\$\odot O\$]{center=0, analytic=\$(x-x_0)^2+(y-y_0)^2=r_0^2\$}}, EqualityRelation{AB=AC}, PointOnArcRelation{point=D, arc=type:MINOR_ARC\$\cap\$AC}, EqualityRelation{\$\angle ABE=(1/4\pi)\$}, (ExpressRelation:[key:]1), LineCrossRelation [crossPoint=Optional.of(E), iLine1=BD, iLine2=AC], SegmentRelation:AD, SegmentRelation:CD, EqualityRelation{AB=BD}, 求角的大小: AngleRelation{angle=\$\angle BDC\$}, RadiusRelation{radius=M_0N_0, circle=Circle[\$\odot O\$]{center=0, analytic=\$(x-x_0)^2+(y-y_0)^2=r_0^2\$}}, length=null}, InscribedShapeOfCircleRelation{closedShape=\$\triangle ABC\$, circle=Circle[\$\odot O_1\$]{center=0_1, analytic=\$(x-x_{0_1})^2+(y-y_{0_1})^2=r_{0_1}^2\$}}, EqualityRelation{BC=v_2}, (ExpressRelation:[key:]2), SegmentRelation:AD, SegmentRelation:CD, EqualityRelation{CD=\$(2^{(1/2)})\$}, EqualityRelation{AD=\$(26^{(1/2)})\$}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]\$\angle BDC\$)}

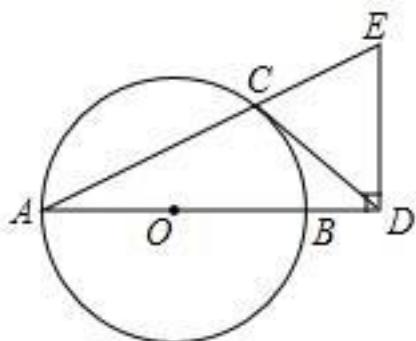
596、topic: 如图(1),AB||CD,P为定点,E,F分别是AB,CD上的动点.?(1)求证:\$\angle EPF=\angle BEP+\angle PFD\$;(2)若M为CD上一点,如图(2),\$\angle FMN=\angle BEP\$,且MN交PF于点N.试说明\$\angle EPF\$与\$\angle PNM\$的关系,并证明你的结论;(3)移动E,F使得\$\angle EPF=90^\circ\$,如图(3),作\$\angle PEG=\angle BEP\$,求\$\angle AEG\$与\$\angle PFD\$度数的比值.



graph:
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NLP: LineParallelRelation [iLine1=AB, iLine2=CD], PointRelation:P, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, PointOnLineRelation{point=M, line=CD, isConstant=false, extension=false}, EqualityRelation{ $\angle FMN = \angle BEP$ }, LineCrossRelation [crossPoint=Optional.of(N), iLine1=MN, iLine2=PF], JudgeTwoAnglesConnectRelation{ [$\angle EPN, \angle MNP$]}, PointRelation:F, EqualityRelation{ $\angle EPN = (1/2\pi)$ }, 求值(大小): (ExpressRelation:[key:]($\angle AEG / \angle MFN$)), ProveConclusionRelation:[证明: EqualityRelation{ $\angle EPN = \angle BEP + \angle MFN$ }], ProveConclusionRelation:[证明: JudgeTwoAnglesConnectRelation{ [$\angle EPN, \angle MNP$] }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]($\angle AEG / \angle MFN$)))}

597、topic: 如图,AB是 $\odot O$ 的直径,CD与 $\odot O$ 相切于点C,与AB的延长线交于点D,\$DE \perp AD\$且与AC的延长线交于点E.?#%(1)求证:\$DC=DE\$;?#%(2)若\$\tan \angle CAB=\frac{1}{2}\$,\$AB=3\$,求BD的长.

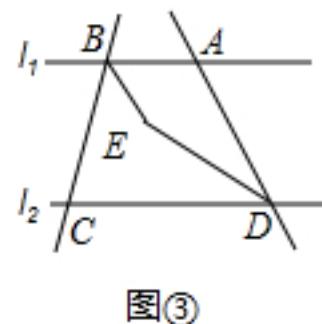
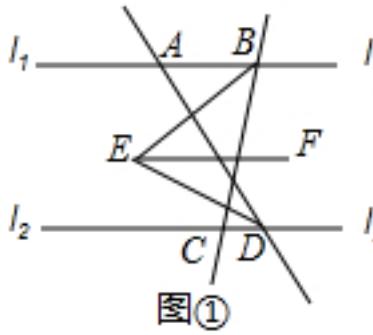


graph:
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NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LineContactCircleRelation{line=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(C), outpoint=Optional.of(D)}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=CD,

iLine2=AB], LinePerpRelation{line1=DE, line2=AD, crossPoint=D}, LineCrossRelation
 [crossPoint=Optional.of(E), iLine1=DE,
 iLine2=AC], EqualityRelation{BD=v_0}, EqualityRelation{tan(∠CAO)=(1/2)}, EqualityRelation{AB=3}, 求
 值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
 EqualityRelation{CD=DE}], SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]BD)}

598、topic: 已知直线 $\{l\}_1 \parallel \{l\}_2$, 点A是 $\{l\}_1$ 上的动点, 点B在 $\{l\}_1$ 上, 点C、D在 $\{l\}_2$ 上, $\angle ABC, \angle ADC$ 的平分线交于点E(不与点B,D重合). #%(1)若点A在点B的左
 侧, $\angle ABC=80^\circ, \angle ADC=50^\circ$, 过点E作 $EF \parallel \{l\}_1$, 如图①所示, 求 $\angle BED$ 的度数. #%(2)若点A在点B的左
 侧, $\angle ABC=\alpha^\circ, \angle ADC=50^\circ$, 如图②所示, 求 $\angle BED$ 的度数; #%(3)若点A在点B的右侧, $\angle ABC=\alpha^\circ, \angle ADC=50^\circ$,
 如图③所示, 求 $\angle BED$ 的度数. #%#



graph:

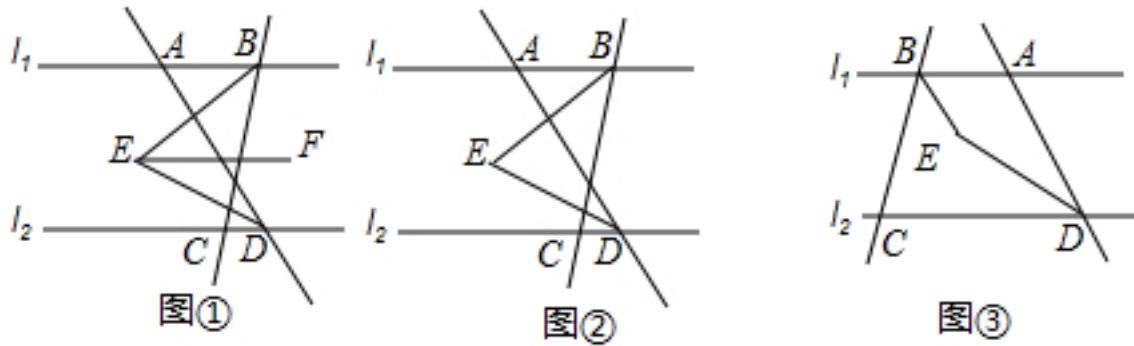
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```

NLP: AngleBisectorRelation{line=BE, angle=∠ABC, angle1=∠ABE, angle2=∠CBE}, AngleBisectorRelation{line=DE, angle=∠ADC, angle1=∠ADE, angle2=∠CDE}, PointRelation:B, PointRelation:D, LineParallelRelation [iLine1=StraightLine[l_1] analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false, iLine2=StraightLine[l_2] analytic :y=k_l_2*x+b_l_2 slope:null b:null isLinearFunction:false], PointOnLineRelation{point=A, line=StraightLine[l_1] analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=B, line=StraightLine[l_1] analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=C, line=StraightLine[l_2] analytic :y=k_l_2*x+b_l_2 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=D, line=N_1M_2, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=N_3M_4, isConstant=false, extension=false}, PositionRelation [A在B的左

方],EqualityRelation{ $\angle ABC = (4/9 * \pi)$ },EqualityRelation{ $\angle ADC = (5/18 * \pi)$ },LineParallelRelation [iLine1=EF, iLine2=AB],PointOnLineRelation{point=E, line=EF, isConstant=false, extension=false},求角的大小: AngleRelation{angle= $\angle BED$ },PositionRelation [A在B的左
方],EqualityRelation{ $\angle ABC = 1/180 * \alpha * \pi$ },EqualityRelation{ $\angle ADC = (5/18 * \pi)$ },求角的大小:
AngleRelation{angle= $\angle BED$ },PositionRelation [A在B的右
方],EqualityRelation{ $\angle ABC = 1/180 * \alpha * \pi$ },EqualityRelation{ $\angle ADC = (5/18 * \pi)$ },求角的大小:
AngleRelation{angle= $\angle BED$ },SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle BED$)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle BED$)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle BED$)}

599、topic: 已知直线 $\{l\}_1$ 平行于直线 $\{l\}_2$,点A是 $\{l\}_1$ 上的动点,点B在 $\{l\}_1$ 上,点C、D在 $\{l\}_2$ 上, $\angle ABC, \angle ADC$ 的平分线交于点E(不与点B,D重合).#%#(1)若点A在点B的左侧, $\angle ABC=80^\circ, \angle ADC=60^\circ$,过点E作 $EF \parallel \{l\}_1$,如图①所示,求 $\angle BED$ 的度数.#%#(2)若点A在点B的左侧, $\angle ABC=\alpha^\circ, \angle ADC=60^\circ$,如图②所示,求 $\angle BED$ 的度数(直接写出计算的结果,用含 α 的式子表示);#%#(3)若点A在点B的右侧, $\angle ABC=\alpha^\circ, \angle ADC=60^\circ$,如图③所示,求 $\angle BED$ 的度数(用含 α 的式子表示).#%#



```

graph:
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```

```

NLP: AngleBisectorRelation{line=BE,angle=∠ABC, angle1=∠ABE,
angle2=∠CBE},AngleBisectorRelation{line=DE,angle=∠ADC, angle1=∠ADE,
angle2=∠CDE},PointRelation:B,PointRelation:D,LineParallelRelation [iLine1=StraightLine[l_1]
analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false, iLine2=StraightLine[l_2]
analytic :y=k_l_2*x+b_l_2 slope:null b:null isLinearFunction:false],PointOnLineRelation{point=A,
line=StraightLine[l_1] analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false,
isConstant=false, extension=false},PointOnLineRelation{point=B, line=StraightLine[l_1]}

```

```

analytic :y=k_l_1*x+b_l_1 slope:null b:null isLinearFunction:false, isConstant=false,
extension=false},PointOnLineRelation{point=C, line=StraightLine[l_2] analytic :y=k_l_2*x+b_l_2
slope:null b:null isLinearFunction:false, isConstant=false,
extension=false},PointOnLineRelation{point=D, line=N_1M_2, isConstant=false,
extension=false},PointOnLineRelation{point=E, line=N_3M_4, isConstant=false,
extension=false},PositionRelation [A在B的左
方],EqualityRelation{∠ABC=(4/9*Pi)},EqualityRelation{∠ADC=(1/3*Pi)},LineParallelRelation
[iLine1=EF, iLine2=AB],PointOnLineRelation{point=E, line=EF, isConstant=false, extension=false},求
角的大小: AngleRelation{angle=∠BED},PositionRelation [A在B的左
方],EqualityRelation{∠ABC=1/180*α*Pi},EqualityRelation{∠ADC=(1/3*Pi)},求角的大小:
AngleRelation{angle=∠BED},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]∠BED)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]∠BED)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]∠BED)}

```

600、topic: 如图,已知: $\odot O$ 上两个定点A,B和两个动点C,D,AC与BD交于点E. #%(1)如图1,求证
 $EA \cdot EC = EB \cdot ED$; #%(2)如图2,若 $\widehat{AB} = \widehat{BC}$,AD是 $\odot O$ 的直径,求
证: $AD \cdot AC = 2BD \cdot BC$; #%(3)如图3,若 $AC \perp BD$,点O到AD的距离为2,求BC的长. #%#

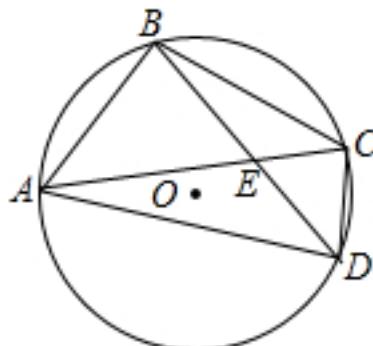


图1

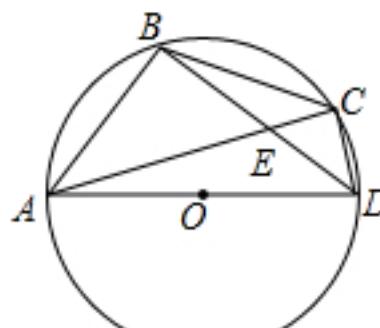


图2

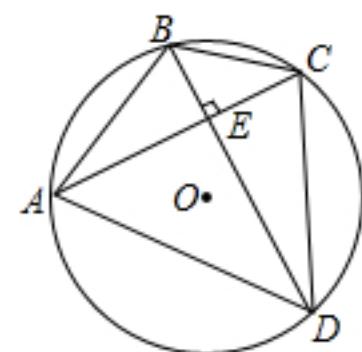


图3

```

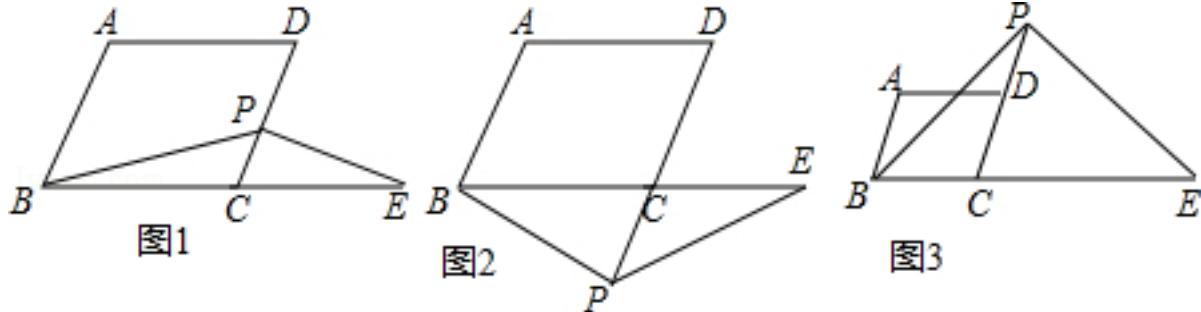
graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000052580_Q_1.jpg", "coordinates": {"A": "-9.00,0.00", "B": "-7.97,1.75", "C": "-5.19, 0.85", "D": "-5.19,-0.85", "E": "-6.65,0.52", "O": "-7.00,0.00"}, "collineations": {"0": "B##C", "1": "B##A", "2": "C##E##A", "3": "D##E##B", "4": "D##C", "5": "A##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000052580_Q_2.jpg", "coordinates": {"A": "-3.00,0.00", "B": "-1.54,1.93", "C": "0.71,1.04", "D": "1.00,0.00", "E": "-0.08,0.82", "O": "-1.00,0.00"}, "collineations": {"0": "B##A", "1": "C##E##A", "2": "D##E##B", "3": "D##C", "4": "B##C", "5": "A##O##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000052580_Q_3.jpg", "coordinates": {"A": "2.00,0.00", "B": "2.96,1.71", "C": "4.57,1.92", "D": "5.37,-1.46", "E": "3.43,1.09", "O": "4.00,0.00"}, "collineations": {"0": "B##A", "1": "C##E##A", "2": "D##E##B", "3": "D##C", "4": "B##C", "5": "A##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}], "appliedproblems": {}}

```

NLP: PointRelation:D,LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD],(ExpressRelation:[key:]1),(ExpressRelation:[key:]2),EqualityRelation{⌒AB=⌒BC},DiameterRelation{diameter=AD, circle=Circle[O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}},

length=null}, EqualityRelation{BC=v_0}, (ExpressRelation:[key:]3), LinePerpRelation{line1=AC, line2=BD, crossPoint=E}, PointToLineDistanceRelation{point=O, line=AD, distance=Express:[2]}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{AE*CE=BE*DE}], ProveConclusionRelation:[证明: EqualityRelation{AD*AC=2*BD*BC}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}

601、topic: 已知平行四边形ABCD中, $\angle A=120^\circ$,点P为边DC所在直线上一点,点E为边BC所在直线上一点,且 $PB=PE$.#%#(1)当点P在DC边上时(如图1),求证: $CE-PC=AD$;#%#(2)当点P在DC延长线上时(如图2), PC,CE 与 AD 又有怎样的数量关系?请写出你的猜想,并证明;#%#(3)当点P在CD延长线上时(如图3), PC,CE 与 AD 又有怎样的数量关系?请写出你的猜想,并证明.#%#



graph:

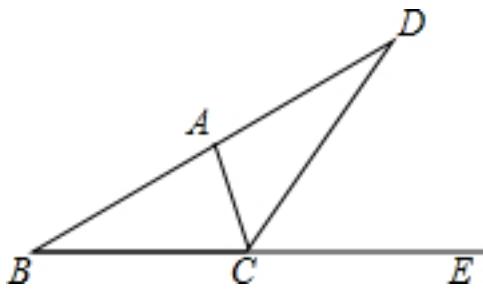
```

{"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000040612_Q_1.jpg", "coordinates": {"A": "1.10,1.90", "B": "0.00,0.00", "C": "2.90,0.00", "D": "4.09,1.89", "E": "6.77,0.00", "P": "3.38,0.68"}, "collineations": {"0": "A##B", "1": "B##C##E", "2": "C##P##D", "3": "D##A", "4": "P##B", "5": "P##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000040612_Q_1.jpg", "coordinates": {"A": "1.12,-2.00", "B": "0.00,-3.94", "C": "2.99,-3.94", "D": "4.11,-2.00", "E": "4.60,-3.94", "P": "2.30,-5.13"}, "collineations": {"0": "A##B", "1": "B##C##E", "2": "P##C##D", "3": "D##A", "4": "P##B", "5": "P##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000040612_Q_1.jpg", "coordinates": {"A": "2.07,-8.09", "B": "0.95,-10.03", "C": "3.68,-10.03", "D": "4.79,-8.09", "E": "10.08,-10.03", "P": "5.52,-6.84"}, "collineations": {"0": "A##B", "1": "B##C##E", "2": "C##D##P", "3": "D##A", "4": "P##B", "5": "P##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]
  
```

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{ $\angle BAD=(2/3\pi)$ }, PointOnLineRelation{point=P, line=DC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{BP=EP}, 求值(大小): (ExpressRelation:[key:](CE/AD)), 求值(大小): (ExpressRelation:[key:](CE/AD)), ProveConclusionRelation:[证明: EqualityRelation{CE-CP=AD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](CE/AD))}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](CE/AD))}

602、topic: 如图,D是 $\triangle ABC$ 中 $\angle ACB$ 的外角平分线与BA延长线的交点.#%#求证: $\angle BAC > \angle B$ #%#

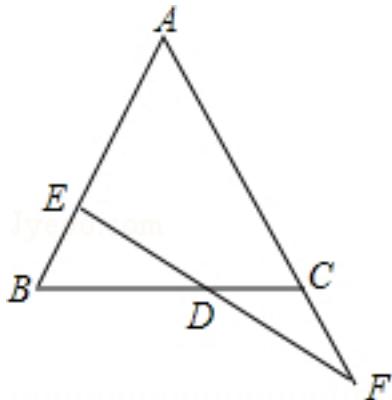


graph:

{"stem": {"pictures": [{"picturename": "1000082702_Q_1.jpg", "coordinates": {"A": "-3.86,1.85", "B": "-5.48,0.64", "C": "-3.31,0.65", "D": "-1.31,3.77", "E": "0.16,0.66"}, "collineations": {"0": "B###A##D", "1": "B##C##E", "2": "D##C", "3": "A##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: ProveConclusionRelation:[证明: InequalityRelation{ $\angle BAC > \angle ABC$ }]

603、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, EF 交 AB 于 E ,交 AC 的延长线于 F ,且 $BE=CF$,求证: $DE=DF$ #%#



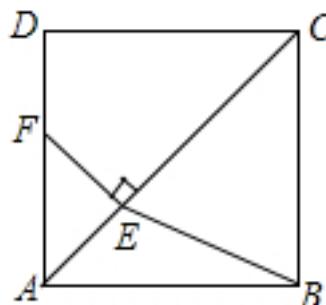
graph:

{"stem": {"pictures": [{"picturename": "1000040369_Q_1.jpg", "coordinates": {"A": "-2.81,2.75", "B": "-6.56,0.58", "C": "-1.56,0.58", "D": "-2.81,0.58"}, "collineations": {"0": "A##C", "1": "A##D", "2": "A##B", "3": "C##D##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

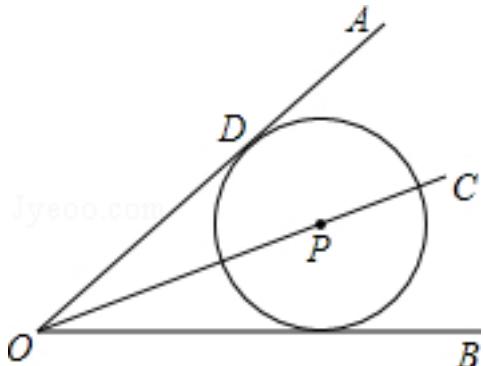
TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=AC$ }, EqualityRelation{ $BE=CF$ }, ProveConclusionRelation:[证明: EqualityRelation{ $DE=DF$ }]

604、topic: 如图,在正方形ABCD中,点E是对角线AC上一点,且 $CE=CD$,过点E作 $EF \perp AC$ 交AD于点F,连接BE.(1)求证: $DF=AE$;(2)当 $AB=2$ 时,求 $B\{E\}^2$ 的值.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000034725_Q_1.jpg", "coordinates": {"A": "1.00,0.00", "B": "5.00,0.00", "C": "5.00,4.00", "D": "1.00,4.00", "E": "2.17,1.17", "F": "1.00,2.34"}, "collineations": {"0": "B###A", "1": "B###C", "2": "B###E", "3": "C###D", "4": "A###F###D", "5": "A###E###C", "6": "F###E"}, "variable-equals": {}, "circles": "[]"}, "appliedproblems": "[]", "substems": "[]"}}

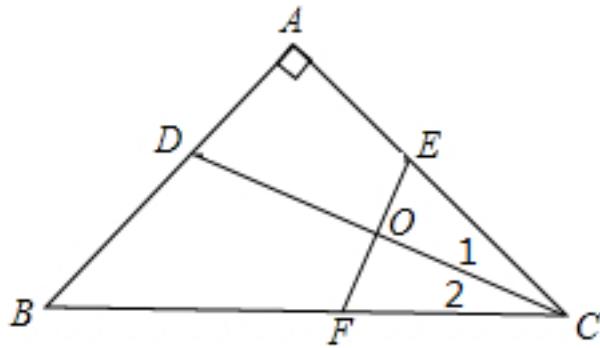
NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, EqualityRelation{CE=CD}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=AD], LinePerpRelation{line1=EF, line2=AC, crossPoint=E}, SegmentRelation:BE, EqualityRelation{AB=2}, 求值(大小): (ExpressRelation:[key:](BE)^2), ProveConclusionRelation:[证明: EqualityRelation{DF=AE}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](BE)^2)}

605、topic: 如图,已知:OC平分 $\angle AOB$,P是OC上任意一点, $\odot P$ 与OA相切于点D.求证:OB与 $\odot P$ 相切.


graph:
 {"stem": {"pictures": [{"picturename": "1000040840_Q_1.jpg", "coordinates": {"O": "-4.47,-1.61", "P": "0.00,0.00", "A": "0.60,2.60", "B": "2.70,-1.61", "C": "2.59,0.95", "D": "-1.03,1.24"}, "collineations": {"0": "A###D##O", "1": "O###B", "2": "O###P###C"}, "variable>equals": {}, "circles": [{"center": "P", "pointincircle": "D"}], "appliedproblems": "[]", "substems": "[]"}}

NLP: AngleBisectorRelation{line=OC, angle= $\angle BOD$, angle1= $\angle BOC$, angle2= $\angle COD$ }, PointOnLineRelation{point=P, line=OC, isConstant=false, extension=false}, LineContactCircleRelation{line=OA, circle=Circle[$\odot P$]{center=P, analytic=(x-x_P)^2+(y-y_P)^2=r_P^2}, contactPoint=Optional.of(D), outpoint=Optional.absent()}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=OB, circle=Circle[$\odot P$]{center=P, analytic=(x-x_P)^2+(y-y_P)^2=r_P^2}, contactPoint=Optional.absent(), outpoint=Optional.absent()}]

606、topic: 如图, $\triangle ABC$ 中, $\angle A=90^\circ$, $AB=AC$,D、E、F分别在AB、AC、BC上,且AD=AE,CD为EF的中垂线,求证: $BF=2AD$.

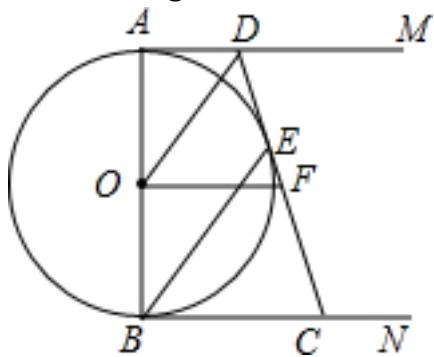
graph:

```
{"stem": {"pictures": [{"picturename": "1000030994_Q_1.jpg", "coordinates": {"A": "-8.00,7.00", "B": "-11.0,4.00", "C": "-5.00,4.00", "D": "-9.24,5.76", "E": "-6.40,5.40", "F": "-6.98,4.00", "O": "-6.69,4.70"}, "collineations": {"0": "A###D##B", "1": "A###E##C", "2": "D##O##C", "3": "E##O##F", "4": "E##O##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle DAE = (1/2\pi)$ }, EqualityRelation{ $AB = AC$ }, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false}, EqualityRelation{AD=AE}, MiddlePerpendicularRelation [iLine1=CD, iLine2=EF, crossPoint=Optional.of(O)], ProveConclusionRelation:[证明: EqualityRelation{BF=2*AD}]

607、topic: 如图,AB是 $\odot O$ 的直径,AM和BN是它的两条切线,DE切 $\odot O$ 于点E,交AM于点D,交BN于点C,F是CD的中点,连接OF.(1)求证:OD||BE;(2)猜想:OF与CD有何数量关系?并说明理由.



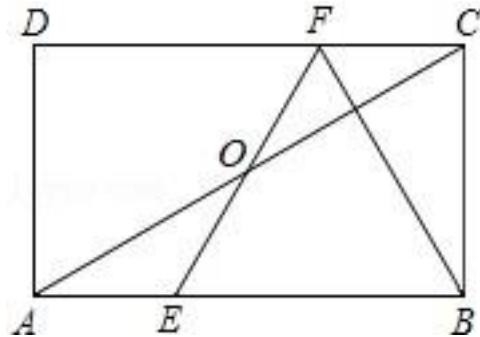
graph:

```
{"stem": {"pictures": [{"picturename": "1000081008_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "0.00,-3.00", "C": "4.11,-3.00", "D": "2.19,3.00", "E": "2.86,0.91", "O": "0.00,0.00", "F": "3.15,0.00", "M": "4.00,3.00", "N": "6.00,-3.00"}, "collineations": {"0": "A##O##B", "1": "A##D##M", "2": "D##E##F##C", "3": "B##C##N", "4": "B##E", "5": "O##F", "6": "O##D"}, "variable>equals": {}, "circles": [{"center": "O", "point": "incircle": "A##B##F##E"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, LineContactCircleRelation{line=DE, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(E), outpoint=Optional.of(D)}}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=DE, iLine2=AM], LineCrossRelation [crossPoint=Optional.of(C), iLine1=DE, iLine2=BN], MiddlePointOfSegmentRelation{middlePoint=F, segment=CD}, SegmentRelation:OF, 求值(大小): (ExpressRelation:[key:](FO/CD)), ProveConclusionRelation:[证明: LineParallelRelation]

[iLine1=OD, iLine2=BE]], SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:](FO/CD))}

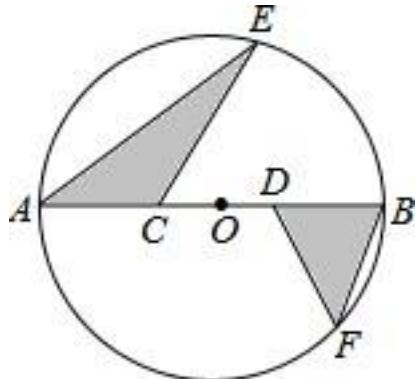
608、topic: 如图所示,在矩形\$ABCD\$中,E,F分别是边AB,CD上的点,\$AE=CF\$,连接EF,BF,EF与对角线AC交于点O,且\$BE=BF\$,\$\angle BEF=2\angle BAC\$.?(1)求证:\$OE=OF\$;?(2)若\$BC=2\sqrt{3}\$,求AB的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000026669_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.00,0.00", "C": "6.00,3.46", "D": "0.00,3.46", "E": "2.00,0.00", "F": "4.00,3.46", "O": "3.00,1.73"}, "collineations": {"0": "E###A##B", "1": "F##D##C", "2": "A##D", "3": "F##B", "4": "A##C##O", "5": "E##F##O", "6": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, EqualityRelation{AE=CF}, MultiPointCollinearRelation:[E, F], MultiPointCollinearRelation:[B, F], LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=EF], EqualityRelation{BE=BF}, EqualityRelation{\$\angle BEO=2*\angle EAO\$}, EqualityRelation{AB=v_0}, EqualityRelation{BC=2*(3^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{EO=FO}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)}

609、topic: 如图,半径为\$6cm\$的\$\odot O\$中,点C、D为直径AB的三等分点,点E、F分别在AB两侧的半圆上,\$\angle BCE=\angle BDF=60^\circ\$,连接AE、BF,求图中两个阴影部分的面积.

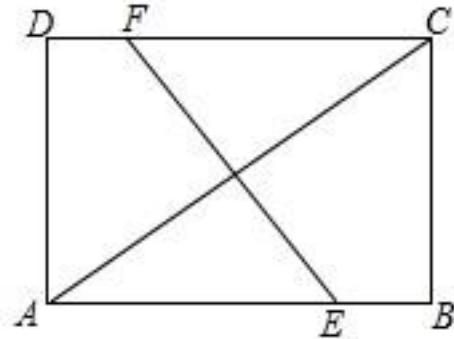


graph:
 {"stem": {"pictures": [{"picturename": "BD8262E1D9FF41A39988DD39C8529946.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-7.00,4.00", "C": "-11.00,4.00", "D": "-9.00,4.00", "E": "-9.31,6.92", "F": "-7.81,1.95", "O": "-10.00,4.00"}, "collineations": {"0": "B##C##O##D##A", "1": "E##A", "2": "C##E", "3": "B##F", "4": "D##F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##E##F"}]}, "app": {}}}

"liedproblems":{},"substems":[]}

NLP: DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, RadiusRelation{radius=null, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=Express:[6]}, SegmentAliquotsPointRelation{aliquotsNum='3', points=[C, D], segment=AB}, MultiEqualityRelation [multiExpressCompare= $\angle ECO=\angle BDF=(1/3\pi)$, originExpressRelationList=[], keyWord=null, result=null], SegmentRelation:AE, SegmentRelation:BF

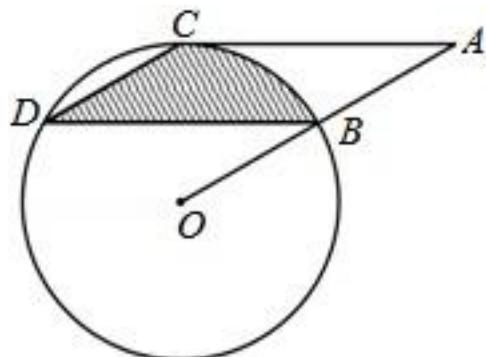
610、topic: 如图,在四边形\$ABCD\$中,\$BE=DF,AC\$和\$EF\$互相平分,\$\angle B=90^\circ\$.求证:
四边形\$ABCD\$为矩形.



graph:
{"stem": {"pictures": [{"picturename": "1000005477_Q_1.jpg", "coordinates": {"A": "-10.00, -1.46", "B": "2.66, 5.58", "C": "2.66, 5.58", "D": "-10.00, 5.58", "E": "-0.25, -1.46", "F": "-7.09, 5.58"}, "collineations": {"0": "A##B", "1": "D##F##C", "2": "A##D", "3": "C##B", "4": "A##C", "5": "E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}

NLP: 已知条件
QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{BE=DF}, LineDecileSegmentRelation [iLine1=AC, iLine2=EF, crossPoint=Optional.absent()], LineDecileSegmentRelation [iLine1=EF, iLine2=AC, crossPoint=Optional.absent()], EqualityRelation{ $\angle CBE=(1/2\pi)$ }, ProveConclusionRelation:[证明:
RectangleRelation{rectangle=Rectangle:ABCD}]

611、topic: 如图,点\$B\$、\$C\$、\$D\$都在\$\odot O\$上,过点\$C\$作\$AC\parallel BD\$交\$OB\$延长线于点\$A\$,连接\$CD\$,且
 $\angle CDB=\angle OBD=30^\circ$, $DB=\sqrt{3}cm$.
求证:\$AC\$是\$\odot O\$的切线;
求由弦\$CD\$、\$BD\$与弧\$BC\$所围成的阴影部分的面积(结果保留\$\pi\$) .

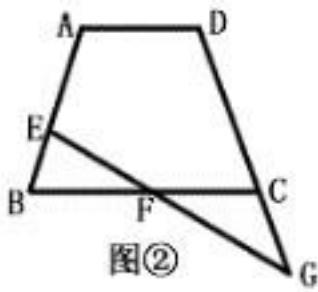
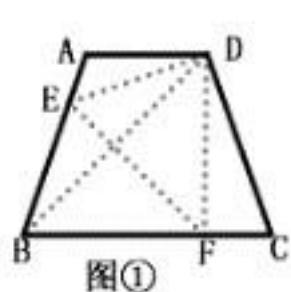


graph:

{"stem":{"pictures":[{"picturename":"1000008323_Q_1.jpg","coordinates":{"A":"10.42,6.00","B":"5.20,2.99","C":"0.00,6.00","D":"-5.20,2.99","O":"0.00,0.00"}, "collineations":{"0":"O###B##A","1":"D##C","2":"O##B##A","3":"B##D","4":"C##A"}, "variable>equals":{},"circles":[{"center":"O","pointincircle":"B##D##C"}]}],"appliedproblems":{},"substems":[]}}

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[B]}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[C]}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[D]}, PointOnLineRelation{point=C, line=AC, isConstant=false, extension=false}, LineParallelRelation[iLine1=AC, iLine2=BD], LineCrossRelation[crossPoint=Optional.of(A), iLine1=AC, iLine2=OB], SegmentRelation:CD, MultiEqualityRelation[multiExpressCompare= $\angle BDC = \angle DBO = (1/6\pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BD={3^(1/2)}}, ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, chordLength=null, straightLine=null}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=AC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(C), outpoint=Optional.of(A)}]

612、topic: 如图,在梯形ABCD中,已知AD||BC,\$AB=DC\$,E、F分别是AB和BC边上的点.#%#(1)如图①,以EF为对称轴翻折梯形ABCD,使点B与点D重合,且DF⊥BC.若\$AD=4\$,\$BC=8\$,求梯形ABCD的面积;#%#(2)如图②,连结EF并延长与DC的延长线交于点G,如果\$FG = k \cdot EF\$(k为正数),试猜想BE与CG有何数量关系?写出你的结论并证明之.



graph:

{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":1,"questionrelies":"","picture":{},"collineations":{},"variable>equals":{},"circles":{},"appliedproblems":{}}, {"substemid":2,"questionrelies":"","picture":{},"collineations":{},"variable>equals":{},"circles":{},"appliedproblems":{}}],"appliedproblems":{},"substems":[]}}

NLP: TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, LineParallelRelation[iLine1=AD, iLine2=BC], EqualityRelation{AB=CD}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false}, TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, EqualityRelation{S_ABCD=v_0}, SymmetricRelation{preData=B, afterData=D, symmetric=StraightLine[EF] analytic:y=k_EF*x+b_EF slope:null b:null isLinearFunction:false, pivot=}, TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, LinePerpRelation{line1=DF, line2=BC, crossPoint=F}, EqualityRelation{AD=4}, EqualityRelation{BC=8}, 求值(大小):

(ExpressRelation:[key:]v_0),AtomAttributeRelation{atomAttribute=AtomAttribute{atomExpr=Expressions:[k], numberType=POSITIVE}},LineCrossRelation [crossPoint=Optional.of(G), iLine1=EF, iLine2=DC],EqualityRelation{FG=k*EF},求值(大小):
 (ExpressRelation:[key:](BE/CB)),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]S_ABCD)},SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:](BE/CB))

613、topic: 如图,在 $\triangle ABC$ 和 $\triangle ADE$ 中, $AB=AC, AD=AE, \angle BAC+\angle EAD=180^\circ$, $\triangle ABC$ 不动, $\triangle ADE$ 绕点A旋转,连接BE、CD,F为BE的中点,连接AF.
 #%(1)如图1,当 $\angle BAE=90^\circ$ 时,求证: $CD=2AF$;
 #%(2)当 $\angle BAE\neq 90^\circ$ 时,(1)的结论是否成立?请结合图2说明理由.#%#

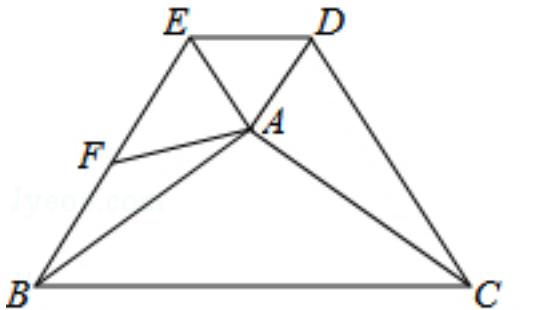


图1

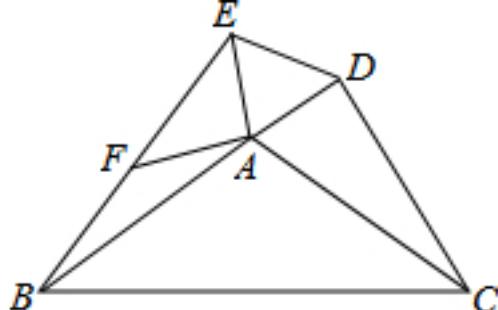


图2

graph:
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NLP:
 TriangleRelation: $\triangle ABC$,TriangleRelation: $\triangle ADE$,EqualityRelation{AB=AC},EqualityRelation{AD=AE},EqualityRelation{ $\angle BAC+\angle DAE=(\pi)$ },TriangleRelation: $\triangle ABC$,SegmentRelation:BE,SegmentRelation:CD,MiddlePointOfSegmentRelation{middlePoint=F,segment=BE},SegmentRelation:AF,(ExpressRelation:[key:]1),EqualityRelation{ $\angle BAE=(1/2\pi)$ },ProveConclusionRelation:[证明:
 EqualityRelation{CD=2*AF}]

614、topic: 已知在 $\triangle ABC$ 中, $\angle ABC=90^\circ, AB=3, BC=4$.点Q是线段AC上的一个动点,过点Q作AC的垂线交线段AB(如图1)或线段AB的延长线(如图2)于点P.#%#(1)当点P在线段AB上时,求证: $\triangle AQP \sim \triangle ABC$;
 #%(2)当 $\triangle PQB$ 为等腰三角形时,求AP的长.#%#

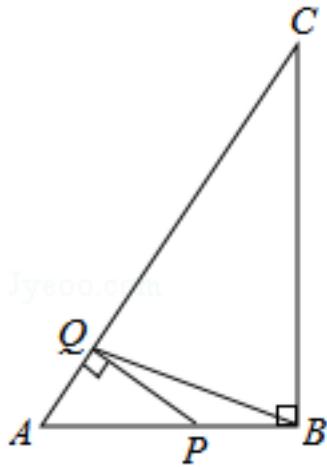


图1

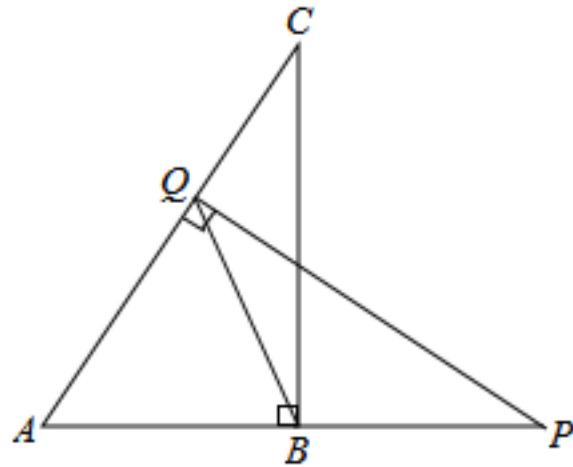
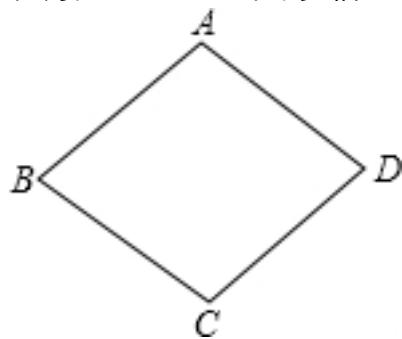


图2

```
graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "CB05C072A6D843DABEC0846289C37120.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-11.00,3.00", "C": "-11.00,7.00", "P": "-12.29,3.00", "Q": "-13.38,3.82"}, "collineations": {"0": "B##P###A", "1": "B##C", "2": "A##C##Q", "3": "B##Q", "4": "P##Q"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}
```

NLP: LinePerpRelation{line1=PQ, line2=AC, crossPoint=Q}, TriangleRelation:△ABC, EqualityRelation{∠CBP=(1/2*Pi)}, EqualityRelation{AB=3}, EqualityRelation{BC=4}, PointOnLineRelation{point=Q, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=P, line=AB, isConstant=false, extension=false}, EqualityRelation{AP=v_1}, IsoscelesTriangleRelation:IsoscelesTriangle:△PQB[Option al.of(P)], 求值(大小): (ExpressRelation:[key:]v_1), ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA=△AQP, triangleB=△ABC}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AP)}

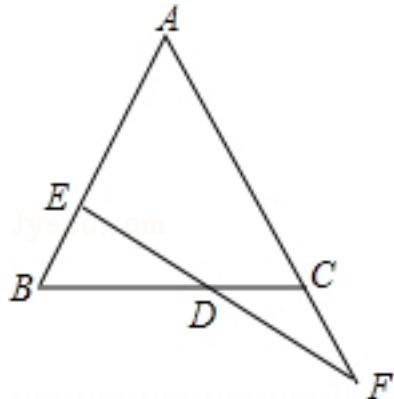
615、topic: 如图,已知菱形ABCD,画一个矩形,使得A,B,C,D四点分别在矩形的四条边上,且矩形的面积为菱形ABCD面积的2倍.%#



```
graph:
{"stem": {"pictures": [{"picturename": "1000050583_Q_1.jpg", "coordinates": {"A": "-5.00,6.00", "B": "-7.60,4.00", "C": "-5.00,2.00", "D": "-2.40,4.00"}}, "collineations": {"0": "A##B", "1": "A##D", "2": "B##C", "3": "C##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "subsystems": []}
```

NLP:
RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{S_ABCD=v_0}, RhombusRelation{rhombus=Rhombus:ABCD}, PointRelation:A, PointRelation:B, PointRelation:C

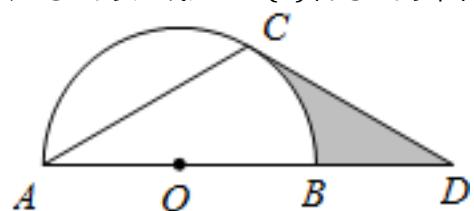
616、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, EF 交 AB 于 E ,交 AC 的延长线于 F ,且 $BE=CF$,求证: $DE=DF$ #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040369_Q_1.jpg", "coordinates": {"A": "-2.81,2.75", "B": "-6.56,0.58", "C": "-1.56,0.58", "D": "-2.81,0.58"}, "collineations": {"0": "A##C", "1": "A##D", "2": "A##B", "3": "C##B"}, "variable>equals": {}, "circles": {}, "appliedproblems": {}, "subsystems": []}]}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=AC$ }, EqualityRelation{ $BE=CF$ }, ProveConclusionRelation:
 [证明: EqualityRelation{ $DE=DF$ }]

617、topic: 如图,点D在 $\odot O$ 的直径AB的延长线上,点C在 $\odot O$ 上, $AC=CD$, $\angle ACD=120^\circ$.#%#(1)求证: CD 是 $\odot O$ 的切线;#%#(2)若 $\odot O$ 的半径为2,求图中阴影部分的面积.#%#

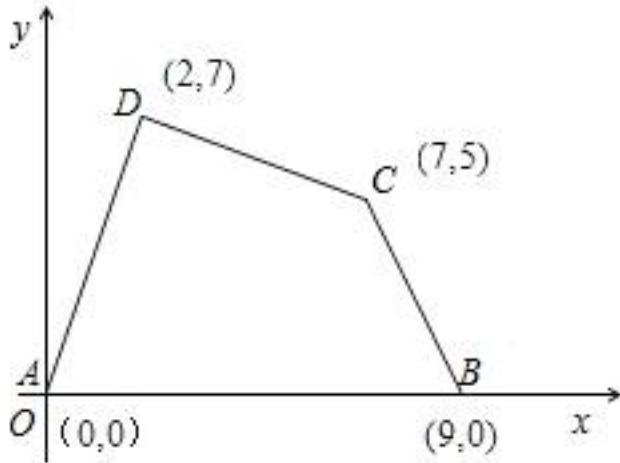


graph:
 {"stem": {"pictures": [{"picturename": "1000060797_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "3.00,1.73", "D": "6.06,0.00", "O": "2.00,0.00"}, "collineations": {"0": "A##O##D", "1": "D##C", "2": "C##A"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##C##B"}], "appliedproblems": {}, "subsystems": []}]}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, points=[C]}, EqualityRelation{AC=CD}, EqualityRelation{ $\angle ACD=(2/3\pi)$ }, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=Express:[2]}}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=CD, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, contactPoint=Optional.of(C), outpoint=Optional.of(D)}]}

618、topic: 如图,在直角坐标系中,四边形\$ABCD\$各顶点的坐标分别为\$A(0,0)\$ \$、\$B(9,0)\$ \$、\$C(7,5)

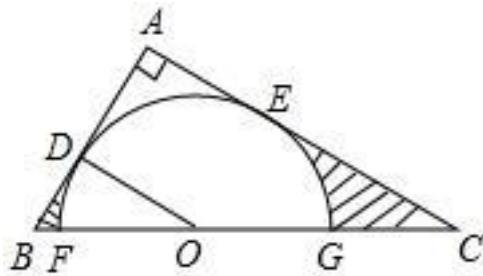
\$、\$D(2,7)\$,求四边形\$ABCD\$的面积.



graph:
 {"stem": {"pictures": [{"picturename": "1000024452_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "9.00,0.00", "C": "7.00,5.00", "D": "2.00,7.00"}, "collineations": {"0": "B###A", "1": "C###B", "2": "D###A", "3": "C##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{S_ABCD=v_0}, CoorSysTypeRelation [name=xOy, types=直角坐标系], 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, PointRelation:A(0,0), PointRelation:B(9,0), PointRelation:C(7,5), PointRelation:D(2,7), 求值(大小):
 (ExpressRelation:[key]:v_0), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key]:S_ABCD)}

619、topic: 如图,在\$Rt\triangle ABC\$中,\$\angle A=90^\circ\$,O是BC边上一点,以O为圆心的半圆与AB边相切于点D,与AC、BC边分别交于点E、F、G,连接OD,已知\$BD=2\$,\$AE=3\$,\$\tan \angle BOD=\frac{2}{3}\$.?(1)求\$\odot O\$的半径OD;?(2)求证:AE是\$\odot O\$的切线;?(3)求图中两部分阴影面积的和.

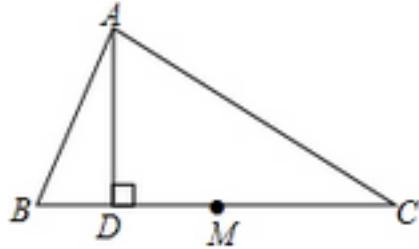


graph:
 {"stem": {"pictures": [{"picturename": "1000025058.jpg", "coordinates": {"A": "3.46,2.00", "B": "-1.73,1.00", "C": "0.00,2.00", "D": "1.73,1.00", "O": "0.00,0.00"}, "collineations": {"0": "B###C", "1": "B###D", "2": "A##C", "3": "A##D##O"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C##D##B"}]}, {"text": "analytic=(x-x_O)^2+(y-y_O)^2=r_O^2"}], "appliedproblems": {}, "substems": []}}

NLP: CircleCenterRelation{point=O, conic=Circle[\$\odot\$O]}{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, RightTriangleRelation:RightTriangle:\$\triangle ABC\$[Optional.of(C)], EqualityRelation{\$\angle CAD=(1/2*\pi)\$}, PointOnLineRelation{point=O, line=BC, isConstant=false, extension=false}, LineContactCircleRelation{line=AB, circle=Circle[\$\odot\$O]}{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, contactPoint=Optional.of(D),

outpoint=Optional.absent(), SegmentRelation:AB, PointRelation:F, PointRelation:G, SegmentRelation:O
 D, EqualityRelation{BD=2}, EqualityRelation{AE=3}, EqualityRelation{tan($\angle BOD$)=(2/3)}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=AE, circle=Circle[$\odot O$]}{center=O, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.absent(), outpoint=Optional.absent()]}

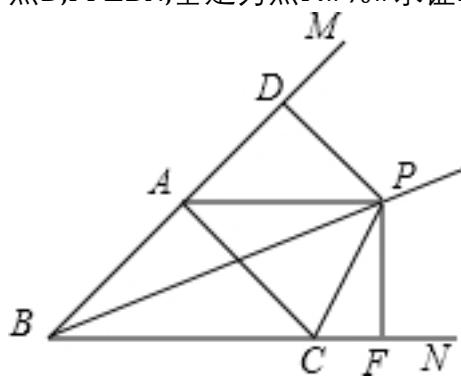
620、topic: 如图,在三角形ABC中, $\angle B = 2\angle C$, AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040694_Q_1.jpg", "coordinates": {"A": "-9.03,4.35", "B": "-11.0", "C": "-4.00,2.00", "D": "-9.03,2.00", "M": "-7.50,2.00"}, "collineations": {"0": "A##D", "1": "A##B", "2": "A##C", "3": "B##D##M##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABD = 2 * \angle ACM$ }, MiddlePointOfSegmentRelation{middlePoint=M, segment=BC}, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{ $DM = (1/2) * AB$ }]

621、topic: 如图,PA,PC分别是 $\triangle ABC$ 外角 $\angle MAC$ 与 $\angle NCA$ 的平分线,它们交于点P,且 $PD \perp BM$,垂足为点D, $PF \perp BN$,垂足为点F. #%#求证:BP为 $\angle MBN$ 的平分线.#%#

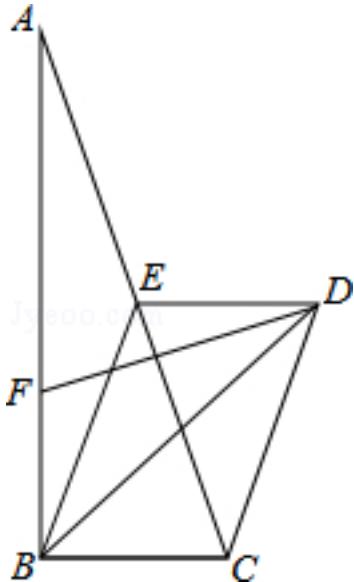


graph:
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NLP: AngleBisectorRelation{line=PA, angle= $\angle CAD$, angle1= $\angle CAP$, angle2= $\angle DAP$ }, AngleBisectorRelation{line=PC, angle= $\angle ACF$, angle1= $\angle ACP$, angle2= $\angle FCP$ }, ExternalAngleOfTriangleRelation: $\angle CAD / \triangle ABC$, ExternalAngleOfTriangleRelation: $\angle ACF / \triangle ABC$, LinePerpRelation{line1=PD, line2=BM, crossPoint=D}, LinePerpRelation{line1=PF, line2=BN, crossPoint=F}

crossPoint=F},ProveConclusionRelation:[证明: AngleBisectorRelation{line=BP,angle=∠ABC, angle1=∠ABP, angle2=∠CBP}]

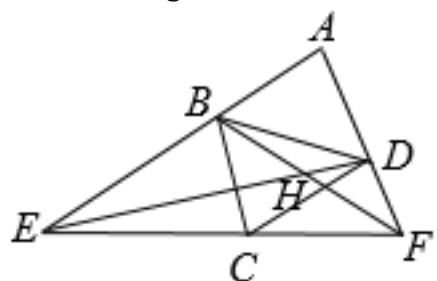
622、topic: 如图,△ABC是直角三角形,且∠ABC=90°,四边形BCDE是平行四边形,E为AC的中点,BD平分∠ABC,点F在AB上,且BF=BC.求证:(1)DF=AE;(2)DF⊥AC.



graph:
 {"stem": {"pictures": [{"picturename": "1000031848_Q_1.jpg", "coordinates": {"A": "-7.00,11.00", "B": "-7.0 0,2.00", "C": "-4.00,2.00", "D": "-2.50,6.50", "E": "-5.50,6.50", "F": "-7.00,5.00"}, "collineations": {"0": "A###F", "1": "A###E##C", "2": "B##C", "3": "B##E", "4": "E##D", "5": "D##C", "6": "B##D", "7": "F##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
 RightTriangleRelation:RightTriangle:△ABC[Optional.of(B)],EqualityRelation{∠CBF=(1/2*Pi)},Parallel ogramRelation{parallelogram=Parallelogram:BCDE},MiddlePointOfSegmentRelation{middlePoint=E,segment=AC},AngleBisectorRelation{line=BD,angle=∠CBF, angle1=∠CBD, angle2=∠DBF},PointOnLineRelation{point=F, line=AB, isConstant=false, extension=false},EqualityRelation{BF=BC},ProveConclusionRelation:[证明: EqualityRelation{DF=AE}],ProveConclusionRelation:[证明: LinePerpRelation{line1=DF, line2=AC, crossPoint=}]]

623、topic: 已知:如图,四边形ABCD是菱形,∠A=60°,直线EF经过点C,分别交AB、AD的延长线于E、F两点,连接ED、FB相交于点H.#%#(1)如果菱形的边长是3,DF=2,求BE的长;#%#(2)除△AEF外,△BEC与图中哪一个三角形相似,找出来并证明;#%#(3)请说明\$ {{ B D}^2}=DH\cdot DE\$的理由.#%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000040745_Q_1.jpg", "coordinates": {"A": "3.89,1.85", "B": "2.43,0.49", "C": "2.88,-1.46", "D": "4.34,-0.10", "E": "0.23,-1.57", "F": "4.65,-1.39", "H": "3.48,-0.41"}, "collineations": {"0": "A###B###E", "1": "E###C###F", "2": "F###D###A", "3": "B###C", "4": "C###D", "5": "B###D", "6": "B###H###F", "7": "D###H###E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

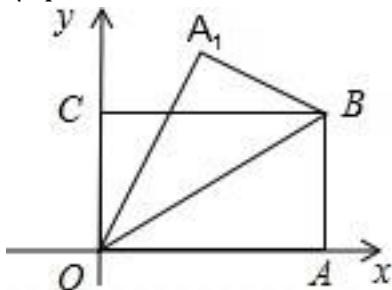
NLP:

RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{ $\angle BAD = (1/3\pi)$ }, PointOnLineRelation {point=C, line=EF, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=AD], LineCrossRelation [crossPoint=Optional.of(H), iLine1=ED, iLine2=FB], EqualityRelation{BE=v_0}, RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{AB=3}, EqualityRelation{DF=2}, 求值(大小):

(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]BE)}, ProveConclusionRelation:[证明: EqualityRelation{((BD)^2)=DH*DE}]

624、topic: 如图,在直角坐标系中,将矩形\$OABC\$沿\$OB\$对折,使点A落在点\$A_1\$处,已知\$OA = \sqrt{3}\$,\$AB=1\$,求点\$A_1\$的坐标.



graph:

```
{"stem": {"pictures": [{"picturename": "1000007569_Q_1.jpg", "coordinates": {"A": "1.73,0.00", "B": "1.73,1.00", "C": "0.00,1.00", "O": "0.00,0.00", "A_1": "0.87,1.50"}, "collineations": {"0": "O###A_1", "1": "B##O", "2": "B###C", "3": "A###B", "4": "A_1###B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: CoorSysTypeRelation [name=xOy, types=直角坐标系], SymmetricRelation{preData=A, afterData=A_1, symmetric=StraightLine[BO] analytic:y=k_OB*x+b_OB slope:null b:null isLinearFunction:false, pivot=}, RectangleRelation{rectangle=Rectangle:OABC}, EqualityRelation{AO=(3^(1/2))}, EqualityRelation{AB=1}, 坐标PointRelation:A_1, SolutionConclusionRelation{relation=坐标PointRelation:A_1}

625、topic: \$O\$的半径为8cm,锐角\$\triangle ABC\$的三点均在\$O\$上,若\$BC=8\sqrt{3}\$cm\$,求\$\angle A\$的度数.

graph:

```
{"stem": {"pictures": [{"picturename": "1000035146_Q_1.jpg", "coordinates": {"A": "1.71,-3.61", "B": "-3.46,2.00", "C": "3.46,2.00", "O": "0.00,0.00"}, "collineations": {"0": "B###C", "1": "B###A", "2": "A###C", "3": "O#B", "4": "O###C"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C###B###A"}]}, "appliedproblems": {}, "substems": []}}
```

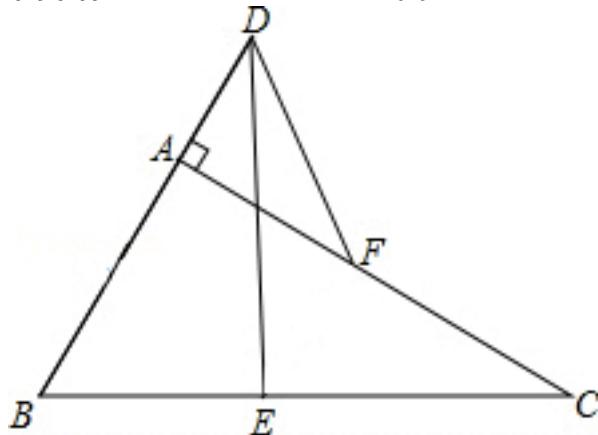
NLP: RadiusRelation{radius=null, circle=Circle[\$O\$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2},

```

length=Express:[8]},InscribedShapeOfCircleRelation{closedShape=AcuteTriangle:△ABC,
circle=Circle[○O]{center=O,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2},EqualityRelation{BC=8*(3^(1/2))},求角的大小:
AngleRelation{angle=∠BAC},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]∠BAC)}

```

626、topic: 如图,在Rt△ABC中,∠BAC=90°,E,F分别是BC,AC的中点,延长BA到点D,使\$AD=\frac{1}{2}AB\$.连接DE,DF.(1)求证:AF与DE互相平分;(2)若BC=4,求DF的长.



```

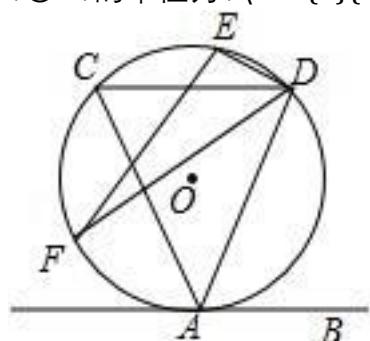
graph:
{"stem": {"pictures": [{"picturename": "1000041503_Q_1.jpg", "coordinates": {"A": "-6.59,5.49", "B": "-9.06,2.00", "C": "-1.65,2.00", "D": "-5.35,7.24", "E": "-5.35,2.00", "F": "-4.12,3.75"}, "collinearities": {"0": "D##A#B", "1": "D##E", "2": "D##F", "3": "A##F##C", "4": "B##E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}

```

NLP:

RightTriangleRelation:RightTriangle:△ABC[Optional.of(A)],EqualityRelation{∠BAF=(1/2*Pi)},MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},MiddlePointOfSegmentRelation{middlePoint=F,segment=AC},PointOnLineRelation{point=D, line=BA, isConstant=false, extension=true},EqualityRelation{AD=(1/2)*AB},SegmentRelation:DE,SegmentRelation:DF,EqualityRelation{DF=v_0},EqualityRelation{BC=4},求值(大小):
(ExpressRelation:[key:]v_0),ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=AF, iLine2=DE, crossPoint=Optional.absent()]],ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=DE, iLine2=AF, crossPoint=Optional.absent()]],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DF)}

627、topic: 如图,直线AB与\$○O\$相切于点A,弦\$CD||AB\$,E、F为圆上的两点,且\$∠CDE=∠ADF\$.若\$○O\$的半径为\$\frac{5}{2}\$,\$CD=4\$,求弦EF的长.

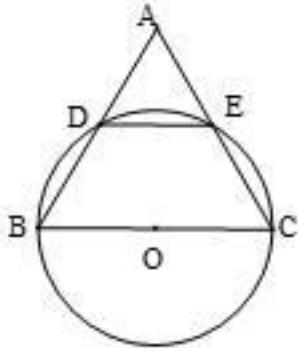


graph:

```
{"stem": {"pictures": [{"picturename": "1000025002.jpg", "coordinates": {"A": "0.00,-5.00", "B": "7.00,-5.00", "C": "-4.00,3.00", "D": "4.00,3.00", "E": "0.60,4.96", "F": "-4.60,-1.96", "O": "0.00,0.00"}, "collineations": {"0": "B###A", "1": "A###C", "2": "A###D", "3": "D###F", "4": "D###E", "5": "D###C", "6": "E###F"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###D###C###E###F"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null, straightLine=null}, LineContactCircleRelation{line=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(A), outpoint=Optional.of(B)}, LineParallelRelation [iLine1=CD, iLine2=AB], PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[E, F]}, EqualityRelation{ $\angle CDE = \angle ADF$ }, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, length=Express:[(5/2)], EqualityRelation{CD=4}, 求值(大小): (ExpressRelation:[key:]EF), ChordOfCircleRelation{chord=EF, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, chordLength=null, straightLine=null}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]EF)}

628、topic: 如图,以 $\odot O$ 的直径BC为一边作等边 $\triangle ABC$,AB、AC交 $\odot O$ 于点D、E,求证: $BD=DE=EC$.

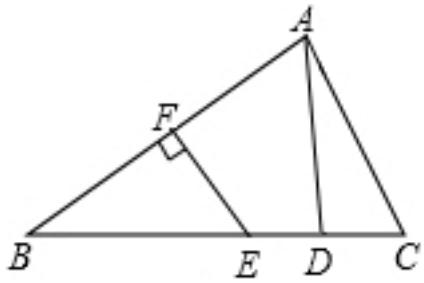


graph:

```
{"stem": {"pictures": [{"picturename": "E82377BAFEB549D3991384CD21A73D29.jpg", "coordinates": {"A": "-11.00,7.46", "B": "-13.00,4.00", "C": "-9.00,4.00", "D": "-12.00,5.73", "E": "-10.00,5.73", "O": "-11.00,4.00"}, "collineations": {"0": "B##D##A", "1": "C##E##A", "2": "B##O##C", "3": "D##E"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C##D##B##E"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: DiameterRelation{diameter=BC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null}, RegularTriangleRelation:RegularTriangle: $\triangle ABC$, LineCrossCircleRelation{line=AB, circle= $\odot O$, crossPoints=[D], crossPointNum=1}, LineCrossCircleRelation{line=AC, circle= $\odot O$, crossPoints=[E], crossPointNum=1}, ProveConclusionRelation:[证明: MultiEqualityRelation [multiExpressCompare=BD=DE=CE, originExpressRelationList=[], keyWord=null, result=null]]]

629、topic: 如图,在 $\triangle ABC$ 中,AB的垂直平分线EF交BC于点E,交AB于点F,D是线段CE的中点, $\angle CAD=20^\circ$, $\angle ACB$ 的补角是 110° .求证: $BE=AC$.



graph:

```
{"stem": {"pictures": [{"picturename": "1000072737_Q_1.jpg", "coordinates": {"A": "-7.67, 8.60", "B": "-14.23, 4.00", "C": "-6.00, 4.00", "D": "-7.67, 4.00", "E": "-9.34, 4.00", "F": "-10.95, 6.30"}, "collineations": {"0": "A##C", "1": "A##D", "2": "E##F", "3": "A##F##B", "4": "C##D##E##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: MiddlePerpendicularRelation [iLine1=EF, iLine2=AB, crossPoint=Optional.of(F)], TriangleRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=AB], MiddlePointOfSegmentRelation{middlePoint=D, segment=CE}, EqualityRelation{ $\angle CAD = (1/9\pi)$ }, ProveConclusionRelation:[证明: EqualityRelation{BE=AC}]

630、topic: 在菱形ABCD中, $\angle ABC=60^\circ$,E是对角线AC上任意一点,F是线段BC延长线上一点,且 $CF=AE$,连接BE、EF. #%(1)如图1,当E是线段AC的中点时,求证 $BE=EF$. #%(2)如图2,当点E不是线段AC的中点,其它条件不变时,请你判断(1)中的结论是否成立,并说明理由; #%(3)如图3,当点E是线段AC延长线上的任意一点,其它条件不变时,(1)中的结论是否成立?若成立,请给予证明;若不成立,请说明理由.#%##%#第28题图

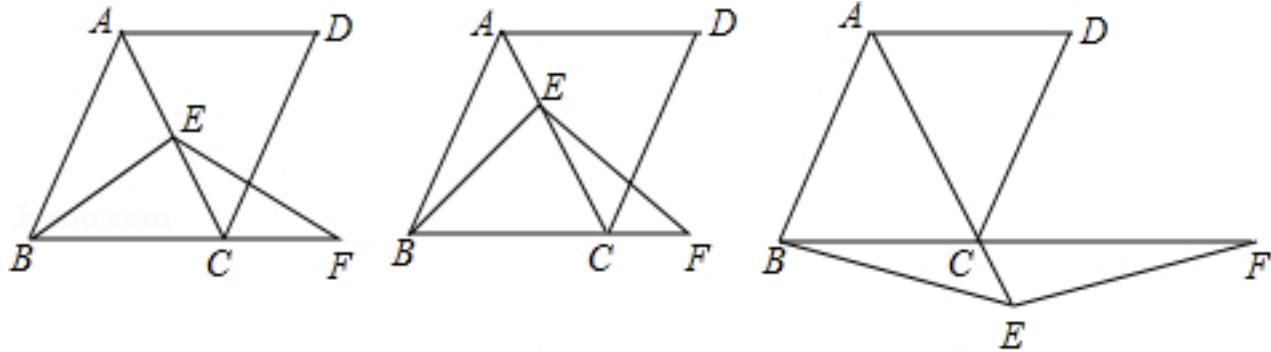


图1

图2

图3

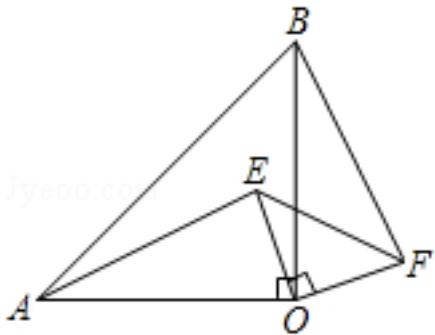
graph:

```
{"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000041575_Q_1.jpg", "coordinates": {"A": "-10.00, 3.73", "B": "-11.00, 2.00", "C": "-9.00, 2.00", "D": "-8.00, 3.73", "E": "-9.50, 2.87", "F": "-8.00, 2.00"}, "collineations": {"0": "B##C##F", "1": "A##E##C", "2": "C##D", "3": "E##F", "4": "E##B", "5": "A##D", "6": "A##B"}, "variable>equals": {}, "circles": []}], {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000041575_Q_1.jpg", "coordinates": {"A": "-8.00, 7.73", "B": "-9.00, 6.00", "C": "-7.00, 6.00", "D": "-6.00, 7.73", "E": "-7.75, 7.30", "F": "-6.50, 6.00"}, "collineations": {"0": "A##E##C", "1": "B##C##F", "2": "C##D", "3": "A##D", "4": "B##E", "5": "A##B", "6": "E##F"}, "variable>equals": {}, "circles": []}], {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000041575_Q_1.jpg", "coordinates": {"A": "-5.00, 3.73", "B": "-6.00, 2.00", "C": "-4.00, 2.00", "D": "-3.00, 3.73", "E": "-3.50, 1.14", "F": "-1.00, 2.00"}, "collineations": {"0": "A##C##E", "1": "B##C##F", "2": "C##D", "3": "A##D", "4": "B##E", "5": "A##B", "6": "E##F"}, "variable>equals": {}, "circles": []}]}], "appliedproblems": {}, "subsystems": []}}
```

NLP:

RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{ $\angle ABC = (1/3 * \pi)$ }, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=true}, EqualityRelation{CF=AE}, SegmentRelation:BE, SegmentRelation:EF, [ExpressRelation:[key:]1], MiddlePointOfSegmentRelation{middlePoint=E, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=Q_0, segment=AC}, [ExpressRelation:[key:]2], NegativeRelation{relation=PointRelation:E}, [ExpressRelation:[key:]3], PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{BE=EF}]

631、topic: 如图所示,已知,等腰直角 $\triangle OAB$ 中, $\angle AOB=90^\circ$,等腰直角 $\triangle EOF$ 中, $\angle EOF=90^\circ$,连接AE、BF.试说明:(1)AE=BF;(2) $AE \perp BF$. #



graph:

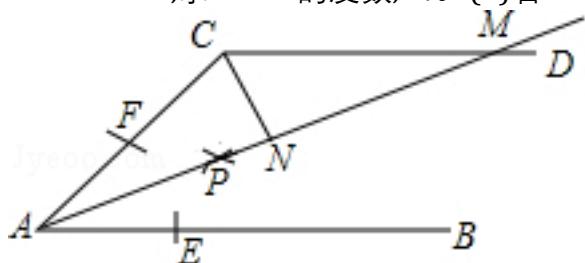
{"stem": {"pictures": [{"picturename": "1000033735_Q_1.jpg", "coordinates": {"A": "-16.00, -21.00", "B": "-13.00, -18.00", "E": "-13.47, -19.72", "F": "-11.72, -20.53", "O": "-13.00, -21.00"}, "collineations": {"0": "B##A", "1": "B##O", "2": "B##F", "3": "A##E", "4": "E##O", "5": "E##F", "6": "A##O", "7": "O##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle OAB$ [Optional.of(O)][Optional.of(O)], EqualityRelation{ $\angle AOB = (1/2 * \pi)$ }, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle EOF$ [Optional.of(O)][Optional.of(O)], EqualityRelation{ $\angle EOF = (1/2 * \pi)$ }, SegmentRelation:AE, SegmentRelation:BF, ProveConclusionRelation:[证明:

EqualityRelation{AE=BF}], ProveConclusionRelation:[证明: LinePerpRelation{line1=AE, line2=BF, crossPoint=}]]

632、topic: 如图,AB||CD,以点A为圆心,小于AC长为半径作圆弧,分别交AB、AC于E、F两点,再分别以E、F为圆心,大于 $\frac{1}{2}EF$ 长为半径作圆弧,两条弧交于点P,作射线AP,交CD于点M.#(1)若 $\angle ACD=112^\circ$,求 $\angle MAB$ 的度数;(2)若 $CN \perp AM$,垂足为N,求证: $\triangle ACN \cong \triangle MCN$.#



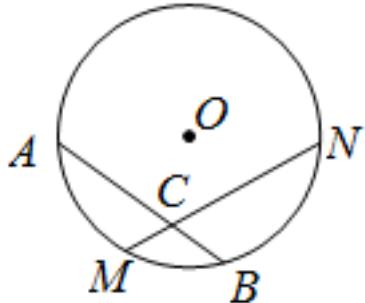
graph:

{"stem": {"pictures": [{"picturename": "1000033294_Q_1.jpg", "coordinates": {"A": "0.00, 0.00", "B": "8.00, 0.00", "C": "0.00, 4.00", "D": "8.00, 4.00", "E": "2.00, 0.00", "F": "4.00, 0.00", "M": "6.00, 0.00", "N": "6.00, 2.00", "P": "4.00, 2.00"}, "collineations": {"0": "A#B", "1": "A#C", "2": "A#D", "3": "B#C", "4": "B#D", "5": "C#D", "6": "E#F", "7": "E#P", "8": "F#P", "9": "M#N"}, "variable-equals": {}, "circles": [{"center": "A", "radius": "sqrt(10)"}, {"center": "E", "radius": "sqrt(2)"}, {"center": "F", "radius": "sqrt(2)"}]}], "appliedproblems": {}, "substems": []}}

.00","C":"1.62,4.00","D":"8.00,4.00","E":"1.93,0.00","F":"0.72,1.79","M":"5.93,4.00","N":"2.97,2.00","P":"2.60,1.75"}, "collineations": {"0": "B###E###A", "1": "A###P###N###M", "2": "D###M###C", "3": "C##F###A", "4": "C###N"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: EqualityRelation{AC=v_0}, LineParallelRelation [iLine1=AB, iLine2=CD], CircleCenterRelation{point=A, conic=Circle[\odot A]{center=A, analytic= $(x-x_A)^2+(y-y_A)^2=r_A^2$ }}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AB, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=AB, iLine2=AC], SegmentRelation:AP, LineCrossRelation [crossPoint=Optional.of(M), iLine1=AP, iLine2=CD], EqualityRelation{ $\angle FCM=(28/45\pi)$ }, 求角的大小: AngleRelation{angle= $\angle EAP$ }, LinePerpRelation{line1=CN, line2=AM, crossPoint=N}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle EAP$)}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ACN$, triangleB= $\triangle MCN$ }]

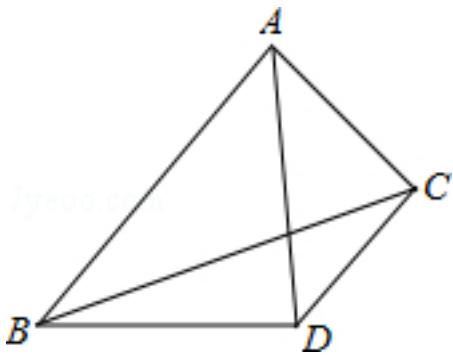
633、topic: 如图,M是 \widehat{AB} 的中点,过点M的弦MN交AB于点C,设 $\odot O$ 的半径为4cm,\$MN=4\sqrt{3}\$cm.(1)求圆心O到弦MN的距离;(2)求 $\angle ACM$ 的度数.



graph:
{"stem": {"pictures": [{"picturename": "1000060706_Q_1.jpg", "coordinates": {"A": "-3.33,2.21", "B": "3.33,2.21", "C": "1.02,2.21", "M": "0.00,4.00", "N": "3.45,-2.02", "O": "0.00,0.00"}, "collineations": {"0": "B###C###A", "1": "M###C###N"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###M###B###N"}]}, "appliedproblems": {}, "substems": []}}

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[M]}, ChordOfCircleRelation{chord=MN, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, chordLength=null, straightLine=null}, MiddlePointOfArcRelation:M/type:MAJOR_ARC \cap AB, LineCrossRelation [crossPoint=Optional.of(C), iLine1=MN, iLine2=AB], RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, length=Express:[4], EqualityRelation{MN=4*(3^(1/2))}, CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, 距离,求距离: PointToLineDistanceRelation{point=O, line=MN, distance=null}, 求角的大小: AngleRelation{angle= $\angle ACM$ }, SolutionConclusionRelation{relation=距离,求距离: PointToLineDistanceRelation{point=O, line=MN, distance=null}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ACM$)}

634、topic: 如图, $\triangle ABC$ 中, $AB=2AC$, AD 平分 $\angle BAC$, 且 $AD=BD$. 求证: $DC \perp AC$.



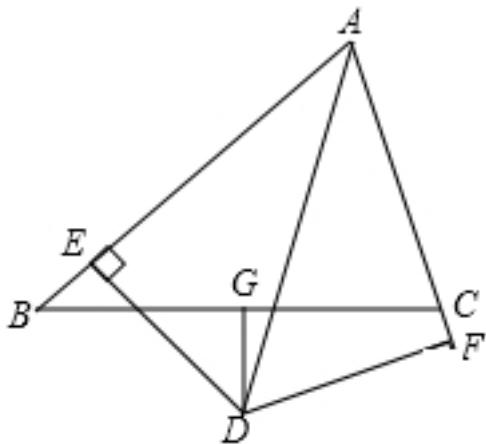
graph:

```
{"stem": {"pictures": [{"picturename": "1000034397_Q_1.jpg", "coordinates": {"A": "-4.99,6.63", "B": "-8.28, 1.93", "C": "-2.22,5.89", "D": "-3.28,1.93"}, "collineations": {"0": "B###A", "1": "A###D", "2": "A###C", "3": "B###C", "4": "B###D", "5": "D###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=2*AC$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, EqualityRelation{ $AD=BD$ }, ProveConclusionRelation:[证明: LinePerpRelation{line1=DC, line2=AC, crossPoint=C}]

635、topic: 如图,在 $\triangle ABC$ 中,已知 AD 平分 $\angle BAC$,分别过点D作 $DE \perp AB$ 于点E, $DF \perp AC$,交AC的延长线于点F. #%(1)求证: $\triangle AED \cong \triangle AFD$; #%(2)过点D作 $DG \perp BC$ 于点G,若 $BE=CF$, $BG=5cm$,求 BC 的长.#%#

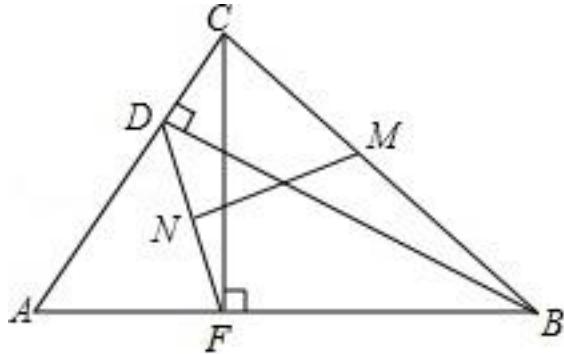


graph:

```
{"stem": {"pictures": [{"picturename": "1000037831_Q_1.jpg", "coordinates": {"A": "-8.00,5.00", "B": "-11.77,2.03", "C": "-6.56,2.00", "D": "-9.18,-0.12", "E": "-11.22,2.46", "F": "-6.22,1.30", "G": "-9.17,2.01"}, "collineations": {"0": "A###E###B", "1": "B###G###C", "2": "A###C###F", "3": "E###D", "4": "G###D", "5": "F###D", "6": "A###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=AC, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=AC], EqualityRelation{ $BC=v_0$ }, LinePerpRelation{line1=DG, line2=BC, crossPoint=G}, EqualityRelation{ $BE=CF$ }, EqualityRelation{ $BG=5$ }, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle AED$, triangleB= $\triangle AFD$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}

636、topic: 如图,在 $\triangle ABC$ 中,BD、CF分别是高,M为BC的中点,N为DF的中点,求证: $MN \perp DF$.



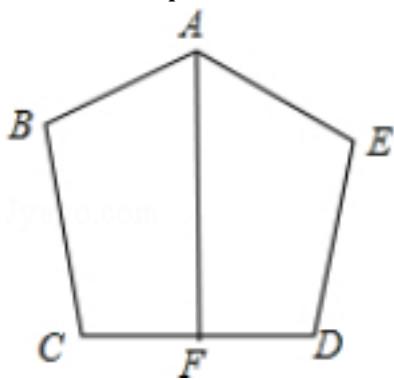
graph:

```
{"stem": {"pictures": [{"picturename": "1000031191_Q_1.jpg", "coordinates": {"A": "-11.00,1.00", "B": "-4.0", "C": "-8.00,5.00", "D": "-8.89,3.81", "F": "-8.00,1.00", "M": "-6.00,3.00", "N": "-8.44,2.41"}, "collinearities": {"0": "A###D##C", "1": "A###F##B", "2": "C##M##B", "3": "D##N##F", "4": "M##N", "5": "B##D", "6": "C##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=M,segment=BC},MiddlePointOfSegmentRelation{middlePoint=N,segment=DF},LinePerpRelation{line1=BD, line2=AD, crossPoint=D},LinePerpRelation{line1=CF, line2=AF, crossPoint=F},ProveConclusionRelation:[证明: LinePerpRelation{line1=MN, line2=DF, crossPoint=N}]

637、topic: 如图,AB=AE,BC=ED, $\angle B=\angle E$, $AF \perp CD$,F为垂足,求证: $CF=DF$.



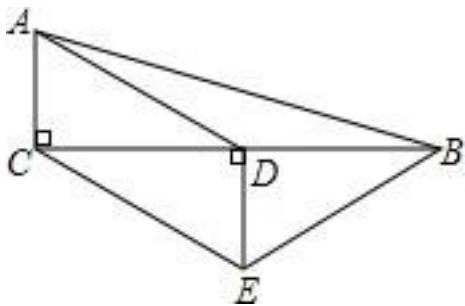
graph:

```
{"stem": {"pictures": [{"picturename": "1000031205_Q_1.jpg", "coordinates": {"A": "-7.00,5.00", "B": "-9.00,4.00", "C": "-8.23,1.48", "D": "-5.77,1.48", "E": "-5.00,4.00", "F": "-7.00,1.48"}, "collinearities": {"0": "A##B", "1": "A##E", "2": "A##F", "3": "C##F##D", "4": "B##C", "5": "E##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

EqualityRelation{AB=AE}, EqualityRelation{BC=DE}, EqualityRelation{ $\angle ABC = \angle AED$ }, LinePerpRelation{line1=AF, line2=CD, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{CF=DF}]

638、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$,D是BC的中点, $DE \perp BC$, $CE \parallel AD$,若 $AC=3$, $CE=5$,则三角形 CEB 的周长是多少?



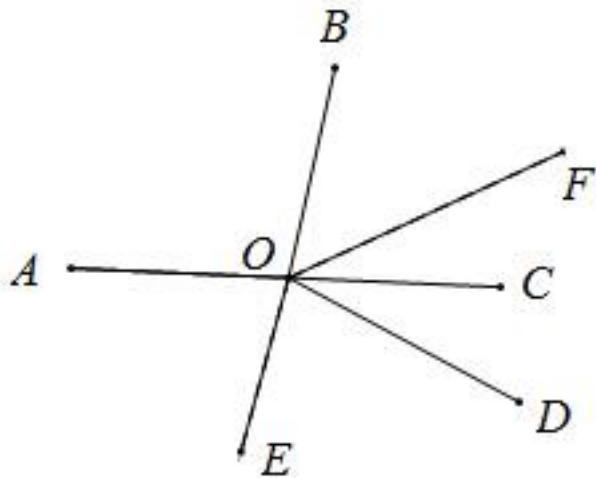
graph:

```
{"stem":{"pictures":[{"picturename":"1EA3C935430D4CDA956D8CDAB6F33307.jpg","coordinates":{"A": "-14.00,8.00","B": "-6.00,5.00","C": "-14.00,5.00","D": "-10.00,5.00","E": "-10.00,2.00"},"collinearations":{"0": "A##D","1": "A##B","2": "A##C","3": "B##C##D","4": "B##E","5": "E##C","6": "D##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

EqualityRelation{C_△BCE=v_0}, TriangleRelation:△ABC, EqualityRelation{∠ACD=(1/2*Pi)}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, LinePerpRelation{line1=DE, line2=BC, crossPoint=D}, LineParallelRelation [iLine1=CE, iLine2=AD], EqualityRelation{AC=3}, EqualityRelation{CE=5}, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]C_△BCE)}

639、topic: 如图,从点O引出6条射线OA、OB、OC、OD、OE、OF,且 $\angle AOB = 100^\circ$,OF平分 $\angle BOC$, $\angle AOE = \angle DOE$, $\angle EOF = 140^\circ$,求 $\angle COD$ 的度数.



graph:

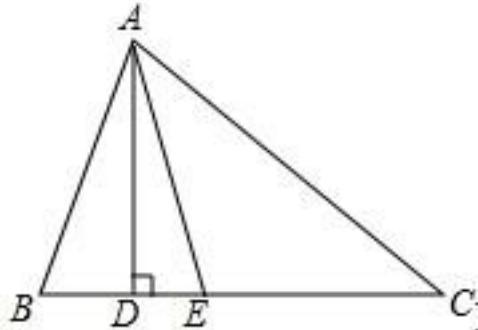
```
{"stem":{"pictures":[{"picturename":"1000006428_Q_1.jpg","coordinates":{"A": "-12.38,-0.69","B": "-6.91,5.57","C": "-1.30,0.16","D": "-1.64,-1.80","E": "-7.51,-4.87","F": "-2.08,5.00","O": "-7.02,0.15"},"collinearations":{"0": "A##O","1": "B##O","2": "C##O","3": "D##O","4": "E##O","5": "F##O"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

SegmentRelation:OB, SegmentRelation:OC, SegmentRelation:OD, SegmentRelation:OE, SegmentRelation:OF, EqualityRelation{∠AOB=(5/9*Pi)}, AngleBisectorRelation{line=OF, angle=∠BOC, angle1=∠BOF, angle2=∠COF}, EqualityRelation{∠AOE=∠DOE}, EqualityRelation{∠EOF=(7/9*Pi)}, 求角的大小:
AngleRelation{angle=∠COD}, SolutionConclusionRelation{relation=求值(大小)}:

{ExpressRelation:[key:] $\angle COD$ }

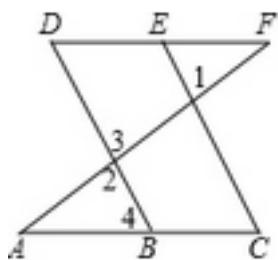
640、topic: 如图,在 $\triangle ABC$ 中, $AD \perp BC$, AE 平分 $\angle BAC$,完成下列问题?
(1)若 $\angle B=70^\circ$, $\angle C=34^\circ$,求 $\angle DAE$ 、 $\angle AEC$ 的度数;
(2)若 $\angle B > \angle C$,试猜想 $\angle DAE$ 与 $\angle B - \angle C$ 有何关系?请证明你的猜想



graph: {"stem": {"pictures": [{"picturename": "1000021814_Q_1.jpg", "coordinates": {"A": "-0.01,6.23", "B": "-2.27,0.00", "C": "9.23,0.00", "D": "-0.01,0.00", "E": "2.02,0.00"}, "collinearities": {"0": "A##B", "1": "A##D", "2": "A##E", "3": "A##C", "4": "B##D##E##C"}, "variable-equals": {"0": "\u00b21=\u00b2PNB", "1": "\u00b22=\u00b2MNP", "2": "\u00b21=\u00b2AMP"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, AngleBisectorRelation{line=AE, angle= $\angle BAC$, angle1= $\angle BAE$, angle2= $\angle CAE$ }, EqualityRelation{ $\angle ABD=(7/18*\pi)$ }, EqualityRelation{ $\angle ACE=(17/90*\pi)$ }, 求角的大小: AngleRelation{angle= $\angle DAE$ }, 求角的大小: AngleRelation{angle= $\angle AEC$ }, InequalityRelation{ $\angle ABD > \angle ACE$ }, 数字比较大大小: DualExpressRelation{expresses=[Express:[$\angle ABD - \angle ACE$], Express:[$\angle DAE$]}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DAE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AEC$)}, SolutionConclusionRelation{relation=数字比较大大小: DualExpressRelation{expresses=[Express:[$\angle ABD - \angle ACE$], Express:[$\angle DAE$]}}}

641、topic: 已知: $\angle 1 = \angle 2$, $\angle C = \angle D$, 请说明: $\angle A = \angle F$.

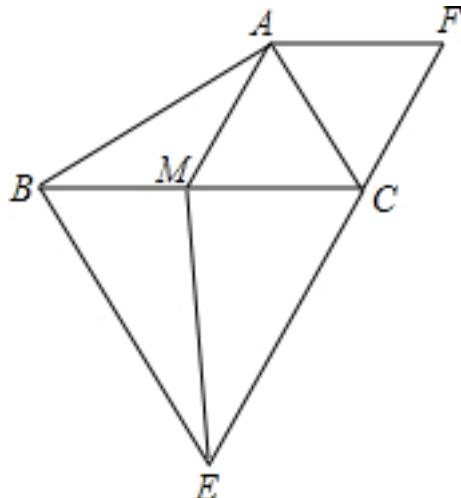


graph: {"stem": {"pictures": [{"picturename": "1000050438_Q_1.jpg", "coordinates": {"A": "-7.00,2.00", "B": "-4.82,2.00", "C": "-3.00,2.00", "D": "-6.23,5.45", "E": "-4.42,5.45", "F": "-2.59,5.45", "G": "-5.35,3.29", "H": "-3.97,4.37"}, "collinearities": {"0": "A##B##C", "1": "D##E##F", "2": "D##G##B", "3": "E##H##C", "4": "A##G##H##F"}, "variable-equals": {"0": "\u00b21=\u00b2EHF", "1": "\u00b22=\u00b2AGB", "2": "\u00b23=\u00b2DGF", "3": "\u00b24=\u00b2DBA"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{ $\angle EHF = \angle AGB$ }, EqualityRelation{ $\angle BCH = \angle EDG$ }, ProveConclusionRelation:[证明:
EqualityRelation{ $\angle BAG = \angle EFH$ }]

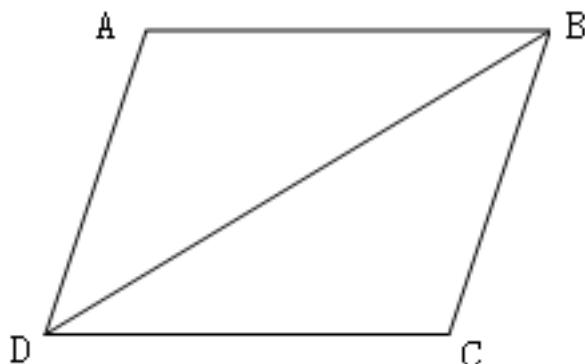
642、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=60^\circ$,分别以 $\triangle ABC$ 的两边为边向外作等边 $\triangle BCE$ 和 $\triangle ACF$,过点A作 $AM \parallel FC$ 交 BC 于点M,连接 EM .求证:#%#(1)四边形 $AMCF$ 是菱形;#%#(2) $\triangle ACB \cong \triangle MCE$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "20BA26CAC27C4E688966CE86B52D0AA9.jpg", "coordinates": {"A": "-8.73,11.00", "B": "-12.00,8.00", "C": "-7.00,8.00", "E": "-9.50,3.67", "F": "-5.27,11.00", "M": "-10.46,8.00"}, "collinearations": {"0": "A##F", "1": "A##B", "2": "A##C", "3": "A##M", "4": "B##C##M", "5": "B##E", "6": "F##C##E", "7": "M##E"}}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ACM = (1/3 * \pi)$ }, RegularTriangleRelation:RegularTriangle: $\triangle BCE$, RegularTriangleRelation:RegularTriangle: $\triangle ACF$, PointOnLineRelation{point=A, line=AM, isConstant=false, extension=false}, LineParallelRelation [iLine1=AM, iLine2=FC], LineCrossRelation [crossPoint=Optional.of(M), iLine1=AM, iLine2=BC], SegmentRelation:EM, ProveConclusionRelation:[证明:
RhombusRelation{rhombus=Rhombus:AMCF}], ProveConclusionRelation:[证明:
TriangleCongRelation{triangleA= $\triangle ACB$, triangleB= $\triangle MCE$ }]]

643、topic: 已知:如图, $AD=BC$, $AD \parallel BC$.求证: $\angle A = \angle C$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000072626_Q_1.jpg", "coordinates": {"A": "1.00,3.00", "B": "6.00,3.00", "C": "6.00,1.00", "D": "1.00,1.00"}}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "substems": []}}

.00","C":"5.00,0.00","D":"0.00,0.00"},"collineations":{"0":"A##B","1":"A##D","2":"B##C","3":"C##D","4":"B##D"},"variable-equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}

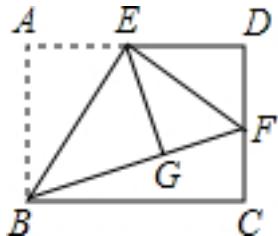
NLP: EqualityRelation{AD=BC}, LineParallelRelation [iLine1=AD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{ $\angle BAD = \angle BCD$ }]

644、topic: 如图所示,在 $\triangle ABC$ 中,AD是中线,过点B,C分别作AD的垂线BE, CF,垂足分别为点E,F.求证: $BE=CF$.#%#

graph:
{"stem": {"pictures": [{"picturename": "AA97BECB8DF34E5DAD1EBC227A57F7D3.jpg", "coordinates": {"A": "-9.00,8.00", "B": "-14.00,3.00", "C": "-7.00,3.00", "D": "-10.50,3.00", "E": "-10.21,3.96", "F": "-10.79,2.04"}, "collineations": {"0": "B##A", "1": "A##D##E##F", "2": "A##C", "3": "B##C##D", "4": "B##F", "5": "E##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=AD, line2=BE, crossPoint=E}, LinePerpRelation{line1=AD, line2=CF, crossPoint=F}, PointOnLineRelation{point=B, line=BE, isConstant=false, extension=false}, PointOnLineRelation{point=C, line=CF, isConstant=false, extension=false}, MidianLineOfTriangleRelation{midianLine=AD, triangle= $\triangle ABC$, top=A, bottom=BC}, ProveConclusionRelation:[证明: EqualityRelation{ $BE=CF$ }]

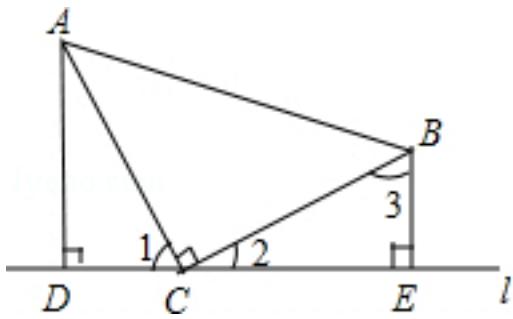
645、topic: 如图,在矩形ABCD中,点E是AD的中点,将 $\triangle ABE$ 沿直线BE折叠后得到 $\triangle GBE$,延长BG交CD于点F.若 $AB=6$, $BC=4\sqrt{6}$,求FD的长度.#%#



graph:
{"stem": {"pictures": [{"picturename": "210CE1D84BC34ABE82F727D408936C05.jpg", "coordinates": {"A": "-14.00,9.00", "B": "-14.00,3.00", "C": "-4.20,3.00", "D": "-4.20,9.00", "E": "-9.10,9.00", "F": "-4.20,5.00", "G": "-8.12,4.20"}, "collineations": {"0": "A##D##E", "1": "A##B", "2": "B##C", "3": "E##B", "4": "B##G##F", "5": "C##D##F", "6": "F##E", "7": "F##G", "8": "E##G"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
EqualityRelation{DF=v_0}, RectangleRelation{rectangle=Rectangle:ABCD}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AD}, TurnoverRelation{start=A, segment=BE, target=G}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BG, iLine2=CD], EqualityRelation{AB=6}, EqualityRelation{BC=4*(6^(1/2))}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DF)}

646、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $CA=BC$,直线\$l\$在 $\triangle ABC$ 的外部且过点C,\$AD\bot l\$,\$BE\bot l\$,垂足分别为点D,E.#%#(1)试说明: $\triangle ACD \cong \triangle CBE$.#%#(2)如果直线\$l\$过点C且经过 $\triangle ABC$ 的内部,其他条件不变,结论是否仍然成立?并说明理由.#%#



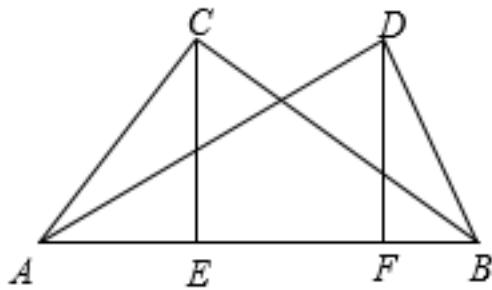
graph:

{"stem": {"pictures": [{"picturename": "1000029216_Q_1.jpg", "coordinates": {"A": "3.00,4.00", "B": "8.00,3.00", "C": "5.00,1.00", "D": "3.00,1.00", "E": "8.00,1.00"}, "collineations": {"0": "B###A", "1": "A###D", "2": "B##E", "3": "A###C", "4": "D##C##E", "5": "B##C"}, "variable>equals": {"0": "\u00221=\u0022ACD", "1": "\u00222=\u0022BCE", "2": "\u00223=\u0022CBE"}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ACB=(1/2\pi)\}$, EqualityRelation $\{AC=BC\}$, LinePerpRelation
 {line1=CD, line2=AD, crossPoint=D}, LinePerpRelation{line1=DE, line2=BE,
 crossPoint=E}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ACD$,
 $\triangle B= \triangle CBE\}$]

647、topic: 如图:AC \perp BC,AD \perp BD,AD=BC,CE \perp AB,DF \perp AB,垂足分别是E,F,求证:AE=BF.#%#

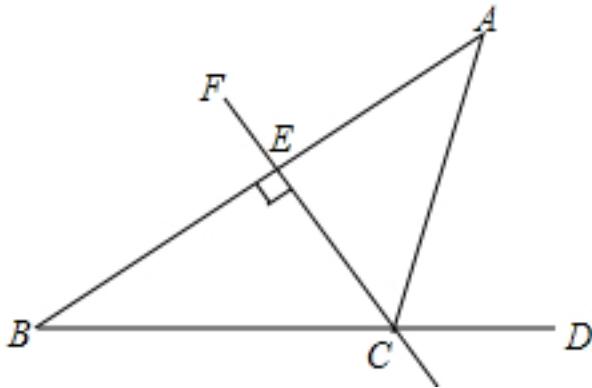


graph:

{"stem": {"pictures": [{"picturename": "1000042047_Q_1.jpg", "coordinates": {"A": "-13.00,2.00", "B": "-7.0,2.00", "C": "-11.00,5.00", "D": "-9.00,5.00", "E": "-11.00,2.00", "F": "-9.00,2.00"}, "collineations": {"0": "A##E##F##B", "1": "A##C", "2": "A##D", "3": "C##E", "4": "B##C", "5": "B##D", "6": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LinePerpRelation{line1=AC, line2=BC, crossPoint=C}, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, EqualityRelation{AD=BC}, LinePerpRelation{line1=CE, line2=AB, crossPoint=E}, LinePerpRelation{line1=DF, line2=AB, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{AE=BF}]

648、topic: 已知:如图,CF \perp AB于E,且AE=EB,已知 $\angle B=40^\circ$,求 $\angle ACD$ 、 $\angle DCF$ 的度数.#%#

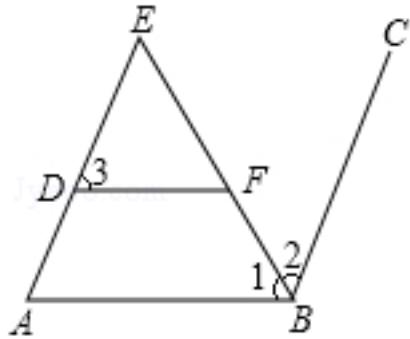


graph:

{"stem": {"pictures": [{"picturename": "225F044385A74E629A15922D501E3596.jpg", "coordinates": {"A": "-8.02,9.02", "B": "-14.00,4.00", "C": "-8.90,4.00", "D": "-6.00,4.00", "E": "-11.01,6.51", "F": "-11.59,7.20"}, "collineations": {"0": "A###B##E", "1": "A##C", "2": "B##D", "3": "C##E##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LinePerpRelation{line1=CF, line2=AB, crossPoint=E}, EqualityRelation{AE=BE}, EqualityRelation{ $\angle CBE = (2/9\pi)$ }, 求角的大小:
 AngleRelation{angle= $\angle ACD$ }, 求角的大小:
 AngleRelation{angle= $\angle DCE$ }, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle ACD$)}, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle DCE$)}

649、topic: 如图, $\angle E=\angle 1$, $\angle 3+\angle ABC=180^\circ$,BE是 $\angle ABC$ 的角平分线,求证:DF||AB. # % #



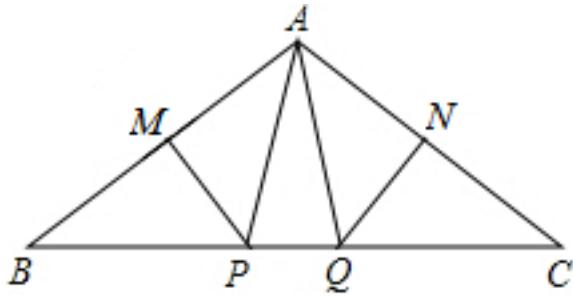
graph:

{"stem": {"pictures": [{"picturename": "1000030586_Q_1.jpg", "coordinates": {"D": "-9.54,5.38", "E": "-9.05,6.85", "F": "-7.99,5.38", "A": "-10.00,4.00", "B": "-7.00,4.00", "C": "-6.00,7.00"}, "collineations": {"0": "E##D##A", "1": "E##F##B", "2": "D##F", "3": "A##B", "4": "B##C"}, "variable-equals": {"0": "\angle 1 = \angle ABE", "1": "\angle 2 = \angle EBC", "2": "\angle 3 = \angle EDF"}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{ $\angle DEF = \angle ABF$ }, EqualityRelation{ $\angle EDF + \angle ABC = \pi$ }, AngleBisectorRelation{line=BE, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=DF, iLine2=AB]]]

650、topic: 如图, $\angle BAC=110^\circ$,若MP、NQ分别垂直平分AB、AC,求 $\angle PAQ$ 的度数. # % #



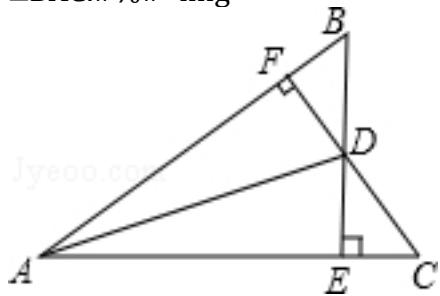
graph:

{"stem": {"pictures": [{"picturename": "1000072735_Q_1.jpg", "coordinates": {"A": "-6.00, 8.00", "B": "-11.0, 0.50", "C": "-2.28, 4.99", "M": "-8.50, 6.50", "N": "-4.14, 6.49", "P": "-7.60, 4.99", "Q": "-5.36, 4.99"}, "collinearations": {"0": "A##P", "1": "A##Q", "2": "M##P", "3": "N##Q", "4": "A##M##B", "5": "A##N##C", "6": "P##Q##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{ $\angle MAN = (11/18\pi)$ }, MiddlePerpendicularRelation [iLine1=MP, iLine2=AB, crossPoint=Optional.of(M)], MiddlePerpendicularRelation [iLine1=NQ, iLine2=AC, crossPoint=Optional.of(N)], 求角的大小:

AngleRelation{angle= $\angle PAQ$ }, SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:] $\angle PAQ$)

651、topic: 如图,已知BE \perp AC于E,CF \perp AB于F,BE、CF相交于点D,若BD=CD,求证:AD平分 $\angle BAC$.#%#

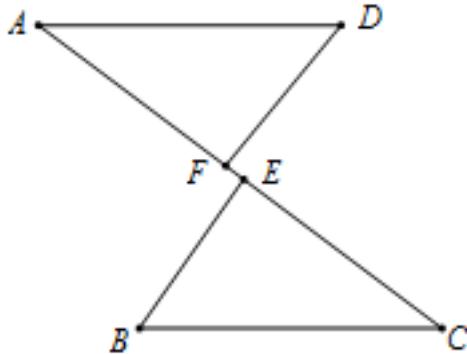


graph:

{"stem": {"pictures": [{"picturename": "24EFB20AAEEE46F59BC747B7092BF89E.jpg", "coordinates": {"A": "-14.00, 4.00", "B": "-9.00, 9.00", "C": "-6.93, 4.00", "D": "-9.00, 6.07", "E": "-9.00, 4.00", "F": "-10.46, 7.54"}, "collinearations": {"0": "A##F##B", "1": "D##A", "2": "A##C##E", "3": "B##D##E", "4": "C##D##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: LinePerpRelation{line1=BE, line2=AC, crossPoint=E}, LinePerpRelation{line1=CF, line2=AB, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=BE, iLine2=CF], EqualityRelation{BD=CD}, ProveConclusionRelation:[证明:
AngleBisectorRelation{line=AD, angle= $\angle EAF$, angle1= $\angle DAE$, angle2= $\angle DAF$ }]

652、topic: 如图,AE=CF,AD=BC,DF=BE,求证:AD \parallel BC.#%#



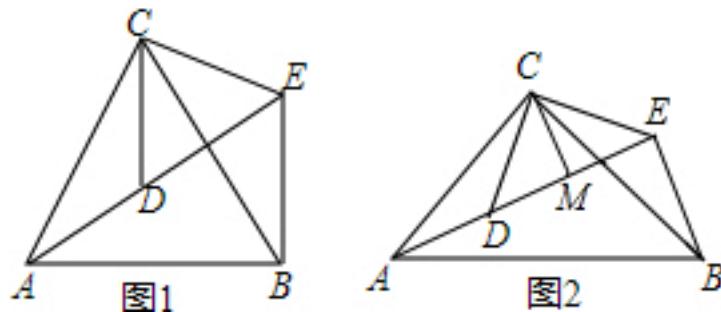
graph:

```
{"stem":{"pictures":[{"picturename":"1000032754_Q_1.jpg","coordinates":{"A":"1.50,-1.40","B":"5.30,-12.80","C":"16.70,-12.80","D":"12.90,-1.40","E":"9.30,-7.30","F":"8.60,-6.60"}],"collineations":{"0":"A##F###E##C","1":"D##A","2":"D##F","3":"B##E","4":"B##C"},"variable>equals":{},"circles":[]},"appliedproblems":{},"substems":[]}
```

NLP:

EqualityRelation{AE=CF}, EqualityRelation{AD=BC}, EqualityRelation{DF=BE}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AD, iLine2=BC]]

653、topic: 如图1,△ABC和△DCE均为等边三角形,点A、D、E在同一直线上,连接BE. #%%#%#
(1)求证:AD=BE; #(2)求∠AEB的度数; #(3)如图2,△ACB和△DCE均为等腰三角形,且
∠ACB=∠DCE=90°,点A、D、E在同一直线上,CM为△DCE中DE边上的高,连接BE,请判断∠AEB的度数及线
段CM、AE、BE之间的数量关系,并说明理由.



graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":"1","questionrelies":"","picture":{},"coordinates":{},"collineations":{},"variable>equals":{},"circles":[]},{"substemid":"2","questionrelies":"1","substemid":"3","questionrelies":"","picture":{},"coordinates":{},"collineations":{},"variable>equals":{},"circles":[]}]}, "appliedproblems":{},"substems":[]}]
```

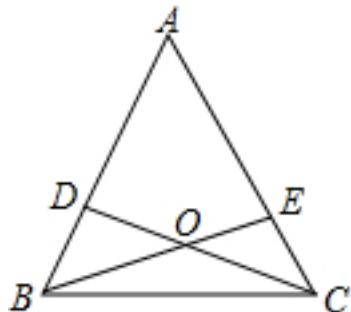
NLP:

RegularTriangleRelation:RegularTriangle:△ABC, RegularTriangleRelation:RegularTriangle:△DCE, PointOnLineRelation{point=A, line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0 slope:null b:null isLinearFunction:false, isConstant:false, extension:false}, PointOnLineRelation{point=D, line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0 slope:null b:null isLinearFunction:false,

```

isConstant=false, extension=false},PointOnLineRelation{point=E, line=StraightLine[n_0]
analytic :y=k_n_0*x+b_n_0 slope:null b:null isLinearFunction:false, isConstant=false,
extension=false},SegmentRelation:BE,求角的大小:
AngleRelation{angle=∠BED},(ExpressRelation:[key:]2),IsoscelesTriangleRelation:IsoscelesTriangle:△
ACB[Optional.of(A)],IsoscelesTriangleRelation:IsoscelesTriangle:△DCE[Optional.of(E)],MultiEquality
Relation [multiExpressCompare=∠ACB=∠DCE=(1/2*Pi), originExpressRelationList=[], keyWord=null,
result=null],PointOnLineRelation{point=A, line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0
slope:null b:null isLinearFunction:false, isConstant=false,
extension=false},PointOnLineRelation{point=D, line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0
slope:null b:null isLinearFunction:false, isConstant=false,
extension=false},PointOnLineRelation{point=E, line=StraightLine[n_0] analytic :y=k_n_0*x+b_n_0
slope:null b:null isLinearFunction:false, isConstant=false,
extension=false},TriangleRelation:△DCE,SegmentRelation:DE,LinePerpRelation{line1=CM, line2=DE,
crossPoint=},SegmentRelation:BE,求值(大小): (ExpressRelation:[key:]∠BED),求值(大小):
(ExpressRelation:[key:](CM/AE)),求值(大小):
(ExpressRelation:[key:](AE/BE)),LinePerpRelation{line1=CM, line2=AM,
crossPoint=M},ProveConclusionRelation:[证明:
EqualityRelation{AD=BE}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]∠BED)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]∠BED)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:](CM/AE))},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:](AE/BE))}
```

654、topic: 已知:如图,AB=AC,AD=AE,BE与CD相交于点O.求证:△ABE \cong △ACD. # % #



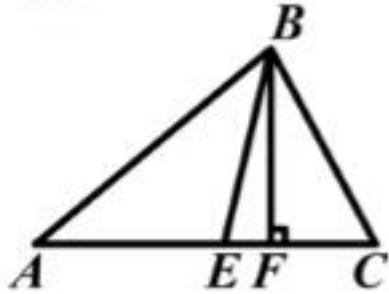
```

graph:
{"stem": {"pictures": [{"picturename": "1000072673_Q_1.jpg", "coordinates": {"A": "2.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "0.50,1.01", "E": "3.50,1.01", "O": "2.00,0.58"}, "collineations": {"0": "A###D###B", "1": "B##C", "2": "C##E##A", "3": "C##O##D", "4": "B##O##E"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "substems": []}]}

```

NLP: EqualityRelation{AB=AC},EqualityRelation{AD=AE},LineCrossRelation
[crossPoint=Optional.of(O), iLine1=BE, iLine2=CD],ProveConclusionRelation:[证明:
TriangleCongRelation{triangleA=△ABE, triangleB=△ACD}]

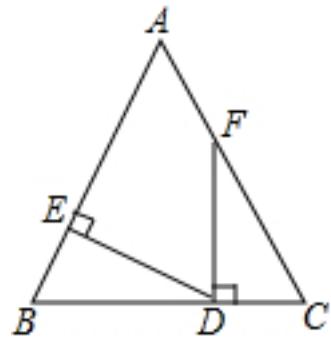
655、topic: 如图,在△ABC中,已知BE是∠ABC的角平分线, BF是高,且∠C > ∠A.求证:
 $\angle EBF = \frac{1}{2}(\angle C - \angle A)$.



graph:
 {"stem": {"pictures": [{"picturename": "1000022490_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "0.00, 4.00", "C": "3.00,0.00", "E": "-0.51,0.00", "F": "0.00,0.00"}, "collineations": {"0": "A###E###F##C", "1": "A#B", "2": "B##E", "3": "B##F", "4": "B##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation:△ABC, AngleBisectorRelation{line=BE, angle=∠ABC, angle1=∠ABE, angle2=∠CBE}, InequalityRelation{∠BCF>∠BAE}, LinePerpRelation{line1=BF, line2=AF, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{∠EBF=(1/2)*(∠BCF-∠BAE)}]

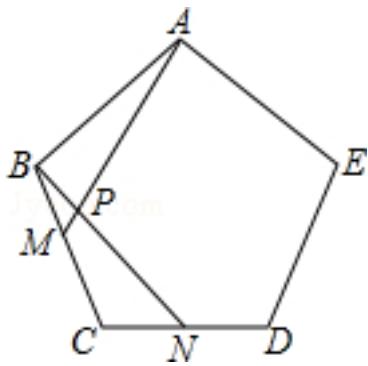
656、topic: 如图,△ABC中,∠A=50°,AB=AC,DF⊥BC,DE⊥AB,求∠EDF的度数.



graph:
 {"stem": {"pictures": [{"picturename": "1000021699_Q_1.jpg", "coordinates": {"A": "0.00,6.43", "B": "-3.00,0.00", "C": "3.00,0.00", "D": "1.00,0.00", "E": "-2.29,1.53", "F": "1.00,4.29"}, "collineations": {"0": "A##F##C", "1": "E##B##A", "2": "D##E", "3": "D##F", "4": "B##D##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation:△ABC, EqualityRelation{∠EAF=(5/18*Pi)}, EqualityRelation{AB=AC}, LinePerpRelation{line1=DF, line2=BC, crossPoint=D}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, 求角的大小: AngleRelation{angle=∠EDF}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠EDF)}

657、topic: 如图,正五边形ABCDE,点M、N分别是边BC、CD上的点,且BM=CN,AM交BN于点P.(1)求证:△ABM≌△BCN;(2)求∠APN的度数.

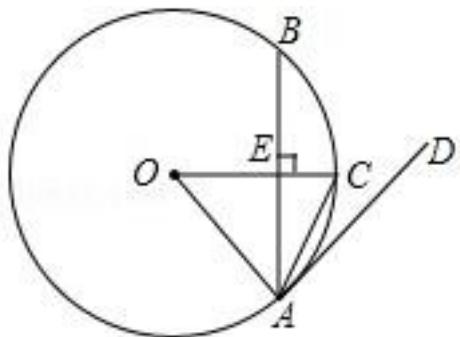


graph:

{"stem": {"pictures": [{"picturename": "1000031945_Q_1.jpg", "coordinates": {"A": "-12.03,8.17", "B": "-14.05,6.68", "C": "-13.26,4.29", "D": "-10.74,4.31", "E": "-9.98,6.71", "M": "-13.73,5.72", "P": "-13.54,6.00", "N": "-12.25,4.30"}, "collineations": {"0": "A###P###M", "1": "B###P###N", "2": "C###N###D", "3": "B###M##C", "4": "B###A", "5": "A###E", "6": "E###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: PointOnLineRelation{point=M, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=N, line=CD, isConstant=false, extension=false}, EqualityRelation{BM=CN}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=AM, iLine2=BN], 求角的大小: AngleRelation{angle= $\angle APN$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABM$, triangleB= $\triangle BCN$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle APN$)}

658、topic: 如图,在 $\odot O$ 中,半径 OC 垂直于弦 AB ,垂足为点 E . 若 $OC=5$, $AB=8$,求 $\tan \angle BAC$. 若 $\angle DAC=\angle BAC$,且点 D 在 $\odot O$ 的外部,判断直线 AD 与 $\odot O$ 的位置关系,并加以证明.



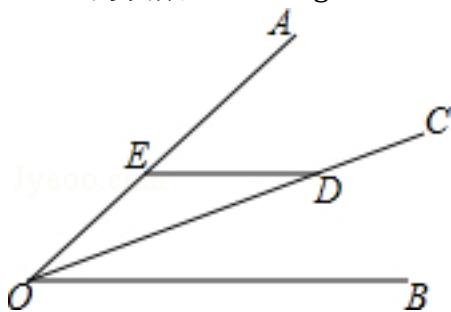
graph:

{"stem": {"pictures": [{"picturename": "1000008332_Q_1.jpg", "coordinates": {"A": "4.00,-3.00", "B": "4.00,3.00", "C": "5.00,0.00", "D": "5.84,-0.55", "E": "4.00,0.00", "O": "0.00,0.00"}, "collineations": {"0": "O##A", "1": "A##E##B", "2": "A##C", "3": "D##A", "4": "O##C##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "C##B##A"}]}, "appliedproblems": {}, "substems": []}}

NLP: RadiusRelation{radius=OC, circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, CircleRelation{circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, LinePerpRelation{line1=OC, line2=AB, crossPoint=E}, ChordOfCircleRelation{chord=AB, circle=null, chordLength=null, straightLine=null}, EqualityRelation{CO=5}, EqualityRelation{AB=8}, 求值(大小): (ExpressRelation:[key:] $\tan(\angle CAE)$), EqualityRelation{ $\angle CAD = \angle CAE$ }, PointOutCircleRelation{point=Dcurve=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}},

points=[D]},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]tan($\angle CAE$)},JudgePostionConclusionRelation: [data1=AD,
 data2=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }]

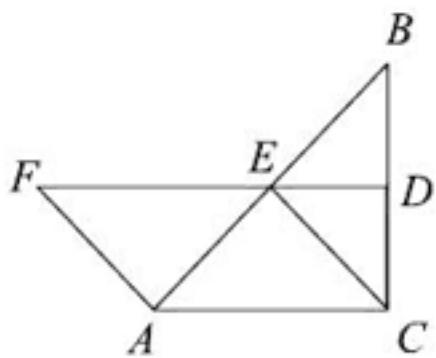
659、topic: 如图,D是 $\angle AOB$ 的平分线OC上一点,过点D作DE $\parallel OB$ 交射线OA于点E,已知 $\angle BOD=25^\circ$,求 $\angle OED$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030634_Q_1.jpg", "coordinates": {"A": "-11.09,6.93", "C": "-9.49,6.20", "B": "-8.95,4.52", "E": "-12.30,5.11", "D": "-11.06,5.25", "O": "-12.99,4.07"}, "collineations": {"0": "A##E##O", "1": "C###D##O", "2": "E##D", "3": "O##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=OC,angle= $\angle BOE$, angle1= $\angle BOC$,
 angle2= $\angle COE$ },PointOnLineRelation{point=D, line=OC, isConstant=false,
 extension=false},PointOnLineRelation{point=D, line=DE, isConstant=false,
 extension=false},LineParallelRelation [iLine1=DE, iLine2=OB],LineCrossRelation
 [crossPoint=Optional.of(E), iLine1=DE, iLine2=OA],EqualityRelation{ $\angle BOD=(5/36\pi)$ },求角的大小:
 AngleRelation{angle= $\angle DEO$ },SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle DEO$)}

660、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$,BC的垂直平分线DE交BC于点D,交AB于点E,点F在DE上,且 $AF=CE=AE$.#%#(1)求证:四边形ACEF是平行四边形.#%#(2)当 $\angle B$ 满足什么条件时,四边形ACEF是菱形?
 并说明理由.#%#

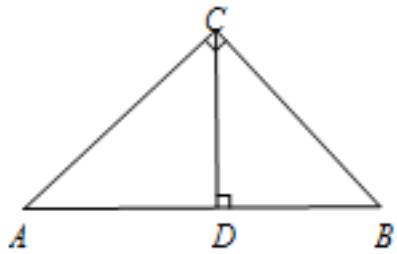


graph:
 {"stem": {"pictures": [{"picturename": "1000041787_Q_1.jpg", "coordinates": {"A": "-11.00,4.00", "B": "-8.00,7.00", "C": "-8.00,4.00", "D": "-8.00,5.50", "E": "-9.50,5.50", "F": "-12.50,5.50"}, "collineations": {"0": "A##C", "1": "A##F", "2": "A##E##B", "3": "B##D##C", "4": "C##E", "5": "F##E##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: MiddlePerpendicularRelation [iLine1=DE, iLine2=BC,

crossPoint=Optional.of(D)],TriangleRelation: $\triangle ABC$,EqualityRelation $\{\angle ACD=(1/2*\pi)\}$,LineCrossRelation [crossPoint=Optional.of(D), iLine1=DE, iLine2=BC],LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AB],PointOnLineRelation{point=F, line=DE, isConstant=false, extension=false},MultiEqualityRelation [multiExpressCompare=AF=CE=AE, originExpressRelationList=[], keyWord=null, result=null],RhombusRelation{rhombus=Rhombus:ACEF},求角的大小: AngleRelation{angle= $\angle DBE$ },ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:ACEF}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DBE$)}

661、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=16$, $BC=12$, $CD \perp AB$,垂足为D.求AB、CD的长.#%#



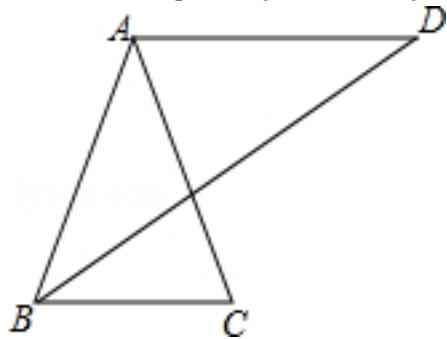
graph:

{"stem": {"pictures": [{"picturename": "1000082953_Q_1.jpg", "coordinates": {"A": "-5.09, -0.49", "B": "-0.09, -0.41", "C": "-1.93, 1.96", "D": "-1.89, -0.44"}, "collineations": {"0": "A###D##B", "1": "A###C", "2": "B###C", "3": "D###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: $\triangle ABC$,EqualityRelation $\{\angle ACB=(1/2*\pi)\}$,EqualityRelation $\{AC=16\}$,EqualityRelation $\{BC=12\}$,LinePerpRelation{line1=CD, line2=AB, crossPoint=D},求值(大小): (ExpressRelation:[key:]AB),求值(大小): (ExpressRelation:[key:]CD),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CD)}

662、topic: (2015·宿迁)如图,已知 $AB=AC=AD$,且 $AD \parallel BC$,求证: $\angle C=2\angle D$.#%#



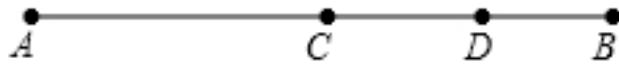
graph:

{"stem": {"pictures": [{"picturename": "1000031144_Q_1.jpg", "coordinates": {"A": "-13.04, 5.00", "B": "-13.75, 1.01", "C": "-12.34, 1.01", "D": "-9.00, 5.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "A##D", "3": "B##D", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: MultiEqualityRelation [multiExpressCompare=AB=AC=AD, originExpressRelationList=[], keyWord=null, result=null],LineParallelRelation [iLine1=AD, iLine2=BC],ProveConclusionRelation:[证]

明: EqualityRelation{ $\angle ACB=2*\angle ADB$ }]

663、topic: 如图,AB=8cm,C是线段AB的中点,D是CB的中点,求AD的长度.#%#



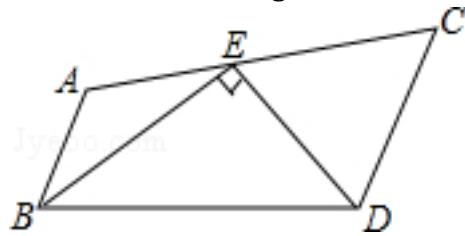
graph:

```
{"stem":{"pictures":[{"picturename":"1000072221_Q_1.jpg","coordinates":{"A": "-13.00,4.00","B": "-5.00,4.00","C": "-9.00,4.00","D": "-7.00,4.00"},"collineations":{"0": "A###C###D##B"}, "variable-equals":{},"circles":[]}, "appliedproblems":{},"substems":[]}}
```

NLP:

EqualityRelation{AD=v_0}, EqualityRelation{AB=8}, MiddlePointOfSegmentRelation{middlePoint=C, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=D, segment=CB}, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AD)}

664、topic: 如图所示,BE平分 $\angle ABD$,DE平分 $\angle CDB$,BE和DE相交于AC上一点E,如果 $\angle BED=90^\circ$,求证:AB||CD.#%#

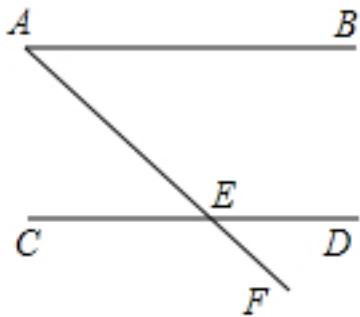


graph:

```
{"stem":{"pictures":[{"picturename":"1000030569_Q_1.jpg","coordinates":{"A": "0.99,2.66","B": "0.00,0.00","C": "9.81,4.84","D": "8.00,0.00","E": "5.40,3.75"}, "collineations": {"0": "D##E", "1": "E##B", "2": "B##A", "3": "A##E##C", "4": "C##D", "5": "D##B"}, "variable-equals":{},"circles":[]}, "appliedproblems":{},"substems":[]}}
```

NLP: AngleBisectorRelation{line=BE, angle= $\angle ABD$, angle1= $\angle ABE$, angle2= $\angle DBE$ }, AngleBisectorRelation{line=DE, angle= $\angle BDC$, angle1= $\angle BDE$, angle2= $\angle CDE$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=BE, iLine2=DE], PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, EqualityRelation{ $\angle BED=(1/2*\pi)$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=CD]]]

665、topic: 如图,已知 $\angle BAF=55^\circ$,直线CD交AF于点E,且 $\angle CEF=125^\circ$,试说明:AB||CD.#%#

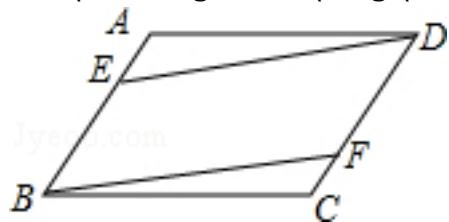


graph:

```
{"stem": {"pictures": [{"picturename": "1000032958_Q_1.jpg", "coordinates": {"A": "0.00,5.00", "B": "8.00,5.00", "C": "0.00,0.00", "D": "8.00,0.00", "E": "3.50,0.00", "F": "5.90,-3.43"}, "collineations": {"0": "B###A", "1": "A###E##F", "2": "C###E##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: EqualityRelation{ $\angle BAE = (11/36\pi)$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=CD, iLine2=AF], EqualityRelation{ $\angle CEF = (25/36\pi)$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=CD]]]

666、topic: 如图,在平行四边形ABCD中,E、F分别在AB、CD边上,且 $AE=CF$.(1)求证: $\triangle ADE \cong \triangle CBF$;(2)求证:四边形BFDE是平行四边形.

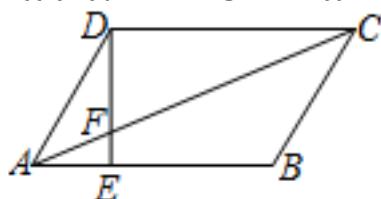


graph:

```
{"stem": {"pictures": [{"picturename": "1000001144_Q_1.jpg", "coordinates": {"D": "-8.02,7.83", "E": "-16.48,6.98", "F": "-10.32,5.19", "A": "-15.72,7.86", "B": "-18.79,4.34", "C": "-11.09,4.31"}, "collineations": {"1": "D###F###C", "2": "D###A", "3": "D###E", "4": "B###F", "5": "B###C", "0": "A###E###B"}, "questionrelies": "", "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, EqualityRelation{AE=CF}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ADE$, triangleB= $\triangle CBF$ }], ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BEDF}]]

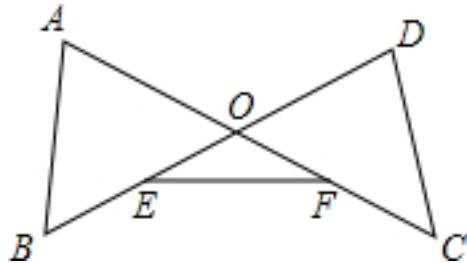
667、topic: 如图,在平行四边形ABCD中, $AE:EB=1:2$.(1)求 $\frac{\text{Area of } \triangle AEF}{\text{Area of } \triangle CDF}$;(2)如果 $\text{Area of } \triangle AEF = 6 \text{ cm}^2$,求 $\text{Area of } \triangle CDF$.



graph:
 {"stem": {"pictures": [{"picturename": "1000062179_Q_1.jpg", "coordinates": {"A": "-1.00,0.00", "B": "2.00,0.00", "C": "3.00,2.00", "D": "0.00,2.00", "E": "0.00,0.00", "F": "0.00,0.50"}, "collineations": {"0": "A###E###B", "1": "F###A###C", "2": "F###E###D", "3": "D###C", "4": "B###C", "5": "A###D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

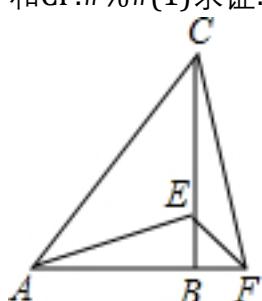
NLP:
 ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{(AE)/(BE)=(1)/(2)}, 求值(大小): (ExpressRelation:[key:]C_△AEF)/C_△CDF), EqualityRelation{S_△AEF}=6}, 求值(大小): (ExpressRelation:[key:]S_△CDF)), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]C_△AEF)/C_△CDF}), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_△CDF))}

668、topic: 如图,已知线段AC与BD相交于点O,连接AB、DC,点E为OB的中点,点F为OC的中点,连接EF.
 #%(1)添加条件 $\angle A=\angle D$, $\angle OEF=\angle OFE$.求证:AB=DC;
 #%(2)分别将“ $\angle A=\angle D$ ”记为①,“ $\angle OEF=\angle OFE$ ”记为②,“ $AB=DC$ ”记为③,添加条件①、③,以②为结论构成命题1,添加条件②、③,以①为结论构成命题2.命题1是____命题,命题2是____命题(选填“真”或“假”).#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000081419_Q_1.jpg", "coordinates": {"A": "-2.54,-0.19", "B": "-3.27,-3.99", "C": "2.75,-4.29", "D": "2.40,-0.42", "E": "-1.71,-3.01", "F": "1.30,-3.16", "O": "-0.16,-2.03"}, "collineations": {"0": "A###O###C", "1": "B###O###D", "2": "A###B", "3": "E###F", "4": "D###C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 669、topic: 如图,在 $\triangle ABC$ 中, $AB=BC$, $\angle ABC=90^\circ$, F 为 AB 延长线上一点,点 E 在 BC 上, $BE=BF$,连结 AE , EF 和 CF .#%(1)求证: $AE=CF$;
 #%(2)若 $\angle CAE=30^\circ$,求 $\angle EFC$ 的度数.#%#



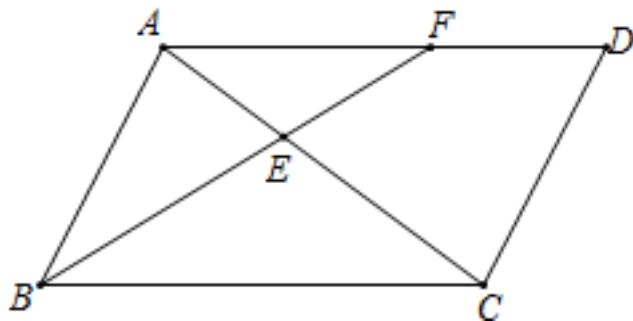
graph:
 {"stem": {"pictures": [{"picturename": "1000063717_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,0.00", "C": "0.00,4.00", "D": "0.00,1.00", "E": "1.00,0.00"}, "collineations": {"0": "A###F###B", "1": "B###E#"}}], "appliedproblems": {}, "substems": []}}

```
##C","2":"C###F","3":"A###C","4":"A###E","5":"F###E"},"variable>equals":{},"circles":[]}]}"appliedproblems":{},"substems":[]}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=BC$ }, EqualityRelation{ $\angle ABE=(1/2*\pi)$ }, PointOnLineRelation{point=F, line=AB, isConstant=false, extension=true}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{ $BE=BF$ }, SegmentRelation:AE, SegmentRelation:EF, EqualityRelation{ $\angle CAE=(1/6*\pi)$ }, 求角的大小: AngleRelation{angle= $\angle CFE$ }, ProveConclusionRelation:[证明: EqualityRelation{ $AE=CF$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CFE$)}

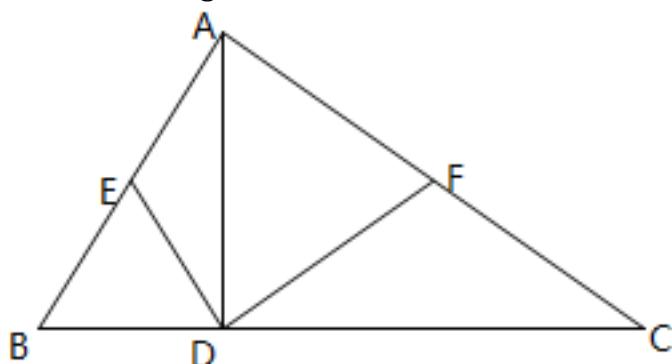
670、topic: 如图,在 $\square ABCD$ 中, $\angle ABC$ 的平分线BF分别与AC、AD交于点E、F.(1)求证: $AB=AF$;(2)当 $AB=3, BC=5$ 时,求 $\frac{AE}{AC}$ 的值.



```
graph:
{"stem":{"pictures":[{"picturename":"1000062123_Q_1.jpg","coordinates":{"A":"1.00,2.83","B":"0.00,0.00","C":"5.00,0.00","D":"6.00,2.83","E":"2.50,1.77","F":"4.00,2.83"}, "collinearities":{"0":"F###A###D","1":"E###A###C","2":"E###F###B","3":"A###B","4":"C###B","5":"C###D"}, "variable>equals":{},"circles":[]}]}"appliedproblems":{},"substems":[]}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=BF, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=BF, iLine2=AD], AngleBisectorRelation{line=BF, angle= $\angle ABC$, angle1= $\angle ABF$, angle2= $\angle CBF$ }, PointRelation:F, EqualityRelation{ $AB=3$ }, EqualityRelation{ $BC=5$ }, 求值(大小): (ExpressRelation:[key:] $((AE)/(AC))$), ProveConclusionRelation:[证明: EqualityRelation{ $AB=AF$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $((AE)/(AC))$)}

671、topic: 如图,在 $\triangle ABC$ 中,AD为边BC上的高,DE、DF分别为AB、AC上的中线,AB=6,AC=8.求DE+DF的长.

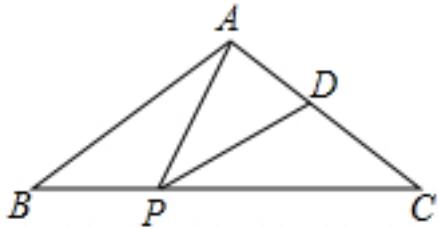


graph:

{"stem": {"pictures": [{"picturename": "1000072718_Q_1.jpg", "coordinates": {"A": "1.80,2.40", "B": "0.00,0.00", "C": "5.00,0.00", "D": "1.80,0.00", "E": "0.90,1.20", "F": "3.40,1.20"}, "collineations": {"0": "B###E###A", "1": "B##D##C", "2": "C##F##A", "3": "D##E", "4": "D##F", "5": "A##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation:△ABC, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, LineDecileSegmentRelation [iLine1=DE, iLine2=AB, crossPoint=Optional.of(E)], LineDecileSegmentRelation [iLine1=DF, iLine2=AC, crossPoint=Optional.of(F)], EqualityRelation{AB=6}, EqualityRelation{AC=8}, 求值(大小): (ExpressRelation:[key:]DE+DF), LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DE+DF)}

672、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$,点P、D分别是BC、AC边上的点,且 $\angle APD=\angle B$.#%(1)求证:\$AC\cdot CD=CP\cdot BP\$;(2)若 $AB=10, BC=12$,当 $PD\parallel AB$ 时,求BP的长.#%#

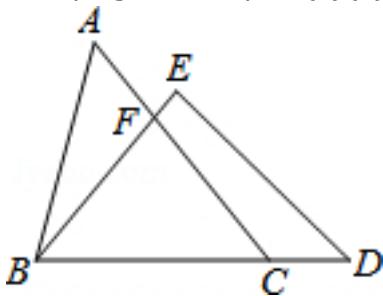


graph:

{"stem": {"pictures": [{"picturename": "1000041744_Q_1.jpg", "coordinates": {"A": "-6.00,6.00", "B": "-9.00,2.00", "C": "-3.00,2.00", "D": "-3.92,3.22", "P": "-4.83,2.00"}, "collineations": {"0": "B##A", "1": "A##D##C", "2": "B##P##C", "3": "A##P", "4": "P##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation:△ABC, EqualityRelation{AB=AC}, PointOnLineRelation{point=P, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false}, EqualityRelation{∠APD=∠ABP}, EqualityRelation{BP=v_0}, EqualityRelation{AB=10}, EqualityRelation{BC=12}, LineParallelRelation [iLine1=PD, iLine2=AB], 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{AC*CD=CP*BP}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BP)}

673、topic: 如图,在 $\triangle ABC$ 和 $\triangle BDE$ 中,点C在边BD上,边AC交边BE于点F.若 $AC=BD, AB=ED, BC=BE$,求证:\$\angle ACB=\frac{1}{2}\angle AFB\$.#%#

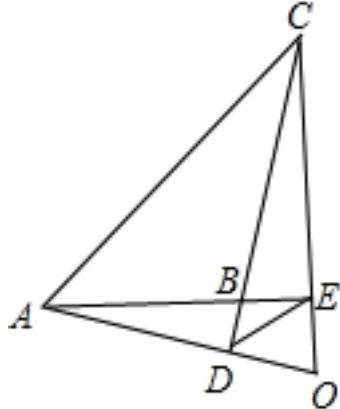


graph:

{"stem": {"pictures": [{"picturename": "1000030733_Q_1.jpg", "coordinates": {"A": "-9.29,5.54", "B": "-10.00,0.00", "C": "-7.00,0.00", "D": "-5.00,0.00", "E": "-6.00,2.00", "F": "-7.50,1.50"}, "collineations": {"0": "B##E", "1": "A##D", "2": "C##F", "3": "B##F", "4": "D##F", "5": "E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

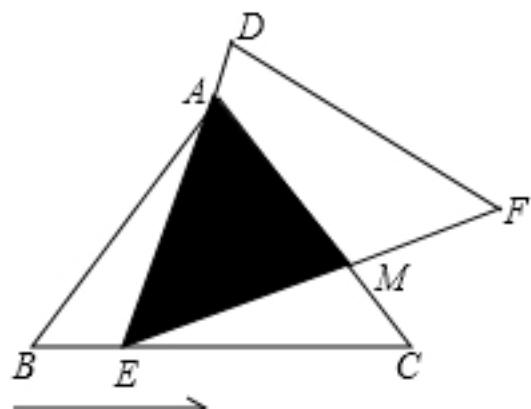
0,2.00","C": "-5.76,2.00","D": "-5.00,2.00","E": "-7.00,5.00","F": "-7.88,4.12"},"collineations":{"0": "B###C##D","1": "A###B","2": "A###F###C","3": "B###F###E","4": "E###D"},"variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []]

NLP: TriangleRelation:△ABC, TriangleRelation:△BDE, PointOnLineRelation{point=C, line=BD, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AC, iLine2=BE], EqualityRelation{AC=BD}, EqualityRelation{AB=DE}, EqualityRelation{BC=BE}, ProveConclusionRelation:[证明: EqualityRelation{∠BCF=(1/2)*∠AFB}]

674、topic: 如图,点O是△ABC的垂心(垂心即三角形三条高所在直线的交点),连接AO交CB的延长线于点D,连接CO交AB的延长线于点E,连接DE.求证:△ODE~△OCA.

graph:
{"stem": {"pictures": [{"picturename": "1000034923_Q_1.jpg", "coordinates": {"A": "-7.00,4.00", "B": "-4.78,4.02", "C": "-4.00,7.00", "D": "-4.92,3.46", "E": "-3.97,4.03", "O": "-3.99,3.23"}, "collineations": {"0": "A###D# #O", "1": "C###E###O", "2": "A###B###E", "3": "A###C", "4": "D###B###C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}]}

NLP: CoreAndShapeRelation:O/△ABC/OrthoCentre, LineCrossRelation [crossPoint=Optional.of(D), iLine1=AO, iLine2=CB], LineCrossRelation [crossPoint=Optional.of(E), iLine1=CO, iLine2=AB], SegmentRelation:DE, ProveConclusionRelation:[证明:
TriangleSimilarRelation{triangleA=△ODE, triangleB=△OCA}]

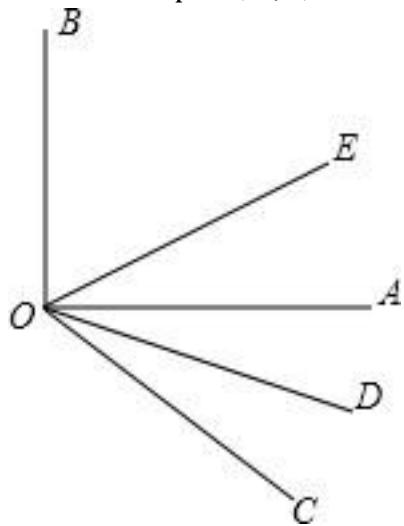
675、topic: 如图,在△ABC中,已知AB=AC=5,BC=6,且△ABC \cong △DEF,将△DEF与△ABC重合在一起,△ABC不动,△DEF运动,并满足:点E在边BC上沿B到C的方向运动,且DE始终经过点A,EF与AC交于M点.
(1)求证:△ABE~△ECM;
(2)探究:在△DEF运动过程中,重叠部分能否构成等腰三角形?若能,求出BE的长;若不能,请说明理由.

graph:

{"stem": {"pictures": [{"picturename": "1000041748_Q_1.jpg", "coordinates": {"A": "-6.00,6.00", "B": "-9.00,2.00", "C": "-3.00,2.00", "D": "-5.76,6.47", "E": "-8.00,2.00", "F": "-2.10,3.07", "M": "-3.60,2.80"}}, "collineations": [{"0": "A###M###C", "1": "B###E###C", "2": "A###B", "3": "D###A###E", "4": "E###M###F", "5": "D##F"}], "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: TriangleRelation: $\triangle ABC$, MultiEqualityRelation [multiExpressCompare=AB=AC=5, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BC=6}, TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DEF$ }, TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle DEF$, PointOnLineRelation{point=A, line=DE, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=EF, iLine2=AC], EqualityRelation{BE=v_0}, 求值(大小):
(ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:
TriangleSimilarRelation{triangleA= $\triangle ABE$, triangleB= $\triangle ECM$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BE)}

676、topic: 如图,\$\angle AOB=100^\circ\$,OE是\$\angle BOC\$的平分线,OD是\$\angle AOC\$的平分线,求\$\angle EOD\$的度数.

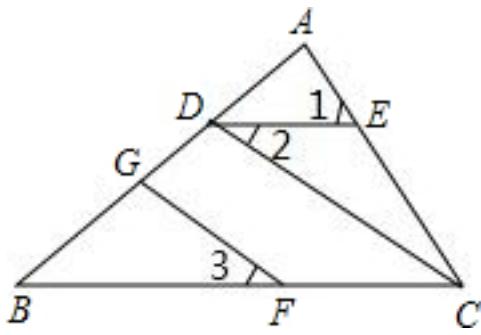


graph:

{"stem": {"pictures": [{"picturename": "1000021447_Q_1.jpg", "coordinates": {"A": "5.00,0.00", "B": "-0.86,4.86", "C": "4.67,-1.70", "D": "4.90,-0.86", "E": "3.83,3.21", "O": "0.00,0.00"}}, "collineations": {"0": "B##O", "1": "E##O", "2": "A##O", "3": "D##O", "4": "C##O"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: EqualityRelation{ $\angle AOB=(5/9*\pi)$ }, AngleBisectorRelation{line=OE, angle= $\angle BOC$, angle1= $\angle BOE$, angle2= $\angle COE$ }, AngleBisectorRelation{line=OD, angle= $\angle AOC$, angle1= $\angle AOD$, angle2= $\angle COD$ }, 求角的大小: AngleRelation{angle= $\angle DOE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DOE$)}

677、topic: 如图, $\angle 1=\angle ACB$, $\angle 2=\angle 3$,求证: $\angle BDC+\angle DGF=180^\circ$.#%#

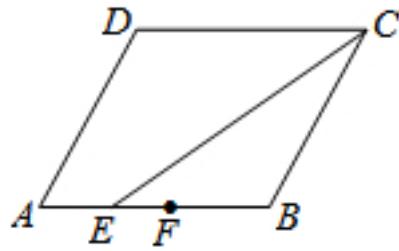


graph:

```
{"stem": {"pictures": [{"picturename": "1000063471_Q_1.jpg", "coordinates": {"A": "4.32,0.40", "B": "1.67,-2.01", "C": "5.72,-2.01", "D": "3.18,-0.64", "E": "4.92,-0.64", "F": "3.71,-2.01", "G": "2.43,-1.32"}, "collineations": [{"0": "B###A###G###D", "1": "E###A###C", "2": "F###B###C", "3": "G###F", "4": "C###D", "5": "E###D"}, "variable>equals": {"0": "\u00d7AED=\u00d7ECF", "1": "\u00d72=\u00d7CDE", "2": "\u00d73=\u00d7BFG"}, "circles": []}], "appliedproblem": "s": {}, "substems": []}}
```

NLP: EqualityRelation{ $\angle AED = \angle ECF$ }, EqualityRelation{ $\angle CDE = \angle BFG$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\angle CDG + \angle DGF = (\text{Pi})$ }]]

678、topic: 如图,在平行四边形ABCD中,已知CE是 $\angle DCB$ 的平分线,F是AB的中点,AB=6,BC=4,求AE:EF:FB的值.#%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000062092_Q_1.jpg", "coordinates": {"A": "5.00,4.00", "B": "11.00,4.00", "C": "13.16,7.37", "D": "7.16,7.37", "E": "7.00,4.00", "F": "8.00,4.00"}, "collineations": [{"0": "A###E###F##B", "1": "B###C", "2": "C###D", "3": "D###A", "4": "C###E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

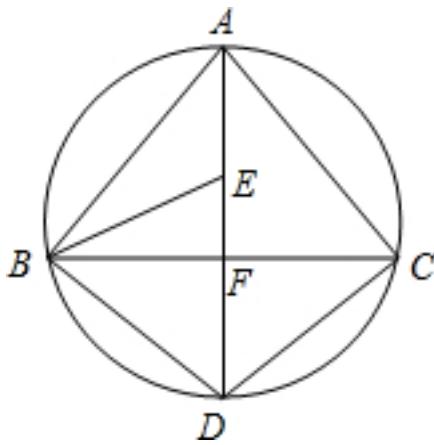
NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, AngleBisectorRelation{line=CE, angle= $\angle BCD$, angle1= $\angle BCE$, angle2= $\angle DCE$ }, MiddlePointOfSegmentRelation{middlePoint=F, segment=AB}, EqualityRelation{AB=6}, EqualityRelation{BC=4}, 求值(大小):

ProportionRelation{proportion=Proportion{proportionFactor=[Express:[AE], Express:[EF], Express:[BF]], value=null}}, SolutionConclusionRelation{relation=求值(大小)}:

ProportionRelation{proportion=Proportion{proportionFactor=[Express:[AE], Express:[EF], Express:[BF]], value=null}}}

679、topic: 如图,AD为 $\triangle ABC$ 外接圆的直径,AD $\perp BC$,垂足为F, $\angle ABC$ 的平分线交AD于点E,连接BD、CD. #%#(1)求证:BD=CD; #%#(2)请判断B、E、C三点是否在以点D为圆心,以DB为半径的圆上?并说明理由.#%#

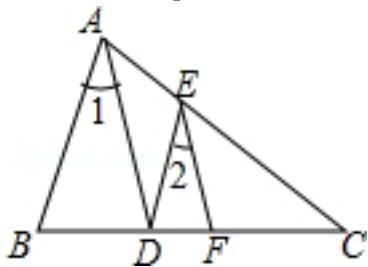


graph:

{"stem": {"pictures": [{"picturename": "1000080966_Q_1.jpg", "coordinates": {"A": "-8.12,2.70", "B": "-10.96,-2.79", "C": "-5.12,-2.71", "D": "-8.02,-4.32", "E": "-8.07,-1.00", "F": "-8.04,-2.75", "O": "-8.07,-0.81"}, "collinearities": {"0": "B###A", "1": "C###A", "2": "C##D", "3": "D##B", "4": "B##E", "5": "B##F##C", "6": "A##E##F##D##O"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##D##C"}]}, "appliedproblems": {}, "substems": []}}

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O_0$]{center= O_0 , analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }}, AngleBisectorRelation{line=BE, angle= $\angle ABF$, angle1= $\angle ABE$, angle2= $\angle EBF$ }, DiameterRelation{diameter=AD, circle=Circle[$\odot O_0$]{center= O_0 , analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$, length=null}}, LinePerpRelation{line1=AD, line2=BC, crossPoint=F}, SegmentRelation:BD, SegmentRelation:CD, CircleCenterRelation{point=D, conic=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, RadiusRelation{radius=DB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}}, ProveConclusionRelation:[证明: EqualityRelation{BD=CD}], ProveConclusionRelation:[证明: PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[B]}], ProveConclusionRelation:[证明: PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[E]}], ProveConclusionRelation:[证明: PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[C]}]

680、topic: 如图,AD平分 $\angle BAC$,EF平分 $\angle DEC$,且 $\angle 1=\angle 2$,试说明DE与AB的位置关系.#%#



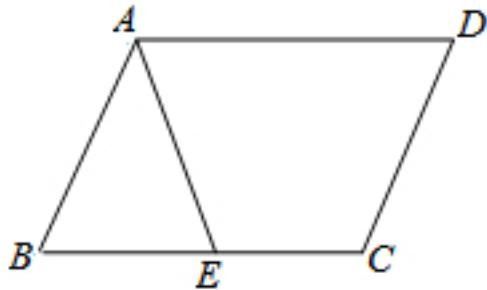
graph:

{"stem": {"pictures": [{"picturename": "40D86224443B4015B468C77A3F7AC4EF.jpg", "coordinates": {"A": "-13.00,6.00", "B": "-14.00,3.00", "C": "-7.00,3.00", "D": "-11.76,3.00", "E": "-11.08,5.04", "F": "-10.23,3.00"}, "collinearities": {"0": "A##E##C", "1": "D##A", "2": "B##A", "3": "B##D##C##F", "4": "D##E", "5": "E##F"}, "variable-equals": {"0": "\u00b21=\u00b2BAD", "1": "\u00b22=\u00b2DEF"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=AD, angle= $\angle BAE$, angle1= $\angle BAD$,

angle2= $\angle DAE$, AngleBisectorRelation{line=EF, angle= $\angle CED$, angle1= $\angle CEF$,
 angle2= $\angle DEF$, EqualityRelation{ $\angle BAD = \angle DEF$ }, JudgePostionConclusionRelation: [data1=DE,
 data2=AB]

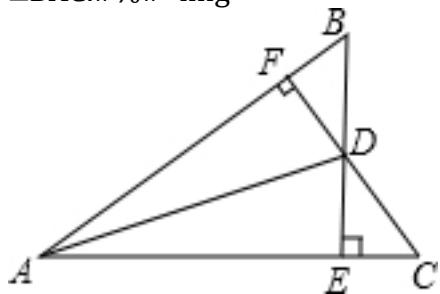
681、topic: 在平行四边形ABCD中,E为BC边上的一点,连结AE,AB=AE.求证: $\angle DAE = \angle D$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040569_Q_1.jpg", "coordinates": {"A": "2.00,4.00", "B": "0.00,0.00", "C": "5.00,0.00", "D": "7.00,4.00", "E": "4.00,0.00"}, "collineations": {"0": "E###B###C", "1": "B##A", "2": "A##E", "3": "C##D", "4": "A##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substs": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, SegmentRelation:AE, EqualityRelation{AB=AE}, ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle DAE = \angle ADC$ }]

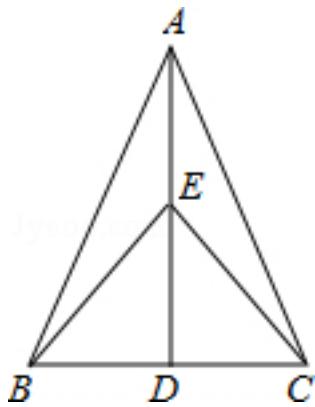
682、topic: 如图,已知BE \perp AC于E,CF \perp AB于F,BE、CF相交于点D,若BD=CD. #%#求证:AD平分 $\angle BAC$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041469_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.29,4.29", "C": "6.07,0.00", "D": "4.29,1.78", "E": "4.29,0.00", "F": "3.04,3.04"}, "collineations": {"0": "A##F##B", "1": "A##E##C", "2": "F##D##C", "3": "B##D##E", "4": "D##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substs": []}}

NLP: LinePerpRelation{line1=BE, line2=AC, crossPoint=E}, LinePerpRelation{line1=CF, line2=AB, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=BE, iLine2=CF], EqualityRelation{BD=CD}, ProveConclusionRelation:[证明:
 AngleBisectorRelation{line=AD, angle= $\angle EAF$, angle1= $\angle DAE$, angle2= $\angle DAF$ }]

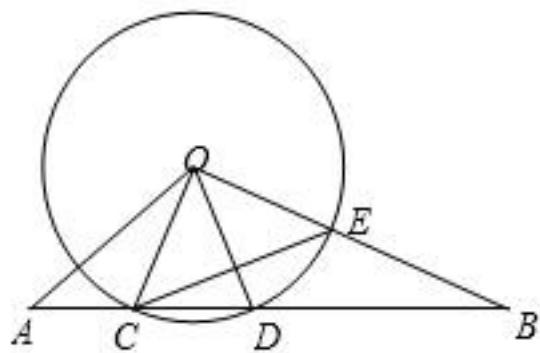
683、topic: 如图,在 $\triangle ABC$ 中,AB=AC,D是BC的中点,点E在AD上,用轴对称的性质说明:BE=CE.#%#



graph:
 {"stem": {"pictures": [{"picturename": "42573E84F70548978EFDFD146DB79038.jpg", "coordinates": {"A": "-9.00,10.00", "B": "-12.00,4.00", "C": "-6.00,4.00", "D": "-9.00,4.00", "E": "-9.00,6.00"}, "collineations": {"0": "B###A", "1": "C###A", "2": "B##E", "3": "C##E", "4": "A##E##D", "5": "B##C##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{BE=CE}]

684、topic: 如图, $\odot O$ 的半径为 6, 线段 AB 与 $\odot O$ 相交于点 C、D, $\angle AC=4^\circ$, $\angle BOD=\angle A$, OB 与 $\odot O$ 相交于点 E, 设 $OA=x$, $CD=y$. (1) 求 BD 长; (2) 求 y 关于 x 的函数解析式; (3) 当 $CE \perp OD$ 时, 求 AO 的长.

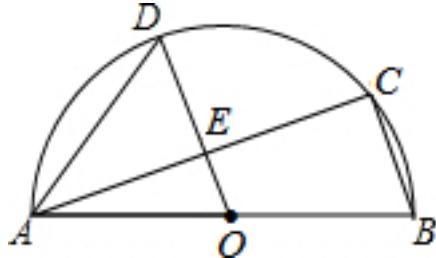


graph:
 {"stem": {"pictures": [{"picturename": "1000026049_Q_1.jpg", "coordinates": {"A": "-7.32,5.00", "B": "-12.32,-5.00", "C": "-3.32,-5.00", "D": "3.32,-5.00", "E": "5.56,-2.26", "O": "0.00,0.00"}, "collineations": {"0": "O##C", "1": "E##C", "2": "D##B##A", "3": "O##D", "4": "O##B##E", "5": "O##A"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "C##D##E"}]}, "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "2", "pictures": [], "appliedproblems": {}}]}}

NLP: RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=Express:[6]}, LineCrossCircleRelation{line=AB, circle= $\odot O$, crossPoints=[C, D], crossPointNum=2}, EqualityRelation{AC=4}, EqualityRelation{ $\angle BOD=\angle A$ }, LineCrossCircleRelation{line=OB, circle= $\odot O$, crossPoints=[E], crossPointNum=1}, EqualityRelation{AO=x}, EqualityRelation{CD=y}, EqualityRelation{BD=v_0}, EqualityRelation{CE=v_1}

yRelation{AO=v_1},LinePerpRelation{line1=CE, line2=OD, crossPoint=},求值(大小):
 (ExpressRelation:[key:]v_0),表达式之间的关系: DualExpressRelation{expresses=[Express:[y], Express:[x]]},求值(大小): (ExpressRelation:[key:]v_1),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BD)},SolutionConclusionRelation{relation=表达式之间的关系: DualExpressRelation{expresses=[Express:[y], Express:[x]]}},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AO)}

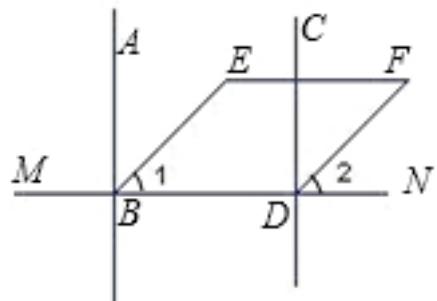
685、topic: 如图,AB是半圆O的直径,C、D是半圆O上的两点,且OD||BC,OD与AC交于点E.#%#(1)若 $\angle B=70^\circ$,求 $\angle CAD$ 的度数;#%#(2)若AB=4,AC=3,求DE的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060736_Q_1.jpg", "coordinates": {"A": "4.00,0.00", "B": "8.00,0.00", "C": "6.25,1.98", "D": "4.68,1.50", "E": "5.12,0.99", "O": "6.00,0.00"}, "collineations": {"0": "A###C##E", "1": "B##A##O", "2": "D##E##O", "3": "B##C", "4": "A##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, points=[C, D]}, LineParallelRelation [iLine1=OD, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(E), iLine1=OD, iLine2=AC], EqualityRelation{ $\angle CBO=(7/18\pi)$ },求角的大小: AngleRelation{angle= $\angle DAE$ }, EqualityRelation{DE=v_0}, EqualityRelation{AB=4}, EqualityRelation{AC=3},求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DAE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DE)}

686、topic: 如图,已知:AB⊥MN,CD⊥MN,垂足为B,D,BE,DF分别平分 $\angle ABN$, $\angle CDN$.试说明:BE||DF.#%#

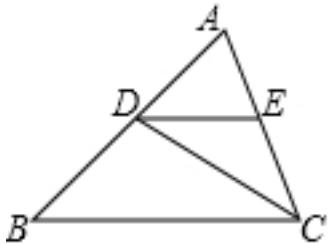


graph:
 {"stem": {"pictures": [{"picturename": "43DB8D5FC2CB4430896DF9CE02D50819.jpg", "coordinates": {"A": "-12.00,6.00", "B": "-12.00,3.00", "C": "-9.00,6.00", "D": "-9.00,3.00", "E": "-10.00,5.00", "F": "-7.00,5.00", "M": "-12.00,0.00", "N": "-9.00,0.00"}, "collineations": {"0": "A##B##M", "1": "B##E##N", "2": "C##D##M", "3": "D##F##N"}, "variable>equals": {}, "circles": []}}, "appliedproblems": {}, "substems": []}}

M": "-14.00,3.00", "N": "-7.00,3.00"}, "collineations": {"0": "B###A", "1": "C###D", "2": "B###E", "3": "D##F", "4": "E###F", "5": "B###M###N###D"}, "variable>equals": {"0": "\angle 1 = \angle EBD", "1": "\angle 2 = \angle FDN"}, "circles": [{"0": ""}], "appliedproblems": {}, "subsystems": []}

NLP: LinePerpRelation{line1=AB, line2=MN, crossPoint=B}, LinePerpRelation{line1=CD, line2=MN, crossPoint=D}, AngleBisectorRelation{line=BE, angle=\angle ABD, angle1=\angle ABE, angle2=\angle DBE}, AngleBisectorRelation{line=DF, angle=\angle CDN, angle1=\angle CDF, angle2=\angle FDN}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=BE, iLine2=DF]]]

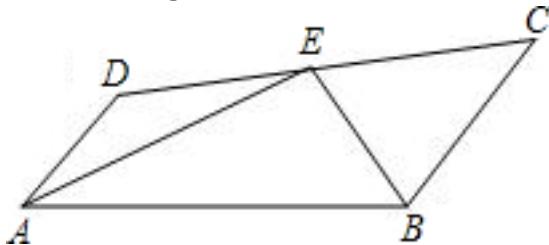
687、topic: 如图,在 $\triangle ABC$ 中,CD是 $\triangle ABC$ 的角平分线,DE $\parallel BC$,交AC于点E,已知 $\angle AED=64^\circ$, $\angle A=80^\circ$,求 $\angle BDC$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000063423_Q_1.jpg", "coordinates": {"A": "1.17,2.60", "B": "-2.92,-0.37", "C": "2.62,-0.37", "D": "-0.35,1.49", "E": "1.71,1.49"}, "collineations": {"0": "B###A###D", "1": "E###A###C", "2": "C###B", "3": "C###D", "4": "E###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle ABC$, LineParallelRelation [iLine1=DE, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AC], EqualityRelation{\mathangle AED=(16/45*\pi)}, EqualityRelation{\mathangle DAE=(4/9*\pi)}, 求角的大小: AngleRelation{angle=\mathangle BDC}, AngleBisectorRelation{line=CD, angle=\mathangle BCE, angle1=\mathangle BCD, angle2=\mathangle DCE}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] \mathangle BDC)}

688、topic: 如图:E在线段CD上,EA,EB分别平分 $\angle DAB$ 和 $\angle CBA$, $\angle AEB=90^\circ$.设AD=x,BC=y,且 $\${{\{(x-3)\}^2}}+|y-4|=0$.#%#(1)求AD和BC的长.#%#(2)你认为AD和BC还有什么关系?并验证你的结论.#%#

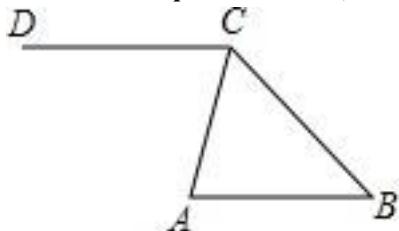


graph:
 {"stem": {"pictures": [{"picturename": "CC7C7051D87C463686BEEE9C76F4F82E.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-7.00,3.00", "C": "-4.92,6.41", "D": "-12.44,5.56", "E": "-8.68,5.99"}, "collineations": {"0": "B###A", "1": "E###A", "2": "A###D", "3": "B###C", "4": "B###E", "5": "C###D###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: PointOnLineRelation{point=E, line=CD, isConstant=false, extension=false}, AngleBisectorRelation{line=EA, angle=\mathangle BAD, angle1=\mathangle BAE,

$\text{angle2} = \angle DAE$, AngleBisectorRelation{line=EB, angle= $\angle ABC$, angle1= $\angle ABE$,
 $\text{angle2} = \angle CBE$, EqualityRelation{ $\angle AEB = (1/2 * \pi)$ }, EqualityRelation{AD=x}, EqualityRelation{BC=y}, EqualityRelation{ $((x-3)^2) + abs(y-4) = 0$ }, 求值(大小): (ExpressRelation:[key:]AD), 求值(大小): (ExpressRelation:[key:]BC), 求值(大小):
 (ExpressRelation:[key:](AD/BC)), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](AD/BC))}}

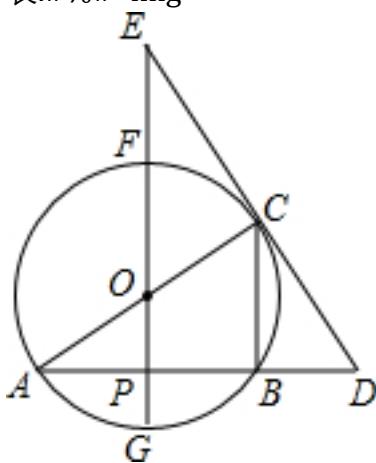
689、topic: 如图,已知 $\angle ACD = 70^\circ$, $\angle ACB = 60^\circ$, $\angle ABC = 50^\circ$. 求证: $AB \parallel CD$



graph:
 {"stem": {"pictures": [{"picturename": "1000021752_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "7.00,0.00", "C": "2.85,4.94", "D": "-4.00,4.94"}, "collineations": {"0": "A##C", "1": "B##C", "2": "D##C", "3": "A##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}

NLP:
 EqualityRelation{ $\angle ACD = (7/18 * \pi)$ }, EqualityRelation{ $\angle ACB = (1/3 * \pi)$ }, EqualityRelation{ $\angle ABC = (5/18 * \pi)$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=CD]]

690、topic: 如图, $\odot O$ 中,FG、AC是直径,AB是弦, $FG \perp AB$,垂足为点P,过点C的直线交AB的延长线于点D,交GF的延长线于点E,已知 $AB = 4$, $\odot O$ 的半径为 $\sqrt{5}$. #%(1)分别求出线段AP、CB的长;#%#(2)如果 $OE = 5$,求证:DE是 $\odot O$ 的切线;#%#(3)如果 $\tan \angle E = \frac{3}{2}$,求DE的长.#%#

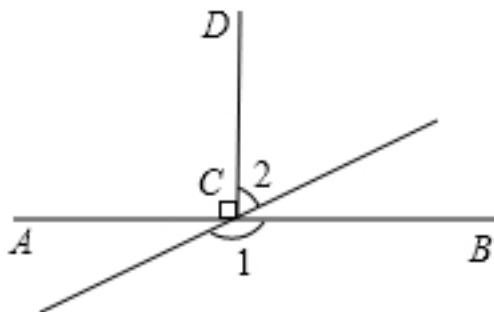


graph:
 {"stem": {"pictures": [{"picturename": "1000060769_Q_1.jpg", "coordinates": {"A": "-2.02,-0.96", "B": "2.02,-0.96", "C": "1.99,1.02", "E": "0.00,4.97", "D": "2.99,-0.98", "F": "0.00,2.24", "G": "0.00,-2.24", "O": "0.00,0.00", "P": "0.00,-0.96"}, "collineations": {"0": "A##O##C", "1": "A##P##B##D", "2": "E##F##O##P##G", "3": "C##B", "4": "E##C##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A"}]}], "appliedproblems": {}, "subsystems": []}

##C###G##B###F"]}], "appliedproblems": {}, "substems": []}

NLP: CircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, DiameterRelation{diameter=FG, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}}, DiameterRelation{diameter=AC, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}}, ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, chordLength=null, straightLine=null}}, LinePerpRelation{line1=FG, line2=AB, crossPoint=P}, EqualityRelation{AB=4}, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=Express:[$(5^{(1/2)})$]}}}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=GF, iLine2=ED], LineCrossRelation [crossPoint=Optional.of(D), iLine1=AB, iLine2=ED], PointOnLineRelation{point=C, line=ED, isConstant=false, extension=false}, 求值(大小): (ExpressRelation:[key:]AP), 求值(大小): (ExpressRelation:[key:]BC), EqualityRelation{EO=5}, EqualityRelation{DE=v_1}, EqualityRelation{tan($\angle CEF$)=(3/2)}, 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AP)}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}}, ProveConclusionRelation:[证明: LineContactCircleRelation{line=DE, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, contactPoint=Optional.of(C), outpoint=Optional.absent()}}]}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DE)}]

691、topic: 如图,CD⊥AB,垂足为C, $\angle 1=130^\circ$,求 $\angle 2$ 的度数.#%#

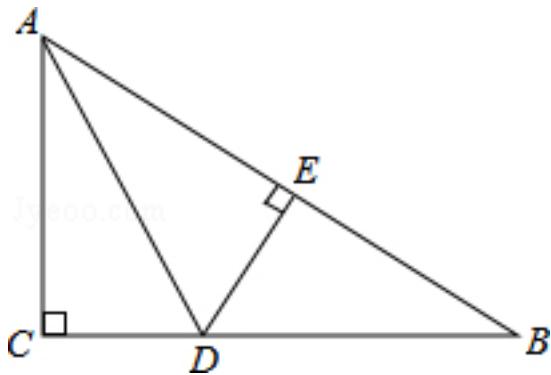


graph:

{"stem": {"pictures": [{"picturename": "1000072271_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "0.00,0.00", "D": "0.00,3.00", "E": "1.93,2.30", "F": "-2.00,-2.38"}, "collinearities": {"0": "A###C###B", "1": "E###C###F", "2": "C###D"}, "variable>equals": {"0": "\u03291=\u0329BCF", "1": "\u03292=\u0329DCE"}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LinePerpRelation{line1=CD, line2=AB, crossPoint=C}, EqualityRelation{ $\angle BCF=(13/18\pi)$ }, 求角的大小: (ExpressRelation:[key:] $\angle DCE$), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DCE$)}

692、topic: 如图,在Rt△ABC中, $\angle C=90^\circ$,AD平分 $\angle CAB$,DE⊥AB于E,若AC=6,BC=8,AB=10,CD=3.#%#(1)求DE的长;#%#(2)求△ADB的面积.#%#



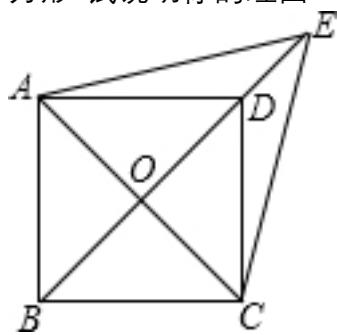
graph:

{"stem": {"pictures": [{"picturename": "4AD58AC2681C42258AB272C9A119593A.jpg", "coordinates": {"A": "-14.00,9.00", "B": "-6.00,3.00", "C": "-14.00,3.00", "D": "-11.00,3.00", "E": "-9.20,5.40"}, "collineations": {"0": "A###B##E", "1": "A##C", "2": "D##A", "3": "C##B##D", "4": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACD = (1/2 * \pi)$ }, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, EqualityRelation{AC=6}, EqualityRelation{BC=8}, EqualityRelation{AB=10}, EqualityRelation{CD=3}, EqualityRelation{DE=v_0}, 求值(大小):
 (ExpressRelation:[key]:v_0), EqualityRelation{S_ $\triangle ABD$ =v_1}, 求值(大小):
 (ExpressRelation:[key]:v_1), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key]:DE)}, SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key]:S_ $\triangle ABD$)}

693、topic: 如图,已知 $\square ABCD$ 中,对角线AC,BD交于点O,E是BD延长线上的点,且 $\triangle ACE$ 是等边三角形.
 (1)求证:四边形ABCD是菱形;
 (2)当 $\angle AED$ 与 $\angle EAD$ 满足什么数量关系时,四边形ABCD是正方形?试说明你的理由.



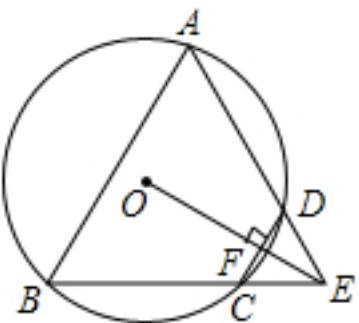
graph:

{"stem": {"pictures": [{"picturename": "1000061924_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "5.46,5.46", "O": "2.00,2.00"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##E", "3": "B##C", "4": "E##C", "5": "A##O##C", "6": "B##O##D##E", "7": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD], PointOnLineRelation{point=E, line=BD, isConstant=false, extension=true}, RegularTriangleRelation:RegularTriangle: $\triangle ACE$, SquareRelation{square=Square:ABC}

D}, JudgeTwoAnglesConnectRelation{ [$\angle AED, \angle DAE$]}, ProveConclusionRelation:[证明:
RhombusRelation{rhombus=Rhombus:ABCD}], ProveConclusionRelation:[证明:
JudgeTwoAnglesConnectRelation{ [$\angle AED, \angle DAE$]})]

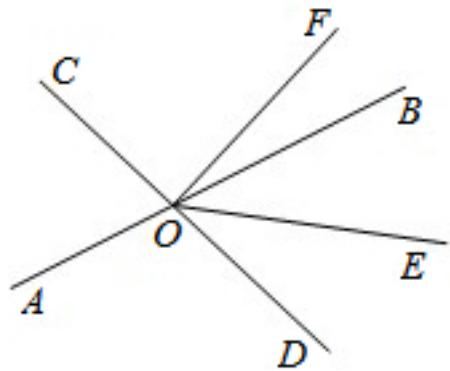
694、topic: 如图,四边形ABCD是 $\odot O$ 的内接四边形,BC的延长线与AD的延长线交于点E,且 $DC=DE$.#%#(1)求证: $\angle A=\angle AEB$;(2)连接OE,交CD于点F, $OE \perp CD$,求证: $\triangle ABE$ 是等边三角形.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000052574_Q_1.jpg", "coordinates": {"A": "0.49,2.82", "B": "-1.88,-2.16", "C": "2.20,-1.84", "D": "2.81,-0.55", "E": "3.62,-1.72", "F": "2.56,-1.19", "O": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "A###D####E", "2": "B###C###E", "3": "D###F###C", "4": "O###F###E"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C###D"}]}, "appliedproblems": {}, "substs": []}}

NLP: InscribedShapeOfCircleRelation{closedShape=ABCD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=BC, iLine2=AD], EqualityRelation{CD=DE}, SegmentRelation:OE, LineCrossRelation [crossPoint=Optional.of(F), iLine1=OE, iLine2=CD], LinePerpRelation{line1=OE, line2=CD, crossPoint=F}, ProveConclusionRelation:[证明:
EqualityRelation{ $\angle BAD=\angle CED$ }], ProveConclusionRelation:[证明:
RegularTriangleRelation:RegularTriangle: $\triangle ABE$]

695、topic: 如图,直线AB、CD相交于点O,OE平分 $\angle BOD$, $\angle AOC=76^\circ$, $\angle DOF=90^\circ$.求 $\angle EOF$ 的度数.#%#

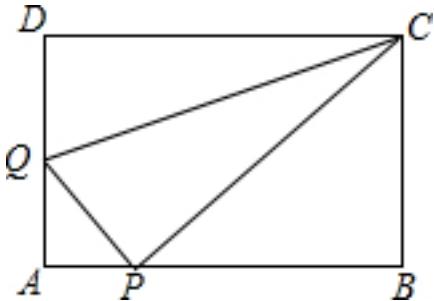


graph:
 {"stem": {"pictures": [{"picturename": "1000051524_Q_1.jpg", "coordinates": {"A": "-5.08,0.37", "B": "-0.98,2.99", "C": "-4.84,2.60", "D": "-1.18,-0.41", "E": "-0.47,1.25", "F": "-1.59,3.65", "O": "-3.42,1.43"}, "collineations": {"0": "O##E", "1": "O##F", "2": "C##O##D", "3": "A##O##B"}, "variable-equals": {}, "circles": []}]}]

appliedproblems":{},"substems":[]}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], AngleBisectorRelation{line=OE, angle= $\angle BOD$, angle1= $\angle BOE$, angle2= $\angle DOE$ }, EqualityRelation{ $\angle AOC = (19/45 * \pi)$ }, EqualityRelation{ $\angle DOF = (1/2 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle EOF$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle EOF$)}

696、topic: 如图,在矩形ABCD中,AB=5,AD=3,点P是AB边上一点(不与A、B重合),连接CP,过点P作PQ $\perp CP$,交AD边于点Q.当 $\triangle CDQ \cong \triangle CPQ$ 时,求AQ的长. #%#



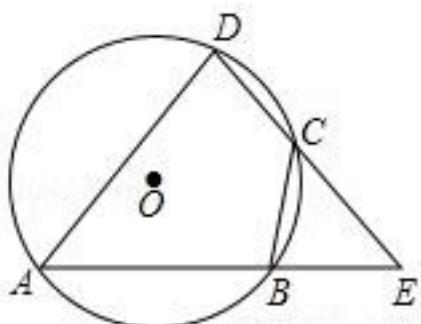
graph:

{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":1,"questionrelies":"","picture": [{"picturename":"1000061895_Q_1.jpg","coordinates":{"A":"4.00,3.00","B":"9.00,3.00","C":"9.00,6.00","D":"4.00,6.00","P":"5.00,3.00","Q":"4.00,4.33"}, "collineations": {"0": "A###P###B", "1": "B###C", "2": "C##D", "3": "D###Q###A", "4": "C##Q", "5": "C##P", "6": "Q##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid":2,"questionrelies":"","pictures": [{"picturename": "1000061895_Q_1.jpg", "coordinates": {"A": "12.00,3.00", "B": "17.00,3.00", "C": "17.00,6.00", "D": "12.00,6.00", "M": "14.50,5.50", "P": "14.00,3.00", "Q": "12.00,5.00"}, "collineations": {"0": "A###P###B", "1": "B###C", "2": "C##D", "3": "D###Q###A", "4": "C##M##Q", "5": "C##P", "6": "D##M", "7": "Q##P", "8": "P##M"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}}

NLP:

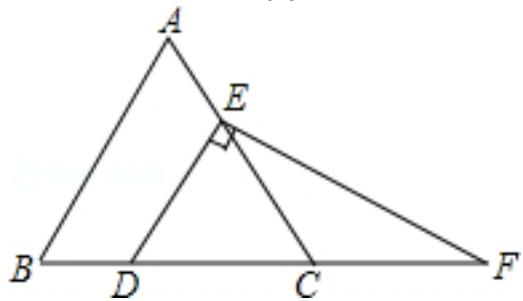
EqualityRelation{AQ=v_0}, PointRelation:A, PointRelation:B, RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=5}, EqualityRelation{AD=3}, PointOnLineRelation{point=P, line=AB, isConstant=false, extension=false}, SegmentRelation:CP, LinePerpRelation{line1=PQ, line2=CP, crossPoint=P}, LineCrossRelation [crossPoint=Optional.of(Q), iLine1=PQ, iLine2=AD], SegmentRelation:CQ, TriangleCongRelation{triangleA= $\triangle CDQ$, triangleB= $\triangle CPQ$ }, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AQ)}

697、topic: 如图,已知A、B、C、D是 $\odot O$ 上的四点,延长DC、AB相交于点E,若 $BC=BE$.求证: $\triangle ADE$ 是等腰三角形.



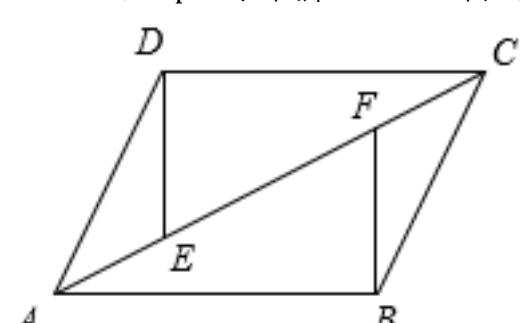
graph:
 {"stem": {"pictures": [{"picturename": "1000008190_Q_1.jpg", "coordinates": {"A": "-1.17,-5.71", "B": "7.54, -5.90", "C": "8.36,-0.72", "D": "5.98,2.13", "E": "12.78,-6.01", "O": "3.25,-2.57"}, "collineations": {"0": "D###C ####E", "1": "A###D", "2": "B###C", "3": "B###E###A"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C##D"}]}, "appliedproblems": {}, "substems": []}]}

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[A, B, C, D]}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DC, iLine2=AB], EqualityRelation{BC=BE}, ProveConclusionRelation:[IsoscelesTriangleRelation:IsoscelesTriangle: $\triangle ADE$ [Optional.of(D)]]]

698、topic: 如图,在等边三角形ABC中,点D、E分别在边BC、AC上,DE||AB,过点E作EF \perp DE,交BC的延长线于点F. #(1)求 $\angle F$ 的度数; #(2)若CD=2,求DF的长.


graph:
 {"stem": {"pictures": [{"picturename": "1000031175_Q_1.jpg", "coordinates": {"A": "-8.50,6.60", "B": "-10.0,4.00", "C": "-7.00,4.00", "D": "-9.00,4.00", "E": "-8.00,5.73", "F": "-5.00,4.00"}, "collineations": {"0": "B###D ####C##F", "1": "A###B", "2": "A###E###C", "3": "E###F", "4": "E###D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C##D"}]}, "appliedproblems": {}, "substems": []}]}

NLP: RegularTriangleRelation:RegularTriangle: $\triangle ABC$, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, LineParallelRelation [iLine1=DE, iLine2=AB], LinePerpRelation{line1=EF, line2=DE, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=BC], 求角的大小: AngleRelation{angle= $\angle CFE$ }, EqualityRelation{DF=v_0}, EqualityRelation{CD=2}, 求值(大小): (ExpressRelation:[key]:v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]: $\angle CFE$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:DF)}

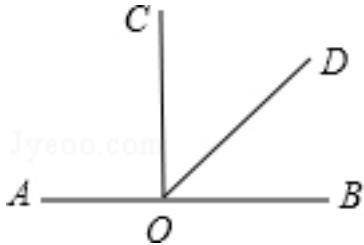
699、topic: 如图,在 $\square ABCD$ 中,E、F是AC上的两点,且AE=CF. #求证:DE=BF. #


graph:

{"stem": {"pictures": [{"picturename": "1000041805_Q_1.jpg", "coordinates": {"A": "-14.00,2.00", "B": "-10.00,2.00", "C": "-8.00,5.00", "D": "-12.00,5.00", "E": "-12.00,3.00", "F": "-10.00,4.00"}, "collineations": {"0": "A#E##F###C", "1": "D##E", "2": "A##D", "3": "B##C", "4": "F##B", "5": "A##B", "6": "C##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, EqualityRelation{AE=CF}, ProveConclusionRelation:[证明: EqualityRelation{DE=BF}]

700、topic: 如图,AOB为直线, $\angle AOD:\angle DOB=3:1$,OD平分 $\angle COB$.(1)求 $\angle AOC$ 的度数;(2)判断AB与OC的位置关系.



graph:

{"stem": {"pictures": [{"picturename": "52185629F37C47E1AB4D1E119C7EF5ED.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-6.00,3.00", "C": "-10.00,8.00", "D": "-6.00,7.00", "O": "-10.00,3.00"}, "collineations": {"0": "B##O##A", "1": "O##C", "2": "O##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

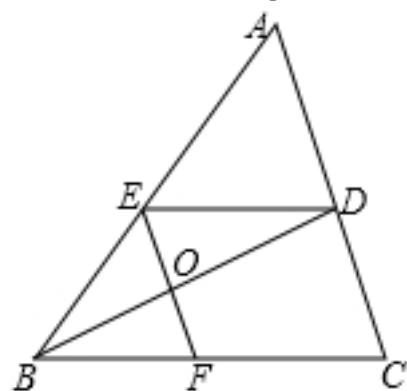
NLP:

(ExpressRelation:[key:]AOB), EqualityRelation{($\angle AOD$)/($\angle BOD$)=(3)/(1)}, AngleBisectorRelation{line=OD, angle= $\angle BOC$, angle1= $\angle BOD$, angle2= $\angle COD$ }, 求角的大小:

AngleRelation{angle= $\angle AOC$ }, SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key:] $\angle AOC$), JudgePostionConclusionRelation: [data1=AB, data2=OC]

701、topic: 已知:如图, $\triangle ABC$ 中, $\angle B$ 的平分线BD交AC于点D,DE||BC,EF||AC,EF交BD于点O.求证: $BE=CF$.

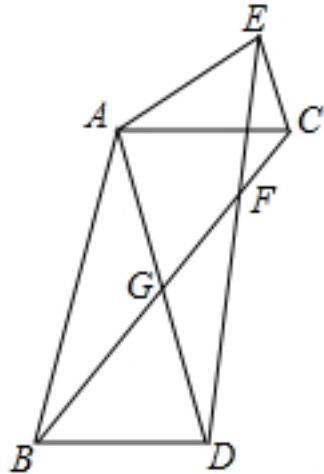


graph:

{"stem": {"pictures": [{"picturename": "1000034194_Q_1.jpg", "coordinates": {"A": "-4.58,6.01", "B": "-7.00,2.00", "C": "-3.00,2.00", "D": "-3.73,3.85", "E": "-5.88,3.85", "F": "-5.16,2.00", "O": "-5.49,2.85"}, "collineations": {"0": "A##E##B", "1": "B##F##C", "2": "C##D##A", "3": "E##D", "4": "B##O##D", "5": "E##O##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: AngleBisectorRelation{line=BD,angle= $\angle B$, angle1= $\angle DBE$,
 angle2= $\angle DBF$ },TriangleRelation: $\triangle ABC$,LineCrossRelation [crossPoint=Optional.of(D), iLine1=BD,
 iLine2=AC],LineParallelRelation [iLine1=DE, iLine2=BC],LineParallelRelation [iLine1=EF,
 iLine2=AC],LineCrossRelation [crossPoint=Optional.of(O), iLine1=EF,
 iLine2=BD],ProveConclusionRelation:[证明: EqualityRelation{BE=CF}]

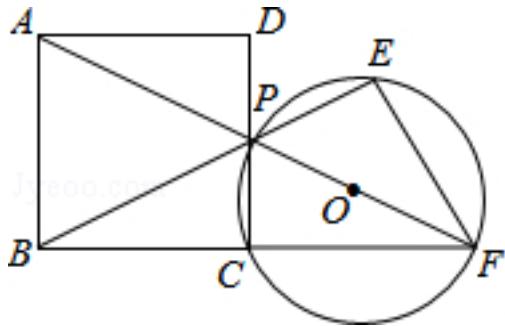
702、topic: 如图,在 $\triangle ABD$ 和 $\triangle ACE$ 中,AB=AD,AC=AE, $\angle BAD=\angle CAE$,连接BC、DE相交于点F,BC与AD相交于点G.证明: $\triangle ABC \cong \triangle ADE$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000050563_Q_1.jpg", "coordinates": {"A": "-1.47,4.02", "B": "-4.74, -4.29", "C": "7.46,4.09", "D": "1.93,-4.23", "E": "4.91,10.25", "F": "3.02,1.04", "G": "0.48,-0.70"}, "collinearations": [{"0": "A###G##D", "1": "A##C", "2": "A##B", "3": "A##E", "4": "G##B##F##C", "5": "B##D", "6": "D##E##F", "7": "C##E"}], "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation: $\triangle ABD$,TriangleRelation: $\triangle ACE$,EqualityRelation{AB=AD},EqualityRelation{AC=AE},E
 qualityRelation{ $\angle BAG=\angle CAE$ },LineCrossRelation [crossPoint=Optional.of(F), iLine1=BC,
 iLine2=DE],LineCrossRelation [crossPoint=Optional.of(G), iLine1=BC,
 iLine2=AD],ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABC$,
 triangleB= $\triangle ADE$ }]

703、topic: 如图,在边长为2的正方形ABCD中,点P是CD的中点,连接AP并延长交BC的延长线于点F,作 $\triangle CPF$ 的外接圆 $\odot O$,连接BP并延长交 $\odot O$ 于点E,连接EF,求EF的长度.

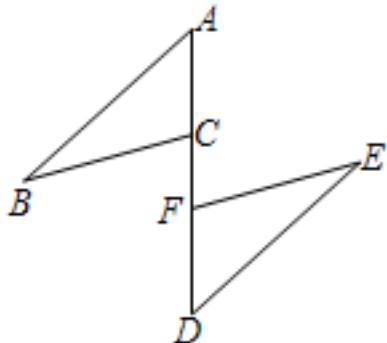


graph:
 {"stem": {"pictures": [{"picturename": "1000024965.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "6.40,3.20", "F": "8.00,0.00", "P": "4.00,2.00", "O": "6.00,1.00"}}, "collinearations": {}]}

tions": {"0": "A###B", "1": "F###C###B", "2": "F###O###P###A", "3": "A###D", "4": "P###D###C", "5": "P###E###B", "6": "E###F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "P###F###E###C"}]}, "appliedproblems": {}, "substems": []}

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle CPF$, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, EqualityRelation{EF=v_0}, SquareRelation{square=Square:ABCD}, EqualityRelation{AB=2}, MiddlePointOfSegmentRelation{middlePoint=P, segment=CD}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AP, iLine2=BC], CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LineCrossCircleRelation{line=BP, circle= $\odot O$, crossPoints=[E], crossPointNum=1}, SegmentRelation:EF, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]EF)}

704、topic: 如图,在 $\triangle ABC$ 与 $\triangle DEF$ 中,AB=DE,BC=EF,AF=DC.求证: $\triangle ABC \cong \triangle DEF$.#%#



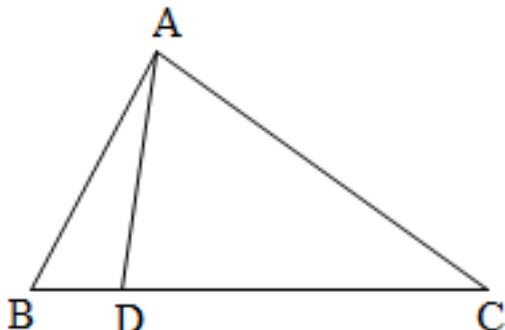
graph:

{"stem": {"pictures": [{"picturename": "", "coordinates": {"A": "-11.00,8.00", "B": "-14.00,5.00", "C": "-11.00,6.00", "D": "-11.00,2.00", "E": "-8.00,5.00", "F": "-11.00,4.00"}, "collineations": {"0": "C###A###D###F", "1": "A###B", "2": "B###C", "3": "F###E", "4": "D###E"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "substems": []}}]

NLP:

TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle DEF$, EqualityRelation{AB=DE}, EqualityRelation{BC=EF}, EqualityRelation{AF=DC}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DEF$ }]

705、topic: 如图,D为 $\triangle ABC$ 的边BC上一点,且 $\angle BAD = \angle C$,求证: $\frac{AD^2}{AC^2} = \frac{BD}{BC}$ #%#



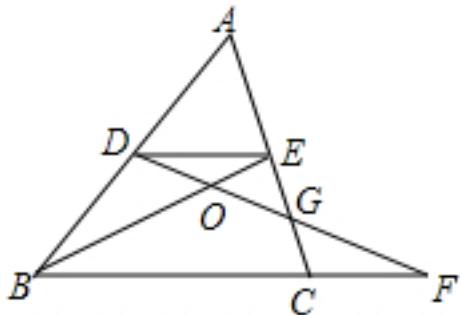
graph:

{"stem": {"pictures": [{"picturename": "1000062183_Q_1.jpg", "coordinates": {"A": "-2.06,3.62", "B": "-3.92,"}}]}

0.69", "C": "1.43,0.71", "D": "-1.62,0.70"}, "collineations": {"0": "B###C###D", "1": "B###A", "2": "A###C", "3": "A###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: TriangleRelation:△ABC, SegmentRelation:BC, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, EqualityRelation{∠BAD=∠ACD}, ProveConclusionRelation:[证明: EqualityRelation{(((AD)^2))/(((AC)^2))} = ((BD)/(BC))}]

706、topic: 如图,在△ABC中,点D,E分别是边AB,AC的中点,DF过EC的中点G并与BC的延长线交于点F,BE与DF交于点O.已知△ADE的面积为2,求四边形BOGC的面积.#%#

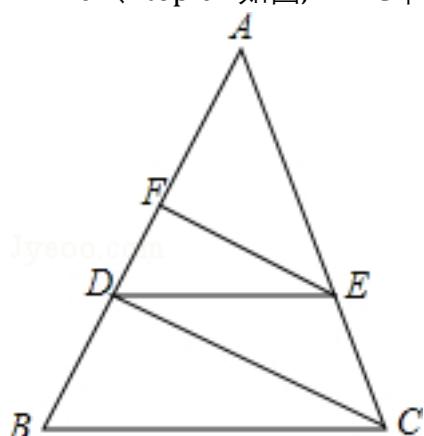


graph:

{"stem": {"pictures": [{"picturename": "1000062181_Q_1.jpg", "coordinates": {"A": "1.20,2.00", "B": "-1.20,-2.00", "C": "2.80,-2.00", "D": "0.00,0.00", "E": "2.00,0.00", "F": "4.80,-2.00", "G": "2.40,-1.00", "O": "1.20,-0.50"}}, "collineations": {"0": "A###E###G###C", "1": "D###O###G###F", "2": "B###F###C", "3": "A###D###B", "4": "E###D", "5": "B###O###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: MiddlePointOfSegmentRelation{middlePoint=G, segment=EC}, 已知条件
 QuadrilateralRelation{quadrilateral=BCGO}, EqualityRelation{S_BCGO=v_0}, TriangleRelation:△ABC, MiddlePointOfSegmentRelation{middlePoint=D, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AC}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=BC], PointOnLineRelation{point=G, line=DF, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=BE, iLine2=DF], EqualityRelation{S_△ADE=2}, 求值(大小):
 (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]S_BCGO)}

707、topic: 如图,△ABC中,DE||BC,EF||CD.求证:AD是AB和AF的比例中项.#%#

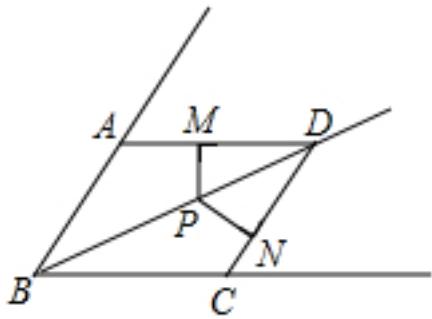


graph:

{"stem": {"pictures": [{"picturename": "1000062108_Q_1.jpg", "coordinates": {"A": "9.00,10.00", "B": "6.00,3.00", "C": "11.00,3.00", "D": "6.85,4.99", "E": "10.43,4.99", "F": "7.46,6.41"}, "collineations": {"0": "A###F##D##B", "1": "B##C", "2": "C##E##A", "3": "A##F##D##B", "4": "F##E", "5": "E##D", "6": "D##C"}, "variable-equals": {}, "circles": []}, {"appliedproblems": {}, "substems": []}]}

NLP: TriangleRelation: $\triangle ABC$, LineParallelRelation [iLine1=DE, iLine2=BC], LineParallelRelation [iLine1=EF, iLine2=CD], ProveConclusionRelation: [证明: EqualityRelation{AD^2=AF*AB}]

708、topic: 如图,已知BD是 $\angle ABC$ 的角平分线,AB=CB,点P在BD上,PM $\perp AD$ 于点M,PN $\perp CD$ 于点N,求证:PM=PN.

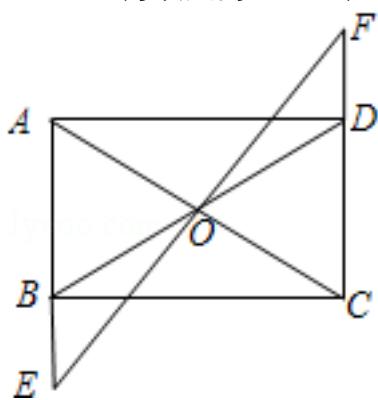


graph:

{"stem": {"pictures": [{"picturename": "1000080526_Q_1.jpg", "coordinates": {"A": "3.06,1.53", "B": "0.00,0.00", "C": "3.06,-1.53", "D": "4.34,0.00", "M": "3.63,0.85", "N": "3.63,-0.85", "P": "2.65,0.00"}, "collineations": {"0": "B###P###D", "1": "A##M##D", "2": "C##N##D", "3": "A##B", "4": "B##C", "5": "P##M", "6": "P##N"}, "variable-equals": {}, "circles": []}, {"appliedproblems": {}, "substems": []}]}

NLP: AngleBisectorRelation{line=BD, angle= $\angle ABC$, angle1= $\angle ABD$, angle2= $\angle CBD$ }, EqualityRelation{AB=BC}, PointOnLineRelation{point=P, line=BD, isConstant=false, extension=false}, LinePerpRelation{line1=PM, line2=AD, crossPoint=M}, LinePerpRelation{line1=PN, line2=CD, crossPoint=N}, ProveConclusionRelation: [证明: EqualityRelation{MP=NP}]

709、topic: 如图,在矩形ABCD中,O是AC与BD的交点,过O点的直线EF与AB、CD的延长线分别交于E、F.(1)求证:\$\vartriangle BOE \cong \vartriangle DOF\$;(2)当EF与AC满足什么关系时,以A、E、C、F为顶点的四边形是菱形?证明你的结论.



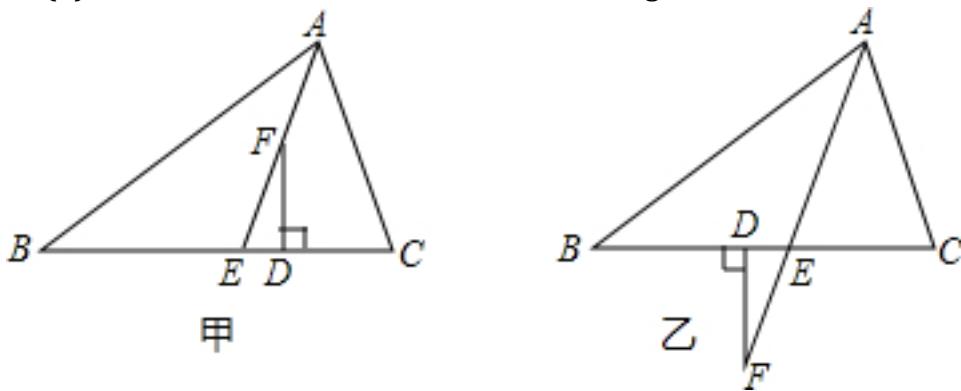
graph:

{"substems": [], {"questionrelies": "1"}, "stem": {"pictures": [{"variable-equals": {}, "picturename": "100001146_Q_1.jpg", "collineations": {"2": "E##O##F", "1": "B##O##D", "3": "B##A##E", "4": ""}}], "appliedproblems": {}, "substems": []}}

"F###C###D","5": "A###D","6":
 "B###C","0": "A###O###C"}, "coordinates": {"D": "-0.99,8.27", "E": "-7.81,1.51", "F": "-0.98,10.20", "A": "-7.79,8.29", "B": "-7.81,3.44", "C": "-1.01,3.41", "O": "-4.40,5.85"}]}}}

NLP: PointOnLineRelation{point=O, line=EF, isConstant=false, extension=false}, RectangleRelation{rectangle=Rectangle:ABCD}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD], LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=CD], RhombusRelation{rhombus=Rhombus:AECF}, 求值(大小): (ExpressRelation:[key:](EF/AC)), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BOE$, triangleB= $\triangle DOF$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](EF/AC))}, JudgePostionConclusionRelation: [data1=EF, data2=AC]

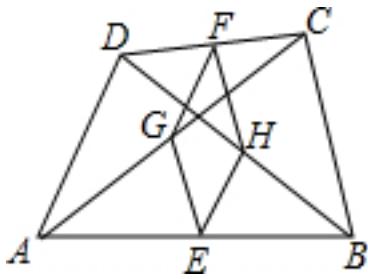
710、topic: 已知,如图甲,在 $\triangle ABC$ 中, AE 平分 $\angle BAC$ ($\angle C > \angle B$), F 为 AE 上一点,且 $FD \perp BC$ 于 D .(1)试说明: $\angle EFD = \frac{1}{2}(\angle C - \angle B)$;(2)当 F 在 AE 的延长线上时,如图乙,其余条件不变,(1)中的结论还成立吗?请说明理由.#%#



graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000041236_Q_1.jpg", "coordinates": {"A": "-1.06,3.33", "B": "-6.54,-0.90", "C": "-0.54,-0.90", "D": "-2.00,-0.90", "E": "-2.82,-0.90", "F": "-2.00,1.07"}, "collineations": {"0": "A###E###F", "1": "C##A", "2": "B##A", "3": "C##D##E##B", "4": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000041236_Q_2.jpg", "coordinates": {"A": "-1.06,3.33", "B": "-6.54,-0.90", "C": "-0.54,-0.90", "D": "-3.51,-0.90", "E": "-2.82,-0.90", "F": "-3.51,-2.54"}, "collineations": {"0": "A###E###F", "1": "C##A", "2": "B##A", "3": "C##D##E##B", "4": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}}

NLP:
 InequalityRelation{ $\angle ACD > \angle ABE$ }, TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=AE, angle= $\angle BAC$, angle1= $\angle BAE$, angle2= $\angle CAE$ }, PointOnLineRelation{point=F, line=AE, isConstant=false, extension=false}, LinePerpRelation{line1=FD, line2=BC, crossPoint=D}, PointOnLineRelation{point=F, line=AE, isConstant=false, extension=true}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle DFE = \frac{1}{2}(\angle ACD - \angle ABE)$ }]]

711、topic: 已知:如图,在四边形ABCD中, $AD=BC$,点E,F,G,H分别是AB,CD,AC,BD的中点.求证:四边形EGFH是菱形.#%#



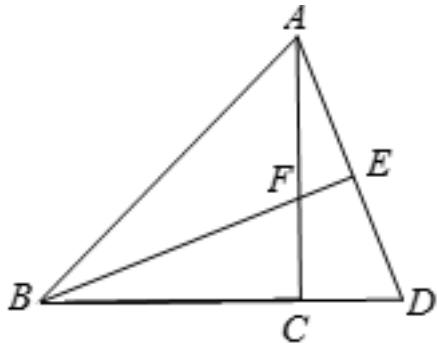
graph:

```
{"stem": {"pictures": [{"picturename": "1000050576_Q_1.jpg", "coordinates": {"A": "-7.00,3.00", "B": "-2.00,3.00", "C": "-3.12,6.24", "D": "-5.44,6.05", "E": "-4.50,3.00", "F": "-4.28,6.15", "G": "-5.06,4.62", "H": "-3.72,4.53"}, "collineations": {"0": "A###E###B", "1": "D###F###C", "2": "A###G###C", "3": "D###H###B", "4": "A###D", "5": "B###C", "6": "F###H", "7": "E###H", "8": "F###G", "9": "E###G"}, "variable>equals": {}, "circles": "[]"}, "appliedproblems": {}, "subsystems": []}}
```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{AD=BC}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=F, segment=CD}, MiddlePointOfSegmentRelation{middlePoint=G, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=H, segment=BD}, ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:EGFH}]

712、topic: 如图,已知在 $\triangle ABD$ 中, $AC \perp BD$, $BE \perp AD$, $AC=BC$,#%#(1)求证 $\triangle BCF \cong \triangle ACD$;#%#(2)若 BE 平分 $\angle ABD$, $DE=6$,#%#①求证: $BA=BD$ #%#②求 $\triangle ABF$ 的面积#%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000042046_Q_1.jpg", "coordinates": {"A": "-4.30,17.54", "B": "-9.84,12.00", "C": "-4.30,12.00", "D": "-2.00,12.00", "E": "-3.15,14.77", "F": "-4.30,14.30"}, "collineations": {"0": "A###E###D", "1": "A###B", "2": "A###F###C", "3": "B###F###E", "4": "B###C###D"}, "variable>equals": {}, "circles": "[]"}, "appliedproblems": {}, "subsystems": []}}
```

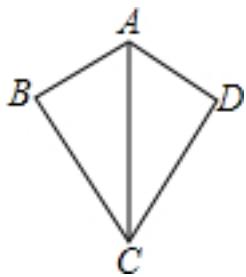
NLP: TriangleRelation: $\triangle ABD$, LinePerpRelation{line1=AC, line2=BD, crossPoint=C}, LinePerpRelation{line1=BE, line2=AD, crossPoint=E}, EqualityRelation{AC=BC}, AngleBisectorRelation{line=BE, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, EqualityRelation{DE=6}, EqualityRelation{S $_{\triangle ABF}$ =v_0}, 求值(大小):

(ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BCF$, triangleB= $\triangle ACD$ }], ProveConclusionRelation:[证明:

EqualityRelation{AB=BD}], SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:]S $_{\triangle ABF}$)}

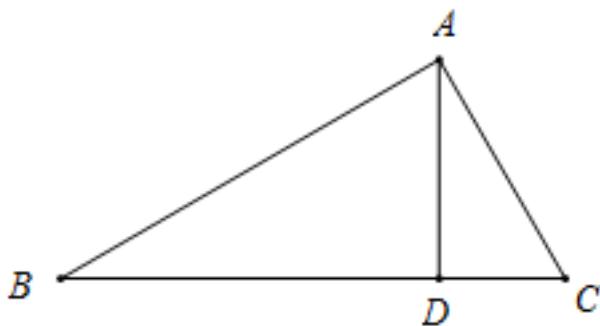
713、topic: 如图所示,已知 $AB=AD$, $BC=DC$,求证: $\angle DAC=\angle BAC$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000035454_Q_1.jpg", "coordinates": {"A": "-7.00,7.00", "B": "-8.00, 6.00", "C": "-7.00,4.00", "D": "-6.00,6.00"}, "collineations": {"0": "B##C", "1": "A##B", "2": "A##C", "3": "A##D", "4": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{AB=AD}, EqualityRelation{BC=CD}, ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle CAD = \angle BAC$ }]

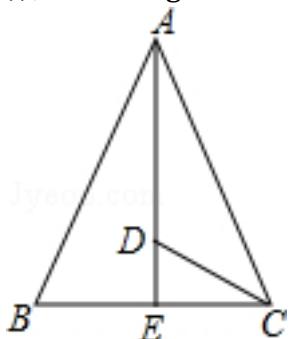
714、topic: 如图,已知 $\triangle ABC$ 中,边BC上的高为AD, $\angle C=2\angle B$, $DC=DE$,求证: $BD=AC+CD$ #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040369_Q_1.jpg", "coordinates": {"A": "-2.81,2.75", "B": "-6.56, 0.58", "C": "-1.56,0.58", "D": "-2.81,0.58", "E": "-4.06,0.58"}, "collineations": {"0": "A##C", "1": "A##D", "2": "A##B", "3": "C##D##B##E", "4": "A##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=BC, line2=AD, crossPoint=D}, EqualityRelation{ $\angle ACD = 2 * \angle ABE$ }, EqualityRelation{CD=DE}, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{ $BD = AC + CD$ }]

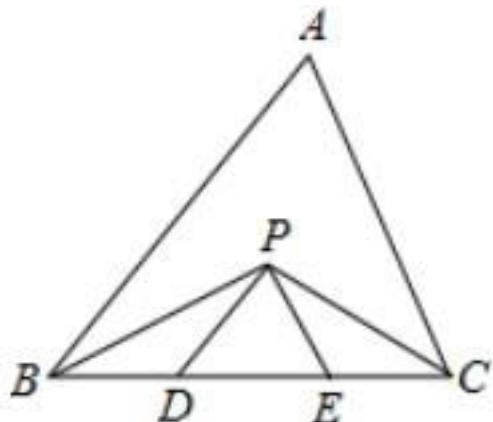
715、topic: 如图, $\triangle ABC$ 中, $AB=AC$, $\angle BAC$ 和 $\angle ACB$ 的平分线相交于点D, $\angle ADC=130^\circ$, 求 $\angle BAC$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000029253_Q_1.jpg", "coordinates": {"A": "1.61,9.13", "B": "0.00,0.00", "C": "3.22,0.00", "D": "1.61,1.35", "E": "1.61,0.00"}, "collineations": {"0": "A##B", "1": "B##C##E", "2": "A##C", "3": "A##D##E", "4": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=AE, angle= $\angle BAC$, angle1= $\angle BAE$, angle2= $\angle CAE$ }, AngleBisectorRelation{line=CD, angle= $\angle ACE$, angle1= $\angle ACD$, angle2= $\angle DCE$ }, TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, EqualityRelation{ $\angle ADC=(13/18\pi)$ }, 求角的大小: AngleRelation{angle= $\angle BAC$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BAC$)}

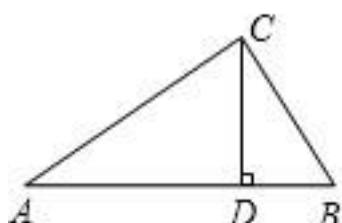
716、topic: 如图,在 $\triangle ABC$ 中,\$BC=5\$cm,BP、CP分别是 $\angle ABC$ 和 $\angle ACB$ 的角平分线,且PD $\parallel AB$,PE $\parallel AC$,求 $\triangle PDE$ 的周长是多少cm?



graph:
 [{"circles": [], "variable>equals": {}, "picturename": "100002899_Q_1.jpg", "collineations": {"3": "P##C", "2": "P##B", "1": "A##C", "0": "A##B", "6": "B##E##C", "5": "P##E", "4": "P##D"}, "coordinates": {"D": "-3.20,-2.00", "E": "-1.20,-2.03", "P": "-1.75,-0.20", "A": "-1.01,3.65", "B": "-5.50,-1.96", "C": "0.71,-2.06"}}]

NLP:
 EqualityRelation{C_△DEP=v_0}, TriangleRelation: $\triangle ABC$, EqualityRelation{BC=5}, AngleBisectorRelation{line=BP, angle= $\angle ABD$, angle1= $\angle ABP$, angle2= $\angle DBP$ }, AngleBisectorRelation{line=CP, angle= $\angle ACE$, angle1= $\angle ACP$, angle2= $\angle ECP$ }, LineParallelRelation [iLine1=PD, iLine2=AB], LineParallelRelation [iLine1=PE, iLine2=AC], 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]C_△DEP)}

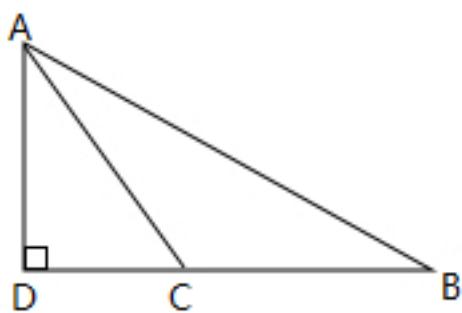
717、topic: 如图,已知在 $\triangle ABC$ 中,\$CD \perp AB\$于D,\$AC=20\$,\$BC=15\$,\$DB=9\$,求DC的长和 $\triangle ABC$ 的周长.



graph:
 {"stem": {"pictures": [{"picturename": "1000008622_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "25.00,0.00", "C": "16.00,12.00", "D": "16.00,0.00"}, "collineations": {"0": "B##C", "1": "D##C", "2": "A##C", "3": "A##D##B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{CD=v_0}, EqualityRelation{C_△ABC=v_1}, TriangleRelation:△ABC, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, EqualityRelation{AC=20}, EqualityRelation{BC=15}, EqualityRelation{BD=9}, 求值(大小): (ExpressRelation:[key:]v_0), 求值(大小): (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]CD), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]C_△ABC)}

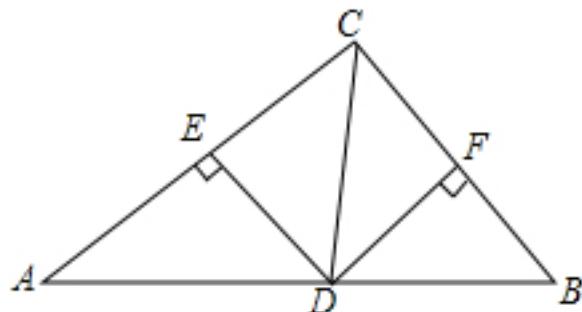
718、topic: 如图,在钝角三角形ABC中, $CB=9$, $AB=17$, $AC=10$, $AD \perp BC$, 垂足为D. 求CD的长. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000082911_Q_1.jpg", "coordinates": {"A": "-0.50,0.54", "B": "3.25,-1.46", "C": "1.00,-1.46", "D": "-0.50,-1.46"}, "collineations": {"0": "D##C##B", "1": "A##D", "2": "B##A", "3": "A##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{CD=v_0}, ObtuseTriangleRelation:ObtuseTriangle:△ABC[Optional.absent()], EqualityRelation{BC=9}, EqualityRelation{AB=17}, EqualityRelation{AC=10}, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]CD)}

719、topic: (2015·广西)如图,在△ABC中,CD平分∠ACB交AB于点D,DE⊥AC于点E,DF⊥BC于点F,且 $BC=4$, $DE=2$, 求△BCD的面积. #%#



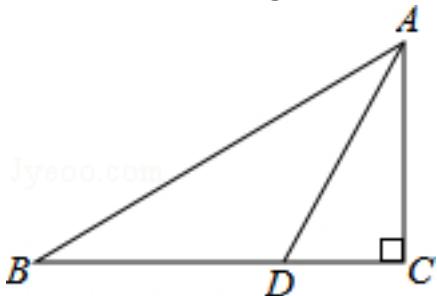
graph:

{"stem": {"pictures": [{"picturename": "1000031004_Q_1.jpg", "coordinates": {"A": "-14.87,2.03", "B": "-8.77,1.87", "C": "-11.99,5.00", "D": "-11.82,1.95", "E": "-13.43,3.52", "F": "-10.38,3.44"}, "collineations": {"0": "A##D##B", "1": "C##E##A", "2": "C##F##B", "3": "C##D", "4": "D##E", "5": "D##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{S_△BCD=v_0}, TriangleRelation:△ABC, AngleBisectorRelation{line=CD, angle=∠ECF, angle1=∠DCE, angle2=∠DCF}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=CD, iLine2=AB], LinePerpRelation{line1=DE, line2=AC, crossPoint=E}, LinePerpRelation{line1=DF, line2=BC, crossPoint=F}, EqualityRelation{BC=4}, EqualityRelation{DE=2}, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]S_△BCD)}

720、topic: (2015·大连)如图,在△ABC中,∠C=90°,AC=2,点D在BC上,∠ADC=2∠B,\$AD=\sqrt{5}\$,求BC的长.#%#



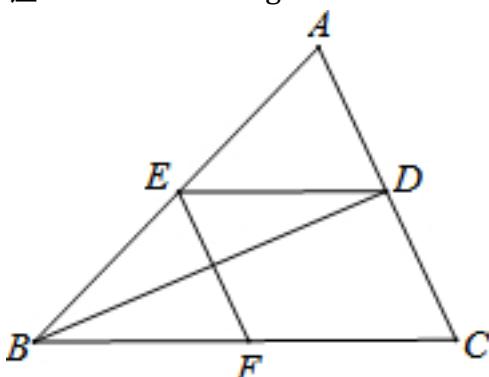
graph:

{"stem": {"pictures": [{"picturename": "1000031190_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-11.20,4.00", "C": "-8.00,4.00", "D": "-8.98,4.00"}, "collineations": {"0": "A##D", "1": "A##B", "2": "A##C", "3": "B##D##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{BC=v_0}, TriangleRelation:△ABC, EqualityRelation{∠ACD=(1/2*Pi)}, EqualityRelation{AC=2}, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, EqualityRelation{∠ADC=2*∠ABD}, EqualityRelation{AD=(5^(1/2))}, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]BC)}

721、topic: 已知:如图,BD是△ABC的角平分线,点E、F分别在AB、BC上,且ED||BC,EF||AC.#%#求证:BE=CF.#%#

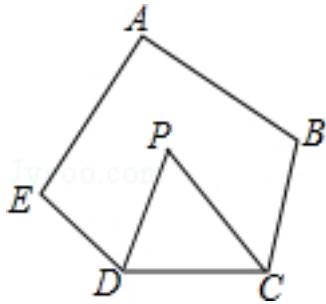


graph:

```
{"stem":{"pictures":[{"picturename":"1000081622_Q_1.jpg","coordinates":{"A":"4.00,6.00","B":"2.00,1.00","C":"8.00,1.00","D":"5.89,3.64","E":"3.05,3.64","F":"5.16,1.00"},"collineations":{"0":"A###E###B","1":"B###F###C","2":"A###D###C","3":"B###D","4":"D###E","5":"E###F"},"variable-equals":{},"circles":[]}]}, "appliedproblems":{}, "substems":[]}
```

NLP: TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false}, LineParallelRelation [iLine1=ED, iLine2=BC], LineParallelRelation [iLine1=EF, iLine2=AC], AngleBisectorRelation{line=BD, angle= $\angle EBF$, angle1= $\angle DBE$, angle2= $\angle DBF$ }, ProveConclusionRelation:[证明: EqualityRelation{BE=CF}]

722、topic: 如图,在五边形ABCDE中, $\angle A+\angle B+\angle E=300^\circ$,DP、CP分别平分 $\angle EDC$ 、 $\angle BCD$,求 $\angle P$ 的度数.#%#



graph:

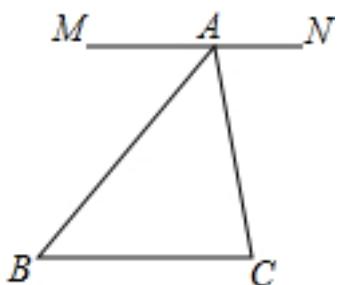
```
{"stem":{"pictures":[{"picturename":"1000031928_Q_1.jpg","coordinates":{"A":"-5.00,9.68","B":"-1.91,8.02","C":"-2.27,5.50","D":"-5.07,5.33","E":"-6.67,6.59","P":"-4.32,7.73"},"collineations":{"0":"B###A","1":"A###E","2":"E###D","3":"D###P","4":"D###C","5":"C###P","6":"C###B"},"variable-equals":{},"circles":[]}]}, "appliedproblems":{}, "substems":[]}
```

NLP:

PolygonRelation{polygon=ABCDE}, EqualityRelation{ $\angle BAE + \angle ABC + \angle AED = (5/3)\pi$ }, AngleBisectorRelation{line=DP, angle= $\angle CDE$, angle1= $\angle CDP$, angle2= $\angle EDP$ }, AngleBisectorRelation{line=CP, angle= $\angle BCD$, angle1= $\angle BCP$, angle2= $\angle DCP$ }, 求角的大小:

AngleRelation{angle= $\angle CPD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CPD$)}

723、topic: 如图,点A在直线MN上,且 $MN \parallel BC$,求证: $\angle BAC + \angle B + \angle C = 180^\circ$.#%#

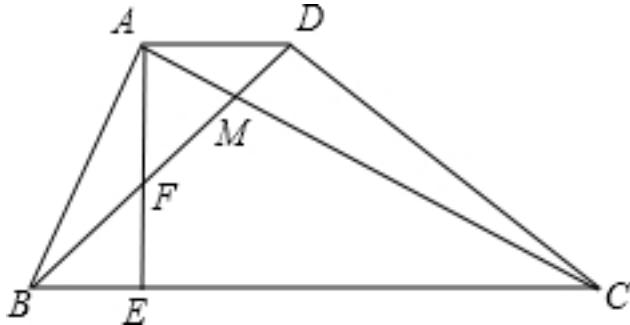


graph:

```
{"stem":{"pictures":[{"picturename":"1000035344_Q_1.jpg","coordinates":{"A":"4.00,4.00","B":"0.00,0.00","C":"5.00,0.00","M":"1.00,4.00","N":"6.00,4.00"},"collineations":{"0":"A###B","1":"A###C","2":"B###C","3":"M###A###N"},"variable-equals":{},"circles":[]}]}, "appliedproblems":{}, "substems":[]}
```

NLP: PointOnLineRelation{point=A, line=MN, isConstant=false, extension=false}, LineParallelRelation [iLine1=MN, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{ $\angle BAC + \angle ABC + \angle ACB = (\pi)$ }]

724、topic: 如图,四边形ABCD中,对角线AC、BD相交于点M,且 $AC \perp AB$, $BD \perp CD$,过点A作AE $\perp BC$,垂足为E,交BD于点F.(1)求证: $\{AB\}^2 = BF \cdot BD$ (2)若 $AB = AD$, $BE = 1$, $AE = 2$,求线段EF的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000062211_Q_1.jpg", "coordinates": {"A": "-10.00, 1.96", "B": "-11.01, 0.00", "C": "-6.22, 0.00", "D": "-7.80, 1.96", "E": "-10.00, 0.00", "F": "-10.00, 0.61", "M": "-8.81, 1.34"}, "collinearities": {"0": "A##B", "1": "C##D", "2": "D##A", "3": "B##E##C", "4": "A##F##E", "5": "A##M##C", "6": "D##M##F##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

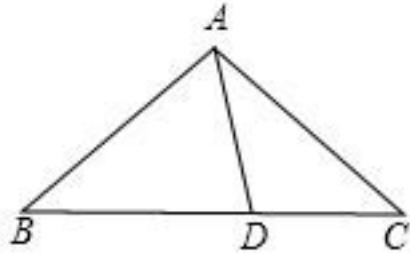
NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, LineCrossRelation[crossPoint=Optional.of(M), iLine1=AC, iLine2=BD], LinePerpRelation{line1=AC, line2=AB, crossPoint=A}, LinePerpRelation{line1=BD, line2=CD, crossPoint=D}, LinePerpRelation{line1=AE, line2=BC, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AE, iLine2=BD], EqualityRelation{EF=v_0}, EqualityRelation{AB=AD}, EqualityRelation{BE=1}, EqualityRelation{AE=2}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{((AB)^2)=BF*BD}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]EF)}

725、topic: 如图,\$\angle B=\angle ACB\$,\$CD \perp AB\$于点D,CE平分\$\angle ACB\$,若\$\angle DCE=42^\circ\$,求\$\angle BAC\$的度数.

graph:
 {"stem": {"pictures": [{"picturename": "1000021712_Q_1.jpg", "coordinates": {"A": "1.46, 2.03", "B": "-1.65, 0.00", "C": "5.00, 0.00", "D": "3.02, 3.04", "E": "0.28, 1.26"}, "collinearities": {"0": "C##D", "1": "E##B##D#A", "2": "E##C", "3": "C##A", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{ $\angle CBE = \angle ACB$ }, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, AngleBisectorRelation{line=CE, angle= $\angle ACB$, angle1= $\angle ACE$, angle2= $\angle BCE$ }, EqualityRelation{ $\angle DCE = (7/30 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle CAE$ }, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle CAE$)

726、topic: 如图,在 $\triangle ABC$ 中, $AB=BD=AC$, $AD=CD$,求 $\angle ADB$ 的度数.

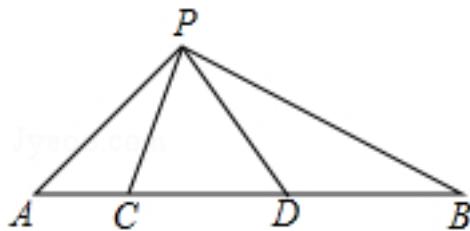


graph:

```
{"stem":{"pictures":[{"picturename":"1000021357_Q_1.jpg","coordinates":{"A": "-4.35,2.71","B": "-9.21,-0.82","C": "0.50,-0.82","D": "-3.21,-0.82"},"collineations":{"0": "A##B","1": "A##C","2": "A##D","3": "B##D##C"},"variable-equals":{},"circles":[]],"appliedproblems":{},"substems":[]}}
```

NLP: TriangleRelation:△ABC, MultiEqualityRelation [multiExpressCompare=AB=BD=AC, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AD=CD}, 求角的大小: AngleRelation{angle=∠ADB}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠ADB)}

727、topic: 如图,点C,D在线段AB上,△PCD是等边三角形,且△ACP~△PDB,求∠APB的度数.#%#

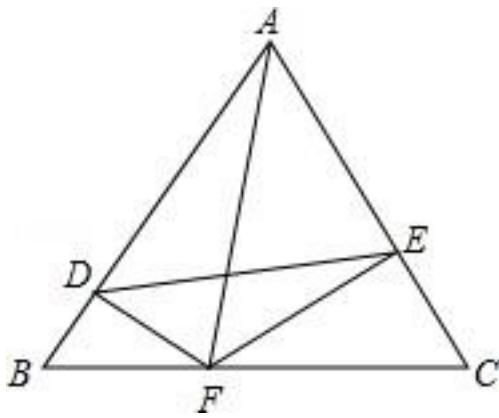


graph:

```
{"stem":{"pictures":[{"picturename":"1000050806_Q_1.jpg","coordinates":{"A": "-9.00,2.00","B": "-2.00,2.00","C": "-8.00,2.00","D": "-6.00,2.00","P": "-7.00,3.73"},"collineations":{"0": "A##P","1": "P##B","2": "P##C","3": "P##D","4": "A##B##C##D"},"variable-equals":{},"circles":[]],"appliedproblems":{},"substems":[]}}
```

NLP: PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, RegularTriangleRelation:RegularTriangle:△PCD, TriangleSimilarRelation{triangleA=△ACP, triangleB=△PDB}, 求角的大小: AngleRelation{angle=∠APB}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠APB)}

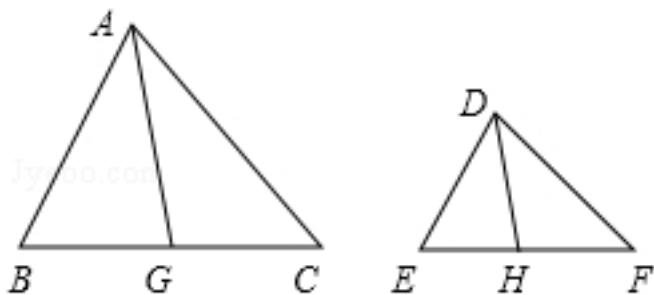
728、topic: \$\\vartriangle ABC\$为等边三角形,边长为\$a\$,\$DF\\bot AB\$,\$EF\\bot AC\$(1)求证:\$\\vartriangle BDF\\sim \\vartriangle CEF\$; #(2)若\$a=4\$,设\$BF=m\$,四边形\$ADFE\$面积为\$S\$,求出\$S\$与\$m\$之间的函数关系,并探究当\$m\$为何值时\$S\$取最大值; #(3)已知\$A\$、\$D\$、\$F\$、\$E\$四点共圆,已知\$\\tan \\angle EDF=\\frac{\\sqrt{3}}{2}\$,求此圆直径.



graph:
 {"stem": {"pictures": [{"picturename": "1000010405_Q_1.jpg", "coordinates": {"A": "2.00,3.46", "B": "0.00,0.00", "C": "4.00,0.00", "D": "0.25,0.43", "E": "3.25,1.00", "F": "1.00,0.00"}, "collinearities": {"0": "B###A###D", "1": "B###F###C", "2": "D###F", "3": "D###E", "4": "E###F"}, "variable>equals": {}, "circles": []}], "applied_problems": {}, "substems": []}}

NLP:
 RegularTriangleRelation{RegularTriangle:△ABC, EqualityRelation{AB=a}, LinePerpRelation{line1=DF, line2=AB, crossPoint=D}, LinePerpRelation{line1=EF, line2=AC, crossPoint=}, EqualityRelation{a=4}, EqualityRelation{BF=m}, 已知条件
 QuadrilateralRelation{quadrilateral=ADFE}, EqualityRelation{S_ADFE=S}, 表达式之间的关系:
 DualExpressRelation{expresses=[Express:[S], Express:[m]]}, 求值(大小):
 (ExpressRelation:[key:]m), ExtremumRelation [key=Express:[S], value=null, extremumType=MAX], MultiPointConcyclicRelation{circle=, pointSet=[A, D, F, E]}, EqualityRelation{tan(∠EDF)=(((3^(1/2))/2))}, 圆的直径:
 CircleRelation{circle=Circle[○O_0]{center=O_0, analytic=(x-x_O_0)^2+(y-y_O_0)^2=r_O_0^2}}, ProveConclusionRelation:[证明:
 TriangleSimilarRelation{triangleA=△BDF, triangleB=△CEF}], SolutionConclusionRelation{relation=表达式之间的关系: DualExpressRelation{expresses=[Express:[S], Express:[m]]}}, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]m)}, SolutionConclusionRelation{relation=圆的直径:
 CircleRelation{circle=Circle[○O_0]{center=O_0, analytic=(x-x_O_0)^2+(y-y_O_0)^2=r_O_0^2}}}

729、topic: 如图,在△ABC和△DEF中,G,H分别是边BC和EF的中点,已知
 $AB=2DE, AC=2DF, \angle BAC=\angle EDF$. #(1) 中线AG与DH的比是多少?%#(2) △ABC与△DEF的面积比是多少?%#



graph:
 {"stem": {"pictures": [{"picturename": "1000050782_Q_1.jpg", "coordinates": {"A": "-6.00,5.00", "B": "-8.00,0.00", "C": "-4.00,0.00", "D": "-2.00,5.00", "E": "-4.00,0.00", "F": "-2.00,-5.00"}, "collinearities": {"0": "B###A###C", "1": "B###D###E", "2": "D###F###E"}, "variable>equals": {}, "circles": []}], "applied_problems": {}, "substems": []}}

```

2.00","C":"-3.00,2.00","D":"1.00,3.50","E":"0.00,2.00","F":"2.50,2.00","G":"-5.50,2.00","H":"1.25,2.00"},"
collineations": {"0":"A###C","1":"A##B","2":"A##G","3":"B##C##G","4":"D##E","5":"D##F","
6":"D##H","7":"F##E##H"},"variable-equals":{},"circles":[]}, "appliedproblems":{},"substems":[]}
}

```

NLP:

TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle DEF$, MiddlePointOfSegmentRelation{middlePoint=G, segment=BC}, MiddlePointOfSegmentRelation{middlePoint=H, segment=EF}, EqualityRelation{AB=2*DE}, EqualityRelation{AC=2*DF}, EqualityRelation{ $\angle BAC = \angle EDF$ }, 求值(大小):

(ExpressRelation:[key:] (AG/DH)), EqualityRelation{ $S_{\triangle ABC} = v_0$ }, EqualityRelation{ $S_{\triangle DEF} = v_1$ }, 求值(大小): (ExpressRelation:[key:] v_0/v_1), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] (AG/DH)), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] v_0/v_1)

730、topic: 如图所示,点C在线段AB上, $AC=8cm$, $CB=6cm$, 点M、N分别是AC、BC的中点.
求线段MN的长; (2)若C为线段AB上任意一点,满足 $AC+CB=acm$, 其他条件不变,你能猜想出MN的长度吗? 并说明理由; (3)若C在线段AB的延长线上,且满足 $AC-CB=bcm$, M、N分别为AC、BC的中点,你能猜想出MN的长度吗? 请画出图形,写出你的结论,并说明理由.



graph:

```

{"stem": {"pictures": [{"picturename": "1000021420_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "M": "4.00,0.00", "C": "8.00,0.00", "N": "11.00,0.00", "B": "14.00,0.00"}, "collineations": {"0": "A##M##C##N##B"}, "variable-equals": {}}, "circles": []}, "appliedproblems": {}, "substems": []}
}

```

NLP: PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{AC=8}, EqualityRelation{BC=6}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BC}, EqualityRelation{MN=v_0}, 求值(大小):

(ExpressRelation:[key:] v_0), EqualityRelation{MN=v_1}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{AC+BC=a*c*m}, 求值(大小):

(ExpressRelation:[key:] v_1), EqualityRelation{MN=v_2}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{AC-BC=b*c*m}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BC}, 求值(大小):

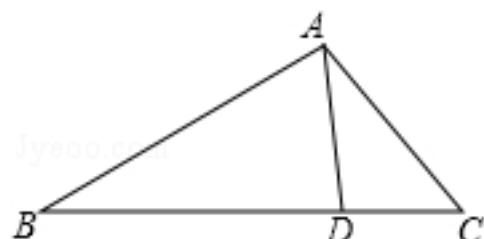
(ExpressRelation:[key:] v_2), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] MN), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] MN), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] MN)

731、topic: 如图,D是 $\triangle ABC$ 的边BC上一点,已知 $AB=4$, $AD=2$, $\angle DAC = \angle B$, 若 $\triangle ABD$ 的面积为a, 求 $\triangle ACD$ 的面积.

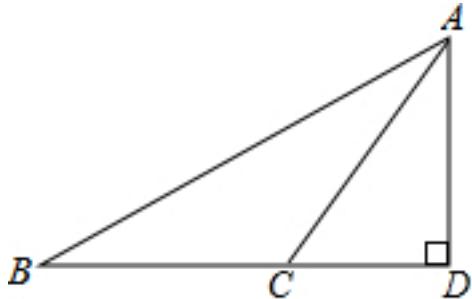


graph:

{"stem": {"pictures": [{"picturename": "1000034956_Q_1.jpg", "coordinates": {"A": "-3.51,5.97", "B": "-6.93,4.00", "C": "-1.51,4.00", "D": "-2.98,4.00"}, "collineations": {"0": "B###A", "1": "A###D", "2": "A###C", "3": "B###D###C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{ $S_{\triangle ACD}=v_0$ }, TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=D, line=BC, isConstant=false}, EqualityRelation{AB=4}, EqualityRelation{AD=2}, EqualityRelation{ $\angle CAD=\angle ABD$ }, EqualityRelation{ $S_{\triangle ABD}=a$ }, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]S_△ACD)}

732、topic: 如图,已知CB=9,AB=17,AC=10,AD⊥BC于点D,求AD的长.#%#

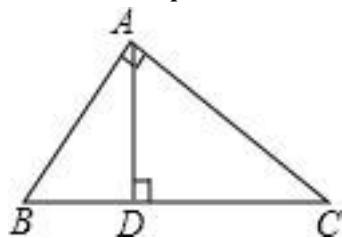


graph:

{"stem": {"pictures": [{"picturename": "1000060863_Q_1.jpg", "coordinates": {"A": "15.00,8.00", "B": "0.00,0.00", "C": "9.00,0.00", "D": "15.00,0.00"}, "collineations": {"0": "C###A", "1": "D###A", "2": "B###A", "3": "D###C###B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
EqualityRelation{AD=v_0}, EqualityRelation{BC=9}, EqualityRelation{AB=17}, EqualityRelation{AC=10}, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, 求值(大小):
(ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AD)}

733、topic: 如图,在 $\triangle ABC$ 中, $\angle BAC=90^\circ$, $AB=15$, $AC=20$, $AD \perp BC$,垂足为D.求AD、BD的长.#%#



graph:

{"stem": {"pictures": [{"picturename": "1000061329_Q_1.jpg", "coordinates": {"A": "0.00,12.00", "B": "-9.00,0.00", "C": "16.00,0.00", "D": "0.00,0.00"}, "collineations": {"0": "B###D###C", "1": "D###A", "2": "A###B", "3": "A###C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:
TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle BAC=(1/2*\pi)$ }, EqualityRelation{AB=15}, EqualityRelation{AC=20}, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, 求值(大小): (ExpressRelation:[key:]AD),

求值(大小): (ExpressRelation:[key:]BD),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BD)}

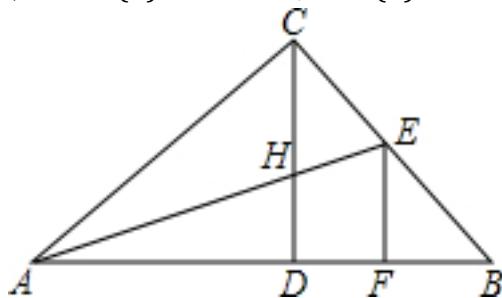
734、topic: 如图,已知A、B、C是数轴上三点,点C表示的数为6,BC=4,AB=12. #%(1)写出数轴上点A、B表示的数;#%(2)动点P、Q分别从A、C同时出发,点P以每秒6个单位长度的速度沿数轴向右匀速运动,点Q以每秒3个单位长度的速度沿数轴向左匀速运动,M为AP的中点,点N在线段CQ上,且 $\$CN=\frac{1}{3}CQ$.设运动时间为t($t>0$)秒.#%#①求数轴上点M、N表示的数(用含t的式子表示);#%#②t为何值时,原点O恰为线段PQ的中点.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000083110_Q_1.jpg", "coordinates": {"A": "-6.48, 1.35", "B": "-0.48, 1.32", "C": "1.52, 1.31", "O": "-1.48, 1.33"}, "collinearations": {"0": "A###O###B##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: PointOnLineRelation{point=A, line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=B, line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation{point=C, line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false}, PointRelation:C(6,0), EqualityRelation{BC=4}, EqualityRelation{AB=12}, KnowledgePointWordRelation{knowledgeWord=KNOWLEDGE_WORD{knowledgeDesc='数轴', knowledgeId='110200'}}, InequalityRelation{t>0}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AP}, PointOnLineRelation{point=N, line=CQ, isConstant=false, extension=false}, EqualityRelation{CN=(1/3)*CQ}, MiddlePointOfSegmentRelation{middlePoint=O, segment=PQ}, PointCoincidenceRelation{point1=O, point2=W_9(0,0)}, 求值(大小): (ExpressRelation:[key:]t), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]t)}

735、topic: 在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$,CD是AB边上的高,角平分线AE交CD于H,EF $\perp AB$ 于F,求证:#%(1) $\angle ACD=\angle B$;#%(2) $CH=EF$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041261_Q_1.jpg", "coordinates": {"A": "-4.02, -0.13", "B": "4.25, -0.13", "C": "-0.13, 4.00", "D": "-0.13, -0.13", "E": "1.65, 2.32", "F": "1.65, -0.13", "H": "-0.13, 1.55"}, "collinearations": {"0": "A###F###D##B", "1": "A##C", "2": "E##H", "3": "D##H##C", "4": "F##E", "5": "E##C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

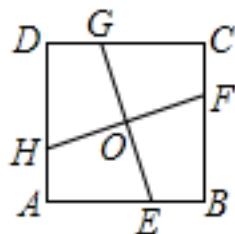
NLP:
 RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACE=(1/2*\pi)$ }, LinePer

```

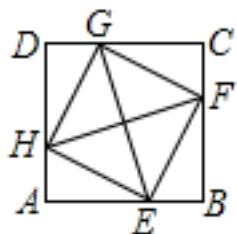
pRelation{line1=CD, line2=AB, crossPoint=D},LineCrossRelation [crossPoint=Optional.of(H),
iLine1=AE, iLine2=CD],LinePerpRelation{line1=EF, line2=AB,
crossPoint=F},LinePerpRelation{line1=CD, line2=AD,
crossPoint=D},AngleBisectorRelation{line=AE,angle=∠CAD, angle1=∠CAE,
angle2=∠DAE},ProveConclusionRelation:[证明:
EqualityRelation{∠ACH=∠EBF}],ProveConclusionRelation:[证明: EqualityRelation{CH=EF}]

```

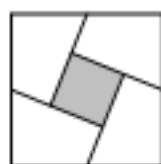
736、topic: 如图①,在正方形ABCD中,E、F、G、H分别为AB、BC、CD、DA上的点,HA=EB=FC=GD,连接EG、FH,交点为O. #%(1)如图②,连接EF、FG、GH、HE,试判断四边形EFGH的形状,并证明你的结论; #%(2)将正方形ABCD沿线段EG、HF剪开,再把得到的四个四边形按图③的方式拼接成一个四边形,若正方形ABCD的边长为3cm,HA=EB=FC=DG=1cm,则图③中阴影部分的面积为____\$ {{c
m}^2}\$. #%#



图①



图②



图③

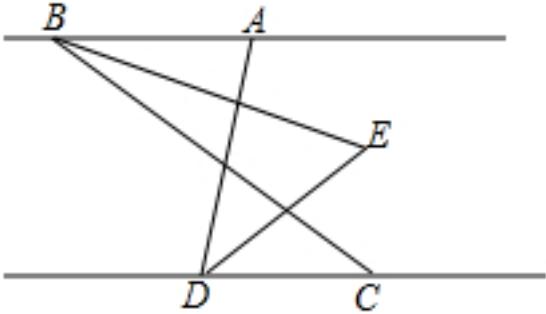
```

graph:
{"stem":{"pictures":[],"appliedproblems":{},"substems":[{"substemid":"1","questionrelies":"","picture
s":[{"picturename":"1000041044_Q_1.jpg","coordinates":{"A":"0.00,0.00","B":"3.00,0.00","C":"3.00,3.0
0","D":"0.00,3.00","E":"2.00,0.00","F":"3.00,2.00","G":"1.00,3.00","H":"0.00,1.00","O":"1.50,1.50"},"colli
neations":{"0":"A##E##B","1":"B##F##C","2":"C##G##D","3":"D##H##A","4":"G##O#
#E","5":"F##O##H"},"variable>equals":{},"circles":[]}]}, "appliedproblems":{}]}

```

NLP: SquareRelation{square=Square:ABCD},PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false},PointOnLineRelation{point=F, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=G, line=CD, isConstant=false, extension=false},PointOnLineRelation{point=H, line=DA, isConstant=false, extension=false},MultiEqualityRelation [multiExpressCompare=AH=BE=CF=DG, originExpressRelationList=[], keyWord=null, result=null],SegmentRelation:EG,SegmentRelation:FH,MultiPointCollinearRelation:[E, F],MultiPointCollinearRelation:[F, G],MultiPointCollinearRelation:[G, H],MultiPointCollinearRelation:[H, E],SegmentRelation:HF,SquareRelation{square=Square:ABCD},EqualityRelation{AB=3},MultiEquality Relation [multiExpressCompare=AH=BE=CF=DG=1, originExpressRelationList=[], keyWord=null, result=null],ShapeJudgeConclusionRelation{geoEle=EFGH}

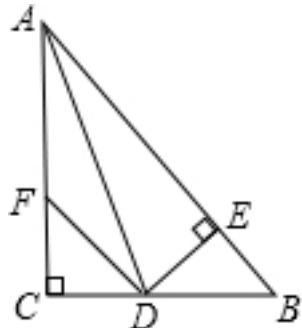
737、topic: 如图,已知AB||CD,BE平分∠ABC,DE平分∠ADC,∠BAD=80°,试求:#%(1)∠EDC的度数; #%(2)若∠BCD=n°,试求∠BED的度数(用含n的式子表示). #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060050_Q_1.jpg", "coordinates": {"A": "5.00,5.00", "B": "1.00,5.00", "C": "7.00,0.00", "D": "4.12,0.00", "E": "7.34,2.70"}, "collineations": {"0": "B##A", "1": "A##D", "2": "B#E", "3": "B##C", "4": "D##C", "5": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], AngleBisectorRelation{line=BE, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, AngleBisectorRelation{line=DE, angle= $\angle ADC$, angle1= $\angle ADE$, angle2= $\angle CDE$ }, EqualityRelation{ $\angle BAD = (4/9\pi)$ }, 求角的大小: AngleRelation{angle= $\angle CDE$ }, 求角的大小: AngleRelation{angle= $\angle BED$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CDE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BED$)}

738、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$,AD是 $\angle BAC$ 的平分线,DE $\perp AB$ 于点E,点F在AC上,BD=DF.求证:(1)CF=EB;(2)AB=AF+2EB.

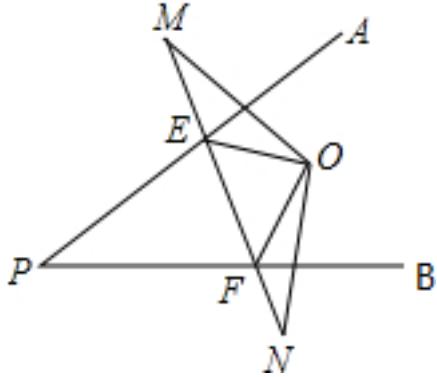


graph:
 {"stem": {"pictures": [{"picturename": "1000038045_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "5.00,-1.00", "C": "0.00,-1.00", "D": "2.07,-1.00", "E": "3.54,0.46", "F": "0.00,1.07"}, "collineations": {"0": "A##F##C", "1": "A##D", "2": "A##E##B", "3": "B##D##C", "4": "D##F", "5": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle DCF = (1/2\pi)$ }, AngleBisectorRelation{line=AD, angle= $\angle EA$ F, angle1= $\angle DAE$, angle2= $\angle DAF$ }, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, EqualityRelation{BD=DF}, ProveConclusionRelation:[证明: EqualityRelation{CF=BE}], ProveConclusionRelation:[证明: EqualityRelation{AB=AF+2*BE}]

739、topic: 如图所示,已知O是 $\angle APB$ 内的一点,M、N分别是点O关于PA、PB的对称点,连接MN,与

PA、PB分别相交于点E、F,已知MN=5cm.(1)求 $\triangle OEF$ 的周长;(2)连接PM、PN,判断 $\triangle PMN$ 的形状,并说明理由;(3)若 $\angle APB=\alpha$,求 $\angle MPN$ (用含 α 的代数式表示).

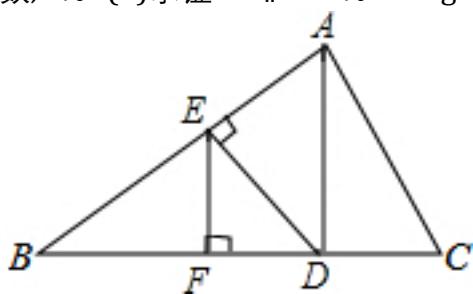


graph:

```
{"stem": {"pictures": [{"picturename": "1000072738_Q_1.jpg", "coordinates": {"A": "-9.16,7.52", "B": "-8.00,4.00", "E": "-10.59,5.75", "F": "-9.79,4.00", "M": "-11.21,7.11", "N": "-9.13,2.57", "O": "-9.13,5.43", "P": "-12.00,4.00"}, "collineations": {"0": "O##E", "1": "O##F", "2": "O##N", "3": "O##M", "4": "A##E##P", "5": "P##F##B", "6": "M##E##F##N"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}
```

NLP: SymmetricRelation{preData=M,afterData=O,symmetric=StraightLine[AP]
 analytic :y=k_PA*x+b_PA slope:null b:null isLinearFunction:false,
 pivot=},SymmetricRelation{preData=N,afterData=O,symmetric=StraightLine[BP]
 analytic :y=k_PB*x+b_PB slope:null b:null isLinearFunction:false,
 pivot=},SegmentRelation:MN,LineCrossRelation [crossPoint=Optional.of(E), iLine1=MN,
 iLine2=PA],LineCrossRelation [crossPoint=Optional.of(F), iLine1=MN,
 iLine2=PB],EqualityRelation{MN=5},EqualityRelation{C_△EFO=v_0},求值(大小):
 (ExpressRelation:[key:]v_0),SegmentRelation:PM,SegmentRelation:PN,(ExpressRelation:[key:]α),Equa
 lityRelation{∠EPF=α},求角的大小:
 AngleRelation{angle=∠MPN},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]C_△EFO)},SolveGeoShapeConclusionRelation{iPolygon=△PMN,
 iPolygonType=SOLVEENCLOSESHAPE},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]∠MPN)}

740、topic: 如图,EF⊥BC,DE⊥AB,∠B=∠ADE=30°.(1)用“三角形内角和等于180°”求 $\angle FED$ 的度数;(2)求证:AD||EF.

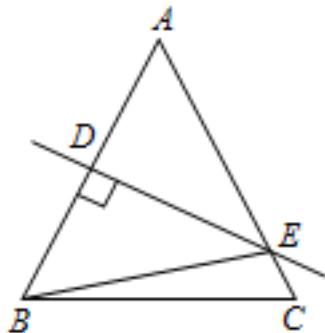


graph:

```
{"stem": {"pictures": [{"picturename": "1000038018_Q_1.jpg", "coordinates": {"A": "-11.00,3.00", "B": "-14.50,0.98", "C": "-9.83,0.98", "D": "-11.03,0.98", "E": "-11.91,2.47", "F": "-11.91,0.98"}, "collineations": {"0": "A##E##B", "1": "B##F##D##C", "2": "A##D", "3": "E##F", "4": "A##C", "5": "E##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}
```

NLP: LinePerpRelation{line1=EF, line2=BC, crossPoint=F}, LinePerpRelation{line1=DE, line2=AB, crossPoint=E}, MultiEqualityRelation [multiExpressCompare= $\angle EBF = \angle ADE = (1/6 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], 求角的大小:
 AngleRelation{angle= $\angle DEF$ }, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle DEF$)}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AD, iLine2=EF]]]

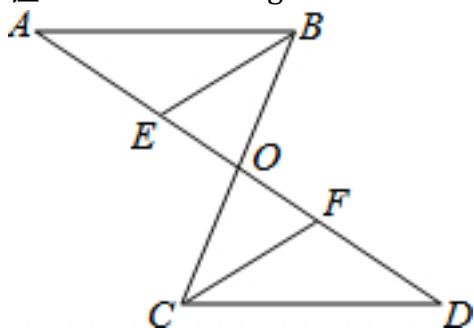
741、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, D 是 AB 的中点, $DE \perp AB$,垂足为 D ,已知 $\triangle BCE$ 的周长是8,且 $AC-BC=2$,求 AB, BC 的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000063508_Q_1.jpg", "coordinates": {"A": "1.50,4.77", "B": "0.00,0.00", "C": "3.00,0.00", "D": "0.75,2.38", "E": "2.41,1.86"}, "collineations": {"0": "A##D##B", "1": "A##E##C", "2": "D##E", "3": "C##B", "4": "B##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=AC$ }, MiddlePointOfSegmentRelation{middlePoint=D, segment=AB}, LinePerpRelation{line1=DE, line2=AB, crossPoint=D}, EqualityRelation{ $C_{\triangle BCE}=8$ }, EqualityRelation{ $AC-BC=2$ }, 求值(大小):
 (ExpressRelation:[key:]AB), 求值(大小):
 (ExpressRelation:[key:]BC), SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]AB)}, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]BC)}}

742、topic: 已知:如图, $AB \parallel CD$, $AB=CD$, AD 、 BC 相交于点 O , $BE \parallel CF$, BE 、 CF 分别交 AD 于点 E 、 F .求证: $BE=CF$.#%#

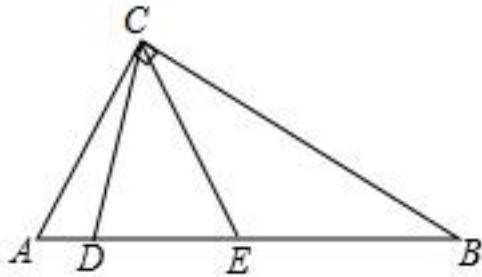


graph:
 {"stem": {"pictures": [{"picturename": "1000061428_Q_1.jpg", "coordinates": {"A": "5.00,10.00", "B": "9.00,10.00", "C": "7.00,5.00", "D": "11.00,5.00", "E": "6.77,8.52", "F": "9.23,6.48", "O": "8.00,7.50"}, "collineations": {}}], "appliedproblems": {}, "substems": []}}

{"0":"A###B","1":"B###O###C","2":"C###D","3":"D###F###O###E###A","4":"C###F","5":"B###E"}, "variable>equals":{}, "circles":[]}, "appliedproblems":{}, "substems":[]}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{AB=CD}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AD, iLine2=BC], LineParallelRelation [iLine1=BE, iLine2=CF], LineCrossRelation [crossPoint=Optional.of(E), iLine1=BE, iLine2=AD], LineCrossRelation [crossPoint=Optional.of(F), iLine1=CF, iLine2=AD], ProveConclusionRelation:[证明: EqualityRelation{BE=CF}]

743、topic: 如图,在\$Rt\triangle ABC\$中,D、E为斜边AB上的两个点,且\$BD=BC\$,\$AE=AC\$,求\$\angle DCE\$的度数.

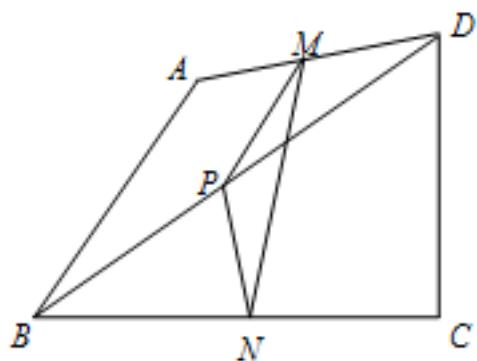


graph:

{"stem": {"pictures": [{"picturename": "1000022489_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "5.33,0.00", "C": "0.00,4.00", "D": "1.33,0.00", "E": "2.00,0.00"}, "collineations": {"0": "A###B###D##E", "1": "A##C", "2": "D##C", "3": "C##E", "4": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: RightTriangleRelation:RightTriangle:\$\triangle ABC\$[Optional.of(C)], PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, EqualityRelation{BD=BC}, EqualityRelation{AE=AC}, 求角的大小: AngleRelation{angle=\$\angle DCE\$}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:\$\angle DCE\$)}

744、topic: 如图,在四边形ABCD中,AB=CD,M,N,P分别是AD,BC,BD的中点.#%#求证:\$\angle PNM=\angle PMN\$.#%#



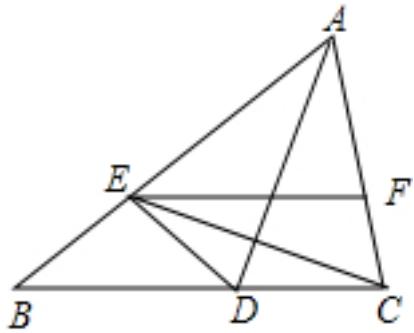
graph:

{"stem": {"pictures": [{"picturename": "1000040183_Q_1.jpg", "coordinates": {"A": "-2.02,4.87", "B": "-4.02,1.40", "C": "1.98,1.40", "D": "1.98,5.40", "P": "-1.02,3.40", "M": "-0.02,5.13", "N": "-1.02,1.40"}, "collineations": {"0": "A##B", "1": "A##M##D", "2": "B##P##D", "3": "B##N##C", "4": "P##N", "5": "M##N", "6": "C##D", "7": "M##P"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{AB=CD}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AD}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BC}, MiddlePointOfSegmentRelation{middlePoint=P, segment=BD}, ProveConclusionRelation:[证明:
EqualityRelation{ $\angle MNP = \angle NMP$ }]

745、topic: 已知:如图,AD是 $\triangle ABC$ 的角平分线,点E在AB上,且AE=AC,连结ED. #%(1)求证: $\triangle AED \cong \triangle ACD$; #%(2)点F为AC上一点,连结EF、EC.若EC平分 $\angle DEF$,试说明 $\angle AED$ 与 $\angle EFC$ 满足怎样的数量关系.#%#

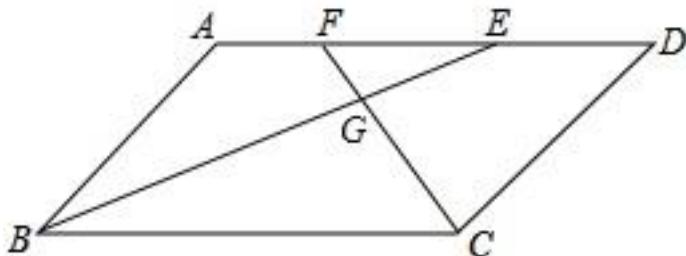


graph:

{"stem": {"pictures": [{"picturename": "1000037592_Q_1.jpg", "coordinates": {"A": "-6.80, 6.54", "B": "-9.95, 4.02", "C": "-6.35, 4.02", "D": "-7.75, 4.02", "E": "-8.81, 4.93"}, "collineations": {"0": "A##E##B", "1": "A##D", "2": "E##D", "3": "A##C", "4": "B##D##C", "5": "C##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000037592_Q_1.jpg", "coordinates": {"F": "-6.51, 4.94"}, "collineations": {"0": "A##F##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}}

NLP: TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, EqualityRelation{AE=AC}, SegmentRelation:ED, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, SegmentRelation:EF, SegmentRelation:EC, AngleBisectorRelation{line=EC, angle= $\angle DEF$, angle1= $\angle CED$, angle2= $\angle CEF$ }, JudgeTwoAnglesConnectRelation{ [$\angle AED, \angle CFE$]}, ProveConclusionRelation:[证明:
TriangleCongRelation{triangleA= $\triangle AED$, triangleB= $\triangle ACD$ }], ProveConclusionRelation:[证明:
JudgeTwoAnglesConnectRelation{ [$\angle AED, \angle CFE$]}

746、topic: 已知,如图,在平行四边形ABCD中, $\angle ABC$ 的角平分线交AD于点E, $\angle BCD$ 的角平分线交AD于点F,交BE于点G.求证AF=DE.#%#



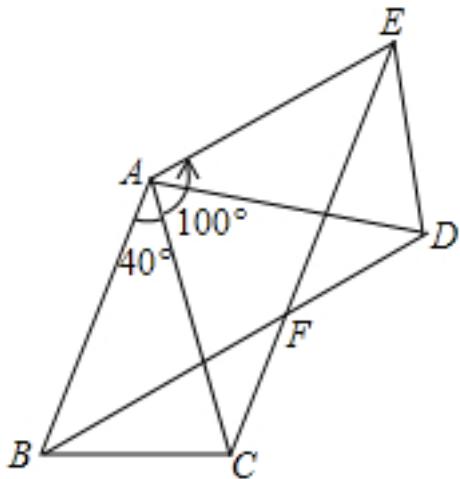
graph:

{"stem": {"pictures": [{"picturename": "1000080059_Q_1.jpg", "coordinates": {"A": "0.00, 1.77", "B": "-1.75, 0.00", "C": "0.00, -1.77", "D": "1.75, 0.00", "E": "0.5, 1.77", "F": "0.5, -1.77", "G": "0.5, 0.00"}, "collineations": {"0": "A##B##C##D", "1": "A##D", "2": "B##C", "3": "E##F", "4": "B##E", "5": "C##F", "6": "E##G", "7": "F##G"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}}

0.00", "C": "1.96,0.00", "D": "3.70,1.77", "E": "2.05,1.77", "F": "1.30,1.77", "G": "1.44,1.38"}, "collineations": {"0": "A###F###E##D", "1": "F###G###C", "2": "B###G###E", "3": "A###B", "4": "B###C", "5": "C###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP: AngleBisectorRelation{line=BG, angle= $\angle ABC$, angle1= $\angle ABG$, angle2= $\angle CBG$ }, AngleBisectorRelation{line=CG, angle= $\angle BCD$, angle1= $\angle BCG$, angle2= $\angle DCG$ }, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, ProveConclusionRelation: [证明: EqualityRelation{AF=DE}]

747、topic: 如图, $\triangle ABC$ 中, $AB=AC$, $\angle BAC=40^\circ$,将 $\triangle ABC$ 绕点A按逆时针方向旋转 100° ,得到 $\triangle ADE$,连接BD、CE交于点F.(1)求 $\angle ACE$ 的度数;(2)求证:四边形ABFE是菱形.



graph:
{"stem": {"pictures": [{"picturename": "1000034740_Q_1.jpg", "coordinates": {"A": "3.00,4.00", "B": "1.00,0.00", "C": "4.04,-0.35", "D": "7.29,2.72", "E": "7.10,5.78", "F": "5.10,1.78"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##C", "3": "A##E", "4": "E##D", "5": "A##D", "6": "C##F##E", "7": "B##F##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, EqualityRelation{ $\angle BAC=(2/9\pi)$ }, RotateRelation{preData= $\triangle ABC$, afterData= $\triangle ADE$, rotatePoint=A, rotateDegree='5/9\pi', rotateDirection=ANTICLOCKWISE}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BD, iLine2=CE], 求角的大小: AngleRelation{angle= $\angle ACF$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ACF$)}, ProveConclusionRelation: [证明: RhombusRelation{rhombus=Rhombus:ABFE}]

748、topic: 如图, $AB \parallel CD$,点E、F分别在AB、CD上,连接EF, $\angle AEF$ 、 $\angle CFE$ 的平分线交于点G, $\angle BEF$ 、 $\angle DFE$ 的平分线交于点H.(1)求证:四边形EGFH是矩形;(2)小明在完成(1)的证明后继续进行了探索.过G作MN//EF,分别交AB、CD于点M、N,过H作PQ//EF,分别交AB、CD于点P、Q,得到四边形MNQP.此时,他猜想四边形MNQP是菱形,请你在下列框图中补全他的证明思路.

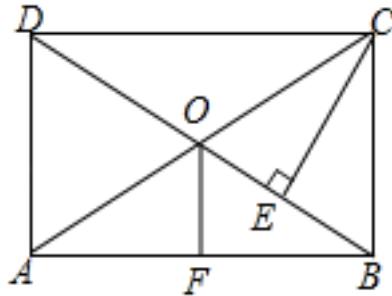
小明的证明思路

由 $AB \parallel CD, MN \parallel EF, PQ \parallel EF$, 易证四边形 $MNQP$ 是平行四边形. 要证 $MNQP$ 是菱形, 只要证 $NM=NQ$. 由已知条件: _____ 和 $MN \parallel EF$, 可证 $NG=NF$, 故只要证 $GM=FQ$, 即证 $\triangle MGE \cong \triangle QFH$. 易证 _____, _____, 故只要证 $\angle MGE = \angle QFH, \angle QFH = \angle GEF$ 即可.

graph:
 {"stem": {"pictures": [{"picturename": "1000061894_Q_1.jpg", "coordinates": {"A": "8.00,9.00", "B": "15.00,9.00", "C": "5.00,5.00", "D": "12.00,5.00", "E": "11.50,9.00", "F": "8.50,5.00", "G": "7.50,7.00", "H": "12.5,7.00", "M": "9.00,9.00", "N": "6.00,5.00", "P": "14.00,9.00", "Q": "11.00,5.00"}, "collineations": {"0": "A###M###E##P##B", "1": "P###H###Q", "2": "D###Q###F###N###C", "3": "N###G###M", "4": "E###H", "5": "H##F", "6": "F###G", "7": "G###E", "8": "E###F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=EG,angle= $\angle FEM$, angle1= $\angle FEG$, angle2= $\angle GEM$ },AngleBisectorRelation{line=FG,angle= $\angle EFN$, angle1= $\angle EFG$, angle2= $\angle GFN$ },AngleBisectorRelation{line=EH,angle= $\angle FEP$, angle1= $\angle FEH$, angle2= $\angle HEP$ },AngleBisectorRelation{line=FH,angle= $\angle EFQ$, angle1= $\angle EFH$, angle2= $\angle HFQ$ },LineParallelRelation [iLine1=AB, iLine2=CD],PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false},PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false},SegmentRelation:EF,SegmentRelation:N_1M_2,LineCrossRelation [crossPoint=Optional.of(H), iLine1=N_6M_7, iLine2=N_8M_9],LineParallelRelation [iLine1=MN, iLine2=EF],PointOnLineRelation{point=G, line=MN, isConstant=false, extension=false},LineCrossRelation [crossPoint=Optional.of(M), iLine1=MN, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(N), iLine1=MN, iLine2=CD],LineParallelRelation [iLine1=PQ, iLine2=EF],PointOnLineRelation{point=H, line=PQ, isConstant=false, extension=false},LineCrossRelation [crossPoint=Optional.of(P), iLine1=PQ, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(Q), iLine1=PQ, iLine2=CD],已知条件
QuadrilateralRelation{quadrilateral=MNPQ},ProveConclusionRelation:[证明:
RectangleRelation{rectangle=Rectangle:EGFH}]}

749、topic: 如图所示,矩形ABCD中,对角线AC、BD交于O点,CE \perp BD于E,OF \perp AB于F,DE:BE=3:1,OF=2cm,求AC的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000061884_Q_1.jpg", "coordinates": {"A": "2.07,4.00", "B": "9.00,4.00", "C": "9.00,8.00", "D": "2.07,8.00", "E": "7.27,5.00", "F": "5.54,4.00", "O": "5.54,6.00"}, "collineations": {"0": "A###F###B", "1": "B###C", "2": "C###D", "3": "D###A", "4": "A###O###C", "5": "B###E###O###D", "6": "C###E", "7": "O###F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AC=v_0},RectangleRelation{rectangle=Rectangle:ABCD},LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD],LinePerpRelation{line1=CE, line2=BD, crossPoint=E},LinePerpRelation{line1=OF, line2=AB, crossPoint=F},EqualityRelation{(DE)/(BE)=(3)/(1)},EqualityRelation{FO=2},求值(大小): (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AC)}

750、topic: 如图,在四边形ABCD中, $\angle BAD=90^\circ$, $\angle DBC=90^\circ$, $AD=3$, $AB=4$, $BC=12$.#%#(1)求CD的长度.#%#(2)求四边形ABCD的面积.#%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000070781_Q_1.jpg", "coordinates": {"A": "-1.20, 1.60", "B": "0.00, 0.00", "C": "6.00, 0.00", "D": "0.00, 2.50"}, "collineations": {"0": "D##A", "1": "C##B", "2": "C##D", "3": "A##B", "4": "D##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{ $\angle BAD=(1/2*\pi)$ }, EqualityRelation{ $\angle CB$
 $D=(1/2*\pi)$ }, EqualityRelation{AD=3}, EqualityRelation{AB=4}, EqualityRelation{BC=12}, EqualityRelati
on{CD=v_0}, 求值(大小): (ExpressRelation:[key]:v_0), 已知条件

QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{S_ABCD=v_1}, 求值(大小):

(ExpressRelation:[key]:v_1), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key]:CD)}, SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key]:S_ABCD))

751、topic: (1)如图1,在 $\triangle ABC$ 中, $\angle ABC$ 的平分线BF与 $\angle ACB$ 的平分线CF相交于F,过点F作DE||BC,交直线AB于点D,交直线AC于点E,求证: $BD+CE=DE$;(2)如图2, $\triangle ABC$ 的外角平分线BF,CF相交于F,过点F作DE||BC,交直线AB于点D,交直线AC于点E,那么BD,CE,DE之间存在什么关系?#%#(3)如图3, $\angle ABC$ 的平分线BF与 $\angle ACB$ 的外角平分线CF相交于F,过点F作DE||BC,交直线AB于点D,交直线AC于点E,那么BD,CE,DE之间存在什么关系?根据(1)、(2)写出你的猜想,并证明你的结论.#%#

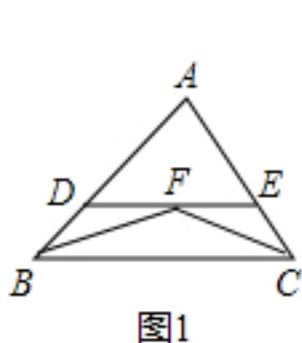


图1

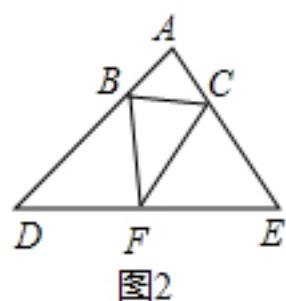


图2

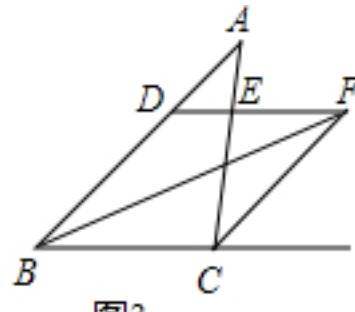


图3

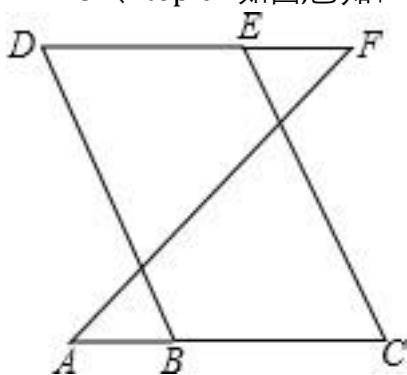
graph:

```
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00","B":"1.00,-7.00","C":"5.00,-7.00","D":"3.46,-3.72","E":"4.18,-3.72","F":"7.56,-3.72"},"collineations":{ "0":"A###D###B","1":"A###E###C","2":"D###E###F","3":"C###B","4":"C###F","5":"B###F"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{}}}

NLP: AngleBisectorRelation{line=BF,angle= $\angle CBD$, angle1= $\angle CBF$, angle2= $\angle DBF$ },AngleBisectorRelation{line=CF,angle= $\angle BCE$, angle1= $\angle BCF$, angle2= $\angle ECF$ },(ExpressRelation:[key:]1),TriangleRelation: $\triangle ABC$,LineCrossRelation [crossPoint=Optional.of(F), iLine1=BF, iLine2=CF],LineParallelRelation [iLine1=DE, iLine2=BC],PointOnLineRelation{point=F, line=DE, isConstant=false, extension=false},LineCrossRelation [crossPoint=Optional.of(D), iLine1=DE, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AC],(ExpressRelation:[key:]2),TriangleRelation: $\triangle ABC$,LineCrossRelation [crossPoint=Optional.of(F), iLine1=BF, iLine2=CF],LineParallelRelation [iLine1=DE, iLine2=BC],PointOnLineRelation{point=F, line=DE, isConstant=false, extension=false},LineCrossRelation [crossPoint=Optional.of(D), iLine1=DE, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AC],求值(大小): (ExpressRelation:[key:](BD/CE)),求值(大小): (ExpressRelation:[key:](CE/DE)),AngleBisectorRelation{line=BF,angle= $\angle CBD$, angle1= $\angle CBF$, angle2= $\angle DBF$ },AngleBisectorRelation{line=CF,angle= $\angle BCE$, angle1= $\angle ECF$, angle2= $\angle BCF$ },AngleBisectorRelation{line=BF,angle= $\angle CBD$, angle1= $\angle CBF$, angle2= $\angle DBF$ },AngleBisectorRelation{line=CF,angle= $\angle BCE$, angle1= $\angle BCF$, angle2= $\angle ECF$ },(ExpressRelation:[key:]3),LineCrossRelation [crossPoint=Optional.of(F), iLine1=BF, iLine2=CF],LineParallelRelation [iLine1=DE, iLine2=BC],PointOnLineRelation{point=F, line=DE, isConstant=false, extension=false},LineCrossRelation [crossPoint=Optional.of(D), iLine1=DE, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AC],求值(大小): (ExpressRelation:[key:](BD/CE)),求值(大小): (ExpressRelation:[key:](CE/DE)),AngleBisectorRelation{line=CF,angle= $\angle BCE$, angle1= $\angle ECF$, angle2= $\angle BCF$ },ProveConclusionRelation:[证明]: EqualityRelation{BD+CE=DE}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](BD/CE))},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](CE/DE))},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](BD/CE))},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](CE/DE))}

752、topic: 如图,已知 $\angle A=\angle F$, $\angle C=\angle D$,求证: $BD \parallel CE$.

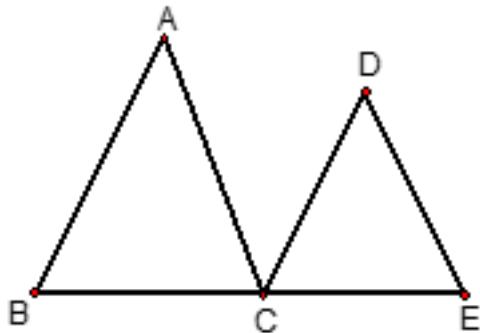


graph:

{"stem": {"pictures": [{"picturename": "1000021318_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "2.00,0.00", "C": "6.20,0.00", "D": "0.00,5.00", "E": "4.20,5.00", "F": "6.00,5.00"}, "collineations": {"0": "D###E###F", "1": "F##A", "2": "D##B", "3": "E##C", "4": "A##B##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}}}

NLP: EqualityRelation{ $\angle BAF = \angle AFE$ }, EqualityRelation{ $\angle BCE = \angle BDE$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=BD, iLine2=CE]]

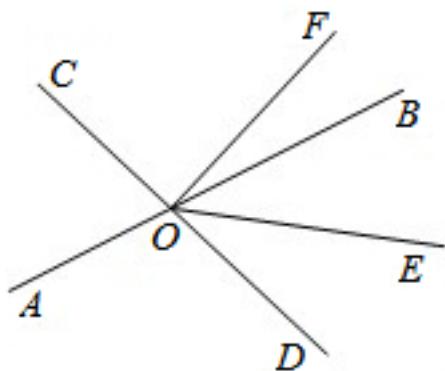
753、topic: 已知:如图,AB||CD, $\angle A = \angle D$,试说明AC||DE成立的理由.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000037685_Q_1.jpg", "coordinates": {"A": "-10.00,5.00", "B": "-12.00,1.00", "C": "-8.50,1.00", "D": "-7.00,4.00", "E": "-5.87,1.00"}, "collineations": {"0": "B##A", "1": "C##A", "2": "C##D", "3": "D##E", "4": "E##C##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{ $\angle BAC = \angle CDE$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AC, iLine2=DE]]]

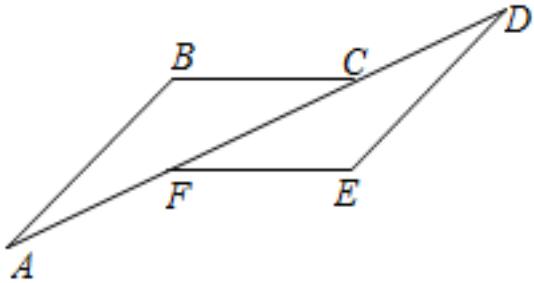
754、topic: 如图,直线AB,CD相交于点O,OE平分 $\angle BOD$, $\angle AOC=72^\circ$,OF \perp CD,垂足为O,求 $\angle EOF$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000051524_Q_1.jpg", "coordinates": {"A": "-5.08,0.37", "B": "-0.98,2.99", "C": "-4.84,2.60", "D": "-1.18,-0.41", "E": "-0.47,1.25", "F": "-1.59,3.65", "O": "-3.42,1.43"}, "collineations": {"0": "O##E", "1": "O##F", "2": "C##O##D", "3": "A##O##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], AngleBisectorRelation{line=OE, angle= $\angle BOD$, angle1= $\angle BOE$, angle2= $\angle DOE$ }, EqualityRelation{ $\angle AOC = (2/5\pi)$ }, LinePerpRelation{line1=OF, line2=CD, crossPoint=O}, 求角的大小: AngleRelation{angle= $\angle EOF$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle EOF$)}

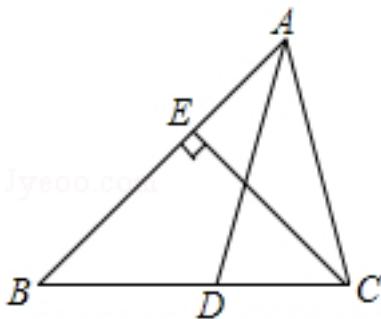
755、topic: 如图, $\triangle ABC \cong \triangle DEF$, 点A,F,C,D在同一直线上, $\angle ABC=135^\circ$, $\angle A=20^\circ$. 求 $\angle DFE$ 和 $\angle E$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000063485_Q_1.jpg", "coordinates": {"A": "-1.24, -1.40", "B": "0.29, 1.51", "C": "2.83, 2.29", "D": "4.45, 3.76", "E": "3.19, 0.71", "F": "0.58, 0.25"}, "collineations": {"0": "F###A###C###D", "1": "D###E", "2": "F###E", "3": "A###B", "4": "B###C"}, "variable>equals": {}, "circles": []}], "applydproblems": {}, "substems": []}}

NLP: TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DEF$ }, PointRelation:A, PointRelation:F, PointRelation:C, EqualityRelation{ $\angle ABC=(3/4\pi)$ }, EqualityRelation{ $\angle BAF=(1/9\pi)$ }, 求角的大小: AngleRelation{angle= $\angle CFE$ }, 求角的大小: AngleRelation{angle= $\angle DEF$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CFE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DEF$)}

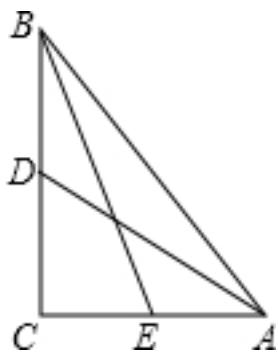
756、topic: 如图,AD是 $\triangle ABC$ 的角平分线,CE是 $\triangle ABC$ 的高, $\angle BAC=60^\circ$, $\angle BCE=40^\circ$,求 $\angle ADB$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "86E224C2DE974845AB37458CC06AF741.jpg", "coordinates": {"A": "-9.82, 8.99", "B": "-14.00, 4.00", "C": "-8.00, 4.00", "D": "-10.69, 4.00", "E": "-11.52, 6.95"}, "collineations": {"0": "E###B##A", "1": "C##A", "2": "B##C##D", "3": "A##D", "4": "C##E"}, "variable>equals": {}, "circles": []}], "applydproblems": {}, "substems": []}}

NLP:
 TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle CAE=(1/3\pi)$ }, EqualityRelation{ $\angle DCE=(2/9\pi)$ }, 求角的大小: AngleRelation{angle= $\angle ADB$ }, AngleBisectorRelation{line=AD, angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ }, LinePerpRelation{line1=CE, line2=BE, crossPoint=E}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ADB$)}

757、topic: 如图,Rt $\triangle ABC$ 中, $\angle C=90^\circ$,AD、BE分别是BC、AC边上的中线,\$AD=2\sqrt{10}\$, \$BE=5\$, 求 $\{AB\}^2$ 的值.#%#



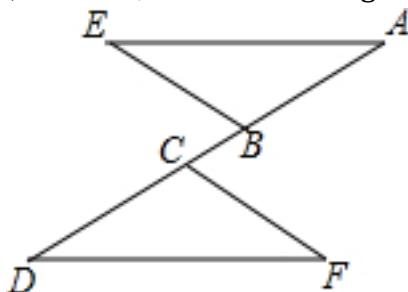
graph:

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{"stem": {"pictures": [{"picturename": "1000080219_Q_1.jpg", "coordinates": {"A": "1.00,0.00", "B": "-2.00, 2.00", "C": "-2.0,0.00", "D": "-2.00,1.00", "E": "-0.50,0.00"}, "collineations": {"0": "A###E##C", "1": "B##D ##C", "2": "A##B", "3": "B##E", "4": "A##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle DCE = (1/2 * \pi)$ }, LineDecileSegmentRelation [iLine1=AD, iLine2=BC, crossPoint=Optional.of(D)], LineDecileSegmentRelation [iLine1=BE, iLine2=AC, crossPoint=Optional.of(E)], EqualityRelation{AD=2*(10^(1/2))}, EqualityRelation{BE=5}, 求值(大小): (ExpressRelation:[key:]((AB)^2)), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]((AB)^2))}

758、topic: 已知:如图,点A、B、C、D在一条直线上,AC=BD,AE=DF,BE=CF.求证:AE||DF,BE||CF.#%#

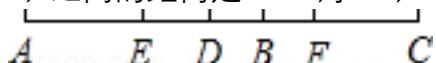


graph:

```
{"stem": {"pictures": [{"picturename": "1000061417_Q_1.jpg", "coordinates": {"A": "11.50,7.00", "B": "8.50, 5.00", "C": "7.00,4.00", "D": "4.00,2.00", "E": "5.50,7.00", "F": "10.00,2.00"}, "collineations": {"0": "A##B##C##D", "1": "A##E", "2": "E##B", "3": "C##F", "4": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: MultiPointCollinearRelation:[A, B, C, D], EqualityRelation{AC=BD}, EqualityRelation{AE=DF}, EqualityRelation{BE=CF}, LineParallelRelation [iLine1=BE, iLine2=CF], ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AE, iLine2=DF]]]

759、topic: 如图,已知AB和CD的公共部分\$BD=\frac{1}{3}AB=\frac{1}{4}CD\$.线段AB,CD的中点E,F之间的距离是10cm,求AB,CD的长.#%#

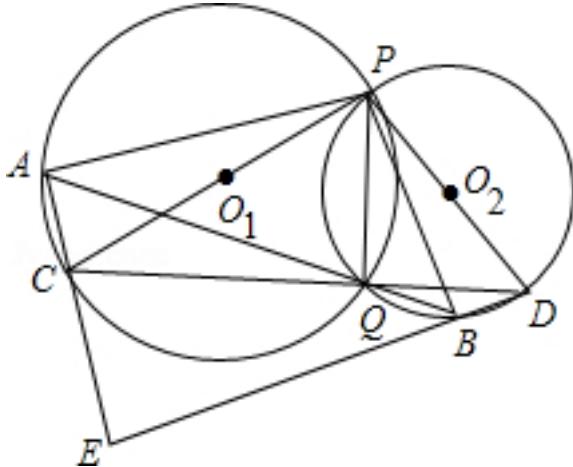


graph:

{"stem": {"pictures": [{"picturename": "1000083103_Q_1.jpg", "coordinates": {"A": "-4.97,0.56", "B": "-1.97,0.59", "C": "1.03,0.62", "D": "-2.97,0.58", "E": "-3.47,0.57", "F": "-0.97,0.60"}, "collineations": {"0": "A###E##D##B##F##C"}, "variable>equals": {}, "circles": {}}, "appliedproblems": {}, "substems": []}}

NLP: MultiEqualityRelation [multiExpressCompare=BD=(1/3)*AB=(1/4)*CD, originExpressRelationList=[], keyWord=null, result=null], DistanceOfDualPointsRelation{pointA=E, pointB=F, distance=Express:[10]}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=F, segment=CD}, 求值(大小): (ExpressRelation:[key]:AB), 求值(大小): (ExpressRelation:[key]:CD), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:AB)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]:CD)}

760、topic: 如图, $\odot\{O_1\}$ 和 $\odot\{O_2\}$ 相交于 P、Q 两点, 其中 $\odot\{O_1\}$ 的半径 $r_1=2$, $\odot\{O_2\}$ 的半径 $r_2=\sqrt{2}$. 过点 Q 作 $CD \perp PQ$, 分别交 $\odot\{O_1\}$ 和 $\odot\{O_2\}$ 于点 C、D, 连接 CP、DP, 过点 Q 任作一直线 AB 交 $\odot\{O_1\}$ 和 $\odot\{O_2\}$ 于点 A、B, 连接 AP、BP、AC、DB, 且 AC 与 DB 的延长线交于点 E. #%(1) 求证: $\frac{PA}{PB}=\sqrt{2}$?#%(2) 若 $PQ=2$, 试求 $\angle E$ 度数.



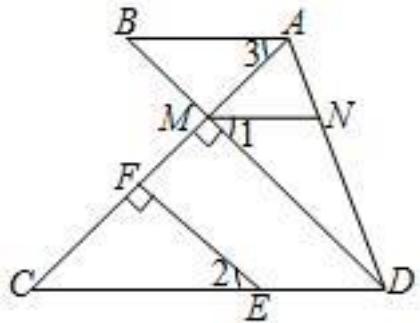
graph:

{"stem": {"pictures": [{"picturename": "1000024971.jpg", "coordinates": {"A": "-3.99,0.31", "B": "5.97,-2.78", "C": "-3.46,-2.00", "D": "7.45,-2.00", "E": "-2.31,-7.12", "O[1]": "0.00,0.00", "O[2]": "5.46,0.00", "P": "3.46,2.00", "Q": "3.46,-2.00"}, "collineations": {"0": "A###C##E", "1": "B##D##E", "2": "A##P", "3": "P##O[2]##D", "4": "C##O[1]##P", "5": "Q##P", "6": "P##B", "7": "C##Q##D", "8": "B##Q##A"}, "variable>equals": {}, "circles": [{"center": "O[1]", "pointincircle": "A##C##Q##P"}, {"center": "O[2]", "pointincircle": "B##D##Q##P"}]}, "appliedproblems": {}, "substems": []}}

NLP: PointOnLineRelation{point=Q, line=AB, isConstant=false, extension=false}, CircleCrossRelation{conic1=Circle[$\odot O_1$]{center= O_1 , analytic= $(x-x_{O_1})^2+(y-y_{O_1})^2=r_{O_1}^2$ }, conic2=Circle[$\odot O_2$]{center= O_2 , analytic= $(x-x_{O_2})^2+(y-y_{O_2})^2=r_{O_2}^2$ }, corssPoints=[P, Q], corssPointNum=2}, RadiusRelation{radius=null, circle=Circle[$\odot O_1$]{center= O_1 , analytic= $(x-x_{O_1})^2+(y-y_{O_1})^2=r_{O_1}^2$ }, length=Express:[2]}, RadiusRelation{radius=null, circle=Circle[$\odot O_2$]{center= O_2 , analytic= $(x-x_{O_2})^2+(y-y_{O_2})^2=r_{O_2}^2$ }, length=Express:[$(2^{(1/2)})$]}, LinePerpRelation{line1=CD, line2=PQ, crossPoint=Q}, LineCrossCircleRelation{line=CD, circle= $\odot O_1$, crossPoints=[C], crossPointNum=1}, LineCrossCircleRelation{line=CD, circle= $\odot O_2$, crossPoints=[D]},

crossPointNum=1},SegmentRelation:CP,SegmentRelation:DP,LineCrossCircleRelation{line=AB, circle=O_1, crossPoints=[A], crossPointNum=1},LineCrossCircleRelation{line=AB, circle=O_2, crossPoints=[B], crossPointNum=1},MultiPointCollinearRelation:[A, P],MultiPointCollinearRelation:[B, P],MultiPointCollinearRelation:[A, C],MultiPointCollinearRelation:[D, B],LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=DB],EqualityRelation{PQ=2},求角的大小: AngleRelation{angle= $\angle BEC$ },ProveConclusionRelation:[证明: EqualityRelation{((AP)/(BP))=(2^(1/2))}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BEC$)}

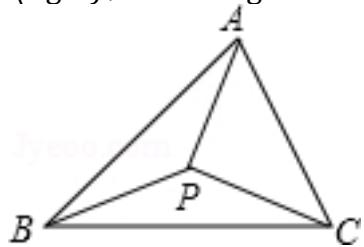
761、topic: 如图,已知EF⊥AC于点F,DB⊥AC于点M,∠1=∠2,∠3=∠C,求证:AB||MN.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000050222_Q_1.jpg", "coordinates": {"A": "-6.00,6.00", "B": "-8.00, 6.00", "C": "-9.00,3.00", "D": "-5.00,3.00", "E": "-6.50,3.00", "F": "-7.75,4.25", "M": "-7.00,5.00", "N": "-5.67,5.00"}, "collineations": {"0": "A###M##F##C", "1": "B##M##D", "2": "A##N##D", "3": "C##E##D", "4": "E##F", "5": "A##B", "6": "M##N"}, "variable>equals": {"0": " $\angle 1 = \angle DMN$ ", "1": " $\angle 2 = \angle CEF$ ", "2": " $\angle 3 = \angle BAM$ "}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: LinePerpRelation{line1=EF, line2=AC, crossPoint=F},LinePerpRelation{line1=DB, line2=AC, crossPoint=M},EqualityRelation{ $\angle DMN = \angle CEF$ },EqualityRelation{ $\angle BAM = \angle ECF$ },ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=MN]]]

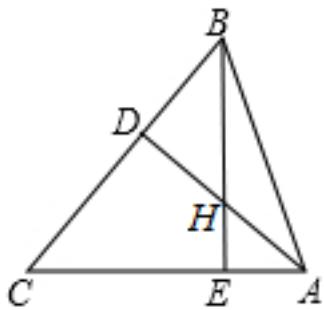
762、topic: 如图,已知P是△ABC内一点,试说明 $PA+PB+PC > \frac{1}{2}(AB+BC+AC)$ #%#



graph:
 {"stem": {"pictures": [{"picturename": "8B04DFE50EBD46AB9B929FDB05E6EBB1.jpg", "coordinates": {"A": "-11.00,5.00", "B": "-15.00,2.00", "C": "-9.00,2.00", "P": "-12.00,3.00"}, "collineations": {"0": "B###A", "1": "C##A", "2": "A##P", "3": "B##C", "4": "B##P", "5": "C##P"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation:△ABC,PositionOfPoint2RegionRelation{point=P, region=EnclosedRegionRelation{name=ABC, closedShape=△ABC}, position=inner},ProveConclusionRelation:[证明: InequalityRelation{AP+BP+CP>(1/2)*(AB+BC+AC)}]

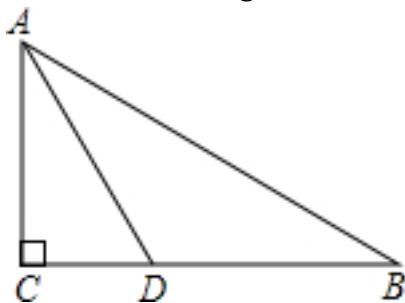
763、topic: 如图,在 $\triangle ABC$ 中, $\angle BAC:\angle ABC=7:6$, $\angle ABC$ 比 $\angle C$ 大 10° , BE 、 AD 是 $\triangle ABC$ 的高,交点 H ,求 $\angle DHB$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000051262_Q_1.jpg", "coordinates": {"A": "-3.91,3.00", "B": "-4.84,5.57", "C": "-7.00,3.00", "D": "-5.72,4.52", "E": "-4.84,3.00", "H": "-4.84,3.79"}, "collineations": {"0": "A###E#C", "1": "C###D###B", "2": "B###A", "3": "B###H###E", "4": "A###H###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle BAE\}/\angle ABD=(7)/(6)$, TriangleRelation: $\triangle ABC$,
 求角的大小: AngleRelation{angle= $\angle BHD$ }, LinePerpRelation{line1= BE , line2= CE ,
 crossPoint=E}, LinePerpRelation{line1= AD , line2= CD ,
 crossPoint=D}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BHD$)}

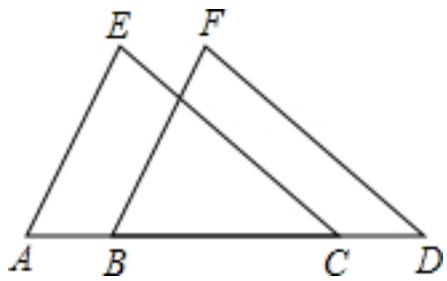
764、topic: 如图所示, $\triangle ABC$ 中, $\angle C=90^\circ$, $\angle B=30^\circ$, AD 是 $\triangle ABC$ 的角平分线,若 $AC=\sqrt{3}$,求线段 AD 的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060443_Q_1.jpg", "coordinates": {"A": "0.00,1.73", "B": "3.00,0.00", "C": "0.00,0.00", "D": "1.00,0.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "A##D", "3": "B##D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{AD=v_0}, TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ACD=(1/2*\pi)\}$, EqualityRelation
 $\{\angle ABD=(1/6*\pi)\}$, TriangleRelation: $\triangle ABC$, EqualityRelation $\{AC=(3^{(1/2)})\}$, 求值(大小):
 (ExpressRelation:[key:]v_0), AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$,
 angle2= $\angle CAD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}

765、topic: 如图,点A,B,C,D在一条直线上,AB=CD,AE||BF,CE||DF.求证:AE=BF.#%#

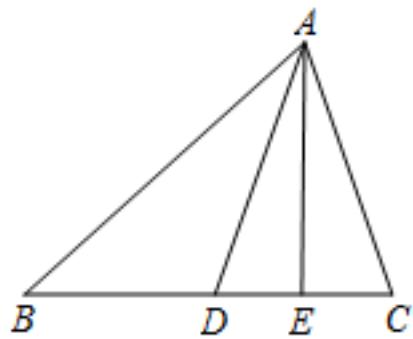


graph:

{"stem":{"pictures":[{"picturename":"1000063518_Q_1.jpg","coordinates":{"A":"3.33,-1.08","B":"4.26,-1.08","C":"5.79,-1.08","D":"6.72,-1.08","E":"4.31,1.19","F":"5.24,1.19"}, "collineations":{"0":"A##B##C##D","1":"A##E","2":"B##F","3":"E##C","4":"D##F"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{}}, "substems":[]}]

NLP: MultiPointCollinearRelation:[A, B, C, D], EqualityRelation{AB=CD}, LineParallelRelation [iLine1=AE, iLine2=BF], LineParallelRelation [iLine1=CE, iLine2=DF], ProveConclusionRelation:[证明: EqualityRelation{AE=BF}]

766、topic: 如图,AE,AD分别是 $\triangle ABC$ 的高和角平分线,且 $\angle B=36^\circ$, $\angle C=76^\circ$,求 $\angle DAE$ 的度数.#%#



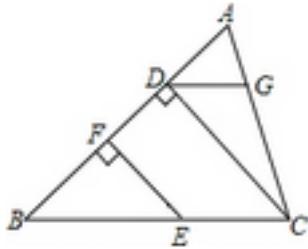
graph:

{"stem":{"pictures":[{"picturename":"1000063419_Q_1.jpg","coordinates":{"A":"5.74,1.94","B":"2.96,-0.08","C":"6.24,-0.08","D":"5.01,-0.08","E":"5.74,-0.08"}, "collineations":{"0":"B##C##E##D","1":"C##A","2":"A##D","3":"A##B","4":"A##E"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{}}, "substems":[]}]

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABD=(1/5\pi)$ }, EqualityRelation{ $\angle ACE=(19/45\pi)$ }, 求角的大小: AngleRelation{angle= $\angle DAE$ }, LinePerpRelation{line1=AE, line2=BE, crossPoint=E}, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle CAD$, angle2= $\angle BAD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DAE$)}

767、topic: 如图,CD \perp AB,EF \perp AB,垂足分别是D、F, $\angle BEF=\angle CDG$,试说明 $\angle B+\angle BDG=180^\circ$.#%#

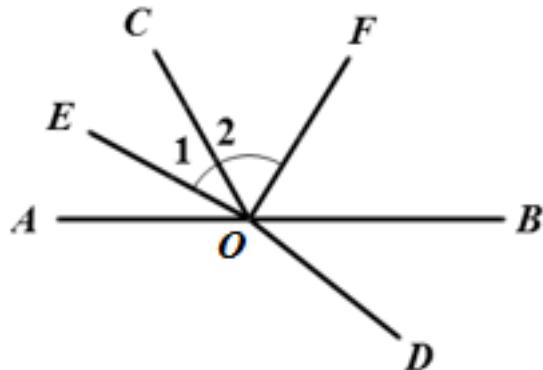


graph:

{"stem": {"pictures": [{"picturename": "1000050435_Q_1.jpg", "coordinates": {"A": "-4.07, 4.82", "B": "-7.00, 2.00", "C": "-3.00, 2.00", "D": "-4.92, 4.00", "E": "-4.68, 2.00", "F": "-5.80, 3.16", "G": "-3.76, 4.00"}, "collinearities": [{"0": "A###D##F##B", "1": "B##E##C", "2": "C##G##A", "3": "E##F", "4": "D##C", "5": "D##G"}], "variable>equals": {}, "circles": [], "appliedproblems": {}, "subsystems": []}}

NLP: LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, LinePerpRelation{line1=EF, line2=AB, crossPoint=F}, EqualityRelation{ $\angle BEF = \angle CDG$ }, ProveConclusionRelation:[证明:
EqualityRelation{ $\angle EBF + \angle FDG = (\text{Pi})$ }]]

768、topic: 如图,AB、DC相交于点O,OE、OF分别平分 $\angle AOC$ 、 $\angle BOC$,试说明 $OE \perp OF$.#%#

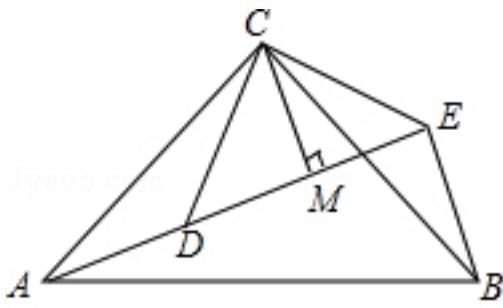


graph:

{"stem": {"pictures": [{"picturename": "1000030601_Q_1.jpg", "coordinates": {"O": "-7.75, 2.00", "C": "-10.0, 0.500", "E": "-10.56, 3.41", "A": "-10.00, 2.00", "D": "-7.00, 1.00", "B": "-6.00, 2.00", "F": "-6.49, 4.52"}, "collinearities": [{"0": "A##O##B", "1": "C##O##D", "2": "E##O", "3": "O##F"}, "variable>equals": {"0": "\angle 1 = \angle EOC", "1": "\angle 2 = \angle COF"}, "circles": [], "appliedproblems": {}, "subsystems": []}]}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=DC], AngleBisectorRelation{line=OE, angle= $\angle AOC$, angle1= $\angle AOE$, angle2= $\angle COE$ }, AngleBisectorRelation{line=OF, angle= $\angle BOC$, angle1= $\angle BOF$, angle2= $\angle COF$ }, ProveConclusionRelation:[证明: LinePerpRelation{line1=OE, line2=OF, crossPoint=O}]]

769、topic: 如图,CA=CB,CD=CE, $\angle ACB = \angle DCE = 90^\circ$,点A,D,E在同一直线上,CM为 $\triangle DCE$ 中DE边上的高, $\angle CDE = \angle CED$,连接BE,求 $\angle AEB$ 的度数.#%#

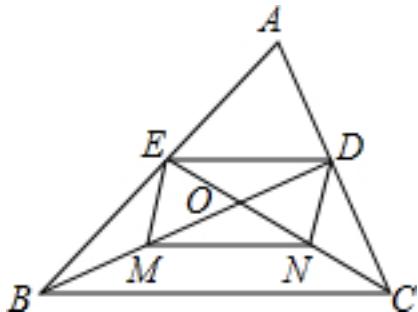


graph:

{"stem": {"pictures": [{"picturename": "1000040012_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "4.00,4.00", "D": "2.80,1.14", "E": "6.86,2.80", "M": "4.83,1.97"}, "collineations": {"0": "A##D##M##E", "1": "A##C", "2": "B##A", "3": "C##D", "4": "C##M", "5": "E##C", "6": "B##E", "7": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AC=BC}, EqualityRelation{CD=CE}, MultiEqualityRelation [multiExpressCompare= $\angle ACB = \angle DCE = (1/2\pi)$, originExpressRelationList=[], keyWord=null, result=null], TriangleRelation: $\triangle DCE$, SegmentRelation:DE, LinePerpRelation{line1=CM, line2=DE, crossPoint=M}, EqualityRelation{ $\angle CDM = \angle CEM$ }, SegmentRelation:BE, 求角的大小: AngleRelation{angle= $\angle BEM$ }, LinePerpRelation{line1=CM, line2=AM, crossPoint=M}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BEM$)}

770、topic: 如图, $\triangle ABC$ 的边AC、AB上的中线BD、CE相交于点O,M、N分别是BO、CO的中点,顺次连接点D、E、M、N. #求证:四边形DEMN是平行四边形. #

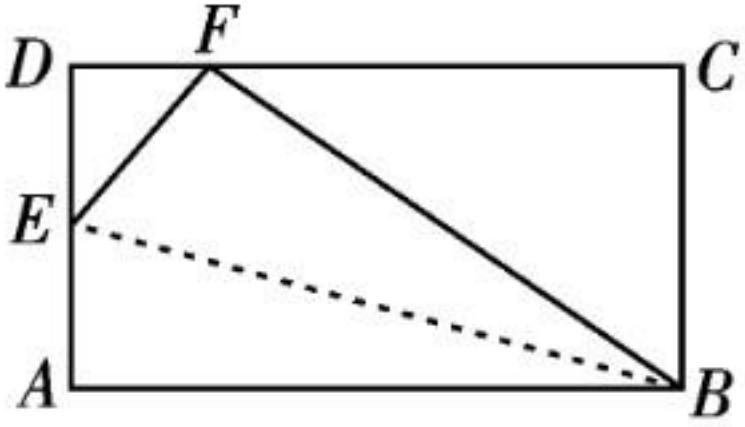


graph:

{"stem": {"pictures": [{"picturename": "1000034239_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-11.0,3.00", "C": "-6.00,3.00", "D": "-7.00,4.50", "E": "-9.50,4.50", "M": "-9.67,3.50", "N": "-7.17,3.50", "O": "-8.33,4.00"}, "collineations": {"0": "A##B##E", "1": "B##C", "2": "A##D##C", "3": "E##D", "4": "D##N", "5": "M##N", "6": "E##M", "7": "E##O##C", "8": "B##O##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, SegmentRelation:BD, SegmentRelation:CE, LineCrossRelation [crossPoint=Optional.of(O), iLine1=BD, iLine2=CE], LineDecileSegmentRelation [iLine1=BD, iLine2=AC, crossPoint=Optional.of(D)], LineDecileSegmentRelation [iLine1=CE, iLine2=AB, crossPoint=Optional.of(E)], MiddlePointOfSegmentRelation{middlePoint=M, segment=BO}, MiddlePointOfSegmentRelation{middlePoint=N, segment=CO}, ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:DEMN}]

771、topic: 如图,已知矩形纸ABCD,若把 $\triangle ABE$ 沿折痕BE向上翻折,A点恰好落在CD边上,设此点为F,这时 $AE:ED=5:3$, $BE = 5\sqrt{5}$,求此矩形的长和宽.

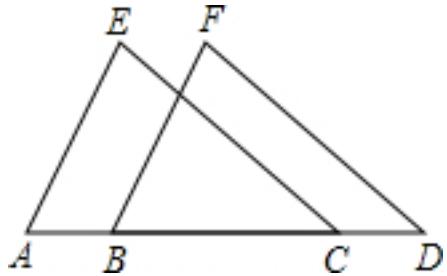


graph:

```
{"stem": {"pictures": [{"picturename": "1000004697_Q_1.jpg", "coordinates": {"A": "1.19,0.00", "B": "11.18,0.00", "C": "11.18,7.99", "D": "1.19,7.99", "E": "1.19,5.02", "F": "5.21,8.01"}, "collineations": {"0": "A###B", "1": "B###C", "2": "E###B", "3": "E###F", "4": "F###B", "5": "A###E###D", "6": "D###F###C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: PointOnLineRelation{point=A, line=CD, isConstant=false, extension=false}, EqualityRelation{BE=5*(5^(1/2))}

772、topic: 如图,点A,B,C,D在一条直线上,AB=CD,AE||BF,CE||DF.求证:AE=BF.#%#

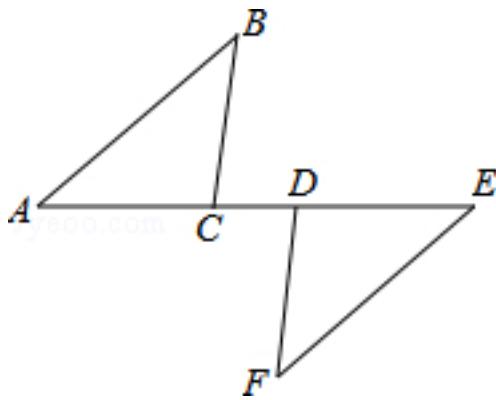


graph:

```
{"stem": {"pictures": [{"picturename": "1000063518_Q_1.jpg", "coordinates": {"A": "3.33,-1.08", "B": "4.26,-1.08", "C": "5.79,-1.08", "D": "6.72,-1.08", "E": "4.31,1.19", "F": "5.24,1.19"}, "collineations": {"0": "A##B##C##D", "1": "A##E", "2": "B##F", "3": "E##C", "4": "D##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: MultiPointCollinearRelation:[A, B, C, D], EqualityRelation{AB=CD}, LineParallelRelation [iLine1=AE, iLine2=BF], LineParallelRelation [iLine1=CE, iLine2=DF], ProveConclusionRelation:[证明: EqualityRelation{AE=BF}]

773、topic: 如图,△ABC和△EFD分别在线段AE的两侧,点C、D在线段AE上,AC=DE,AB||EF,AB=EF.求证:BC=FD.#%#



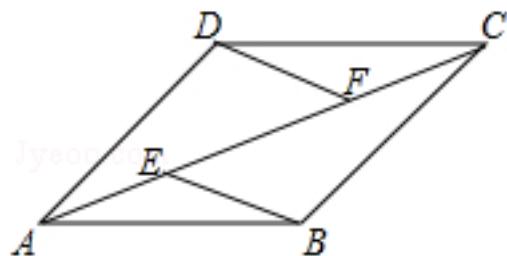
graph:

```
{"stem": {"pictures": [{"picturename": "1000030877_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "-2.59,2.01", "C": "-3.00,0.00", "D": "-2.00,0.00", "E": "0.00,0.00", "F": "-2.41,-2.01"}, "collineations": {"0": "A##B", "1": "B##C", "2": "A##C##D##E", "3": "D##F", "4": "E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle EFD$, SegmentRelation:AE, PointOnLineRelation{point=C, line=AE, isConstant=false, extension=false}, PointOnLineRelation{point=D, line=AE, isConstant=false, extension=false}, EqualityRelation{AC=DE}, LineParallelRelation [iLine1=AB, iLine2=EF], EqualityRelation{AB=EF}, ProveConclusionRelation:[证明: EqualityRelation{BC=DF}]

774、topic: 如图,在四边形ABCD中,AB||CD,E、F为对角线AC上两点,且AE=CF,DF||BE.#%#求证:四边形ABCD为平行四边形.#%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000084580_Q_1.jpg", "coordinates": {"A": "-5.48,-1.85", "B": "-2.2,0,-1.85", "C": "-0.45,1.43", "D": "-3.73,1.43", "E": "-4.00,-0.89", "F": "-1.93,0.46"}, "collineations": {"0": "B##A", "1": "D##C", "2": "C##B", "3": "D##A", "4": "A##E##F##C", "5": "D##F", "6": "E##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, LineParallelRelation [iLine1=AB, iLine2=CD], PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, EqualityRelation{AE=CF}, LineParallelRelation [iLine1=DF, iLine2=BE], ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:ABCD}]

775、topic: 已知 $\triangle ABC$, $AB=AC$, 将 $\triangle ABC$ 沿BC方向平移得到 $\triangle DEF$.#%#(1)如图1,连接BD,AF,求证: $BD=AF$;#%#(2)如图2,M为AB边上一点,过M作BC的平行线MN分别交边AC,DE,DF于点G,H,N,连接BH,GF,求证: $BH=GF$.#%#

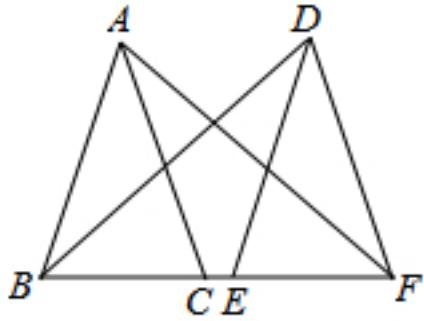


图1

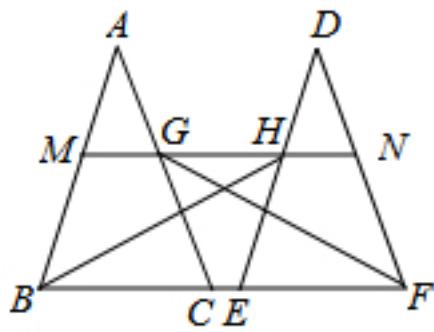


图2

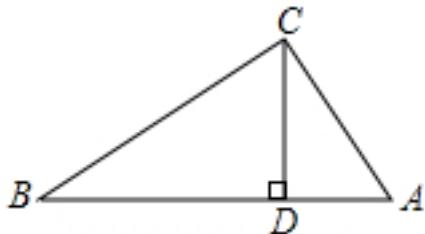
graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000040571_Q_1.jpg","coordinates":{"A":"1.00,3.00","B":"0.00,0.00","C":"2.00,0.00","D":"4.00,3.00","E":"3.00,0.00","F":"5.00,0.00"}, "collineations":{"0":"B###C##E##F","1":"A##B","2":"C##A","3":"D##E","4":"D##F"}, "variable>equals":{}, "circles":[]}], "appliedproblems":{}}, {"substemid":"2","questionrelies":"","picture": [{"picturename":"1000040571_Q_1.jpg","coordinates":{"A":"1.00,3.00","B":"0.00,0.00","C":"2.00,0.00","D":"4.00,3.00","E":"3.00,0.00","F":"5.00,0.00","G":"1.33,2.00","H":"3.67,2.00","M":"0.67,2.00","N":"4.33,2.00"}, "collineations":{"0":"G##M##H##N","1":"A##M##B","2":"A##G##C","3":"D##H##E","4":"D##N##F","5":"G##H","6":"H##B","7":"G##F"}, "variable>equals":{}, "circles":[]}], "appliedproblems":{}}]}
```

NLP:

```
TriangleRelation: $\triangle ABC$ , EqualityRelation{ $AB=AC$ }, TranslateRelation{preData= $\triangle ABC$ , afterData= $\triangle DEF$ , translateInfos='[TranslateInfo{rotateUnit=', translateDirection=null, lineDirection=BC}]}], (ExpressRelation:[key:]1), SegmentRelation:BD, SegmentRelation:AF, (ExpressRelation:[key:]2), PointOnLineRelation{point=M, line=AB, isConstant=false, extension=false}, LineParallelRelation [iLine1=BC, iLine2=BF], LineCrossRelation [crossPoint=Optional.of(G), iLine1=AC, iLine2=MN], LineCrossRelation [crossPoint=Optional.of(H), iLine1=DE, iLine2=MN], LineCrossRelation [crossPoint=Optional.of(N), iLine1=DF, iLine2=MN], SegmentRelation:BH, SegmentRelation:GF, ProveConclusionRelation:[证明: EqualityRelation{BD=AF}], ProveConclusionRelation:[证明: EqualityRelation{BH=FG}]}
```

776、topic: 在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, CD是AB边上的高, $AB=13\text{cm}$, $BC=12\text{cm}$, $AC=5\text{cm}$, 求:(1) $\triangle ABC$ 的面积; (2)CD的长.



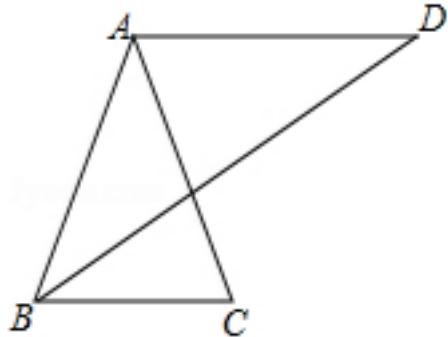
graph:

```
{"stem":{"pictures": [{"picturename":"9CE279A06845461691140C19DC9EFA5B.jpg","coordinates":{"A":"-1.00,3.00","B":"-14.00,3.00","C":"-2.92,7.62","D":"-2.92,3.00"}}, "collineations":{"0":"A##D##B","1":"C##A","2":"C##B","3":"C##D"}, "variable>equals":{}, "circles":[]}, "appliedproblems":{}}, "subsystems":[]}
```

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ACB=(1/2*\pi)$ }, LinePerpRelation{line1=CD, line2=AB},

crossPoint=D}, EqualityRelation{AB=13}, EqualityRelation{BC=12}, EqualityRelation{AC=5}, LinePerpRelation{line1=CD, line2=BD, crossPoint=D}, EqualityRelation{S_△ABC=v_0}, 求值(大小):
 (ExpressRelation:[key:]v_0), EqualityRelation{CD=v_1}, 求值(大小):
 (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]S_△ABC), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]CD)}

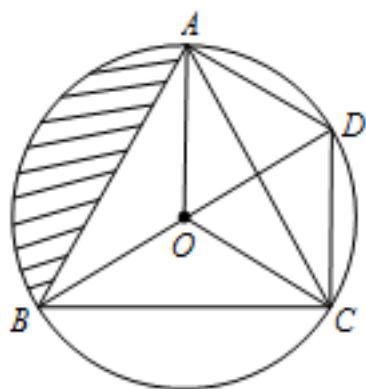
777、topic: 如图,已知AB=AC=AD,且AD||BC,求证: $\angle C=2\angle D$.%#



```
graph: [{"stem": {"pictures": [{"picturename": "1000027144_Q_1.jpg", "coordinates": {"A": "2.00,5.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "7.39,5.00"}, "collineations": {"0": "A###B", "1": "C###B", "2": "A###C", "3": "A##D", "4": "B###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}]
```

NLP: MultiEqualityRelation [multiExpressCompare=AB=AC=AD, originExpressRelationList=[], keyWord=null, result=null], LineParallelRelation [iLine1=AD, iLine2=BC], ProveConclusionRelation: [证明: EqualityRelation{ $\angle ACB = 2 * \angle ADB$ }]

778、topic: 如图,O是 $\triangle ABC$ 的内心,BO的延长线和 $\triangle ABC$ 的外接圆相交于D,连接DC、DA、OA、OC,四边形OADC为平行四边形.
 (1)求证: $\triangle BOC \cong \triangle CDA$
 (2)若 $AB=2$,求阴影部分的面积.

```

graph:
>{"stem":{"pictures":[{"picturename":"1000039644_Q_1.jpg","collineations":{"0":"A###B","1":"B###C","2":"C###A","3":"O##A","4":"B##O##D","5":"O##C","6":"A##D","7":"C##D"}, "coordinates":{"A":"0.00,3.46","B": "-2.00,0.00","C": "2.00,0.00","D": "2.00,2.31","O": "0.00,1.15"}, "variable-equals":{},"circles":[{"center": "O","pointincircle": "A##B##C##D"}]}}, "appliedproblems":{}}, "subsystems":[]}

```

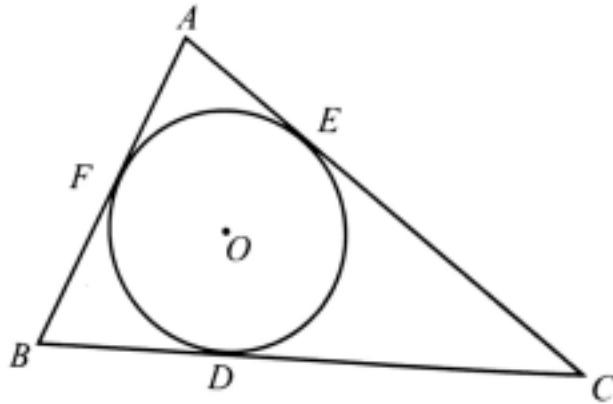
NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O_0$]{center= O_0 , analytic= $(x-x_0)^2 + (y-y_0)^2 = r^2$ }}.CoreAndShapeRelation: $O_0/\triangle ABC/\text{InnerCentre}$.LineCros

```

sCircleRelation{line=BO, circle=O_0, crossPoints=[D],
crossPointNum=1},MultiPointCollinearRelation:[D, C],MultiPointCollinearRelation:[D,
A],MultiPointCollinearRelation:[O, A],MultiPointCollinearRelation:[O,
C],ParallelogramRelation{parallelogram=Parallelogram:ADCO},EqualityRelation{AB=2},ProveConclusionRelation:[证明： TriangleCongRelation{triangleA=△BOC, triangleB=△CDA}]

```

779、topic: 如图, $\odot O$ 是 $\triangle ABC$ 的内切圆,D,E,F为切点,且 $AB=9\text{cm}$, $BC=14\text{cm}$, $CA=13\text{cm}$,求 AF, BD, CE 的长.%#



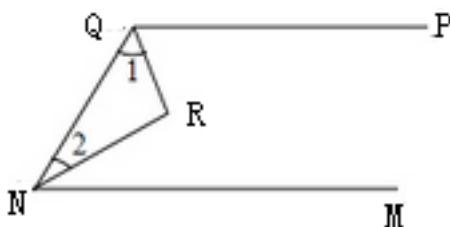
```

graph:
{"stem": {"pictures": [{"picturename": "1000083383_Q_1.jpg", "coordinates": {"A": "-0.71,2.74", "B": "-2.93, -1.17", "C": "4.05,-1.69", "D": "-0.44,-1.36", "E": "0.75,1.38", "F": "-1.70,1.00", "O": "-0.32,0.22"}, "collinearations": [{"0": "A##B", "1": "B##C", "2": "C##A"}], "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "D##E##F"}]}, "appliedproblems": {}, "substems": []}

```

NLP: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, CircumscribedShapeOfCircleRelation: $\triangle ABC/\text{Circle}[\odot O]\{\text{center}=O, \text{analytic}=(x-x_O)^2+(y-y_O)^2=r_O^2\}$ Points:[D, E, F], EqualityRelation{AB=9}, EqualityRelation{BC=14}, EqualityRelation{AC=13}, 求值(大小): (ExpressRelation:[key:]AF), 求值(大小): (ExpressRelation:[key:]BD), 求值(大小): (ExpressRelation:[key:]CE), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AF)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BD)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CE)}

780、topic: 如图,已知QR平分 $\angle PQN$,NR平分 $\angle QNM$, $\angle 1+\angle 2=90^\circ$,求证:PQ||MN.%#



```

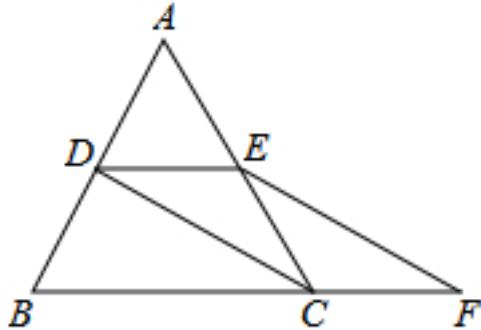
graph:
{"stem": {"pictures": [{"picturename": "1000050441_Q_1.jpg", "coordinates": {"M": "-3.00,2.00", "N": "-8.0,2.00", "P": "-3.00,5.00", "Q": "-7.00,5.00", "R": "-5.92,3.50"}, "collinearations": [{"0": "Q##P", "1": "Q##N", "2": "N##M", "3": "N##R", "4": "Q##R"}], "variable>equals": {"0": "\angle 1=\angle NQR", "1": "\angle 2=\angle QNR"}, "circles": []}}

```

],"appliedproblems":{},"substems":[]}]

NLP: AngleBisectorRelation{line=QR,angle= $\angle NQP$, angle1= $\angle NQR$, angle2= $\angle PQR$ },AngleBisectorRelation{line=NR,angle= $\angle MNQ$, angle1= $\angle MNR$, angle2= $\angle QNR$ },EqualityRelation{ $\angle NQR + \angle QNR = (1/2 * \pi)$ },ProveConclusionRelation:[证明: LineParallelRelation [iLine1=PQ, iLine2=MN]]]

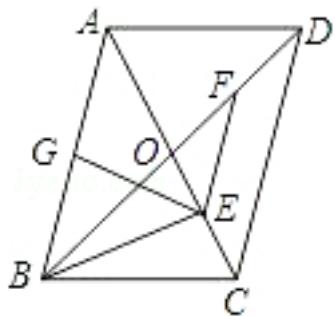
781、topic: 如图, $\triangle ABC$ 是等边三角形,D、E分别为AB、AC的中点,延长BC至点F,使 $CF = \frac{1}{2}BC$,连接CD和EF.求证:四边形DEFC是平行四边形.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000031905_Q_1.jpg", "coordinates": {"A": "-6.32,1.86", "B": "-7.30,0.16", "C": "-5.30,0.16", "D": "-6.80,1.02", "E": "-5.81,1.01", "F": "-4.30,0.16"}, "collineations": {"0": "A###D#B", "1": "B###C##F", "2": "A###E###C", "3": "D###E", "4": "D###C", "5": "E###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 RegularTriangleRelation:RegularTriangle: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=AB},MiddlePointOfSegmentRelation{middlePoint=E,segment=AC},PointOnLineRelation{point=F, line=BC, isConstant=false, extension=true},EqualityRelation{CF=(1/2)*BC},SegmentRelation:CD,SegmentRelation:EF,ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:CDEF}]

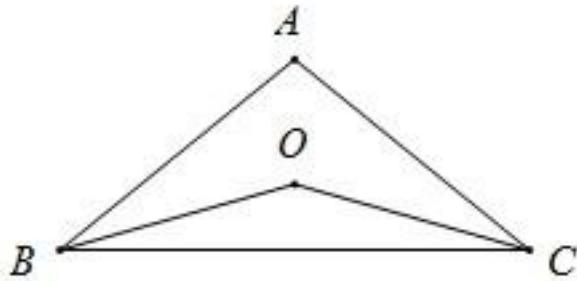
782、topic: 如图平行四边形ABCD中,对角线AC、BD交于点O,BD=2AD,E、F、G分别为OC、OD、AB的中点.求证:#%#(1)BE \perp AC;#%#(2)EG=EF#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040185_Q_1.jpg", "coordinates": {"A": "-4.31,5.59", "B": "-5.56,1.35", "C": "-2.56,1.35", "D": "-1.31,5.59", "E": "-3.00,2.41", "F": "-2.37,4.53", "G": "-4.93,3.47", "O": "-3.43,3.47"}, "collineations": {"0": "A###B###G", "1": "A###D", "2": "A###O###E###C", "3": "G###E", "4": "O###B###F###D", "5": "B###E", "6": "B###C", "7": "D###C", "8": "E###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD},LineCrossRelation
[crossPoint=Optional.of(O), iLine1=AC,
iLine2=BD],EqualityRelation{BD=2*AD},MiddlePointOfSegmentRelation{middlePoint=E,segment=OC}
,MiddlePointOfSegmentRelation{middlePoint=F,segment=OD},MiddlePointOfSegmentRelation{middle
Point=G,segment=AB},ProveConclusionRelation:[证明: LinePerpRelation{line1=BE, line2=AC,
crossPoint=E}],ProveConclusionRelation:[证明: EqualityRelation{EG=EF}]

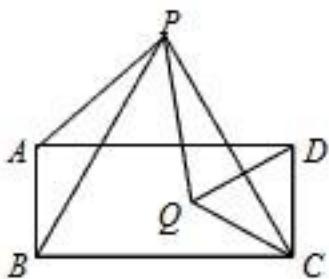
783、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC$ 、 $\angle ACB$ 的平分线交于O点.
①当 $\angle A = 30^\circ$ 时, $\angle BOC = 105^\circ = 90^\circ + \frac{1}{2} \times 30^\circ$
②当 $\angle A = 40^\circ$ 时, $\angle BOC = 110^\circ = 90^\circ + \frac{1}{2} \times 40^\circ$
③当 $\angle A = 50^\circ$ 时, $\angle BOC = 115^\circ = 90^\circ + \frac{1}{2} \times 50^\circ$;....#%#当 $\angle A = n^\circ$ 时(n为已知数)时,猜测 $\angle BOC =$
\$_____,并用所学的三角形的有关知识说明理由.



graph:
{"stem": {"pictures": [{"picturename": "1000006429_Q_1.jpg", "coordinates": {"A": "-8.31,3.65", "B": "-13.71,-0.74", "C": "-4.52,-0.63", "O": "-8.52,1.14"}, "collineations": {"0": "A##B", "1": "A##C", "2": "C##B", "3": "B##O", "4": "C##O"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=BO,angle= $\angle ABC$, angle1= $\angle ABO$,
angle2= $\angle CBO$ },AngleBisectorRelation{line=CO,angle= $\angle ACB$, angle1= $\angle ACO$,
angle2= $\angle BCO$ },TriangleRelation: $\triangle ABC$,ConditionRelation{EqualityRelation{ $\angle BAC = (1/6\pi)$ }},
MultiEqualityRelation [multiExpressCompare= $\angle BOC = (7/12\pi) = (1/2\pi) + (1/2)*(1/6\pi)$,
originExpressRelationList=[], keyWord=null,
result=null]},ConditionRelation{EqualityRelation{ $\angle BAC = (2/9\pi)$ }}, MultiEqualityRelation
[multiExpressCompare= $\angle BOC = (11/18\pi) = (1/2\pi) + (1/2)*(2/9\pi)$, originExpressRelationList=[],
keyWord=null,
result=null]},(ExpressRelation:[key:n],ConditionRelation{EqualityRelation{ $\angle BAC = (5/18\pi)$ }},
MultiEqualityRelation [multiExpressCompare= $\angle BOC = (23/36\pi) = (1/2\pi) + (1/2)*(5/18\pi)$,
originExpressRelationList=[], keyWord=null, result=null]},OmitExpressRelation [express=Express:[...],
value=null, separator=null, items=[], type=UNKNOWN],EqualityRelation{ $\angle BAC = 1/180*n\pi$ }

784、topic: 如图,四边形ABCD是矩形,\$\triangle PBC\$和\$\triangle QCD\$都是等边三角形,
且点P在矩形上方,点Q在矩形内.求证: ?#%#(1)\$\angle PBA=\angle PCQ=30^\circ
\$;?#%#(2)\$PA=PQ\$.



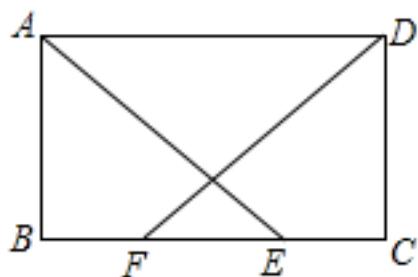
graph:

```
{"stem": {"pictures": [{"picturename": "1000005467_Q_1.jpg", "coordinates": {"A": "-9.95,5.00", "B": "-9.82,-2.17", "C": "3.05,-1.93", "D": "2.92,5.24", "P": "-3.59,9.10", "Q": "-3.22,1.54"}, "collineations": {"0": "A###P", "1": "B###P", "2": "A##B", "3": "A##D", "4": "C##D", "5": "B##C", "6": "P##Q", "7": "P##C", "8": "D##Q", "9": "C##Q"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP:

RectangleRelation{rectangle=Rectangle:ABCD}, RegularTriangleRelation:RegularTriangle: $\triangle PBC$, RegularTriangleRelation:RegularTriangle: $\triangle QCD$, PositionOfPoint2RegionRelation{point=P, region=EnclosedRegionRelation{name=ABCD, closedShape=Rectangle:ABCD}, position=outer}, PositionOfPoint2RegionRelation{point=Q, region=EnclosedRegionRelation{name=ABCD, closedShape=Rectangle:ABCD}, position=inner}, ProveConclusionRelation:[证明: MultiEqualityRelation [multiExpressCompare= $\angle ABP = \angle PCQ = (1/6\pi)$, originExpressRelationList=[], keyWord=null, result=null]], ProveConclusionRelation:[证明: EqualityRelation{AP=PQ}]

785、topic: (2015·济南)如图,在矩形ABCD中,BF=CE,求证:AE=DF. #%#



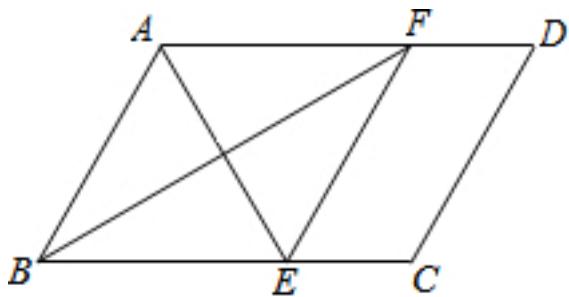
graph:

```
{"stem": {"pictures": [{"picturename": "A6A2839B821242398D6B1A1B411605F8.jpg", "coordinates": {"A": "-14.00,7.00", "B": "-14.00,3.00", "C": "-7.00,3.00", "D": "-7.00,7.00", "E": "-9.00,3.00", "F": "-12.00,3.00"}, "collineations": {"0": "B###A", "1": "A##D", "2": "E##A", "3": "B##F##E##C", "4": "C##D", "5": "D##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP:

RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{BF=CE}, ProveConclusionRelation:[证明: EqualityRelation{AE=DF}]

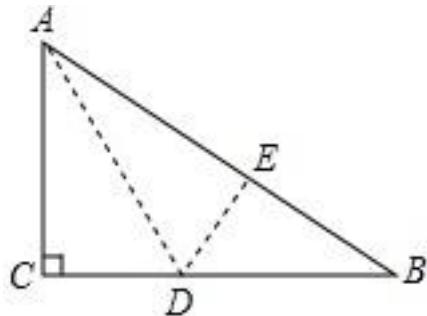
786、topic: 已知:如图,在 $\square ABCD$ 中, $\angle BAD$ 的平分线交BC于点E, $\angle ABC$ 的平分线交AD于点F. #%#求证:四边形ABEF是菱形. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000081638_Q_1.jpg", "coordinates": {"A": "2.00,4.00", "B": "0.00,0.00", "C": "7.00,0.00", "D": "9.00,4.00", "E": "4.47,0.00", "F": "6.47,4.00"}, "collineations": {"0": "A###F###D", "1": "B##E##C", "2": "D##C", "3": "B##F", "4": "A##E", "5": "A##B", "6": "E##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}

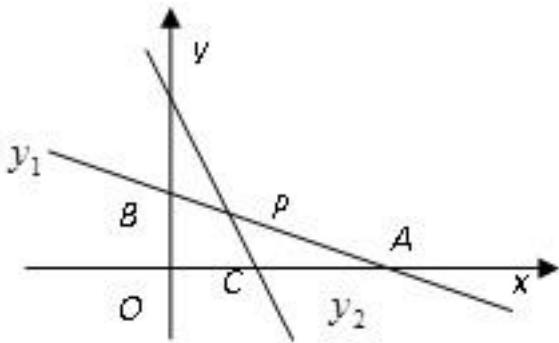
NLP: AngleBisectorRelation{line=AE,angle=∠BAF,angle1=∠BAE,angle2=∠EAF},AngleBisectorRelation{line=BF,angle=∠ABE,angle1=∠ABF,angle2=∠EBF},ParallelogramRelation{parallelogram=Parallelogram:ABCD},ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:ABEF}]

787、topic: 如图,有一块直角三角形纸片,已知两直角边AC=6cm,BC=8cm,现将直角边AC沿直线AD折叠,使它恰好落在斜边AB上,且与AE重合,求CD的长.



graph:
 NLP: EqualityRelation{CD=v_0},EqualityRelation{BC=8},LineCoincideRelation [iLine1=AB,iLine2=AE],求值(大小): (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CD)}

788、topic: 如图,在平面直角坐标系xOy中,已知直线 $y_1 = -\frac{2}{3}x + 2$ 与x轴、y轴分别交于点A和点B,直线 $y_2 = kx + b$ 经过点C(1,0)且与线段AB交于点P,并把 $\triangle ABO$ 分成两部分.(1)求 $\triangle ABO$ 的面积.(2)若 $\triangle ABO$ 被直线CP分成的两部分的面积相等,求点P的坐标及直线CP的函数表达式.

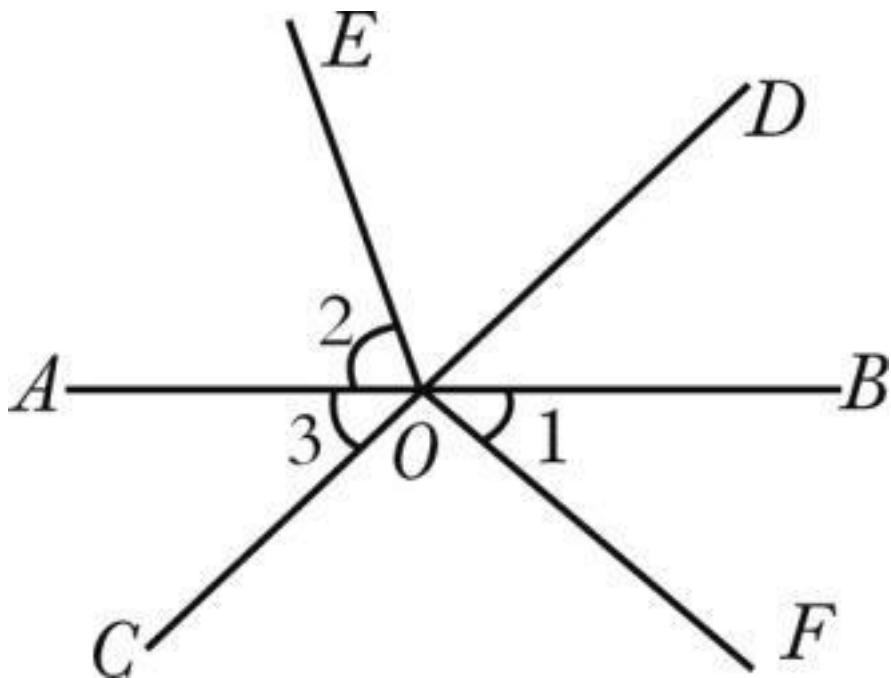


graph:

```
[{"variable>equals":{}, "picturename": "1000001499_Q_1.jpg", "collineations": {"1": "B###P###A", "0": "O ####A####C"}, "coordinates": {"P": "0.75,1.50", "A": "3.00,0.00", "B": "0.00,2.00", "C": "1.00,0.00", "O": "0.00,0.00"}}]
```

NLP: CoorSysTypeRelation [name=xOy, types=直角坐标系], LineCrossRelation
[crossPoint=Optional.of(A), iLine1=StraightLine[n_0] analytic : $y_1 = -\frac{2}{3}x + 2$ slope:-2/3 b:
isLinearFunction:true, iLine2=StraightLine[X] analytic : $y = 0$ slope:0 b:0
isLinearFunction:false], LineCrossRelation [crossPoint=Optional.of(B), iLine1=StraightLine[n_0]
analytic : $y_1 = -\frac{2}{3}x + 2$ slope:-2/3 b: isLinearFunction:true, iLine2=StraightLine[Y] analytic : $x = 0$
slope: b: isLinearFunction:false], PointOnLineRelation{point=C(1,0), line=StraightLine[n_1]
analytic : $y_2 = kx + b [k \neq 0]$ slope:k b: isLinearFunction:true, isConstant:false,
extension=false}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=StraightLine[n_1]
analytic : $y_2 = kx + b [k \neq 0]$ slope:k b: isLinearFunction:true,
iLine2=AB], EqualityRelation{S_△ABO=v_2}, 求值(大小): (ExpressRelation:[key:]v_2), 坐标
PointRelation:P, 解析式, 圆锥曲线解析式, 标准方程, 方程:
SegmentRelation:CP, SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]S_△ABO)}, SolutionConclusionRelation{relation=坐标
PointRelation:P}, SolutionConclusionRelation{relation=解析式, 圆锥曲线解析式, 标准方程, 方程:
StraightLineRelation{straightLine=StraightLine[CP] analytic : $y = k_{CP}x + b_{CP}$ slope:null b:null
isLinearFunction:false}}

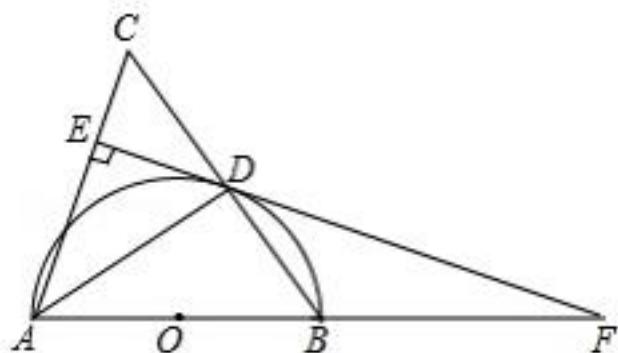
789、topic: 如图, 直线\$AB\$、\$CD\$相交于点\$O\$, \$OE\$平分\$\angle AOD\$,\$\angle FOC\{=\}90^\circ\$. \$\angle 1=40^\circ\$. 求\$\angle 2\$和\$\angle 3\$的度数.



graph:
 {"stem": {"pictures": [{"picturename": "AD80C1C723A64C5184839E8AFC645CD8.jpg", "coordinates": {"A": "-14.00,6.00", "B": "-4.00,6.00", "C": "-10.35,4.40", "D": "-6.94,8.45", "E": "-10.42,9.04", "F": "-6.47,3.87", "O": "-9.00,6.00"}, "collineations": {"0": "B##O###A", "1": "C##O##D", "2": "O##E", "3": "O##F"}, "variable>equals": {"0": "\u03291=\u0329BOF", "1": "\u03292=\u0329AOE", "2": "\u03293=\u0329AOC"}, "circles": []}, "appliedproblems": {}}, "substems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], AngleBisectorRelation{line=OE, angle= $\angle AOD$, angle1= $\angle AOE$, angle2= $\angle DOE$ }, EqualityRelation{ $\angle COF = (1/2 * \pi)$ }, EqualityRelation{ $\angle BOF = (2/9 * \pi)$ }, 求角的大小: (ExpressRelation:[key:] $\angle AOE$), 求角的大小: (ExpressRelation:[key:] $\angle AOC$), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOC$)}

790、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$,以AB为直径作半圆 $\odot O$,交BC于点D,连接AD,过点D作 $DE \perp AC$,垂足为点E,交AB的延长线于点F.(1)求证:EF是 $\odot O$ 的切线.(2)如果 $\odot O$ 的半径为5, $\sin \angle ADE = \frac{4}{5}$,求BF的长.

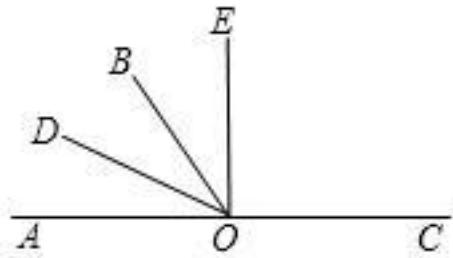


graph:
 {"stem": {"pictures": [{"picturename": "1000010208_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "10.00,"}}}, "appliedproblems": {}}}

0.00", "C": "2.80,9.60", "D": "6.40,4.80", "E": "1.79,6.14", "F": "22.86,0.00", "O": "5.00,0.00"}, "collineations": {"0": "A###E###C", "1": "C###D###B", "2": "E###D###F", "3": "A###O###B###F", "4": "A###D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B###A###D"}]], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=null}, LineCrossCircleRelation{line=BC, circle= $\odot O$, crossPoints=[D], crossPointNum=1}, SegmentRelation:AD, LinePerpRelation{line1=DE, line2=AC, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=AB], EqualityRelation{BF=v_0}, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=Express:[5]}, EqualityRelation{sin($\angle ADE$)=(4/5)}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: LineContactCircleRelation{line=EF, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, contactPoint=Optional.of(D), outpoint=Optional.absent()}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BF)}

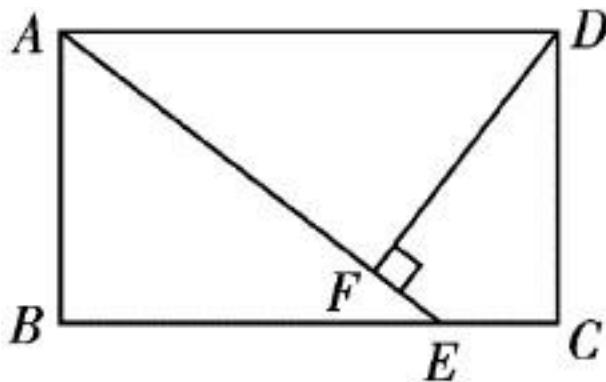
791、topic: 如图,已知O是直线AC上一点,OB是一条射线,OD平分 $\angle AOB$,OE在 $\angle BOC$ 内, $\angle BOE=\frac{1}{2}\angle EOC$, $\angle DOE=70^\circ$,求 $\angle EOC$ 的度数.



graph:
{"stem": {"pictures": [{"picturename": "1000025169_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "-1.71, 4.70", "C": "5.00,0.00", "D": "-4.33,2.50", "E": "0.87,4.92", "O": "0.00,0.00"}, "collineations": {"0": "A###O###B", "1": "D##O", "2": "O##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}

NLP: PointOnLineRelation{point=O, line=AC, isConstant=false, extension=false}, SegmentRelation:OB, AngleBisectorRelation{line=OD, angle= $\angle AOB$, angle1= $\angle AOD$, angle2= $\angle BOD$ }, EqualityRelation{ $\angle BOE=(1/2)*\angle COE$ }, EqualityRelation{ $\angle DOE=(7/18*\pi)$ }, 求角的大小: AngleRelation{angle= $\angle COE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle COE$)}

792、topic: 如图,已知点E是矩形ABCD的边BC上异于B、C的一点,\$DF \perp AE\$于点F.?(1)求证:\$\triangle ABE \sim \triangle DFA\$;?(2)若\$AB=6\$,\$AD=12\$,\$BE=8\$,求DF的长.



graph:

{"stem": {"pictures": [{"picturename": "1000004674_Q_1.jpg", "coordinates": {"A": "-10.00,6.00", "B": "-10.00,0.00", "C": "2.00,0.00", "D": "2.00,6.00", "E": "0.00,0.00", "F": "-1.18,0.71"}, "collineations": {"0": "A###F##E", "1": "A###D", "2": "D###F", "3": "D###C", "4": "B###E##C", "5": "A###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

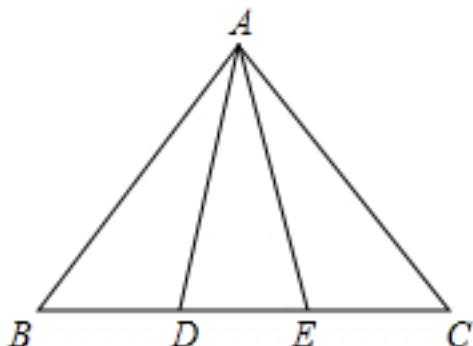
NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, LinePerpRelation{line1=DF, line2=AE, crossPoint=F}, EqualityRelation{DF=v_0}, EqualityRelation{AB=6}, EqualityRelation{AD=12}, EqualityRelation{BE=8}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA=△ABE, triangleB=△DFA}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DF)}

793、topic: 如图,正方形ABCD的边长为9,将正方形折叠,使顶点D落在BC边上的点 E处,折痕为GH. 若 BE:EC=2:1,求线段EC,CH的长.#%#

graph:

NLP: SquareRelation{square=Square:ABCD, length=9}, SquareRelation{square=Square:ABCD}, PointCoincidenceRelation{point1=D, point2=E}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, SegmentRelation:GH, EqualityRelation{(BE)/(CE)=(2)/(1)}, 求值(大小): (ExpressRelation:[key:]CE), 求值(大小): (ExpressRelation:[key:]CH), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CE)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CH)}

794、topic: 如图,点D、E在△ABC的边BC上,AD=AE,BD=CE.试说明△ABC是等腰三角形.#%#

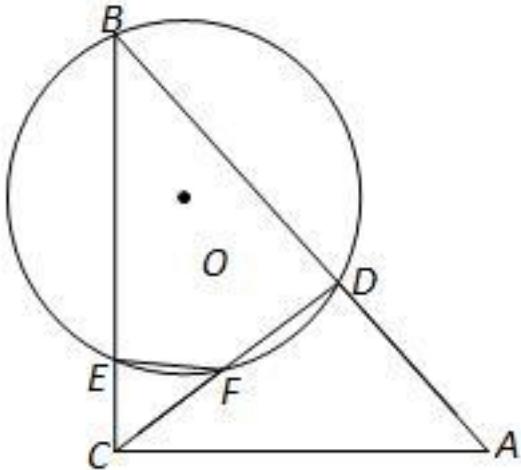


graph:

{"stem": {"pictures": [{"picturename": "1000070798_Q_1.jpg", "coordinates": {"A": "2.00,3.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "1.00,0.00", "E": "3.00,0.00"}, "collineations": {"0": "B###D##E##C", "1": "B##A", "2": "D##A", "3": "A##E", "4": "A##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, TriangleRelation:△ABC, EqualityRelation{AD=AE}, EqualityRelation{BD=CE}, ProveConclusionRelation:[IsoscelesTriangleRelation:IsoscelesTriangle:△ABC[Optional.of(A)]]]

795、topic: 已知:如图,四边形BEFD内接于\$○O\$,BE、DF的延长线交于C,在BD的延长线上取一点A,使\$\{AC\}^2=AD\cdot AB\$.求证:\$EF\parallel AC\$.

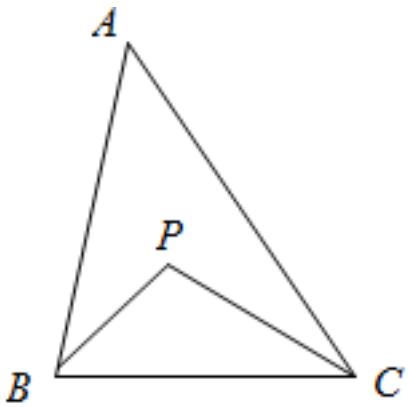


graph:

{"stem": {"pictures": [{"picturename": "B46AF1E706A54C7D83FEE4CFC819361E.jpg", "coordinates": {"A": "-5.77,4.70", "B": "-11.00,11.83", "C": "-11.00,4.70", "D": "-7.60,7.20", "E": "-11.00,6.17", "F": "-9.00,6.17", "O": "-10.00,9.00"}, "collineations": {"0": "B##A##D", "1": "A##C", "2": "B##E##C", "3": "C##F##D", "4": "F##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B##D##E##F"}]}, "appliedproblems": {}, "subsystems": []]}

NLP: InscribedShapeOfCircleRelation{closedShape=BDFE, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, LineCrossRelation [crossPoint=Optional.of(C), iLine1=BE, iLine2=DF], PointOnLineRelation{point=A, line=BD, isConstant=false, extension=true}, EqualityRelation{((AC)^2)=AD*AB}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=EF, iLine2=AC]]]

796、topic: 如图,在△ABC中,\$\angle ABC=80^\circ\$, \$\angle ACB=50^\circ\$, BP平分\$\angle ABC\$, CP平分\$\angle ACB\$, 求\$\angle BPC\$的度数.%#



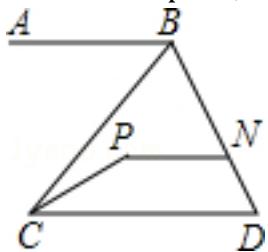
graph:

{"stem": {"pictures": [{"picturename": "1000038212_Q_1.jpg", "coordinates": {"A": "0.86,4.90", "B": "0.00,0.00", "C": "4.97,0.00", "P": "1.77,1.49"}, "collineations": {"0": "A###B", "1": "B###C", "2": "C###A", "3": "B##P", "4": "C##P"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ABC = (4/9\pi)\}$, EqualityRelation $\{\angle ACB = (5/18\pi)\}$, AngleBisesectorRelation{line=BP, angle= $\angle ABC$, angle1= $\angle ABP$, angle2= $\angle CBP$ }, AngleBisectorRelation{line=CP, angle= $\angle ACB$, angle1= $\angle ACP$, angle2= $\angle BCP$ }, 求角的大小: AngleRelation{angle= $\angle BPC$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BPC$)}

797、topic: 如图,AB||CD, $\angle ABC=50^\circ$, $\angle CPN=150^\circ$, $\angle PNB=60^\circ$, $\angle NDC=60^\circ$, 求 $\angle BCP$ 的度数.



graph:

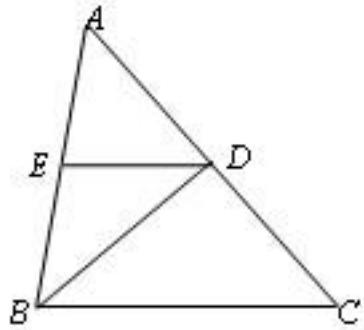
{"stem": {"pictures": [{"picturename": "B54E7B2114F64E63A14E4EE7BC21B1D2.jpg", "coordinates": {"A": "-15.00,7.00", "B": "-11.00,7.00", "C": "-13.52,4.00", "D": "-9.27,4.00", "P": "-11.60,5.11", "N": "-9.91,5.11"}, "collineations": {"0": "B##A", "1": "B##N##D", "2": "B##C", "3": "C##P", "4": "D##C", "5": "P##N"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB,

iLine2=CD], EqualityRelation $\{\angle ABC = (5/18\pi)\}$, EqualityRelation $\{\angle CPN = (5/6\pi)\}$, EqualityRelation $\{\angle BNP = (1/3\pi)\}$, EqualityRelation $\{\angle CDN = (1/3\pi)\}$, 求角的大小:

AngleRelation{angle= $\angle BCP$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BCP$)}

798、topic: 如图,在 $\triangle ABC$ 中, $AB=BC=12cm$, $\angle ABC=80^\circ$, BD是 $\angle ABC$ 的平分线, $DE \parallel BC$. (1) 求 $\angle EDB$ 的度数; (2) 求DE的长.

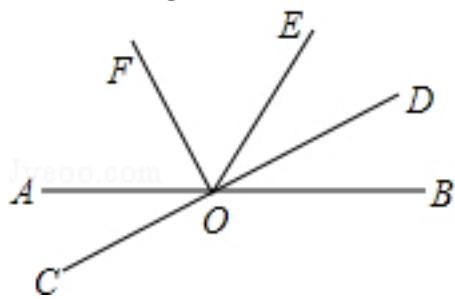


graph:

```
{"stem": {"pictures": [{"picturename": "1000027589_Q_1.jpg", "coordinates": {"A": "0.69,3.94", "B": "0.00,0.00", "C": "4.00,0.00", "D": "2.35,1.97", "E": "0.35,1.97"}, "collineations": {"0": "A###E##B", "1": "A##D##C", "2": "B##C", "3": "B##D", "4": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: TriangleRelation:△ABC, MultiEqualityRelation [multiExpressCompare=AB=BC=12, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{∠CBE=(4/9*Pi)}, AngleBisectorRelation{line=BD, angle=∠CBE, angle1=∠CBD, angle2=∠DBE}, LineParallelRelation [iLine1=DE, iLine2=BC], 求角的大小: AngleRelation{angle=∠BDE}, EqualityRelation{DE=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]∠BDE), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]DE)}

799、topic: 如图,直线AB、CD相交于点O,∠DOE=∠BOD,OF平分∠AOE,若∠AOC=28°,求∠EOF的度数.%#

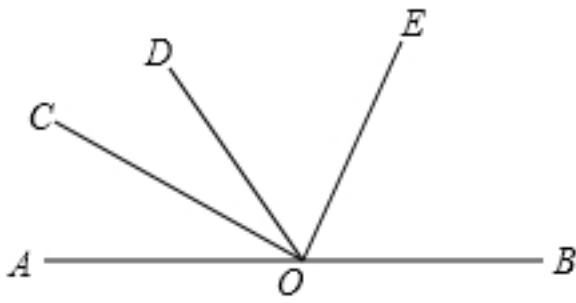


graph:

```
{"stem": {"pictures": [{"picturename": "4C2472CB293647B080FB80543C3B1F4A.jpg", "coordinates": {"A": "-15.00,5.00", "B": "-7.00,5.00", "C": "-14.53,3.12", "D": "-7.05,7.10", "E": "-8.50,8.71", "F": "-12.61,8.03", "O": "-11.00,5.00"}, "collineations": {"0": "B##A##O", "1": "O##C##D", "2": "O##E", "3": "O##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], EqualityRelation{∠DOE=∠BOD}, AngleBisectorRelation{line=OF, angle=∠AOE, angle1=∠AOF, angle2=∠EOF}, EqualityRelation{∠AOC=(7/45*Pi)}, 求角的大小: AngleRelation{angle=∠EOF}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]∠EOF)}

800、topic: 如图,AB为一条直线,OC是∠AOD的平分线,OE在∠BOD内,\$∠DOE:∠BOD=1:3\$,∠COE=72°,求∠EOB的度数.%#

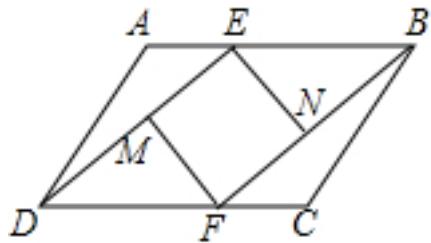


graph:

{"stem": {"pictures": [{"picturename": "1000072560_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.00,0.00", "C": "0.57,1.76", "D": "2.07,2.85", "E": "3.93,2.85", "O": "3.00,0.00"}, "collineations": {"0": "A###O##B", "1": "O##C", "2": "O##D", "3": "O##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: SegmentRelation:AB, AngleBisectorRelation{line=OC, angle=∠AOD, angle1=∠AOC, angle2=∠COD}, EqualityRelation{∠DOE)/(∠BOD)=(1)/(3)}, EqualityRelation{∠COE=(2/5*Pi)}, 求角的大小: AngleRelation{angle=∠BOE}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠BOE)}

801、topic: 如图,□ABCD中,AE=CF,M、N分别是DE、BF的中点.求证:四边形MFNE是平行四边形.



graph:

{"stem": {"pictures": [{"picturename": "451B5296190444E9A13E40119DC06F49.jpg", "coordinates": {"A": "-12.00,7.00", "B": "-6.00,7.00", "C": "-8.00,3.00", "D": "-14.00,3.00", "E": "-10.00,7.00", "F": "-10.00,3.00", "M": "-12.00,5.00", "N": "-8.00,5.00"}, "collineations": {"0": "A##D", "1": "A##B##E", "2": "M##E##D", "3": "D##F##C", "4": "B##C", "5": "B##N##F", "6": "E##N", "7": "M##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{AE=CF}, MiddlePointOfSegmentRelation{middlePoint=M, segment=DE}, MiddlePointOfSegmentRelation{middlePoint=N, segment=BF}, ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:EMFN}]

802、topic: 如图1,在△OAB中,∠OAB=90°,∠AOB=30°,OB=8.以OB为边,在△OAB外作等边△OBC,D是OB的中点,\$AD = \frac{1}{2}BO\$,连接AD并延长交OC于点E.(1)求证:四边形ABCE是平行四边形;(2)如图2,将图1中的四边形ABCO折叠,使点C与点A重合,折痕为FG,求OG的长.

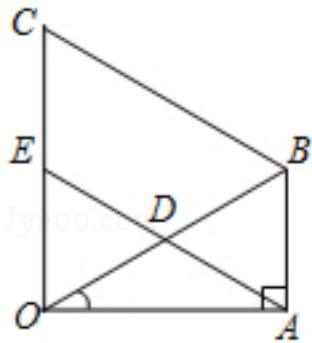


图1

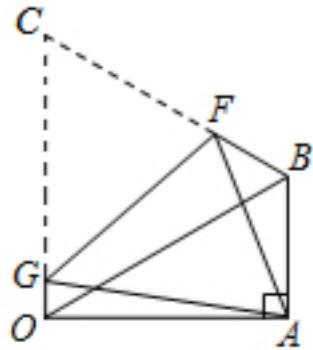


图2

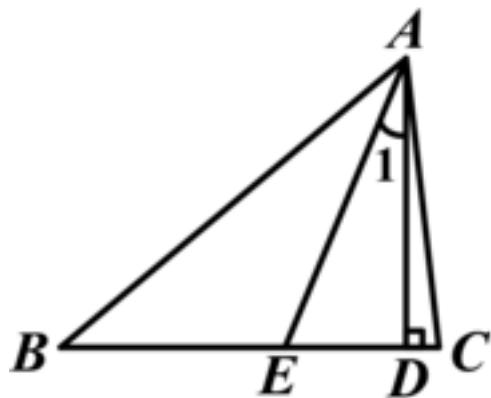
graph:
 {"stem": {"pictures": [{"picturename": "1000031864_Q_1.jpg", "coordinates": {"A": "6.93,0.00", "B": "6.93,4.00", "C": "0.00,8.00", "O": "0.00,0.00", "E": "0.00,4.00", "D": "3.46,2.00"}, "collineations": {"0": "B##A", "1": "B##C", "2": "A##O", "3": "O##C##E", "4": "O##B##D", "5": "D##E##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000031864_Q_1.jpg", "coordinates": {"F": "4.85,5.20", "G": "0.00,1.00"}, "collineations": {"0": "C##G##O", "1": "G##A", "2": "F##A", "3": "C##F##B", "4": "F##G"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}}

NLP:

TriangleRelation: $\triangle OAB$, EqualityRelation $\{\angle BAO = (1/2 * \pi)\}$, EqualityRelation $\{\angle AOD = (1/6 * \pi)\}$, Equalit
yRelation $\{BO = 8\}$, TriangleRelation: $\triangle OAB$, RegularTriangleRelation: RegularTriangle: $\triangle OBC$, MiddlePoin
tOfSegmentRelation $\{middlePoint = D, segment = OB\}$, EqualityRelation $\{AD = (1/2) * BO\}$, LineCrossRelation
[crossPoint = Optional.of(E), iLine1 = AD,
iLine2 = OC], EqualityRelation $\{GO = v_0\}$, (ExpressRelation:[key:]2), SymmetricRelation{preData = C, after
Data = A, symmetric = StraightLine[FG] analytic :y = k_FG * x + b_FG slope:null b:null
isLinearFunction: false, pivot = }, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证
明]:

ParallelogramRelation{parallelogram = Parallelogram:ABCE}], SolutionConclusionRelation{relation = 求
值(大小): (ExpressRelation:[key:]GO)}

803、topic: 如图,在 $\triangle ABC$ 中, $\angle BAE = \angle CAE$, $\angle ADC = 90^\circ$, $\angle B = 40^\circ$, $\angle C = 84^\circ$. #(1)求 $\angle 1$ 的度数; #(2)
通过确定三角形中的最大内角的度数来确定图中各三角形的形状.#%#



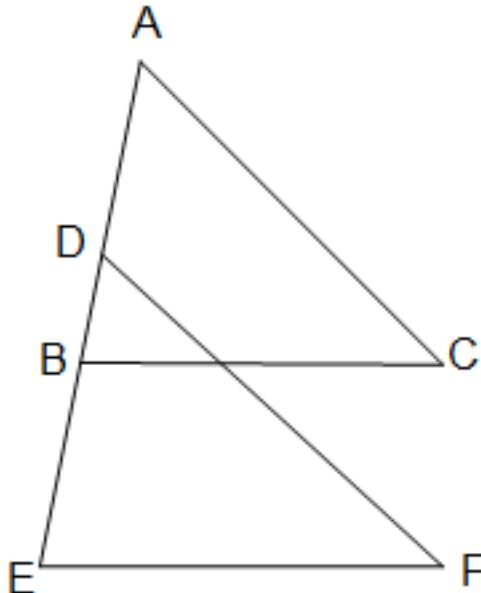
graph:
 {"stem": {"pictures": [{"picturename": "B851B1C3A70C44F4B582DF9F722C8E64.jpg", "coordinates": {"A": "-8.49,7.63", "B": "-14.00,3.00", "C": "-8.00,3.00", "D": "-8.49,3.00", "E": "-10.36,3.00"}, "collineations": {"0": "B##A", "1": "C##A", "2": "B##C", "3": "A##E", "4": "A##D", "5": "D##C"}}], "appliedproblems": {}, "substems": {}}}

:"B##A","1":"A##C","2":"A##D","3":"A##E","4":"B##C##D##E"},"variable>equals": {"0": " $\angle 1 = \angle DAE$ "}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle BAE = \angle CAE\}$, EqualityRelation $\{\angle ADC = (1/2 * \pi)\}$, EqualityRelation $\{\angle ABE = (2/9 * \pi)\}$, EqualityRelation $\{\angle ACD = (7/15 * \pi)\}$, 求角的大小:
 (ExpressRelation:[key:] $\angle DAE$), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle DAE$)}

804、topic: 如图,点A、D、B、E在一条直线上,且AC=DF,AD=BE,BC=EF.求证: $\angle C = \angle F$.#%#



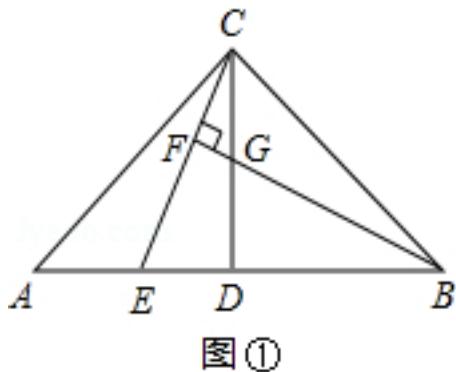
graph:

{"stem": {"pictures": [{"picturename": "1000072655_Q_1.jpg", "coordinates": {"A": "-8.57, 9.30", "B": "-10.0, 5.00", "C": "-7.00, 5.00", "D": "-9.57, 6.30", "E": "-11.00, 2.00", "F": "-8.00, 2.00"}, "collinearations": {"0": "A##C", "1": "D##F", "2": "B##C", "3": "E##F", "4": "A##D##B##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

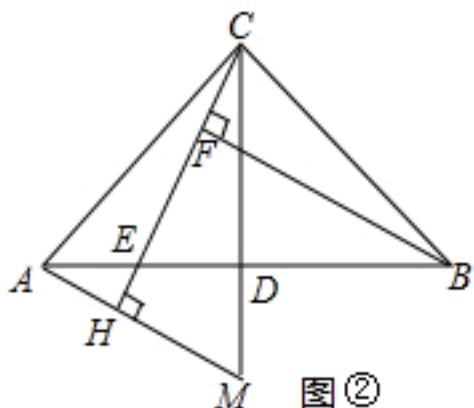
NLP: MultiPointCollinearRelation:[A, D, B,

E], EqualityRelation{AC=DF}, EqualityRelation{AD=BE}, EqualityRelation{BC=EF}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle ACB = \angle DFE$ }]

805、topic: 已知:在 $\triangle ABC$ 中, $AC=BC$, $\angle ACB=90^\circ$,点D是AB的中点,点E是AB边上一点.#%#(1)直线BF垂直于CE于点F,交CD于点G(如图①),求证: $AE=CG$;%#(2)直线AH垂直于CE,垂足为H,交CD的延长线于点M(如图②),找出图中与BE相等的线段,并说明.%#



图①



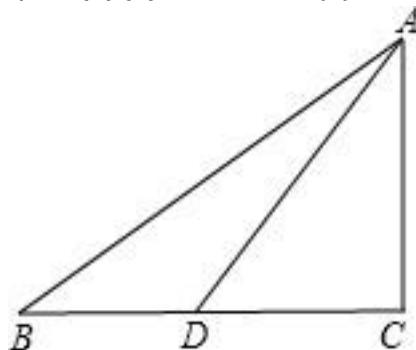
图②

graph:
 {"stem": {"pictures": [{"picturename": "1000050449_Q_1.jpg", "coordinates": {"A": "-3.84,2.54", "B": "2.56,2.54", "C": "-0.84,5.54", "D": "-0.84,2.54", "E": "-1.98,2.54", "F": "-1.45,3.92", "G": "-0.84,3.69"}, "collineations": [{"0": "A###E##D##B", "1": "C##A", "2": "E##F##C", "3": "C##D##G", "4": "G##F##B", "5": "C##B"}], "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000050449_Q_1.jpg", "coordinates": {"H": "-2.22,1.92", "M": "-0.84,1.39"}}, {"collineations": [{"0": "A##H##M", "1": "E##F##C##H", "2": "C##D##G##M"}], "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $AC=BC$ }, EqualityRelation{ $\angle ACB=(1/2\pi)$ }, MiddlePointOfSegmentRelation{middlePoint=D, segment=AB}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, LinePerpRelation{line1=BF, line2=CE, crossPoint=F}, LinePerpRelation{line1=AH, line2=CE, crossPoint=H}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=AH, iLine2=CD]

806、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$,点D在BC上, $BD=4$, $AD=BC$, $\cos \angle ADC = \frac{3}{5}$. 求:(1)DC的长;(2) $\sin B$ 的值.



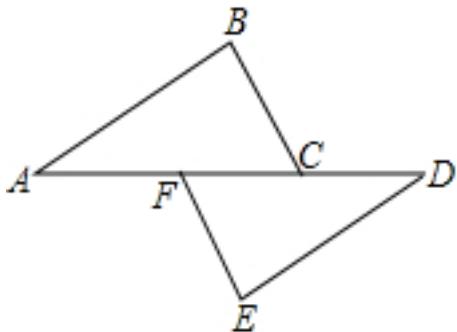
graph:
 {"stem": {"pictures": [{"picturename": "1000007591_Q_1.jpg", "coordinates": {"A": "0.00,8.00", "B": "-10.00,0.00", "C": "0.00,0.00", "D": "-6.00,0.00"}, "collineations": [{"0": "A##D", "1": "A##B"}], "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle C=(1/2\pi)$ }, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, EqualityRelation{ $BD=4$ }, EqualityRelation{ $AD=BC$ }, EqualityRelation{ $\cos(\angle ADC)=(3/5)$ }, EqualityRelation{ $CD=v_0$ }, 求值(大小): (ExpressRelation:[key:]v_0), 求值(大小): (ExpressRelation:[key:]sin($\angle B$)), SolutionConclusionRelation{relation=求值(大小):}

{ExpressRelation:[key:]CD}),SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:]sin($\angle B$))}

807、topic: 如图,点A、F、C、D在同一直线上,点B和点E分别在直线AD的两侧,且 $AB=DE$, $\angle A=\angle D$, $AF=DC$.试说明: $BC\parallel EF$.#%#

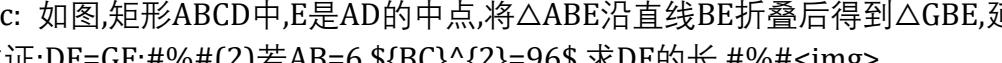


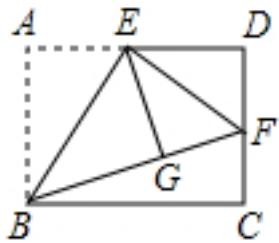
graph:

```
{"stem":{"pictures":[{"picturename":"C242FD0D2E964F3D98304042EF088C39.jpg","coordinates":{"A":-14.00,5.00,"B":-11.00,8.00,"C":-10.00,5.00,"D":-7.00,5.00,"E":-10.00,2.00,"F":-11.00,5.00}],"collineations":{"0":"B###A","1":"A###F###D##C","2":"C##B","3":"E##D","4":"E##F"},"variable>equals":{},"circles":[]},"appliedproblems":{},"subsystems":[]}
```

NLP: PointRelation:A,PointRelation:F,PointRelation:C,PointOnLineDifferentSideRelation{point1=B, point2=E,

line=AD}, EqualityRelation{AB=DE}, EqualityRelation{ $\angle BAF = \angle CDE$ }, EqualityRelation{AF=CD}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=BC, iLine2=EF]]]

808、topic: 如图,矩形ABCD中,E是AD的中点,将 $\triangle ABE$ 沿直线BE折叠后得到 $\triangle GBE$,延长BG交CD于点F.
(1)求证: $DF=GF$;
(2)若 $AB=6$, $BC^2=96$,求DF的长.




graph:

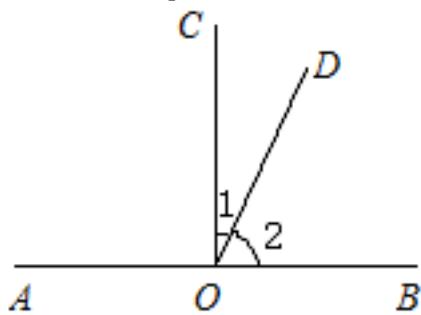
```
{"stem":{"pictures":[{"picturename":"1000080265_Q_1.jpg","coordinates":{"A": "-3.00,2.00","B": "-3.00,0.00","C": "0.27,0.00","D": "0.27,2.00","E": "-1.37,2.00","F": "0.27,0.67","G": "-1.04,0.40"}, "collineations": {"0": "A###E###D","1": "B###C","2": "A###B","3": "C###F###D","4": "B###G###F","5": "B###E","6": "G###E","7": "F###E"}, "variable-equals": {},"circles": []}], "appliedproblems": {}}, "substems": []}}
```

NLP:

RectangleRelation{rectangle=Rectangle:ABCD}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AD}, TurnoverRelation{start=A, segment=BE, target=G}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BG, iLine2=CD], EqualityRelation{DF=v_0}, EqualityRelation{AB=6}, EqualityRelation{(BC)^2=96}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{DF=FG}], SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key:]DF)}

809、topic: 如图,点O在直线AB上,CO⊥AB,∠2-∠1=34°.求∠AOD的度数.#%#

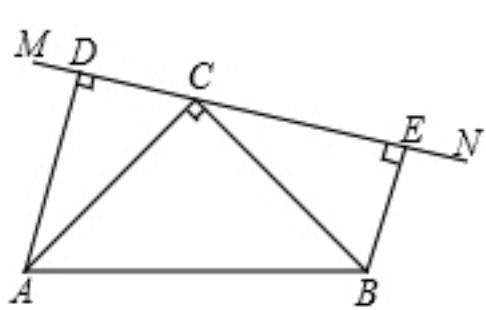


graph:

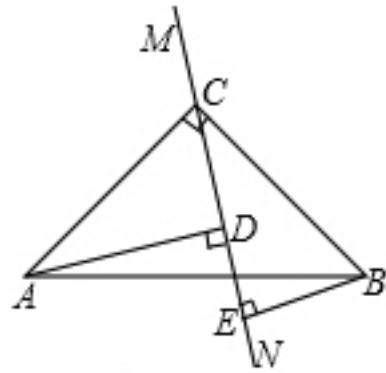
{"stem":{"pictures":[{"picturename":"1000051544_Q_1.jpg","coordinates":{"A": -7.73, "B": -1.08, "O": -4.42, "C": -4.47, "D": -2.93}, {"O": -4.42, "C": -4.47, "D": -2.93}], "collineations": [{"O": "O##C", "1": "O##D", "2": "A##O##B"}], "variable-equals": [{"0": "\u03b1=\u03b1COD", "1": "\u03b2=\u03b1BOD"}, {"circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: PointOnLineRelation{point=O, line=AB, isConstant=false, extension=false}, LinePerpRelation{line1=CO, line2=AB, crossPoint=O}, EqualityRelation{∠BOD-∠COD=(17/90*Pi)}, 求角的大小: AngleRelation{angle=∠AOD}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]∠AOD)}

810、topic: 在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=BC$,直线MN经过点C,且 $AD\perp MN$ 于D, $BE\perp MN$ 于E,#%#(1)求证: $DE=AD+BE$;%#(2)当直线MN绕点C旋转到图②的位置时,其余条件不变,(1)中的结论还成立吗?若成立,请给出证明;若不成立,问 DE,AD,BE 的关系如何?%#



图①



图②

graph:

{"stem":{"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "C41333792E6043348BFBF16357B829A9_1.jpg", "coordinates": {"A": -13.0, "B": -7.0, "C": -10.0, "D": -11.9, "E": -6.4, "M": -14.58, "N": -4.57}, {"A": -13.0, "B": -7.0, "C": -10.0, "D": -9.38, "E": -8.43, "M": -10.53, "N": -7.99}], "collineations": [{"0": "B##A", "1": "A##D", "2": "C##A", "3": "B##E", "4": "B##C", "5": "M##N##D##E##C"}], "variable-equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "C41333792E6043348BFBF16357B829A9_2.jpg", "coordinates": {"A": -13.0, "B": -7.0, "C": -10.0, "D": -11.9, "E": -6.4, "M": -14.58, "N": -4.57}, {"A": -13.0, "B": -7.0, "C": -10.0, "D": -9.38, "E": -8.43, "M": -10.53, "N": -7.99}], "collineations": [{"0": "B##A", "1": "A##D", "2": "C##A", "3": "B##E", "4": "B##C", "5": "M##N##D##E##C"}], "variable-equals": {}, "circles": []}]}}

M####N####D###E###C"}, "variable>equals":{}, "circles":[]}, "appliedproblems":{}]]}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ACB = (1/2\pi)\}$, EqualityRelation $\{AC = BC\}$, PointOnLineRelation $\{point = C, line = MN, isConstant = false, extension = false\}$, LinePerpRelation $\{line1 = AD, line2 = MN, crossPoint = D\}$, LinePerpRelation $\{line1 = BE, line2 = MN, crossPoint = E\}$, 求值(大小):

(ExpressRelation:[key:] (DE/AD)), 求值(大小):

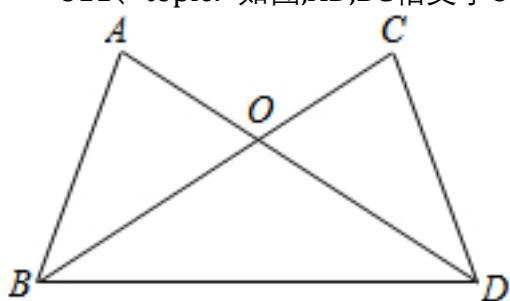
(ExpressRelation:[key:] (AD/BE)), ProveConclusionRelation:[证明:

EqualityRelation $\{DE = AD + BE\}$], SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] (DE/AD)), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] (AD/BE))}

811、topic: 如图,AD,BC相交于O,OA=OC, $\angle OBD = \angle ODB$. 求证:AB=CD. #%#

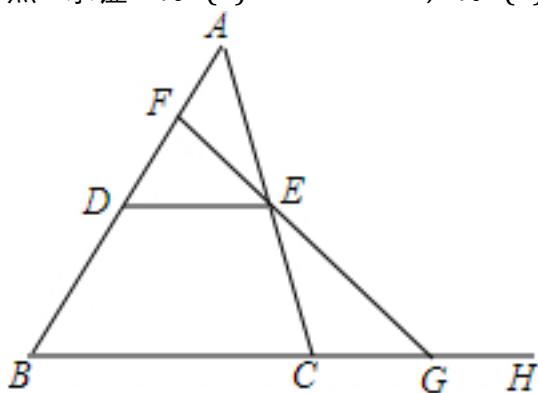


graph:

{"stem": {"pictures": [{"picturename": "1000035913_Q_1.jpg", "coordinates": {"A": "-2.74, 4.18", "B": "-4.15, 0.66", "C": "0.69, 4.18", "D": "2.10, 0.66", "O": "-1.03, 2.94"}, "collineations": {"0": "B###A", "1": "A##O##D", "2": "B##D", "3": "D##C", "4": "B##O##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AD, iLine2=BC], EqualityRelation $\{AO = CO\}$, EqualityRelation $\{\angle DBO = \angle BDO\}$, ProveConclusionRelation:[证明: EqualityRelation $\{AB = CD\}$]

812、topic: 已知:如图,点D,E分别在AB、AC上,DE||BC,F是AD上一点,FE的延长线交BC的延长线于点G.求证:#%#(1) $\angle EGH > \angle ADE$;#%#(2) $\angle EGH = \angle ADE + \angle A + \angle AEF$. #%#



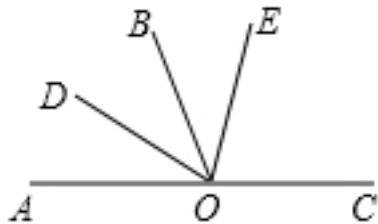
graph:

{"stem": {"pictures": [{"picturename": "1000070798_Q_1.jpg", "coordinates": {"A": "2.99, 4.97", "B": "0.00, 0.00", "C": "4.97, 0.00", "D": "1.20, 2.00", "E": "4.18, 2.00", "F": "2.40, 4.00", "G": "5.95, 0.00", "H": "8.00, 0.00"}, "collineations": {"0": "B##D##F##A", "1": "B##C##G##H", "2": "C##E##A", "3": "F##E##G", "4": "A##B##C##D##E##F##G##H"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}

,"D###E"},"variable>equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}

NLP: PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, LineParallelRelation [iLine1=DE, iLine2=BC], PointOnLineRelation{point=F, line=AD, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=FE, iLine2=BC], ProveConclusionRelation:[证明:
InequalityRelation{ $\angle EGH > \angle EDF$ }], ProveConclusionRelation:[证明:
EqualityRelation{ $\angle EGH = \angle EDF + \angle EAF + \angle AEF$ }]]

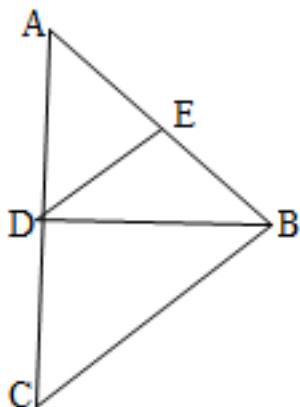
813、topic: 已知 $\angle AOB + \angle BOC = 180^\circ$, OD是 $\angle AOB$ 的平分线, OE在 $\angle BOC$ 内, $\angle BOE = \frac{1}{2}\angle EOC$, $\angle DOE = 72^\circ$, 求 $\angle EOC$ 的度数.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000081140_Q_1.jpg", "coordinates": {"A": "3.00,3.00", "B": "6.12,8.78", "C": "13.00,3.00", "D": "3.08,6.57", "E": "9.88,8.78", "O": "8.00,3.00"}, "collineations": {"0": "B###O", "1": "A###O", "2": "O##C", "3": "O##D", "4": "O##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{ $\angle AOB + \angle BOC = (\pi)$ }, AngleBisectorRelation{line=OD, angle= $\angle AOB$, angle1= $\angle AOD$, angle2= $\angle BOD$ }, EqualityRelation{ $\angle BOE = (1/2) * \angle COE$ }, EqualityRelation{ $\angle DOE = (2/5 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle COE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle COE$)}

814、topic: 如图,在 $\triangle ABC$ 中, $AB=BC=12\text{cm}$, $\angle ABC=80^\circ$, BD是 $\angle ABC$ 的平分线, $DE \parallel BC$. 求:(1) $\angle EDB$ 的度数;(2)DE的长.#%#

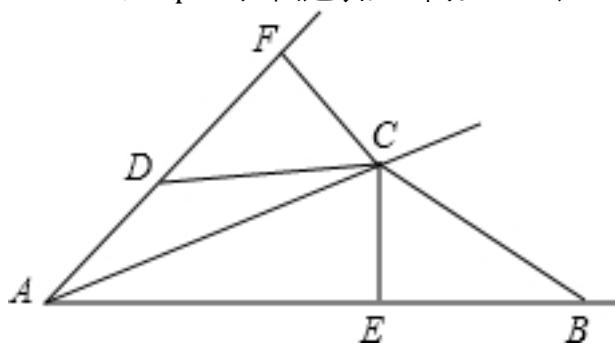


graph:
{"stem": {"pictures": [{"picturename": "1000063476_Q_1.jpg", "coordinates": {"A": "2.28,3.52", "B": "4.41,1.44", "C": "2.28,-0.09", "D": "2.28,1.44", "E": "3.50,2.32"}, "collineations": {"0": "C###A##D", "1": "B##A#"}}, "appliedproblems": {}, "subsystems": []}}

```
##E,"2":"E###D","3":"B###D","4":"C##B"},"variable>equals":{},"circles":[]],"appliedproblems":{}},  
"substems":[]}
```

NLP: TriangleRelation: $\triangle ABC$, MultiEqualityRelation [multiExpressCompare=AB=BC=12, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{ $\angle CBE = (4/9\pi)$ }, AngleBisectorRelation{line=BD, angle= $\angle CBE$, angle1= $\angle CBD$, angle2= $\angle DBE$ }, LineParallelRelation [iLine1=DE, iLine2=BC], 求角的大小: AngleRelation{angle= $\angle BDE$ }, EqualityRelation{DE=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BDE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DE)}

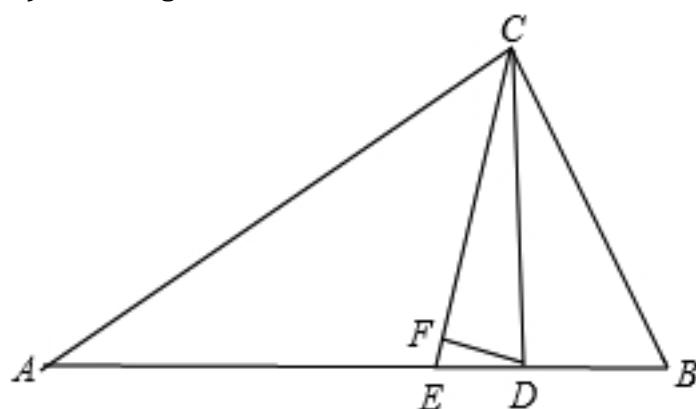
815、topic: 如图,已知AC平分 $\angle BAD$,CF $\perp AD$ 于F,CE $\perp AB$ 于E,DC=BC.求证: $\triangle BCE \cong \triangle DCF$.#%#



graph:
{"stem":{"pictures":[{"picturename":"1000030793_Q_1.jpg","coordinates":{"A": "-10.00,0.00","B": "-1.0,0.00","C": "-4.34,2.34","D": "-8.36,1.64","E": "-4.34,0.00","F": "-6.00,4.00"}, "collineations": {"0": "A###D ###F", "1": "A###C", "2": "A###E###B", "3": "F##C", "4": "D##C", "5": "E##C", "6": "B##C"}, "variable>equals": {}}, "circles": []}, "appliedproblems": {}}, "substems": []}

NLP: AngleBisectorRelation{line=AC, angle= $\angle DAE$, angle1= $\angle CAD$, angle2= $\angle CAE$ }, LinePerpRelation{line1=CF, line2=AD, crossPoint=F}, LinePerpRelation{line1=CE, line2=AB, crossPoint=E}, EqualityRelation{CD=BC}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BCE$, triangleB= $\triangle DCF$ }]

816、topic: (1)如图, $\triangle ABC$ 中, $\angle A=40^\circ$, $\angle B=72^\circ$,CE平分 $\angle ACB$,CD $\perp AB$ 于D,DF $\perp CE$ 于F,求 $\angle CDF$ 的度数;(2)在(1)中,若 $\angle A=\alpha$, $\angle B=\beta$ ($\alpha \neq \beta$),其他条件不变,求 $\angle CDF$ 的度数.(用含 α 和 β 的代数式表示)#%#



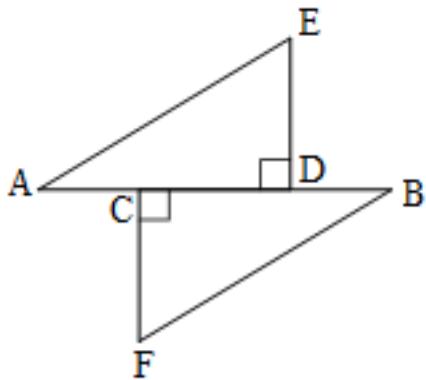
graph:

{"stem": {"pictures": [{"picturename": "C8FD2E4FA6E7455EAC3B3FB5FBDA3872.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-5.00,3.00", "C": "-6.93,8.93", "D": "-6.93,3.00", "E": "-8.63,3.00", "F": "-8.50,3.45"}, "collineations": {"0": "B###D##E##A", "1": "C##A", "2": "B##C", "3": "C##D", "4": "C##F##E", "5": "F##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle CAE = (2/9\pi)\}$, EqualityRelation $\{\angle CBD = (2/5\pi)\}$, AngleBisectorRelation{line=CE, angle= $\angle ACB$, angle1= $\angle ACE$, angle2= $\angle BCE$ }, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, LinePerpRelation{line1=DF, line2=CE, crossPoint=F}, 求角的大小: AngleRelation{angle= $\angle CDF$ }, EqualityRelation $\{\angle CAE = \alpha\}$, EqualityRelation $\{\angle CBD = \beta\}$, Condition: $[[\alpha \neq \beta]]$, 求角的大小: AngleRelation{angle= $\angle CDF$ }, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle CDF$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle CDF$)

817、topic: 已知:如图,ED \perp AB,FC \perp AB,垂足分别为D、C,AE \parallel BF,且AE=BF.求证AC=BD.#%#

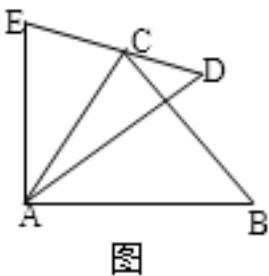


graph:

{"stem": {"pictures": [{"picturename": "1000061414_Q_1.jpg", "coordinates": {"A": "4.00,4.00", "B": "11.00,4.00", "C": "6.00,4.00", "D": "9.00,4.00", "E": "9.00,7.00", "F": "6.00,1.00"}, "collineations": {"0": "A##E", "1": "E##D", "2": "A##C##D##B", "3": "B##F", "4": "F##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LinePerpRelation{line1=ED, line2=AB, crossPoint=D}, LinePerpRelation{line1=FC, line2=AB, crossPoint=C}, LineParallelRelation [iLine1=AE, iLine2=BF], EqualityRelation{AE=BF}, ProveConclusionRelation:[证明: EqualityRelation{AC=BD}]

818、topic: 已知:如图,AE=AC, AD=AB, $\angle EAC = \angle DAB$,求证: $\triangle EAD \cong \triangle CAB$.#%#



图

graph:

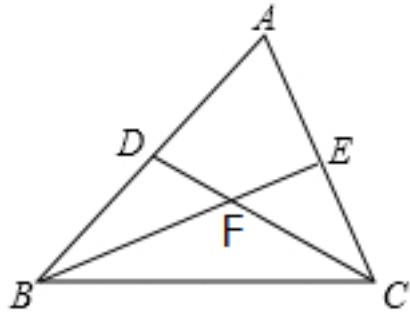
{"stem": {"pictures": [{"picturename": "1000040175_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "3.78,0.00", "C": "1.45,2.40", "D": "3.23,1.96", "E": "0.00,2.80"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C#"}}, "appliedproblems": {}, "substems": []}}

```
##A","3":"E###A","4":"A###D","5":"D##C##E"},"variable>equals":{},"circles":[]],"appliedproblems":{},"substems":[]}]
```

NLP:

EqualityRelation{AE=AC}, EqualityRelation{AD=AB}, EqualityRelation{∠CAE=∠BAD}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△EAD, triangleB=△CAB}]

819、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC$ 、 $\angle ACB$ 的平分线BE、CD相交于点F, $\angle A=60^\circ$,求 $\angle BFC$ 的度数.#%#

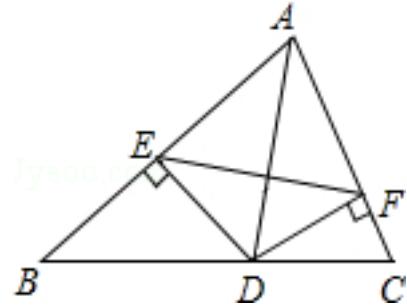


graph:

```
{"stem":{"pictures":[{"picturename":"C9AEE7F697A34404B9FD7BA791513221.jpg","coordinates":{"A": "-11.00,7.00","B": "-15.00,4.00","C": "-10.64,4.00","D": "-12.64,5.77","E": "-10.81,5.40","F": "-11.83,5.06}],"collineations": {"0": "B###D##A","1": "C##E##A","2": "B##C","3": "C##F##D","4": "B##F##E"}, "variable>equals":{},"circles":[]],"appliedproblems":{},"substems":[]}]}
```

NLP: TriangleRelation:△ABC, AngleBisectorRelation{line=BE, angle=∠CBD, angle1=∠CBE, angle2=∠DBE}, AngleBisectorRelation{line=CD, angle=∠BCE, angle1=∠BCD, angle2=∠DCE}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=CD], EqualityRelation{∠DAE=(1/3*Pi)}, 求角的大小:
AngleRelation{angle=∠BFC}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠BFC)}

820、topic: 如图,AD是 $\triangle ABC$ 的角平分线,DE、DF分别是 $\triangle ABD$ 和 $\triangle ACD$ 的高.#%#(1)若 $DE=5, AC=8$,求 $\triangle ADC$ 的面积;#%#(2)求证:AD垂直平分EF.#%#



graph:

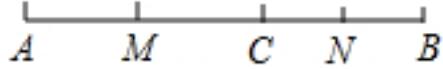
```
{"stem":{"pictures":[{"picturename":"1000041862_Q_1.jpg","coordinates":{"A": "-5.27,4.87","B": "-8.00,2.00","C": "-4.00,2.00","D": "-5.77,2.00","E": "-6.94,3.12","F": "-4.29,2.65}],"collineations": {"0": "A##E#B","1": "B##D##C","2": "C##F##A","3": "A##D","4": "D##E","5": "D##F","6": "E##F"}, "variable>equals":{},"circles":[]],"appliedproblems":{},"substems":[]}]}
```

NLP:

TriangleRelation:△ABC, TriangleRelation:△ABD, TriangleRelation:△ACD, AngleBisectorRelation{line=

$AD, \angle EAF, \angle DAF, \angle DAE}$, LinePerpRelation{line1=DE, line2=BE, crossPoint=E}, LinePerpRelation{line1=DF, line2=AF, crossPoint=F}, EqualityRelation{ $S_{\triangle ACD} = v_0$ }, EqualityRelation{DE=5}, EqualityRelation{AC=8}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_{\triangle ACD})}, ProveConclusionRelation:[MiddlePerpendicularRelation [iLine1=AD, iLine2=EF, crossPoint=Optional.absent()]]

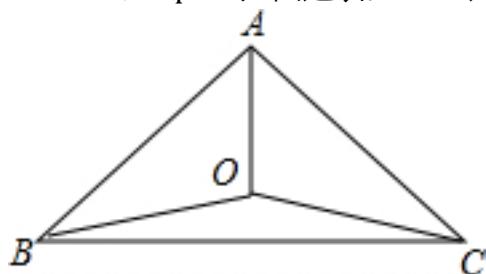
821、topic: 如图,已知线段AB=8cm,点C是AB上任一点,点M、N分别是AC和CB的中点,求MN的长度.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000081139_Q_1.jpg", "coordinates": {"A": "1.00,2.00", "B": "9.00,2.00", "C": "5.85,2.00", "M": "3.43,2.00", "N": "7.43,2.00"}, "collineations": {"0": "A###M##C##N##B"}, "variable>equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}}}

NLP: EqualityRelation{MN=v_0}, EqualityRelation{AB=8}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=N, segment=CB}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]MN)}

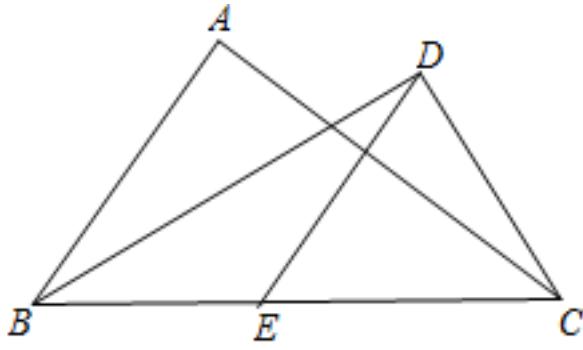
822、topic: 如图,已知AB=AC,BO=CO, $\angle BOC=160^\circ$,求 $\angle AOB$ 的度数.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000063502_Q_1.jpg", "coordinates": {"A": "6.74,2.30", "B": "4.79,0.45", "C": "8.68,0.45", "O": "6.74,0.79"}, "collineations": {"0": "B##C", "1": "B##A", "2": "A##C", "3": "O##A", "4": "O##B", "5": "O##C"}, "variable>equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}}}

NLP: EqualityRelation{AB=AC}, EqualityRelation{BO=CO}, EqualityRelation{ $\angle BOC=(8/9*\pi)$ }, 求角的大小: AngleRelation{angle= $\angle AOB$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOB$)}

823、topic: 如图:在 $\triangle ABC$ 中,BD平分 $\angle ABC$, $BD \perp CD$ 于D, $DE \parallel AB$ 交BC于E,求证 $BE=CE$.#%#

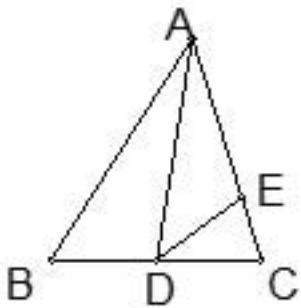


graph:

```
{"stem": {"pictures": [{"picturename": "1000050021_Q_1.jpg", "coordinates": {"A": "-6.48,4.87", "B": "-8.00, 2.00", "C": "-2.00,2.00", "D": "-3.60,4.65", "E": "-5.00,2.00"}, "collineations": {"0": "A###B", "1": "B##E##C", "2": "A##C", "3": "D##E", "4": "D##C", "5": "D##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=BD, angle= $\angle ABE$, angle1= $\angle ABD$, angle2= $\angle DBE$ }, LinePerpRelation{line1=BD, line2=CD, crossPoint=D}, LineParallelRelation [iLine1=DE, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{BE=CE}]

824、topic: 如图,已知在 $\triangle ABC$ 中,\$AD\$是 $\angle BAC$ 平分线,点\$E\$在\$AC\$边上,且 $\angle AED=\angle ADB$.求证: (1)\$\triangle ABD \sim \triangle ADE\$; #(2)\$\{A, D\}^2 = AB \cdot AE\$.



graph:

```
{"stem": {"pictures": [{"picturename": "1000010791_Q_1.jpg", "coordinates": {"A": "-3.84,5.93", "B": "-8.44, -0.53", "C": "-3.32,-0.68", "D": "-5.65,-0.61", "E": "-3.38,0.13"}, "collineations": {"0": "B##C##D", "1": "A##C##E", "2": "A##D", "3": "A##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP: TriangleRelation: $\triangle ABC$, AngleBisectorRelation{line=AD, angle= $\angle BAE$, angle1= $\angle BAD$, angle2= $\angle DAE$ }, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, EqualityRelation{ $\angle AED = \angle ADB$ }, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle ABD$, triangleB= $\triangle ADE$ }], ProveConclusionRelation:[证明: EqualityRelation{ $(AD)^2 = AB \cdot AE$ }]

825、topic: 如图, \$AB = AE\$, \$AC = AD\$, \$BC = DE\$, C,D在BE边上.求证: \$\angle CAE = \angle DAB\$.

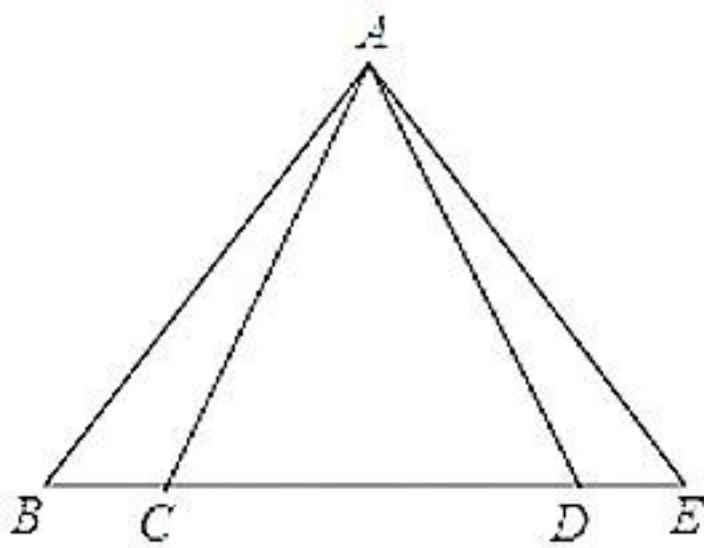


图 4-3-18

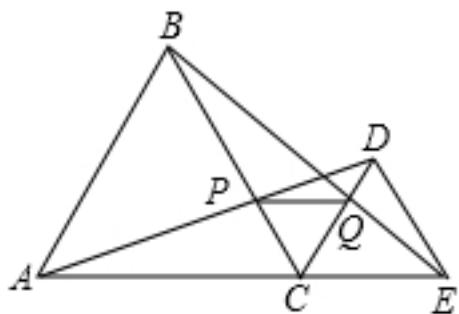
graph:

```
{"stem": {"pictures": [{"picturename": "1000004345_Q_1.jpg", "coordinates": {"A": "-6.98,7.01", "B": "-9.00,4.00", "C": "-7.98,4.00", "D": "-5.97,4.02", "E": "-4.95,4.02"}, "collineations": {"0": "B###C###D##E", "1": "A##D", "2": "A##C", "3": "A##B", "4": "A##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

EqualityRelation{AB=AE}, EqualityRelation{AC=AD}, EqualityRelation{BC=DE}, PointRelation:C, PointOnLineRelation{point=D, line=BE, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle CAE = \angle BAD$ }]

826、topic: 如图,C为线段AE上一动点(不与点A、E重合),在AE同侧分别作等边 $\triangle ABC$ 和等边 $\triangle CDE$,AD与BC相交于点P,BE与CD相交于点Q,连接PQ.求证: $\triangle PCQ$ 为等边三角形.



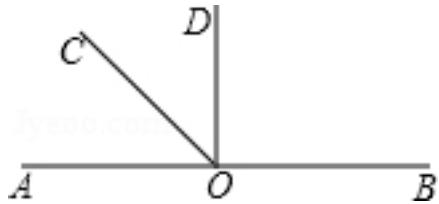
graph:

```
{"stem": {"pictures": [{"picturename": "1000038156_Q_1.jpg", "coordinates": {"A": "-0.00,0.00", "B": "3.00,5.20", "C": "6.00,0.00", "D": "8.00,3.46", "E": "10.00,0.00", "P": "4.80,2.08", "Q": "7.20,2.08"}, "collineations": {"0": "A##B", "1": "D##E", "2": "P##Q", "3": "A##C##E", "4": "B##P##C", "5": "A##P##D", "6": "C##Q##D", "7": "B##Q##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: PointRelation:A, PointRelation:E, PointOnLineRelation{point=C, line=AE, isConstant=false, extension=false}, RegularTriangleRelation:RegularTriangle: $\triangle ABC$, RegularTriangleRelation:RegularTriangle: $\triangle CDE$

angle:△CDE,SegmentRelation:AE,LineCrossRelation [crossPoint=Optional.of(P), iLine1=AD, iLine2=BC],LineCrossRelation [crossPoint=Optional.of(Q), iLine1=BE, iLine2=CD],SegmentRelation:PQ,ProveConclusionRelation:[证明:
 RegularTriangleRelation:RegularTriangle:△PCQ]

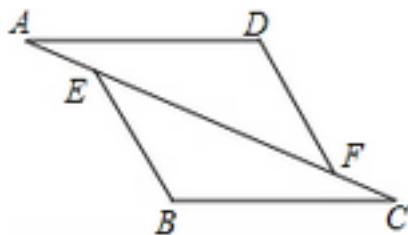
827、topic: 如图,O是直线AB上的一点,\$\angle AOC=\frac{1}{3}\angle BOC\$,OC是∠AOD的平分线.#%#(1)求∠COD的度数;#%#(2)试判断OD与AB的位置关系,并说明理由.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000081849_Q_1.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,0.00", "C": "-2.00,2.00", "D": "0.00,2.00", "O": "0.00,0.00"}, "collineations": {"0": "A##O##B", "1": "O##C", "2": "O##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}

NLP: PointOnLineRelation{point=O, line=AB, isConstant=false, extension=false}, EqualityRelation{∠AOC=(1/3)*∠BOC}, AngleBisectorRelation{line=OC, angle=∠AOD, angle1=∠AOC, angle2=∠COD}, 求角的大小:
 AngleRelation{angle=∠COD}, SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]∠COD)}, JudgePostionConclusionRelation: [data1=OD, data2=AB]

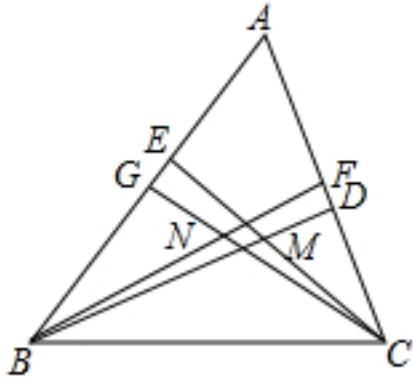
828、topic: 如图,已知:在△AFD和△CEB中,点A,E,F,C在同一直线上,AE=CF, ∠B=∠D,AD||BC.求证:AD=BC.#%#



graph:
 {"stem": {"pictures": [{"picturename": "D53F8F576F394BEFB5C286E777EDE1B6.jpg", "coordinates": {"A": "-15.00,7.00", "B": "-13.00,3.00", "C": "-10.00,3.00", "D": "-12.00,7.00", "E": "-13.95,6.16", "F": "-11.05,3.84"}, "collineations": {"0": "D##A", "1": "A##E##F##C", "2": "B##C", "3": "B##E", "4": "F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}

NLP:
 TriangleRelation:△AFD, TriangleRelation:△CEB, PointRelation:A, PointRelation:E, PointRelation:F, EqualityRelation{AE=CF}, EqualityRelation{∠CBE=∠ADF}, LineParallelRelation [iLine1=AD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{AD=BC}]

829、topic: 锐角△ABC中,BD和CE是两条高,相交于点M,BF和CG是两条角平分线,相交于点N,如果∠BMC=100°.#%#求:(1)∠A的度数;#%#(2)∠BNC的度数.#%#

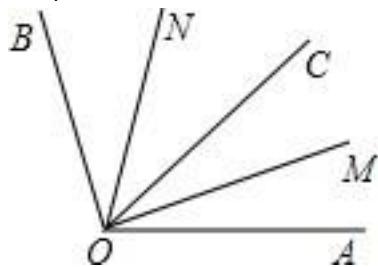


graph:

```
{"stem": {"pictures": [{"picturename": "28.jpg", "coordinates": {"A": "-12.00,7.00", "B": "-15.00,2.00", "C": "-4.98,0.90", "D": "-9.43,4.77", "E": "-12.83,5.61", "F": "-11.24,6.34", "G": "-13.44,4.60", "M": "-12.20,5.23", "N": "-11.48,3.75"}, "collineations": {"0": "A###F###D###C", "1": "E###M###C", "2": "G###N###C", "3": "A#E###G###B", "4": "B###M###F", "5": "B###N###D", "6": "C###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: AcuteTriangleRelation:AcuteTriangle: $\triangle ABC$,LineRoleRelation{Segment=BD, roleType=HEIGHT},LineCrossRelation [crossPoint=Optional.of(M), iLine1=BD, iLine2=CE],LineCrossRelation [crossPoint=Optional.of(N), iLine1=BF, iLine2=CG],EqualityRelation{ $\angle BMC = (5/9\pi)$ },LinePerpRelation{line1=CE, line2=BE, crossPoint=E},AngleBisectorRelation{line=BF,angle= $\angle GBN$, angle1= $\angle FBG$, angle2= $\angle FBN$ },AngleBisectorRelation{line=CG,angle= $\angle BCD$, angle1= $\angle BCG$, angle2= $\angle DCG$ },求角的大小: AngleRelation{angle= $\angle BNC$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BNC$)}

830、topic: 如图,OM是 $\angle AOC$ 的平分线,ON是 $\angle BOC$ 的平分线.(1)如果 $\angle AOC=28^\circ$, $\angle MON=35^\circ$,求出 $\angle AOB$ 的度数.(2)如果 $\angle MON=72^\circ$,求出 $\angle AOB$ 的度数.(3)如果 $\angle MON$ 的大小改变, $\angle AOB$ 的大小是否随之改变?它们之间有怎样的大小关系?请写出来.



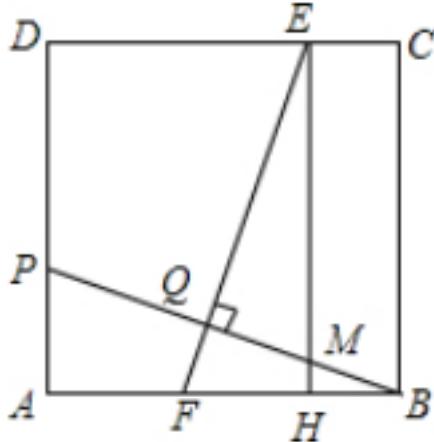
graph:

```
{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000021452_Q_1.jpg", "coordinates": {"A": "5.00,0.00", "B": "1.71,4.69", "C": "4.41,2.35", "M": "5.39,1.34", "N": "3.90,4.49", "O": "0.00,0.00"}, "collineations": {"0": "N###O", "1": "M###O", "2": "C#O", "3": "O##B", "4": "A##O"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "", "pictures": [{"picturename": "4.4_15(2).jpg", "coordinates": {"A": "5.00,0.00", "B": "-4.04,2.94", "C": "3.48,3.48", "M": "4.97,2.06", "N": "-0.41,5.27", "O": "0.00,0.00"}, "collineations": {"0": "N##O", "1": "M##O", "2": "C##O", "3": "O##B", "4": "O##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}]}
```

NLP: AngleBisectorRelation{line=OM,angle= $\angle AOC$, angle1= $\angle AOM$,

angle2= $\angle COM$ },AngleBisectorRelation{line=ON,angle= $\angle BOC$, angle1= $\angle BON$,
 angle2= $\angle CON$ },EqualityRelation{ $\angle AOC=(7/45\pi)$ },EqualityRelation{ $\angle MON=(7/36\pi)$ },求角的大小:
 AngleRelation{angle= $\angle AOB$ },EqualityRelation{ $\angle MON=(2/5\pi)$ },求角的大小:
 AngleRelation{angle= $\angle AOB$ },SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle AOB$)},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle AOB$)}

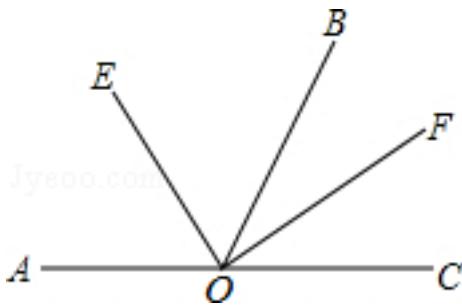
831、topic: 如图,在正方形ABCD中,点P在AD上,且不与点A、D重合,BP的垂直平分线分别交CD、AB于E、F两点,垂足为Q,过点E作EH $\perp AB$ 于点H. #%(1)求证:HF=AP; #%(2)若正方形ABCD的边长为12,AP=4,求线段EQ的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041028_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "4.00,4.00", "D": "0.00,4.00", "E": "3.21,4.00", "F": "1.73,0.00", "P": "0.00,1.48", "Q": "2.00,0.74", "M": "3.21,0.29", "H": "3.21,0.00"}, "collinearities": {"0": "A##F##H##B", "1": "B##C", "2": "C##E##D", "3": "D##P##A", "4": "P##Q##M##B", "5": "E##Q##F", "6": "E##M##H"}, "variable>equals": {}}, "circles": []}, "appliedproblems": {}, "subsystems": []}

NLP: MiddlePerpendicularRelation [iLine1=FQ, iLine2=BP,
 crossPoint=Optional.of(Q)],SquareRelation{square=Square:ABCD},PointOnLineRelation{point=P,
 line=AD, isConstant=false,
 extension=false},NegativeRelation{relation=PointCoincidenceRelation{point1=P,
 point2=A}},NegativeRelation{relation=PointCoincidenceRelation{point1=P,
 point2=D}},LinePerpRelation{line1=EH, line2=AB, crossPoint=H},LineCrossRelation
 [crossPoint=Optional.of(F), iLine1=AB, iLine2=FE],LineCrossRelation [crossPoint=Optional.of(E),
 iLine1=CD,
 iLine2=FE],EqualityRelation{EQ=v_1},SquareRelation{square=Square:ABCD},EqualityRelation{AB=12
 },EqualityRelation{AP=4},求值(大小): (ExpressRelation:[key:]v_1),ProveConclusionRelation:[证明:
 EqualityRelation{FH=AP}],SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]EQ)}}

832、topic: 如图所示,AC为一条直线,O是AC上一点, $\angle AOB=120^\circ$,OE、OF分别平分 $\angle AOB$ 和 $\angle BOC$. #%(1)求 $\angle EOF$ 的大小#%(2)当OB绕O旋转时,OE、OF仍为 $\angle AOB$ 和 $\angle BOC$ 平分线,问:OE、OF有怎样的位置关系?你能否用一句话概括出这个命题.#%#

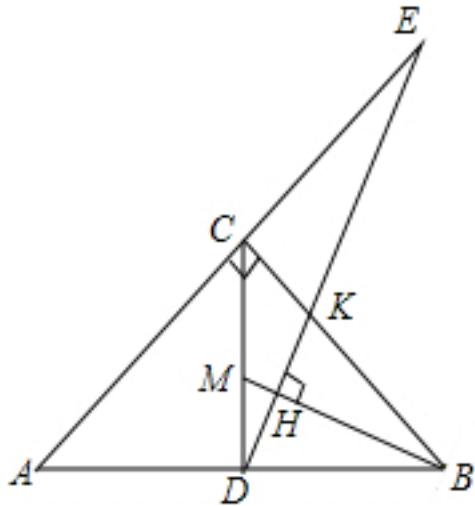


graph:

```
{"stem":{"pictures":[{"picturename":"1000083109_Q_1.jpg","coordinates":{"A": "-4.63,0.05","B": "-0.25,2.61","C": "1.11,0.08","E": "-2.89,2.10","F": "0.96,1.62","O": "-1.70,0.07"}, "collineations": {"0": "A##O##C", "1": "O###E", "2": "O###B", "3": "O###F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

833、topic: 如图,在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$, $CD \perp AB$, M 是 CD 上的点, $DH \perp BM$ 于 H , DH 的延长线交 AC 的延长线于 E .求证:(1) $\triangle AED \sim \triangle CBM$;(2) $AE \cdot CM = AC \cdot CD$.



graph:

```
{"stem":{"pictures":[{"picturename":"1000041415_Q_1.jpg","coordinates":{"A": "0.00,0.00","B": "6.00,0.00","C": "3.00,3.00","D": "3.00,0.00","E": "5.20,5.20","H": "3.46,1.08","M": "3.00,1.27","K": "3.89,2.11"}, "collineations": {"0": "A##C##E", "1": "E##K##H##D", "2": "C##K##B", "3": "B##H##M", "4": "C##M##D", "5": "A##D##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACK=(1/2\pi)$ }, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, PointOnLineRelation{point=M, line=CD, isConstant=false, extension=false}, LinePerpRelation{line1=DH, line2=BM, crossPoint=H}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DH, iLine2=AC], ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle AED$, triangleB= $\triangle CBM$ }], ProveConclusionRelation:[证明: EqualityRelation{AE*CM=AC*CD}]

834、topic: 如图1,已知平行四边形\$ABCD\$中,对角线AC,BD交于点O,E是BD延长线上的点,且

$\triangle ACE$ 是等边三角形. (1)求证:四边形 $ABCD$ 是菱形; (2)如图2,若 $\angle AED=2\angle EAD$, $AC=6$. 求 DE 的长.

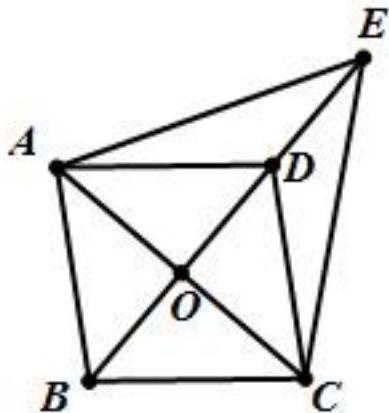
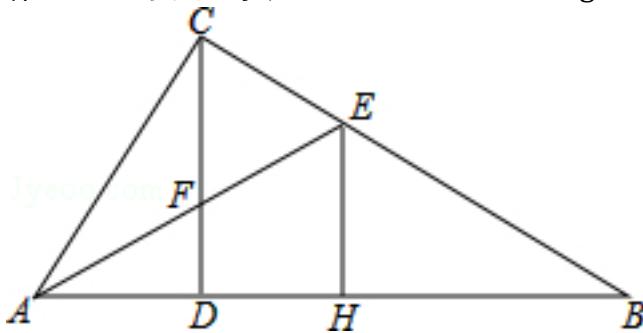


图 1

```
graph:
{"stem":{"pictures":[{"picturename":"1000027649_Q_1.jpg","coordinates":{"A": "-0.69,3.94","B": "0.00,0.00","C": "4.00,0.00","D": "3.31,3.94","E": "5.06,6.04","O": "1.65,1.97"}, "collineations": {"0": "A##B","1": "A##D","2": "A##O##C","3": "E##A","4": "B##O##D##E","5": "C##B","6": "C##D","7": "C##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD], PointOnLineRelation{point=E, line=BD, isConstant=false, extension=true}, RegularTriangleRelation:RegularTriangle: $\triangle ACE$, EqualityRelation{DE=v_0}, (ExpressRelation:[key:]2), EqualityRelation{ $\angle AED=2*\angle DAE$ }, EqualityRelation{AC=6}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明]: RhombusRelation{rhombus=Rhombus:ABCD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DE)}

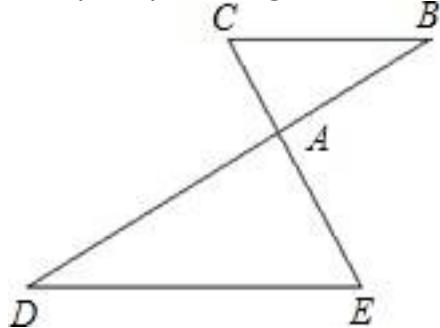
835、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $CD \perp AB$ 于点D, $\angle CAB$ 的平分线交CD于点F,交BC于点E,过点E作 $EH \perp AB$ 于点H.求证: $EC=CF=EH$.



```
graph:
{"stem":{"pictures":[{"picturename":"1000031288_Q_1.jpg","coordinates":{"A": "-9.00,2.00","B": "-3.00,2.00","C": "-7.17,4.76","D": "-7.17,2.00","E": "-5.69,3.78","F": "-7.17,2.98","H": "-5.69,2.00"}, "collineations": {"0": "E##H","1": "A##D##H##B","2": "A##C","3": "B##E##C","4": "C##F##D","5": "A##F##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: AngleBisectorRelation{line=AF,angle= $\angle CAD$, angle1= $\angle CAF$,
 angle2= $\angle DAF$ },TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle ACE = (1/2 * \pi)$ },LinePerpRelation{line1=CD,
 line2=AB, crossPoint=D},LinePerpRelation{line1=EH, line2=AB,
 crossPoint=H},ProveConclusionRelation:[证明: MultiEqualityRelation
 [multiExpressCompare=CE=CF=EH, originExpressRelationList=[], keyWord=null, result=null]]]

836、topic: 如图, CE 与 BD 交于点A, $AC=2$, $AE=3$, $AB=4$, $AD=6$, 求证: $\triangle ADE \sim \triangle ABC$.



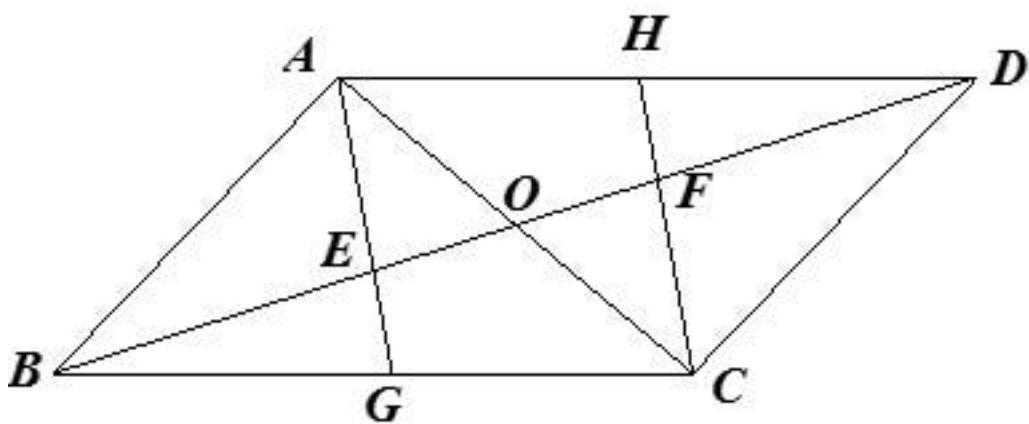
graph:
 {"stem": {"pictures": [{"picturename": "1000005822_Q_1.jpg", "coordinates": {"A": "-0.59,1.37", "B": "1.18, 2.28", "C": "-1.00,2.28", "D": "-3.26,0.00", "E": "-0.00,0.00"}, "collineations": {"0": "B##A##D", "1": "C##A##E", "2": "B##C", "3": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(A), iLine1=CE, iLine2=BD], EqualityRelation{AC=2}, EqualityRelation{AE=3}, EqualityRelation{AB=4}, EqualityRelation{AD=6}, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle ADE$, triangleB= $\triangle ABC$ }]

837、topic: 如图, 在平行四边形ABCD中, 对角线AC, BD交于点O, 点E, 点F在BD上, 且 $BE = DF$, 连接AE并延长, 交BC于点G, 连接CF并延长, 交AD于点H?

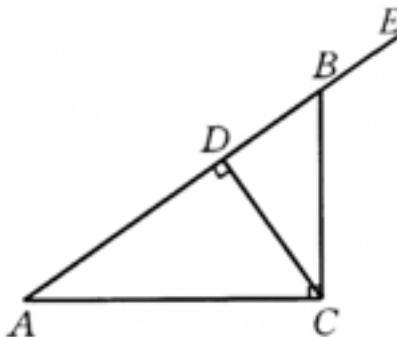
#%# (1) 求证: $\triangle AOE \cong \triangle COF$?

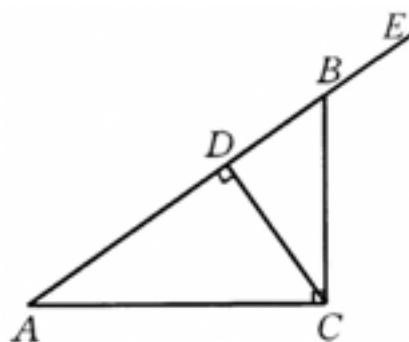
#%# (2) 若AC平分 $\angle HAG$, 求证: 四边形AGCH是菱形.



graph:
 {"substems": [{"questionrelies": "1"}], "stem": {"pictures": [{"variable>equals": {}, "picturename": "1000001171_Q_1.jpg", "collineations": {"3": "F###H###C", "2": "A###E###G", "1": "A###O###C", "0": "A###H###D", "5": "B###G###C", "4": "B###E###O###D", "6": "A###B", "7": "C###D"}, "coordinates": {"D": "3.10,2.41", "E": "-7.30,-0.91", "F": "-0.37,1.30", "G": "-7.30,-1.98", "A": "-7.30,2.30", "B": "-10.77,-2.01", "C": "-0.37,-1.90", "O": "-3.84,0.20", "H": "-0.37,2.37"}}]}]

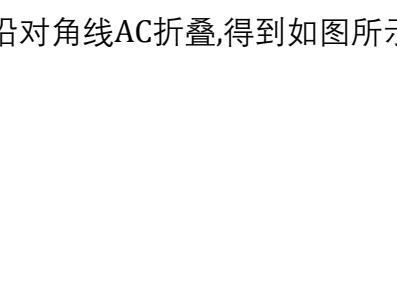
NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=BD], PointOnLineRelation{point=E, line=BD, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=BD, isConstant=false, extension=false}, EqualityRelation{BE=DF}, SegmentRelation:AE, LineCrossRelation [crossPoint=Optional.of(G), iLine1=AE, iLine2=BC], SegmentRelation:CF, LineCrossRelation [crossPoint=Optional.of(H), iLine1=CF, iLine2=AD], AngleBisectorRelation{line=AC, angle= $\angle EAH$, angle1= $\angle CAE$, angle2= $\angle CAH$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle AOE$, triangleB= $\triangle COF$ }], ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:AGCH}]

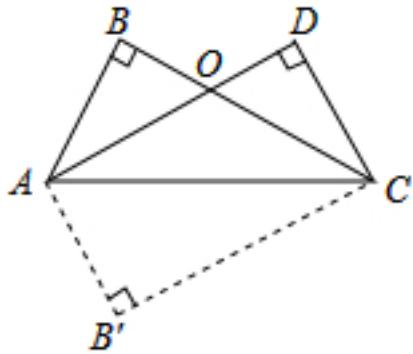
838、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $CD \perp AB$,垂足为D, $\angle BCD=35^\circ$,求:(1) $\angle EBC$ 的度数;(2) $\angle A$ 的度数.



graph:
 {"stem": {"pictures": [{"picturename": "DEB5F45F03144B9FBA63ED3778F9D0D2.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-10.00,5.80", "C": "-10.00,3.00", "D": "-11.32,4.88", "E": "-8.83,6.62"}, "collineations": {"0": "C##A", "1": "A##D##B##E", "2": "B##C", "3": "C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ACB=(1/2*\pi)$ }, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, EqualityRelation{ $\angle BCD=(7/36*\pi)$ }, 求角的大小: AngleRelation{angle= $\angle CBE$ }, 求角的大小: AngleRelation{angle= $\angle CAD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CBE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CAD$)}.

839、topic: 把长方形AB'CD沿对角线AC折叠,得到如图所示的图形,已知 $\angle BAO=30^\circ$,求 $\angle AOC$ 和 $\angle BAC$ 的度数.

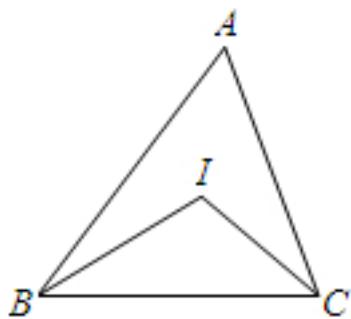


graph:

{"stem":{"pictures":[{"picturename":"1000073072_Q_1.jpg","coordinates":{"A":"0.00,0.00","B":"1.80,2.40","B'":"1.80,-2.40","C":"5.00,0.00","D":"3.20,2.40","O":"2.50,1.87"}],"collineations":{"0":"B##O##C","1":"A##O##D","2":"C##D","3":"A##B","4":"A##C","5":"A##B'","6":"C##B'"}, "variable-equals":{}, "circles":[]}},"appliedproblems":{},"substems":[]}

NLP: EqualityRelation{ $\angle BAO = (1/6\pi)$ }, 求角的大小: AngleRelation{angle= $\angle AOC$ }, 求角的大小:
 AngleRelation{angle= $\angle BAC$ }, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle AOC$)}, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle BAC$)}

840、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC$ 与 $\angle ACB$ 的平分线相交于点I,当 $\angle ABC=70^\circ$, $\angle ACB=50^\circ$ 时,求 $\angle BIC$ 的度数.#%#

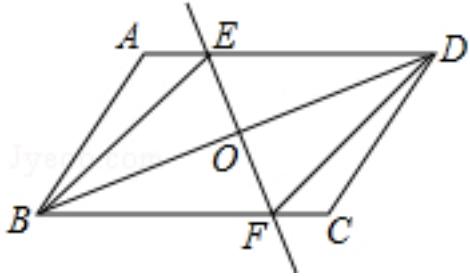


graph:

{"stem":{"pictures":[{"picturename":"1000051259_Q_1.jpg","coordinates":{"A":"-5.04,6.29","B":"-5.62,3.00","C":"-2.28,3.00","I":"-4.43,4.00"}],"collineations":{"0":"A##B","1":"A##C","2":"B##I","3":"I##C","4":"B##C"}, "variable-equals":{}, "circles":[]}},"appliedproblems":{},"substems":[]}

NLP: AngleBisectorRelation{line=BI, angle= $\angle ABC$, angle1= $\angle ABI$,
 angle2= $\angle CBI$ }, AngleBisectorRelation{line=CI, angle= $\angle ACB$, angle1= $\angle ACI$,
 angle2= $\angle BCI$ }, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ABC=(7/18\pi)$ }, EqualityRelation{ $\angle ACB=(5/18\pi)$ }, 求角的大小: AngleRelation{angle= $\angle BIC$ }, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle BIC$)}

841、topic: 如图,在 $\square ABCD$ 中,O为对角线BD的中点,过点O的直线EF分别交AD,BC于E,F两点,连接BE,DF.#%#(1)求证: $\triangle DOE \cong \triangle BOF$ #%#(2)当 $\angle DOE$ 等于多少度时,四边形BFDE为菱形?请说明理由.#%#



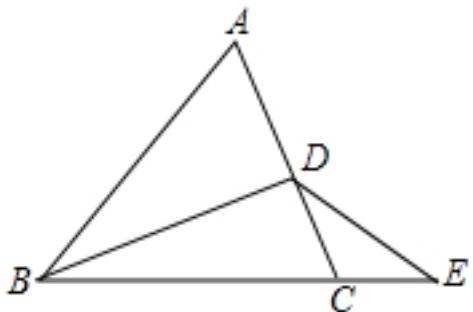
graph:

```
{"stem": {"pictures": [{"picturename": "1000034733_Q_1.jpg", "coordinates": {"A": "2.00,3.00", "B": "1.00,0.00", "C": "6.00,0.00", "D": "7.00,3.00", "E": "3.25,3.00", "F": "4.75,0.00", "O": "4.00,1.50"}, "collineations": {"0": "B##A", "1": "B##E", "2": "D##C", "3": "F##D", "4": "A##E##D", "5": "B##F##C", "6": "B##D", "7": "E##O##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD},MiddlePointOfSegmentRelation{middlePoint=O,segment=BD},LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AD],LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=BC],PointOnLineRelation{point=O, line=EF, isConstant=false, extension=false},SegmentRelation:BE,SegmentRelation:DF,RhombusRelation{rhombus=Rhombus:BFDE},求角的大小: AngleRelation{angle= $\angle DOE$ },ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle DOE$, triangleB= $\triangle BOF$ }],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DOE$)}

842、topic: 如图,已知点D在AC上,点E在BC的延长线上,求证: $\angle ADB > \angle CDE$.#%#

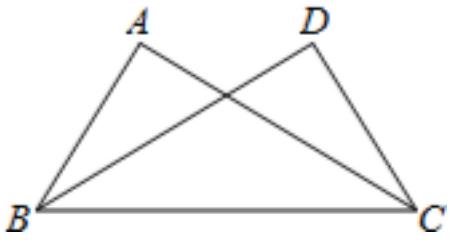


graph:

```
{"stem": {"pictures": [{"picturename": "1000072320_Q_1.jpg", "coordinates": {"A": "-5.00,6.00", "B": "-8.00,2.00", "C": "-3.00,2.00", "D": "-3.79,3.57", "E": "-1.00,2.00"}, "collineations": {"0": "A##B", "1": "B##D", "2": "D##E", "3": "A##D##C", "4": "B##C##E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false},PointOnLineRelation{point=E, line=BC, isConstant=false, extension=true},ProveConclusionRelation:[证明: InequalityRelation{ $\angle ADB > \angle CDE$ }]

843、topic: 如图,在 $\triangle ABC$ 和 $\triangle DCB$ 中, $AB=DC, AC=DB$,求证: $\triangle ABC \cong \triangle DCB$.#%#



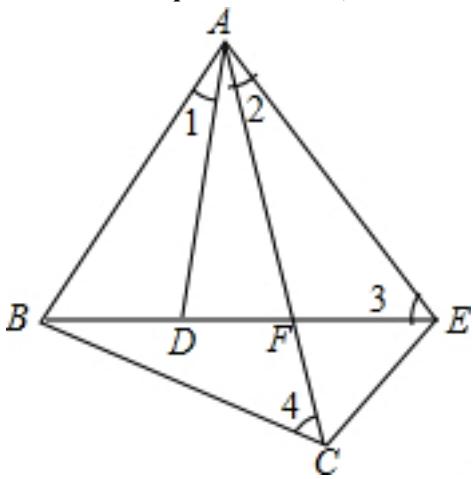
graph:

{"stem": {"pictures": [{"picturename": "E00F1255D1EF460890C91E71953B6D6B.jpg", "coordinates": {"A": "-12.00,6.00", "B": "-14.00,3.00", "C": "-8.00,3.00", "D": "-10.00,6.00"}, "collineations": {"0": "C##A", "1": "A##B", "2": "B##C", "3": "B##D", "4": "C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle DCB$, EqualityRelation{ $AB=CD$ }, EqualityRelation{ $AC=BD$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DCB$ }]

844、topic: 如图,已知 $\angle 1=\angle 2,\angle 3=\angle 4$,求证: $\triangle ABD \sim \triangle ACE$.#%#

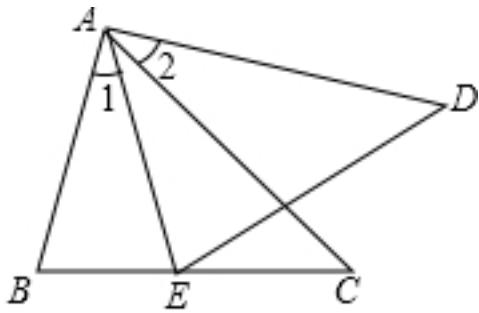


graph:

{"stem": {"pictures": [{"picturename": "1000062133_Q_1.jpg", "coordinates": {"A": "-1.46,0.86", "B": "-3.25, -2.65", "C": "0.31,-4.47", "D": "-1.47,-2.65", "E": "2.39,-2.65", "F": "-0.30,-2.65"}, "collineations": {"0": "B##D####F##E", "1": "F##A##C", "2": "A##B", "3": "A##E", "4": "A##D", "5": "C##B", "6": "E##C"}, "variable>equals": {"0": "\u00b21=\u00b2BAD", "1": "\u00b22=\u00b2EAF", "2": "\u00b23=\u00b2AEF", "3": "\u00b24=\u00b2BCF"}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{ $\angle BAD = \angle EAF$ }, EqualityRelation{ $\angle AEF = \angle BCF$ }, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle ABD$, triangleB= $\triangle ACE$ }]

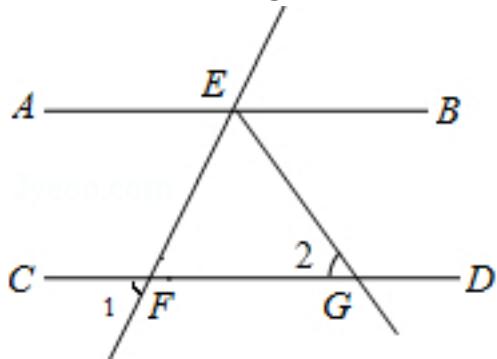
845、topic: 如图,AB=AE, $\angle 1=\angle 2,\angle C=\angle D$.求证: $\triangle ABC \cong \triangle AED$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "3F76EF912A0E461BAF2BCB78BE11745B.jpg", "coordinates": {"A": "-13.00,5.00", "B": "-14.00,1.00", "C": "-10.00,1.00", "D": "-8.47,2.88", "E": "-12.00,1.00"}, "collineations": {"0": "A##B", "1": "D##A", "2": "E##B##C", "3": "A##C", "4": "D##E", "5": "A##E"}, "variable-equations": {"0": "\u00221=\u0022BAE", "1": "\u00222=\u0022CAD"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 EqualityRelation{AB=AE}, EqualityRelation{ $\angle BAE = \angle CAD$ }, EqualityRelation{ $\angle ACE = \angle ADE$ }, ProveConclusionRelation:[证明： TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle AED$ }]

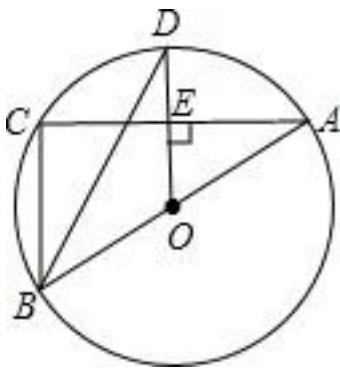
846、topic: 如图,已知 $AB \parallel CD$,直线EF交AB于点E,交CD于点F,EG平分 $\angle BEF$,交CD于点G, $\angle 1=50^\circ$,求 $\angle 2$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000037828_Q_1.jpg", "coordinates": {"A": "-10.79,-3.95", "B": "-6.72,-3.97", "C": "-10.74,-5.95", "D": "-6.72,-5.96", "E": "-8.53,-3.95", "F": "-9.96,-5.95", "G": "-7.48,-5.95"}, "collineations": {"0": "A##E##B", "1": "C##F##G##D", "2": "E##G", "3": "E##F"}, "variable-equations": {"0": "\u00221=\u0022EFG", "1": "\u00222=\u0022EGF"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=CD], AngleBisectorRelation{line=EG, angle= $\angle BEF$, angle1= $\angle BEG$, angle2= $\angle FEG$ }, LineCrossRelation [crossPoint=Optional.of(G), iLine1=EG, iLine2=CD], EqualityRelation{ $\angle EFG=(5/18\pi)$ }, 求角的大小：
 (ExpressRelation:[key:] $\angle EGF$), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle EGF$)

847、topic: 如图,\$\odot O\$是\$\triangle ABC\$的外接圆,AB是\$\odot O\$的直径,D为\$\odot O\$上一点,\$OD \perp AC\$,垂足为点E,连接BD,\$\angle ODB=30^\circ\$,求证:\$BC=OD\$.

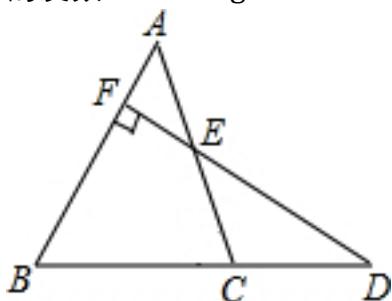


graph:

```
{"stem": {"pictures": [{"picturename": "1000024940.jpg", "coordinates": {"A": "4.00,3.00", "B": "-4.00,-3.00", "C": "-4.00,3.00", "D": "0.00,5.00", "E": "0.00,3.00", "O": "0.00,0.00"}, "collineations": {"0": "A###O##B", "1": "E###C##A", "2": "E###D##O", "3": "B##C", "4": "B##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##D##C"}}], "appliedproblems": {}, "subsystems": []}}
```

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, length=null}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[D]}, LinePerpRelation{line1=OD, line2=AC, crossPoint=E}, SegmentRelation:BD, EqualityRelation{ $\angle BDE = (1/6\pi)$ }, ProveConclusionRelation:[证明: EqualityRelation{BC=DO}]}

848、topic: 如图,已知D是BC延长线上一点,DF \perp AB交AC于点E,交AB于点F, $\angle A=70^\circ$, $\angle D=50^\circ$,求 $\angle ACB$ 的度数.#%#



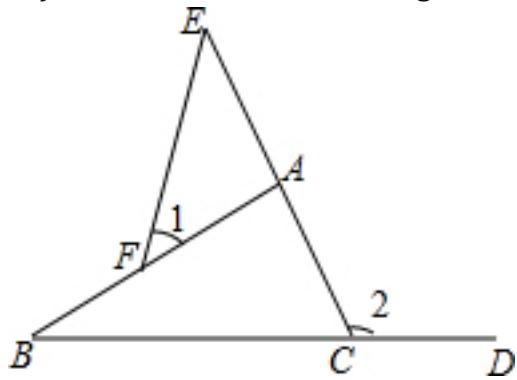
graph:

```
{"stem": {"pictures": [{"picturename": "1000072320_Q_1.jpg", "coordinates": {"A": "-3.53,7.21", "B": "-8.55,3.00", "C": "-2.00,3.00", "D": "-1.00,3.00", "E": "-2.77,5.10", "F": "-4.12,6.72"}, "collineations": {"0": "A##F##B", "1": "B##C##D", "2": "A##E##C", "3": "D##E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP: PointOnLineRelation{point=D, line=BC, isConstant=false, extension=true}, LinePerpRelation{line1=DF, line2=AB, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DF, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=DF, iLine2=AB], EqualityRelation{ $\angle EAF = (7/18\pi)$ }, EqualityRelation{ $\angle CDE = (5/18\pi)$ }, 求角的大小: AngleRelation{angle= $\angle BCE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BCE$)}

849、topic: 如图,在 $\triangle ABC$ 中,D在BC的延长线上,E在CA的延长线上,点F在AB上运动(不与点A重

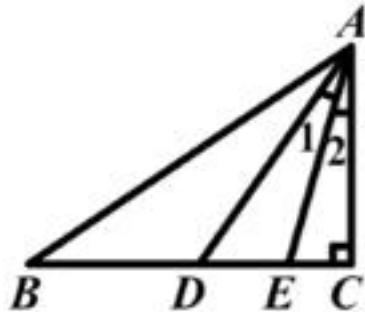
合).#%#求证: $\angle 1 < \angle 2$ #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000082705_Q_1.jpg", "coordinates": {"A": "-1.19,0.56", "B": "-3.92, -1.59", "C": "-0.49,-1.53", "D": "1.19,-1.51", "E": "-1.69,2.06", "F": "-2.56,-0.52"}, "collineations": {"0": "B##C", "1": "C###A##E", "2": "B###F##A", "3": "E##F"}, "variable>equals": {"0": "\u03b1=\u03b1EFA", "1": "\u03b2=\u03b1ECD"}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: PointRelation:A, TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=true}, PointOnLineRelation{point=E, line=CA, isConstant=false, extension=true}, PointOnLineRelation{point=F, line=AB, isConstant=false, extension=false}, ProveConclusionRelation:[证明: InequalityRelation{ $\angle AFE < \angle ACD$ }]

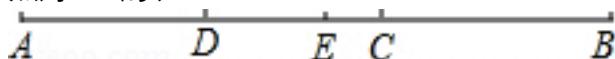
850、topic: 如图,已知 $\angle B=34^\circ$, $\angle AEB=104^\circ$, $\angle 1=\angle 2$, $AC \perp BC$,求 $\angle BAD$ 的度数.



graph:
 {"stem": {"pictures": [{"picturename": "1000022491_Q_1.jpg", "coordinates": {"A": "5.00,6.75", "B": "-5.00, 0.00", "C": "5.00,0.00", "D": "1.41,0.00", "E": "3.32,0.00"}, "collineations": {"0": "B##D##E##C", "1": "A##B", "2": "A##D", "3": "A##E", "4": "A##C"}, "variable>equals": {"0": "\u03b1=\u03b1DAE", "1": "\u03b2=\u03b1EAC"}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
 EqualityRelation{ $\angle ABD=(17/90\pi)$ }, EqualityRelation{ $\angle AED=(26/45\pi)$ }, EqualityRelation{ $\angle DAE=\angle CAE$ }, LinePerpRelation{line1=AC, line2=BC, crossPoint=C}, 求角的大小:
 AngleRelation{angle= $\angle BAD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BAD$)}

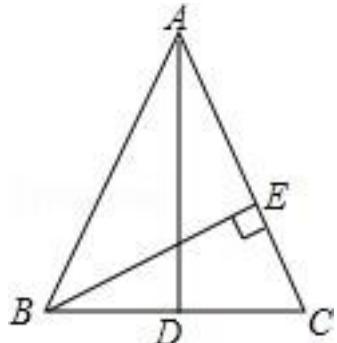
851、topic: 如图,已知点C为AB上一点, $AC=12cm$, $CB=\frac{1}{2}AC$, D、E分别为AC、AB的中点,求DE的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000025961_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "9.00,0.00", "C": "6.00,0.00", "D": "3.00,0.00", "E": "4.50,0.00"}, "collineations": {"0": "B###A###D###C###E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: EqualityRelation{DE=v_0}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{AC=12}, EqualityRelation{BC=(1/2)*AC}, MiddlePointOfSegmentRelation{middlePoint=D, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, 求值(大小): (ExpressRelation:[key]:v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:DE)}

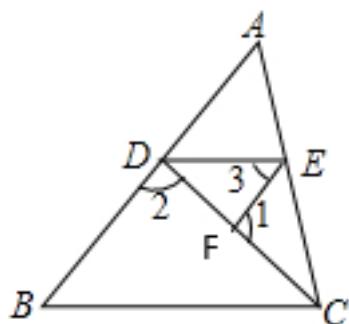
852、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, AD 是 BC 边上的中线, $BE \perp AC$ 于点 E .求证 $\angle CBE = \angle BAD$.



graph:
 {"stem": {"pictures": [{"picturename": "1000026614_Q_1.jpg", "coordinates": {"A": "3.00,8.00", "B": "1.00,4.00", "C": "5.00,4.00", "D": "3.00,4.00", "E": "4.20,5.60"}, "collineations": {"0": "A###B", "1": "A###C", "2": "A#D", "3": "B###D###C", "4": "B###E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, LineDecileSegmentRelation [iLine1=AD, iLine2=BC, crossPoint=Optional.of(D)], LinePerpRelation{line1=BE, line2=AC, crossPoint=E}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle DBE = \angle BAD$ }]

853、topic: 如图,已知 $\angle 1 + \angle 2 = 180^\circ$, $\angle 3 = \angle B$,求证: $DE \parallel BC$.

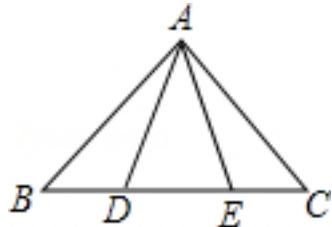


graph:
 {"stem": {"pictures": [{"picturename": "1000051285_Q_1.jpg", "coordinates": {"A": "-4.00,5.19", "B": "-6.00,1.89", "C": "-3.00,1.89", "D": "-5.09,3.39", "E": "-3.46,3.39", "F": "-3.97,2.59"}, "collineations": {"0": "A##D#B#", "1": "A###E###C", "2": "C##B", "3": "D###F###C", "4": "D###E", "5": "F###E"}, "variable-equals": {"0": "\angle 1 = \angle EFC", "1": "\angle 2 = \angle BDC", "2": "\angle 3 = \angle DEF"}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

EqualityRelation{ $\angle CFE + \angle BDF = (Pi)$ }, EqualityRelation{ $\angle DEF = \angle CBD$ }, ProveConclusionRelation:[证明:
LineParallelRelation [iLine1=DE, iLine2=BC]]

854、topic: 如图,已知点D、E在 $\triangle ABC$ 的边BC上,AB=AC, BD=CE, 求证:AD=AE.#%#

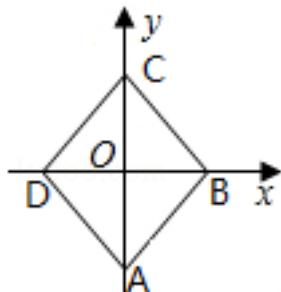


graph:

{"stem": {"pictures": [{"picturename": "1000037610_Q_1.jpg", "coordinates": {"A": "-11.00, 8.00", "B": "-12.60, 6.00", "C": "-9.40, 6.00", "D": "-11.56, 6.00", "E": "-10.44, 6.00"}, "collineations": {"0": "B###D##E##C", "1": "A##B", "2": "A##C", "3": "A##D", "4": "A##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, EqualityRelation{BD=CE}, ProveConclusionRelation:[证明: EqualityRelation{AD=AE}]

855、topic: 如图,正方形ABCD以(0,0)为中心,边长为4,求各顶点的坐标.#%#

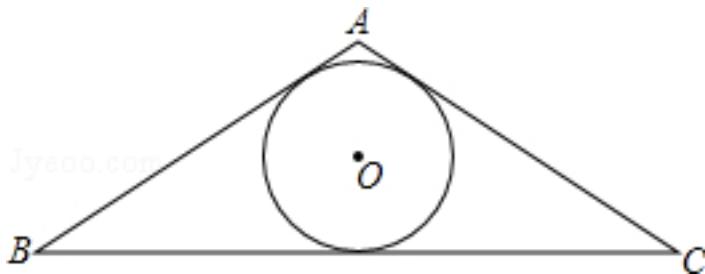


graph:

{"stem": {"pictures": [{"picturename": "1000070673_Q_1.jpg", "coordinates": {"A": "0.00, -2.83", "B": "2.83, 0.00", "C": "0.00, 2.83", "D": "-2.83, 0.00", "O": "0.00, 0.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "D##A", "4": "D##O##B", "5": "C##O##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

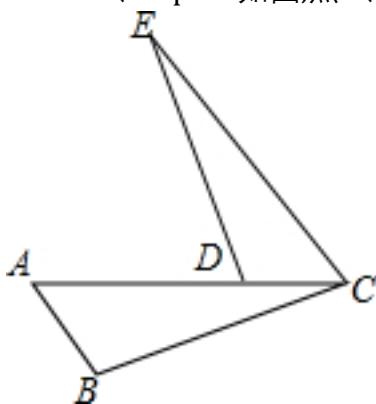
856、topic: 如图,已知 $\triangle ABC$ 的内切圆 $\odot O$ 的半径为r, $\triangle ABC$ 的周长为\$1\$,求 $\triangle ABC$ 的面积 S.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000083416_Q_1.jpg", "coordinates": {"A": "0.00,1.32", "B": "-2.61,-0.99", "C": "2.60,-1.01", "O": "0.00,0.00"}, "collineations": {"0": "B##A", "1": "A##C", "2": "B##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: CircumscribedShapeOfCircleRelation: $\triangle ABC / \text{Circle}[\odot O] \{ \text{center}=O, \text{analytic}=(x-x_O)^2+(y-y_O)^2=r_O^2 \}$
 Points: [], EqualityRelation{ $C_{\triangle ABC}=v_0$ }, EqualityRelation{ $S_{\triangle ABC}=S$ }, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, length=Express:[r], 求值(大小):
 (ExpressRelation:[key:]S), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]S)}

857、topic: 如图,点A、D、C在同一直线上, $AB \parallel EC$, $AC = CE$, $\angle B = \angle EDC$.#%#求证: $BC = DE$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "ECCA0DB51ECD4ACA9FF1B777E58F73A7.jpg", "coordinates": {"A": "-15.00,3.00", "B": "-14.47,2.15", "C": "-11.00,3.00", "D": "-12.00,3.00", "E": "-13.12,6.39"}, "collineations": {"0": "A##B", "1": "A##D##C", "2": "B##C", "3": "C##E", "4": "D##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=EC], EqualityRelation{AC=CE}, EqualityRelation{ $\angle ABC = \angle CDE$ }, ProveConclusionRelation:[证明: EqualityRelation{BC=DE}]

858、topic: 在 $\triangle ABC$ 中, $\angle A = 90^\circ$, $BC = 10$, $AC = 8$, 求 $\triangle ABC$ 中的最短边与最长边之比.

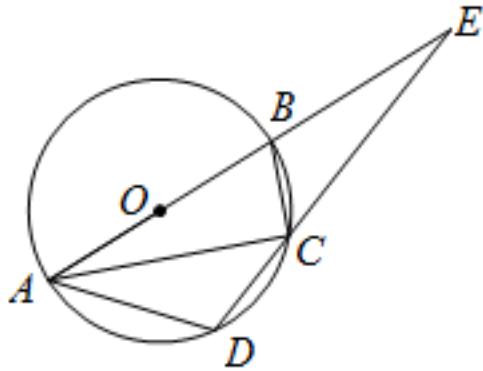
graph:
 {"stem": {"pictures": [{"picturename": "1000005747_Q_1.jpg", "coordinates": {"A": "-9.39,9.00", "B": "-11.46,6.83", "C": "-6.49,6.24"}, "collineations": {"0": "B##A", "1": "B##C", "2": "A##C"}, "variable-equals": {}}], "appliedproblems": {}, "subsystems": []}}

"circles":[]}, "appliedproblems":{}}, "substems":[]}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle BAC = (1/2 * \pi)\}$, EqualityRelation $\{BC = 10\}$, EqualityRelation $\{AC = 8\}$

859、topic: 如图,四边形ABCD内接于 $\odot O$,AC平分 $\angle BAD$,DC的延长线交AB的延长线于E,若 $AC = CE$.求证: $BE = AD$.#%#

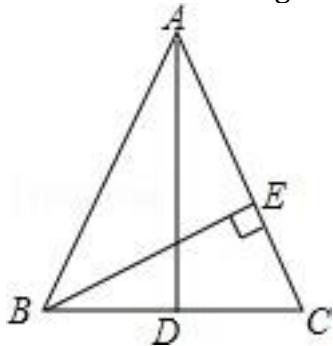


graph:

{"stem": {"pictures": [{"picturename": "1000060804_Q_1.jpg", "coordinates": {"A": "0.18,-1.05", "B": "1.01,-0.53", "C": "1.07,-0.88", "D": "0.80,-1.23", "E": "1.68,-0.11", "O": "0.59,-0.78"}, "collineations": {"0": "A###D", "1": "D##C##E", "2": "E##B##O##A", "3": "A##C", "4": "B##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##D##C##B"}]}], "appliedproblems": {}, "substems": []}}

NLP: InscribedShapeOfCircleRelation{closedShape=ABCD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, AngleBisectorRelation{line=AC, angle= $\angle DAO$, angle1= $\angle CAD$, angle2= $\angle CAO$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=DC, iLine2=AB], EqualityRelation{AC=CE}, ProveConclusionRelation:[证明: EqualityRelation{BE=AD}]

860、topic: 如图1-1-21,在 $\triangle ABC$ 中,\$AB=AC\$,AD是BC边上的中线,\$BE\perp AC\$于点E.求证
 $\angle CBE = \angle BAD$.



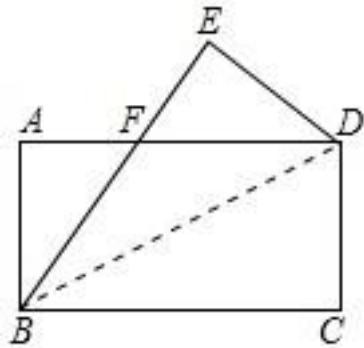
graph:

{"stem": {"pictures": [{"picturename": "1000026614_Q_1.jpg", "coordinates": {"A": "3.00,8.00", "B": "1.00,4.00", "C": "5.00,4.00", "D": "3.00,4.00", "E": "4.20,5.60"}, "collineations": {"0": "A##B", "1": "A##C", "2": "A##D", "3": "B##D##C", "4": "B##E"}, "variable>equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}}]

NLP:

(ExpressRelation:[key:]-1-21),TriangleRelation: $\triangle ABC$,EqualityRelation{ $AB=AC$ },LineDecileSegmentRelation [iLine1=AD, iLine2=BC, crossPoint=Optional.of(D)],LinePerpRelation{line1=BE, line2=AC, crossPoint=E},ProveConclusionRelation:[证明: EqualityRelation{ $\angle DBE=\angle BAD$ }]

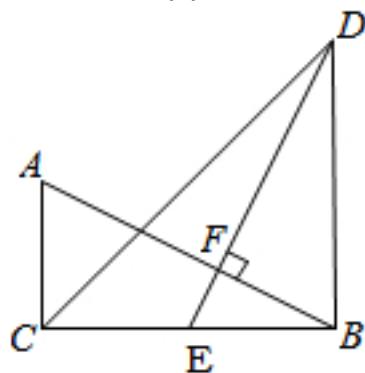
861、topic: 如图,将长方形ABCD($AB < AD$)沿BD折叠后,点C落在点E处,且BE交AD于点F.?(1)求证: $BF=FD$?#%(2)若 $AB=4$, $BC=8$,求DF的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000006998_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "8.00,0.00", "D": "8.00,4.00", "E": "4.80,6.40", "F": "3.00,4.00"}, "collineations": {"0": "E###D", "1": "A##F##D", "2": "B##A", "3": "B##E##F", "4": "D##A", "5": "C##D", "6": "B##C", "7": "B##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 InequalityRelation{ $AB < AD$ }, RectangleRelation{rectangle=Rectangle:ABCD}, TurnoverRelation{start=C, segment=BD, target=E}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=AD], EqualityRelation{ $DF=v_0$ }, EqualityRelation{ $AB=4$ }, EqualityRelation{ $BC=8$ }, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{ $BF=DF$ }], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]DF)}

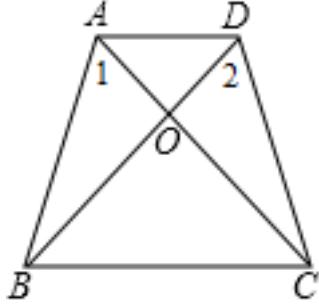
862、topic: 已知:如图,在 $\triangle ABC$ 和 $\triangle DBC$ 中, $\angle ACB=\angle DBC=90^\circ$,E是BC的中点, $EF \perp AB$,垂足为F,且 $AB=DE$.?(1)求证: $BC=DB$?#%(2)若 $DB=8cm$,求AC的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000072675_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "8.00,0.00", "C": "0.00,0.00", "D": "8.00,8.00", "E": "4.00,0.00", "F": "4.80,1.60"}, "collineations": {"0": "E##F##D", "1": "D##B", "2": "B##F##A", "3": "A##C", "4": "C##E##B", "5": "C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$,TriangleRelation: $\triangle DBC$,MultiEqualityRelation
[multiExpressCompare= $\angle ACE = \angle DBE = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null,
result=null],MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},LinePerpRelation{line1=EF,
line2=AB, crossPoint=F},EqualityRelation{AB=DE},EqualityRelation{AC=v_0},EqualityRelation{BD=8},
求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明:
EqualityRelation{BC=BD}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]AC)}

863、topic: 已知:如图,在四边形ABCD中,AC、BD相交于点O,AB=DC, $\angle 1 = \angle 2$.求证:AC=DB.#%#

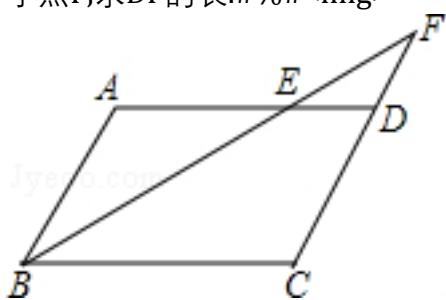


graph:

{"stem": {"pictures": [{"picturename": "1000061413_Q_1.jpg", "coordinates": {"A": "6.00,7.00", "B": "5.00,3.00", "C": "10.00,3.00", "D": "9.00,7.00", "O": "7.50,5.50"}, "collineations": {"0": "A###B", "1": "B##C", "2": "C##D", "3": "D##A", "4": "A##O##C", "5": "B##O##D"}, "variable>equals": {"0": "\u00b21=\u00b2BAC", "1": "\u00b22=\u00b2BDC"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},LineCrossRelation
[crossPoint=Optional.of(O), iLine1=AC,
iLine2=BD],EqualityRelation{AB=CD},EqualityRelation{ $\angle BAO = \angle CDO$ },ProveConclusionRelation:[证
明: EqualityRelation{AC=BD}]

864、topic: 如图,在平行四边形ABCD中,若AB=6,AD=10, $\angle ABC$ 的平分线交AD于点E,交CD的延长线于点F,求DF的长.#%#



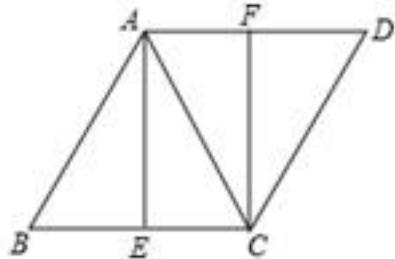
graph:

{"stem": {"pictures": [{"picturename": "1000031841_Q_1.jpg", "coordinates": {"A": "-7.93,4.80", "B": "-9.00,2.00", "C": "-4.00,2.00", "D": "-2.93,4.80", "E": "-4.93,4.80", "F": "-2.22,6.67"}, "collineations": {"0": "A##E#D", "1": "A##B", "2": "C##D##F", "3": "B##C", "4": "B##E##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=BF,angle= $\angle ABC$, angle1= $\angle ABF$,
angle2= $\angle CBF$ },EqualityRelation{DF=v_1},ParallelogramRelation{parallelogram=Parallelogram:ABCD},
EqualityRelation{AB=6},EqualityRelation{AD=10},求值(大小):

(ExpressRelation:[key:]v_1),SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]DF)}

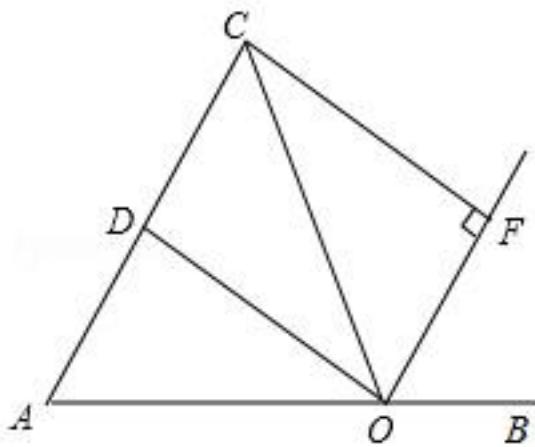
865、topic: 如图,在菱形\$ABCD\$中,\$AC\$为对角线,点\$E\$、\$F\$分别是边\$BC\$、\$AD\$的中点.?#%#(1)
求证:\$\triangle ABE \cong \triangle CDF\$;?#%#(2)若\$\angle B=60^\circ\$, \$AB=4\$,求线段
\$AE\$的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000005420_Q_1.jpg", "coordinates": {"A": "-4.00,5.27", "B": "-6.67, -0.64", "C": "-0.19,-0.61", "D": "2.49,5.32", "E": "-3.43,-0.62", "F": "-0.75,5.29"}, "collineations": {"0": "A###F", "1": "B###E##C", "2": "A##B", "3": "A##E", "4": "A##C", "5": "F##C", "6": "D##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:
 RhombusRelation{rhombus=Rhombus:ABCD},SegmentRelation:AC,MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},MiddlePointOfSegmentRelation{middlePoint=F,segment=AD},EqualityRelation{AE=v_0},EqualityRelation{\$\angle ABE=(1/3*\pi)\$},EqualityRelation{AB=4},求值(大小):
 (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=\$\triangle ABE\$, triangleB=\$\triangle CDF\$}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AE)}

866、topic: 如图,点O是线段AB上的一点,\$OA=OC\$,OD平分\$\angle AOC\$交AC于点D,OF平分
\$\angle COB\$,\$CF \perp OF\$于点F.求证:四边形\$CDOF\$是矩形.



graph:
 {"stem": {"pictures": [{"picturename": "1000027645_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "3.41,5.41", "D": "1.70,2.70", "F": "7.70,2.70", "O": "6.00,0.00"}, "collineations": {"0": "A###D##C", "1": "A##O##B", "2": "C##O", "3": "D##O", "4": "C##F", "5": "O##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

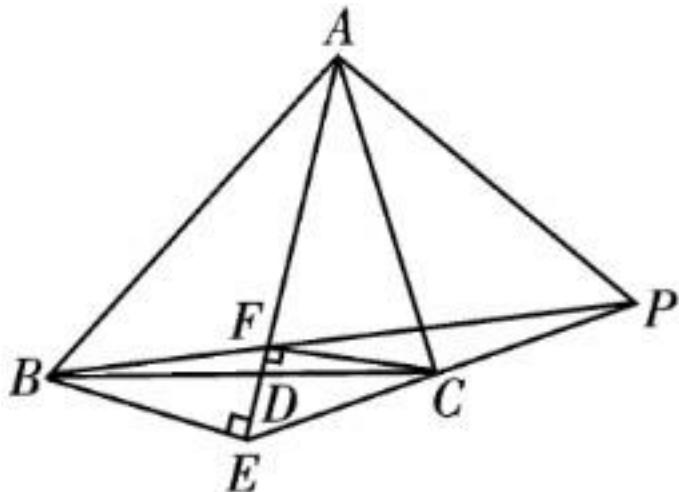
NLP: PointOnLineRelation{point=O, line=AB, isConstant=false,

```

extension=false}, EqualityRelation{AO=CO}, AngleBisectorRelation{line=OD, angle=∠AOC,
angle1=∠AOD, angle2=∠COD}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=OD,
iLine2=AC], AngleBisectorRelation{line=OF, angle=∠BOC, angle1=∠BOF,
angle2=∠COF}, LinePerpRelation{line1=CF, line2=OF, crossPoint=F}, ProveConclusionRelation:[证明:
RectangleRelation{rectangle=Rectangle:CDOF}]

```

867、topic: 如图,已知AD是 $\triangle ABC$ 的角平分线, $BE \perp AD$, $CF \perp AD$, BF与EC的延长线交于点P,连结AP.求证: $CF \parallel AP$.



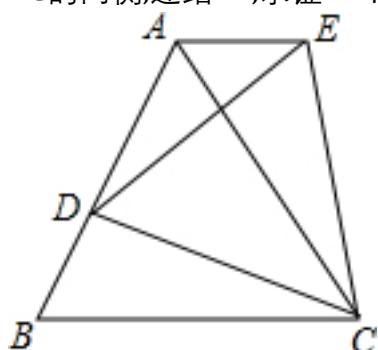
```

graph:
{"stem": {"pictures": [{"picturename": "1000004698.jpg", "coordinates": {"A": "7.90,7.82", "B": "1.81,2.13", "C": "8.81,2.13", "D": "5.95,2.13", "E": "5.52,0.86", "F": "6.25,3.01", "P": "16.21,4.98"}, "collinearities": {"0": "B # # # C # # # D", "1": "B # # # P # # # F", "2": "P # # # C # # # E", "3": "B # # # A", "4": "C # # # F", "5": "P # # # A", "6": "E # # # B", "7": "F # # # A # # # D # # # E", "8": "C # # # A"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

```

NLP: TriangleRelation:△ABC, LinePerpRelation{line1=BE, line2=AD, crossPoint=E}, LinePerpRelation{line1=CF, line2=AD, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(P), iLine1=BF, iLine2=EC], SegmentRelation:AP, AngleBisectorRelation{line=AD, angle=∠BAC, angle1=∠CAD, angle2=∠BAD}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=CF, iLine2=AP]]

868、topic: 如图, $\triangle ABC$ 是等边三角形,D是边AB上一点,以CD为边作等边三角形CDE,使点E,A在直线DC的同侧,连结AE,求证: $AE \parallel BC$.#%#



```

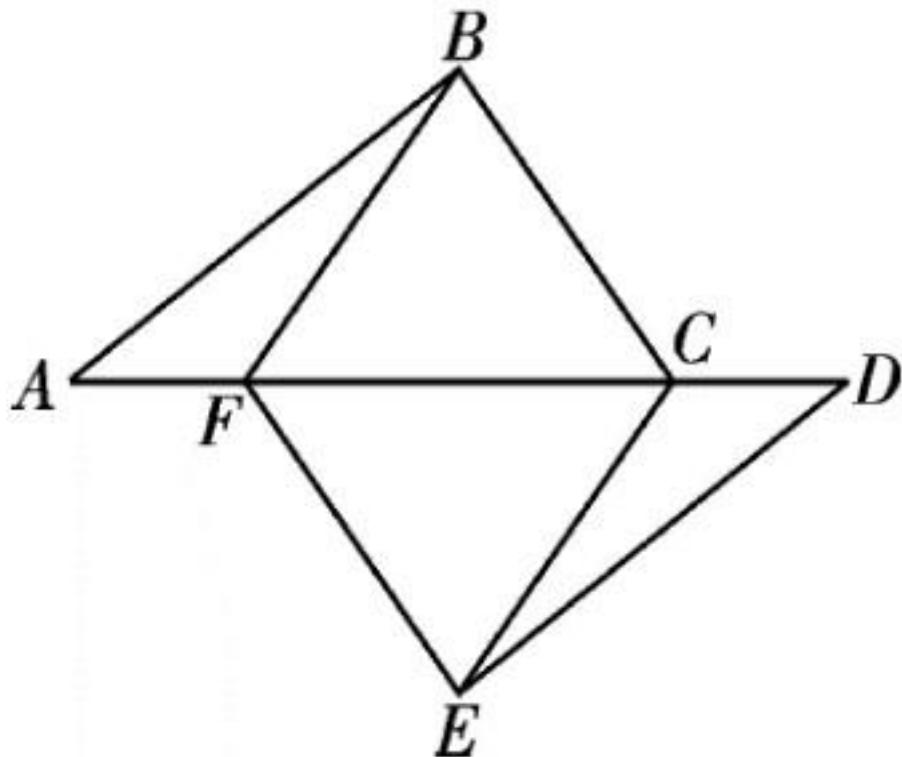
graph:
{"stem": {"pictures": [{"picturename": "1000063604_Q_1.jpg", "coordinates": {"A": "3.00,5.20", "B": "0.00,0", "C": "2.00,0", "D": "1.00,2.00", "E": "2.00,2.00"}}, "appliedproblems": {}, "subsystems": []}}

```

.00","C":"6.00,0.00","D":"1.12,1.94","E":"5.25,5.20}),"collineations":{"0":"D###E","1":"C###E","2":"B# #C","3":"D###C","4":"A###C","5":"A###E","6":"A###D###B}),"variable-equals":{},"circles":[]}]],"appliedproblems":{},"subsystems":[]}]

NLP: RegularTriangleRelation:RegularTriangle: $\triangle ABC$,PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false},RegularTriangleRelation:RegularTriangle: $\triangle CDE$,PointOnLineSameSideRelation{pointSet=[E, A], line=DC},SegmentRelation:AE,ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AE, iLine2=BC]]]

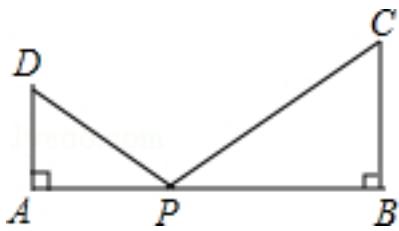
869、topic: 如图,已知点A、F、C、D在同一直线上,点B和点E分别在直线AD的两侧,且 $AB=DE$, $\angle A=\angle D$, $AF=DC$.(1)求证:四边形BCEF是平行四边形;(2)若 $\angle ABC=90^\circ$, $AB=4$, $BC=3$,当AF为何值时,四边形BCEF是菱形.



graph:
 {"stem": {"pictures": [{"picturename": "1000004752_Q_1.jpg", "coordinates": {"A": "-1.50,0.00", "B": "2.30, 2.75", "C": "3.50,0.00", "D": "5.00,0.00", "E": "1.20,-2.75", "F": "0.00,0.00"}, "collineations": {"0": "A###F##C###D", "1": "B###A", "2": "B###F", "3": "B###C", "4": "E###F", "5": "E###C", "6": "E###D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": [{"questionrelies": "1"}]}]

NLP: PointRelation:A,PointRelation:F,PointRelation:C,PointOnLineDifferentSideRelation{point1=B, point2=E, line=AD},EqualityRelation{AB=DE},EqualityRelation{\mathbf{\angle BAF}=\mathbf{\angle CDE}},EqualityRelation{AF=CD},EqualityRelation{\mathbf{\angle ABC}=(1/2*\pi)},EqualityRelation{AB=4},EqualityRelation{BC=3},RhombusRelation{rhombus=Rhombus:BCEF},求值(大小): (ExpressRelation:[key:]AF),ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BCEF}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AF)}

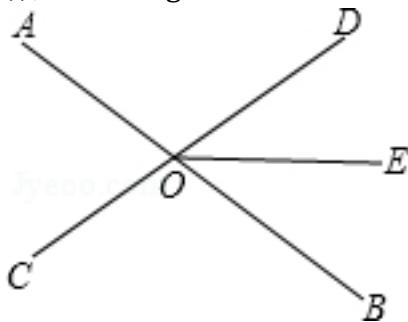
870、topic: 如图,已知 $\angle A=\angle B=90^\circ$, $AB=7$, $AD=2$, $BC=3$,点P在AB上,且 $\triangle PAD \sim \triangle PBC$,求AP的长.%#



graph:
 {"stem": {"pictures": [{"picturename": "1000035311_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "7.00,0.00", "C": "7.00,3.00", "D": "0.00,2.00", "P": "2.80,0.00"}, "collineations": {"0": "A###P##B", "1": "A##D", "2": "D##P", "3": "C##P", "4": "C##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substs": []}}

NLP: EqualityRelation{AP=v_0}, MultiEqualityRelation
 [multiExpressCompare= $\angle DAP = \angle CBP = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AB=7}, EqualityRelation{AD=2}, EqualityRelation{BC=3}, PointOnLineRelation{point=P, line=AB, isConstant=false, extension=false}, TriangleSimilarRelation{triangleA= $\triangle PAD$, triangleB= $\triangle PBC$ }, 求值(大小): (ExpressRelation:[key:v_0]), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:AP])}

871、topic: 如图,直线AB、CD相交于点O,OE平分 $\angle BOD$, $\angle AOD - \angle AOC = 20^\circ$,求 $\angle AOE$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030602_Q_1.jpg", "coordinates": {"E": "-7.35,3.85", "B": "-8.35,2.18", "O": "-10.25,4.17", "D": "-9.00,5.00", "A": "-12.00,6.00", "C": "-12.00,3.00"}, "collineations": {"0": "C##D", "1": "A##O##B", "2": "O##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substs": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], AngleBisectorRelation{line=OE, angle= $\angle BOD$, angle1= $\angle BOE$, angle2= $\angle DOE$ }, EqualityRelation{ $\angle AOD - \angle AOC = (1/9 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle AOE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOE$)}

872、topic: 如图1,四边形ABCD是正方形,点E在BC上,过D点作DG \perp DE交BA的延长线于G.#%#(1)求证:DE=DG;#%#(2)如图2以线段DE、DG为边作出正方形DEFG,点K在AB上且BK=AG,连接KF,请画出图形,猜想四边形CEFK是怎样的特殊四边形,并证明你的猜想;#%#(3)在(2)的条件下当 $\frac{|CE|}{|CB|} = \frac{m}{n}$ 时,请直接写出 $\frac{|S_{\text{正方形 } ABCD}}{|S_{\text{正方形 } DEFG}|}$ 的值.#%#

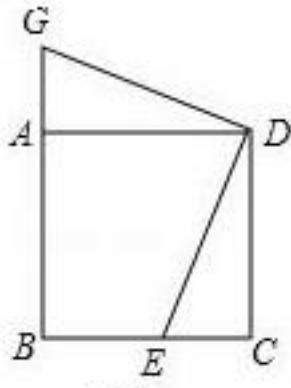


图1

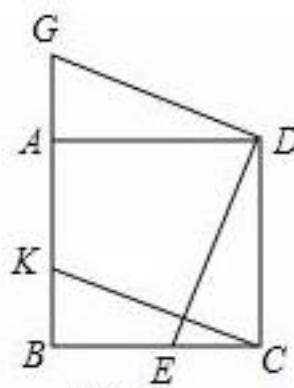
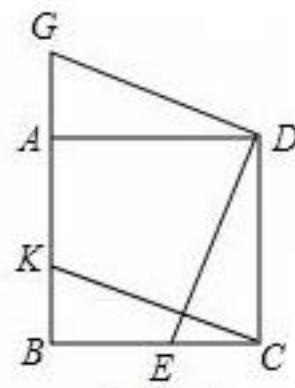


图2

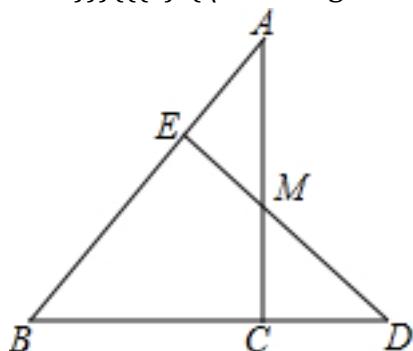


备用图

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": "1000041540_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "0.00,0.00", "C": "3.00,0.00", "D": "3.00,3.00", "E": "1.72,0.00", "G": "0.00,4.28"}, "collineations": {"0": "G###A##B", "1": "B##E##C", "2": "C##D", "3": "D##A", "4": "D##G", "5": "D##E"}, "variable>equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "", "picture": "1000041540_Q_1.jpg", "coordinates": {"A": "0.00,-2.00", "B": "0.00,-5.00", "C": "3.00,-5.00", "D": "3.00,-2.00", "E": "1.69,-5.00", "K": "0.00,-3.69", "G": "0.00,-0.69"}, "collineations": {"0": "G##A##K##B", "1": "B##E##C", "2": "C##D", "3": "D##A", "4": "D##G", "5": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, LinePerpRelation{line1=DG, line2=DE, crossPoint=D}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=DG, iLine2=BA], PointOnLineRelation{point=D, line=DG, isConstant=false, extension=false}, PointOnLineRelation{point=K, line=AB, isConstant=false, extension=false}, EqualityRelation{BK=AG}, SegmentRelation:KF, 求值(大小): (ExpressRelation:[key:](((S_0)))/(((S_0)))), ProveConclusionRelation:[证明: EqualityRelation{DE=DG}], ShapeJudgeConclusionRelation{geoEle=CEFK}, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:](((S_0)))/(((S_0))))})

873、topic: 如图, $\triangle ABC$ 中, M 为 AC 的中点, E 为 AB 边上一点, 且 $AE = \frac{1}{4}AB$, 连结 EM , 延长 EM 交 BC 的延长线于点 D . #%(1) 求证: $BC = 2CD$; #%(2) 求 $\frac{\{S\}_{\triangle MCD}}{\{S\}_{\triangle ABC}}$ 的值. #%#



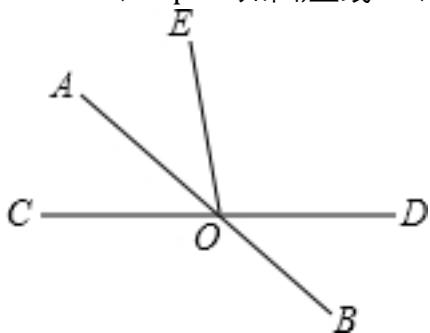
graph:
 {"stem": {"pictures": [{"picturename": "1000062110_Q_1.jpg", "coordinates": {"A": "7.00,12.93", "B": "3.00,12.93", "C": "5.00,12.93", "D": "5.00,10.00", "E": "4.00,11.00", "M": "5.5,12.93", "S": "5.5,10.00"}}, {"picturename": "1000062110_Q_2.jpg", "coordinates": {"A": "7.00,12.93", "B": "3.00,12.93", "C": "5.00,12.93", "D": "5.00,10.00", "E": "4.00,11.00", "M": "5.5,12.93", "S": "5.5,10.00"}}], "appliedproblems": {}}}

6.00", "C": "7.00,6.00", "D": "9.00,6.00", "E": "6.00,11.20", "M": "7.00,9.46"}, "collineations": {"0": "A###E##B#", "1": "B###C###D", "2": "D###M###E", "3": "A###M###C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP:

TriangleRelation: $\triangle ABC$, MiddlePointOfSegmentRelation{middlePoint=M, segment=AC}, PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, EqualityRelation{AE=(1/4)*AB}, SegmentRelation:EM, LineCrossRelation[crossPoint=Optional.of(D), iLine1=EM, iLine2=BC], 求值(大小): (ExpressRelation:[key:]S $_{\triangle CDM}$)/S $_{\triangle ABC}$), ProveConclusionRelation:[证明: EqualityRelation{BC=2*CD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S $_{\triangle CDM}$)/S $_{\triangle ABC}$ })

874、topic: 如图,直线AB、CD相交于点O,若OA平分 $\angle COE$, $\angle EOD=100^\circ$,求 $\angle AOE$ 的度数.#%#



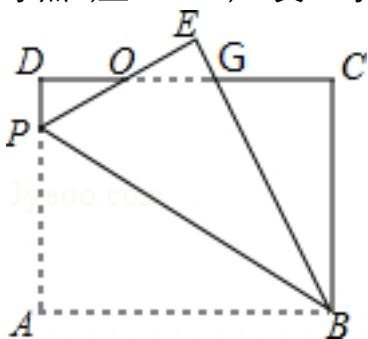
graph:

{"stem": {"pictures": [{"picturename": "1000081785_Q_1.jpg", "coordinates": {"A": "-3.18,2.66", "B": "2.76,-2.31", "C": "-4.00,0.00", "D": "4.00,0.00", "E": "-0.69,3.94", "O": "0.00,0.00"}, "collineations": {"0": "B###O##A", "1": "D###O##C", "2": "E##O"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], AngleBisectorRelation{line=OA, angle= $\angle COE$, angle1= $\angle AOC$, angle2= $\angle AOE$ }, EqualityRelation{ $\angle DOE = (5/9)\pi$ }, 求角的大小:

AngleRelation{angle= $\angle AOE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOE$)}

875、topic: 如图,,矩形ABCD中,AB=8,BC=6,P为AD上一点,将 $\triangle ABP$ 沿BP翻折至 $\triangle EBP$,PE与CD相交于点O,且 $OE=OD$,BE交CD于点G,求AP的长.#%#



graph:

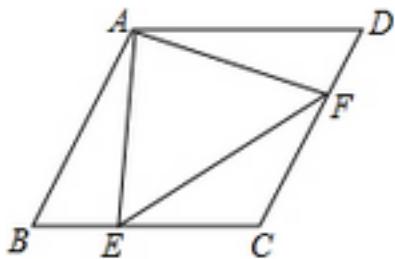
{"stem": {"pictures": [{"picturename": "1000031195_Q_1.jpg", "coordinates": {"A": "-7.00,2.00", "B": "-3.00,"}}

2.00","C":"-3.00,5.00","D":"-7.00,5.00","E":"-5.29,6.06","G":"-4.69,5.00","O":"-6.38,5.00","P":"-7.00,4.39"}, "collineations": {"0": "A###P###D", "1": "A###B", "2": "P###O###E", "3": "D###O###G###C", "4": "B ###C", "5": "B###G###E", "6": "B###P"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substs": []}

NLP:

EqualityRelation{AP=v_0}, RectangleRelation{rectangle=Rectangle:ABCD}, EqualityRelation{AB=8}, EqualityRelation{BC=6}, PointOnLineRelation{point=P, line=AD, isConstant=false, extension=false}, TurnoverRelation{start=A, segment=BP, target=E}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=PE, iLine2=CD], EqualityRelation{EO=DO}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=BE, iLine2=CD], 求值(大小):
(ExpressRelation:[key]:v_0), SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key]:AP)}

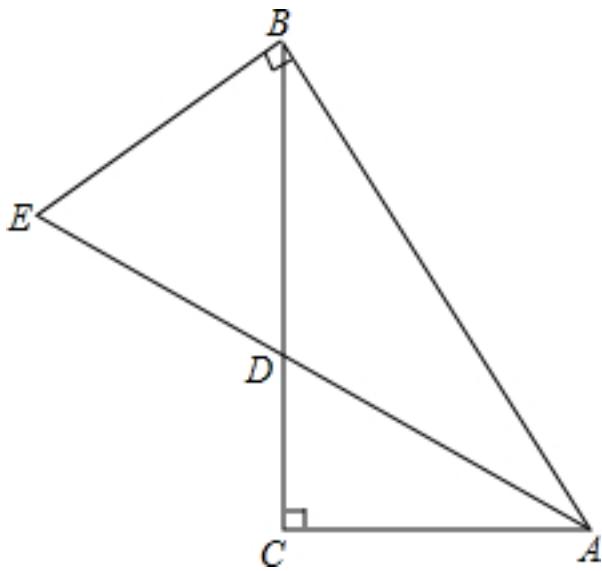
876、topic: 如图,已知菱形ABCD中,E、F分别是CB、CD上的点,且BE=DF.求证: $\angle AEF = \angle AFE$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041806_Q_1.jpg", "coordinates": {"A": "-11.63,6.03", "B": "-13.78,3.45", "C": "-10.18,3.40", "D": "-8.63,5.97", "E": "-12.53,3.44", "F": "-8.96,5.42"}, "collineations": {"0": "E##F", "1": "D###F###C", "2": "A###D", "3": "B###E###C", "4": "A###B", "5": "A###E", "6": "A###F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substs": []}}

NLP: RhombusRelation{rhombus=Rhombus:ABCD}, PointOnLineRelation{point=E, line=CB, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, EqualityRelation{BE=DF}, ProveConclusionRelation:[证明:
EqualityRelation{ $\angle AEF = \angle AFE$ }]

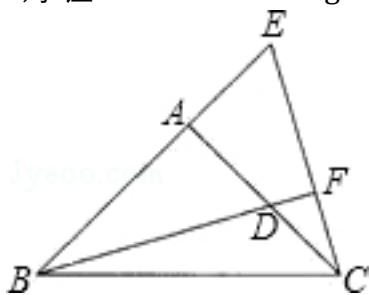
877、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$,AD是角平分线,过点B作BA的垂线与AD的延长线相交于点E,求证: $\triangle BDE$ 是等腰三角形.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030944_Q_1.jpg", "coordinates": {"A": "-6.00, 2.00", "B": "-9.00, 6.00", "C": "-9.00, 2.00", "D": "-9.00, 3.50", "E": "-11.00, 4.50"}, "collineations": {"0": "B###A", "1": "A###D##E", "2": "C##D##B", "3": "B###E", "4": "C##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LinePerpRelation{line1=EB, line2=BA, crossPoint=B}, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ACD = (1/2 * \pi)$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle CAD$, angle2= $\angle BAD$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AD, iLine2=EB], PointOnLineRelation{point=B, line=EB, isConstant=false, extension=false}, ProveConclusionRelation:[IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle BDE$ [Optional.of(B)]]]

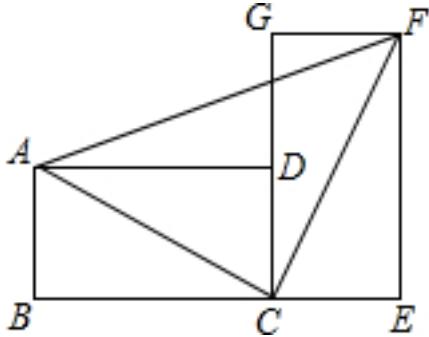
878、topic: 如图, $\angle BAC = 90^\circ$, $AB = AC$, 点D在AC上,点E在BA的延长线上,BD=CE,BD的延长线交CE于点F,求证: $BF \perp CE$. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000031287_Q_1.jpg", "coordinates": {"A": "-7.00, 4.00", "B": "-9.00, 2.00", "C": "-5.00, 2.00", "D": "-5.75, 2.75", "E": "-5.75, 5.25", "F": "-5.20, 2.87"}, "collineations": {"0": "B##D##F", "1": "E###A###B", "2": "A###D###C", "3": "B###C", "4": "E###F###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{ $\angle BAD = (1/2 * \pi)$ }, EqualityRelation{ $AB = AC$ }, PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BA, isConstant=false, extension=true}, EqualityRelation{BD=CE}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BD, iLine2=CE], ProveConclusionRelation:[证明: LinePerpRelation{line1=BF, line2=CE, crossPoint=F}]

879、topic: 如图,把两个全等的矩形ABCD和矩形CEFG拼成如图所示的图案,求 $\angle ACF$, $\angle AFC$ 的度数.#%#



```
graph:
{"stem": {"pictures": [{"picturename": "1000050613_Q_1.jpg", "coordinates": {"A": "-8.00,5.00", "B": "-8.00,3.00", "C": "-4.00,3.00", "D": "-4.00,5.00", "E": "-2.00,3.00", "F": "-2.00,7.00", "G": "-4.00,7.00"}, "collinearations": {"0": "G###D##C", "1": "B##C##E", "2": "D##A", "3": "A##B", "4": "E##F", "5": "G##F", "6": "A##F", "7": "C##F", "8": "A##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: R_QuadrilateralCong:Rectangle:ABCD, Rectangle:CEFG, 求角的大小:

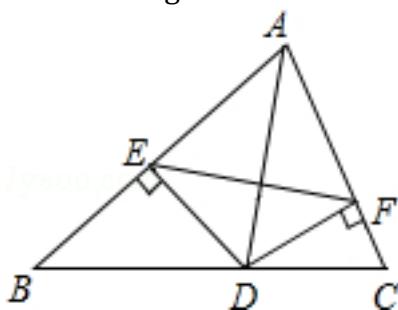
AngleRelation{angle= $\angle ACF$ }, 求角的大小:

AngleRelation{angle= $\angle AFC$ }, SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] $\angle ACF$), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:] $\angle AFC$)}

880、topic: 如图,AD是 $\triangle ABC$ 的角平分线,DE、DF分别是 $\triangle ABD$ 和 $\triangle ACD$ 的高.求证:AD垂直平分EF.#%#



graph:

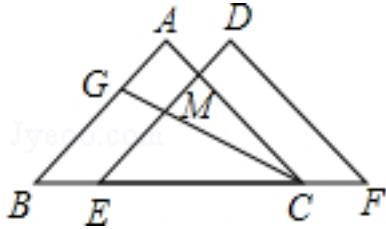
```
{"stem": {"pictures": [{"picturename": "1000027222_Q_1.jpg", "coordinates": {"A": "5.00,4.00", "B": "1.00,0.00", "C": "6.07,0.00", "D": "3.93,0.00", "E": "2.46,1.46", "F": "5.93,0.54"}, "collinearations": {"0": "E##D", "1": "D##F", "2": "E##F", "3": "A##D", "4": "A##E##B", "5": "B##D##C", "6": "A##F##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle ABD$, TriangleRelation: $\triangle ACD$, AngleBisectorRelation{line=AD, angle= $\angle EAF$, angle1= $\angle DAF$, angle2= $\angle DAE$ }, LinePerpRelation{line1=DE, line2=BE, crossPoint=E}, LinePerpRelation{line1=DF, line2=AF, crossPoint=F}, ProveConclusionRelation:[MiddlePerpendicularRelation [iLine1=AD, iLine2=EF, crossPoint=Optional.absent()]]]

881、topic: 如图,点E、C在BF上,\$BE=FC\$,\$\angle ABC=\angle DEF=45^\circ\$,\$\angle A=\angle D=90^\circ\$.?%#(1)求

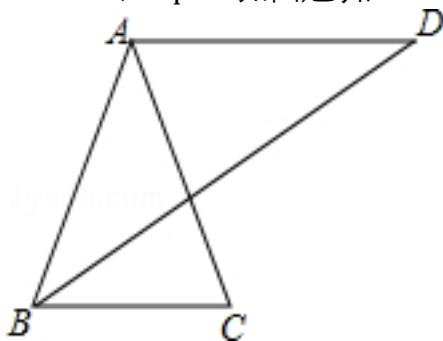
证:\$AB=DE\$;?#%#(2)若AC交DE于M,且\$AB=\sqrt{3}\$,\$ME=\sqrt{2}\$,将线段CE绕点C顺时针旋转,使点E旋转到AB上的G处,求旋转角\$\angle ECG\$的度数.



```
graph:
{"stem": {"pictures": [{"picturename": "1000026424_Q_1.jpg", "coordinates": {"A": "1.50,1.50", "B": "0.00,0.00", "C": "3.00,0.00", "D": "2.50,1.50", "E": "1.00,0.00", "F": "4.00,0.00", "G": "0.64,0.64", "M": "1.42,0.42"}, "collineations": {"0": "A###G##B", "1": "B##E##C##F", "2": "D##F", "3": "D##M##E", "4": "C##A", "5": "G##M##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: PointOnLineRelation{point=E, line=BF, isConstant=false, extension=false}, PointOnLineRelation{point=C, line=BF, isConstant=false, extension=false}, EqualityRelation{BE=CF}, MultiEqualityRelation [multiExpressCompare=\$\angle EBG = \angle CEM = (1/4)\pi\$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare=\$\angle CAG = \angle FDM = (1/2)\pi\$, originExpressRelationList=[], keyWord=null, result=null], LineCrossRelation [crossPoint=Optional.of(M), iLine1=AC, iLine2=DE], EqualityRelation{AB=\$(3^{(1/2)})\$}, EqualityRelation{EM=\$(2^{(1/2)})\$}, ConstantPointOnLineRelation [line=StraightLine[CE] analytic:y=k_CE*x+b_CE slope:null b:null isLinearFunction:false, point=C], PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false}, PointCoincidenceRelation{point1=E, point2=G}, 求角的大小: AngleRelation{angle=\$\angle ECM\$}, ProveConclusionRelation:[证明: EqualityRelation{AB=DE}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]\$\angle ECM\$)}

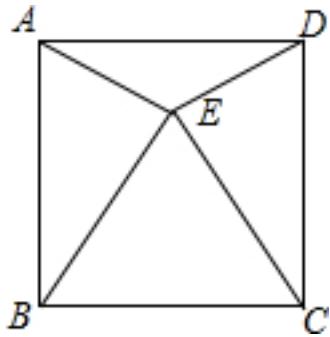
882、topic: 如图,已知AB=AC=AD,且AD||BC,求证:\$\angle C=2\angle D\$.#%#



```
graph:
{"stem": {"pictures": [{"picturename": "1000030926_Q_1.jpg", "coordinates": {"A": "-7.00,4.00", "B": "-7.96,1.22", "C": "-5.99,1.22", "D": "-4.00,4.00"}, "collineations": {"0": "B##A", "1": "A##C", "2": "C##B", "3": "D##B", "4": "A##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: MultiEqualityRelation [multiExpressCompare=AB=AC=AD, originExpressRelationList=[], keyWord=null, result=null], LineParallelRelation [iLine1=AD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{\$\angle ACB=2*\angle ADB\$}]

883、topic: 如图,四边形ABCD是正方形, $\triangle CBE$ 是等边三角形,求 $\angle AEB$ 的度数.#%#

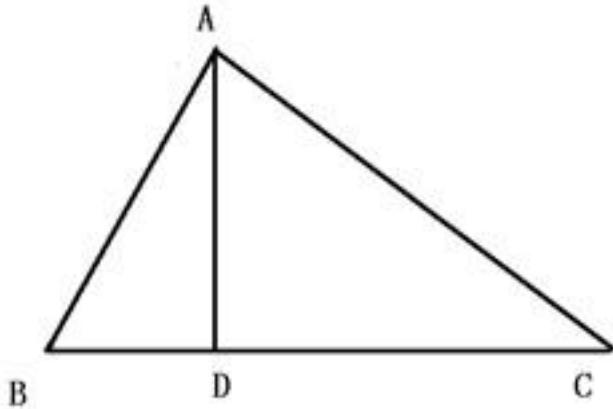


graph:

```
{"stem": {"pictures": [{"picturename": "1000050590_Q_1.jpg", "coordinates": {"A": "-7.00,7.00", "B": "-7.00,3.00", "C": "-3.00,3.00", "D": "-3.00,7.00", "E": "-5.00,6.46"}, "collineations": {"0": "A###E", "1": "B##E", "2": "C##B", "3": "D##C", "4": "A##B", "5": "C##E", "6": "D##E", "7": "A##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: SquareRelation{square=Square:ABCD},RegularTriangleRelation:RegularTriangle: $\triangle CBE$,求角的大小: AngleRelation{angle= $\angle AEB$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AEB$)}

884、topic: 在 $\triangle ABC$ 中, $AD \perp BC$ 于点D, $AB = 25$, $AC = 30$, $AD = 24$, 试判断 $\triangle ABC$ 的形状



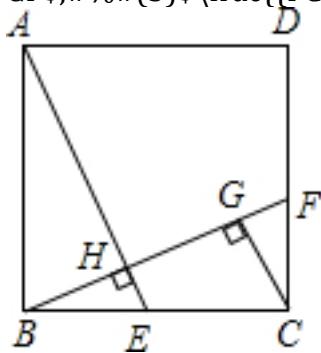
graph:

```
{"stem": {"pictures": [{"picturename": "1000001382_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "20.00,0.00", "C": "20.00,15.00"}, "collineations": {"0": "A##D", "1": "A##C", "2": "A##B", "3": "C##D##B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP: TriangleRelation: $\triangle ABC$,LinePerpRelation{line1=AD, line2=BC, crossPoint=D},EqualityRelation{AB=25},EqualityRelation{AC=30},EqualityRelation{AD=24},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AC)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ABC$)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ACB$)},SolutionConclusionRelation{relation=求值(大小): }

{ExpressRelation:[key:] $\angle BAC$ }

885、topic: 如图,在正方形ABCD中,E是BC上的一点,连接AE,作BF $\perp AE$,垂足为H,交CD于F,作CG $\parallel AE$,交BF于G.求证:(1) $CG=BH$;(2) $(FC)^2=BF \cdot FG$

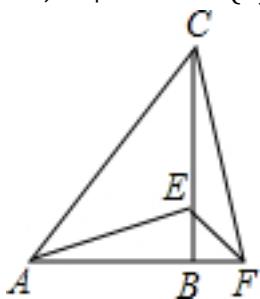


graph:

{"stem": {"pictures": [{"picturename": "1000062212_Q_1.jpg", "coordinates": {"A": "-11.03,0.00", "B": "-11.03,-4.02", "C": "-7.01,-4.02", "D": "-7.01,0.00", "E": "-9.34,-4.02", "F": "-7.01,-2.30", "G": "-7.63,-2.57", "H": "-9.60,-3.41"}, "collineations": {"0": "A##B", "1": "C##G", "2": "A##D", "3": "B##E##C", "4": "C##F##D", "5": "A##H##E", "6": "B##H##G##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, SegmentRelation:AE, LinePerpRelation{line1=BF, line2=AE, crossPoint=H}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BF, iLine2=CD], LineParallelRelation [iLine1=CG, iLine2=AE], LineCrossRelation [crossPoint=Optional.of(G), iLine1=CG, iLine2=BF], ProveConclusionRelation:[证明: EqualityRelation{CG=BH}], ProveConclusionRelation:[证明: EqualityRelation{(CF)^2=BF*FG}], ProveConclusionRelation:[证明: EqualityRelation{((CF)^2)/((AB)^2)=((FG)/(BG)))}]

886、topic: 已知:如图,在 $\triangle ABC$ 中, $AB=BC$, $\angle ABC=90^\circ$,F为AB延长线上一点,点E在BC上, $BE=BF$,连接AE,EF和CF.(1)求证: $AE=CF$;(2)若 $\angle CAE=30^\circ$,求 $\angle EFC$ 的度数.



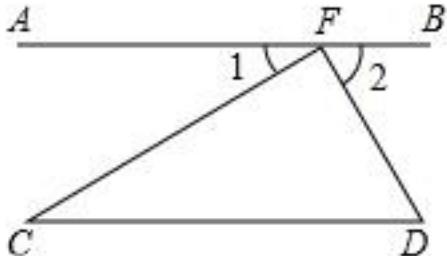
graph:

{"stem": {"pictures": [{"picturename": "1000063717_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,0.00", "C": "0.00,4.00", "E": "0.00,1.00", "F": "1.00,0.00"}, "collineations": {"0": "A##F##B", "1": "B##E##C", "2": "C##F", "3": "A##C", "4": "A##E", "5": "F##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}

NLP:
TriangleRelation: $\triangle ABC$, EqualityRelation{AB=BC}, EqualityRelation{ $\angle ABE=(1/2\pi)$ }, PointOnLineRela

tion{point=F, line=AB, isConstant=false, extension=true}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{BE=BF}, SegmentRelation:AE, SegmentRelation:EF, EqualityRelation{ $\angle CAE = (1/6 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle CFE$ }, ProveConclusionRelation:[证明: EqualityRelation{AE=CF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CFE$)}

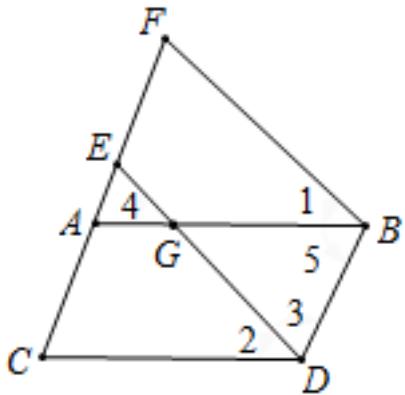
887、topic: 如图,已知 $\angle 1$ 和 $\angle D$ 互余, $CF \perp DF$,求证: $AB \parallel CD$.



graph:
 {"stem": {"pictures": [{"picturename": "1000032959_Q_1.jpg", "coordinates": {"A": "1.50,-1.80", "B": "16.50,-1.80", "C": "1.70,-8.50", "D": "16.60,-8.50", "F": "12.80,-1.80"}, "collineations": {"0": "A###F##B", "1": "D##F", "2": "C##F", "3": "C##D"}, "variable>equals": {"0": " $\angle 1 = \angle AFC$ ", "1": " $\angle 2 = \angle BFD$ "}, "circles": []}], "appliedproblems": {}, "substems": []}

NLP: AngleComplementRelation: $\angle AFC / \angle CDF$, LinePerpRelation{line1=CF, line2=DF, crossPoint=F}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=CD]]

888、topic: 如图, $\angle 1 = \angle 2, \angle 5 = \angle C, \angle C + \angle CDB = 180^\circ$,求证: $DE \parallel BF$.#%#

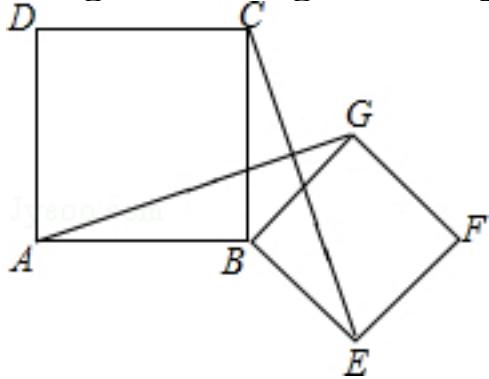


graph:
 {"stem": {"pictures": [{"picturename": "1000050442_Q_1.jpg", "coordinates": {"A": "-6.00,4.00", "B": "-2.00,4.00", "C": "-7.00,2.00", "D": "-3.00,2.00", "E": "-5.57,4.85", "F": "-4.57,6.85", "G": "-4.81,4.00"}, "collineations": {"0": "C##A##E##F", "1": "B##F", "2": "D##B", "3": "D##C", "4": "A##G##B", "5": "E##G##D"}, "variable>equals": {"0": " $\angle 1 = \angle FBA$ ", "1": " $\angle 2 = \angle CDE$ ", "2": " $\angle 3 = \angle EDB$ ", "3": " $\angle 4 = \angle EGA$ ", "4": " $\angle 5 = \angle ABD$ "}, "circles": []}], "appliedproblems": {}, "substems": []}

NLP:
 EqualityRelation{ $\angle FBG = \angle CDG$ }, EqualityRelation{ $\angle DBG = \angle ACD$ }, EqualityRelation{ $\angle ACD + \angle BDC = (\pi)$ },
 ProveConclusionRelation:[证明: LineParallelRelation [iLine1=DE, iLine2=BF]]

889、topic: 如图,四边形ABCD、BEFG均为正方形,连接AG、CE,求证:

#%#①AG=CE;#%#②AG⊥CE.



graph:

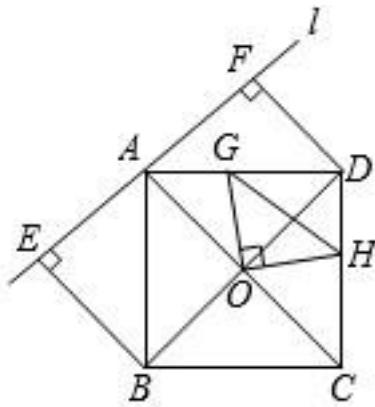
```
{"stem": {"pictures": [{"picturename": "1000030761_Q_1.jpg", "coordinates": {"A": "-12.00,3.00", "B": "-8.0,3.00", "C": "-8.00,7.00", "D": "-12.00,7.00", "E": "-6.00,1.00", "F": "-4.00,3.00", "G": "-6.00,5.00"}, "collinearations": {"0": "A##D", "1": "A##B", "2": "B##C", "3": "C##D", "4": "B##E", "5": "E##F", "6": "F##G", "7": "G##B", "8": "A##G", "9": "C##E", "10": "E##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

SquareRelation{square=Square:ABCD}, SquareRelation{square=Square:BEFG}, SegmentRelation:AG, SegmentRelation:CE, ProveConclusionRelation:[证明:

EqualityRelation{AG=CE}], ProveConclusionRelation:[证明: LinePerpRelation{line1=AG, line2=CE, crossPoint=}]]

890、topic: 如图,直线\$l\$经过正方形\$ABCD\$的顶点A,分别过此正方形的顶点B、D作\$BE\perp l\$于点E、\$DF\perp l\$于点F.(1)求证:\$BE+DF=EF\$;(2)以正方形对角线的交点O为端点,引两条相互垂直的射线分别与AD,CD交于G,H两点,若\$EF=2\$,\$\frac{S_{\triangle ABE}}{S_{\triangle ABE}}=\frac{1}{2}\$,求线段GH长度的最小值.



graph:

```
{"stem": {"pictures": [{"picturename": "1000027741_Q_1.jpg", "coordinates": {"A": "3.00,5.00", "B": "3.00,1.00", "C": "7.00,1.00", "D": "7.00,5.00", "E": "1.00,3.00", "F": "5.00,7.00", "O": "5.00,3.00"}, "collinearations": {"0": "D##F", "1": "B##E", "2": "B##C", "3": "E##A##F", "5": "A##O##C", "6": "B##O##D", "7": "A##B", "8": "A##D", "9": "C##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

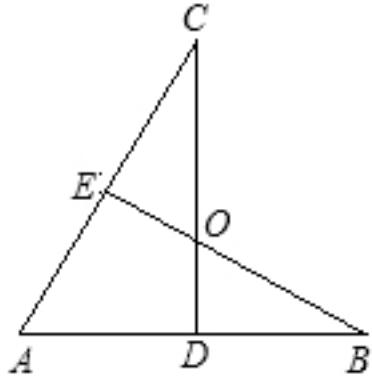
NLP: PointOnLineRelation{point=A, line=StraightLine[l]} analytic :y=k_l*x+b_l slope:null b:null

```

isLinearFunction:false, isConstant:false,
extension=false},SquareRelation{square=Square:ABCD},SquareRelation{square=Square:ABCD},Point
OnLineRelation{point=B, line=BE, isConstant=false, extension=false},PointOnLineRelation{point=D,
line=DF, isConstant=false, extension=false},LinePerpRelation{line1=AE, line2=BE,
crossPoint=E},LinePerpRelation{line1=EF, line2=DF,
crossPoint=F},EqualityRelation{GH=v_0},SquareRelation{square=Square:ABCD},PointRelation:0,Equa
lityRelation{EF=2},EqualityRelation{S_△ABE}=(1/2)},最小值:
(ExpressRelation:[key:]v_0[v_0=v_0]),ProveConclusionRelation:[证明:
EqualityRelation{BE+DF=EF}],SolutionConclusionRelation{relation=最小值:
(ExpressRelation:[key:]v_0[v_0=v_0])}

```

891、topic: 如图,已知 $CD \perp AB$ 于D, $BE \perp AC$ 于E, CD 交 BE 于点O.点O在 $\angle BAC$ 的平分线上,试求证: $OC=OB$.#%#



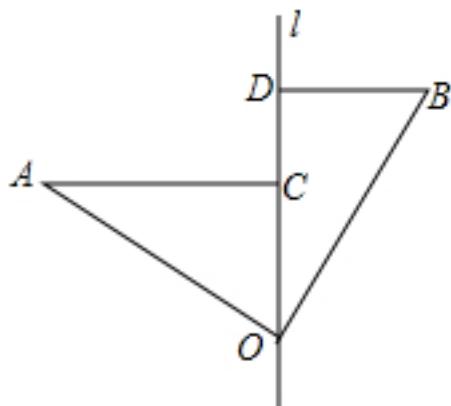
```

graph:
{"stem":{"pictures":[{"picturename":"1000032847_Q_1.jpg","coordinates":{"A":"0.00,0.00","B":"3.61,0
.00","C":"1.78,3.14","D":"1.78,0.00","E":"0.88,1.55","O":"1.78,1.04"},"collinearities":{"0":"A###D##B#",
"1":"B##O##E","2":"A##E##C","3":"C##O##D"},"variable-equals":{},"circles":[]],"appliedp
roblems":{},"substems":[]}

```

NLP: AngleBisectorRelation{line=M_0N_0,angle=∠DAE,angle1=∠DAM_0,
angle2=∠EAM_0},LinePerpRelation{line1=CD, line2=AB, crossPoint=D},LinePerpRelation{line1=BE,
line2=AC, crossPoint=E},LineCrossRelation [crossPoint=Optional.of(O), iLine1=CD,
iLine2=BE],ProveConclusionRelation:[证明: EqualityRelation{CO=BO}]

892、topic: 如图, $\angle AOB=90^\circ$, $OA=OB$,直线 l 经过点O,分别过A、B两点作 $AC \perp l$ 、 $BD \perp l$,垂足分别为C、D.#%#求证: $OC=BD$.#%#

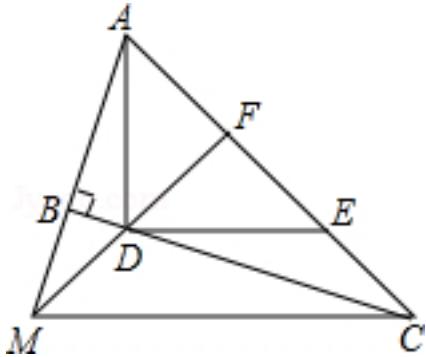


graph:

{"stem": {"pictures": [{"picturename": "1000072642_Q_1.jpg", "coordinates": {"A": "-10.00,5.00", "B": "-4.0,7.00", "C": "-6.00,5.00", "D": "-6.00,7.00", "O": "-6.00,3.00"}, "collineations": {"0": "A##O", "1": "A##C", "2": "B##O", "3": "B##D", "4": "D##C##O"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{ $\angle AOB = (1/2 * \pi)$ }, EqualityRelation{AO=BO}, PointOnLineRelation{point=0, line=StraightLine[]} analytic :y=k_l*x+b_l slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, LinePerpRelation{line1=OC, line2=AC, crossPoint=C}, LinePerpRelation{line1=OD, line2=BD, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{CO=BD}]

893、topic: 如图, $\angle ABC = 90^\circ$, D、E分别在BC、AC上, $AD \perp DE$, 且 $AD = DE$, 点F是AE的中点, FD与AB相交于点M.(1)求证: $\angle FMC = \angle FCM$;(2)AD与MC垂直吗? 并说明理由.#%#

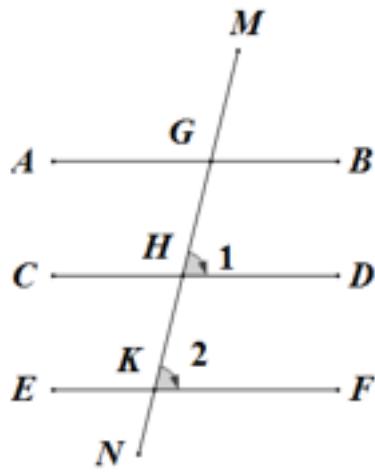


graph:

{"stem": {"pictures": [{"picturename": "1000041564_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-8.60,4.20", "C": "-5.00,3.00", "D": "-8.00,4.00", "E": "-6.00,4.00", "F": "-7.00,5.00", "M": "-9.00,3.00"}, "collineations": {"0": "A##B##M", "1": "A##D", "2": "D##E", "3": "M##D##F", "4": "A##F##E##C", "5": "M##C", "6": "B##D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{ $\angle ABD = (1/2 * \pi)$ }, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, LinePerpRelation{line1=AD, line2=DE, crossPoint=D}, EqualityRelation{AD=DE}, MiddlePointOfSegmentRelation{middlePoint=F, segment=AE}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=FD, iLine2=AB], ProveConclusionRelation:[证明: EqualityRelation{ $\angle CMD = \angle ECM$ }], ProveConclusionRelation:[LinePerpRelation{line1=AD, line2=MC, crossPoint=}]]

894、topic: 如图, 直线MN分别与直线AB、CD、EF相交于点G、H、K, $\angle 1 = \angle 2$, $AB \parallel EF$. 求证: $AB \parallel CD$. #%#

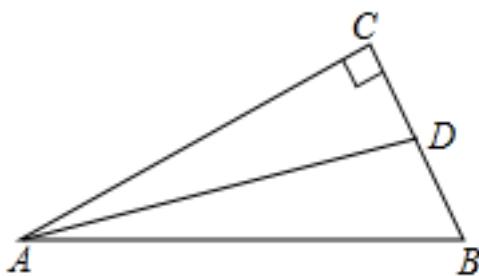


graph:

```
{"stem": {"pictures": [{"picturename": "1000030552_Q_1.jpg", "coordinates": {"A": "0.00,6.00", "B": "7.00,6.00", "C": "0.00,3.00", "D": "7.00,3.00", "E": "0.00,0.00", "F": "7.00,0.00", "M": "5.00,9.00", "G": "4.25,6.00", "H": "3.50,3.00", "K": "2.75,0.00", "N": "2.00,-3.00"}, "collineations": {"0": "A###G##B", "1": "C##H##D", "2": "E##K##F", "3": "M##G##H##K##N"}, "variable-equals": {"0": "\u03291=\u0329GHD", "1": "\u03292=\u0329HKF"}, "circles": []}, "appliedproblems": {}, "subsystems": []}}
```

NLP: LineCrossRelation [crossPoint=Optional.of(G), iLine1=MN, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(H), iLine1=MN, iLine2=CD], LineCrossRelation [crossPoint=Optional.of(K), iLine1=MN, iLine2=EF], EqualityRelation{ $\angle DHG = \angle FKH$ }, LineParallelRelation [iLine1=AB, iLine2=EF], ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=CD]]]

895、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$,AD平分 $\angle BAC$,且 $\angle B=3\angle BAD$,求 $\angle ADC$ 的度数.#%#



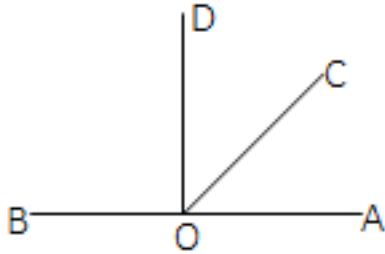
graph:

```
{"stem": {"pictures": [{"picturename": "1000035430_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "5.24,3.80", "D": "6.47,2.10"}, "collineations": {"0": "D##A", "1": "A##B", "2": "B##D##C", "3": "C##A"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ACD=(1/2*\pi)$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$ }, angle1= $\angle BAD$, angle2= $\angle CAD$, EqualityRelation{ $\angle ABD=3*\angle BAD$ }, 求角的大小: AngleRelation{angle= $\angle ADC$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ADC$)}

896、topic: 如图,O为直线AB上一点, $\angle BOC=3\angle AOC$,OC平分 $\angle AOD$.#%#(1)求 $\angle AOC$ 的度数;#%#(2)猜测OD与AB的位置关系,并说明理由.#%#



graph:

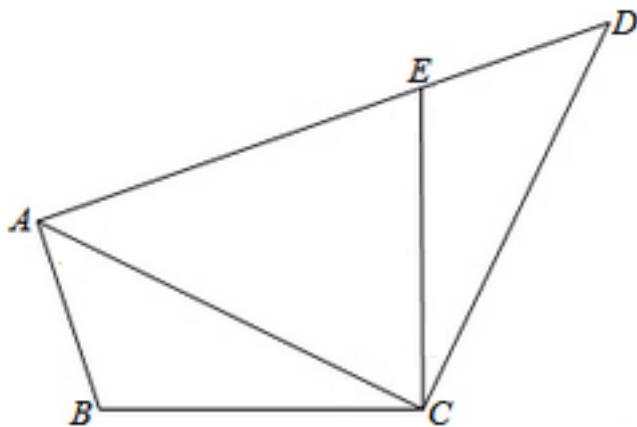
```
{"stem":{"pictures":[{"picturename":"FC4F0F83EFE145B2B2AF59E16604DB7A.jpg","coordinates":{"A":"13.60,-8.30","B":"1.10,-8.30","C":"11.90,-3.10","D":"6.80,-0.80","O":"6.80,-8.30"},"collineations":{"0":"A###O##B","1":"D##O","2":"O##C"},"variable-equals":{},"circles":[]},"appliedproblems":{},"substems":[{"substemid":"2","questionrelies":"1","pictures":[],"appliedproblems":{}}]}}
```

NLP: PointOnLineRelation{point=O, line=AB, isConstant=false, extension=false}, EqualityRelation{ $\angle BOC = 3 * \angle AOC$ }, AngleBisectorRelation{line=OC, angle= $\angle AOD$, angle1= $\angle AOC$, angle2= $\angle COD$ }, 求角的大小:

AngleRelation{angle= $\angle AOC$ }, SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:] $\angle AOC$)}, JudgePostionConclusionRelation: [data1=OD, data2=AB]

897、topic: 如图,四边形ABCD中,点E在AD上,其中 $\angle BAE = \angle BCE = \angle ACD = 90^\circ$,且 $BC = CE$.#%#求证: $\triangle ABC \cong \triangle DEC$.#%#

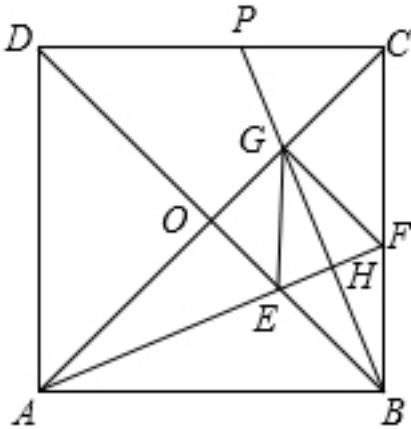


graph:

```
{"stem":{"pictures":[{"picturename":"1000072648_Q_1.jpg","coordinates":{"A":"0.14,-0.80","B":"0.37,-1.50","C":"1.58,-1.50","D":"2.27,-0.06","E":"1.58,-0.31"},"collineations":{"0":"A###B","1":"A###C","2":"B##C","3":"E##C","4":"C##D","5":"A##E##D"},"variable-equals":{},"circles":[]},"appliedproblems":{},"substems":[]}}
```

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false}, MultiEqualityRelation [multiExpressCompare= $\angle BAE = \angle BCE = \angle ACD = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BC=CE}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DEC$ }]

898、topic: 如图,正方形ABCD的对角线相交于点O, $\angle CAB$ 的平分线分别交BD、BC于点E、F,作 $BH \perp AF$ 于点H,分别交AC、CD于点G、P,连接GE、GF.#%#(1)求证: $\triangle OAE \cong \triangle OBG$.#%#(2)试问:四边形BFGE是否为菱形?若是,请证明;若不是,请说明理由.#%#



graph:

```
{"stem":{"pictures":[{"picturename":"A9E6804B4A344F17808977B542D00AC1.jpg","coordinates":{"A":-14.00,3.00,"B":-8.00,3.00,"C":-8.00,9.00,"D":-14.00,9.00,"E":-9.76,4.76,"F":-8.00,5.49,"G":-9.76,7.42,"H":-8.88,5.12,"P":-10.49,9.00,"O":-11.00,6.00}],"collineations":{"0": "B##A","1": "A ##D","2": "E###H###F##A","3": "C##O##G##A","4": "B##F##C","5": "B##G##H##P","6": "B##D##O##E","7": "E##G","8": "G##F","9": "D##P##C"},"variable>equals":{},"circles":[]}, "appliedproblems":{}}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}
```

NLP: SquareRelation{square=Square:ABCDintersection : O},AngleBisectorRelation{line=AH,angle= \angle BAO, angle1= \angle BAH, angle2= \angle HAO},LinePerpRelation{line1=BH, line2=AF, crossPoint=H},LineCrossRelation [crossPoint=Optional.of(G), iLine1=BH, iLine2=AC],LineCrossRelation [crossPoint=Optional.of(P), iLine1=BH, iLine2=CD],SegmentRelation:GE,SegmentRelation:GF,ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= \triangle OAE, triangleB= \triangle OBG}],ProveConclusionRelation:[RhombusRelation{rhombus=Rhombus:BFGE}]

899、topic: 如图所示,在平面直角坐标系中,AB交y轴于点C,连接OB.(1)如图①所示,已知\$A(-2,0)\$、\$B(2,4)\$,求\$\triangle AOB\$的面积;(2)如图②所示,点D在x轴上,\$\angle OBD=\angle OBC\$,求\$\frac{\angle BDA-\angle BAD}{\angle BOC}\$的值;(3)如图③所示,\$BM \perp x\$轴于点M,点N在y轴上,\$\angle MNB=\angle MBN\$,点P在x轴

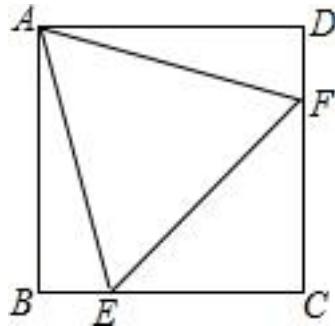
graph:

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```

NLP: LineCrossRelation [crossPoint=Optional.of(C), iLine1=AB, iLine2=StraightLine[Y]
analytic :x=0 slope: b:
isLinearFunction:false],SegmentRelation:OB,EqualityRelation{S_△ABO=v_0},PointRelation:A(-2,0),PointRelation:B(2,4),求值(大小): (ExpressRelation:[key:]v_0),PointOnLineRelation{point=D,
line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false,

extension=false}, EqualityRelation{ $\angle OBD = \angle CBO$ }, 求值(大小):
 (ExpressRelation:[key:](($\angle BDA - \angle BAD$)/($\angle BOC$))), LinePerpRelation{line1=BM, line2=StraightLine[X]
 analytic :y=0 slope:0 b:0 isLinearFunction:false, crossPoint=M}, PointOnLineRelation{point=N,
 line=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, isConstant=false,
 extension=false}, EqualityRelation{ $\angle MNB = \angle MBN$ }, PointOnLineRelation{point=P, line=StraightLine[X]
 analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false,
 extension=false}, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]S_△ABO)}, SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:](($\angle BDA - \angle BAD$)/($\angle BOC$)))}

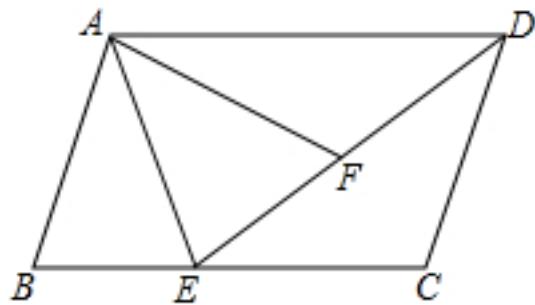
900、topic: 已知:如图,在正方形ABCD中,等边三角形AEF的顶点E,F分别在边BC和CD上.求证:#%#\$\angle CEF=\angle CFE\$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000050883_Q_1.jpg", "coordinates": {"A": "-7.00,5.00", "B": "-7.00,2.00", "C": "-4.00,2.00", "D": "-4.00,5.00", "E": "-6.20,2.00", "F": "-4.00,4.20"}, "collineations": {"0": "A##B", "1": "B##E##C", "2": "C##F##D", "3": "D##A", "4": "A##E", "5": "E##F", "6": "F##A"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
 SquareRelation{square=Square:ABCD}, RegularTriangleRelation:RegularTriangle:△AEF, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle CEF = \angle CFE$ }]

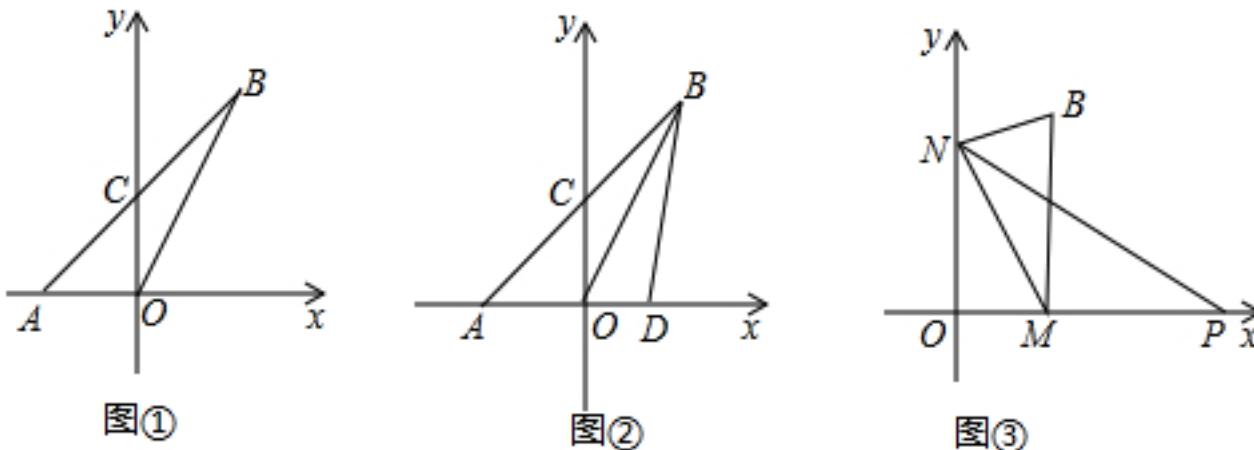
901、topic: 如图,在平行四边形ABCD中, $\angle B = \angle AFE$,EA是 $\angle BEF$ 的角平分线,求证:#%#(1) $\triangle ABE \cong \triangle AFE$;#%#(2) $\angle FAD = \angle CDE$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000034161_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-9.34,3.00", "C": "-4.34,3.00", "D": "-3.00,6.00", "E": "-7.01,3.00", "F": "-5.21,4.35"}, "collineations": {"0": "B##E##C", "1": "E##F##D", "2": "A##E", "3": "A##F", "4": "A##B", "5": "A##D", "6": "C##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{ $\angle ABE = \angle AFE$ }, AngleBisectorRelation{line=EA, angle= $\angle BEF$, angle1= $\angle AEB$, angle2= $\angle AEF$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABE$, triangleB= $\triangle AFE$ }], ProveConclusionRelation:[证明: EqualityRelation{ $\angle DAF = \angle CDF$ }]

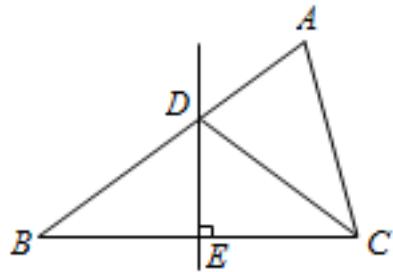
902、topic: 如图所示,在平面直角坐标系中,AB交y轴于点C,连结OB.(1)如图①所示,已知A(-2,0),B(2,4),求 $\triangle AOB$ 的面积;(2)如图②所示,点D在x轴上, $\angle OBD = \angle OBC$,求 $\frac{\angle BDA - \angle BAD}{\angle BOC}$ 的值;(3)如图③所示,BM \perp x轴于点M,N在y轴上, $\angle MNB = \angle MBN$,点P在x轴上, $\angle MNP = \angle MPN$,求 $\angle BNP$ 的度数.

graph:

{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000060877_Q_1.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,4.00", "C": "0.00,2.00", "O": "0.00,0.00"}, "collineations": {"0": "A###B##C", "1": "A##O", "2": "B##O"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000060877_Q_1.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,4.00", "C": "0.00,2.00", "O": "0.00,0.00", "D": "1.43,0.00"}, "collineations": {"0": "A###B##C", "1": "A##O##D", "2": "B##O", "3": "B##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "picture": [{"picturename": "1000060877_Q_1.jpg", "coordinates": {"M": "1.00,0.00", "N": "0.00,3.00", "B": "1.00,3.16", "P": "4.16,0.00", "O": "0.00,0.00"}, "collineations": {"0": "O##M##P", "1": "O##N", "2": "N##M", "3": "B##M", "4": "B##N", "5": "N##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

NLP: LineCrossRelation [crossPoint=Optional.of(C), iLine1=AB, iLine2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false], SegmentRelation:OB, EqualityRelation{S \triangle ABO=v_0}, PointRelation:A(-2,0), PointRelation:B(2,4), 求值(大小): (ExpressRelation:[key:]v_0), PointOnLineRelation{point=D, line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false}, EqualityRelation{ $\angle OBD = \angle CBO$ }, 求值(大小): (ExpressRelation:[key:](($\angle BDA - \angle BAD$)/($\angle BOC$))), LinePerpRelation{line1=BM, line2=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, crossPoint=M}, PointOnLineRelation{point=N, line=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false, isConstant=false, extension=false}, EqualityRelation{ $\angle MNB = \angle MBN$ }, PointOnLineRelation{point=P, line=StraightLine[X] analytic :y=0 slope:0 b:0 isLinearFunction:false, isConstant=false, extension=false}, EqualityRelation{ $\angle MNP = \angle MPN$ }, 求角的大小: AngleRelation{angle= $\angle BNP$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S \triangle ABO)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](($\angle BDA - \angle BAD$)/($\angle BOC$)))), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BNP$)}}

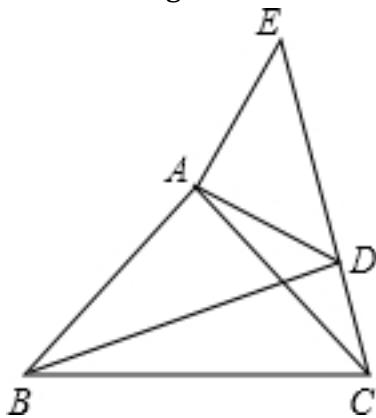
903、topic: 如图所示,在 $\triangle ABC$ 中, $AB=5\text{cm}$, $AC=3\text{cm}$, BC 的垂直平分线分别交 AB , BC 于点D,E,求 $\triangle ACD$ 的周长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000038277_Q_1.jpg", "coordinates": {"A": "-5.00,6.00", "B": "-9.00,3.00", "C": "-4.00,3.00", "D": "-6.50,4.88", "E": "-6.50,3.00"}, "collineations": {"0": "A###D##B", "1": "B##E##C", "2": "A##C", "3": "D##C", "4": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: MiddlePerpendicularRelation [iLine1=DE, iLine2=BC, crossPoint=Optional.of(E)], EqualityRelation{C_△ACD=v_1}, TriangleRelation:△ABC, EqualityRelation{AB=5}, EqualityRelation{AC=3}, 求值(大小): (ExpressRelation:[key:]v_1), LineCrossRelation [crossPoint=Optional.of(E), iLine1=BC, iLine2=ED], LineCrossRelation [crossPoint=Optional.of(D), iLine1=AB, iLine2=ED], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]C_△ACD)}

904、topic: 已知:如图,在 $\triangle ABC$ 、 $\triangle ADE$ 中, $\angle BAC=\angle DAE=90^\circ$, $AB=AC$, $AD=AE$,点C、D、E三点在同一直线上,连接BD.#%#求证:(1) $\triangle BAD \cong \triangle CAE$;%#(2)试猜想BD、CE有何特殊位置关系,并证明.#%#

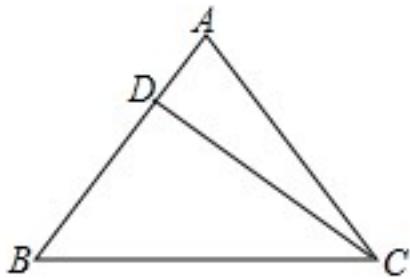


graph:
 {"stem": {"pictures": [{"picturename": "1000040011_Q_1.jpg", "coordinates": {"A": "3.00,3.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "5.34,1.88", "E": "4.12,5.34"}, "collineations": {"0": "E##D##C", "1": "A##B", "2": "E##A", "3": "A##D", "4": "A##C", "5": "B##D", "6": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation:△ABC, TriangleRelation:△ADE, MultiEqualityRelation [multiExpressCompare= $\angle BAC = \angle DAE = (1/2\pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AB=AC}, EqualityRelation{AD=AE}, SegmentRelation:BD, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△BAD, triangleB=△CAE}]]

triangleB=△CAE}], JudgePostionConclusionRelation: [data1=BD, data2=CE]

905、topic: 如图所示,△ABC中AB=AC,BC=20,D为AB上一点,且CD=16,BD=12,求△ABC的面积.#%#



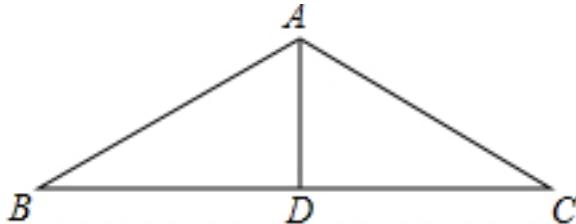
graph:

{"stem": {"pictures": [{"picturename": "1000082210_Q_1.jpg", "coordinates": {"A": "0.00,3.33", "B": "-2.50, 0.00", "C": "2.50,0.00", "D": "-0.69,2.41"}, "collineations": {"0": "A###D##B", "1": "A##C", "2": "C##D", "3": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:

EqualityRelation{S_△ABC=v_0}, TriangleRelation:△ABC, EqualityRelation{AB=AC}, EqualityRelation{BC=20}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, EqualityRelation{CD=16}, EqualityRelation{BD=12}, 求值(大小): (ExpressRelation:[key]:v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:S_△ABC)}

906、topic: 如图所示,在△ABC中,AB=AC,D是BC边上的中点,∠B=30°,求∠BAD和∠ADC的度数.#%#



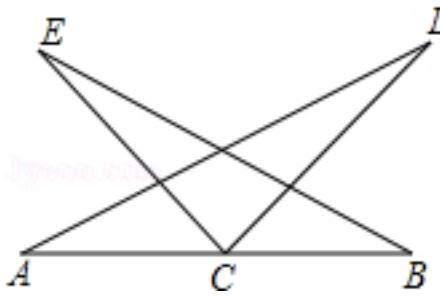
graph:

{"stem": {"pictures": [{"picturename": "3DC34A19E0944A4FA933255B51360E22.jpg", "coordinates": {"A": "-10.00,5.31", "B": "-14.00,3.00", "C": "-6.00,3.00", "D": "-10.00,3.00"}, "collineations": {"0": "A##B", "1": "D##A", "2": "A##C", "3": "C##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP:

TriangleRelation:△ABC, EqualityRelation{AB=AC}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, EqualityRelation{∠B=(1/6*Pi)}, 求角的大小: AngleRelation{angle=∠BAD}, 求角的大小: AngleRelation{angle=∠ADC}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:∠BAD}), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:∠ADC})

907、topic: 如图,C是AB的中点,AD=BE,CD=CE,∠A=40°.求∠B的度数.#%#



graph:

{"stem":{"pictures":[{"picturename":"1000040358_Q_1.jpg","coordinates":{"A": "-9.00,2.00","B": "-5.00,2.00","C": "-7.00,2.00","D": "-4.75,5.57","E": "-9.25,5.57"}, "collineations": {"0": "A###C##B", "1": "A##D", "2": "D##C", "3": "E##C", "4": "E##B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

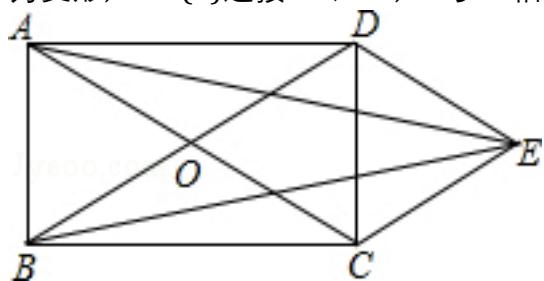
NLP:

MiddlePointOfSegmentRelation{middlePoint=C,segment=AB},EqualityRelation{AD=BE},EqualityRelation{CD=CE},EqualityRelation{ $\angle CAD = (2/9\pi)$ },求角的大小:

AngleRelation{angle= $\angle CBE$ },SolutionConclusionRelation{relation=求值(大小)}:

{ExpressRelation:[key:] $\angle CBE$ }

908、topic: 如图,矩形ABCD的对角线AC、BD相交于点O,DE||AC,CE||BD. #(1)求证:四边形OCED为菱形; #(2)连接AE、BE,AE与BE相等吗? 请说明理由.#%#

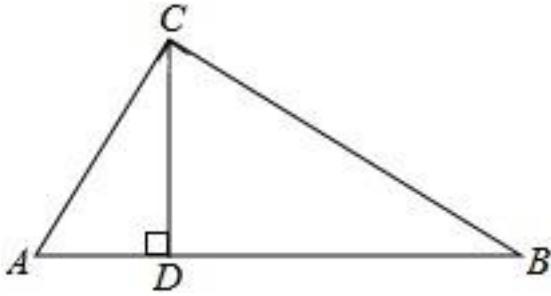


graph:

{"stem":{"pictures":[{"picturename":"1000041069_Q_1.jpg","coordinates":{"A": "-9.00,4.00","B": "-9.00,2.00","C": "-5.00,2.00","D": "-5.00,4.00","E": "-3.00,3.00","O": "-7.00,3.00"}, "collineations": {"0": "A##D", "1": "D##C", "2": "C##B", "3": "A##B", "4": "A##O##C", "5": "D##O##B", "6": "D##E", "7": "A##E", "8": "B##E", "9": "E##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: RectangleRelation{rectangle=Rectangle:ABCD},LineCrossRelation[crossPoint=Optional.of(O), iLine1=AC, iLine2=BD],LineParallelRelation [iLine1=DE, iLine2=AC],LineParallelRelation [iLine1=CE, iLine2=BD],SegmentRelation:AE,SegmentRelation:BE,ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:OCED}],ProveConclusionRelation:[证明: EqualityRelation{AE=BE}]

909、topic: 如图,在 $\triangle ABC$ 中,已知 $\angle ACB=90^\circ$, $AB=10\text{cm}$, $BC=6\text{cm}$, $CD \perp AB$ 于点D. 求:(1)AC的长;(2)CD的长.



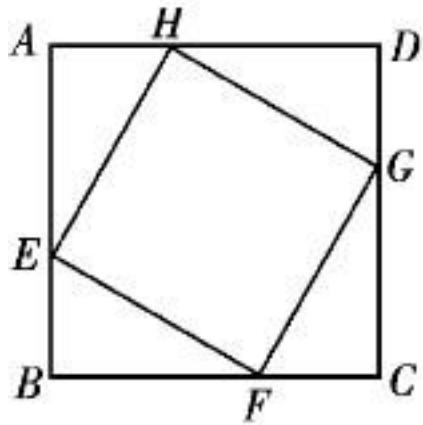
graph:

{"stem":{"pictures":[{"picturename":"1000006703_Q_1.jpg","coordinates":{"A":"5.00,0.00","B":"-5.00,0.00","C":"-1.40,4.80","D":"-1.40,0.00"}, "collineations":{"0":"B##C","1":"B##D##A","2":"D##C","3":"A##C"}, "variable-equals":{},"circles":[]}], "appliedproblems":{},"subsystems":[]}

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation $\{\angle ACB = (1/2\pi)\}$, EqualityRelation $\{AB = 10\}$, EqualityRelation $\{BC = 6\}$, LinePerpRelation $\{line1 = CD, line2 = AB, crossPoint = D\}$, EqualityRelation $\{AC = v_0\}$, 求值(大小):
 (ExpressRelation:[key:]v_0), EqualityRelation $\{CD = v_1\}$, 求值(大小):
 (ExpressRelation:[key:]v_1), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AC), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]CD)}

910、topic: 如图,把一个边长为2的正方形ABCD的各个角去掉,得到的四边形EFGH仍是一个正方形,\$AE = \frac{3}{2}\$.?(1)求正方形EFGH的边长;?(2)求小正方形与原正方形的相似比.



graph:

{"stem":{"pictures":[{"picturename":"1000004667_Q_1.jpg","coordinates":{"A":"0.00,2.00","B":"0.00,0.00","C":"2.00,0.00","D":"2.00,2.00","E":"0.00,0.50","F":"1.50,0.00","G":"2.00,1.50","H":"0.50,2.00"}, "collineations":{"0":"A##H##D","1":"A##E##B","2":"B##F##C","3":"D##G##C","4":"E##H","5":"E##F","6":"G##F","7":"G##H"}, "variable-equals":{},"circles":[]}], "appliedproblems":{},"subsystems":[]}

NLP: EqualityRelation $\{AE = (3/2)\}$, SquareRelation{square=Square:EFGH}, 求值(大小):

(ExpressRelation:[key:]EF), 求值(大小): (ExpressRelation:[key:]FG), 求值(大小):

(ExpressRelation:[key:]GH), 求值(大小):

(ExpressRelation:[key:]EH), SolutionConclusionRelation{relation=求值(大小)}:

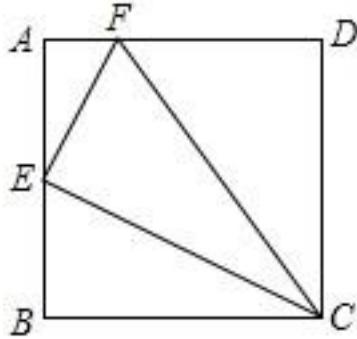
(ExpressRelation:[key:]EF), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]FG), SolutionConclusionRelation{relation=求值(大小)}:

(ExpressRelation:[key:]GH),SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:]EH)}

911、topic: 已知:如图,在正方形\$ABCD\$中,E为AB的中点,F是AD上一点,且\$\{\rm AF\} = \frac{1}{4}\{AD\}\$.说明\$\triangle FEC\$是直角三角形.



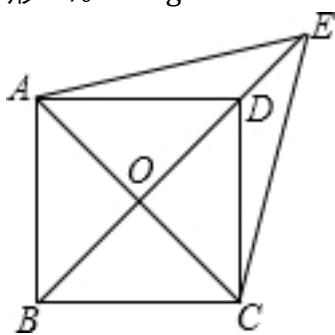
graph:

{ "stem": { "pictures": [{ "picturename": "1000008595_Q_1.jpg", "coordinates": { "A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "0.00,2.00", "F": "1.00,4.00" }, "collineations": { "0": "C##D", "1": "C##E", "2": "C##F", "3": "E##F", "4": "A##F##D", "5": "A##E##B", "6": "B##C" }, "variable-equals": {}, "circles": [] }], "appliedproblems": {}, "substems": [] }

NLP:

SquareRelation{square=Square:ABCD},MiddlePointOfSegmentRelation{middlePoint=E,segment=AB},
PointOnLineRelation{point=F, line=AD, isConstant=false,
extension=false},EqualityRelation{(AF)=(1/4)*AD},ProveConclusionRelation:[证明:
RightTriangleRelation:RightTriangle:\$\triangle FEC\$[Optional.of(E)]]]

912、topic: 如图,已知平行四边形ABCD中,对角线AC、BD交于点O,E是BD延长线上的点,且\$\triangle ACE\$是等边三角形.
#%#(1)求证:四边形ABCD是菱形;
#%#(2)若\$\angle AED=2\angle EAD\$,求证:四边形ABCD是正方形.
#%#



graph:

{ "stem": { "pictures": [{ "picturename": "1000041041_Q_1.jpg", "coordinates": { "A": "0.00,3.00", "B": "0.00,0.00", "C": "3.00,0.00", "D": "3.00,3.00", "E": "4.10,4.10", "O": "1.50,1.50" }, "collineations": { "0": "A##B", "1": "B##C", "2": "C##D", "3": "D##A", "4": "A##O##C", "5": "B##O##D##E", "6": "E##A", "7": "E##C" }, "variable-equals": {}, "circles": [] }], "appliedproblems": {}, "substems": [] }

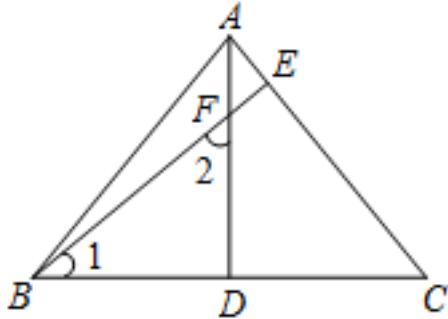
NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD},LineCrossRelation
[crossPoint=Optional.of(O), iLine1=AC, iLine2=BD],PointOnLineRelation{point=E, line=BD,
isConstant=false,
extension=true},RegularTriangleRelation:RegularTriangle:\$\triangle ACE\$,EqualityRelation{\$\angle AED=2*\angle DAE\$},Pr

oveConclusionRelation:[证明:

RhombusRelation{rhombus=Rhombus:ABCD}],ProveConclusionRelation:[证明:

SquareRelation{square=Square:ABCD}]

913、topic: 如图,AD为 $\triangle ABC$ 的高,E为AC上一点,BE交AD于点F,且 $BF=AC, FD=CD$.求证: $BE \perp AC$.#%#

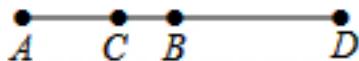


graph:

{"stem": {"pictures": [{"picturename": "1000063712_Q_1.jpg", "coordinates": {"A": "2.28,2.30", "B": "-0.71,-0.69", "C": "4.23,-0.69", "D": "2.28,-0.69", "E": "2.75,1.58", "F": "2.28,1.27"}, "collineations": {"0": "A###F###D", "1": "A###E###C", "2": "B##F##E", "3": "B##D##C", "4": "A##B"}, "variable>equals": {"0": "\u03221=\u0322CBE", "1": "\u03222=\u0322BFD"}, "circles": [], "appliedproblems": {}, "subsystems": []}]}}

NLP: TriangleRelation: $\triangle ABC$,PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false},LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=AD],EqualityRelation{BF=AC},EqualityRelation{DF=CD},LinePerpRelation{line1=AD, line2=BD, crossPoint=D},ProveConclusionRelation:[证明: LinePerpRelation{line1=BE, line2=AC, crossPoint=E}]

914、topic: 如图,已知点C是线段AB上的点,点D是AB延长线上的点,且 $AD:BD=3:2, AB:AC=5:3, AC=3.6$,求AD的长.#%#

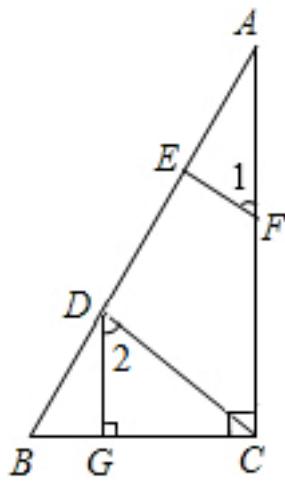


graph:

{"stem": {"pictures": [{"picturename": "4CB1E795805543F588A238EC2D293CAC.jpg", "coordinates": {"A": "-18.00,4.00", "B": "-12.00,4.00", "C": "-14.40,4.00", "D": "0.00,4.00"}, "collineations": {"0": "B##A##C##D"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "subsystems": []}]}}

NLP: EqualityRelation{AD=v_0},PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false},PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true},EqualityRelation{(AD)/(BD)=(3)/(2)},EqualityRelation{(AB)/(AC)=(5)/(3)},EqualityRelation{AC=3.6},求值(大小): (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}

915、topic: 如图,已知 $DG \perp BC, AC \perp BC, EF \perp AB, \angle 1 = \angle 2$,求证: $CD \perp AB$.#%#

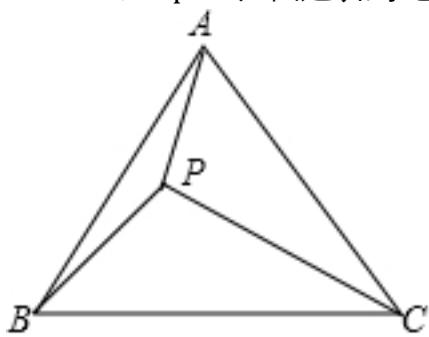


graph:

```
{"stem": {"pictures": [{"picturename": "1000063477_Q_1.jpg", "coordinates": {"A": "5.85,3.07", "B": "3.57,-0.08", "C": "5.85,-0.08", "D": "4.35,1.00", "E": "5.12,2.06", "F": "5.85,1.53", "G": "4.35,-0.08"}, "collineations": {"0": "B###A###E###D", "1": "B###G###C", "2": "F###C###A", "3": "E###F", "4": "C###D", "5": "D###G"}, "variable-equals": {"0": "\u00b21=\u00b2AFE", "1": "\u00b22=\u00b2CDG"}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: LinePerpRelation{line1=DG, line2=BC, crossPoint=G}, LinePerpRelation{line1=AC, line2=BC, crossPoint=C}, LinePerpRelation{line1=EF, line2=AB, crossPoint=E}, EqualityRelation{\u00b2AFE=\u00b2CDG}, ProveConclusionRelation:[证明:
LinePerpRelation{line1=CD, line2=AB, crossPoint=D}]

916、topic: 如图,已知等边三角形ABC内一点P,AP=3,BP=4,CP=5,求\u00b2APB的度数.%#



graph:

```
{"stem": {"pictures": [{"picturename": "1000072298_Q_1.jpg", "coordinates": {"A": "-5.02,9.84", "B": "-9.01,4.39", "C": "-2.29,3.65", "P": "-6.00,7.00"}, "collineations": {"0": "A###B", "1": "B###C", "2": "A###C", "3": "A###P", "4": "B###P", "5": "P###C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: RegularTriangleRelation:RegularTriangle:\u00d7ABC, PositionOfPoint2RegionRelation{point=P, region=EnclosedRegionRelation{name=ABC, closedShape=\u00d7ABC}, position=inner}, EqualityRelation{AP=3}, EqualityRelation{BP=4}, EqualityRelation{CP=5}, 求角的大小: AngleRelation{angle=\u00b2APB}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] \u00b2APB)}

917、topic: 如图1,在\u00d7OAB中,\u00b2OAB=90\u00b0,\u00b2AOB=30\u00b0,OB=8.以OB为边,在\u00d7OAB外作等边\u00d7OBC,D是

OB的中点,连接AD并延长交OC于E.(1)求证:四边形ABCE是平行四边形;(2)如图2,将图1中的四边形ABCO折叠,使点C与点A重合,折痕为FG,求OG的长.

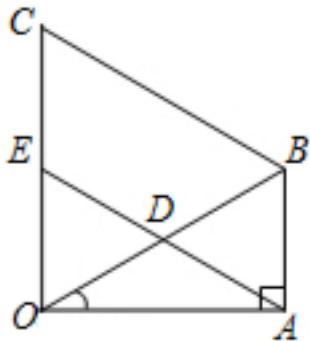


图1

graph:

```
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","picture": [{"picturename":"1000040602_Q_1.jpg","coordinates":{"A":"3.78,0.00","B":"3.78,1.93","C":"0.44,3.86","D":"2.11,0.97","E":"0.44,1.93","O":"0.44,0.00"}, "collineations": {"0":"C###E##O","1":"O##A","2":"A##B","3":"B##C","4":"B##D##O","5":"A##D##E"}, "variable>equals":{}, "circles":[]}], "appliedproblems":{}}, {"substemid":"2","questionrelies":"","picture": [{"picturename":"1000040602_Q_1.jpg","coordinates":{"A":"0.00,-5.85","B":"0.00,-3.56","C":"-3.96,-1.28","O":"-3.96,-5.85","F":"-1.19,2.88","G":"-3.96,-5.28"}, "collineations": {"0":"C##G##O","1":"O##A","2":"A##B","3":"B##F##C","4":"G##F","5":"O##B","6":"G##A","7":"A##F"}, "variable>equals":{}, "circles":[]}], "appliedproblems":{}}]
```

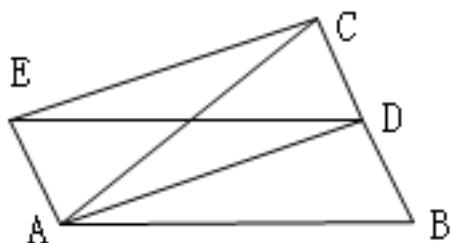
NLP:

TriangleRelation: $\triangle OAB$, EqualityRelation $\{\angle BAO=(1/2*\pi)\}$, EqualityRelation $\{\angle AOD=(1/6*\pi)\}$, EqualityRelation $\{BO=8\}$, TriangleRelation: $\triangle OAB$, RegularTriangleRelation: $\triangle OBC$, MiddlePointOfSegmentRelation $\{middlePoint=D, segment=OB\}$, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AD,

iLine2=OC], EqualityRelation $\{GO=v_0\}$, (ExpressRelation:[key:]2), SymmetricRelation{preData=C, afterData=A, symmetric=StraightLine[FG] analytic:y=k_FG*x+b_FG slope:null b:null isLinearFunction:false, pivot=}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:

ParallelogramRelation{parallelogram=Parallelogram:ABCE}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]GO)}

918、topic: 已知:如图,在 $\triangle ABC$ 中, $AB=AC$, D 为 BC 的中点,四边形 $ABDE$ 是平行四边形.求证:四边形 $ADCE$ 是矩形.



graph:

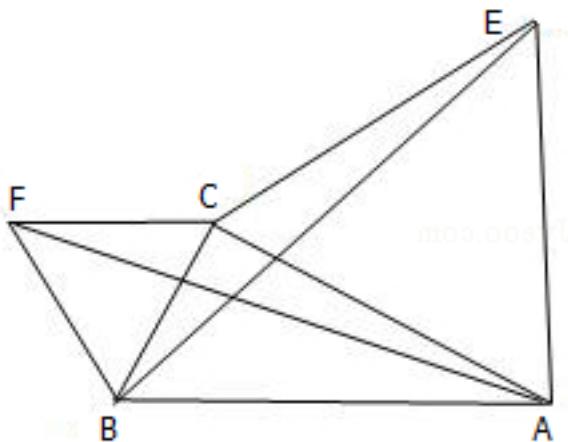
```
{"stem":{"pictures": [{"picturename":"1000050586_Q_1.jpg","coordinates":{"A": "-6.08,4.00","B": "-2.47,"}}
```

4.00", "C": "-4.08,7.00", "D": "-3.28,5.50", "E": "-6.86,5.47"}, "collineations": {"0": "C###D###B", "1": "D##E", "2": "A###B", "3": "A###D", "4": "E###C", "5": "C###A", "6": "A###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]

NLP:

TriangleRelation:△ABC, EqualityRelation{AB=AC}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, ParallelogramRelation{parallelogram=Parallelogram:ABDE}, ProveConclusionRelation:[证明: RectangleRelation{rectangle=Rectangle:ADCE}]

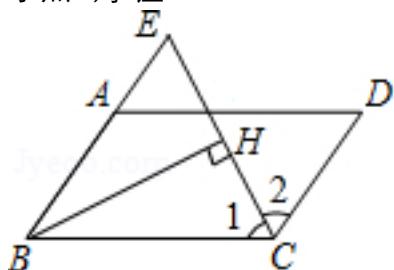
919、topic: 如图,分别以Rt△ABC的直角边AC、BC为边,在Rt△ABC外作两个等边三角形△ACE和△BCF,连结BE、AF.求证:BE=AF.#%#



graph:
{"stem": {"pictures": [{"picturename": "D6383225E8C74FC3853C57FEFC80002D.jpg", "coordinates": {"A": "-6.50,3.00", "B": "-13.00,3.00", "C": "-11.00,6.00", "E": "-6.15,8.40", "F": "-14.60,6.23"}, "collineations": {"0": "B###A", "1": "A###C", "2": "A###E", "3": "A###F", "4": "B###C", "5": "E###B", "6": "F###B", "7": "E###C", "8": "C###F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}

NLP: RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], LineRoleRelation{Segment=AC, roleType=RIGHTLEG}, LineRoleRelation{Segment=BC, roleType=RIGHTLEG}, RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], RegularTriangleRelation:RegularTriangle:△ACE, RegularTriangleRelation:RegularTriangle:△BCF, SegmentRelation:BE, SegmentRelation:AF, ProveConclusionRelation:[证明: EqualityRelation{BE=AF}]

920、topic: (2015·自贡)在平行四边形ABCD中,∠BCD的平分线与BA的延长线相交于点E,BH⊥EC于点H,求证:CH=EH.#%#

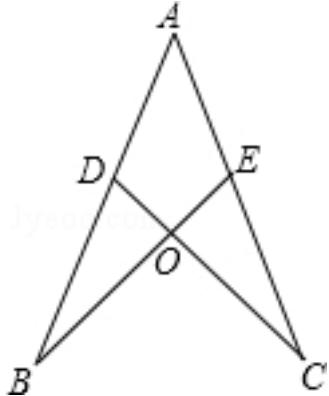


graph:
{"stem": {"pictures": [{"picturename": "1000031857_Q_1.jpg", "coordinates": {"A": "-7.98,4.35", "B": "-9.00,2.00", "C": "-5.00,2.00", "D": "-3.98,4.35", "E": "-7.41,5.67", "H": "-6.20,3.83"}, "collineations": {"0": "E###A#", "1": "A###B", "2": "B###C", "3": "C###D", "4": "D###A", "5": "E###C", "6": "E###B", "7": "B###E", "8": "C###E", "9": "C###D", "10": "D###E"}}, "appliedproblems": {}, "substems": []}]}

```
##B","1":"B###C","2":"C###D","3":"A###D","4":"B###H","5":"E###H###C"},"variable-equals":{"0":"
"∠1=∠ECB","1":"∠2=∠ECD"},"circles":[]],"appliedproblems":{},"substems":[]}
```

NLP: AngleBisectorRelation{line=CH,angle=∠BCD, angle1=∠BCH, angle2=∠DCH}, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LinePerpRelation{line1=BH, line2=EC, crossPoint=H}, ProveConclusionRelation:[证明: EqualityRelation{CH=EH}]

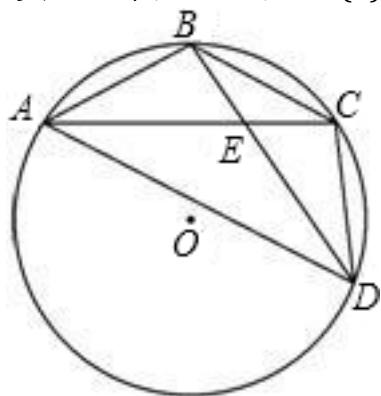
921、topic: 如图,点\$D\$在\$AB\$上,点\$E\$ 在\$AC\$ 上,\$AB=AC\$,\$AD=AE\$.求证:\$\angle B=\angle C\$.



graph:
{"stem": {"pictures": [{"picturename": "1000011145_Q_1.jpg", "coordinates": {"A": "0.00,8.00", "B": "-3.00, 1.00", "C": "3.00,1.00", "D": "-1.18,5.24", "E": "1.18,5.24", "O": "0.00,4.04"}, "collineations": {"0": "B###A###D", "1": "B###E###O", "2": "C###O###D", "3": "C###A###E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, "substems": []}}

NLP: PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, EqualityRelation{AB=AC}, EqualityRelation{AD=AE}, ProveConclusionRelation:[证明: EqualityRelation{∠DBO=∠ECO}]

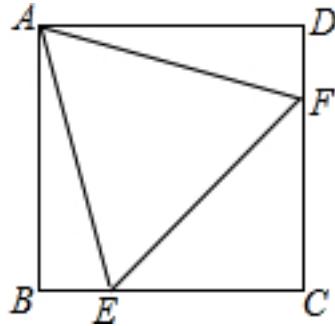
922、topic: 如图,已知A、B、C、D是\$\odot O\$上的四个点,AB=BC,BD交AC于点E,连接CD、AD.#%#(1)求证:DB平分∠ADC;#%#(2)若BE=3,ED=6,求AB的长.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000035146_Q_1.jpg", "coordinates": {"A": "-5.20,0.40", "B": "-2.60, 4.50", "C": "2.60,4.50", "D": "5.20,0.40", "O": "0.00,0.00", "E": "0.00,3.00"}, "collineations": {"0": "B###E###D", "1": "C###A###E", "2": "A###D", "3": "A###B", "4": "B###C", "5": "C###D"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C###D"}]}, "appliedproblems": {}}, "substems": []}}

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[A, B, C, D]}, EqualityRelation{AB=BC}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=BD, iLine2=AC], SegmentRelation:CD, SegmentRelation:AD, EqualityRelation{AB=v_0}, EqualityRelation{BE=3}, EqualityRelation{DE=6}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: AngleBisectorRelation{line=DB, angle= $\angle ADC$, angle1= $\angle ADB$, angle2= $\angle BDC$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)}

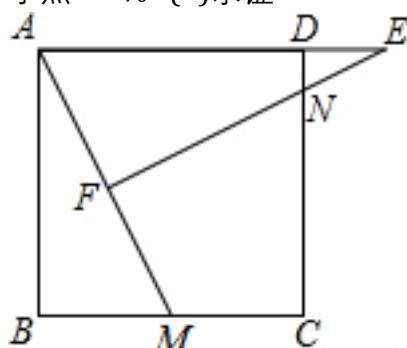
923、topic: 如图,在正方形ABCD中,边长为2的等边三角形AEF的顶点E、F分别在BC和CD上。#%# (1) 求证:CE=CF;#%# (2) 求 $\angle AEB$ 的度数;#%# (3) 求正方形ABCD的面积.#%#



graph:
 {"stem": {"pictures": [{"picturename": "51B99B47A7A54F528D15FBBA4FA623BA.jpg", "coordinates": {"A": "-14.00,6.00", "B": "-14.00,2.14", "C": "-10.14,2.14", "D": "-10.14,6.00", "E": "-12.96,2.14", "F": "-10.14,4.96"}, "collinearities": {"0": "B##A", "1": "A##E", "2": "A##F", "3": "A##D", "4": "B##E##C", "5": "D##F##C", "6": "F##E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false}, 求角的大小:
 AngleRelation{angle= $\angle AEB$ }, SquareRelation{square=Square:ABCD}, EqualityRelation{S_ABCD=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: EqualityRelation{CE=CF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AEB$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_ABCD)}

924、topic: 如图,正方形ABCD中,M为BC上一点,F是AM的中点,EF \perp AM,交AD的延长线于点E,交DC于点N.#%#(1)求证: $\triangle ABM \sim \triangle EFA$;#%#(2)若AB=12,BM=5,求DE的长.#%#

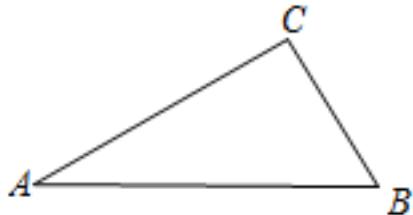


graph:
 {"stem": {"pictures": [{"picturename": "1000081342_Q_1.jpg", "coordinates": {"A": "0.00,12.00", "B": "0.00,0.00", "C": "12.00,0.00", "D": "12.00,12.00", "E": "16.90,12.00", "F": "2.50,6.00", "M": "5.00,0.00", "N": "12.00,9.00"}, "collinearities": {"0": "B##A", "1": "A##M", "2": "M##F", "3": "F##E", "4": "E##D", "5": "D##C", "6": "C##N", "7": "N##E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

.96"}, "collineations": {"0": "A###D###E", "1": "A###F###M", "2": "A###B", "3": "C##N###D", "4": "B##M###C", "5": "E##N###F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}

NLP: SquareRelation{square=Square:ABCD}, PointOnLineRelation{point=M, line=BC, isConstant=false}, MiddlePointOfSegmentRelation{middlePoint=F, segment=AM}, LinePerpRelation{line1=EF, line2=AM, crossPoint=F}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AD], LineCrossRelation [crossPoint=Optional.of(N), iLine1=EF, iLine2=DC], EqualityRelation{DE=v_0}, EqualityRelation{AB=12}, EqualityRelation{BM=5}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA=△ABM, triangleB=△EFA}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DE)}

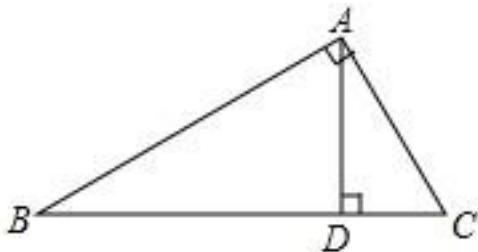
925、topic: 如图,∠A与∠B互为余角,且∠B=2∠A.求∠A、∠B的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000051519_Q_1.jpg", "coordinates": {"A": "-14.50,0.93", "B": "-9.50,0.97", "C": "-10.77,3.12"}, "collineations": {"0": "A##B", "1": "B##C", "2": "A##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: AngleComplementRelation:∠BAC/∠ABC, EqualityRelation{∠ABC=2*∠BAC}, 求角的大小: AngleRelation{angle=∠BAC}, 求角的大小: AngleRelation{angle=∠ABC}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠BAC)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠ABC)}

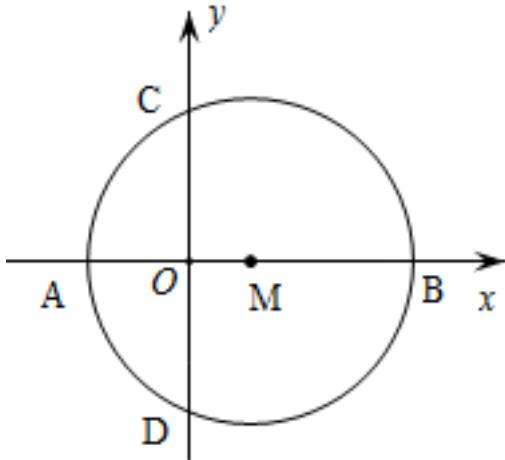
926、topic: 如图,在\$△ABC\$中,已知\$∠BAC=90° \$,\$AD\perp BC\$于点D.试说明:\$\{BC\}^2-\{AC\}^2=\{BD\}^2+\{AD\}^2\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000006713_Q_1.jpg", "coordinates": {"A": "-1.80,2.40", "B": "-5.03,0.00", "C": "0.00,0.00", "D": "-1.800,0.00"}, "collineations": {"0": "B##C##D", "1": "B##A", "2": "A##C", "3": "A##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation:△ABC, EqualityRelation{∠BAC=(1/2*Pi)}, LinePerpRelation{line1=AD, line2=BC, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{(BC)^2-(AC)^2=(BD)^2+(AD)^2}]

927、topic: 如图,圆M的半径是5,圆心M的坐标是(1,0),求圆与坐标轴的交点的坐标.#%#

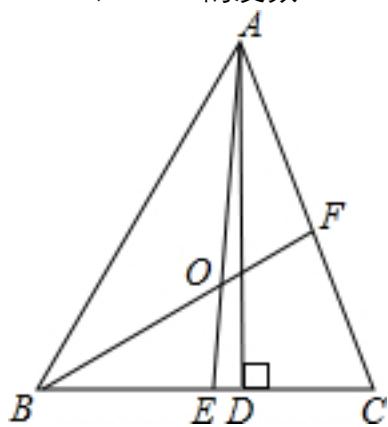


graph:

```
{"stem":{"pictures":[{"picturename":"1000060695_Q_1.jpg","coordinates":{"A":"-4.00,0.00","B":"6.00,0.00","C":"0.00,4.90","D":"0.00,-4.90","O":"0.00,0.00","M":"1.00,0.00"}, "collineations":{"0":"B##M##A##O","1":"C##O##D"}, "variable-equals":{}, "circles":[{"center": "M", "pointincircle": "A##B##C##D"}]}, "appliedproblems":{}}, "substems":[]}
```

NLP: CircleCenterRelation{point=M, conic=Circle[$\odot M$]{center=M, analytic= $(x-x_M)^2+(y-y_M)^2=r_M^2$ }}, RadiusRelation{radius=null, circle=Circle[$\odot M$]{center=M, analytic= $(x-x_M)^2+(y-y_M)^2=r_M^2$ }}, length=Express:[5], PointRelation:M(1,0)

928、topic: 如图,在 $\triangle ABC$ 中,AD是高,AE、BF是角平分线,它们相交于点O, $\angle BAC=50^\circ$, $\angle C=70^\circ$,求 $\angle DAC$ 、 $\angle BOA$ 的度数.#%#



graph:

```
{"stem":{"pictures":[{"picturename":"1000081418_Q_1.jpg","coordinates":{"A":"2.45,4.25","B":"0.00,0.00","C":"4.00,0.00","D":"2.45,0.00","E":"2.08,0.00","F":"3.31,1.91","O":"2.19,1.27"}, "collineations":{"0":"C##F##A","1":"B##O##F","2":"A##O##E","3":"A##D","4":"A##B","5":"B##E##D##C"}, "variable-equals":{}, "circles":{}}, "appliedproblems":{}}, "substems":[]}
```

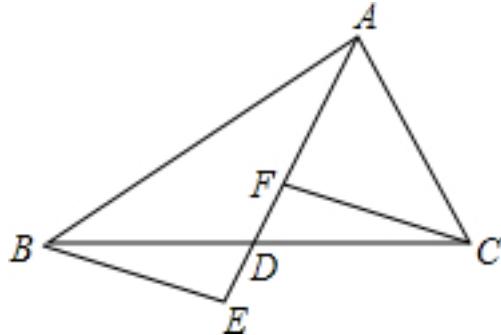
NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle BAF=(5/18\pi)$ }, EqualityRelation{ $\angle DCF=(7/18\pi)$ }, 求角的大小: AngleRelation{angle= $\angle DAF$ }, 求角的大小:

AngleRelation{angle= $\angle AOB$ }, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, AngleBisectorRelation{line=AE, angle= $\angle BAF$, angle1= $\angle EAF$,

angle2= $\angle BAE$ },AngleBisectorRelation{line=BF,angle= $\angle ABE$, angle1= $\angle ABF$,
 angle2= $\angle EBF$ },SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle DAF$),SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:] $\angle AOB$)}

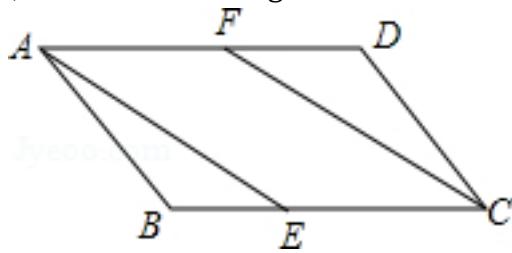
929、topic: 如图,在 $\triangle ABC$ 中,D是BC边的中点,F、E分别是AD及其延长线上的点,CF||BE. #(1)求证: $\triangle BDE \cong \triangle CDF$. #(2)请连接BF、CE,试判断四边形BECF是何种特殊四边形,并说明理由. #



graph:
 {"stem": {"pictures": [{"picturename": "1000084588_Q_1.jpg", "coordinates": {"A": "-0.74,1.03", "B": "-3.62, -1.48", "C": "0.56,-1.43", "D": "-1.53,-1.46", "E": "-1.79,-2.25", "F": "-1.28,-0.66"}, "collineations": {"0": "B##C", "1": "A###F##D##E", "2": "B##A", "3": "C##A", "4": "B##E", "5": "C##F", "6": "B##F", "7": "E##C"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation: $\triangle ABC$,MiddlePointOfSegmentRelation{middlePoint=D,segment=BC},PointOnLineRelation{point=F, line=AD, isConstant=false, extension=false},PointOnLineRelation{point=E, line=AD, isConstant=false, extension=false},LineParallelRelation [iLine1=CF, iLine2=BE],SegmentRelation:BF,SegmentRelation:CE,ProveConclusionRelation:[证明:
 TriangleCongRelation{triangleA= $\triangle BDE$, triangleB= $\triangle CDF$ }],ShapeJudgeConclusionRelation{geoEle=BECF}

930、topic: 如图,在平行四边形ABCD中,点E、F分别在边BC和AD上,且 $BE=DF$.求证: $AE=CF$. #



graph:
 {"stem": {"pictures": [{"picturename": "1000031842_Q_1.jpg", "coordinates": {"A": "-10.00,4.00", "B": "-8.0,2.00", "C": "-4.00,2.00", "D": "-6.00,4.00", "E": "-6.59,2.00", "F": "-7.41,4.00"}, "collineations": {"0": "A##F", "1": "A##B", "2": "C##D", "3": "B##E##C", "4": "A##E", "5": "C##F"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "substems": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD},PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false},PointOnLineRelation{point=F, line=AD, isConstant=false, extension=false},EqualityRelation{BE=DF},ProveConclusionRelation:[证明: EqualityRelation{AE=CF}]

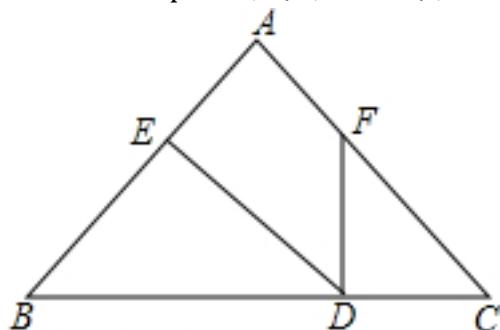
931、topic: 如图,C、D是线段AB上两点,若CB=4cm,DB=7cm,且D是AC的中点,求AC的长度.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000081111_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "7.00,0.00", "C": "3.00,0.00", "D": "0.00,0.00"}, "collineations": {"0": "A###D##C##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AC=v_0},PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false},PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false},EqualityRelation{BC=4},EqualityRelation{BD=7},MiddlePointOfSegmentRelation{middlePoint=D,segment=AC},求值(大小):
 (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]AC)}

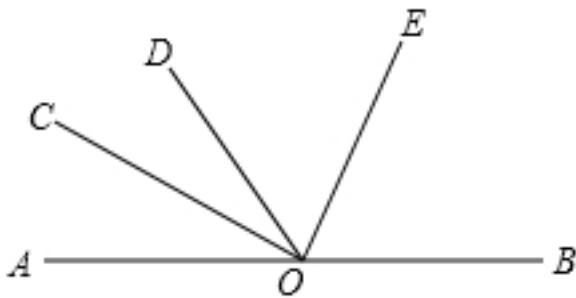
932、topic: 如图, $\triangle ABC$ 中, $\angle B:\angle C=3:4$, $FD \perp BC$, $DE \perp AB$,且 $\angle AFD=146^\circ$,求 $\angle EDF$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000038042_Q_1.jpg", "coordinates": {"A": "-1.47,0.12", "B": "-5.19,-3.23", "C": "0.81,-3.23", "D": "-0.43,-3.23", "E": "-2.56,-0.86", "F": "-0.43,-1.41"}, "collineations": {"0": "A###E##B", "1": "A###F##C", "2": "E##D", "3": "B##C##D", "4": "F##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation: $\triangle ABC$,EqualityRelation{ $(\angle DBE)/(\angle DCF)=(3)/(4)$ },LinePerpRelation{line1=FD, line2=BC, crossPoint=D},LinePerpRelation{line1=DE, line2=AB, crossPoint=E},EqualityRelation{ $\angle AFD=(73/90*\pi)$ },求角的大小:
 AngleRelation{angle= $\angle EDF$ },SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle EDF$)

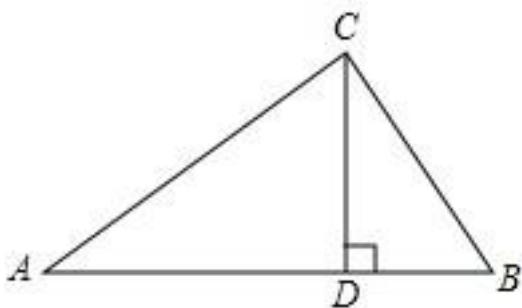
933、topic: 如图,AB为一条直线,OC是 $\angle AOD$ 的平分线,OE在 $\angle BOD$ 内, $\angle DOE=\frac{1}{3}\angle BOD$, $\angle COE=72^\circ$,求 $\angle EOB$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000072560_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.00,0.00", "C": "0.57,1.76", "D": "2.07,2.85", "E": "3.93,2.85", "O": "3.00,0.00"}, "collineations": {"0": "A###O##B", "1": "O##C", "2": "O##D", "3": "O##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: SegmentRelation:AB, AngleBisectorRelation{line=OC, angle= $\angle AOD$, angle1= $\angle AOC$, angle2= $\angle COD$ }, EqualityRelation{ $\angle DOE = (1/3) * \angle BOD$ }, EqualityRelation{ $\angle COE = (2/5 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle BOE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BOE$)}

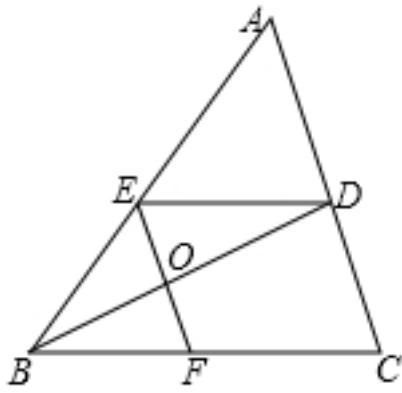
934、topic: 如图,在 $\triangle ABC$ 中, $CD \perp AB$ 于点D,若 $AD=2BD$, $AC=3$, $BC=2$,求 $(BD)^2$ 的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000006983_Q_1.jpg", "coordinates": {"A": "0.00,10.00", "B": "2.89,0.00", "C": "2.31,1.91", "D": "2.31,0.00"}, "collineations": {"0": "B##C", "1": "A##C", "2": "B##A##D", "3": "D##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, EqualityRelation{ $AD=2*BD$ }, EqualityRelation{ $AC=3$ }, EqualityRelation{ $BC=2$ }, 求值(大小): (ExpressRelation:[key:](BD) 2), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](BD) 2)}

935、topic: 已知:如图, $\triangle ABC$ 中, $\angle B$ 的平分线BD交AC于点D,DE $\parallel BC$,交AB于点E,EF $\parallel AC$ 交BC于点F,EF交BD于点O.求证:BE=CF.

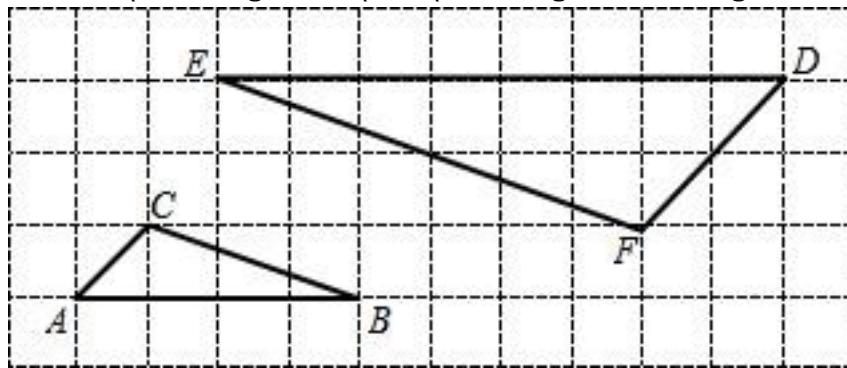


graph:

{"stem": {"pictures": [{"picturename": "1000034194_Q_1.jpg", "coordinates": {"A": "-4.58,6.01", "B": "-7.00, 2.00", "C": "-3.00,2.00", "D": "-3.73,3.85", "E": "-5.88,3.85", "F": "-5.16,2.00", "O": "-5.49,2.85"}, "collineations": {"0": "A###E##B", "1": "B##F##C", "2": "C##D##A", "3": "E##D", "4": "B##O##D", "5": "E##O##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=BD,angle= $\angle B$, angle1= $\angle DBE$, angle2= $\angle DBF$ }, TriangleRelation: $\triangle ABC$, LineCrossRelation [crossPoint=Optional.of(D), iLine1=BD, iLine2=AC], LineParallelRelation [iLine1=DE, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AB], LineParallelRelation [iLine1=EF, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(O), iLine1=EF, iLine2=BD], ProveConclusionRelation:[证明: EqualityRelation{BE=CF}]

936、topic: 如图, 网格图中每个方格都是边长为1的正方形.若\$A\$,\$B\$,\$C\$,\$D\$,\$E\$,\$F\$都是格点, 试说明 $\triangle ABC \sim \triangle DEF$.



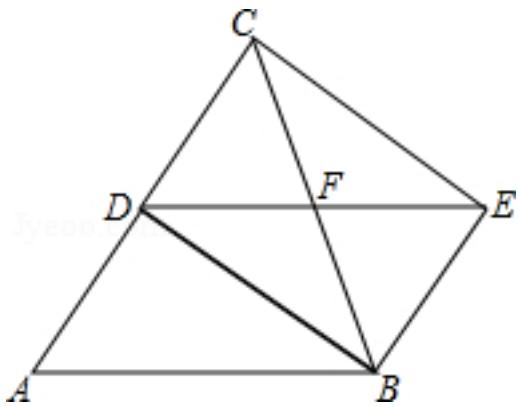
graph:

{"stem": {"pictures": [{"picturename": "1000005836_Q_1.jpg", "coordinates": {"A": "-12.00,5.00", "B": "-8.0,0.500", "C": "-11.00,6.00", "D": "-2.00,8.00", "E": "-10.00,8.00", "F": "-4.00,6.00"}, "collineations": {"0": "B##A", "1": "A##C", "2": "B##C", "3": "D##E", "4": "D##F", "5": "E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

PointRelation:A, PointRelation:B, PointRelation:C, PointRelation:D, PointRelation:E, ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DEF$ }]

937、topic: 如图,在 $\triangle ABC$ 中, $AB=BC$, BD 平分 $\angle ABC$,四边形 $ABED$ 是平行四边形, DE 交 BC 于点 F ,连接 CE .求证:四边形 $BEDF$ 是矩形.#%#

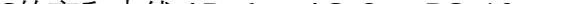


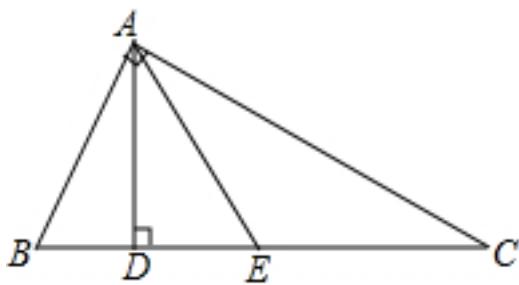
graph:

```
{"stem":{"pictures":[{"picturename":"1000036632_Q_1.jpg","coordinates":{"A":-7.06,2.73,"B":-3.10,2.75,"C":-4.48,6.47,"D":-5.57,4.60,"E":-1.80,4.63,"F":-3.79,4.61}],"collineations":{"0": "A##B","1": "B##E","2": "E###C","3": "B##D","4": "C##D##A","5": "D##F##E","6": "B##F##C"}, "variable-equals":{},"circles":[]}},"appliedproblems":{},"subsystems":[]}]
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=BC$ }, AngleBisectorRelation{line= BD , angle= $\angle ABF$, angle1= $\angle ABD$, angle2= $\angle DBF$ }, ParallelogramRelation{parallelogram=Parallelogram:ABED}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=DE, iLine2=BC], SegmentRelation:CE, ProveConclusionRelation:[证明: RectangleRelation{rectangle=Rectangle:BECD}]]

938、topic: 如图,已知AD,AE分别是 $\triangle ABC$ 的高和中线,AB=6cm,AC=8cm,BC=10cm, $\angle CAB=90^\circ$,试求:(1)AD的长;(2) $\triangle ABE$ 的面积;(3) $\triangle ACE$ 和 $\triangle ABE$ 的周长的差.



graph:

```
{"stem":{"pictures":[{"picturename":"1000038310_Q_1.jpg","coordinates":{"A": "-1.40,4.80","B": "-5.00,0.00","C": "5.00,0.00","D": "-1.40,0.00","E": "0.00,0.00"}],"collineations":{"0": "A###B","1": "B###D##E###C","2": "A###C","3": "A###D","4": "A###E"},"variable>equals":{},"circles":[]},"appliedproblems":{}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "pictures": [], "appliedproblems": {}}]}]
```

NLP:

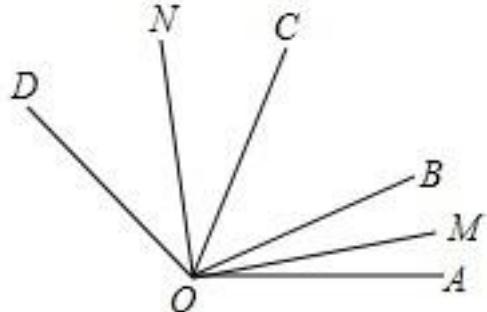
TriangleRelation: $\triangle ABC$, EqualityRelation{AB=6}, EqualityRelation{AC=8}, EqualityRelation{BC=10}, EqualityRelation{ $\angle BAC = (1/2 * \pi)$ }, LinePerpRelation{line1=AD, line2=BD, crossPoint=D}, MidianLineOfTriangleRelation{midianLine=AE, triangle= $\triangle ABC$, top=A, bottom=BC}, EqualityRelation{AD=v_0}, 求值(大小):

(ExpressRelation:[key:v_0],EqualityRelation{S_△ABE=v_1},求值(大小):

(ExpressRelation:[key:]v_1),EqualityRelation{C_△ACE=v_2},EqualityRelation{C_△ABE=v_3},EqualityR

elation{v_2-(v_3)=v_4},求值(大小): (ExpressRelation:[key:]v_4),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_△ABE)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]v_4)}

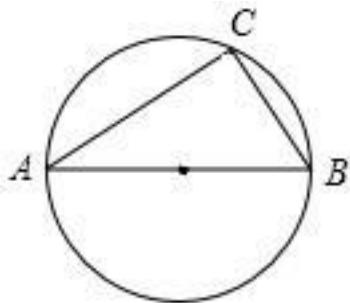
939、topic: 如图,已知 $\angle AOB:\angle BOC:\angle COD = 2:3:4$,射线OM、ON分别平分 $\angle AOB$ 与 $\angle COD$. $\angle MON = 120^\circ$,求 $\angle AOB$ 的度数.



graph:
 {"stem": {"pictures": [{"picturename": "1000006454_Q_1.jpg", "coordinates": {"A": "-0.85, -0.53", "B": "-2.30, 3.37", "C": "-8.04, 5.40", "D": "-13.02, -0.64", "M": "-0.72, 1.74", "O": "-6.93, -0.58", "N": "-11.80, 3.43"}, "collinearations": {"0": "A###O##D", "1": "B##O", "2": "C##O", "3": "M##O", "4": "N##O"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: ProportionsRelation{proportionList=[Proportion{proportionFactor=[Express:[∠AOB], Express:[∠BOC], Express:[∠COD]], value=null}, Proportion{proportionFactor=[Express:[2], Express:[3], Express:[4]], value=null}]}, keyWordList=[=], AngleBisectorRelation{line=OM, angle=∠AOB, angle1=∠AOM, angle2=∠BOM}, AngleBisectorRelation{line=ON, angle=∠COD, angle1=∠CON, angle2=∠DON}, EqualityRelation{∠MON=(2/3*Pi)}, 求角的大小:
 AngleRelation{angle=∠AOB}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠AOB)}

940、topic: 如图,若 $Rt\triangle ABC$ 的三个顶点A、B、C在 $\odot O$ 上,求证: $Rt\triangle ABC$ 斜边AB的中点是 $\odot O$ 的圆心.



graph:
 {"stem": {"pictures": [{"picturename": "1000035800_Q_1.jpg", "coordinates": {"A": "-12.00, 4.05", "B": "-3.97, 4.00", "C": "-6.61, 7.80", "O": "-7.99, 4.02"}, "collinearations": {"0": "A##C", "1": "B##C", "2": "A##O##B"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}]}, "appliedproblems": {}, "substems": []}}

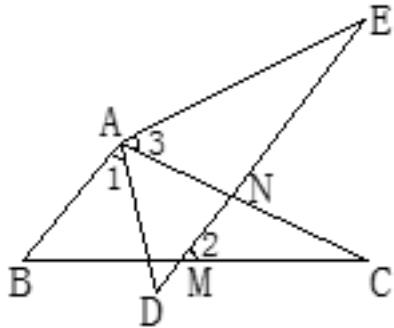
NLP:

```

MiddlePointOfSegmentRelation{middlePoint=Q_0,segment=AB},RightTriangleRelation:RightTriangle:
△ABC[Optional.of(C)],CircleCenterRelation{point=Q_1, conic=Circle[○O]{center=O,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}},PointOnCircleRelation{circle=Circle[○O]{center=O,
analytic=(x-x_0)^2+(y-y_0)^2=r_0^2}, points=[B,
C]},ProveConclusionRelation:[PointCoincidenceRelation{point1=Q_0, point2=Q_1}]

```

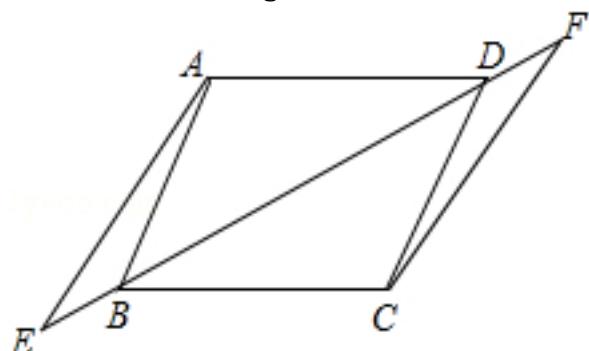
941、topic: 如图,DE分别交BC、AC于M、N两点, $\angle 1=\angle 3=40^\circ$, $AD=AB$, $AC=AE$, $\angle B=60^\circ$, $\angle C=20^\circ$.#%#(1)求 $\angle 2$ 的度数;#%#(2)求 $\angle ENC$ 的度数.#%#



graph:
{"stem": {"pictures": [{"picturename": "1000042045_Q_1.jpg", "coordinates": {"A": "-10.13,5.50", "B": "-11.00,4.00", "C": "-6.00,4.00", "D": "-9.83,3.79", "E": "-6.00,7.01", "M": "-9.58,4.00", "N": "-8.50,4.91"}, "collinearities": {"0": "B##M##C", "1": "A##B", "2": "A##N##C", "3": "A##E", "4": "A##D", "5": "D##M##N##E"}, "variable>equals": {"0": "\u03291=\u0329BAD", "1": "\u03292=\u0329NMC", "2": "\u03293=\u0329EAN"}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: LineCrossRelation [crossPoint=Optional.of(M), iLine1=DE, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(N), iLine1=DE, iLine2=AC], MultiEqualityRelation [multiExpressCompare= $\angle BAD = \angle EAN = (2/9\pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AD=AB}, EqualityRelation{AC=AE}, EqualityRelation{ $\angle ABM = (1/3\pi)$ }, EqualityRelation{ $\angle MCN = (1/9\pi)$ }, 求角的大小: (ExpressRelation:[key:] $\angle CMN$), 求角的大小: AngleRelation{angle= $\angle CNE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CMN$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CNE$)}

942、topic: 如图,已知四边形ABCD是平行四边形,点E、B、D、F在同一直线上,且BE=DF.#%#求证:AE=CF.#%#

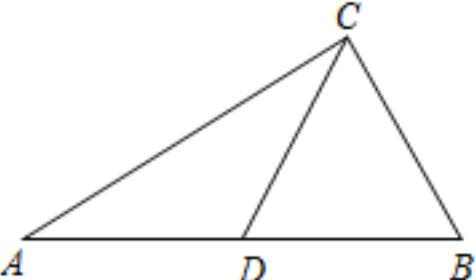


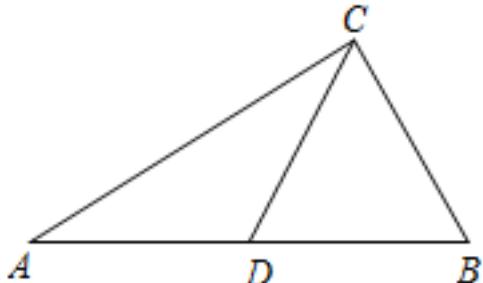
graph:
{"stem": {"pictures": [{"picturename": "1000084521_Q_1.jpg", "coordinates": {"A": "-0.53,3.36", "B": "-1.64,3.36", "C": "1.64,3.36", "D": "0.53,3.36", "E": "-2.13,2.13", "F": "2.13,2.13"}}], "appliedproblems": {}, "subsystems": []}}

0.90","C":"1.03,0.85","D":"2.14,3.31","E":"-2.41,0.41","F":"2.92,3.80"},"collineations":{"0":"A###B","1":"C###B","2":"D###C","3":"D###A","4":"A###E","5":"C###F","6":"E###B###D###F"},"variable-equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}]

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD},PointRelation:E,PointRelation:B,PointRelation:D,EqualityRelation{BE=DF},ProveConclusionRelation:[证明: EqualityRelation{AE=CF}]

943、topic: 如图,在 $\triangle ABC$ 中,CD为边AB上的中线,且 $CD=\frac{1}{2}AB$,求证: $\triangle ABC$ 是直角三角形.

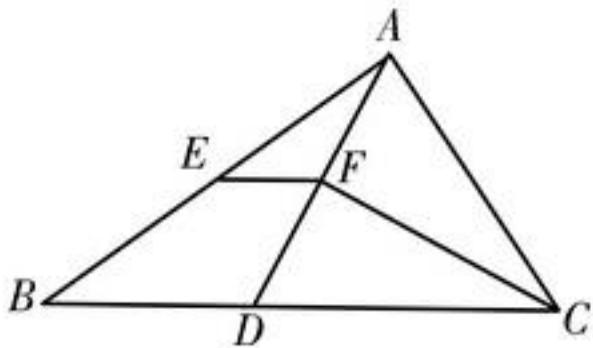


graph:

{"stem": {"pictures": [{"picturename": "1000063666_Q_1.jpg", "coordinates": {"A": "-3.48,-1.97", "B": "1.14,-2.01", "C": "0.00,0.00", "D": "-1.17,-1.99"}, "collineations": {"0": "A###D###B", "1": "D###C", "2": "C###A", "3": "C###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$,LineDecileSegmentRelation [iLine1=CD, iLine2=AB, crossPoint=Optional.of(D)],EqualityRelation{CD=(1/2)*AB},ProveConclusionRelation:[证明: RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)]]

944、topic: 如图,已知 $\triangle ABC$ 中,\$CF\$平分 $\angle ACB$, $CA=CD$, $EF\parallel BD$.求证:\$AE=EB\$.

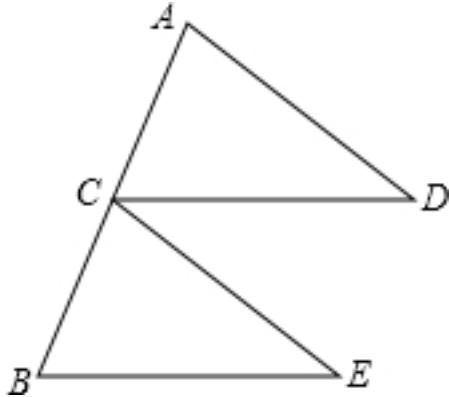


graph:

{"stem": {"pictures": [{"picturename": "1000023379_Q_1.jpg", "coordinates": {"A": "5.00,6.00", "B": "-3.00,0.00", "C": "8.01,0.00", "D": "1.29,0.00", "E": "1.00,3.00", "F": "3.15,3.00"}, "collineations": {"0": "A###E###B", "1": "A###D###F", "2": "F###E", "3": "F###C", "4": "A###C", "5": "C###D###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$,AngleBisectorRelation{line=CF,angle= $\angle ACD$, angle1= $\angle ACF$, angle2= $\angle DCF$ },EqualityRelation{AC=CD},LineParallelRelation [iLine1=EF, iLine2=BD],ProveConclusionRelation:[证明: EqualityRelation{AE=BE}]

945、topic: 如图,点C为AB的中点,CD=BE,CD||BE.求证: $\triangle ACD \cong \triangle CBE$.#%#



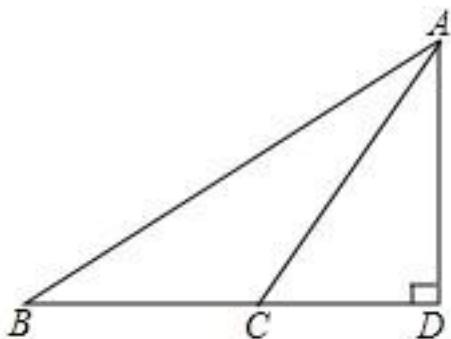
graph:

```
{"stem": {"pictures": [{"picturename": "1000035890_Q_1.jpg", "coordinates": {"A": "-8.00,4.00", "B": "-10.0", "C": "-9.00,2.00", "D": "-6.00,2.00", "E": "-7.00,0.00"}, "collineations": {"0": "B###C###A", "1": "B##", "2": "C###E", "3": "C###D", "4": "A###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

MiddlePointOfSegmentRelation{middlePoint=C,segment=AB},EqualityRelation{CD=BE},LineParallelRelation [iLine1=CD, iLine2=BE],ProveConclusionRelation:[证明:
TriangleCongRelation{triangleA= $\triangle ACD$, triangleB= $\triangle CBE$ }]

946、topic: 如图,在 $\triangle ABD$ 中, $\angle D=90^\circ$,C是BD上一点,已知 $BC=9$, $AB=17$, $AC=10$,求AD的长.



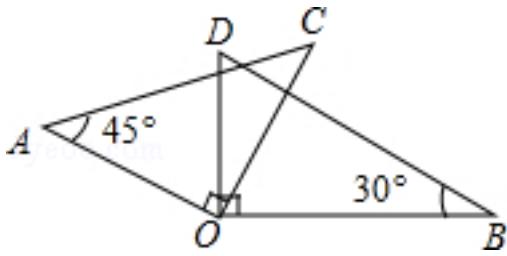
graph:

```
{"stem": {"pictures": [{"picturename": "1000006706_Q_1.jpg", "coordinates": {"A": "6.00,8.00", "B": "-9.00,0.00", "C": "0.00,0.00", "D": "6.00,0.00"}, "collineations": {"0": "B###C###D", "1": "B###A", "2": "A###C", "3": "A###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

EqualityRelation{AD=v_0},TriangleRelation: $\triangle ABD$,EqualityRelation{ $\angle ADC=(1/2*\pi)$ },PointOnLineRelation{point=C, line=BD, isConstant=false, extension=false},EqualityRelation{BC=9},EqualityRelation{AB=17},EqualityRelation{AC=10},求值(大小): (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AD)}

947、topic: 将一副三角板按如图所示方式放置(直角顶点重合),求 $\angle AOB+\angle DOC$ 的度数.#%#

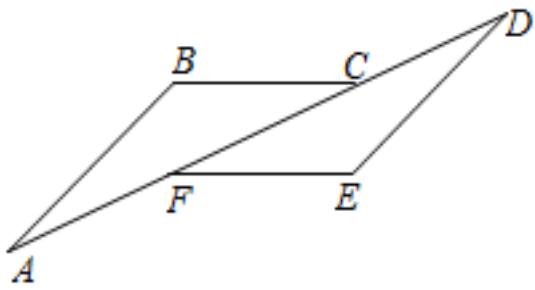


graph:

```
{"stem": {"pictures": [{"picturename": "1000027995.jpg", "coordinates": {"A": "-6.00,3.00", "B": "8.66,0.00", "C": "3.00,6.00", "D": "0.00,5.00", "O": "0.00,0.00"}, "collineations": {"0": "O##A", "1": "O##D", "2": "C##D", "3": "D##B", "4": "O##B", "5": "O##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

NLP:

948、topic: 如图, $\triangle ABC \cong \triangle DEF$, 点A,F,C,D在同一直线上, $\angle ABC = 135^\circ$, $\angle A = 20^\circ$. 求 $\angle DFE$ 和 $\angle E$ 的度数.



graph:

```
{"stem": {"pictures": [{"picturename": "1000063485_Q_1.jpg", "coordinates": {"A": "-1.24,-1.40", "B": "0.29,1.51", "C": "2.83,2.29", "D": "4.45,3.76", "E": "3.19,0.71", "F": "0.58,0.25"}, "collineations": {"0": "F##A##C##D", "1": "D##E", "2": "F##E", "3": "A##B", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}
```

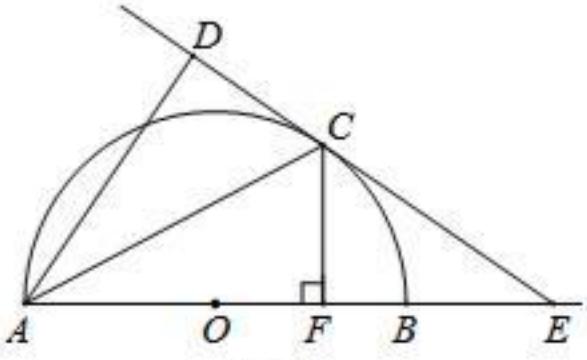
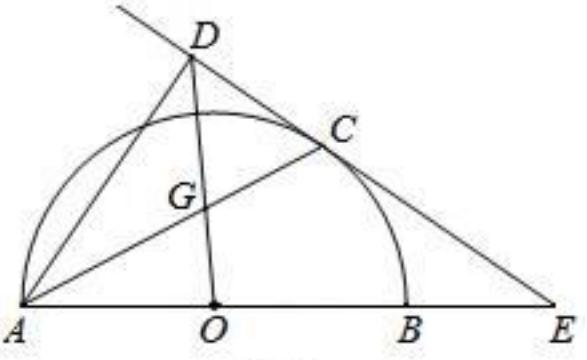
NLP: TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DEF$ }, PointRelation:A, PointRelation:F, PointRelation:C, EqualityRelation{ $\angle ABC = (3/4 * \pi)$ }, EqualityRelation{ $\angle BAF = (1/9 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle CFE$ }, 求角的大小: AngleRelation{angle= $\angle DEF$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CFE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DEF$)}

949、topic: 在平面内正方形ABCD与正方形CEFH如图放置, 连DE,BH,两线交于M. 求证: #%(1) $BH = DE$; #(2) $BH \perp DE$.

graph:

NLP:

```
SquareRelation{square=Square:ABCD}, SquareRelation{square=Square:CEFH}, LineCrossRelation [crossPoint=Optional.of(M), iLine1=DE, iLine2=BH], ProveConclusionRelation:[证明: EqualityRelation{BH=DE}], ProveConclusionRelation:[证明: LinePerpRelation{line1=BH, line2=DE, crossPoint=}]]
```

950、topic: 如图①,AB为半圆的直径,O为圆心,C为圆弧上一点,AD垂直于过C点的直线,AC平分 $\angle DAB$,AB的延长线交直线CD于点E.
(1)求证:DE为 $\odot O$ 的切线;
(2)若AB=8,B为OE的中点,CF $\perp AB$,垂足为点F,求CF的长;
(3)如图②,连接OD交AC于点G,若 $\frac{CG}{GA}=\frac{3}{4}$,求 $\sin \angle E$ 的值.



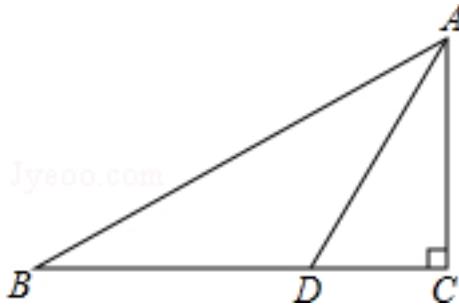
图①

图②

graph:
{"stem": {"pictures": [{"picturename": "1000060682_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "6.00,3.46", "D": "3.00,5.20", "O": "4.00,0.00", "E": "12.00,0.00", "F": "6.00,0.00", "G": "3.60,2.08"}, "collinearations": {"0": "A##O##F##B##E", "1": "D##C##E", "2": "A##G##C", "3": "D##G##O", "4": "A##D", "5": "A##C", "6": "C##F", "7": "D##O"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C"}}], "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, length=null}}, CircleCenterRelation{point=O, conic=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$ }, points=[C]}, LinePerpRelation{line1=CD, line2=AD, crossPoint=D}, AngleBisectorRelation{line=AC, angle= $\angle DAO$, angle1= $\angle CAD$, angle2= $\angle CAO$ }, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AB, iLine2=CD], EqualityRelation{CF=v_1}, EqualityRelation{AB=8}, MiddlePointOfSegmentRelation{middlePoint=B, segment=OE}, LinePerpRelation{line1=CF, line2=AB, crossPoint=F}, 求值(大小): (ExpressRelation:[key:]v_1), LineCrossRelation [crossPoint=Optional.of(G), iLine1=OD, iLine2=AC], EqualityRelation{((CG)/(AG))=(3/4)}, 求值(大小): (ExpressRelation:[key:]sin($\angle BEC$)), ProveConclusionRelation:[证明: LineContactCircleRelation{line=DE, circle=Circle[$\odot O$]{center=0, analytic= $(x-x_0)^2+(y-y_0)^2=r_0^2$, contactPoint=Optional.of(C), outpoint=Optional.absent()}}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CF)}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]sin($\angle BEC$)))}

951、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$, $\angle B=30^\circ$, $AB=4\sqrt{3}$,AD平分 $\angle BAC$,交BC于点D,求AD的长.

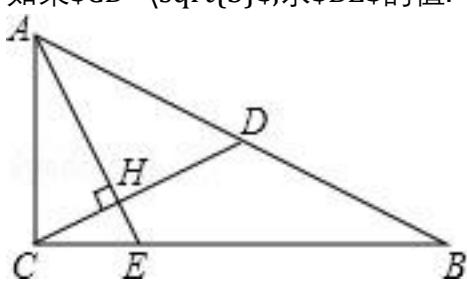
graph:

```
{"stem": {"pictures": [{"picturename": "1000031174_Q_1.jpg", "coordinates": {"A": "-5.97,4.51", "B": "-11.96,1.06", "C": "-5.97,1.05", "D": "-7.97,1.06"}, "collineations": {"0": "B###D###C", "1": "A###B", "2": "A###C", "3": "A###D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

EqualityRelation{AD=v_0}, TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ACD = (1/2 * \pi)$ }, EqualityRelation{ $\angle ABD = (1/6 * \pi)$ }, EqualityRelation{ $AB = 4 * (3^{(1/2)})$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, LineCrossRelation [crossPoint=Optional.of(D), iLine1=AD, iLine2=BC], 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AD)}

952、topic: 如图,已知\$Rt\vartriangle ABC\$中,\$\angle ACB=90^\circ\$,\$CD\$是斜边\$AB\$上的中线,过点A作\$AE\bot CD\$,\$AE\$分别与\$CD\$、\$CB\$相交于点H、E,\$AH=2CH\$. (1)求\$\sin B\$的值; #(2)如果\$CD=\sqrt{5}\$,求\$BE\$的值.



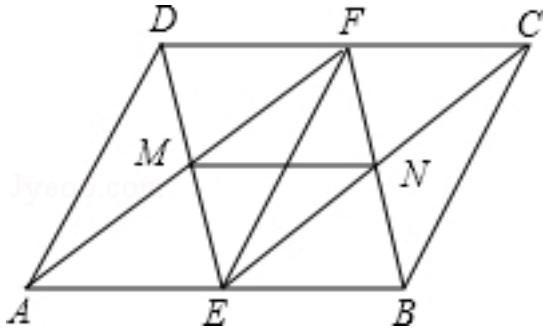
graph:

```
{"stem": {"pictures": [{"picturename": "1000010395_Q_1.jpg", "coordinates": {"A": "0.00,2.00", "B": "4.00,0.00", "C": "0.00,0.00", "D": "2.00,1.00", "E": "1.00,0.00", "H": "0.80,0.40"}, "collineations": {"0": "B###E###C", "1": "H###E##A", "2": "D###H###C", "3": "C##A"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP:

RightTriangleRelation: RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACE = (1/2 * \pi)$ }, LineDecileSegmentRelation [iLine1=CD, iLine2=AB, crossPoint=Optional.absent()], LinePerpRelation{line1=AE, line2=CD, crossPoint=H}, LineCrossRelation [crossPoint=Optional.of(H), iLine1=AE, iLine2=CD], LineCrossRelation [crossPoint=Optional.of(E), iLine1=AE, iLine2=CB], EqualityRelation{AH=2*CH}, 求值(大小): (ExpressRelation:[key:]sin($\angle B$)), EqualityRelation{CD=(5^(1/2))}, 求值(大小): (ExpressRelation:[key:]BE), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]sin($\angle B$)), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BE)}

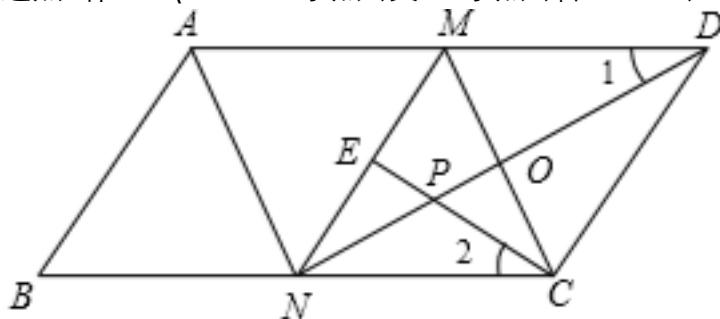
953、topic: 如图,已知在 $\square ABCD$ 中,EF $\parallel BC$,分别交AB、CD于E、F两点,DE、AF交于M,CE、BF交于N.求证:\$MN=\frac{1}{2}AB\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000034240_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-9.0,0.400", "C": "-8.00,7.00", "D": "-12.00,7.00", "E": "-11.00,4.00", "F": "-10.00,7.00", "M": "-11.50,5.50", "N": "-9.50,5.50"}, "collineations": {"0": "A##D", "1": "A##E##B", "2": "B##C", "3": "D##F##C", "4": "D##E##M", "5": "E##N##C", "6": "A##M##F", "7": "F##N##B", "8": "M##N", "9": "E##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD},LineParallelRelation [iLine1=EF, iLine2=BC],LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AB],LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=CD],LineCrossRelation [crossPoint=Optional.of(M), iLine1=DE, iLine2=AF],LineCrossRelation [crossPoint=Optional.of(N), iLine1=CE, iLine2=BF],ProveConclusionRelation:[证明: EqualityRelation{MN=(1/2)*AB}]

954、topic: 如图,在 $\square ABCD$ 中,M、N分别是AD、BC的中点,\$\angle AND=\{90\}^\circ\$, \$MN=\frac{1}{2}AD\$,连接CM交DN于点O.求证:\$\triangle ABN \cong \triangle CDM\$;过点C作\$CE \bot MN\$于点E,交DN于点P,若\$\angle 1=\angle 2\$,求AN的长.

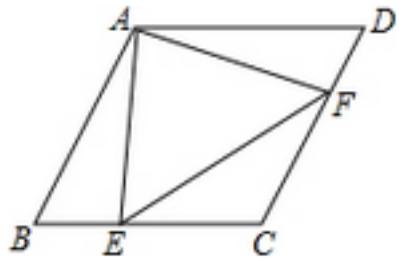


graph:
 {"stem": {"pictures": [{"picturename": "1000040877_Q_1.jpg", "coordinates": {"A": "-4.13,3.57", "B": "-5.61,1.03", "C": "0.29,1.02", "D": "1.77,3.62", "M": "-1.16,3.57", "N": "-2.65,1.03", "O": "-0.46,2.30", "P": "-1.18,1.87"}, "collineations": {"0": "A##B", "1": "B##N##C", "2": "C##D", "3": "D##M##A", "4": "A##N", "5": "N##E##M", "6": "N##P##O##D", "7": "E##P##C", "8": "C##O##M"}, "variable-equals": {"0": "\angle 1 = \angle ADN", "1": "\angle 2 = \angle NCE"}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 ParallelogramRelation{parallelogram=Parallelogram:ABCD},MiddlePointOfSegmentRelation{middlePoint=M,segment=AD},MiddlePointOfSegmentRelation{middlePoint=N,segment=BC},EqualityRelation{\$\angle ANP=((1/2)\pi)\$},EqualityRelation{MN=(1/2)*AD},LineCrossRelation [crossPoint=Optional.of(O), iLine1=CM, iLine2=DN],EqualityRelation{AN=v_0},LinePerpRelation{line1=CE, line2=MN, crossPoint=E},LineCrossRelation [crossPoint=Optional.of(P), iLine1=CE,

iLine2=DN],EqualityRelation{EP=1},EqualityRelation{ $\angle MDO = \angle NCP$ },求值(大小):
 (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABN$, triangleB= $\triangle CDM$ }],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AN)}

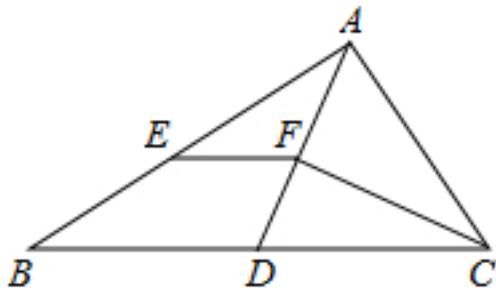
955、topic: 如图,已知菱形ABCD中,E、F分别是CB、CD上的点,且BE=DF.求证: $\angle AEF = \angle AFE$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041806_Q_1.jpg", "coordinates": {"A": "0.49,-0.14", "B": "0.11,-0.87", "C": "0.96,-0.87", "D": "1.35,-0.14", "E": "0.44,-0.87", "F": "1.22,-0.38"}, "collineations": {"0": "E###F", "1": "D###F##C", "2": "A##D", "3": "B##E##C", "4": "A##B", "5": "A##E", "6": "A##F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: RhombusRelation{rhombus=Rhombus:ABCD},PointOnLineRelation{point=E, line=CB, isConstant=false, extension=false},PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false},EqualityRelation{BE=DF},ProveConclusionRelation:[证明:
 EqualityRelation{ $\angle AEF = \angle AFE}$]

956、topic: 如图,在 $\triangle ABC$ 中,\$BC > AC\$,点D在BC上,且 $DC = AC$, $\angle ACB$ 的平分线CF交AD于点F.点E是AB的中点,连接EF.#%#(1)求证:EF||BC;#%#(2)若 $\triangle ABD$ 的面积是6,求四边形BDFE的面积.#%#

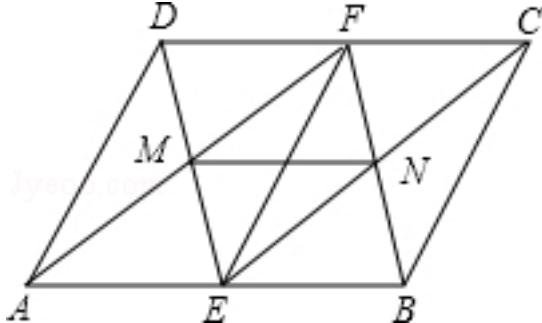


graph:
 {"stem": {"pictures": [{"picturename": "1000041594_Q_1.jpg", "coordinates": {"A": "-4.69,3.88", "B": "-9.00,2.00", "C": "-4.00,2.00", "D": "-6.00,2.00", "E": "-6.84,2.94", "F": "-5.34,2.94"}, "collineations": {"0": "A##E#B", "1": "B##D##C", "2": "A##C", "3": "E##F", "4": "A##F##D", "5": "F##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=CF, angle= $\angle ACD$, angle1= $\angle ACF$, angle2= $\angle DCF$ },TriangleRelation: $\triangle ABC$,InequalityRelation{BC>AC},PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false},EqualityRelation{CD=AC},LineCrossRelation[crossPoint=Optional.of(F), iLine1=CF, iLine2=AD],MiddlePointOfSegmentRelation{middlePoint=E, segment=AB},SegmentRelation:EF,已知条件

QuadrilateralRelation{quadrilateral=BDFE}, EqualityRelation{S_BDFE=v_0}, EqualityRelation{S \triangle ABD=6}, 求值(大小): (ExpressRelation:[key:v_0], ProveConclusionRelation:[证明: LineParallelRelation [iLine1=EF, iLine2=BC]], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:S_BDFE])})

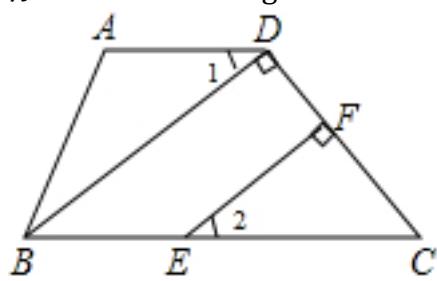
957、topic: 如图,已知在平行四边形ABCD中,EF||BC,分别交AB、CD于E、F两点,DE、AF交于M,CE、BF交于N.求证:\$MN=\frac{1}{2}AB\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000034240_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-9.0,0.400", "C": "-8.00,7.00", "D": "-12.00,7.00", "E": "-11.00,4.00", "F": "-10.00,7.00", "M": "-11.50,5.50", "N": "-9.50,5.50"}, "collineations": {"0": "A##D", "1": "A##E##B", "2": "B##C", "3": "D##F##C", "4": "D##E##M", "5": "E##N##C", "6": "A##M##F", "7": "F##N##B", "8": "M##N", "9": "E##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: ParallelRelation{parallel=BDFE}, LineParallelRelation [iLine1=EF, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=CD], LineCrossRelation [crossPoint=Optional.of(M), iLine1=DE, iLine2=AF], LineCrossRelation [crossPoint=Optional.of(N), iLine1=CE, iLine2=BF], ProveConclusionRelation:[证明: EqualityRelation{MN=(1/2)*AB}]

958、topic: 如图,在四边形ABCD中, $\angle A=104^\circ-\angle 2$, $\angle ABC=76^\circ+\angle 2$, $BD \perp CD$ 于D, $EF \perp CD$ 于F.试说明: $\angle 1=\angle 2$.

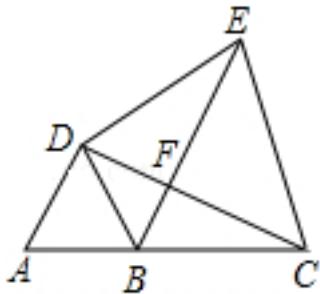


graph:
 {"stem": {"pictures": [{"picturename": "B81D910261C04218AC5D4C41FC801B4C.jpg", "coordinates": {"A": "-13.00,6.00", "B": "-14.00,3.00", "C": "-7.75,3.00", "D": "-10.00,6.00", "E": "-11.13,3.00", "F": "-8.97,4.62"}, "collineations": {"0": "B##A", "1": "A##D", "2": "B##D", "3": "B##E##C", "4": "D##F##C", "5": "F##E"}, "variable-equals": {"0": "\angle 1=\angle ADB", "1": "\angle 2=\angle FEC"}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{ $\angle BAD = (26/45\pi) - \angle CEF$ }, EqualityRelati

on{ $\angle ABE = (19/45\pi) + \angle CEF$ }, LinePerpRelation{line1=BD, line2=CD, crossPoint=D}, LinePerpRelation{line1=EF, line2=CD, crossPoint=F}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle ADB = \angle CEF$ }]

959、topic: 如图,B是AC上的一点, $\triangle ABD$ 和 $\triangle DCE$ 都是等边三角形. #(1)求证: $AC=BE$; #(2)若 $BE \perp DC$,求 $\angle BDC$ 的度数. #



graph:
 {"stem": {"pictures": [{"picturename": "1000027157_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "2.00,0.00", "C": "4.00,0.00", "D": "1.00,1.73", "E": "4.00,3.46", "F": "2.50,0.87"}, "collinearities": {"0": "A###D", "1": "C##A##B", "2": "D##B", "3": "D##C##F", "4": "E##F##B", "5": "D##E", "6": "E##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"questionrelies": "1"}]}}

NLP: PointOnLineRelation{point=B, line=AC, isConstant=false, extension=false}, RegularTriangleRelation:RegularTriangle: $\triangle ABD$, RegularTriangleRelation:RegularTriangle: $\triangle DCE$, LinePerpRelation{line1=BE, line2=DC, crossPoint=F}, 求角的大小: AngleRelation{angle= $\angle BDF$ }, ProveConclusionRelation:[证明: EqualityRelation{AC=BE}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BDF$)}

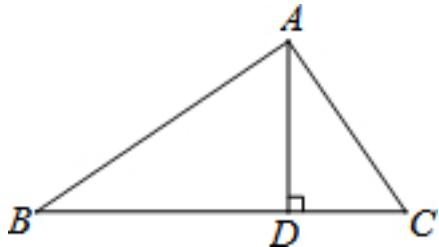
960、topic: 如图,已知线段AB=12cm,点C为AB上的一个动点,点D、E分别是AC、BC的中点. #(1)若点C恰好是AB的中点,求DE的长; #(2)若AC=4cm,求DE的长; #(3)试利用“字母代替数”的方法,说明不论AC取何值(不超过12cm),DE的长不变. #



graph:
 {"stem": {"pictures": [{"picturename": "1000081142_Q_1.jpg", "coordinates": {"A": "0.00,2.00", "B": "12.00,2.00", "C": "4.00,2.00", "D": "2.00,2.00", "E": "8.00,2.00"}, "collinearities": {"0": "A##D##C##E##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AB=12}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, MiddlePointOfSegmentRelation{middlePoint=D, segment=AC}, MiddlePointOfSegmentRelation{middlePoint=E, segment=BC}, EqualityRelation{DE=v_0}, MiddlePointOfSegmentRelation{middlePoint=C, segment=AB}, 求值(大小): (ExpressRelation:[key:]v_0), EqualityRelation{DE=v_1}, EqualityRelation{AC=4}, 求值(大小): (ExpressRelation:[key:]v_1), EqualityRelation{DE=v_2}, (ExpressRelation:[key:]v_2), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DE)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]DE)}

961、topic: 如图,在Rt $\triangle ABC$ 中, $\angle BAC=90^\circ$, $AD \perp BC$ 于点D, $AB=8$, $AC=6$,求AD的长.#%#



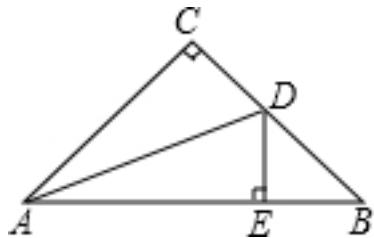
graph:

{"stem": {"pictures": [{"picturename": "1000080214_Q_1.jpg", "coordinates": {"A": "1.20,3.40", "B": "-2.00, 1.00", "C": "3.00,1.00", "D": "1.20,1.00"}, "collineations": {"0": "B###D##C", "1": "A##B", "2": "A##C", "3": "A##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

EqualityRelation{AD=v_0},RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)],EqualityRelation{ $\angle BAC=(1/2*\pi)$ },LinePerpRelation{line1=AD, line2=BC, crossPoint=D},EqualityRelation{AB=8},EqualityRelation{AC=6},求值(大小):
(ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]AD)}

962、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$, $AC=BC$, AD 平分 $\angle CAB$ 交 BC 于点D, $DE \perp AB$ 于点E,且 $AB=6$,则 $\triangle DEB$ 的周长为多少?并请说明理由.#%#



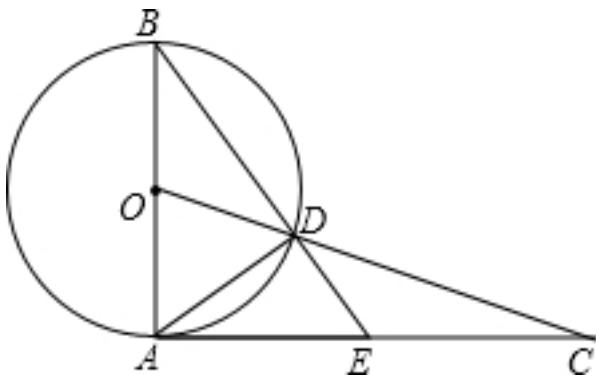
graph:

{"stem": {"pictures": [{"picturename": "1000063527_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "0.00,3.00", "D": "1.24,1.76", "E": "1.24,0.00"}, "collineations": {"0": "A##B##E", "1": "B##D#C", "2": "A##C", "3": "A##D", "4": "E##D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:

EqualityRelation{C_△BDE=v_0},TriangleRelation: $\triangle ABC$,EqualityRelation{ $\angle ACD=(1/2*\pi)$ },EqualityRelation{AC=BC},AngleBisectorRelation{line=AD,angle= $\angle CAE$, angle1= $\angle CAD$, angle2= $\angle DAE$ },LineCrossRelation [crossPoint=Optional.of(D), iLine1=AD, iLine2=BC],LinePerpRelation{line1=DE, line2=AB, crossPoint=E},EqualityRelation{AB=6},求值(大小):
(ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小)}:
(ExpressRelation:[key:]C_△BDE)}

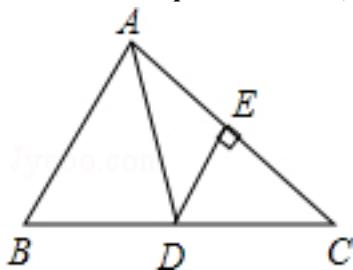
963、topic: 如图,AB是 $\odot O$ 的直径,过点A作 $\odot O$ 的切线并在其上取一点C,连接OC交 $\odot O$ 于点D,BD的延长线交AC于点E,连接AD.(1)求证: $\triangle CDE \sim \triangle CAD$;(2)若 $AB=2\sqrt{2}$, $AC=2\sqrt{2}$,求AE的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060759_Q_1.jpg", "coordinates": {"A": "0.00,-1.00", "B": "0.00,1.00", "C": "2.80,-1.00", "D": "0.94,-0.34", "E": "1.43,-1.00", "O": "0.00,0.00"}, "collineations": {"0": "A###O##B", "1": "A###E###C", "2": "C##D##O", "3": "E##D##B", "4": "A##D"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##D##B"}]}, "appliedproblems": {}, "substems": []}}

NLP: DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LineContactCircleRelation{line=AE, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(A), outpoint=Optional.of(E)}, LineCrossCircleRelation{line=OC, circle= \odot O, crossPoints=[D], crossPointNum=1}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=BD, iLine2=AC], SegmentRelation:AD, EqualityRelation{AE=v_1}, EqualityRelation{AB=2}, EqualityRelation{AC=2*(2^(1/2))}, 求值(大小): (ExpressRelation:[key:v_1], ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA= \triangle CDE, triangleB= \triangle CAD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:AE])}}

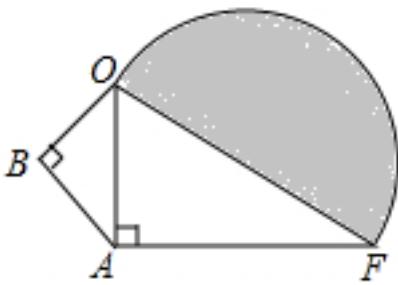
964、topic: 如图,已知DE是AC的垂直平分线,AB=10cm,BC=11cm,求 $\triangle ABD$ 的周长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000037609_Q_1.jpg", "coordinates": {"A": "-7.00,3.00", "B": "-8.39,1.00", "C": "-4.00,1.00", "D": "-6.17,1.00", "E": "-5.50,2.00"}, "collineations": {"0": "B##D##C", "1": "A##E##C", "2": "A##B", "3": "A##D", "4": "D##E"}, "variable-equals": {}, "circles": [], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{C_ \triangle ABD=v_0}, MiddlePerpendicularRelation [iLine1=DE, iLine2=AC, crossPoint=Optional.of(E)], EqualityRelation{AB=10}, EqualityRelation{BC=11}, 求值(大小): (ExpressRelation:[key:v_0], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:C_ \triangle ABD])})

965、topic: 如图,已知 $\angle B=\angle OAF=90^\circ$,BO=3cm,AB=4cm,AF=12cm,求图中半圆的面积.#%#

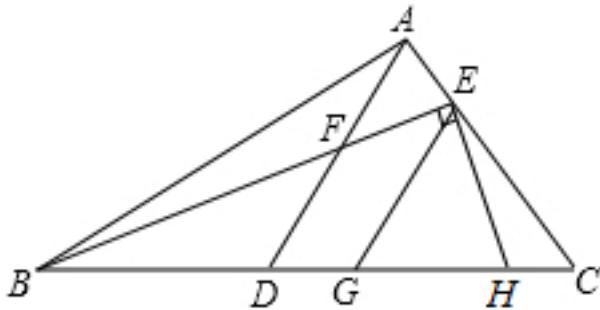


graph:

{"stem": {"pictures": [{"picturename": "1000062296_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "-2.43, 3.17", "O": "0.00,5.00", "F": "12.00,0.00"}, "collineations": {"0": "O##B", "1": "A##B", "2": "A##F", "3": "O##F", "4": "O##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{S_O_0=v_1}, MultiEqualityRelation
 [multiExpressCompare= $\angle ABO = \angle FAO = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BO=3}, EqualityRelation{AB=4}, EqualityRelation{AF=12}, 求值(大小): (ExpressRelation:[key]:v_1), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]:S_O_0)}

966、topic: 如图,在 $\triangle ABC$ 中,点D在BC上,点E在AC上,AD交BE于F.已知 $EG \parallel AD$ 交BC于G, $EH \perp BE$ 交BC于H, $\angle HEG=50^\circ$ (1)求 $\angle BFD$ 的度数;(2)若 $\angle BAD=\angle EBC$, $\angle C=42^\circ$,求 $\angle BAC$ 的度数.



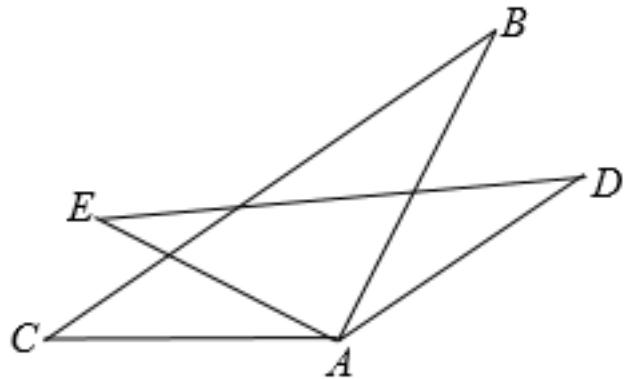
graph:

{"stem": {"pictures": [{"picturename": "E5298FABEB71425FBABB95397088A58A.jpg", "coordinates": {"C": "-7.00,3.00", "B": "-14.00,3.00", "A": "-10.38,6.04", "D": "-11.85,3.00", "E": "-9.33,5.10", "F": "-11.25,4.23", "G": "-10.34,3.00", "H": "-8.39,3.00"}, "collineations": {"0": "B##G##H##D##C", "1": "C##E##A", "2": "E##F##B", "3": "B##A", "4": "A##F##D", "5": "G##E", "6": "E##H"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": []}]}}

NLP: TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AD, iLine2=BE], LineParallelRelation [iLine1=EG, iLine2=AD], LineCrossRelation [crossPoint=Optional.of(G), iLine1=EG, iLine2=BC], LinePerpRelation{line1=EH, line2=BE, crossPoint=E}, LineCrossRelation [crossPoint=Optional.of(H), iLine1=EH, iLine2=BC], EqualityRelation{ $\angle GEH = (5/18 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle BFD$ }, EqualityRelation{ $\angle BAF = \angle DBF$ }, EqualityRelation{ $\angle ECH = (7/30 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle BAE$ }, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key]: $\angle BFD$), SolutionConclusionRelation{relation=求值(大小)}:

{ExpressRelation:[key:] \angle BAE)}

967、topic: 如图, $\angle CAE = \angle BAD$, $\angle B = \angle D$, $AC = AE$,求证: $BC = DE$.#%#

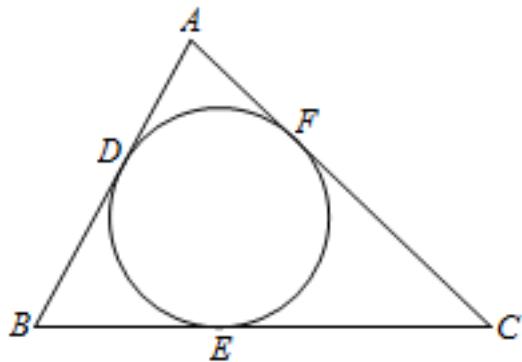


graph:
 {"stem": {"pictures": [{"picturename": "E60EA7ED7FB3422497B548261A02EBAF.jpg", "coordinates": {"A": "-9.00,3.00", "B": "-7.90,7.10", "C": "-13.46,2.73", "D": "-6.00,6.00", "E": "-13.00,5.00"}, "collineations": {"0": "B###A", "1": "C###A", "2": "D##A", "3": "E###A", "4": "D##E", "5": "C##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

EqualityRelation{ $\angle CAE = \angle BAD$ }, EqualityRelation{ $\angle ABC = \angle ADE$ }, EqualityRelation{ $AC = AE$ }, ProveConclusionRelation:[证明: EqualityRelation{ $BC = DE$ }]

968、topic: 如图,已知 $\odot O$ 与 $\triangle ABC$ 的各边分别切于点D、E、F,且 $AB=7$, $BC=5$, $AC=8$,求 AD 、 BE 、 CF 的长.#%#



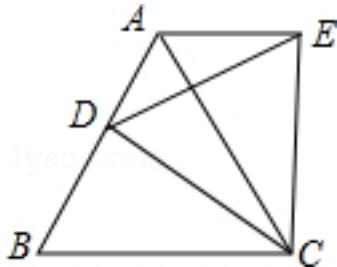
graph:
 {"stem": {"pictures": [{"picturename": "1000060822_Q_1.jpg", "coordinates": {"A": "-1.00,6.93", "B": "-2.00,0.00", "C": "3.00,0.00", "D": "-1.71,1.98", "E": "0.00,0.00", "F": "1.50,2.60", "O": "0.00,1.73"}, "collineations": {"0": "B###A##D", "1": "B##C##E", "2": "A##F##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "E##F##D"}]}, "appliedproblems": {}, "substems": []}}

NLP:

PointRelation:E, PointRelation:F, EqualityRelation{ $AB=7$ }, EqualityRelation{ $BC=5$ }, EqualityRelation{ $AC=8$ }, 求值(大小): (ExpressRelation:[key:]AD), 求值(大小): (ExpressRelation:[key:]BE), 求值(大小): (ExpressRelation:[key:]CF), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BE)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]CF)}

{ExpressRelation:[key:]CF}

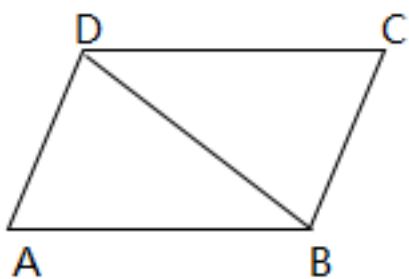
969、topic: 如图所示,等边 $\triangle ABC$ 中,D是AB边上的动点(不与A、B重合),以CD为一边,向上作等边 $\triangle EDC$,连接AE.
(1)求证: $AE \parallel BC$.
(2)图中是否存在旋转关系的三角形?若有,请说出其旋转中心与旋转角;若没有,请说明理由.



graph:
{ "stem":{ "pictures": [{ "picturename": "1000031525_Q_1.jpg", "coordinates": { "A": "-8.50,2.60", "B": "-10.0,0.00", "C": "-7.00,0.00", "D": "-9.14,1.50", "E": "-6.77,2.60" }, "collineations": { "0": "A##B##D", "1": "A##C", "2": "B##C", "3": "D##E", "4": "D##C", "5": "E##C", "6": "A##E" }, "variable>equals": {}, "circles": [] }, "appliedproblems": {}, "substems": [] } }

NLP:
PointRelation:A,PointRelation:B,RegularTriangleRelation:RegularTriangle: $\triangle ABC$,PointOnLineRelation
{point=D, line=AB, isConstant=false,
extension=false},SegmentRelation:CD,SegmentRelation:AE,ProveConclusionRelation:[证明:
LineParallelRelation [iLine1=AE, iLine2=BC]]

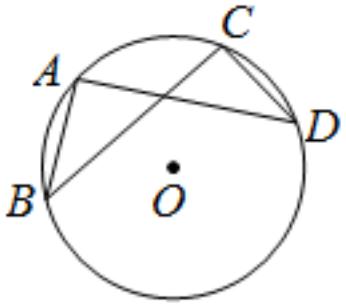
970、topic: 如图,在四边形ABCD中,AB=CD,AD=CB,,请证明 $\angle A=\angle C$.



graph:
{ "stem":{ "pictures": [{ "picturename": "EA54A17FB3CD4DBBA07F4468DFC5F7A9.jpg", "coordinates": { "A": "-14.00,3.00", "B": "-10.00,3.00", "C": "-9.00,6.00", "D": "-13.00,6.00" }, "collineations": { "0": "B##A", "1": "D##A", "2": "B##C", "3": "C##D", "4": "D##B" }, "variable>equals": {}, "circles": [] }, "appliedproblems": {}, "substems": [] } }

NLP: 已知条件
QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{AB=CD},EqualityRelation{AD=BC},Prove ConclusionRelation:[证明: EqualityRelation{ $\angle BAD = \angle BCD$ }]

971、topic: 如图,在 $\odot O$ 中,AB=CD,求证 $AD=BC$.

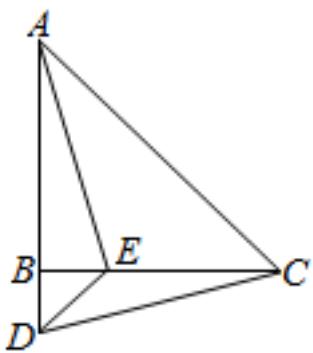


graph:

```
{"stem": {"pictures": [{"picturename": "1000060705_Q_1.jpg", "coordinates": {"A": "-2.99,2.66", "B": "-4.00,0.00", "C": "2.99,2.66", "D": "4.00,0.00", "O": "0.00,0.00", "F": "0.00,1.52"}, "collineations": {"0": "B###C##F", "1": "D###A##F", "2": "A##B", "3": "C##D"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, "appliedproblems": {}, "substems": []}}
```

NLP: CircleRelation{circle=Circle[\odot O]{center=0, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, EqualityRelation{AB=CD}, ProveConclusionRelation:[证明: EqualityRelation{AD=BC}]

972、topic: 如图,在 $\triangle ABC$ 中, $AB=CB$, $\angle ABC=90^\circ$, D 为 AB 延长线上一点,点 E 在 BC 边上,且 $BE=BD$,连接 AE 、 DE 、 DC .#%#(1)求证: $\triangle ABE \cong \triangle CBD$;(2)若 $\angle CAE=30^\circ$,求 $\angle BDC$ 的度数.#%#



graph:

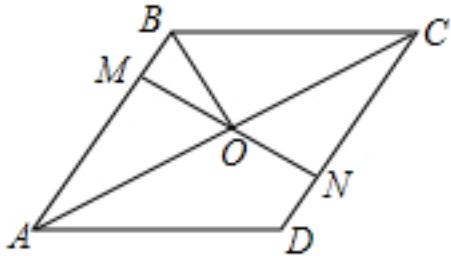
```
{"stem": {"pictures": [{"picturename": "EC4398B45BF1485686DF8F1CD632D3D0.jpg", "coordinates": {"A": "-14.00,7.00", "B": "-14.00,3.00", "C": "-10.00,3.00", "D": "-14.00,1.93", "E": "-12.93,3.00"}, "collineations": {"0": "B##D##A", "1": "D##A", "2": "C##A", "3": "B##E##C", "4": "C##D", "5": "D##E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}
```

NLP:

TriangleRelation: $\triangle ABC$, EqualityRelation{AB=BC}, EqualityRelation{ $\angle ABE=(1/2*\pi)$ }, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{BE=BD}, SegmentRelation:AE, SegmentRelation:DE, SegmentRelation:DC, EqualityRelation{ $\angle CAE=(1/6*\pi)$ }, 求角的大小: AngleRelation{angle= $\angle BDC$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABE$, triangleB= $\triangle CBD$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BDC$)}

973、topic: 如图,在菱形ABCD中,点M、N分别在AB、CD上,且AM=CN,MN与AC交于点O,连接

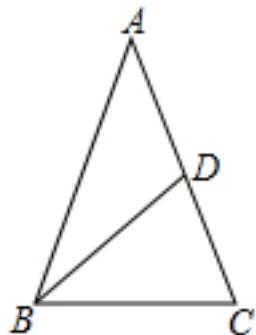
BO.%(1)求证: $\triangle AMO \cong \triangle CNO$;(2)若 $\angle DAC=28^\circ$,则 $\angle OBC$ 的度数.



graph:
{"stem": {"pictures": [{"picturename": "1000034567_Q_1.jpg", "coordinates": {"A": "-3.10,1.53", "B": "-0.92,4.77", "C": "2.81,4.77", "D": "0.64,1.53", "M": "-1.42,4.02", "N": "1.14,2.28", "O": "-0.14,3.15"}, "collineations": {"0": "B###M##A", "1": "A###O##C", "2": "A###D", "3": "D##N##C", "4": "N##O##M", "5": "B##C", "6": "B##O"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [], "appliedproblems": {}}]}]

NLP: RhombusRelation{rhombus=Rhombus:ABCD}, PointOnLineRelation{point=M, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=N, line=CD, isConstant=false, extension=false}, EqualityRelation{AM=CN}, LineCrossRelation [crossPoint=Optional.of(O), iLine1=MN, iLine2=AC], SegmentRelation:BO, EqualityRelation{ $\angle DAO = (7/45\pi)$ }, 求角的大小: AngleRelation{angle= $\angle CBO$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle AMO$, triangleB= $\triangle CNO$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle CBO$)}

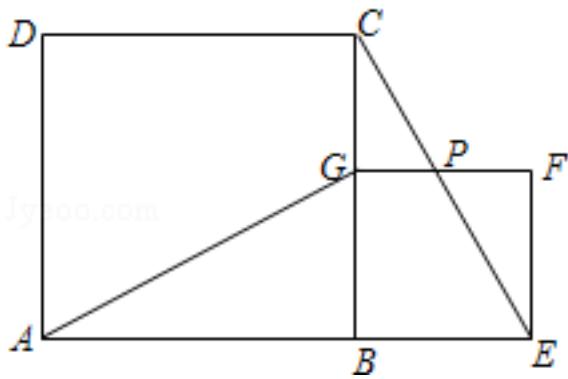
974、topic: 在等腰 $\triangle ABC$ 中,已知 $AB=AC$,中线BD把这个三角形的周长分成15cm和18cm两部分,求底边BC的长.



graph:
{"stem": {"pictures": [{"picturename": "1000032720_Q_1.jpg", "coordinates": {"A": "1.50,3.71", "B": "0.00,0.00", "C": "3.00,0.00", "D": "2.25,1.85"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C##D##A", "3": "B##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []]}

NLP:
EqualityRelation{BC=v_0}, IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{AB=AC}

975、topic: 如图,已知B是线段AE上一点,四边形ABCD和四边形BEFG都是正方形,连接AG、CE.%(1)求证:AG=CE;%(2)设CE与GF的交点为P,求证: $\frac{PG}{CG}=\frac{PE}{AG}$.

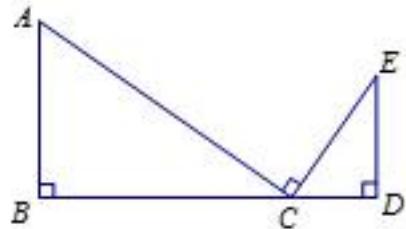


graph:

{"stem": {"pictures": [{"picturename": "1000035317_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "3.00,0.00", "C": "3.00,3.00", "D": "0.00,3.00", "E": "4.67,0.00", "F": "4.67,1.67", "G": "3.00,1.67", "P": "3.74,1.67"}, "collinearations": {"0": "A###B##E", "1": "B##G##C", "2": "C##D", "3": "D##A", "4": "A##G", "5": "E##F", "6": "F##P##G"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: PointOnLineRelation{point=B, line=AE, isConstant=false, extension=false}, SquareRelation{square=Square:ABCD}, SquareRelation{square=Square:BEFG}, SegmentRelation:AG, SegmentRelation:CE, LineCrossRelation [crossPoint=Optional.of(P), iLine1=CE, iLine2=GF], ProveConclusionRelation:[证明: EqualityRelation{AG=CE}], ProveConclusionRelation:[证明: EqualityRelation{((GP)/(CG))=((EP)/(AG))}]

976、topic: 如图,\$C\$为线段\$BD\$上一点,\$AC\bot CE\$,\$AB\perp BD\$,\$ED\perp BD\$.求证:
 $\frac{AB}{CD}=\frac{BC}{DE}$.

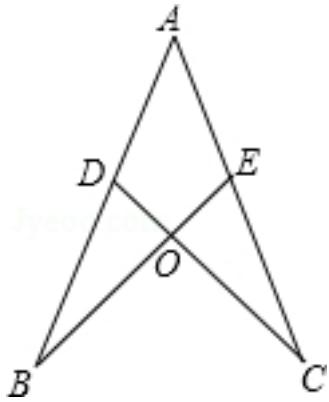


graph:

{"stem": {"pictures": [{"picturename": "1000010782_Q_1.jpg", "coordinates": {"A": "0.00,5.00", "B": "0.00,0.00", "C": "8.00,0.00", "D": "10.50,0.00", "E": "10.50,4.00"}, "collinearations": {"0": "B##C##D", "1": "D##E", "2": "E##C", "3": "A##C", "4": "A##B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: PointOnLineRelation{point=C, line=BD, isConstant=false, extension=false}, LinePerpRelation{line1=AC, line2=CE, crossPoint=C}, LinePerpRelation{line1=AB, line2=BD, crossPoint=B}, LinePerpRelation{line1=ED, line2=BD, crossPoint=D}, ProveConclusionRelation:[证明: EqualityRelation{((AB)/(CD))=((BC)/(DE))}]

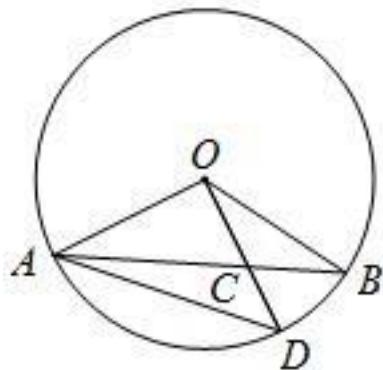
977、topic: 如图,点D在AB上,点E在AC上,AB=AC,AD=AE.求证 $\angle B=\angle C$.



graph:
{"stem": {"pictures": [{"picturename": "1000033321_Q_1.jpg", "coordinates": {"A": "6.2,-1.3", "B": "1.1,-13.4", "C": "11.1,-13.4", "D": "4.0,-6.5", "E": "8.4,-6.5", "O": "6.1,-8.6"}, "collineations": {"0": "A###D##B", "1": "B###O###E", "2": "C##O##D", "3": "A##E##C"}, "variable-equals": {"0": "\u0329ABE=\u0329ACD"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: PointOnLineRelation{point=D, line=AB, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=AC, isConstant=false, extension=false}, EqualityRelation{AB=AC}, EqualityRelation{AD=AE}, ProveConclusionRelation:[证明: EqualityRelation{\u0329DBO=\u0329ECO}]

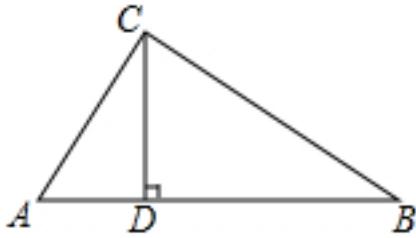
978、topic: 如图,在 $\odot O$ 中, $\angle AOB=120^\circ$, $OD \perp OA$ 于O,交AB于C,交 $\odot O$ 于D.试证明: $AD^2 = AC \cdot AB$



graph:
{"stem": {"pictures": [{"picturename": "1000008175_Q_1.jpg", "coordinates": {"A": "-5.20,-3.00", "B": "5.20,-3.00", "C": "1.73,-3.00", "D": "3.00,-5.20", "O": "0.00,0.00"}, "collineations": {"0": "O##A", "1": "O##B", "2": "O##D##C", "3": "D##A", "4": "A##B", "5": "B##D"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##D"}]}, "appliedproblems": {}, "substems": []}}

NLP: CircleRelation{circle=Circle[\odot O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, EqualityRelation{\u0329AOB=(2/3*\pi)}, LinePerpRelation{line1=OD, line2=OA, crossPoint=O}, LineCrossRelation [crossPoint=Optional.of(C), iLine1=OD, iLine2=AB], LineCrossCircleRelation{line=OD, circle=\odot O, crossPoints=[D], crossPointNum=1}, ProveConclusionRelation:[证明: EqualityRelation{(AD)^2=AC*AB}]

979、topic: 如图,在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=5$, $BC=12$,CD是斜边AB的高,求AD的长.



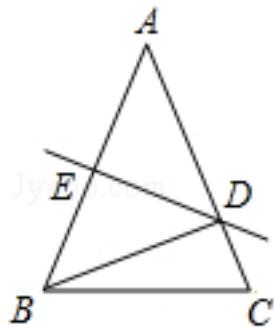
graph:

```
{"stem": {"pictures": [{"picturename": "1000082196_Q_1.jpg", "coordinates": {"A": "-2.60,0.00", "B": "0.00,0.00", "C": "-2.21,0.92", "D": "-2.21,0.00"}, "collineations": {"0": "A###D##B", "1": "A##C", "2": "B##C", "3": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP:

EqualityRelation{AD=v_0}, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{n $\angle ACB=(1/2*\pi)$ }, EqualityRelation{AC=5}, EqualityRelation{BC=12}, LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, 求值(大小): (ExpressRelation:[key:]v_0), LinePerpRelation{line1=CD, line2=AD, crossPoint=D}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AD)}

980、topic: 如图所示,在 $\triangle ABC$ 中,DE是边AB的垂直平分线,交AB于E,交AC于D,连接BD.%(1)若 $\angle ABC=\angle C$, $\angle A=50^\circ$,求 $\angle DBC$ 的度数.%(2)若 $AB=AC$,且 $\triangle BCD$ 的周长为18cm, $\triangle ABC$ 的周长为30cm,求BE的长.%



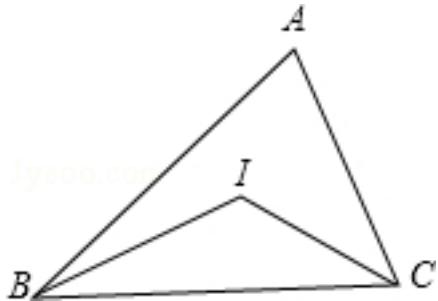
graph:

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{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000030973_Q_1.jpg", "coordinates": {"A": "-10.00,6.00", "B": "-12.00,3.00", "C": "-8.99,2.53", "D": "-9.21,3.31", "E": "-11.00,4.50"}, "collineations": {"0": "A###D##C", "1": "A##E##B", "2": "E##D", "3": "B##D", "4": "B##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000030973_Q_1.jpg", "coordinates": {"A": "-12.00,7.00", "B": "-12.81,6.11", "C": "-11.84,5.84", "D": "-11.87,6.08", "E": "-12.40,6.56"}, "collineations": {"0": "A###D##C", "1": "A##E##B", "2": "E##D", "3": "B##C", "4": "D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}]
```

NLP: TriangleRelation: $\triangle ABC$, MiddlePerpendicularRelation [iLine1=DE, iLine2=AB, crossPoint=Optional.of(E)], LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(D), iLine1=DE, iLine2=AC], SegmentRelation:BD, EqualityRelation{ $\angle CBE=\angle BCD$ }, EqualityRelation{ $\angle DAE=(5/18*\pi)$ }, 求角的大小: AngleRelation{angle= $\angle CBD$ }, EqualityRelation{BE=v_0}, EqualityRelation{AB=AC}, EqualityRelation{C_△BCD=18}, EqualityRelation{C_△ABC=30}, 求值(大小):

(ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle CBD$),SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]BE)}

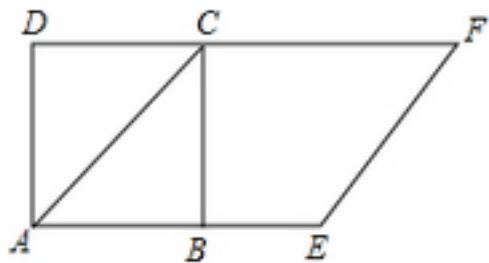
981、topic: 如图,在 $\triangle ABC$ 中, $\angle A=68^\circ$,点I是内心,求 $\angle I$ 的度数.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000083380_Q_1.jpg", "coordinates": {"A": "0.24,1.64", "B": "-1.96,-2.57", "C": "2.49,-1.01", "I": "0.48,-0.46"}, "collineations": {"0": "A###B", "1": "B##C", "2": "C##A", "3": "B#I", "4": "C##I"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation:△ABC,EqualityRelation{ $\angle BAC=(17/45*\pi)$ },PointRelation:I,求角的大小:
 AngleRelation{angle= $\angle BIC$ },SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:] $\angle BIC$)}

982、topic: 如图,以正方形ABCD的对角线AC为一边,延长AB到E,使 $AE = AC$,以AE为一边作菱形AEFC,若菱形的面积为 $9\sqrt{2}$,求正方形边长?#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000041807_Q_1.jpg", "coordinates": {"A": "-15.00,4.00", "B": "-13.00,4.00", "C": "-13.00,6.00", "D": "-15.00,6.00", "E": "-12.17,4.00", "F": "-10.19,6.00"}, "collineations": {"0": "E##F", "1": "D##C##F", "2": "A##D", "3": "B##C", "4": "A##B##E", "5": "A##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: SquareRelation{square=Square:ABCD},PointOnLineRelation{point=E, line=AB, isConstant=false, extension=true},EqualityRelation{AE=AC},RhombusRelation{rhombus=Rhombus:AEFC},RhombusRelation{rhombus=Rhombus:AEFC},EqualityRelation{S_ACFE=9*(2^(1/2))},SquareRelation{square=Square:ABCD},求值(大小): (ExpressRelation:[key:]AB),求值(大小): (ExpressRelation:[key:]BC),求值(大小): (ExpressRelation:[key:]CD),求值(大小): (ExpressRelation:[key:]AD),SolutionConclusionRelation{relation=求值(大小)}:(ExpressRelation:[key:]AB)},SolutionConclusionRelation{relation=求值(大小)}:(ExpressRelation:[key:]BC)},SolutionConclusionRelation{relation=求值(大小)}:(ExpressRelation:[key:]BC)}

(ExpressRelation:[key:]CD)},SolutionConclusionRelation{relation=求值(大小):

(ExpressRelation:[key:]AD)}

983、topic: 如图1,在 $\triangle ABC$ 和 $\triangle EDC$ 中, $AC=CE=CB=CD$, $\angle ACB=\angle DCE=90^\circ$, AB 与 CE 交于点 F , ED 与 AB,BC 分别交于点 M,H .#%#(1)求证: $CF=CH$;#%#(2)如图2, $\triangle ABC$ 不动,将 $\triangle EDC$ 绕点 C 旋转到 $\angle BCE=45^\circ$ 时,试判断四边形 $ACDM$ 的形状,并证明你的结论.#%#

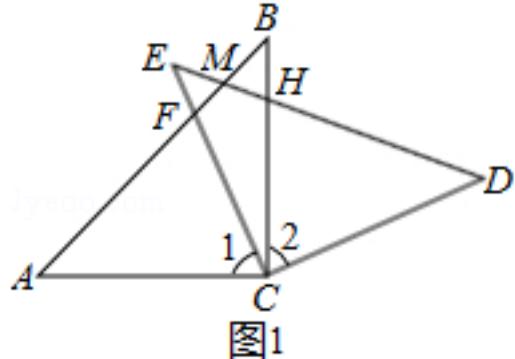


图1

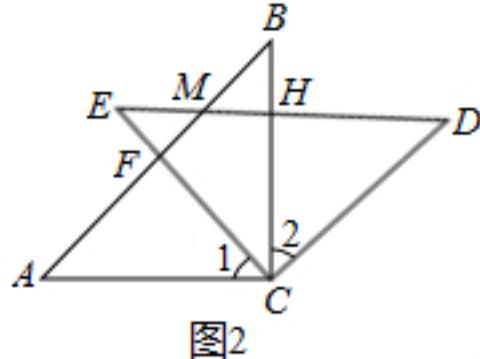


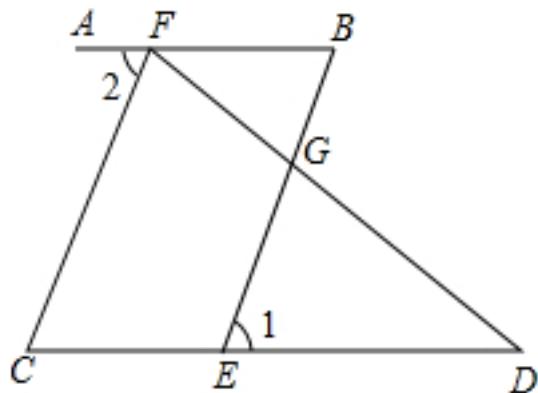
图2

graph:

```
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "picture": [{"picturename": "1000040719_Q_1.jpg", "coordinates": {"A": "-2.99,0.00", "B": "0.00,2.99", "C": "0.00,0.00", "D": "2.72,1.24", "E": "-1.24,2.72", "F": "-0.94,2.05", "H": "0.00,2.26", "M": "-0.53,2.46"}, "collineations": {"0": "B###M###F###A", "1": "A##C", "2": "C##H##B", "3": "E##F##C", "4": "C##D", "5": "D##H##M##E"}, "variable>equals": {"0": "\u03b71=\u03b7ECA", "1": "\u03b72=\u03b7BCD"}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "picture": [{"picturename": "1000040719_Q_1.jpg", "coordinates": {"A": "-2.67,-4.00", "B": "0.00,-1.32", "C": "0.00,-4.00", "D": "1.88,-2.09", "E": "-1.90,-2.12", "F": "-1.35,-2.67", "H": "-0.01,-2.11", "M": "-0.79,-2.11"}, "collineations": {"0": "B##M##F##A", "1": "A##C", "2": "C##H##B", "3": "E##F##C", "4": "C##D", "5": "D##H##M##E"}, "variable>equals": {"0": "\u03b71=\u03b7ECA", "1": "\u03b72=\u03b7BCD"}, "circles": []}], "appliedproblems": {}}]}
```

NLP: TriangleRelation:△ABC, TriangleRelation:△EDC, MultiEqualityRelation [multiExpressCompare=AC=CE=BC=CD, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare=∠ACH=∠DCF=(1/2*Pi), originExpressRelationList=[], keyWord=null, result=null], LineCrossRelation [crossPoint=Optional.of(F), iLine1=AB, iLine2=CE], LineCrossRelation [crossPoint=Optional.of(M), iLine1=ED, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(H), iLine1=ED, iLine2=BC], (ExpressRelation:[key:]2), TriangleRelation:△ABC, ProveConclusionRelation:[证明: EqualityRelation{CF=CH}], ShapeJudgeConclusionRelation{geoEle=ACDM}]

984、topic: 已知:如图, $\angle C=\angle 1$, $\angle 2$ 和 $\angle D$ 互余,BE⊥FD于点G.求证:AB||CD.#%#



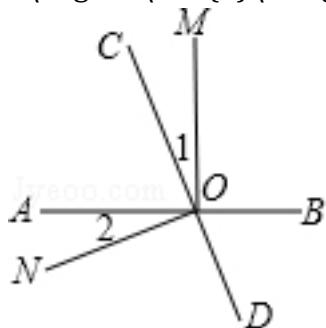
graph:

{"stem":{"pictures":[{"picturename":"1000032962_Q_1.jpg","coordinates":{"A":"0.63,2.36","B":"3.67,2.36","C":"0.00,0.00","D":"5.00,0.00","E":"2.00,0.00","F":"1.67,2.36","G":"3.00,1.41"}],"collineations":{"0":"B##A##F","1":"B##G##E","2":"G##F##D","3":"C##E##D","4":"C##F"}, "variable-equals":{"0":"∠1=∠BED","1":"∠2=∠AFC"},"circles":[]}, "appliedproblems":{},"substems":[]}

NLP:

EqualityRelation{∠ECF=∠DEG}, AngleComplementRelation:∠AFC/∠EDG, LinePerpRelation{line1=BE, line2=FD, crossPoint=G}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AB, iLine2=CD]]]

985、topic: 如图,直线AB,CD相交于O点,OM⊥AB,垂足为O.%(1)若 $∠1=∠2$,求 $∠NOD$;(2)若 $\angle 1=\frac{1}{4}\angle BOC$,求 $∠AOC$ 与 $∠MOD$.%

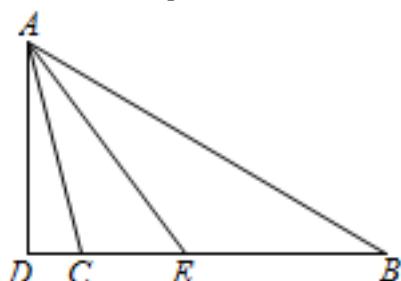


graph:

{"stem":{"pictures":[{"picturename":"3E72768D7A854762BAF12919A54ED10A.jpg","coordinates":{"A":"-14.00,4.00","B":"-6.00,4.00","C":"-12.00,7.46","D":"-8.55,1.48","M":"-10.00,8.00","N":"-12.58,2.51","O":"-10.00,4.00"}],"collineations":{"0":"A##O##B","1":"D##C##O","2":"O##N","3":"O##M"}, "variable-equals":{"0":"∠1=∠COM","1":"∠2=∠AON"},"circles":[]}, "appliedproblems":{},"substems":[]}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], LinePerpRelation{line1=OM, line2=AB, crossPoint=O}, EqualityRelation{∠COM=∠AON}, 求角的大小: AngleRelation{angle=∠DON}, EqualityRelation{∠COM=(1/4)*∠BOC}, 求角的大小: AngleRelation{angle=∠AOC}, 求角的大小: AngleRelation{angle=∠DOM}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠DON)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠AOC)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠DOM)}

986、topic: 如图,AD⊥BD,AE平分∠BAC,∠B=30°,∠ACD=70°,求∠AED的度数.%

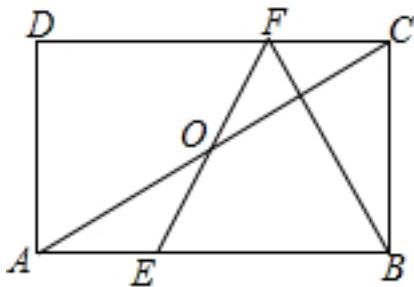


graph:

{"stem": {"pictures": [{"picturename": "1000063556_Q_1.jpg", "coordinates": {"A": "-5.00,2.89", "B": "0.00,0.00", "C": "-3.94,0.00", "D": "-5.00,0.00", "E": "-3.33,0.00"}, "collineations": {"0": "A##B", "1": "A##D", "2": "D##C##E##B", "3": "A##C", "4": "A##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: LinePerpRelation{line1=AD, line2=BD},
crossPoint=D},AngleBisectorRelation{line=AE,angle= $\angle BAC$, angle1= $\angle BAE$,
angle2= $\angle CAE$ },EqualityRelation{ $\angle ABE=(1/6*\pi)$ },EqualityRelation{ $\angle ACD=(7/18*\pi)$ },求角的大小:
AngleRelation{angle= $\angle AEC$ },SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle AEC$)}

987、topic: 如图,在矩形ABCD中,E、F分别是边AB、CD上的点,AE=CF,连接EF、BF,EF与对角线AC交于点O,且BE=BF, $\angle BEF=2\angle BAC$.#%#(1)求证:OE=OF;#%#(2)求 $\angle EBF$ 的度数;#%#(3)若 $BC=2\sqrt{3}$,求矩形ABCD的面积.#%#

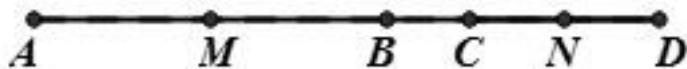


graph:

{"stem": {"pictures": [{"picturename": "1000034741_Q_1.jpg", "coordinates": {"A": "1.00,0.00", "B": "7.98,-0.03", "C": "8.00,4.00", "D": "1.02,4.03", "E": "3.33,-0.01", "F": "5.67,4.01", "O": "4.50,2.00"}, "collineations": {"0": "D##A", "1": "B##C", "2": "B##F", "3": "A##E##B", "4": "D##F##C", "5": "E##O##F", "6": "A##O##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: RectangleRelation{rectangle=Rectangle:ABCD},PointOnLineRelation{point=E, line=AB, isConstant=false, extension=false},PointOnLineRelation{point=F, line=CD, isConstant=false, extension=false},EqualityRelation{AE=CF},MultiPointCollinearRelation:[E, F],MultiPointCollinearRelation:[B, F],LineCrossRelation [crossPoint=Optional.of(O), iLine1=AC, iLine2=EF],EqualityRelation{BE=BF},EqualityRelation{ $\angle BEO=2*\angle EAO$ },求角的大小:
AngleRelation{angle= $\angle EBF$ },RectangleRelation{rectangle=Rectangle:ABCD},EqualityRelation{S_ABCD=v_0},EqualityRelation{BC=2*(3^(1/2))},求值(大小):
(ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明:
EqualityRelation{EO=FO}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle EBF$)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]S_ABCD)}

988、topic: 如图所示,点\$B\$、\$C\$在线段\$AD\$上,点\$M\$是\$AB\$的中点,点\$N\$是\$CD\$的中点,若\$MN=8,BC=2\$,则\$AD\$的长是多少?

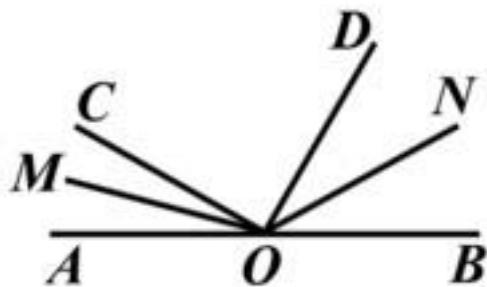


graph:

{"stem": {"pictures": [{"picturename": "3F09CF78B6B54F88AEC7A0F72E57F2C6.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-6.00,3.00", "C": "-4.00,3.00", "D": "0.00,3.00", "M": "-10.00,3.00", "N": "-2.00,3.00"}, "collineations": {"0": "A###M###B###C###N###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{AD=v_0}, PointOnLineRelation{point=B, line=AD, isConstant=false, extension=false}, PointOnLineRelation{point=C, line=AD, isConstant=false, extension=false}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=N, segment=CD}, EqualityRelation{MN=8}, EqualityRelation{BC=2}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AD)}

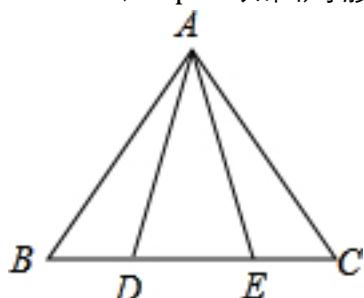
989、topic: 如图所示, $\angle AOB$ 是平角, OM, ON 分别是 $\angle AOC$, $\angle BOD$ 的平分线. #(1) 已知 $\angle AOC = 30^\circ$, $\angle BOD = 60^\circ$, 求 $\angle MON$ 的度数; #(2) 如果只已知 " $\angle COD = 90^\circ$ ", 你能求出 $\angle MON$ 的度数吗? 如果能请求出, 如果不能, 请说明理由.



graph:
{"stem": {"pictures": [{"picturename": "1000026019_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "5.00,0.00", "C": "-4.33,2.50", "D": "2.50,4.33", "M": "-4.83,1.29", "N": "4.33,2.50", "O": "0.00,0.00"}, "collineations": {"0": "O###A###B", "1": "O###D", "2": "O##M", "3": "O##N", "4": "O##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: 已知条件
FlatAngleRelation: $\angle AOB / \text{FLAT_ANGLE}$, AngleBisectorRelation{line=OM, angle= $\angle AOC$, angle1= $\angle AOM$, angle2= $\angle COM$ }, AngleBisectorRelation{line=ON, angle= $\angle BOD$, angle1= $\angle BON$, angle2= $\angle DON$ }, EqualityRelation{ $\angle AOC = (1/6\pi)$ }, EqualityRelation{ $\angle BOD = (1/3\pi)$ }, 求角的大小: AngleRelation{angle= $\angle MON$ }, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle MON$)}

990、topic: 如图, 等腰 $\triangle ABC$ 中, $AB = AC$, 点 D、E 在边 BC 上, $BD = CE$, 试说明 $\triangle AEB \cong \triangle ADC$. #



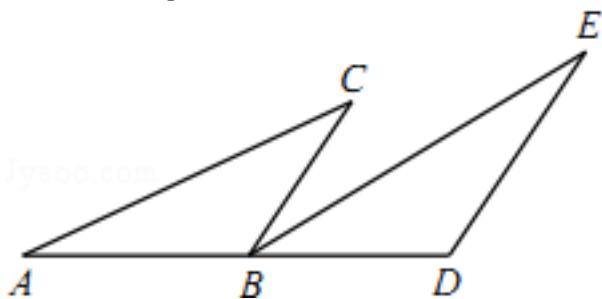
graph:
{"stem": {"pictures": [{"picturename": "1000060018_Q_1.jpg", "coordinates": {"A": "1.00,3.00", "B": "-1.00,-1.00", "C": "3.00,-1.00", "D": "0.5,-0.5", "E": "1.5,-0.5"}, "collineations": {"0": "A###B", "1": "A###C", "2": "B###D", "3": "C###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

0.00", "C": "3.00,0.00", "D": "0.00,0.00", "E": "2.00,0.00"}, "collineations": {"0": "B###D###E###C", "1": "A# #C", "2": "A###E", "3": "A###D", "4": "A###B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}

NLP:

IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{AB=AC}, PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, EqualityRelation{BD=CE}, ProveConclusionRelation: [证明: TriangleCongRelation{triangleA= $\triangle AEB$, triangleB= $\triangle ADC$ }]

991、topic: 如图,点B在线段AD上, $BC \parallel DE$, $AB = ED$, $BC = DB$, 求证: $\angle A = \angle E$.%#

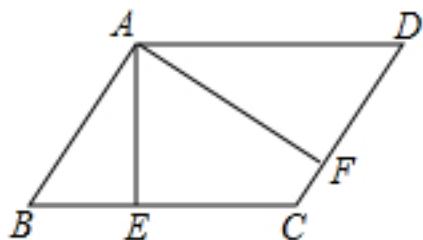


graph:

{"stem": {"pictures": [{"picturename": "AB075604ECA44AF487A330820DE2D4A0.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-10.00,3.00", "C": "-8.66,5.69", "D": "-7.00,3.00", "E": "-5.22,6.58"}, "collineations": {"0": "B###A###D", "1": "A###C", "2": "B###C", "3": "E###B", "4": "D###E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: PointOnLineRelation{point=B, line=AD, isConstant=false, extension=false}, LineParallelRelation [iLine1=BC, iLine2=DE], EqualityRelation{AB=DE}, EqualityRelation{BC=BD}, ProveConclusionRelation: [证明: EqualityRelation{ $\angle BAC = \angle BED$ }]

992、topic: 如图,在平行四边形ABCD中, $AE \perp BC$ 于点E, $AF \perp CD$ 于点F, $\angle EAF = 60^\circ$, $EC = 2$, $CF = 1$, 求平行四边形ABCD的周长及 $\angle B$ 的度数.%#



graph:

{"stem": {"pictures": [{"picturename": "1000084524_Q_1.jpg", "coordinates": {"A": "-4.97,3.11", "B": "-7.67, -1.49", "C": "-1.00,-1.53", "D": "1.69,3.07", "E": "-5.00,-1.51", "F": "0.01,0.19"}, "collineations": {"0": "B##C", "1": "C##F##D", "2": "A##D", "3": "E##A", "4": "F##A", "5": "A##B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, EqualityRelation{C_ABCD=v_0}, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, LinePerpRelation{line1=AE, line2=BC, crossPoint=E}, LinePerpRelation{line1=AF, line2=CD},

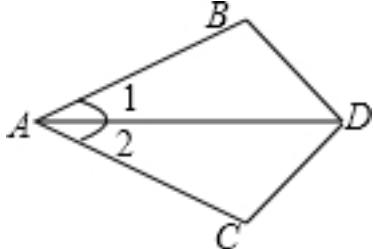
crossPoint=F}, EqualityRelation{ $\angle EAF = (1/3 * \pi)$ }, EqualityRelation{CE=2}, EqualityRelation{CF=1}, 求值(大小): (ExpressRelation:[key:v_0]), 求角的大小:

AngleRelation{angle= $\angle ABE$ }, SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key:C_ABCD]), SolutionConclusionRelation{relation=求值(大小):}

(ExpressRelation:[key: $\angle ABE$])

993、topic: 已知:如图, $\angle 1 = \angle 2$,AB=AC.求证:BD=CD.#%#

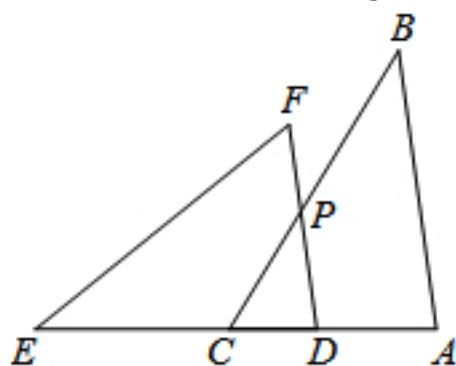


graph:

{"stem": {"pictures": [{"picturename": "1000072625_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "3.18,1.48", "C": "3.18,-1.48", "D": "4.93,0.00"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##C", "3": "B#D", "4": "C##D"}, "variable>equals": {"0": " $\angle 1 = \angle BAD$ ", "1": " $\angle 2 = \angle DAC$ "}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation{ $\angle BAD = \angle CAD$ }, EqualityRelation{AB=AC}, ProveConclusionRelation:[证明: EqualityRelation{BD=CD}]

994、topic: 如图,已知点E,C,D,A在同一条直线上,AB||DF,ED=AB, $\angle E = \angle CPD$.求证: $\triangle ABC \cong \triangle DEF$.#%#

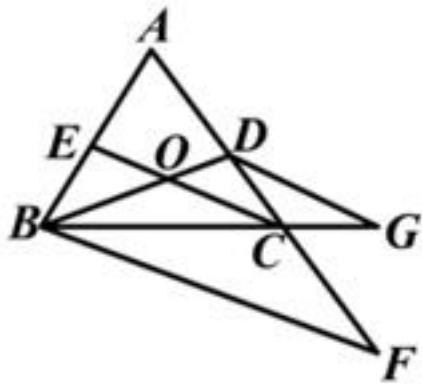


graph:

{"stem": {"pictures": [{"picturename": "1000035491_Q_1.jpg", "coordinates": {"A": "-2.00,2.00", "B": "-3.00,5.00", "C": "-5.00,2.00", "D": "-3.49,2.00", "E": "-6.59,2.00", "F": "-4.42,4.78", "P": "-3.99,3.51"}, "collineations": {"0": "B##A", "1": "E##F", "2": "B##P##C", "3": "F##P##D", "4": "E##C##D##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: PointRelation:E, PointRelation:C, PointRelation:D, LineParallelRelation [iLine1=AB, iLine2=DF], EqualityRelation{DE=AB}, EqualityRelation{ $\angle CEF = \angle CPD$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle ABC$, triangleB= $\triangle DEF$ }]

995、topic: 如图,点D在AC上,点F、G分别在AC、BC的延长线上,CE平分 $\angle ACB$,交BD于点O,且 $\angle EOD + \angle OBF = 180^\circ$, $\angle F = \angle G$.求证: $DG \parallel CE$.

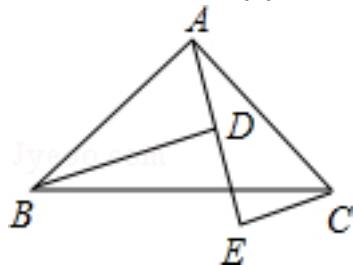


graph:

```
{"stem":{"pictures":[{"picturename":"1000021319_Q_1.jpg","coordinates":{"A":"0.57,-0.19","B":"0.17,-0.84","C":"1.07,-0.84","D":"0.87,-0.57","F":"1.42,-1.32","G":"1.52,-0.84","O":"0.64,-0.67","E":"0.35,-0.54"}, "collineations":{"0":"D##O##B","1":"E##A##B","2":"D##G","3":"E##C##O","4":"A##C##D##F","5":"F##B","6":"B##C##G"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{}}, "substems":[]}}
```

NLP: PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AC, isConstant=false, extension=false}, PointOnLineRelation{point=G, line=BC, isConstant=false, extension=false}, AngleBisectorRelation{line=CE, angle= $\angle BCD$, angle1= $\angle BCE$, angle2= $\angle DCE$ }, LineCrossRelation [crossPoint=Optional.of(O), iLine1=CE, iLine2=BD], EqualityRelation{ $\angle DOE + \angle FBO = (\text{Pi})$ }, EqualityRelation{ $\angle BFC = \angle CGD$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=DG, iLine2=CE]]]

996、topic: 如图,A、D、E三点在同一直线上,且 $\triangle BAD \cong \triangle ACE$. #(1)试证明 $BD=DE+CE$; #(2) $\triangle ABD$ 满足什么条件时, $BD \parallel CE$? #

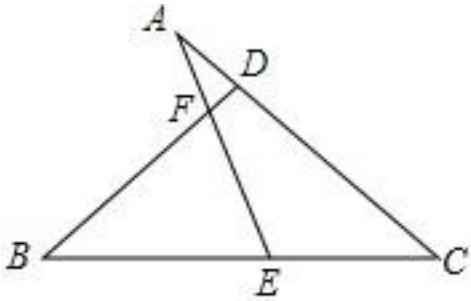


graph:

```
{"stem":{"pictures":[{"picturename":"AE9A1B2A79974F968D85FC22EBC6392B.jpg","coordinates":{"A":"-10.00,8.00","B":"-14.00,4.00","C":"-6.00,4.00","D":"-9.18,6.25","E":"-7.75,3.18"}, "collineations":{"0":"E##D##A","1":"B##A","2":"C##A","3":"C##B","4":"B##D","5":"C##E"}, "variable-equals":{}, "circles":[]}, "appliedproblems":{}}, "substems":[]}}
```

NLP: TriangleCongRelation{triangleA= $\triangle BAD$, triangleB= $\triangle ACE$ }, LineParallelRelation [iLine1=BD, iLine2=CE], ProveConclusionRelation:[证明: EqualityRelation{ $BD = DE + CE$ }], SolveGeoShapeConclusionRelation{iPolygon= $\triangle ABD$, iPolygonType=SOLVEENCLOSESHAPE}]

997、topic: 如图,已知 $\angle A=32^\circ$, $\angle B=45^\circ$, $\angle C=38^\circ$,求 $\angle DFA$ 的度数.



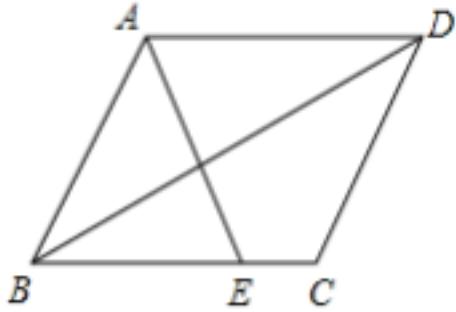
graph:

```
{"stem": {"pictures": [{"picturename": "1000021352_Q_1.jpg", "coordinates": {"A": "-6.61,5.95", "B": "-7.00, 0.00", "C": "1.00,0.00", "D": "-3.49,3.51", "E": "-4.45,0.00", "F": "-5.13,1.87"}, "collineations": {"0": "A###D##C", "1": "A###E###F", "2": "D###F###B", "3": "B###E###C"}, "variable>equals": {}, "circles": []}], "applydproblems": {}, "substems": []}}
```

NLP:

EqualityRelation{ $\angle DAF = (8/45 * \pi)$ }, EqualityRelation{ $\angle EBF = (1/4 * \pi)$ }, EqualityRelation{ $\angle DCE = (19/90 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle AFD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AFD$)}

998、topic: 如图,在 $\square ABCD$ 中,E为BC边上的一点,连接AE、BD且 $AE=AB$.#%#(1)求证: $\angle ABE=\angle EAD$;(2)若 $\angle AEB=2\angle ADB$,求证:四边形ABCD是菱形.#%#

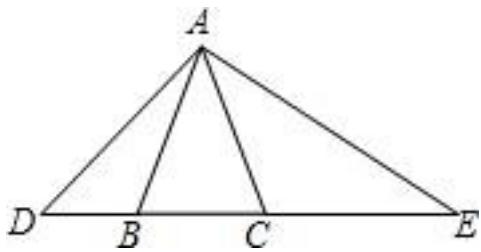


graph:

```
{"stem": {"pictures": [{"picturename": "1000041781_Q_1.jpg", "coordinates": {"A": "-12.00,19.00", "B": "-13.16,16.00", "C": "-9.94,16.00", "D": "-8.78,19.00", "E": "-10.84,16.00"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##E", "3": "B##C", "4": "D##B", "5": "D##C"}, "variable>equals": {}, "circles": []}], "applydproblems": {}, "substems": []}}
```

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, SegmentRelation:AE, SegmentRelation:BD, EqualityRelation{AE=AB}, EqualityRelation{ $\angle AEB=2*\angle ADB$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\angle ABE=\angle DAE$ }], ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:ABCD}]

999、topic: 已知:如图,在 $\triangle ABC$ 中, $AB=AC$, D 为 CB 延长线上一点, E 为 BC 延长线上一点,且满足 $\{AB\}^2=DB \cdot CE$.求证: $\triangle ADB \sim \triangle EAC$.

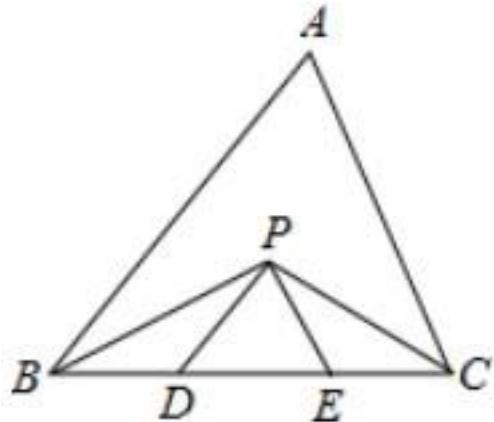


graph:

{"stem": {"pictures": [{"picturename": "1000005821_Q_1.jpg", "coordinates": {"A": "-6.96,5.66", "B": "-8.52, 1.98", "C": "-5.51,1.94", "D": "-10.52,1.98", "E": "2.50,1.84"}, "collineations": {"0": "B##A", "1": "A##D", "2": "A##C", "3": "A##E", "4": "D##B##C##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $AB=AC$ }, PointOnLineRelation{point=D, line=CB, isConstant=false, extension=true}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=true}, EqualityRelation{ $(AB)^2 = BD \cdot CE$ }, ProveConclusionRelation:[证明:
TriangleSimilarRelation{triangleA= $\triangle ADB$, triangleB= $\triangle EAC$ }]

1000、topic: 如图,在 $\triangle ABC$ 中,\$BC=5\$cm,BP、CP分别是 $\angle ABC$ 和 $\angle ACB$ 的平分线,且 $PD \parallel AB, PE \parallel AC$,点D,E 在边BC上.求 $\triangle PDE$ 的周长是多少cm?



graph:

[{"circles": [], "variable>equals": {}, "picturename": "1000002899_Q_1.jpg", "collineations": {"3": "P##C", "2": "P##B", "1": "A##C", "0": "A##B", "6": "B##D##E##C", "5": "P##E", "4": "P##D"}, "coordinates": {"D": "-3.20,-2.00", "E": "-1.20,-2.03", "P": "-1.75,-0.20", "A": "-1.01,3.65", "B": "-5.50,-1.96", "C": "0.71,-2.06"}}]

NLP:

EqualityRelation{ $C_{\triangle DEP}=v_0$ }, TriangleRelation: $\triangle ABC$, EqualityRelation{ $BC=5$ }, AngleBisectorRelation{line=BP, angle= $\angle ABD$, angle1= $\angle ABP$, angle2= $\angle DBP$ }, AngleBisectorRelation{line=CP, angle= $\angle ACE$, angle1= $\angle ACP$, angle2= $\angle ECP$ }, LineParallelRelation [iLine1=PD, iLine2=AB], LineParallelRelation [iLine1=PE, iLine2=AC], PointOnLineRelation{point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, 求值(大小): (ExpressRelation:[key:] v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $C_{\triangle DEP}$)}