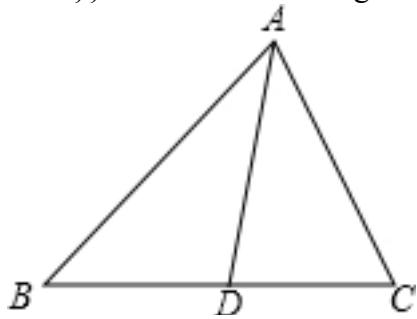


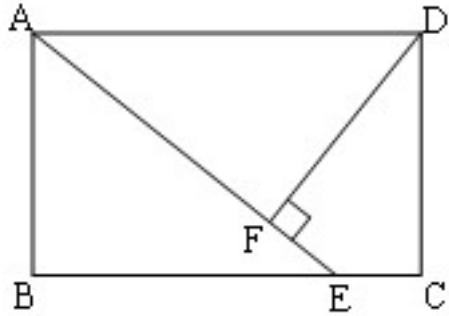
1、topic: 如图,在 $\triangle ABC$ 中,AD是它的角平分线.求证: $\frac{S_{\triangle ABD}}{S_{\triangle ACD}} = \frac{AB}{AC}$.



graph:
 {"stem": {"pictures": [{"picturename": "003098C1CE944094999C6A4BC2E74DC3_Q_1.jpg", "coordinates": {"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##D##C", "3": "C##A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

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

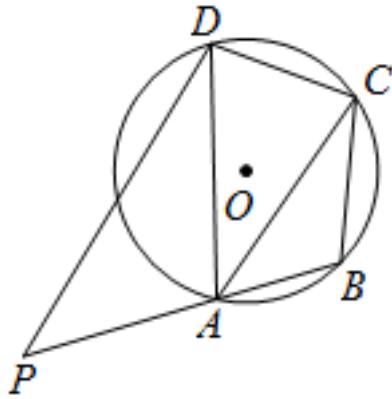
2、topic: 如图,在矩形 $ABCD$ 中,点E是 BC 上一点, $AE=AD$, $DF \perp AE$, 垂足为F,求证 $DF=DC$.



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

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: $AD \cdot DC = PA \cdot BC$.

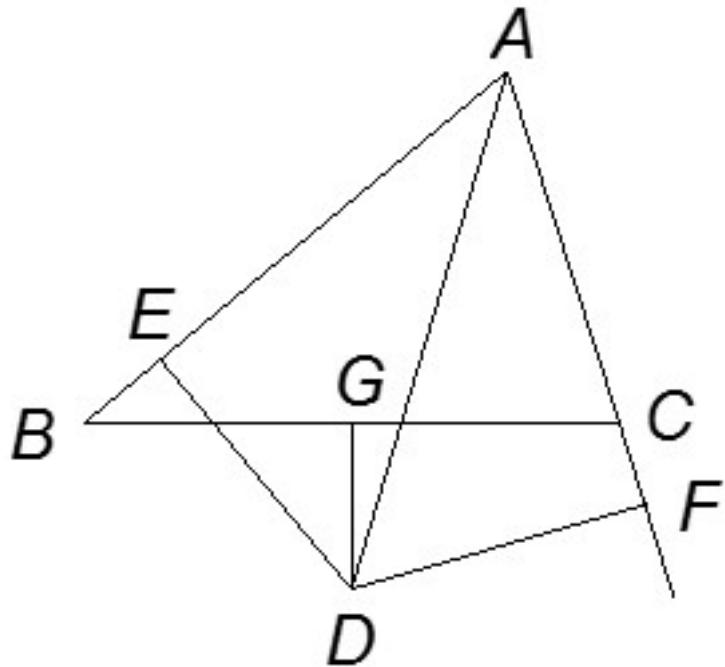


graph:

{"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": [{"center": "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.

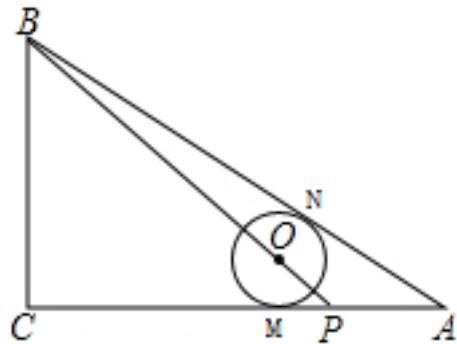


graph:

{"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": [{"center": "D", "pointincircle": "E##F"}]}, "appliedproblems": {}, "substems": []}]}

NLP: TriangleRelation: ΔABC , 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}, 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)}

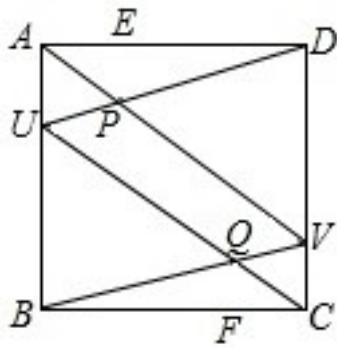
5、topic: 如图,在 ΔABC 中, $\angle C=90^\circ$, $AC=8$, $AB=10$, 点 P 在 AC 上, $AP=2$, 若 $\odot O$ 的圆心在线段 BP 上, 且 $\odot O$ 与 AB 、 AC 都相切, 切点分别为 N 、 M , 求 $\odot O$ 的半径. #%#



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"}, "collinear": {"0": "B##C", "1": "A##N##B", "2": "B##O##P", "3": "A##P##M##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "M##N"}]}, "appliedproblems": {}, "substems": []}}

NLP: CircleCenterRelation {point=Q_0, conic=Circle[$\odot O$]}{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, TriangleRelation: ΔABC , EqualityRelation { $\angle BCM=(1/2\pi)$ }, 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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(N), 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(M), outpoint=Optional.absent()}, 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:]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.



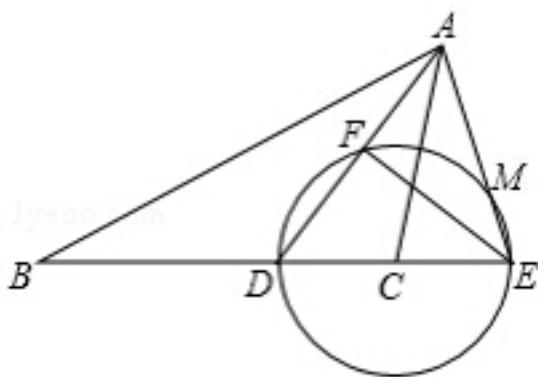
graph:

{"stem": {"pictures": [{"picturename": "0908A274E21F47299A8E3015080A0BFA_Q_1.jpg", "coordinates": {"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": "[]"}, "substems": "[]"}}

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:

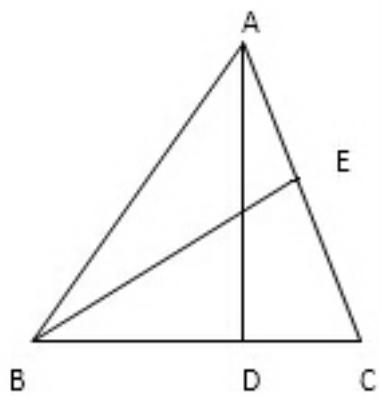
{"stem": {"pictures": [{"picturename": "1000010169_Q_1.jpg", "coordinates": {"A": "2.20,9.60", "B": "-15.00,0.00", "C": "0.00,0.00", "D": "-5.00,0.00", "E": "5.00,0.00", "F": "-1.40,4.80", "M": "4.22,2.69"}, "collineations": {"0": "B##A", "1": "C##A", "2": "E##F", "3": "A##M##E", "4": "B##D##C##E", "5":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

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

```

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

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

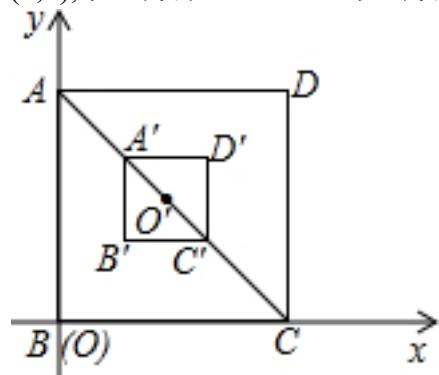


```

graph:
>{"stem": {"pictures": [{"picturename": "112B56FFB3A74507BB100E40B0081909_Q_1.jpg", "coordinates": {"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:△ABC,EqualityRelation{∠DBE=(1/6*Pi)},LinePerpRelation{line1=AD, line2=BD, crossPoint=D},MidianLineOfTriangleRelation{midianLine=BE, triangle=△BAC, top=B, 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'与正方形ABCD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.%#



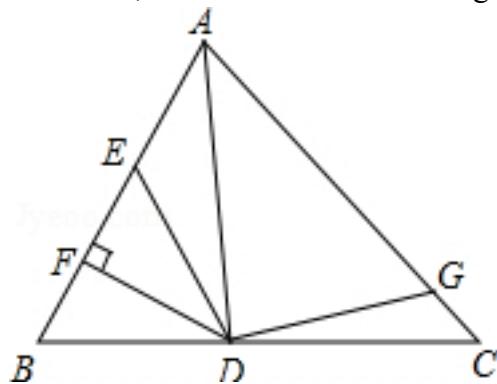
graph:

```
{"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", "E": "1.00,2.00", "F": "1.00,1.00", "G": "2.00,1.00", "H": "2.00,2.00", "O": "0.00,0.00", "P": "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": {}, "subsystems": []}}
```

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:ABCD}, 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)}

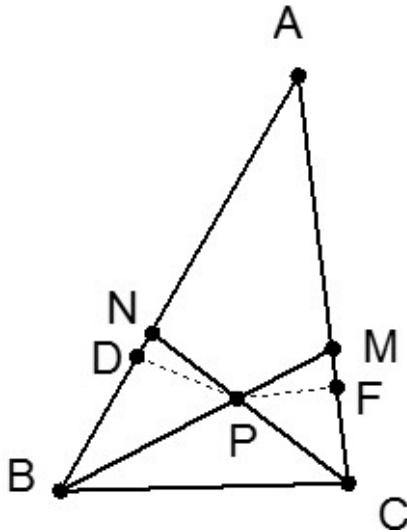
10、topic: 如图,AD是 $\triangle ABC$ 的角平分线,DF $\perp AB$,垂足为点F,DE=DG, $\triangle ADG$ 和 $\triangle AED$ 的面积分别为50和39,求 $\triangle EDF$ 的面积.#%#



```
graph:
{"stem": {"pictures": [{"picturename": "168017878BAB4F52B42C3D9A0DB60780_Q_1.jpg", "coordinates": {"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": {}, "subsystems": []}}
```

NLP: EqualityRelation{S_ΔDEF=v_0},TriangleRelation:ΔABC,LinePerpRelation{line1=DF, line2=AB, crossPoint=F},EqualityRelation{DE=DG},EqualityRelation{S_ΔADG=50},EqualityRelation{S_ΔADE=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_ΔDEF)}

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.

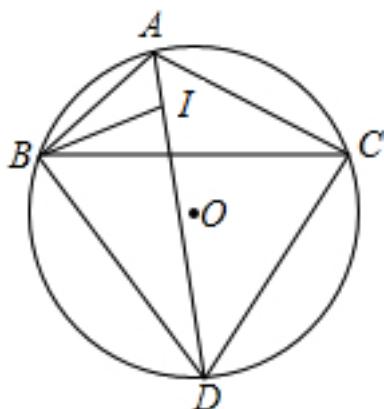


graph:

```
{"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"}, "collineations": {"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: ΔABC , 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. #%#



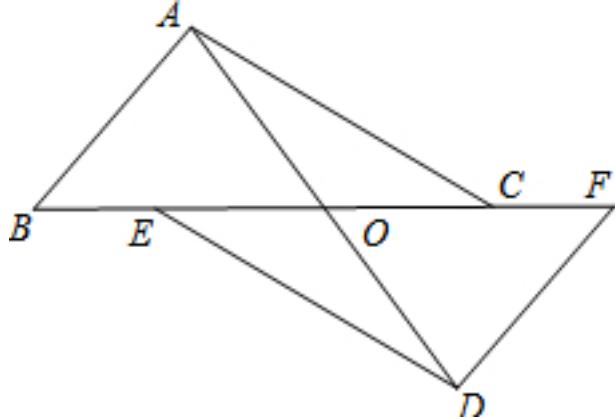
graph:

```
{"stem": {"pictures": [{"picturename": "1000060750_Q_1.jpg", "coordinates": {"A": "0.56,-0.17", "B": "0.13,-0.56", "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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }},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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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 $\angle 4 = \angle 5$.#%# $\therefore AE \parallel CF$.#%#(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.#%#

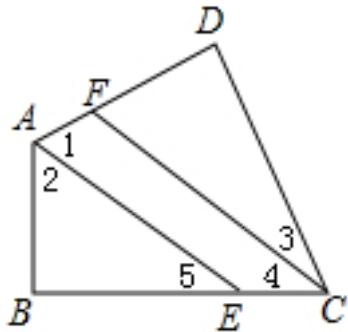


图1

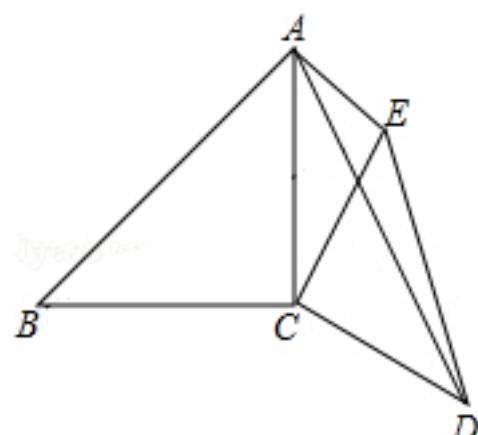
```

graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000060183_Q_1.jpg", "coordinates": {"A": "1.67,4.37", "B": "1.67,2.49", "C": "5.72,2.49", "D": "3.89,5.65", "E": "2.79,6.32", "F": "4.93,1.12", "G": "1.67,6.11", "H": "6.41,1.29"}, "collineations": {"0": "G###A###B", "1": "D###C###H", "2": "D###A", "3": "A###E", "4": "B###C", "5": "C###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000060183_Q_1.jpg", "coordinates": {"A": "-6.35,5.53", "B": "-6.35,4.23", "C": "-2.57,4.23", "D": "-4.58,6.88", "E": "-1.86,3.30", "F": "-3.30,2.75", "G": "-1.90,4.23", "H": "-3.73,4.23"}, "collineations": {"0": "B###H###C###G", "1": "D###C###E", "2": "A###H###E", "3": "D###A", "4": "A###B", "5": "F###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]
}

```

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 $\angle ACB = \angle DCE = 90^\circ$, $AC = BC = 6$, $CD = CE = 3$, $\angle CAE = 45^\circ$,求AD的长. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000081326_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "-3.00,0.0", "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": []}}

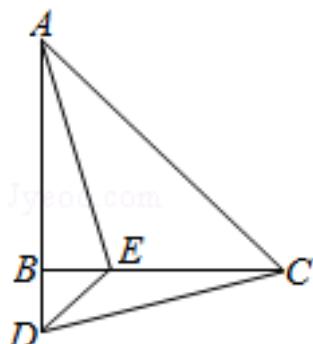
NLP: EqualityRelation{AD=v_0}, MultiEqualityRelation [multiExpressCompare= $\angle ACB = \angle DCE = (1/2 * \pi)$, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare=AC=BC=6, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{CD=CE}, 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": "-6.20,5.00", "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.#%#

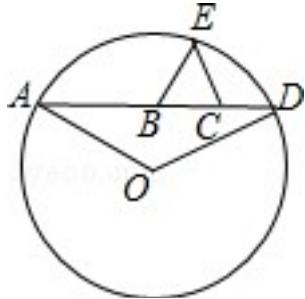


graph:
 {"stem": {"pictures": [{"picturename": "1000029171_Q_1.jpg", "coordinates": {"A": "3.00,7.00", "B": "3.00,3.00", "C": "7.00,3.00", "D": "3.00,2.00", "E": "4.00,3.00"}, "collineations": {"0": "C##A", "1": "C##D", "2": "A##E", "3": "D##E", "4": "A##B##D", "5": "B##E##C"}, "variable-equals": {}, "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:] $\angle BDC$)}

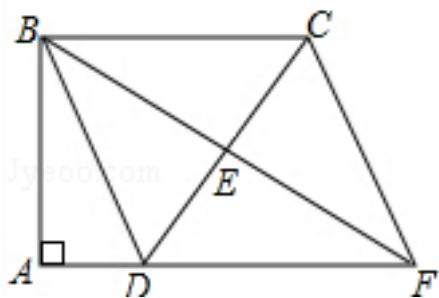
18、topic: 如图,A、B、C、D依次为一直线上4个点,\$BC=2\$,\$\triangle BCE\$为等边三角形,\$\odot O\$过A、D、E三点,且\$\angle AOD=120^\circ\$. 设\$AB=x\$,\$CD=y\$,求y与x的函数关系式.



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:△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. #%(img)

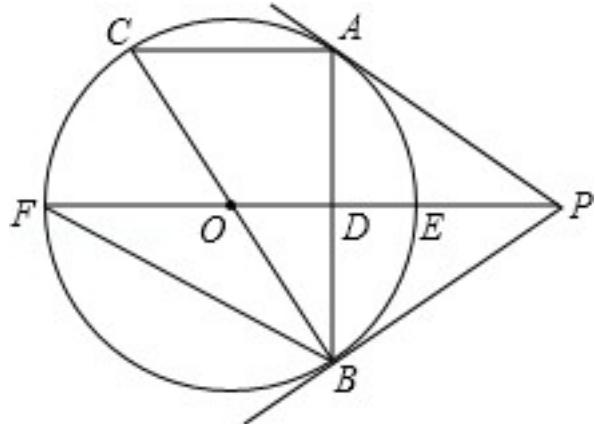


graph:
 {"stem": {"pictures": [{"picturename": "A1AEFF80AD0F4B48860835EB0452987.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-14.00,5.80", "C": "-11.00,5.80", "D": "-13.00,3.00", "E": "-12.00,4.40", "F": "-10.00,3.00"}, "collineations": {"0": "B##A", "1": "A##D##F", "2": "B##F##E", "3": "B##C", "4": "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=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)}

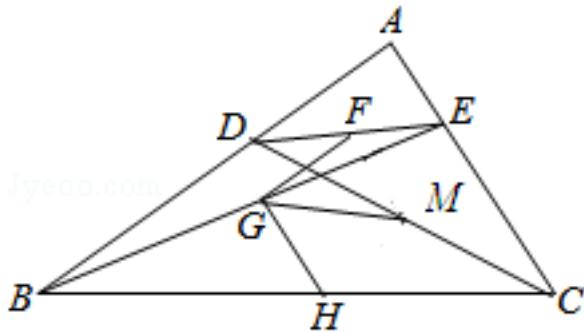
20、topic: 如图, PA 为 $\odot O$ 的切线, A 为切点, 直线 PO 交 $\odot O$ 于点 E, F , 过点 A 作 PO 的垂线 AB 垂足为 D , 交 $\odot O$ 于点 B , 延长 BO 与 $\odot O$ 交于点 C , 连接 AC, BF . (1) 求证: PB 与 $\odot O$ 相切; #%(2) 试探究线段 EF , SOD , OP 之间的数量关系, 并加以证明; #%(3) 若 $SAC=12^\circ$, $\tan \angle F=\frac{1}{2}$, 求 $\cos \angle ACB$ 的值.



graph:
 {"stem": {"pictures": [{"picturename": "1000010427_Q_1.jpg", "coordinates": {"A": "12.10,-1.80", "B": "12.10,-13.5", "C": "4.50,-1.80", "D": "12.1,-7.60", "O": "8.30,-7.60", "E": "15.20,-7.60", "F": "1.30,-7.60", "P": "2.06,-7.60"}, "collineations": {"0": "B##D##F", "1": "D##O##F##E##P", "2": "C##O##B", "3": "A##C", "4": "B##F", "5": "P##A", "6": "P##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: LinePerpRelation{line1=PO, line2=AB, crossPoint=}, PointOnLineRelation{point=A, line=AB, isConstant=false, extension=false}, 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)}, LineCrossCircleRelation{line=PO, circle= $\odot O$, crossPoints=[E]}, crossPointNum=1, LineCrossCircleRelation{line=AB, circle= $\odot O$, crossPoints=[B]}, crossPointNum=1, LineCrossCircleRelation{line=BO, circle= $\odot O$, 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(∠F)=(1/2)}, 求值(大小): (ExpressRelation:[key:]cos(∠ACO)), ProveConclusionRelation:[证明:
 LineContactCircleRelation{line=PB, 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:](EF/DO))}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:](DO/OP))}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]cos(∠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. #%#

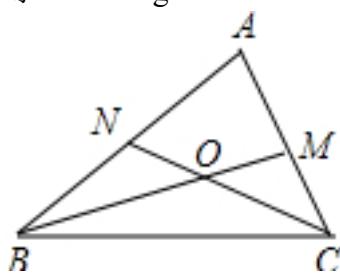


graph:

{"stem": {"pictures": [{"picturename": "1000031946_Q_1.jpg", "coordinates": {"A": "-11.00,5.00", "B": "-13.25, 2.01", "C": "-7.00,2.00", "D": "-12.07,3.57", "E": "-9.65,3.98", "F": "-10.86,3.78", "G": "-11.45,2.99", "H": "-10.12, 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": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000031946_Q_1.jpg", "coordinates": {"M": "-9.53,2.79"}}, {"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: ΔABC [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:] $\angle FGH$), SolutionConclusionRelation {relation=求值(大小)}: (ExpressRelation: [key:]GM)}

22、topic: 如图, ΔABC 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": []}

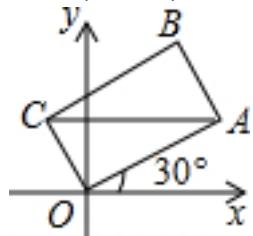
NLP: TriangleRelation: ΔABC , LineCrossRelation [crossPoint=Optional.of(O), iLine1=BM, iLine2=CN], PointToLineDistanceRelation {point=O, line=AB, distance=Express:[d_1]}, PointToLineDistanceRelation {point=O, line=BC, distance=Express:[d_2]}, PointToLineDistanceRelation {point=O, line=CA, distance=Express:[d_3]}

```

distance=Express:[d_2}],PointToLineDistanceRelation{point=O,line=CA,
distance=Express:[d_3}],AngleBisectorRelation{line=BM,angle=∠CBN,angle1=∠MBN,angle2=∠
CBM},AngleBisectorRelation{line=CN,angle=∠BCM,angle1=∠BCN,angle2=∠
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:

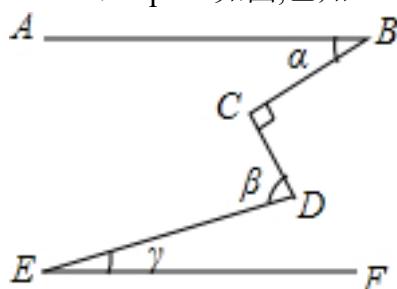
```

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

```

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:

```

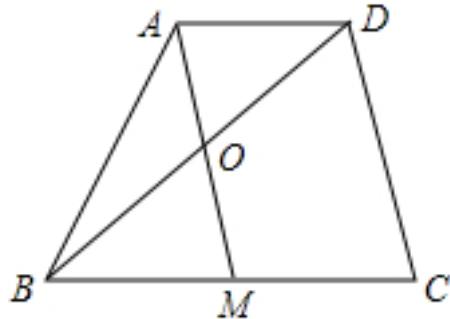
{"stem": {"pictures": [{"picturename": "1000082663_Q_1.jpg", "coordinates": {"A": "2.00,8.00", "B": "10.00,8.00", "C": "6.00,6.00", "D": "6.89,4.21", "E": "2.00,2.00", "F": "10.00,2.00"}, "collineations": {"0": "B##C", "1": "A##B", "2": "E##D", "3": "D##C", "4": "E##F"}, "variable>equals": {"0": "∠α=∠ABC", "1": "∠β=∠CDE", "2": "∠γ=∠DEF"}, "circles": []}], "appliedproblems": {}, "substems": []}

```

NLP: LineParallelRelation [iLine1=AB, iLine2=EF],EqualityRelation{∠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. #%



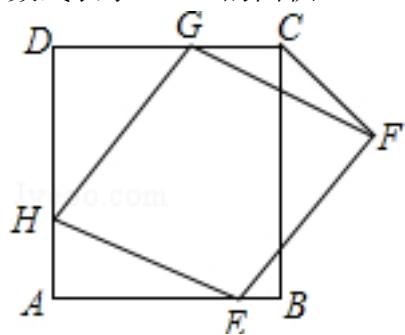
graph:

```
{"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"}],"collinearities":{"0":"A###E###B","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":{},"substeps":[]}}
```

NLP: SquareRelation {square=Square:ABCD, length=6}, SegmentRelation:CD, SegmentRelation:DA, EqualityRelation {AH=2}, SegmentRelation:CF, EqualityRelation {DG=2}, EqualityRelation {S_ΔCFG=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]]}}}

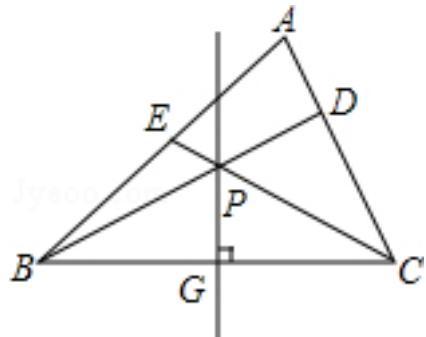
27、topic: 如图,点M、N为线段AB上的两个三等分点,点A、B在 $\odot O$ 上,求证: $\angle OMN = \angle ONM$

graph:

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

NLP: SegmentAliquotsPointRelation {aliquotsNum='3', points=[M, N], segment=AB}, PointOnCircleRelation {circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^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. #

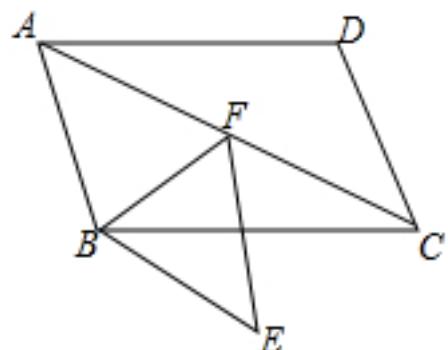


graph:

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

NLP: TriangleRelation: $\triangle ABC$, MiddlePerpendicularRelation [iLine1=PG, iLine2=BC, crossPoint=Optional.of(G)], EqualityRelation{ $\angle GBC = (1/2) * \angle DAE$ }, 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. #

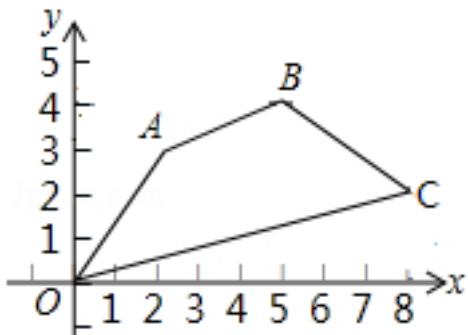


graph:

```
{"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 { $\angle CBE = (1/6 \cdot \pi)$ }, 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.#%#

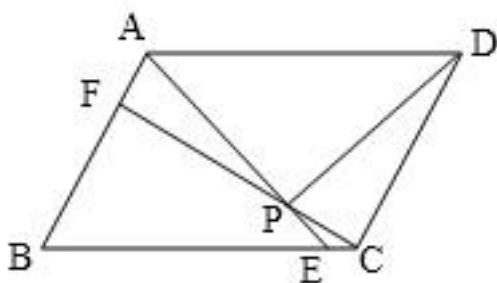


graph:

```
{"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\$.



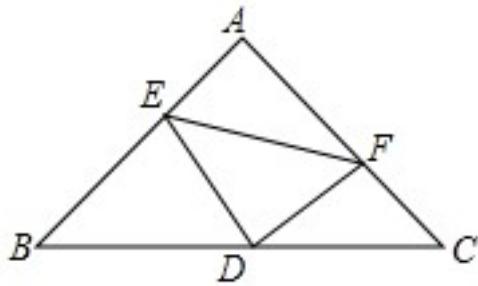
graph:

```
{"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": "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": []}}
```

D###C","1":"E###B###D","2":"A###F###B","3":"C###A","4":"A###E###P","5":"C###P","6":"D###F###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{ $\angle APD = \angle CPD$ }]

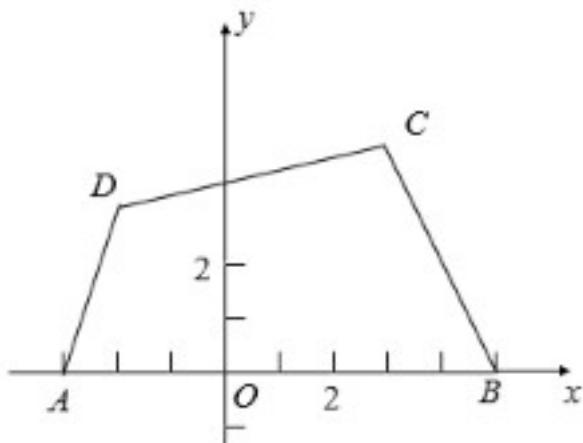
32、topic: 如图, $\triangle ABC$ 是等腰直角三角形, $AB=AC$, 点D是斜边BC的中点, E、F分别是AB、AC边上的点, 且 $DE \perp DF$, 若 $BE=12$, $CF=5$, 求 $\triangle DEF$ 的面积.



graph:
 {"stem": {"pictures": [{"picturename": "1000007044_Q_1.jpg", "coordinates": {"A": "12.02,12.02", "B": "0.00,0.00", "C": "24.04,0.00", "D": "12.02,0.00", "E": "8.48,8.48", "F": "20.50,3.54"}, "collinearities": {"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{ $S_{\triangle DEF}=v_0$ }, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$ [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//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.

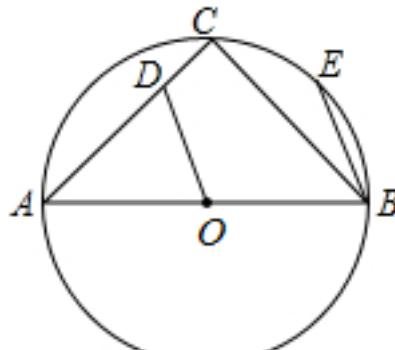


图1

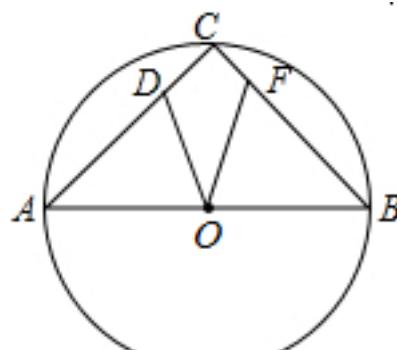


图2

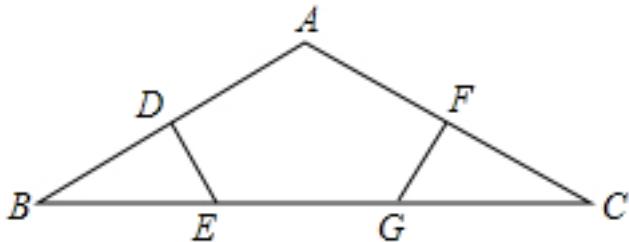
```

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"}}], "appliedproblems": {}, "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"}}], "appliedproblems": {}}], "appliedproblems": {}}

```

NLP: InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O_0$]{center= O_0 }, analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }, PointOnLineRelation{point=D, line=AC, isConstant=false, extension=false}, EqualityRelation{AD=AO}, 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}, (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[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, ProveConclusionRelation:[证明: EqualityRelation{DO=BE}], SolutionConclusionRelation{relation=圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}}]

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=15cm,求EG的长.

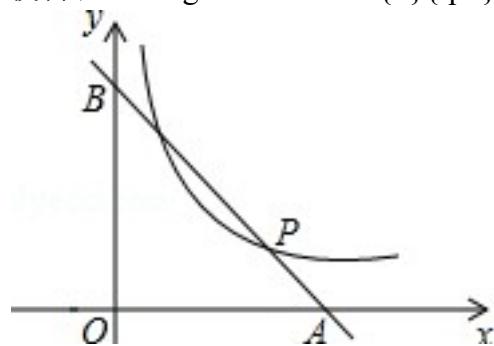


graph:
 {"stem": {"pictures": [{"picturename": "483B98C9CC3649BFBC4D02A6EA451C0C.jpg", "coordinates": {"A": "-7.50,7.33", "B": "-15.00,3.00", "C": "-0.00,3.00", "D": "-11.25,5.17", "E": "-10.00,3.00", "F": "-3.75,5.17", "G": "-5.00,3.00"}, "collineations": {"0": "C##A##F", "1": "A##B##D", "2": "D##E", "3": "C##B##E##G", "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 $\sin \angle BMC = \frac{1}{\pi}$.

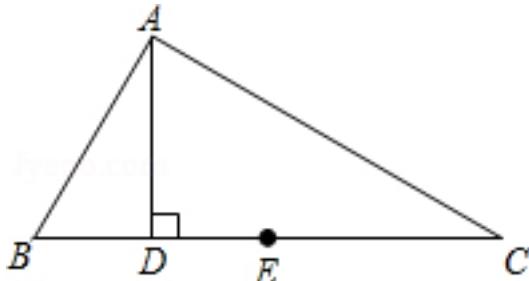


graph:
 {"stem": {"pictures": [{"picturename": "1000010411_Q_1.jpg", "coordinates": {"A": "3.00,0.00", "B": "0.00,3.00", "P": "2.00,1.00", "O": "0.00,0.00"}, "collineations": {"0": "B##A##P"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies":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

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=}, EqualityRelation {C_ΔA'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_ΔA'BC)}, SolutionConclusionRelation {relation=求值(大小):
(ExpressRelation:[key:]sin(BA'*∠C))}, SolutionConclusionRelation {relation=坐标PointRelation:M}

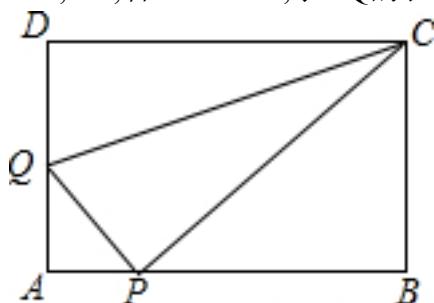
37、topic: 如图,在 $\triangle ABC$ 中,若 $\angle B=2\angle C$, $AD \perp BC$, E 为 BC 边的中点,求证: $AB=2DE$.#%#



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"}, "collinearities": {"0": "B##A", "1": "A##C", "2": "A##D", "3": "B##D##E##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}

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:

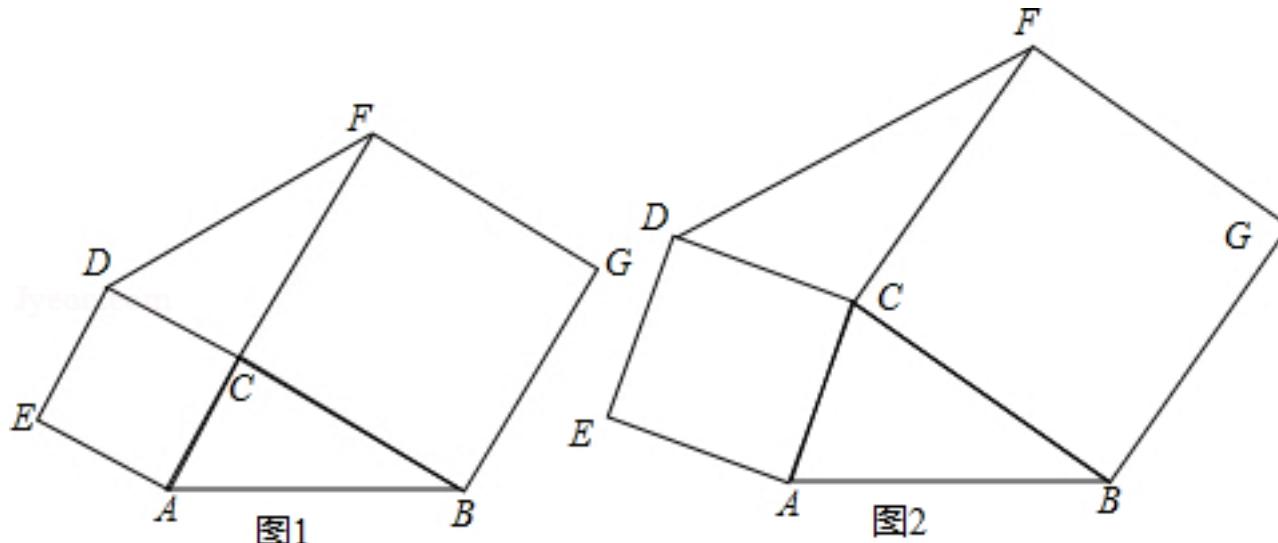
```
{"stem":{"pictures":[],"appliedproblems":{}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000061895_Q_1.jpg", "coordinates": {"A": "4.00,3.00", "B": "9.00,3.00", "C": "9.00,6.00", "D": "4.00,6.00", "P": "5.00,3.00", "Q": "4.00,4.33"}, "collineations": {"0": "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)}

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 $\{S\}_2$ 。如图1,当 $\angle ACB=90^\circ$ 时,求证: $\{S\}_1=\{S\}_2$ 。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。



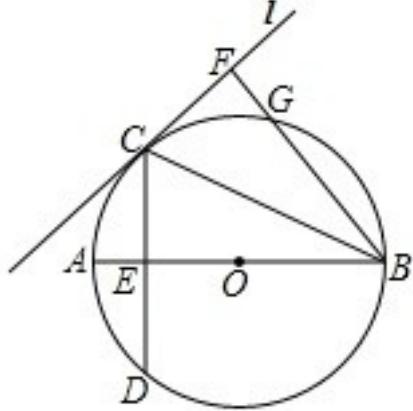
graph:

```
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": "", "pictures": [{"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,E qualityRelation{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 $\odot O$ 的直径,直线 l 与 $\odot O$ 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 $\odot O$ 于G.(1)求证: $\{CE\}^2=FG \cdot FB$;(2)若 $\tan \angle CBF=\frac{1}{2}$, $AE=3$,求 $\odot O$ 的直径.

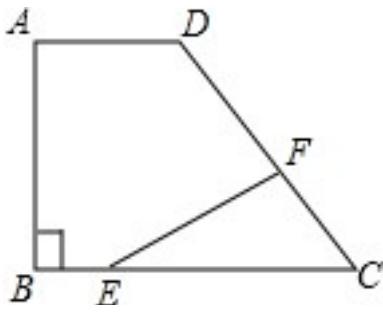


graph:

{"stem": {"pictures": [{"picturename": "1000008295_Q_1.jpg", "coordinates": {"A": "-7.50,0.00", "B": "7.50,0.00", "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"}, "collinearities": {"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"}]}, "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}, 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(E), iLine1=CD, iLine2=AB], LinePerpRelation{line1=CF, line2=BF, crossPoint=F}, LineCrossCircleRelation{line=BF, circle= $\odot O$, crossPoints=[G], crossPointNum=1}, EqualityRelation{tan $\angle CBF = \frac{1}{2}$ }, EqualityRelation{AE=3}, 圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, ProveConclusionRelation:[证明: EqualityRelation{((CE)^2)=FG*BF}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AB)}

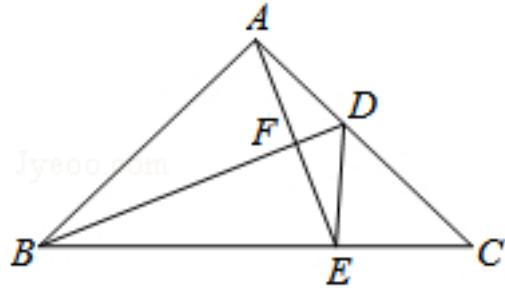
41、topic: 已知:如图,在直角梯形ABCD中, $AD \parallel BC$, $\angle A=90^\circ$, $BC=CD=10$, $\sin C = \frac{4}{5}$.(1)求直角梯形ABCD的面积;(2)点E是BC上一点,过点E作 $EF \perp DC$ 于点F. 求证: $AB \cdot CE = EF \cdot CD$.



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##E##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

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)=(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}]

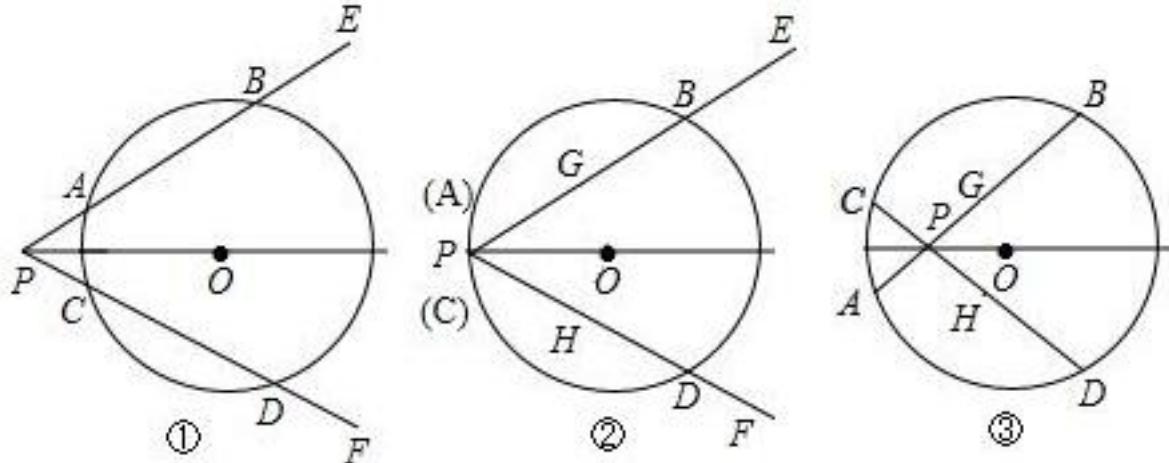
42、topic: 如图, $\triangle ABC$ 中, $AB=AC=5$, $BC=8$, 点 D 在 AC 上, 点 E 在 BC 上, 且 BD 恰好垂直平分 AE 于点 F , 求 $\triangle BEF$ 与 $\triangle AEC$ 的面积之比. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030974_Q_1.jpg", "coordinates": {"A": "-10.00,9.00", "B": "-14.00,6.00", "C": "-6.00,6.00", "D": "-9.18,7.5", "E": "-8.63,6.00", "F": "-9.56,8.04"}, "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": {}, "subsystems": []}}

NLP:
 EqualityRelation {S_ABEF=v_0}, EqualityRelation {S_AECA=v_1}, EqualityRelation {v_0/(v_1)=v_2}, TriangleRelation: $\triangle ABC$, 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.

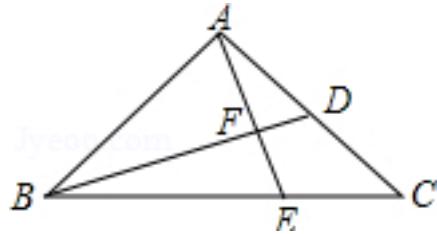



graph:

```
{"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"}],"colineations":{"0":"B###A###P###E","1":"C###D###F###P"},"variable-equals":{},"circles":[{"center":"O","pointincircle":"C###D###A###B"}]}],"appliedproblems":{},"subsystems":[{"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":[]},"{"substemid":2,"questionrelies":{},"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: $\frac{AB}{BC} = \frac{EF}{AF}$.



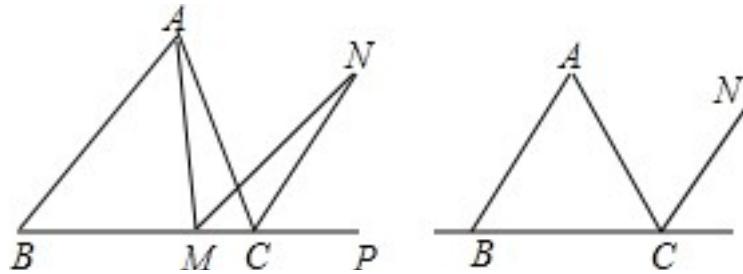
graph:

```
{"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:ΔABC,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))}]

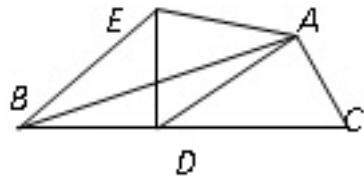
45、topic: 如图,在等边三角形ABC中,M是BC边(不含端点B、C)上任意一点,P是BC延长线上一点,N是 $\angle ACP$ 的平分线上一点. 已知 $\angle AMN=60^\circ$. #(1)求证:AM=MN; #(2)当M在直线BC上运动时,上述结论是否成立? 若成立,请画图证明. #



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": {}, "subsystems": []}}

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 $BC = 6$ cm. #(1)求BE的长; #(2)当 $AD = 4$ cm时,求四边形BDAE的面积.

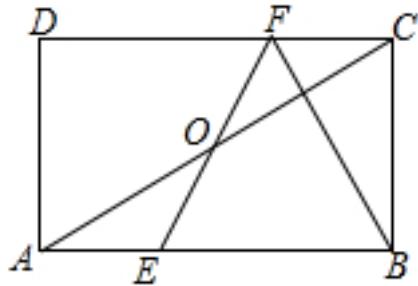


graph:
 [{"variable>equals": {}, "picturename": "1000001498_Q_1.jpg", "collineations": {"0": "B##D##C"}, "coordinates": {"D": "0.00,0.00", "E": "0.00,3.00", "A": "2.83,2.83", "B": "-3.00,0.00", "C": "3.00,0.00"}}]

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle ADC=((1/4*\pi))$ }, TurnoverRelation{start=C, segment=AD, target=E}, SegmentRelation:BE, EqualityRelation{BC=6}, MidianLineOfTriangleRelation{midianLine=AD, triangle= $\triangle ABC$, 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

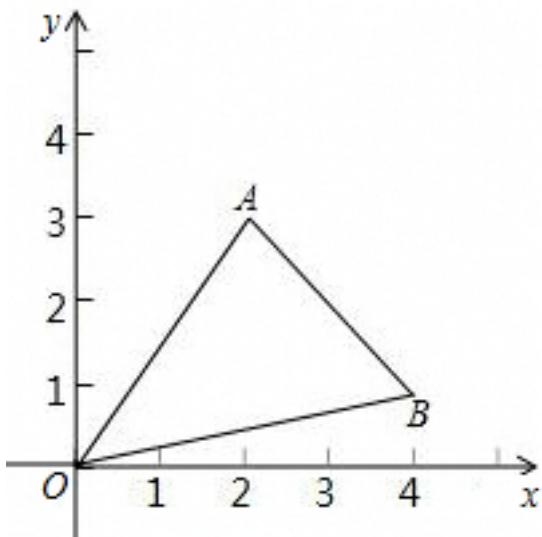
AC交于点O,且BE=BF, $\angle BEF=2\angle BAC$.
 (1)求证:OE=OF;
 (2)若 $BC=2\sqrt{3}$,求AB的长.



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##E##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 { $\angle BEO=2*\angle EAO$ }, 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)}

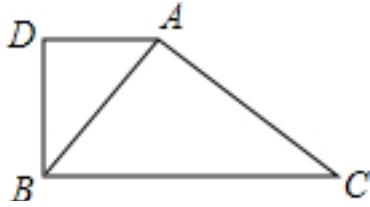
48、topic: 如图,在平面直角坐标系中,A、B两点的坐标分别为\$A(2,3)、B(4,1)\$,试求\$△ABO\$的面积.



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_ΔABO=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_ΔABO)}

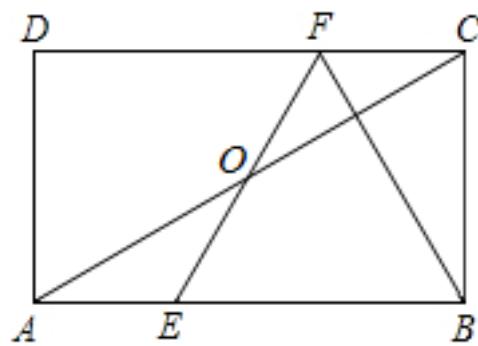
49、topic: 如图,在四边形ADBC中,BC=2BD,BA平分 $\angle DBC$,AB=AC,求证:AD \perp BD. #%%



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"}, "collinearities": {"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=B A, angle= $\angle CBD$, angle1= $\angle ABC$, angle2= $\angle ABD$ }, 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. #%%

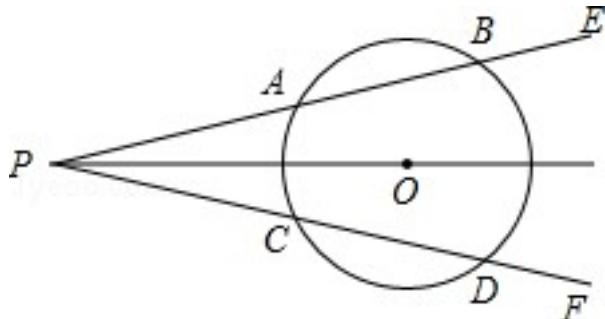


graph:
 {"stem": {"pictures": [{"picturename": "1000035800_Q_1.jpg", "coordinates": {"A": "-4.00,1.00", "B": "2.00,1.00", "C": "2.00,4.46", "D": "-4.00,4.46", "E": "-2.00,1.00", "F": "0.00,4.46", "O": "-1.00,2.73"}, "collinearities": {"0": "A##D", "1": "B##F", "2": "B##C", "3": "A##O##C", "4": "E##O##F", "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:
 {"subsystems":[],"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]},LineCrossCircleRelation{line=PF, circle= $\odot O$, crossPoints=[C, D]}, crossPointNum=2},ProveConclusionRelation:[证明: EqualityRelation{AB=CD}]

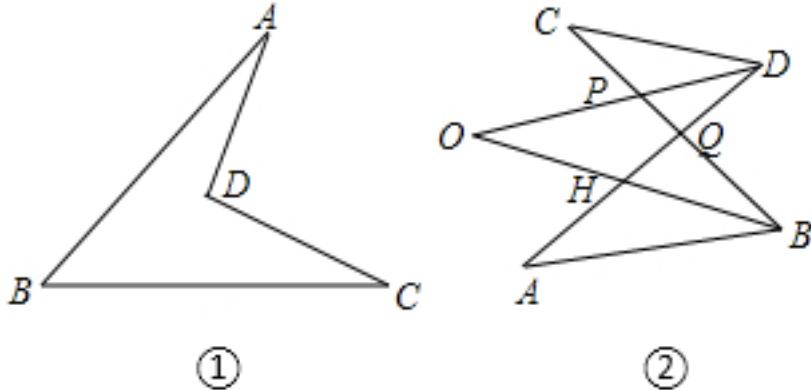
52、topic: 解答:(1)如图1,正方形ABCD中,点E,F分别在边BC,CD上, $\angle EAF=45^\circ$,延长CD到点G,使 $DG=BE$,连结EF,AG.求证: $EF=FG$.#%(2)如图2,等腰直角三角形ABC中, $\angle BAC=90^\circ$, $AB=AC$,点M,N在边BC上,且 $\angle MAN=45^\circ$,若 $BM=1$, $CN=3$,求MN的长.

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": "", "pictures": [{"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{M N=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},

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)}

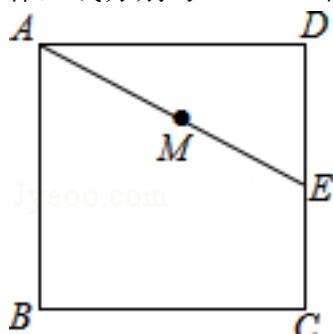
53、topic: (1)如图①, $\angle ADC = 100^\circ$, 试求 $\angle A + \angle B + \angle C$ 的度数; #(2)如图②所示, DO 平分 $\angle CDA$, BO 平分 $\angle CBA$, $\angle A = 20^\circ$, $\angle C = 30^\circ$, 试求 $\angle O$ 的度数. #%



graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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>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=DO, angle= $\angle ADC$, angle1= $\angle ADO$, angle2= $\angle CDO$ }, AngleBisectorRelation{line=BO, 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. #%

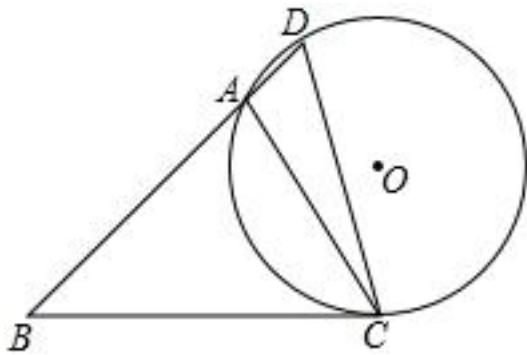


graph:

{"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)}

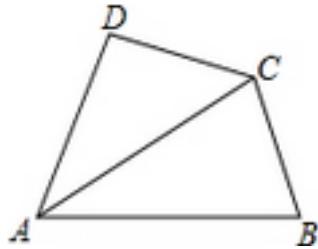
55、topic: 如图,在 $\triangle ABC$ 中, $\angle B=45^\circ$, $\angle ACB=60^\circ$,
 $AB=3\sqrt{2}$,点D为 BA 延长线上的一点,且 $\angle D=\angle ACB$, O 为 $\triangle ACD$ 的外接圆.?(1)求 BC 的长; ?(2)求 O 的半径.



graph:
{"stem": {"pictures": [{"picturename": "1000010402_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "-3.00,0.0", "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)}

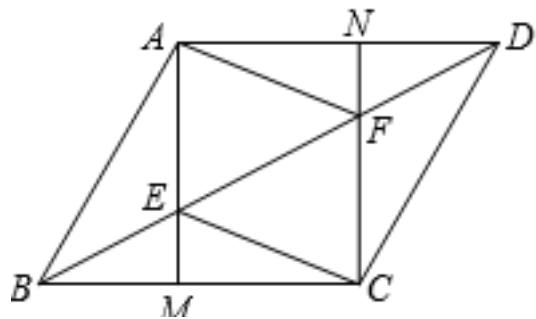
56、topic: 四边形ABCD中,已知AB=a,AD=b,且a>b,对角线AC平分 $\angle BAD$, $DC=BC$,求证: $\angle B+\angle D=180^\circ$



graph:
 {"stem": {"pictures": [{"picturename": "1000040373_Q_1.jpg", "coordinates": {"A": "-5.95, -2.51", "B": "-0.95, -2.51", "C": "-1.80, 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": {}, "subsystems": []}}

NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{AB=a}, EqualityRelation{AD=b}, InequalityRelation{a>b}, AngleBisectorRelation{line=AC, angle= $\angle BAD$, angle1= $\angle BAC$, 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.#%#

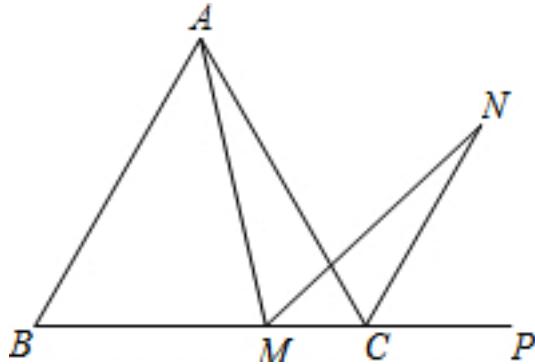


graph:
 {"stem": {"pictures": [{"picturename": "1000050132_Q_1.jpg", "coordinates": {"A": "-8.00, 6.00", "B": "-10.00, 2.00", "C": "-5.00, 2.00", "D": "-3.00, 6.00", "E": "-8.00, 3.14", "F": "-5.00, 4.86", "M": "-8.00, 2.00", "N": "-5.00, 6.00"}, "collineations": {"0": "A##N##D", "1": "A##E##M", "2": "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": {}, "subsystems": []}}

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

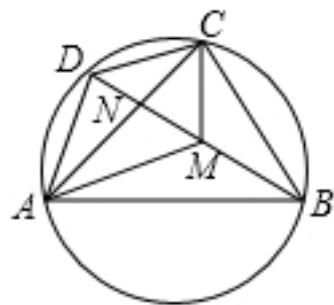
是 $\angle ACP$ 的平分线上一点. 已知 $\angle AMN=60^\circ$.(1)求证:AM=MN;(2)当M在直线上运动时,上述结论是否成立? 若成立,请画图证明.



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": {}, "subsystems": []}}

NLP: AngleBisectorRelation{line=CN,angle= $\angle ACP$, angle1= $\angle ACN$, angle2= $\angle NCP$ }, PointRelation:C, RegularTriangleRelation:RegularTriangle: ΔABC , 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) $\frac{AN}{CN}=\frac{AM}{CM}$.

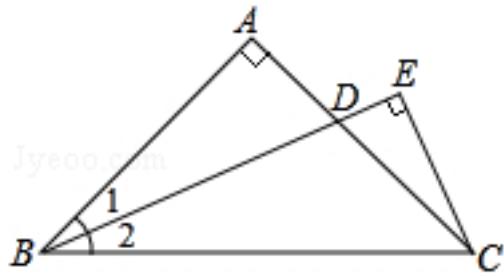


graph:
 {"stem": {"pictures": [{"picturename": "1000052577_Q_1.jpg", "coordinates": {"A": "-0.86,1.29", "B": "4.80,0.87", "C": "2.42,4.98", "D": "0.00,4.20", "N": "1.07,3.46", "O": "2.04,2.01"}, "collineations": {"0": "A##B", "1": "A##D", "2": "A##M", "3": "C##D", "4": "C##M", "5": "C##B", "6": "A##N##C", "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 $\triangle ABC$ 中, $\angle BAC=90^\circ$, $AB=AC$, $CE \perp BD$ 的延长线于点E, $\angle 1=\angle 2$. 求证: $BD=2CE$. #%#

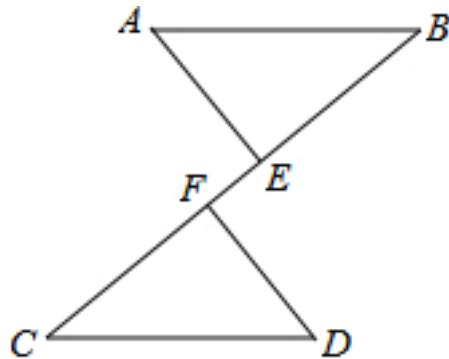


graph:

{"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": "\u00b21=\u00b2ABD", "1": "\u00b22=\u00b2CBD"}, "circles": []}, "appliedproblems": {}, "substems": []}}

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

61、topic: 如图, $AB \parallel CD$, $AB=CD$, 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. #%#



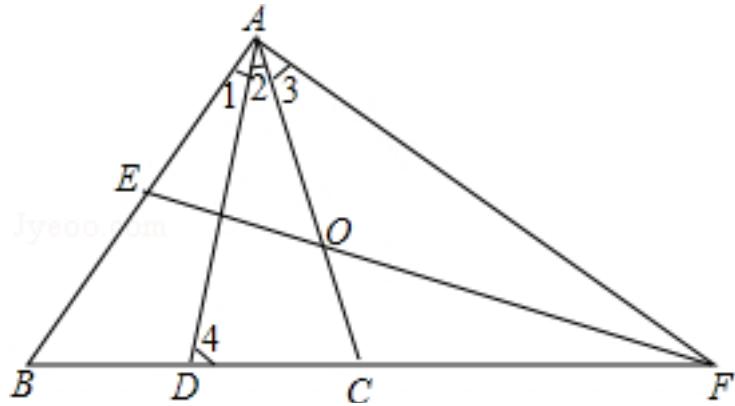
graph:

{"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##F##C", "3": "F##D", "4": "D##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "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

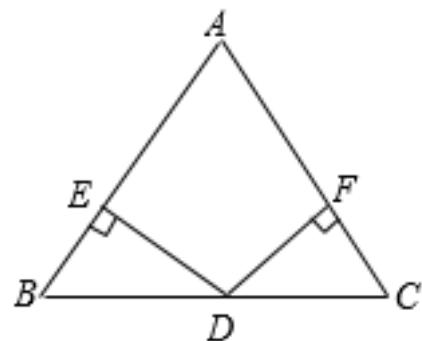
EF于点O.(1)求证:\$\angle 3=\angle B\$;(2)连接OD,求证:\$\angle B+\angle ODB=180^\circ\$.



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###E##B", "1": "B##D##C##F", "2": "A##F", "3": "A##D", "4": "A##O##C", "5": "E##O##F"}, "variable-equals": {"0": "\u22201=\u2220BAD", "1": "\u22202=\u2220DAC", "2": "\u22203=\u2220CAF"}, "circles": []}, "appliedproblems": {}, "substems": []}]}

NLP: TriangleRelation: ΔABC , LineCrossRelation [crossPoint=Optional.of(O), 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 ΔABC 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: $\Delta BED\cong\Delta CFD$; (2)点D在 $\angle A$ 的平分线上吗? 若在请说明理由.

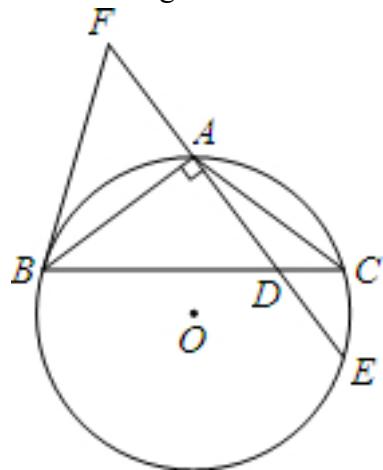


graph:
 {"stem": {"pictures": [{"picturename": "1000040794_Q_1.jpg", "coordinates": {"A": "-2.27,3.39", "B": "-5.27,-1.01", "C": "0.73,-1.01", "D": "-2.27,-1.01", "E": "-4.31,0.39", "F": "-0.22,0.39"}, "collineations": {"0": "A##E##B", "1": "F##C##A", "2": "E##D", "3": "B##D##C", "4": "F##D"}, "variable-equals":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

triangleB=△CFD}],ProveConclusionRelation:[AngleBisectorRelation{line=DA,angle=∠EAF, angle1=∠DAE, angle2=∠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.

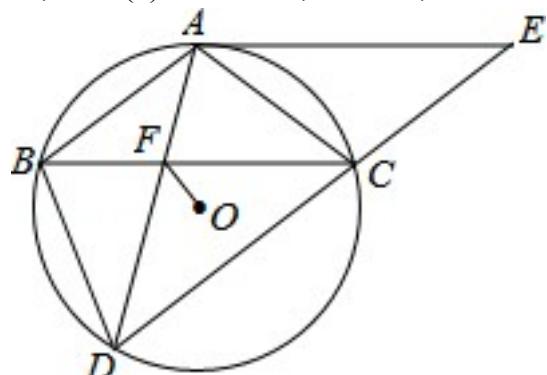


graph:
 {"stem": {"pictures": [{"picturename": "1000060745_Q_1.jpg", "coordinates": {"A": "0.00,3.33", "B": "-3.20,0.93", "C": "3.20,0.93", "D": "1.80,0.93", "E": "3.20,-0.93", "F": "-1.80,5.73", "O": "0.00,0.00"}, "collinearities": {"0": "F###A###D###E", "1": "B###C###D", "2": "A###C", "3": "A###B",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

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{ $\tan(\angle ABD)=\frac{3}{4}$ }, 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= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}}

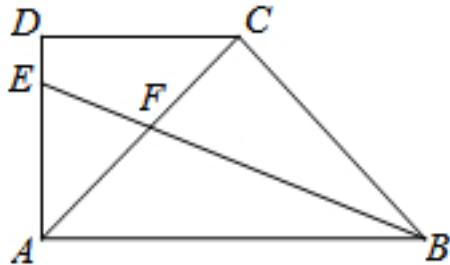
65、topic: 如图, $\triangle ABC$ 内接于 $\odot O$, $AB=AC$, BD 为 $\odot O$ 的弦,且 $AB \parallel CD$,过点A作 $\odot O$ 的切线AE与DC的延长线交于点E,AD与BC交于点F.?(1)求证:四边形 $ABCE$ 是平行四边形;?(2)若 $AE=6$, $CD=5$,求 OF 的长.



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

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}, ChordOfCircleRelation {chord=BD, 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], 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)}, 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)}

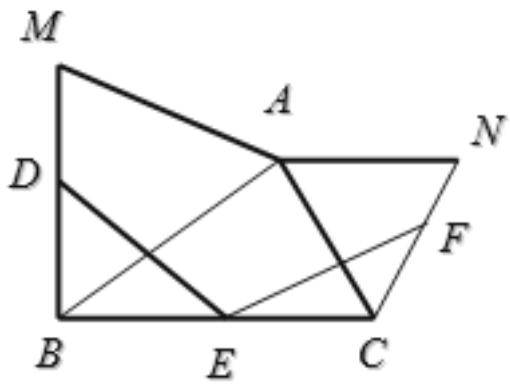
66、topic: 如图,在直角梯形ABCD中, $DC \parallel AB$, $\angle DAB = 90^\circ$, $AC \perp BC$, $AC = BC$, $\angle ABC$ 的平分线分别交AD、AC于点E、F,求 $\frac{BF}{EF}$ 的值.#%#



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"}, "collineations": {"0": "B###A", "1": "B###F###E", "2": "C###D", "3": "A###F###C", "4": "B###C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

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= $\angle ABF$, 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.#%#

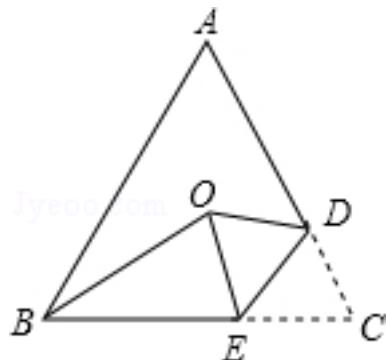


graph:
 {"stem": {"pictures": [{"picturename": "1000040184_Q_1.jpg", "coordinates": {"A": "-2.73,6.83", "B": "-6.75,3.94", "C": "-1.03,3.92", "D": "-6.99,6.40", "E": "-3.89,3.93", "F": "-0.19,5.38", "M": "-7.23,8.87", "N": "0.64,6.84"}, "collineations": {"0": "A###B", "1": "A###M", "2": "A###C", "3": "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=M B},MiddlePointOfSegmentRelation{middlePoint=E,segment=BC},MiddlePointOfSegmentRelation{middle Point=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.#%#



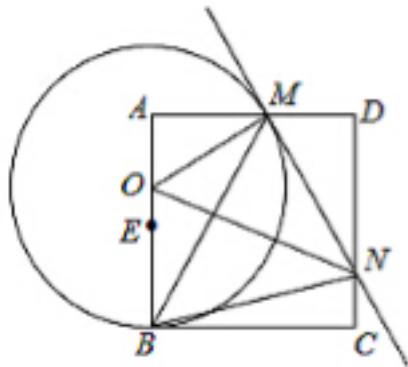
graph:
 {"stem": {"pictures": [{"picturename": "1000027235_Q_1.jpg", "coordinates": {"A": "3.00,5.00", "B": "0.00,0.00", "C": "6.00,0.00", "D": "4.98,1.70", "E": "4.07,0.00", "O": "3.00,1.60"}, "collineations": {"0": "A###B", "1": "C##E###B", "2": "A###C###D", "3": "O###E", "4": "O###D", "5": "E###D", "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:

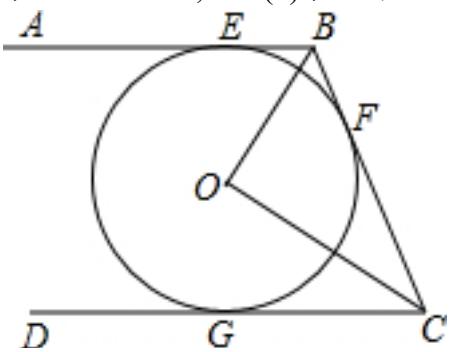
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{"stem": {"pictures": [{"picturename": "1000025034.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "0.00,2.00"}, "collineations": {"0": "B###E##A", "1": "B##C", "2": "D##A", "3": "D##C"}, "variable>equals": {}, "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},MiddlePointOfSegm
entRelation{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_ΔMNO=S_1},EqualityRelation{S_ΔAMO=S_2},EqualityRelation{S_ΔDMN=S_3
},ProveConclusionRelation:[证明: TriangleSimilarRelation{triangleA=ΔAOM,
triangleB=ΔDMN}],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 $AB \parallel CD$, $BO=6\text{cm}$, $CO=8\text{cm}$.
 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":{}}, "substeps":[]}}
```

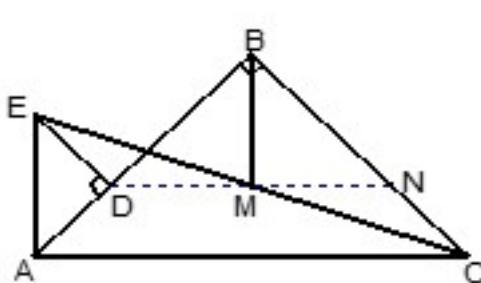
NLP: LineContactCircleRelation{line=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(E),

```

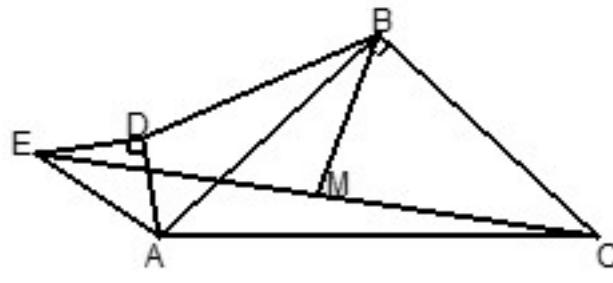
outpoint=Optional.absent()},LineContactCircleRelation{line=BC, circle=Circle[ $\odot$ O]{center=O,
analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(F),
outpoint=Optional.absent()},LineContactCircleRelation{line=CD, circle=Circle[ $\odot$ O]{center=O,
analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, 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=O}],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

```

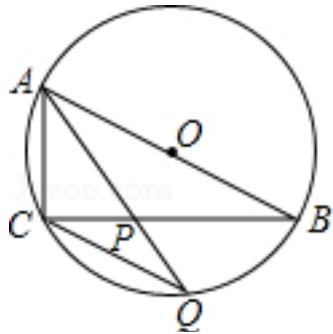
graph:
"stem": {"pictures":[], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000027835_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,4.00", "C": "4.00,0.00", "D": "-2.00,2.00", "E": "-4.00,4.00", "M": "0.00,2.00", "N": "2.00,2.00"}, "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": "", "pictures": [{"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))}

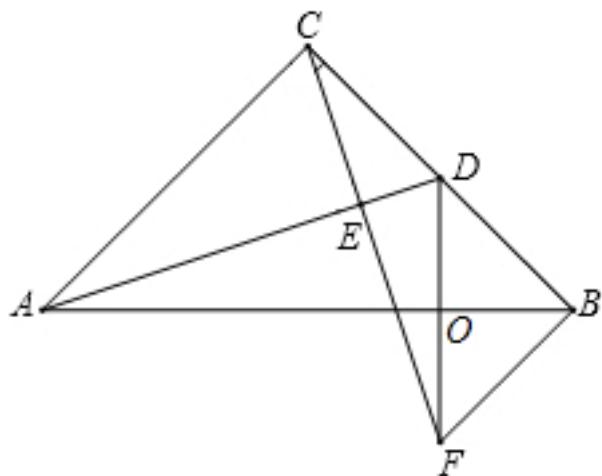
72、topic: 如图,AB是 $\odot O$ 的直径,\$\angle BAC\$的平分线AQ交BC于点P,交 $\odot O$ 于点Q,已知AC=6,\$\angle AQC=30^\circ\$. #(1)求AB的长; #(2)求点P到AB的距离; #(3)求PQ的长. #



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

NLP: AngleBisectorRelation{line=AQ,angle= $\angle CAO$, angle1= $\angle CAQ$, angle2= $\angle OAQ$ },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=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)}

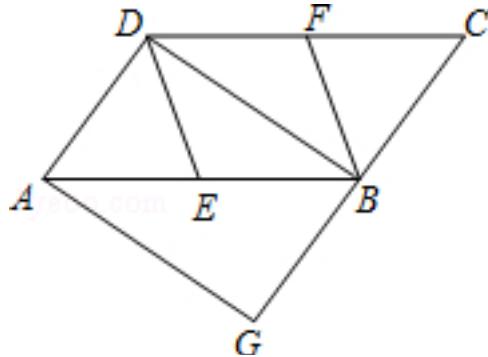
73、topic: 如图,在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=BC$,点D是BC的中点, $CE \perp AD$ 于E, $BF \parallel AC$ 交CE的延长线于点F.求证:AB垂直平分DF.#%#



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": "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: ΔABC [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, $\Delta ADE \cong \Delta CBF$,过A点作AG//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//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": {}, "subsystems": []}}

NLP: 已知条件
 QuadrilateralRelation{quadrilateral=ABCD}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, MiddlePointOfSegmentRelation{middlePoint=F, segment=CD}, TriangleCongRelation{triangleA= ΔADE , triangleB= ΔCBF }, 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=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.

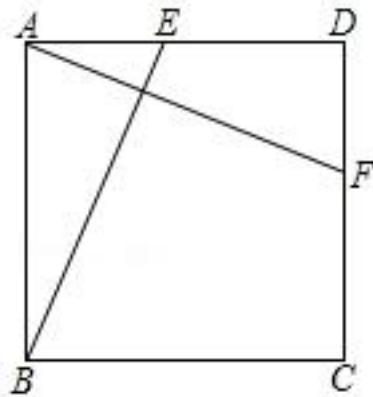
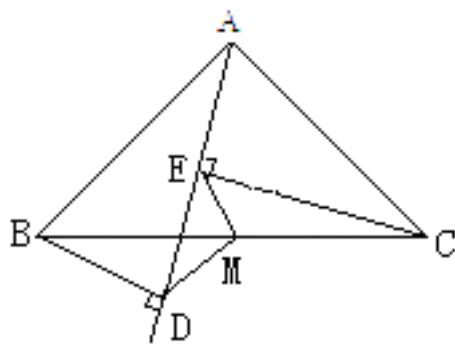


图1

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": "", "pictures": [{"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: $ME=MD$.#%#

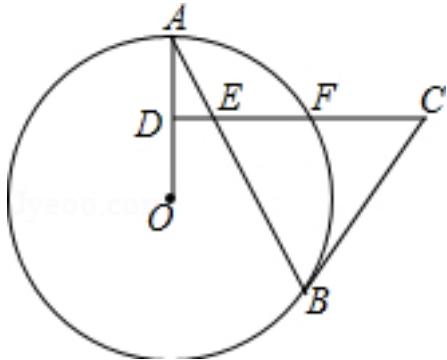


graph:
 {"stem": {"pictures": [{"picturename": "1000040695_Q_1.jpg", "coordinates": {"A": "-6.35,5.21", "B": "-9.00,2.00", "C": "-4.00,2.00", "D": "-7.26,1.57", "E": "-6.97,2.74", "M": "-6.50,2.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##M##C", "3": "A##E##D", "4": "D##B", "5": "D##M",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

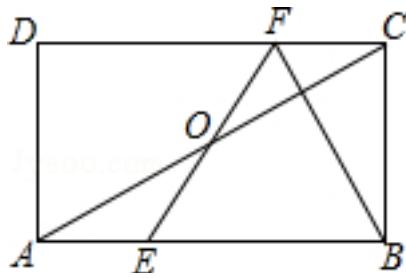
77、topic: 如图,AB是 $\odot O$ 的弦,D为半径OA的中点,过D作 $CD \perp OA$ 交弦AB于点E,交 $\odot O$ 于点F,且 $CE=CB$.#%#(1)求证:BC是 $\odot O$ 的切线;#%#(2)连接AF、BF,求 $\angle ABF$ 的度数;#%#(3)如果 $CD=15$, $BE=10$, $\sin A=\frac{5}{13}$,求 $\odot O$ 的半径.#%#



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"}, "collineations": {"0": "A###D###O", "1": "D###E###F###C", "2": "A###E###B", "3": "B###C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###F"}]}], "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},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=AB, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$,
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= $(x-x_O)^2+(y-y_O)^2=r_O^2$ },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)}],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.#%#

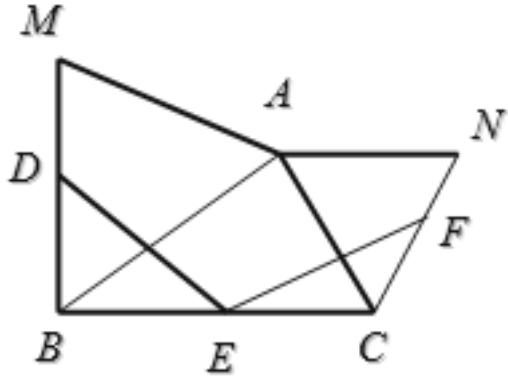


graph:

{"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": {}, "substems": [{"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:]\angle EBF)}

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: $DE=EF$.#%#



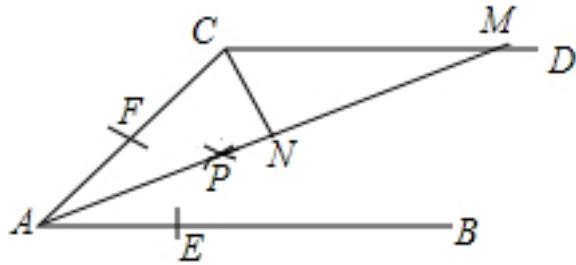
graph:

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

NLP:

TriangleRelation: $\triangle ACN$, RegularTriangleRelation:RegularTriangle: $\triangle ABM$, MiddlePointOfSegmentRelation{middlePoint=D, segment=BM}, MiddlePointOfSegmentRelation{middlePoint=E, segment=BC}, MiddlePointOfSegmentRelation{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: $\triangle ACN \cong \triangle MCN$.

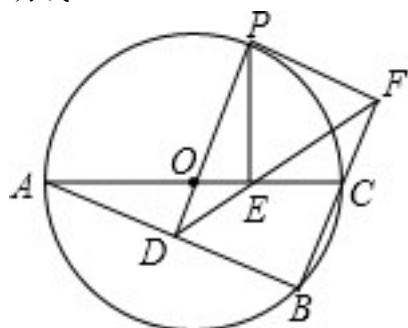


graph:

{"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": [{"center": "A", "radius": "1.63,1.06"}, {"center": "E", "radius": "0.41,0.91"}], "appliedproblems": {}, "subsystems": []}}

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 $\angle POC=60^\circ$, $\angle AC=12^\circ$, 求劣弧PC的长; (结果保留 π) (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", "pointincircle": "C##A##B##P"}], "appliedproblems": {}, "subsystems": []}}

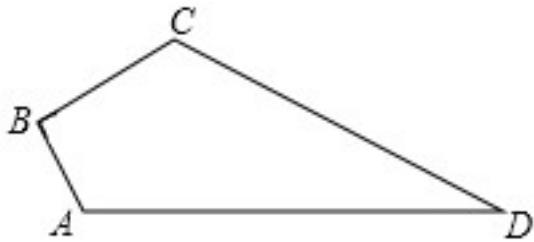
NLP: InscribedShapeOfCircleRelation {closedShape= $\triangle ABC$, circle=Circle[$\odot O$] {center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, DiameterRelation {diameter=AC, circle=Circle[$\odot O$] {center=O,

```

analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null},LinePerpRelation{line1=OD, line2=AB,
crossPoint=D},LineCrossCircleRelation{line=DO, circle=⊕O, crossPoints=[P],
crossPointNum=1},LinePerpRelation{line1=PE, line2=AC,
crossPoint=E},SegmentRelation:PF,EqualityRelation{∠EOP=(1/3*Pi)},EqualityRelation{AC=12},求值(大小): (ExpressRelation:[key:]^CP),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]^CP)},ProveConclusionRelation:[证明:
EqualityRelation{DO=EO}],ProveConclusionRelation:[证明: LineContactCircleRelation{line=PF,
circle=Circle[⊕O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(P),
outpoint=Optional.of(F)}]

```

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



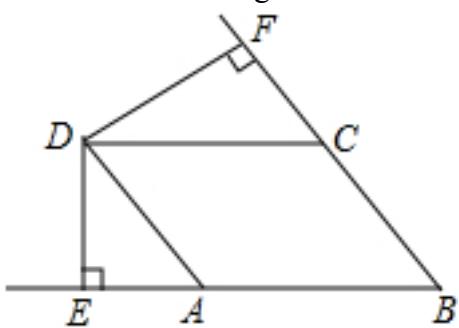
```

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{∠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⊥BA交BA的延长线于点E,DF⊥BC交BC的延长线于点F.求证:DE=DF.#%#



```

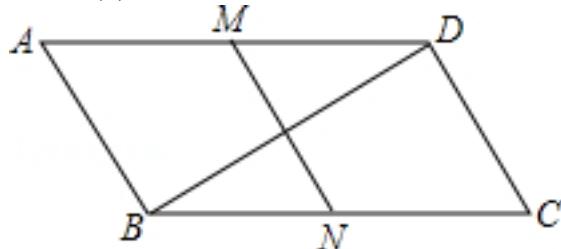
graph:
{"stem": {"pictures": [{"picturename": "1000034566_Q_1.jpg", "coordinates": {"A": "-7.20,-0.34", "B": "-2.41,-0.40", "C": "-4.76,3.78", "D": "-9.55,3.83", "E": "-9.59,-0.32", "F": "-5.93,5.86"}, "collineations": {"0": "D##E", "1": "A##D", "2": "C##D", "3": "D##F", "4": "E##A##B", "5": "B##C##F"}, "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}]

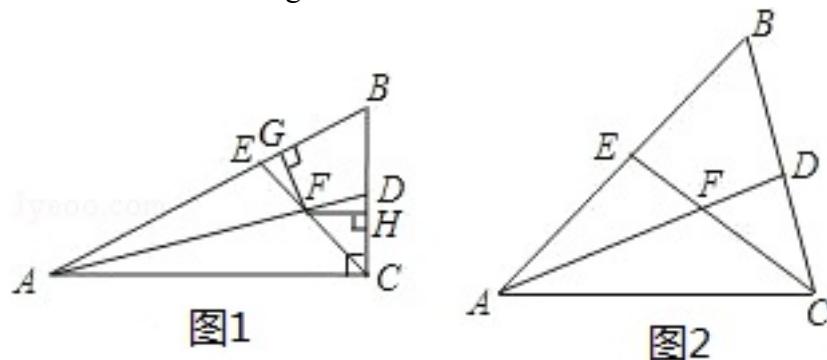
84、topic: 如图,在平行四边形ABCD中,\$\angle C = 60^\circ\$.M、N分别是AD、BC的中点,\$BC = 2CD\$.
(1)求证:四边形MNCD是平行四边形;#%#(2)求证: \$BD = \sqrt{3} MN\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000010825_Q_1.jpg", "coordinates": {"A": "-1.50,4.33", "B": "1.00,0.0", "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": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: ParallelRelation {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: ParallelRelation {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.#%#

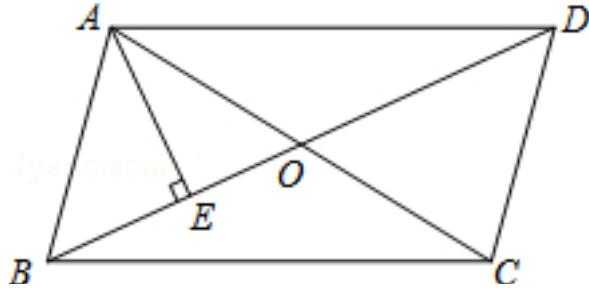


graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "A89EDE9CBA748B097AEA67B5E0EE6CF_1.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-8.00,6.46", "C": "-8.00,3.00", "D": "-8.00,4.61", "E": "-10.20,5.20", "F": "-9.27,4.27", "G": "-9.90,5.37", "H": "-8.00,4.27"}}, "collineations": {"0": "B##A##E##G", "1": "A##F##D", "2": "C##A", "3": "B##D##H##C", "4": "C##E##F", "5": "F##G", "6": "F##H"}, "variable-equals": {}, "circles": []}, {"substemid": "2", "questionrelies": "1", "pictures": [{"picturename": "A89EDE9CBA748B097AEA67B5E0EE6CF_1.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-8.00,6.46", "C": "-8.00,3.00", "D": "-8.00,4.61", "E": "-10.20,5.20", "F": "-9.27,4.27", "G": "-9.90,5.37", "H": "-8.00,4.27"}}, {"picturename": "A89EDE9CBA748B097AEA67B5E0EE6CF_2.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-8.00,6.46", "C": "-8.00,3.00", "D": "-8.00,4.61", "E": "-10.20,5.20", "F": "-9.27,4.27", "G": "-9.90,5.37", "H": "-8.00,4.27"}}], "appliedproblems": {}}]}}

}, {"substemid": "2", "questionrelies": "1", "pictures": [{"picturename": "A89EDE9CBA748B097AEA67B5E0EE6CF_1.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-8.00,6.46", "C": "-8.00,3.00", "D": "-8.00,4.61", "E": "-10.20,5.20", "F": "-9.27,4.27", "G": "-9.90,5.37", "H": "-8.00,4.27"}, "collineations": {"0": "B###A###E###G", "1": "A###F###D", "2": "C###A", "3": "B###D###H###C", "4": "C###E###F", "5": "F###G", "6": "F###H"}, "variable-equals": {}, "circles": []}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "A89EDE9CBA748B097AEA67B5E0EE6CF_2.jpg", "coordinates": {"A": "-15.00,2.00", "B": "-11.00,5.00", "C": "-10.64,2.00", "D": "-10.81,3.40", "E": "-12.64,3.77", "F": "-11.83,3.06"}, "collineations": {"0": "B##A###E", "1": "A###F###D", "2": "C###A", "3": "B###D###C", "4": "C###E###F"}, "variable-equals": {}, "circles": []}], "appliedproblems": []}], "appliedproblems": []}]}

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))})

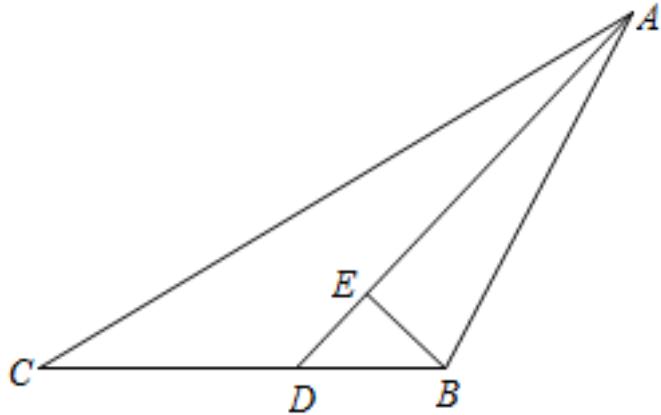
86、topic: 如图, $\square ABCD$ 中, AC 与 BD 相交于点 O , $\angle ABD=2\angle DBC$, $AE \perp BD$ 于点 E . #%(1) 若 $\angle ADB=25^\circ$, 求 $\angle BAE$ 的度数; #%(2) 求证: $AB=2OE$. #%#



graph:
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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: $BE=\frac{1}{2}(AC-AB)$. #%#

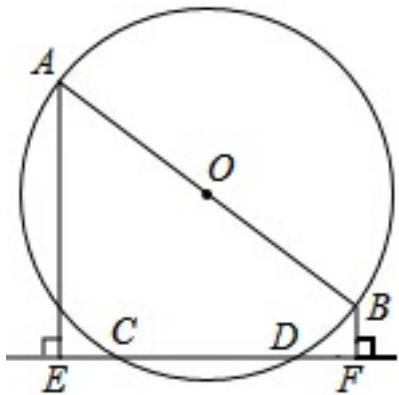


graph:

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NLP: TriangleRelation: ΔABC , 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.%#



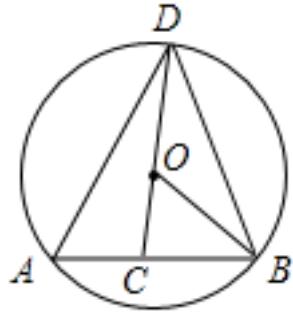
graph:

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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 $SAC=2\sqrt{3}$,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=2cm,过点A的两条弦 $AC=\sqrt{2}$ cm,\$AD=\sqrt{3}cm\$,求 $\angle CAD$ 与所夹弧组成的面积.

graph:
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D": "0.50,0.87", "O": "0.00,0.00"}, "collineations": {"0": "A###O###B", "1": "A###C", "2": "A###D", "3": "D###B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000060820_Q_1.jpg", "coordinates": {"A": "-1.00,0.00", "B": "1.00,0.00", "C": "0.00,1.00", "D": "0.50,-0.87", "O": "0.00,0.00"}, "collineations": {"0": "A###O###B", "1": "A###C", "2": "A###D", "3": "D##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}]}

NLP: PointOnCircleRelation {circle=Circle[$\odot O$]}{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[A]}, DiameterRelation {diameter=AB, circle=Circle[$\odot O$]}{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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{12}{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.#%#

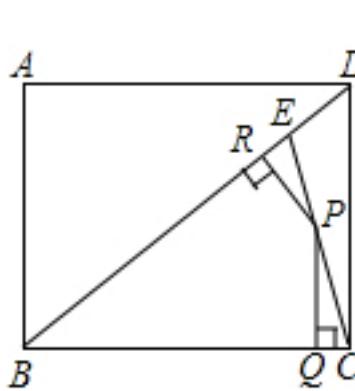


图1

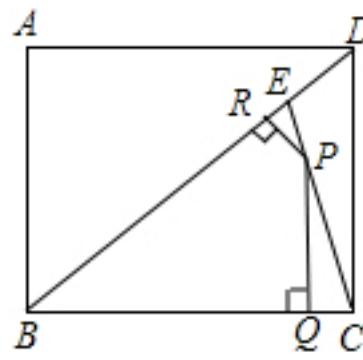


图2

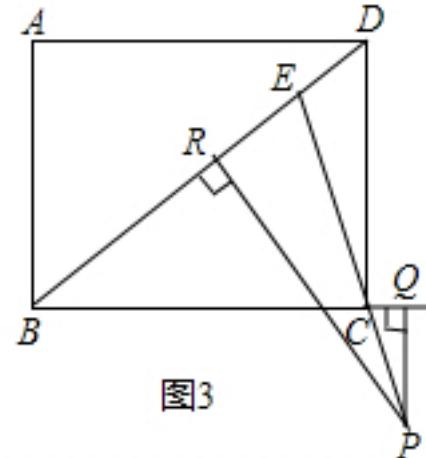


图3

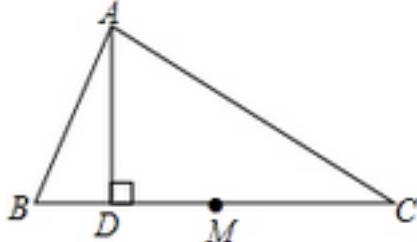
graph:

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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

n: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))}

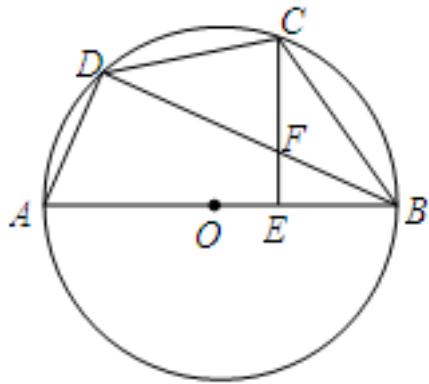
92、topic: 如图,在三角形ABC中, $\angle B = 2\angle C$,AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$.%#



graph:
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NLP: TriangleRelation:△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.%#

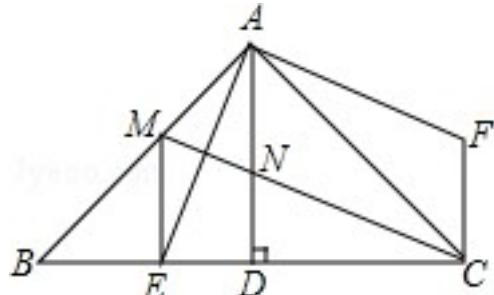


graph:
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NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null},MiddlePointOfArcRelation:C/type:MAJOR_ARC~BD,LinePerpRelation{line1=CE, line2=AB, crossPoint=E},LineCrossRelation [crossPoint=Optional.of(F), 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)}

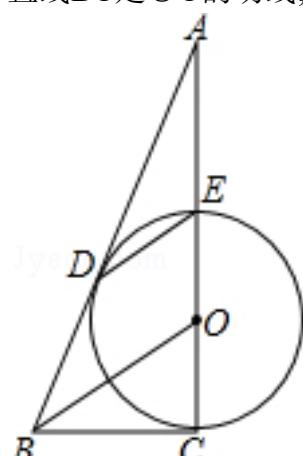
94、topic: 如图, $\triangle ABC$ 中, $\angle BAC = 90^\circ$, $AB = AC$, $AD \perp BC$, 垂足是D, AE 平分 $\angle BAD$, 交 BC 于点E. 在 $\triangle ABC$ 外有一点F, 使 $FA \perp AE$, $FC \perp BC$. #(1) 求证: $BE = CF$; #(2) 在 AB 上取一点M, 使 $BM = 2DE$, 连接MC, 交 AD 于点N, 连接ME. 求证: ① $ME \perp BC$; ② $DE = DN$.



graph:
 {"stem": {"pictures": [{"picturename": "1000026620_Q_1.jpg", "coordinates": {"A": "10.00,5.00", "B": "5.00,0.0", "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"}, "collinearities": {"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": {}, "subsystems": []}}

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation: $\angle CAM = (1/2 * \pi)$, EqualityRelation: $AB = AC$, LinePerpRelation: $AD \perp BC$, crossPoint=D, AngleBisectorRelation: AE is the angle bisector of $\angle BAC$, LineCrossRelation: crossPoint=Optional.of(E), iLine1=AE, iLine2=BC, PositionOfPoint2RegionRelation: point=F, region=EnclosedRegionRelation{name=ABC, closedShape= $\triangle ABC$ }, position=outer, LinePerpRelation: $FA \perp AE$, crossPoint=A, LinePerpRelation: $FC \perp BC$, 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}]

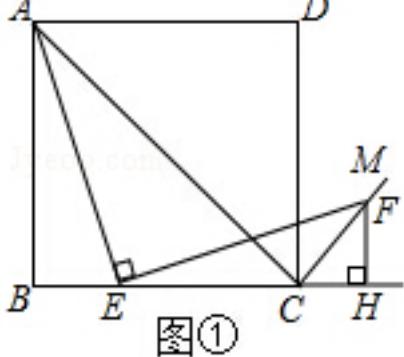
95、topic: 如图,CE是 $\odot O$ 的直径, BD 切 $\odot O$ 于点D, $DE \parallel BO$, CE 的延长线交 BD 于点A. #(1) 求证: 直线BC是 $\odot O$ 的切线; #(2) 若 $AE=2$, $\tan \angle DEO = \sqrt{2}$, 求AO的长. #



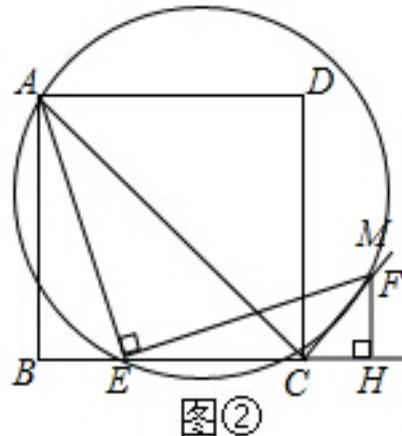
graph:
 {"stem": {"pictures": [{"picturename": "1000040066_Q_1.jpg", "coordinates": {"A": "0.00,6.00", "B": "-2.83,-2.00", "C": "0.00,-2.00", "D": "-1.89,0.67", "E": "0.00,2.00", "O": "0.00,0.00"}, "collineations": {"0": "A###E###O#C", "1": "A###D###B", "2": "C###B", "3": "B###O", "4": "D###E"}, "variable-equals": {}, "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



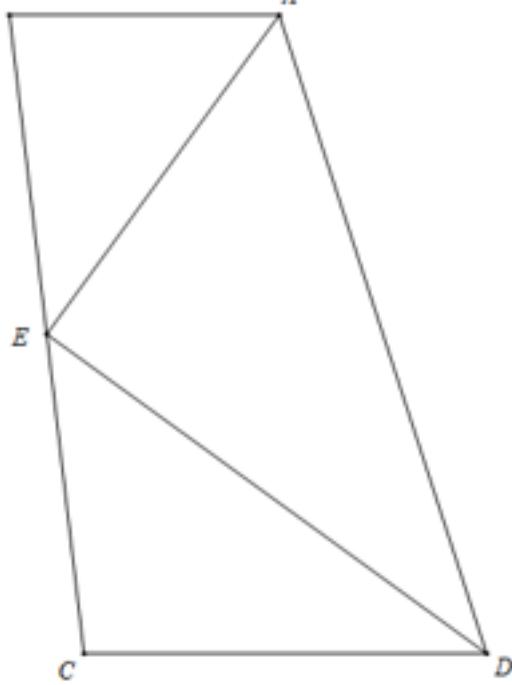
图②

graph:
 {"stem": {"pictures": [{"picturename": "1000025049.jpg", "coordinates": {"A": "-4.00,0.00", "B": "4.00,0.00", "C": "0.50,3.97", "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": "0.00,0.00"}, "collineations": {"0": "B###E###H###C", "1": "D###C", "2": "E###F", "3": "A###C", "4": "F###H", "5": "F###H", "6": "F###C", "7": "E###A", "8": "B###A", "9": "D###A"}, "variable-equals": {"0": "\angle \alpha = \angle PCB", "1": "\angle \beta = \angle POC"}, "circles": [{"center": "O", "pointincircle": "C###B###A"}]}, "appliedproblems": {}, "subsystems": []}}

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:]\$\widehat{AE}\$), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BE/FH)}, ProveConclusionRelation:[证明: EqualityRelation{\$\angle ACF=90^\circ\$}]}

ACF=(1/2*Pi)}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]^AE)}

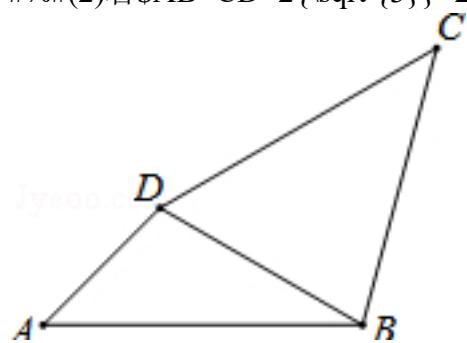
97、topic: 如图,已知AB//CD,AE、DE分别 $\angle BAD$ 和 $\angle ADC$ 的平分线,求证:AB+CD=AD



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.#%#

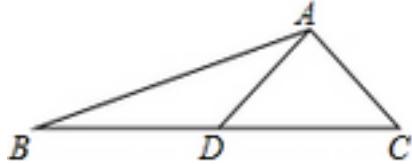


graph:
 {"stem": {"pictures": [{"picturename": "1000027196_Q_1.jpg", "coordinates": {"A": "1.00##1.00##B", "B": "7.00##1.00##C", "C": "8.39##6.20##D", "D": "3.20##3.20"}, "collineations": {"0": "A###B", "1": "A###D", "2": "B###D", "3": "B###C", "4": "D###C"}, "variable>equals": {}, "circles": []}], "appliedproblems":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

#"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.#

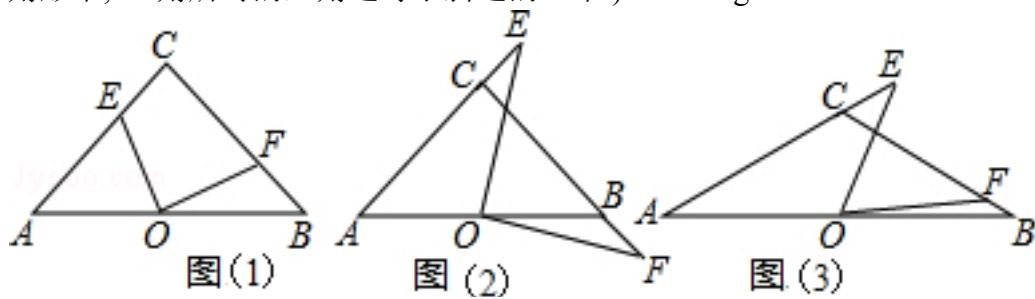


graph:

{"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, $CA = CB = 10\text{cm}$, O 为 AB 的中点, E 、 F 分别在直线 AC 、 BC 上,且 $\angle EOF = 2\angle A$.#①若 $\angle A = 45^\circ$,#①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": "", "pictures": [{"picturename": "1000037839_Q_1.jpg", "coordinates": {"A": "-14.98,10.03", "B": "-9.05,10.03", "C": "-12.01,1.99", "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": []}], "appliedprobl":}}

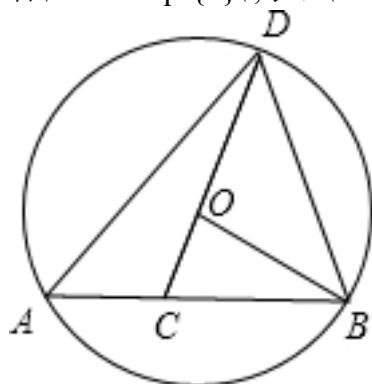
```

ems":{}}, {"substemid": "2", "questionrelies": "", "pictures": [{"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": "2", "questionrelies": "", "pictures": [{"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: ΔABC , 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= ΔCOE , triangleB= ΔBOF }], 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"}]}, {"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": {}}]}}

```

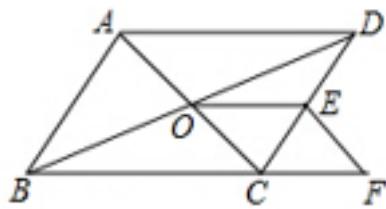
NLP: ChordOfCircleRelation {chord=AB, circle=Circle[$\odot O$]}{center=O, analytic= $(x-x_O)^2 + (y-y_O)^2 = r_O^2$ }, chordLength=null, straightLine=null}, PointRelation:A, PointRelation:B, ChordOfCircleRelation {chord=AB,

```

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.



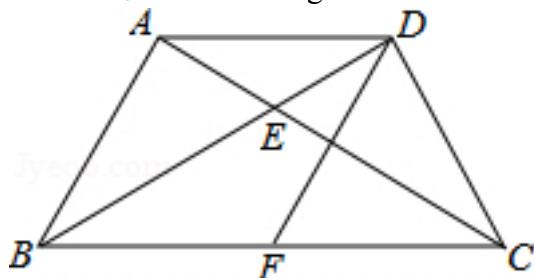
```

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.#%#



```

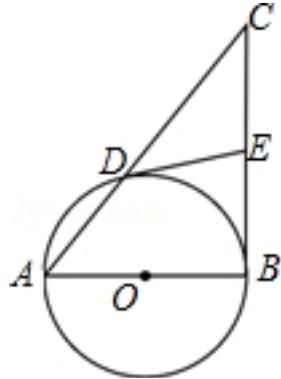
graph:
{"stem": {"pictures": [{"picturename": "D38B55624FC24103908600A2EE9DF528.jpg", "coordinates": {"A": "-12.00,6.00", "B": "-13.50,3.40", "C": "-7.50,3.40", "D": "-9.00,6.00", "E": "-10.50,5.13", "F": "-10.50,3.40"}, "collineations": {"0": "B##A", "1": "A##D", "2": "A##E##C", "3": "B##F##C", "4": "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.#%#

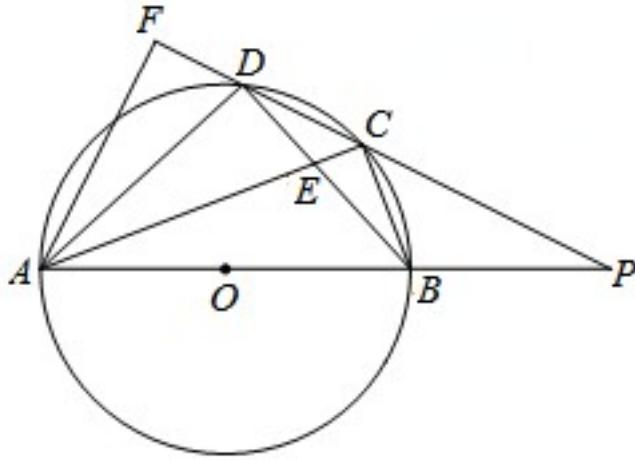


graph:

```
{"stem": {"pictures": [{"picturename": "1000039418_Q_1.jpg", "coordinates": {"A": "4.00,2.00", "B": "8.00,2.00", "C": "8.00,6.00", "D": "6.00,4.00", "E": "8.00,4.00", "O": "6.00,2.00"}, "collinearities": {"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": {}, "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: $\triangle ABC$, 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)}}, 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=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:] $\sin(\angle CAE)$)}]

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.

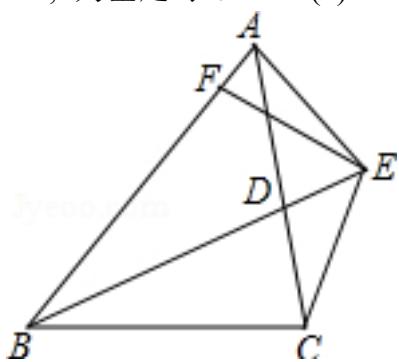


graph:

{"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"}, "collinearities": {"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=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}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD], EqualityRelation {(CD) $^2=CE*AC$ }, 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 {(CD)= $2*(2^{(1/2)})$ }, 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) $BA+BC=2BF$.



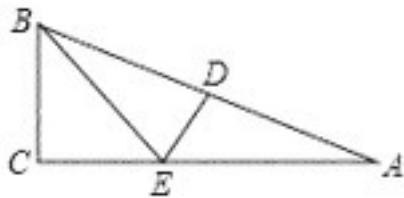
graph:

{"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"}, "collinearities": {"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": [{"substemid": "2", "qu": "106"}]}

estionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}

NLP: TriangleRelation: ΔABC , 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= ΔABD , triangleB= ΔEBC }], ProveConclusionRelation: [证明: EqualityRelation { $\angle BCE + \angle BCD = (Pi)$ }], ProveConclusionRelation: [证明: EqualityRelation { $AB+BC=2*BF$ }]

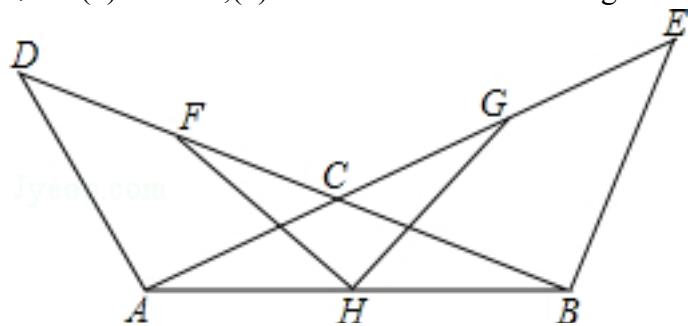
107、topic: 如图, $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=12$, $BC=5$, D是 AB 边上的动点, E是 AC 边上的动点, 则 $BE+ED$ 的最小值



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: ΔABC [Optional.of(C)], EqualityRelation { $\angle BCE = (1/2 * Pi)$ }, 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)

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) $\angle FHG = \angle DAC$.

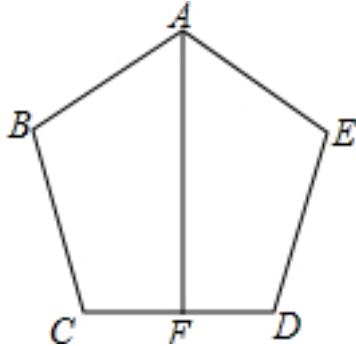


graph:
 {"stem": {"pictures": [{"picturename": "1000041565_Q_1.jpg", "coordinates": {"A": "-9.97,2.04", "B": "-5.98,2.04", "C": "-7.98,2.86", "D": "-10.80,4.03", "E": "-5.16,4.03", "F": "-9.39,3.45", "G": "-6.57,3.45", "H": "-7.98,2.04"}, "collineations": {"0": "A##H##B", "1": "A##D", "2": "B##E", "3": "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 {middlePointF=Optional.of(F)}, MiddlePointOfSegmentRelation {middlePointG=Optional.of(G)}, MiddlePointOfSegmentRelation {middlePointH=Optional.of(H)}}

ePoint=F,segment=DC},MiddlePointOfSegmentRelation{middlePoint=G,segment=CE},MiddlePointOfSegmentRelation{middlePoint=H,segment=AB},EqualityRelation{(2)*∠FHG=∠CAD},ProveConclusionRelation:[证明: EqualityRelation{FH=GH}]

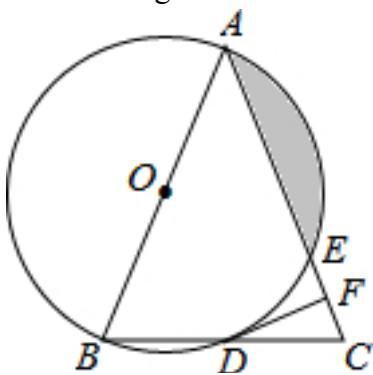
109、topic: 如图,AB=AE,∠ABC=∠AED,BC=ED,点F是CD的中点.求证:AF⊥CD.##



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{∠ABC=∠AED}, EqualityRelation{BC=ED}, MiddlePointOfSegmentRelation{middlePoint=F, segment=CD}, ProveConclusionRelation:[证明: LinePerpRelation{line1=AF, line2=CD, crossPoint=F}]

110、topic: 如图,在△ABC中,AB=AC,以AB为直径的⊙O分别与BC、AC交于点D、E,过点D作⊙O的切线DF,交AC于点F.##(1)求证:DF⊥AC;##(2)若⊙O的半径为4,∠CDF=22.5°,求阴影部分的面积.##

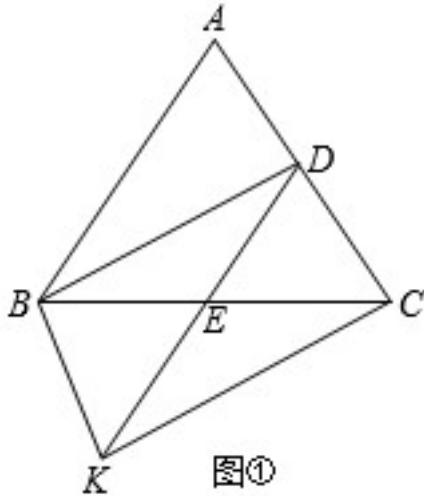


graph:
 {"stem": {"pictures": [{"picturename": "1000081030_Q_1.jpg", "coordinates": {"A": "1.72,3.61", "B": "-1.72,-3.61", "C": "4.39,-3.93", "D": "1.33,-3.77", "E": "3.61,-1.72", "F": "4.00,-2.83", "O": "0.00,0.00"}, "collineations": {"0": "B##O##A", "1": "C##D##B", "2": "A##E##F##C", "3": "D##F"},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

NLP: DiameterRelation{diameter=AB, circle=Circle[⊙O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, TriangleRelation:△ABC, EqualityRelation{AB=AC}, PointRelation:E, LineContactCircleRelation{line=DF, circle=Circle[⊙O]{center=O, 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=O, 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}]
```

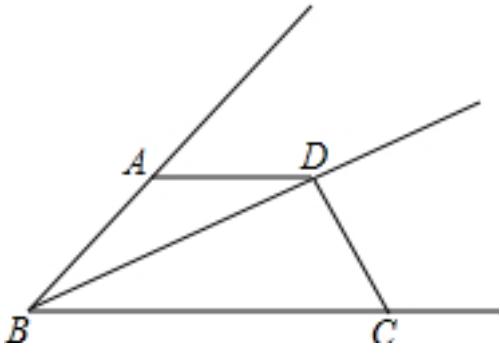
111、topic: 如图①,在 $\triangle ABC$ 中, BD 是 $\angle ABC$ 的角平分线, $DK \parallel AB$ 交 BC 于点 E , 且 $DK=BC$, 连结 BK, CK . (1)求证: $\triangle BDK \cong \triangle DBC$; (2)若 $BA=BC$, 猜想四边形 $BDCK$ 是何种特殊四边形? 并证明你的猜想. (3)若 $\angle BAC=90^\circ$ (如图②), $\angle ABC=30^\circ$, $AB=2\sqrt{3}$, 求四边形 $BDCK$ 的面积.



graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000027748_Q_1.jpg", "coordinates": {"A": "5.00,7.46", "B": "3.00,4.00", "C": "7.00,4.00", "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 $\angle DAB + \angle BCD = 180^\circ$. #

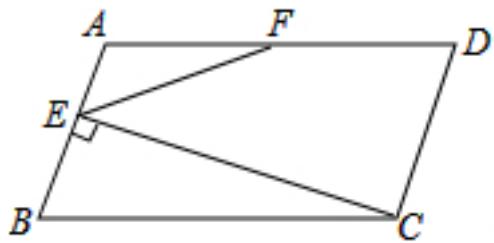


graph:

{"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": {}, "subsystems": []}}

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:

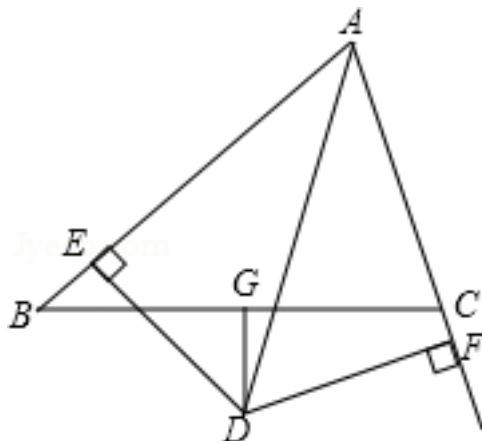
{"stem": {"pictures": [{"picturename": "1000036948_Q_1.jpg", "coordinates": {"A": "-8.29,4.40", "B": "-9.00,2.00", "C": "-4.00,2.00", "D": "-3.29,4.40", "F": "-6.19,4.40", "E": "-8.59,3.37"}, "collineations": {"0": "A##F##D", "1": "A##E##B", "2": "C##D", "3": "B##C", "4": "E##C", "5": "E##F"}, "variable>equals":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

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])

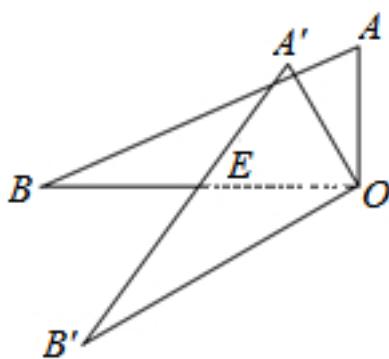
114、topic: 如图,在 $\triangle ABC$ 中,AD为 $\angle BAC$ 的平分线,DG \perp BC且平分BC,DE \perp AB于E,DF \perp AC交AC的延长线于F.#%#(1)求证:BE=CF;#%#(2)如果AB=6,AC=4,求AE,BE的长.#%#



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

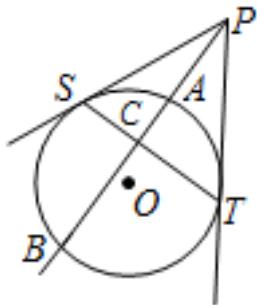
NLP: LineCrossRelation [crossPoint=Optional.of(E), iLine1=A'B', iLine2=BO], EqualityRelation {B'E=v_0}, TriangleRelation: $\triangle AOB$, EqualityRelation { \angle

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 $\frac{1}{PC}=\frac{1}{2}(\frac{1}{PA}+\frac{1}{PB})$.%#

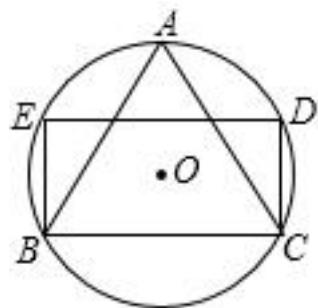


graph:

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

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,  

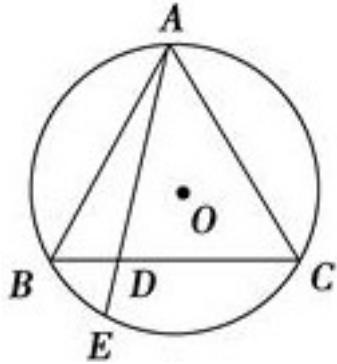
analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[D, E]}, RectangleRelation{rectangle=Rectangle:BCDE},  

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

(ExpressRelation:[key:]S_BCD)}

```

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.



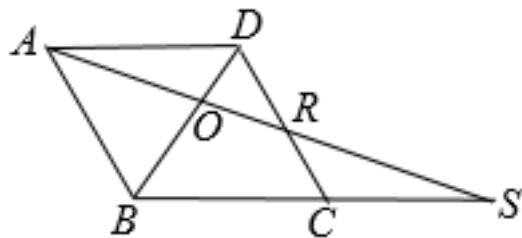
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graph:
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```

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}, 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) $^2=AD \cdot AE$ }]]

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.



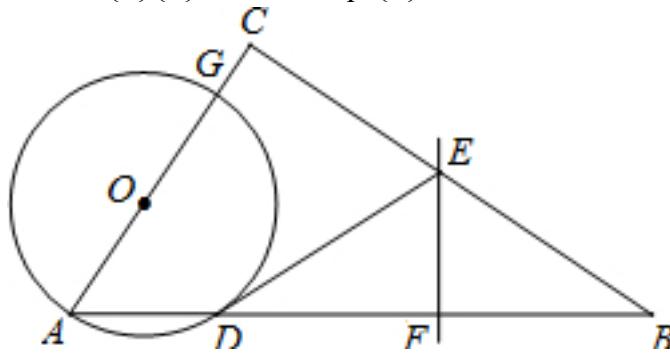
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graph:
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```

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{∠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)}

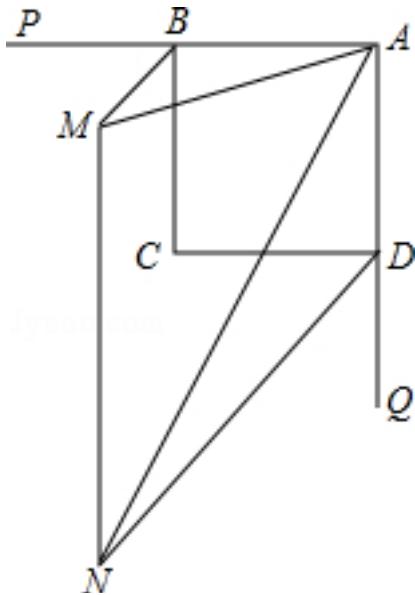
120、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$,点G是线段AC上的一动点(点G不与A、C重合),以AG为直径的 $\odot O$ 交AB于点D,直线EF垂直平分BD,垂足为F,EF交BC于点E,连接DE. (1)求证:DE是 $\odot O$ 的切线; (2)若 $\cos A=\frac{1}{2}$, $AB=8\sqrt{3}$, $AG=2\sqrt{3}$,求BE的长; (3)若 $\cos A=\frac{1}{2}$, $AB=8\sqrt{3}$,直接写出线段BE的取值范围.



graph:
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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=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)}

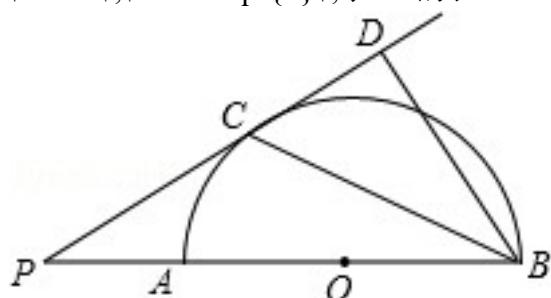
121、topic: 已知:如图,正方形ABCD,BM、DN分别平分正方形的两个外角,且满足 $\angle MAN = 45^\circ$,连结MN.(1)若正方形的边长为a,求 $BM \cdot DN$ 的值.(2)若以BM,DN,MN为三边围成三角形,试猜想三角形的形状,并证明你的结论.



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": {}, "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)}

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 $SP = 6$, $SPC = 6\sqrt{2}$,求BD的长.

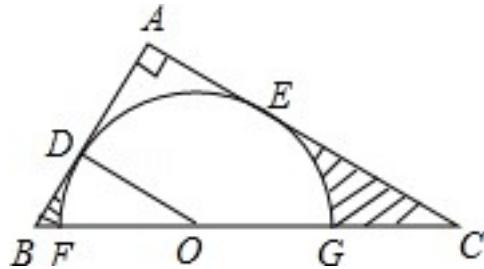


graph:
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circle": "A###B###C"}]}],"appliedproblems": {}}, "substems": []}

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)}

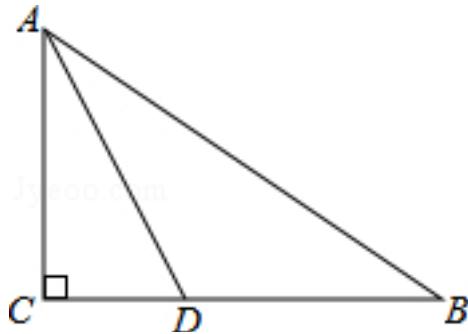
123、topic: 如图,在\$Rt\triangle ABC\$中,\$\angle A=90^\circ\$,O是BC边上一点,以O为圆心的半圆与AB边相切于点D,与AC、BC边分别交于点E、F、G,连接OD,已知\$BD=2\$,\$AE=3\$,\$\tan \angle BOD=\frac{2}{3}\$.?(1)求\$O\$的半径OD;?(2)求证:AE是\$O\$的切线;?(3)求图中两部分阴影面积的和.



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:△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)}]

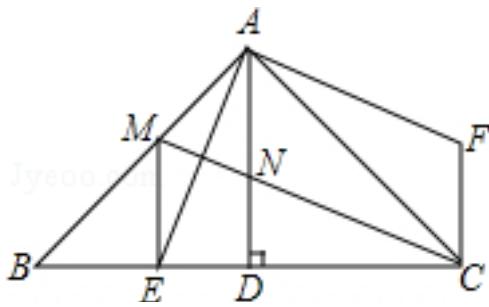
124、topic: 在\$Rt\triangle ABC\$中,\$\angle C=90^\circ\$,AD平分\$\angle CAB\$,AC=6,BC=8,求CD的长度.#%#



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"}, "collineations": {"0": "A##D", "1": "A##B", "2": "A##C", "3": "B##C"}, "variable-equals": {}, "circles": [], "appliedproblems": {}, "substems": []}], "NLP": "EqualityRelation{CD=v_0}, RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], EqualityRelation{∠ACD=(1/2*Pi)}, AngleBisectorRelation{line=AD, angle=∠BAC, angle1=∠BAD, angle2=∠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\$ ⊙A\$中,弦BC,ED所对的圆心角分别是\$ ∠BAC \$,\$ ∠EAD \$.已知\$ ∠BAC+∠EAD=180° \$,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[⊙A]{center=A, analytic=(x-x_A)^2+(y-y_A)^2=r_A^2}, length=Express:[5]}, ChordOfCircleRelation{chord=BC, circle=Circle[⊙A]{center=A, analytic=(x-x_A)^2+(y-y_A)^2=r_A^2}, chordLength=null, straightLine=null}, AngleRelation{angle=∠DAE}, EqualityRelation{DE=6}, EqualityRelation{∠BAC+∠DAE=(Pi)}
 126、topic: 如图,△ABC中,\$ ∠BAC=90° \$,\$ AB=AC \$,\$ AD⊥BC \$,垂足是点D,\$ AE \$平分\$ ∠BAD \$,交BC于点E.在△ABC外有一点F,使\$ FA⊥AE \$,\$ FC⊥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⊥BC \$;②\$ DE=DN \$.#%#

126、topic: 如图,△ABC中,\$ ∠BAC=90° \$,\$ AB=AC \$,\$ AD⊥BC \$,垂足是点D,\$ AE \$平分\$ ∠BAD \$,交BC于点E.在△ABC外有一点F,使\$ FA⊥AE \$,\$ FC⊥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⊥BC \$;②\$ DE=DN \$.#%#

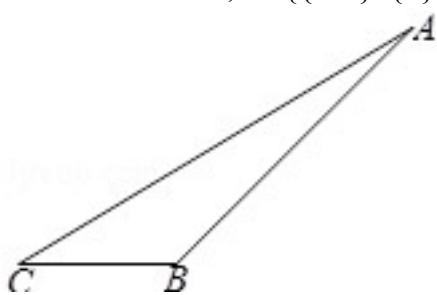


graph:

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```

NLP: TriangleRelation: ΔABC , 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 $\{point = F, region = EnclosedRegionRelation\{name = ABC, closedShape = \Delta ABC\}, position = outer\}$, 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:

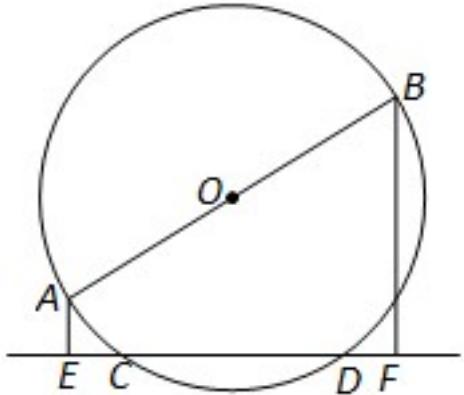
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```

NLP:

TriangleRelation: ΔABC , EqualityRelation $\{BC = 2\}$, EqualityRelation $\{S_{\Delta} = 3\}$, 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])}

(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: $EC = DF$

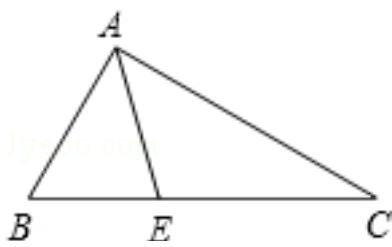


graph:

{"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. #

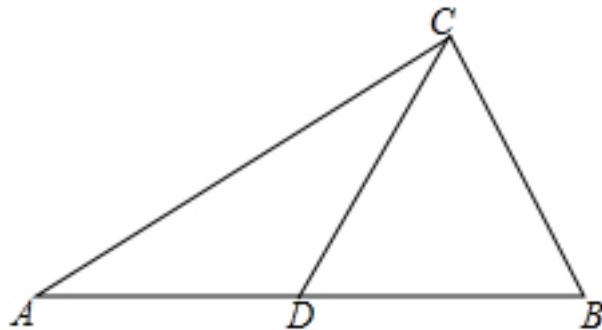


graph:

{"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=求值(大小): (ExpressRelation:[key:] $\angle DAE$)}]

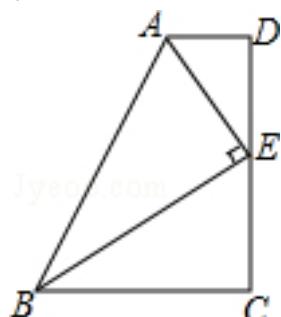
130、topic: 如图,在 $\triangle ABC$ 中,已知D是AB的中点, $AC=12$, $BC=5$, $CD=\frac{13}{2}$.求证: $\triangle ABC$ 为直角三角形.#%#



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"}, "collinearities": {"0": "A##C", "1": "C##B", "2": "C##D", "3": "A##D##B"}, "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)]]]

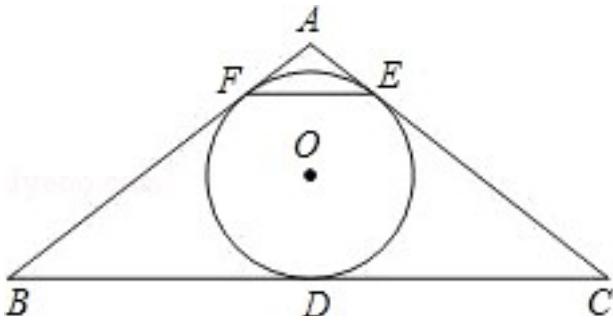
131、topic: 如图,在四边形ABCD中,AD//BC,E为CD的中点,连接AE、BE,BE \perp AE.求证: $AB=BC+AD$.#%#



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"}, "collinearities": {"0": "A##E", "1": "E##B", "2": "B##A", "3": "A##D", "4": "D##E##C", "5": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

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.#%#



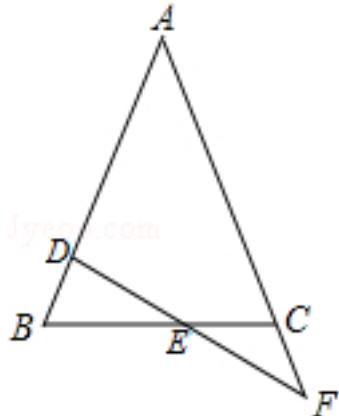
graph:
 {"stem": {"pictures": [{"picturename": "1000008275_Q_1.jpg", "coordinates": {"A": "0.00,2.00", "B": "-3.46,0.0", "C": "3.46,0.00", "E": "0.46,1.73", "D": "0.00,0.00", "F": "-0.46,1.73", "O": "0.00,0.93"}, "collineations": {"0": "A###E###C", "1": "A###B###F", "2": "B###D###C", "3": "E###F"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "D###E###F"}}], "appliedproblems": {}, "substems": []}}

NLP:
 TriangleRelation: ΔABC , EqualityRelation: $AB=AC$, PointRelation: E , PointRelation: F , EqualityRelation: $AC=v_0$, 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, ΔPBF 的面积为 $\{S_1\}$, ΔPDE 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[1_0] analytic :y=k_1_0*x+b_1_0 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=StraightLine[1_0] analytic :y=k_1_0*x+b_1_0 slope:null b:null isLinearFunction:false, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(F), iLine1=StraightLine[1_0] analytic :y=k_1_0*x+b_1_0 slope:null b:null isLinearFunction:false, iLine2=AD], EqualityRelation{CP=CE}, SegmentRelation:DE, SegmentRelation:BP, SegmentRelation:BF, EqualityRelation{CP=x}, EqualityRelation{S_1}, EqualityRelation{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 ΔABC 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: $DE=EF$.#%#

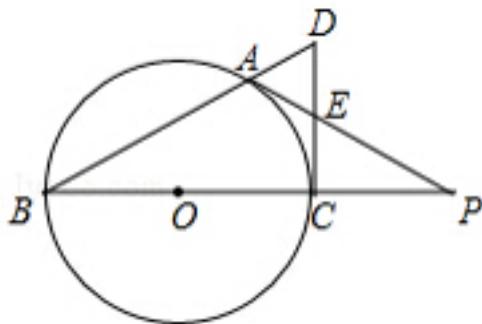


graph:

{"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"}, "collineations": {"0": "B###D###A", "1": "A###C###F", "2": "C###E###B", "3": "D###E###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: ΔABC , 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.



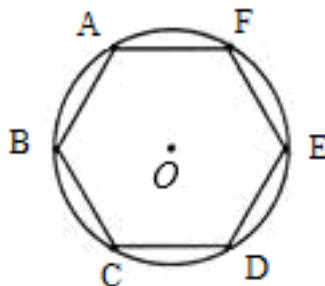
graph:

{"stem": {"pictures": [{"picturename": "1000010170_Q_1.jpg", "coordinates": {"A": "1.74,2.99", "B": "-3.46,0.0", "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"}]}, {"subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}, "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}}

NLP: MiddlePointOfSegmentRelation {middlePoint=E, segment=CD}, DiameterRelation {diameter=BC, 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=[A]}, LineContactCircleRelation {line=CE, 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(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[\odot 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 6π cm,求圆内接正六边形ABCDEF的面积.#%#

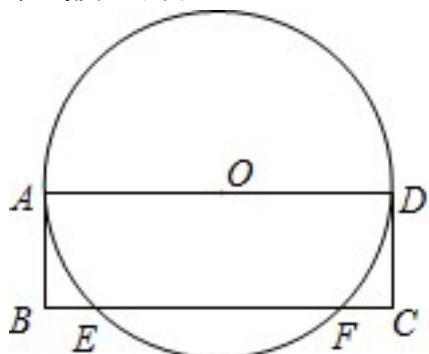


graph:

{"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.

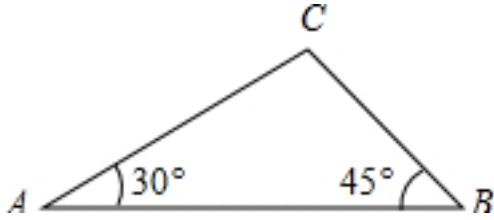


graph:

{"stem": {"pictures": [{"picturename": "1A1B9A2D68BA400788D6220CF3B816E5_Q_1.jpg", "coordinates": {"A": "-16.00,7.00", "B": "-16.00,3.00", "C": "-4.00,3.00", "D": "-4.00,7.00", "E": "-14.47,3.00", "F": "-5.53,3.00", "O": "-10.00,7.00"}, "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.#%#

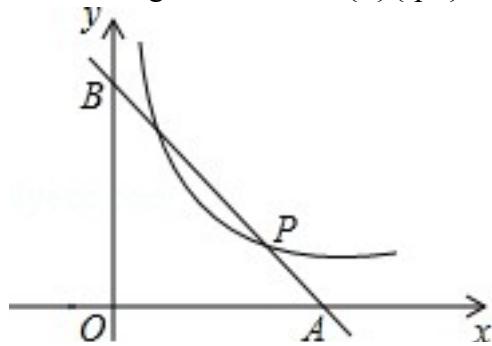


graph:

{"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 $PC \bot y$ 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 $\sin \angle B A' C$ 的值; #%#②对大于1的常数 m ,求 x 轴上的点 M 的坐标,使得 $\sin \angle BMC=\frac{1}{\pi}$ \$.#%#



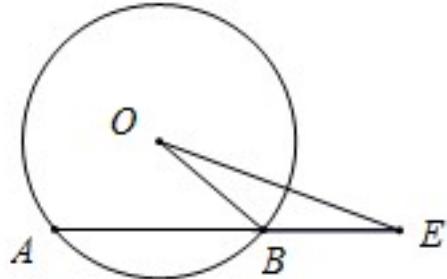
graph:

{"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"}}, {"collineations": {"0": "B##A", "1": "C##A", "2": "B##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, {"appliedproblems": {}, "substems": []}}]

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($\angle BMC$)=(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}

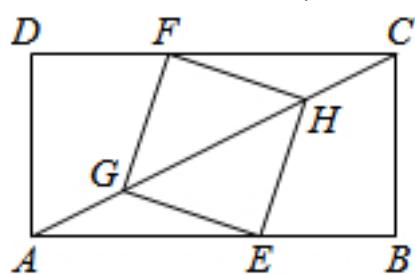
140、topic: 如图,在 $\odot O$ 中,半径 $OB=10\text{cm}$,E是弦AB延长线上一点,连结OE,且 $\angle E=30^\circ$, $OE=12\text{cm}$,求AB.



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=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}},RadiusRelation{radius=OB, circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^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.%



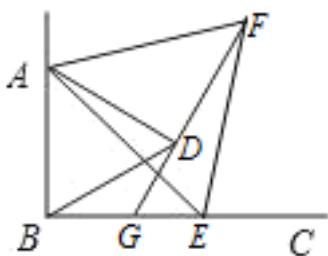
graph:
 {"stem": {"pictures": [{"picturename": "22EE08FEA59D4D43B3BDC941948D1F83.jpg", "coordinates": {"A": "-15.00, 3.00", "B": "-7.00, 3.00", "C": "-7.00, 7.00", "D": "-15.00, 7.00", "E": "-10.00, 3.00", "F": "-12.00, 7.00", "G": "-13.00, 4.00", "H": "-9.00, 6.00"}, "collineations": {"0": "A##B##E", "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":{}}, "subsystems":[]}

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:

graph TD; subgraph Q1 []; A1[A] --- B1[B]; A1 --- C1[C]; A1 --- D1[D]; A1 --- E1[E]; A1 --- F1[F]; A1 --- G1[G]; end; subgraph Q2 []; A2[A] --- B2[B]; A2 --- C2[C]; A2 --- D2[D]; A2 --- E2[E]; A2 --- F2[F]; A2 --- G2[G]; end; subgraph Q3 []; A3[A] --- B3[B]; A3 --- C3[C]; A3 --- D3[D]; A3 --- E3[E]; A3 --- F3[F]; A3 --- G3[G]; end; subgraph Q4 []; A4[A] --- B4[B]; A4 --- C4[C]; A4 --- D4[D]; A4 --- E4[E]; A4 --- F4[F]; A4 --- G4[G]; end; subgraph Q5 []; A5[A] --- B5[B]; A5 --- C5[C]; A5 --- D5[D]; A5 --- E5[E]; A5 --- F5[F]; A5 --- G5[G]; end; subgraph Q6 []; A6[A] --- B6[B]; A6 --- C6[C]; A6 --- D6[D]; A6 --- E6[E]; A6 --- F6[F]; A6 --- G6[G]; end; subgraph Q7 []; A7[A] --- B7[B]; A7 --- C7[C]; A7 --- D7[D]; A7 --- E7[E]; A7 --- F7[F]; A7 --- G7[G]; end; subgraph Q8 []; A8[A] --- B8[B]; A8 --- C8[C]; A8 --- D8[D]; A8 --- E8[E]; A8 --- F8[F]; A8 --- G8[G]; end; subgraph Q9 []; A9[A] --- B9[B]; A9 --- C9[C]; A9 --- D9[D]; A9 --- E9[E]; A9 --- F9[F]; A9 --- G9[G]; end; subgraph Q10 []; A10[A] --- B10[B]; A10 --- C10[C]; A10 --- D10[D]; A10 --- E10[E]; A10 --- F10[F]; A10 --- G10[G]; end; subgraph Q11 []; A11[A] --- B11[B]; A11 --- C11[C]; A11 --- D11[D]; A11 --- E11[E]; A11 --- F11[F]; A11 --- G11[G]; end; subgraph Q12 []; A12[A] --- B12[B]; A12 --- C12[C]; A12 --- D12[D]; A12 --- E12[E]; A12 --- F12[F]; A12 --- G12[G]; end; subgraph Q13 []; A13[A] --- B13[B]; A13 --- C13[C]; A13 --- D13[D]; A13 --- E13[E]; A13 --- F13[F]; A13 --- G13[G]; end; subgraph Q14 []; A14[A] --- B14[B]; A14 --- C14[C]; A14 --- D14[D]; A14 --- E14[E]; A14 --- F14[F]; A14 --- G14[G]; end; subgraph Q15 []; A15[A] --- B15[B]; A15 --- C15[C]; A15 --- D15[D]; A15 --- E15[E]; A15 --- F15[F]; A15 --- G15[G]; end; subgraph Q16 []; A16[A] --- B16[B]; A16 --- C16[C]; A16 --- D16[D]; A16 --- E16[E]; A16 --- F16[F]; A16 --- G16[G]; end; subgraph Q17 []; A17[A] --- B17[B]; A17 --- C17[C]; A17 --- D17[D]; A17 --- E17[E]; A17 --- F17[F]; A17 --- G17[G]; end; subgraph Q18 []; A18[A] --- B18[B]; A18 --- C18[C]; A18 --- D18[D]; A18 --- E18[E]; A18 --- F18[F]; A18 --- G18[G]; end; subgraph Q19 []; A19[A] --- B19[B]; A19 --- C19[C]; A19 --- D19[D]; A19 --- E19[E]; A19 --- F19[F]; A19 --- G19[G]; end; subgraph Q20 []; A20[A] --- B20[B]; A20 --- C20[C]; A20 --- D20[D]; A20 --- E20[E]; A20 --- F20[F]; A20 --- G20[G]; end; subgraph Q21 []; A21[A] --- B21[B]; A21 --- C21[C]; A21 --- D21[D]; A21 --- E21[E]; A21 --- F21[F]; A21 --- G21[G]; end; subgraph Q22 []; A22[A] --- B22[B]; A22 --- C22[C]; A22 --- D22[D]; A22 --- E22[E]; A22 --- F22[F]; A22 --- G22[G]; end; subgraph Q23 []; A23[A] --- B23[B]; A23 --- C23[C]; A23 --- D23[D]; A23 --- E23[E]; A23 --- F23[F]; A23 --- G23[G]; end; subgraph Q24 []; A24[A] --- B24[B]; A24 --- C24[C]; A24 --- D24[D]; A24 --- E24[E]; A24 --- F24[F]; A24 --- G24[G]; end; subgraph Q25 []; A25[A] --- B25[B]; A25 --- C25[C]; A25 --- D25[D]; A25 --- E25[E]; A25 --- F25[F]; A25 --- G25[G]; end; subgraph Q26 []; A26[A] --- B26[B]; A26 --- C26[C]; A26 --- D26[D]; A26 --- E26[E]; A26 --- F26[F]; A26 --- G26[G]; end; subgraph Q27 []; A27[A] --- B27[B]; A27 --- C27[C]; A27 --- D27[D]; A27 --- E27[E]; A27 --- F27[F]; A27 --- G27[G]; end; subgraph Q28 []; A28[A] --- B28[B]; A28 --- C28[C]; A28 --- D28[D]; A28 --- E28[E]; A28 --- F28[F]; A28 --- G28[G]; end; subgraph Q29 []; A29[A] --- B29[B]; A29 --- C29[C]; A29 --- D29[D]; A29 --- E29[E]; A29 --- F29[F]; A29 --- G29[G]; end; subgraph Q30 []; A30[A] --- B30[B]; A30 --- C30[C]; A30 --- D30[D]; A30 --- E30[E]; A30 --- F30[F]; A30 --- G30[G]; end; subgraph Q31 []; A31[A] --- B31[B]; A31 --- C31[C]; A31 --- D31[D]; A31 --- E31[E]; A31 --- F31[F]; A31 --- G31[G]; end; subgraph Q32 []; A32[A] --- B32[B]; A32 --- C32[C]; A32 --- D32[D]; A32 --- E32[E]; A32 --- F32[F]; A32 --- G32[G]; end; subgraph Q33 []; A33[A] --- B33[B]; A33 --- C33[C]; A33 --- D33[D]; A33 --- E33[E]; A33 --- F33[F]; A33 --- G33[G]; end; subgraph Q34 []; A34[A] --- B34[B]; A34 --- C34[C]; A34 --- D34[D]; A34 --- E34[E]; A34 --- F34[F]; A34 --- G34[G]; end; subgraph Q35 []; A35[A] --- B35[B]; A35 --- C35[C]; A35 --- D35[D]; A35 --- E35[E]; A35 --- F35[F]; A35 --- G35[G]; end; subgraph Q36 []; A36[A] --- B36[B]; A36 --- C36[C]; A36 --- D36[D]; A36 --- E36[E]; A36 --- F36[F]; A36 --- G36[G]; end; subgraph Q37 []; A37[A] --- B37[B]; A37 --- C37[C]; A37 --- D37[D]; A37 --- E37[E]; A37 --- F37[F]; A37 --- G37[G]; end; subgraph Q38 []; A38[A] --- B38[B]; A38 --- C38[C]; A38 --- D38[D]; A38 --- E38[E]; A38 --- F38[F]; A38 --- G38[G]; end; subgraph Q39 []; A39[A] --- B39[B]; A39 --- C39[C]; A39 --- D39[D]; A39 --- E39[E]; A39 --- F39[F]; A39 --- G39[G]; end; subgraph Q40 []; A40[A] --- B40[B]; A40 --- C40[C]; A40 --- D40[D]; A40 --- E40[E]; A40 --- F40[F]; A40 --- G40[G]; end; subgraph Q41 []; A41[A] --- B41[B]; A41 --- C41[C]; A41 --- D41[D]; A41 --- E41[E]; A41 --- F41[F]; A41 --- G41[G]; end; subgraph Q42 []; A42[A] --- B42[B]; A42 --- C42[C]; A42 --- D42[D]; A42 --- E42[E]; A42 --- F42[F]; A42 --- G42[G]; end; subgraph Q43 []; A43[A] --- B43[B]; A43 --- C43[C]; A43 --- D43[D]; A43 --- E43[E]; A43 --- F43[F]; A43 --- G43[G]; end; subgraph Q44 []; A44[A] --- B44[B]; A44 --- C44[C]; A44 --- D44[D]; A44 --- E44[E]; A44 --- F44[F]; A44 --- G44[G]; end; subgraph Q45 []; A45[A] --- B45[B]; A45 --- C45[C]; A45 --- D45[D]; A45 --- E45[E]; A45 --- F45[F]; A45 --- G45[G]; end; subgraph Q46 []; A46[A] --- B46[B]; A46 --- C46[C]; A46 --- D46[D]; A46 --- E46[E]; A46 --- F46[F]; A46 --- G46[G]; end; subgraph Q47 []; A47[A] --- B47[B]; A47 --- C47[C]; A47 --- D47[D]; A47 --- E47[E]; A47 --- F47[F]; A47 --- G47[G]; end; subgraph Q48 []; A48[A] --- B48[B]; A48 --- C48[C]; A48 --- D48[D]; A48 --- E48[E]; A48 --- F48[F]; A48 --- G48[G]; end; subgraph Q49 []; A49[A] --- B49[B]; A49 --- C49[C]; A49 --- D49[D]; A49 --- E49[E]; A49 --- F49[F]; A49 --- G49[G]; end; subgraph Q50 []; A50[A] --- B50[B]; A50 --- C50[C]; A50 --- D50[D]; A50 --- E50[E]; A50 --- F50[F]; A50 --- G50[G]; end; subgraph Q51 []; A51[A] --- B51[B]; A51 --- C51[C]; A51 --- D51[D]; A51 --- E51[E]; A51 --- F51[F]; A51 --- G51[G]; end; subgraph Q52 []; A52[A] --- B52[B]; A52 --- C52[C]; A52 --- D52[D]; A52 --- E52[E]; A52 --- F52[F]; A52 --- G52[G]; end; subgraph Q53 []; A53[A] --- B53[B]; A53 --- C53[C]; A53 --- D53[D]; A53 --- E53[E]; A53 --- F53[F]; A53 --- G53[G]; end; subgraph Q54 []; A54[A] --- B54[B]; A54 --- C54[C]; A54 --- D54[D]; A54 --- E54[E]; A54 --- F54[F]; A54 --- G54[G]; end; subgraph Q55 []; A55[A] --- B55[B]; A55 --- C55[C]; A55 --- D55[D]; A55 --- E55[E]; A55 --- F55[F]; A55 --- G55[G]; end; subgraph Q56 []; A56[A] --- B56[B]; A56 --- C56[C]; A56 --- D56[D]; A56 --- E56[E]; A56 --- F56[F]; A56 --- G56[G]; end; subgraph Q57 []; A57[A] --- B57[B]; A57 --- C57[C]; A57 --- D57[D]; A57 --- E57[E]; A57 --- F57[F]; A57 --- G57[G]; end; subgraph Q58 []; A58[A] --- B58[B]; A58 --- C58[C]; A58 --- D58[D]; A58 --- E58[E]; A58 --- F58[F]; A58 --- G58[G]; end; subgraph Q59 []; A59[A] --- B59[B]; A59 --- C59[C]; A59 --- D59[D]; A59 --- E59[E]; A59 --- F59[F]; A59 --- G59[G]; 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A76 --- E76[E]; A76 --- F76[F]; A76 --- G76[G]; end; subgraph Q77 []; A77[A] --- B77[B]; A77 --- C77[C]; A77 --- D77[D]; A77 --- E77[E]; A77 --- F77[F]; A77 --- G77[G]; end; subgraph Q78 []; A78[A] --- B78[B]; A78 --- C78[C]; A78 --- D78[D]; A78 --- E78[E]; A78 --- F78[F]; A78 --- G78[G]; end; subgraph Q79 []; A79[A] --- B79[B]; A79 --- C79[C]; A79 --- D79[D]; A79 --- E79[E]; A79 --- F79[F]; A79 --- G79[G]; end; subgraph Q80 []; A80[A] --- B80[B]; A80 --- C80[C]; A80 --- D80[D]; A80 --- E80[E]; A80 --- F80[F]; A80 --- G80[G]; end; subgraph Q81 []; A81[A] --- B81[B]; A81 --- C81[C]; A81 --- D81[D]; A81 --- E81[E]; A81 --- F81[F]; A81 --- G81[G]; end; subgraph Q82 []; A82[A] --- B82[B]; A82 --- C82[C]; A82 --- D82[D]; A82 --- E82[E]; A82 --- F82[F]; A82 --- G82[G]; end; subgraph Q83 []; A83[A] --- B83[B]; A83 --- C83[C]; A83 --- D83[D]; A83 --- E83[E]; A83 --- F83[F]; A83 --- G83[G]; end; subgraph Q84 []; A84[A] --- B84[B]; A84 --- C84[C]; A84 --- D84[D]; A84 --- E84[E]; A84 --- F84[F]; A84 --- G84[G]; end; subgraph Q85 []; A85[A] --- B85[B]; A85 --- C85[C]; A85 --- D85[D]; A85 --- E85[E]; A85 --- F85[F]; A85 --- G85[G]; end; subgraph Q86 []; A86[A] --- B86[B]; A86 --- C86[C]; A86 --- D86[D]; A86 --- E86[E]; A86 --- F86[F]; A86 --- G86[G]; end; subgraph Q87 []; A87[A] --- B87[B]; A87 --- C87[C]; A87 --- D87[D]; A87 --- E87[E]; A87 --- F87[F]; A87 --- G87[G]; end; subgraph Q88 []; A88[A] --- B88[B]; A88 --- C88[C]; A88 --- D88[D]; A88 --- E88[E]; A88 --- F88[F]; A88 --- G88[G]; end; subgraph Q89 []; A89[A] --- B89[B]; A89 --- C89[C]; A89 --- D89[D]; A89 --- E89[E]; A89 --- F89[F]; A89 --- G89[G]; end; subgraph Q90 []; A90[A] --- B90[B]; A90 --- C90[C]; A90 --- D90[D]; A90 --- E90[E]; A90 --- F90[F]; A90 --- G90[G]; end; subgraph Q91 []; A91[A] --- B91[B]; A91 --- C91[C]; A91 --- D91[D]; A91 --- E91[E]; A91 --- F91[F]; A91 --- G91[G]; end; subgraph Q92 []; A92[A] --- B92[B]; A92 --- C92[C]; A92 --- D92[D]; A92 --- E92[E]; A92 --- F92[F]; A92 --- G92[G]; end; subgraph Q93 []; A93[A] --- B93[B]; A93 --- C93[C]; A93 --- D93[D]; A93 --- E93[E]; A93 --- F93[F]; A93 --- G93[G]; end; subgraph Q94 []; A94[A] --- B94[B]; A94 --- C94[C]; A94 --- D94[D]; A94 --- E94[E]; A94 --- F94[F]; A94 --- G94[G]; end; subgraph Q95 []; A95[A] --- B95[B]; A95 --- C95[C]; A95 --- D95[D]; A95 --- E95[E]; A95 --- F95[F]; A95 --- G95[G]; end; subgraph Q96 []; A96[A] --- B96[B]; A96 --- C96[C]; A96 --- D96[D]; A96 --- E96[E]; A96 --- F96[F]; A96 --- G96[G]; end; subgraph Q97 []; A97[A] --- B97[B]; A97 --- C97[C]; A97 --- D97[D]; A97 --- E97[E]; A97 --- F97[F]; A97 --- G97[G]; end; subgraph Q98 []; A98[A] --- B98[B]; A98 --- C98[C]; A98 --- D98[D]; A98 --- E98[E]; A98 --- F98[F]; A98 --- G98[G]; end; subgraph Q99 []; A99[A] --- B99[B]; A99 --- C99[C]; A99 --- D99[D]; A99 --- E99[E]; A99 --- F99[F]; A99 --- G99[G]; end; subgraph Q100 []; A100[A] --- B100[B]; A100 --- C100[C]; A100 --- D100[D]; A100 --- E100[E]; A100 --- F100[F]; A100 --- G100[G]; end; subgraph Q101 []; A101[A] --- B101[B]; A101 --- C101[C]; A101 --- D101[D]; A101 --- E101[E]; A101 --- F101[F]; A101 --- G101[G]; end; subgraph Q102 []; A102[A] --- B102[B]; A102 --- C102[C]; A102 --- D102[D]; A102 --- E102[E]; A102 --- F102[F]; A102 --- G102[G]; end; subgraph Q103 []; A103[A] --- B103[B]; A103 --- C103[C]; A103 --- D103[D]; A103 --- E103[E]; A103 --- F103[F]; A103 --- G103[G]; end; subgraph Q104 []; A104[A] --- B104[B]; A104 --- C104[C]; A104 --- D104[D]; A104 --- E104[E]; A104 --- F104[F]; A104 --- G104[G]; end; subgraph Q105 []; A105[A] --- B105[B]; A105 --- C105[C]; A105 --- D105[D]; A105 --- E105[E]; A105 --- F105[F]; A105 --- G105[G]; end; subgraph Q106 []; A106[A] --- B106[B]; A106 --- C106[C]; A106 --- D106[D]; A106 --- E106[E]; A106 --- F106[F]; A106 --- G106[G]; end; subgraph Q107 []; A107[A] --- B107[B]; A107 --- C107[C]; A107 --- D107[D]; A107 --- E107[E]; A107 --- F107[F]; A107 --- G107[G]; end; subgraph Q108 []; A108[A] --- B108[B]; A108 --- C108[C]; A108 --- D108[D]; A108 --- E108[E]; A108 --- F108[F]; A108 --- G108[G]; end; subgraph Q109 []; A109[A] --- B109[B]; A109 --- C109[C]; A109 --- D109[D]; A109 --- E109[E]; A109 --- F109[F]; A109 --- G109[G]; end; subgraph Q110 []; A110[A] --- B110[B]; A110 --- C110[C]; A110 --- D110[D]; A110 --- E110[E]; A110 --- F110[F]; A110 --- G110[G]; end; subgraph Q111 []; A111[A] --- B111[B]; A111 --- C111[C]; A111 --- D111[D]; A111 --- E111[E]; A111 --- F111[F]; A111 --- G111[G]; end; subgraph Q112 []; A112[A] --- B112[B]; A112 --- C112[C]; A112 --- D112[D]; A112 --- E112[E]; A112 --- F112[F]; A112 --- G112[G]; end; subgraph Q113 []; A113[A] --- B113[B]; A113 --- C113[C]; A113 --- D113[D]; A113 --- E113[E]; A113 --- F113[F]; A113 --- G113[G]; end; subgraph Q114 []; A114[A] --- B114[B]; A114 --- C114[C]; A114 --- D114[D]; A114 --- E114[E]; A114 --- F114[F]; A114 --- G114[G]; end; subgraph Q115 []; A115[A] --- B115[B]; A115 --- C115[C]; A115 --- D115[D]; A115 --- E115[E]; A115 --- F115[F]; A115 --- G115[G]; end; subgraph Q116 []; A116[A] --- B116[B]; A116 --- C116[C]; A116 --- D116[D]; A116 --- E116[E]; A116 --- F116[F]; A116 --- G116[G]; end; subgraph Q117 []; A117[A] --- B117[B]; A117 --- C117[C]; A117 --- D117[D]; A117 --- E117[E]; A117 --- F117[F]; A117 --- G117[G]; end; subgraph Q118 []; A118[A] --- B118[B]; A118 --- C118[C]; A118 --- D118[D]; A118 --- E118[E]; A118 --- F118[F]; A118 --- G118[G]; end; subgraph Q119 []; A119[A] --- B119[B]; A119 --- C119[C]; A119 --- D119[D]; A119 --- E119[E]; A119 --- F119[F]; A119 --- G119[G]; end; subgraph Q120 []; A120[A] --- B120[B]; A120 --- C120[C]; A120 --- D120[D]; A120 --- E120[E]; A120 --- F120[F]; A120 --- G120[G]; end; subgraph Q121 []; A121[A] --- B121[B]; A121 --- C121[C]; A121 --- D121[D]; A121 --- E121[E]; A121 --- F121[F]; A121 --- G121[G]; end; subgraph Q122 []; A122[A] --- B122[B]; A122 --- C122[C]; A122 --- D122[D]; A122 --- E122[E]; A122 --- F122[F]; A122 --- G122[G]; end; subgraph Q123 []; A123[A] --- B123[B]; A123 --- C123[C]; A123 --- D123[D]; A123 --- E123[E]; A123 --- F123[F]; A123 --- G123[G]; end; subgraph Q124 []; A124[A] --- B124[B]; A124 --- C124[C]; A124 --- D124[D]; A124 --- E124[E]; A124 --- F124[F]; A124 --- G124[G]; end; subgraph Q125 []; A125[A] --- B125[B]; A125 --- C125[C]; A125 --- D125[D]; A125 --- E125[E]; A125 --- F125[F]; A125 --- G125[G]; end; subgraph Q126 []; A126[A] --- B126[B]; A126 --- C126[C]; A126 --- D126[D]; A126 --- E126[E]; A126 --- F126[F]; A126 --- G126[G]; end; subgraph Q127 []; A127[A] --- B127[B]; A127 --- C127[C]; A127 --- D127[D]; A127 --- E127[E]; A127 --- F127[F]; A127 --- G127[G]; end; subgraph Q128 []; A128[A] --- B128[B]; A128 --- C128[C]; A128 --- D128[D]; A128 --- E128[E]; A128 --- F128[F]; A128 --- G128[G]; end; subgraph Q129 []; A129[A] --- B129[B]; A129 --- C129[C]; A129 --- D129[D]; A129 --- E129[E]; A129 --- F129[F]; A129 --- G129[G]; end; subgraph Q130 []; A130[A] --- B130[B]; A130 --- C130[C]; A130 --- D130[D]; A130 --- E130[E]; A130 --- F130[F]; A130 --- G130[G]; end; subgraph Q131 []; A131[A] --- B131[B]; A131 --- C131[C]; A131 --- D131[D]; A131 --- E131[E]; A131 --- F131[F]; A131 --- G131[G]; end; subgraph Q132 []; A132[A] --- B132[B]; A132 --- C132[C]; A132 --- D132[D]; A132 --- E132[E]; A132 --- F132[F]; A132 --- G132[G]; end; subgraph Q133 []; A133[A] --- B133[B]; A133 --- C133[C]; A133 --- D133[D]; A133 --- E133[E]; A133 --- F133[F]; A133 --- G133[G]; end; subgraph Q134 []; A134[A] --- B134[B]; A134 --- C134[C]; A134 --- D134[D]; A134 --- E134[E]; A134 --- F134[F]; A134 --- G134[G]; end; subgraph Q135 []; A135[A] --- B135[B]; A135 --- C135[C]; A135 --- D135[D]; A135 --- E135[E]; A135 --- F135[F]; A135 --- G135[G]; end; subgraph Q136 []; A136[A] --- B136[B]; A136 --- C136[C]; A136 --- D136[D]; A136 --- E136[E]; A136 --- F136[F]; A136 --- G136[G]; end; subgraph Q137 []; A137[A] --- B137[B]; A137 --- C137[C]; A137 --- D137[D]; A137 --- E137[E]; A137 --- F137[F]; A137 --- G137[G]; end; subgraph Q138 []; A138[A] --- B138[B]; A138 --- C138[C]; A138 --- D138[D]; A138 --- E138[E]; A138 --- F138[F]; A138 --- G138[G]; end; subgraph Q139 []; A139[A] --- B139[B]; A139 --- C139[C]; A139 --- D139[D]; A139 --- E139[E]; A139 --- F139[F]; A139 --- G139[G]; end; subgraph Q140 []; A140[A] --- B140[B]; A140 --- C140[C]; A140 --- D140[D]; A140 --- E140[E]; A140 --- F140[F]; A140 --- G140[G]; end; subgraph Q141 []; A141[A] --- B141[B]; A141 --- C141[C]; A141 --- D141[D]; A141 --- E141[E]; A141 --- F141[F]; A141 --- G141[G]; end; subgraph Q142 []; A142[A] --- B142[B]; A142 --- C142[C]; A142 --- D142[D]; A142 --- E142[E]; A142 --- F142[F]; A142 --- G142[G]; end; subgraph Q143 []; A143[A] --- B143[B]; A143 --- C143[C]; A143 --- D143[D]; A143 --- E143[E]; A143 --- F143[F]; A143 --- G143[G]; end; subgraph Q144 []; A144[A] --- B144[B]; A144 --- C144[C]; A144 --- D144[D]; A144 --- E144[E]; A144 --- F144[F]; A144 --- G144[G]; end; subgraph Q145 []; A145[A] --- B145[B]; A145 --- C145[C]; A145 --- D145[D]; A145 --- E145[E]; A145 --- F145[F]; A145 --- G145[G]; end; subgraph Q146 []; A146[A] --- B146[B]; A146 --- C146[C]; A146 --- D146[D]; A146 --- E146[E]; A146 --- F146[F]; A146 --- G146[G]; end; subgraph Q147 []; A147[A] --- B147[B]; A147 --- C147[C]; A147 --- D147[D]; A147 --- E147[E]; A147 --- F147[F]; A147 --- G147[G]; end; subgraph Q148 []; A148[A] --- B148[B]; A148 --- C148[C]; A148 --- D148[D]; A148 --- E148[E]; A148 --- F148[F]; A148 --- G148[G]; end; subgraph Q149 []; A149[A] --- B149[B]; A149 --- C149[C]; A149 --- D149[D]; A149 --- E149[E]; A149 --- F149[F]; A149 --- G149[G]; end; subgraph Q150 []; A150[A] --- B150[B]; A150 --- C150[C]; A150 --- D150[D]; A150 --- E150[E]; A150 --- F150[F]; A150 --- G150[G]; end; subgraph Q151 []; A151[A] --- B151[B]; A151 --- C151[C]; A151 --- D151[D]; A151 --- E151[E]; A151 --- F151[F]; A151 --- G151[G]; end; sub

(大小): (ExpressRelation:[key:]∠DGE}),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]C_△AEF)}

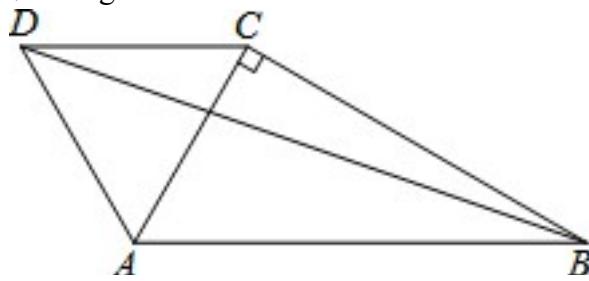
143、topic: 如图,在平面直角坐标系中,已知\$A(0,a)\$、\$B(b,0)\$、\$C(3,c)\$三点,其中a、b、c满足关系式: $\left|a - 2\right| + \sqrt{(b - 3)^2 + (c - 4)^2} = 0$ #(1)求a、b、c的值. #(2)如果在第二象限内有一点\$P(m, \frac{1}{2})\$,请用含m的式子表示四边形ABOP的面积. #(3)在(2)的条件下,是否存在点P,使四边形ABOP的面积为\$\triangle AOP\$的面积的两倍? 若存在,求出点P的坐标;若不存在,请说明理由. #

```
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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
G1: lib1->1B1: lib1->1 A1B1>0 F1: lib1->1 A1B1>0 G2: lib1->2B2: lib1->2 A2B2>0 F2: lib1->2 A2B2>0 G3: lib1->3B3: lib1->3 A3B3>0 F3: lib1->3 A3B3>0

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_ΔAOP=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.

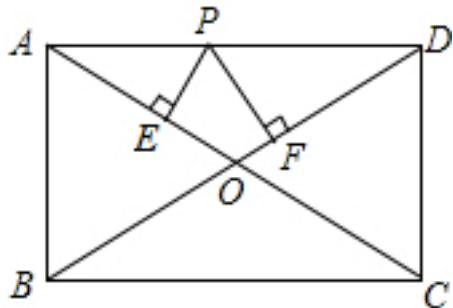


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graph: {"stem": {"pictures": [{"picturename": "1000007598_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "0.50,1.94", "D": "-1.43,1.40"}, "collineations": {"0": "A###C", "1": "A###D", "2": "D###C", "3": "C###B", "4": "D###B"}, "variable>equals": {}}, {"circles": []}], "appliedproblems": {}}, "substems": []}
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NLP: TriangleRelation:ΔABC, EqualityRelation{ $\angle ACB = (1/2 * \pi)$ }, EqualityRelation{ $\angle ABC = (1/6 * \pi)$ }, 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)}

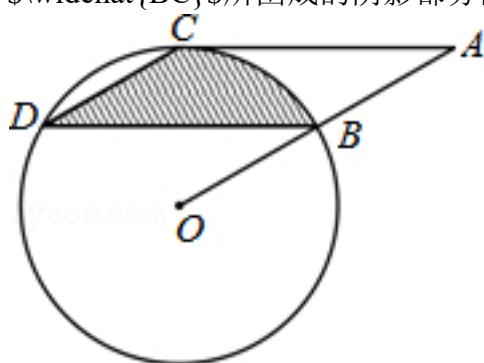
145、topic: 如图,在矩形ABCD中,AB=3,AD=4,P是AD上不与A和D重合的一个动点,过点P分别作AC和BD的垂线,垂足为E,F.求PE+PF的值.#%#



graph:
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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).#%#

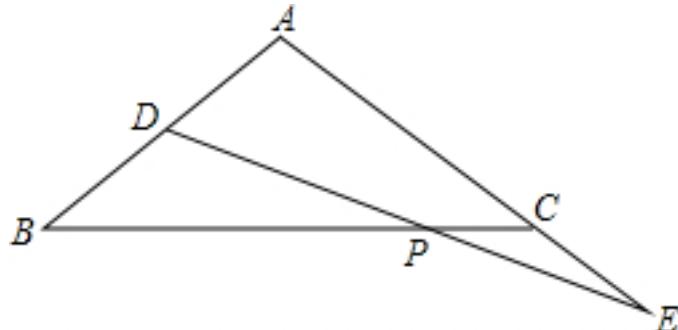


graph:
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C###D","3":"D###B"},"variable>equals":{},"circles":[{"center":"O","pointincircle":"B###C###D"}]}],"appliedproblems":{},"substems":[]}]

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[\odot 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[\odot 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:
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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\$,\$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.#%#

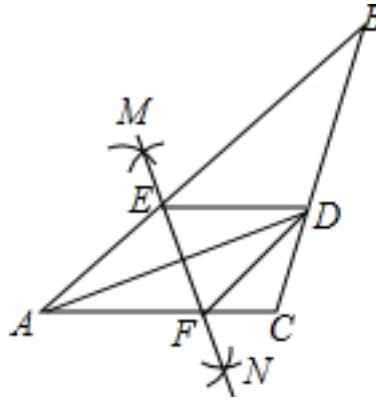
graph:
NLP:
EqualityRelation{BD=v_0}, (ExpressRelation:[key:]1), RectangleRelation{rectangle=Rectangle:ABCD}, MultiEqualityRelation [multiExpressCompare= $\angle A = \angle B = \angle C = \angle D = (1/2 * \pi)$, originExpressRelationList=[],

```

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{p
oint=E, line=BC, isConstant=false,
extension=false},EqualityRelation{CE=5},IsoscelesTriangleRelation:IsoscelesTriangle:ΔEPC[Optional.abs
ent()],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.#%#



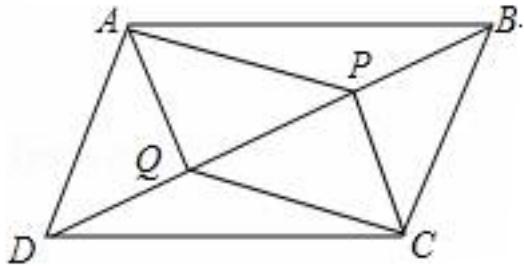
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graph:
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```

NLP: TriangleRelation:ΔABC,AngleBisectorRelation{line=AD,angle=∠EAF, angle1=∠DAE,
angle2=∠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)}

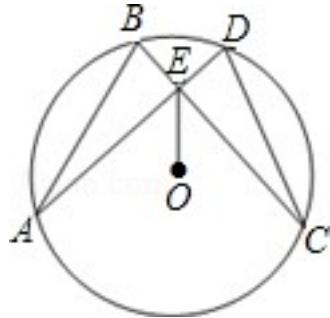
150、topic: 如图,在平行四边形ABCD中,P、Q是对角线BD上的两个点,且BP=DQ.#%#求证:四边形APCQ为平行四边形.#%#



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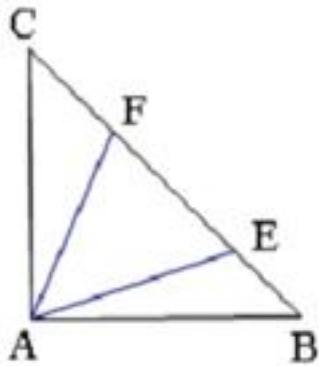
151、topic: 如图,在 $\odot O$ 中,AD、BC相交于点E,OE平分 $\angle AEC$.(1)求证: $AB=CD$;(2)如果 $\odot O$ 的半径为5, $AD \perp CB$, $DE=1$,求AD的长.



graph:
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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.

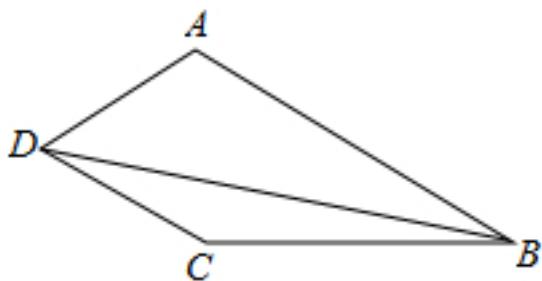


graph:

{"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: $\{ \{BD\}^2 \} = \{ \{AB\}^2 \} + \{ \{BC\}^2 \}$

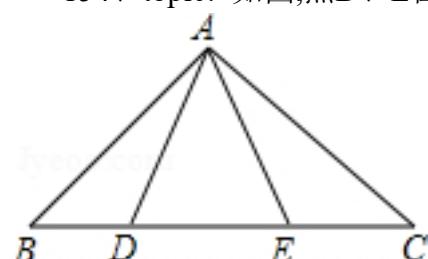


graph:

{"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{ $((BD)^2) = ((AB)^2) + ((BC)^2)$ }]

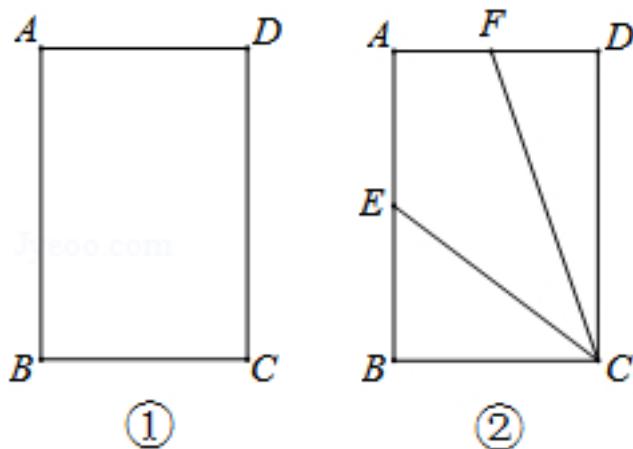
154、topic: 如图,点D、E在 $\triangle ABC$ 的BC边上,AB=AC,AD=AE.求证:BD=CE.



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": {}, "subsystems": []}}

NLP: PointRelation:D, TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=E, line=BC, isConstant=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 $AF+BC=$ _____, $AF=$ _____.

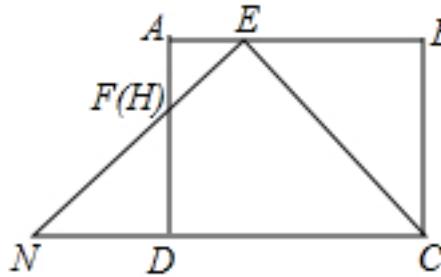


graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000040727_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "2.49,0.00", "D": "2.49,4.00"}, "collineations": {"0": "A###B", "1": "B###C", "2": "C###D", "3": "D###A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "2", "questionrelies": "", "pictures": [{"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": {}}}

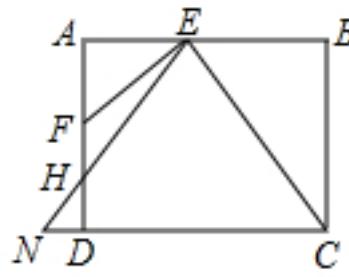
NLP: LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation{AB=CD}, EqualityRelation{ $\angle BAD=\angle ADC$ }, EqualityRelation{CF=v_0}, MiddlePointOfSegmentRelation{middlePoint=E, segment=AB}, PointOnLineRelation{point=F, line=AD, isConstant=false, extension=false}, EqualityRelation{ $\angle DFC=2*\angle BCE$ }, 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

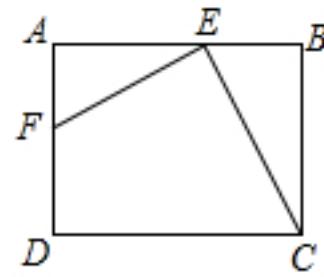
图b,当点H在线段FD上时,设BE=x,DN=y,求y与x之间的函数关系式,并写出它的自变量取值范围;#%#(3)
连接AC,当 $\triangle FHE$ 与 $\triangle AEC$ 相似时,求线段DN的长.#%#



图a



图b



图c

graph:

```
{"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000060689_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "4.00,3.00", "C": "4.00,0.00", "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": "", "pictures": [{"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", "E": "1.75,-2.00", "F": "0.00,-3.31", "H": "0.00,-3.91", "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= $\triangle FHE$, 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.

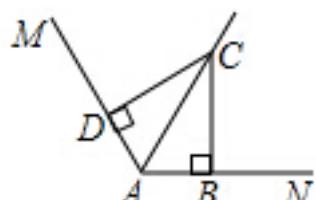
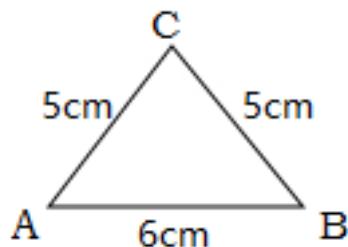


图1

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": "1000021304_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": []}], "appliedproblems": {}}}

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

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)

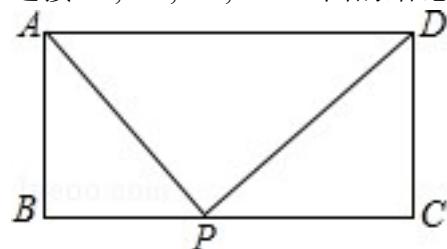


图1

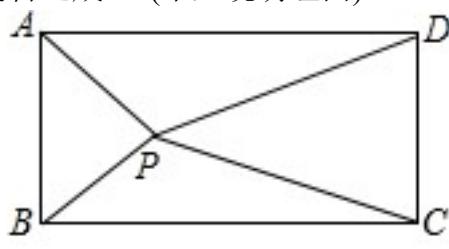


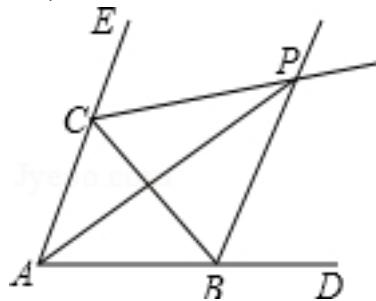
图2

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": []}]

,"variable>equals":{}, "circles":[]}, "appliedproblems":{}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000027627_Q_1.jpg", "coordinates": {"P": "3.00,0.00"}, "collineations": {"0": "B###P##C", "1": "D##P", "2": "A##P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=P, line=BC, isConstant=false, extension=false}, SegmentRelation:PA, SegmentRelation:PD, (ExpressRelation:[key:]2), PositionOfPoint2RegionRelation{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, 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//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. #%#

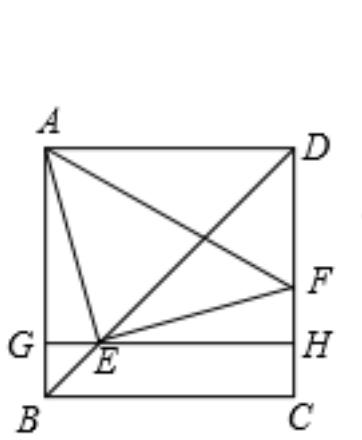


图 1

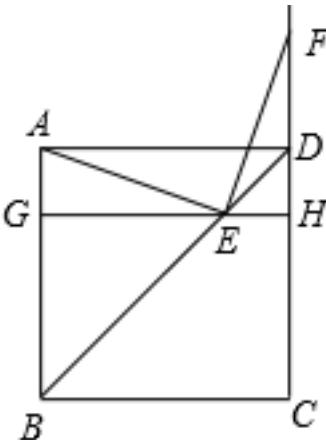


图 2

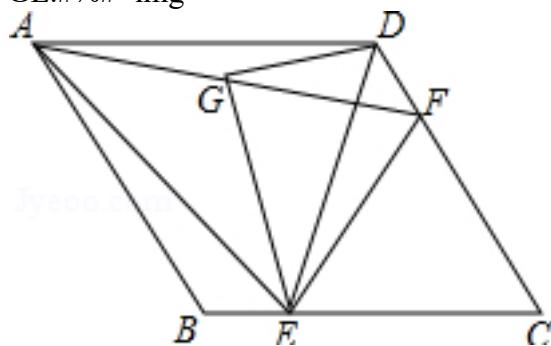
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graph:
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```

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=△AGE, triangleB=△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,∠DAE=∠BAF. (#1)求证:CE=CF; (#2)若∠ABC=120°,点G是线段AF的中点,连接DG,EG.求证:DG⊥GE. #

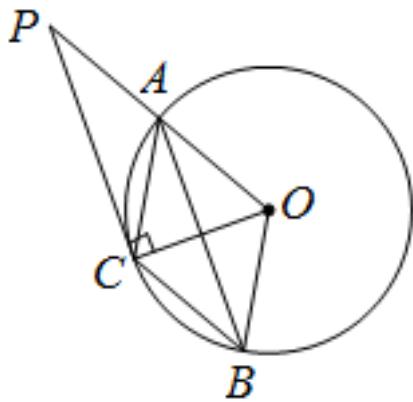


graph:

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NLP: RhombusRelation{rhombus=Rhombus:ABCD}, 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{ $\angle DAE = \angle BAG$ }, EqualityRelation{ $\angle ABE = (2/3 * \pi)$ }, 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, $\angle AOB=120^\circ$,点C是弧AB的中点. #%(1)求证:AB平分 $\angle OAC$;%#(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.%#

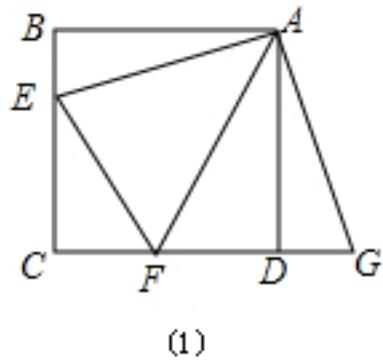


graph:

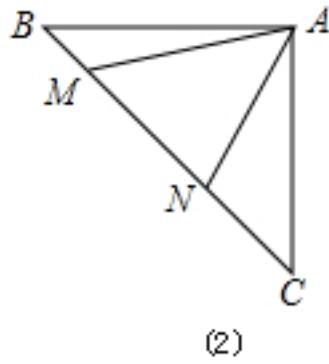
{"stem": {"pictures": [{"picturename": "1000060709_Q_1.jpg", "coordinates": {"A": "3.46,2.00", "B": "-3.46,2.0", "C": "0.00,4.00", "D": "0.00,2.00", "O": "0.00,0.00"}, "collineations": {"0": "O###C###D", "1": "B###A###D", "2": "A###C", "3": "B###C", "4": "O###A", "5": "O###B"}, "variable>equals": {}, "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": []}], "appliedproblems": {}}]}}

NLP: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[A, B]}, EqualityRelation{ $\angle AOB=(2/3 * \pi)$ }, MiddlePointOfArcRelation:C/type:MAJOR_ARC \cap AB, EqualityRelation{CP=v_0}, PointOnLineRelation{point=P, line=OA, isConstant=false, 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.%#



(1)



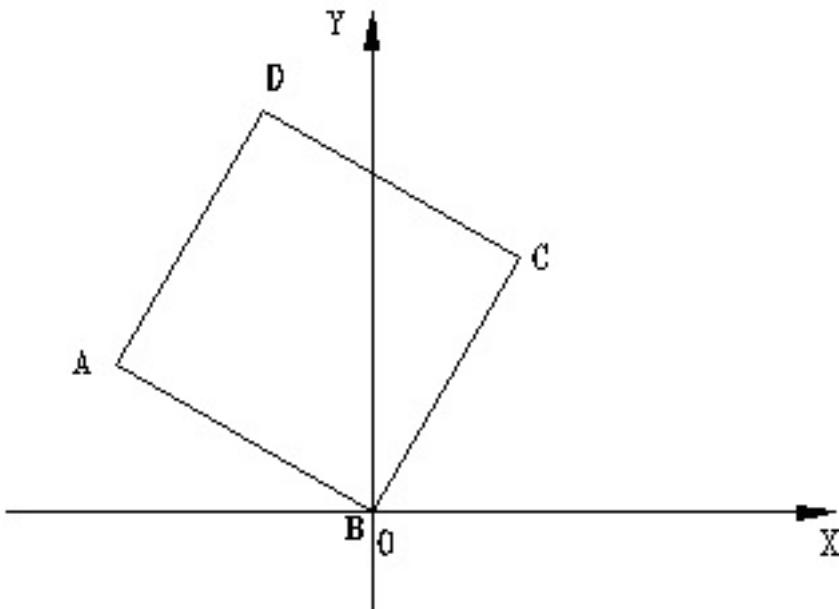
(2)

graph:

```
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"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.

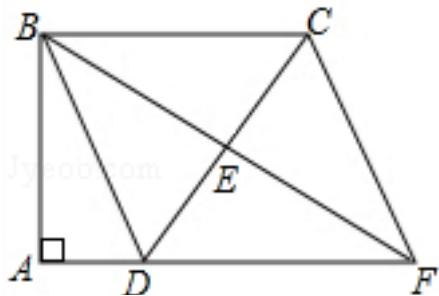


graph:

```
{"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": {}, "subsystems": []}}
```

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. #%#



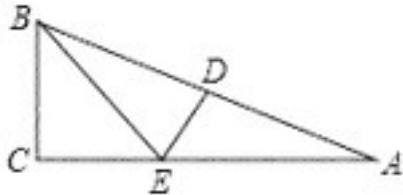
graph:

```
{"stem": {"pictures": [{"picturename": "A1AEFF80AD0F4B48860835EBD0452987.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: $\triangle BCD$ [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)}

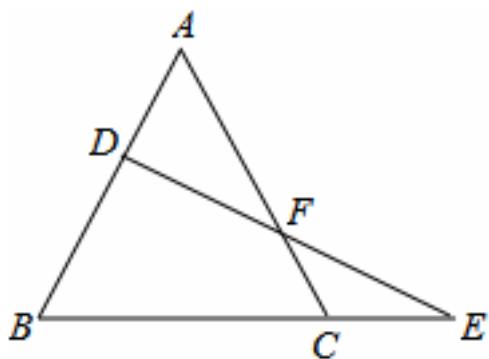
167、topic: 如图, $\triangle ABC$ 中, $\angle ACB = 90^\circ$, $AC = 12$, $BC = 5$, D 是 AB 边上的动点, E 是 AC 边上的动点, 则 $BE + ED$ 的最小值



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 { $\angle BCE = (1/2 * \pi)$ }, 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": "-11.00,5.00", "C": "-7.00,5.00", "D": "-9.65,7.34", "E": "-5.71,5.00", "F": "-7.68,6.17"}, "collineations": {"0": "B##C##E", "1": "A##D##B", "2": "A##F##C", "3": "D##F##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: RegularTriangleRelation: RegularTriangle: $\triangle ABC$, 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.

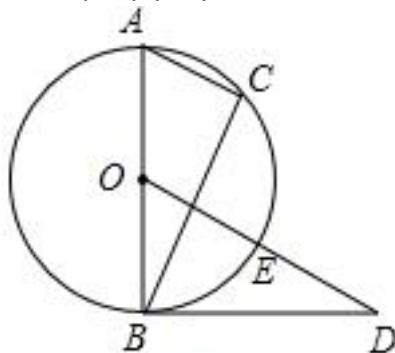
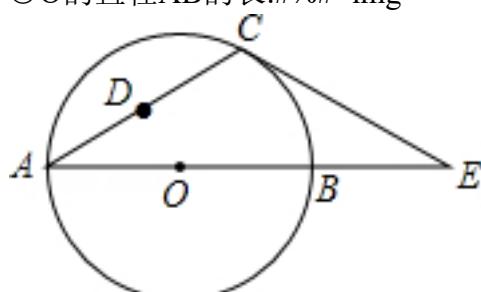


图1

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"}, "collinearities": {"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": {}, "subsystems": [{"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)))}]}

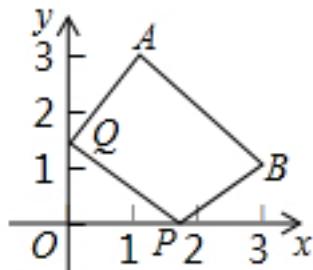
170、topic: 如图, 在 $\triangle ACE$ 中, $CA=CE$, $\angle CAE=30^\circ$, $\odot O$ 经过点C, 且圆的直径AB在线段AE上.
 (1)试说明CE是 $\odot O$ 的切线;
 (2)若 $\triangle ACE$ 中AE边上的高为h, 试用含h的代数式表示 $\odot O$ 的直径AB;
 (3)设点D是线段AC上任意一点(不含端点), 连接OD, 当 $\frac{1}{2}CD+OD$ 的最小值为6时, 求 $\odot O$ 的直径AB的长.



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###O###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: ΔACE , 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: ΔACE , HeightOfTriangleRelation{geo= ΔACE , 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]]}}}

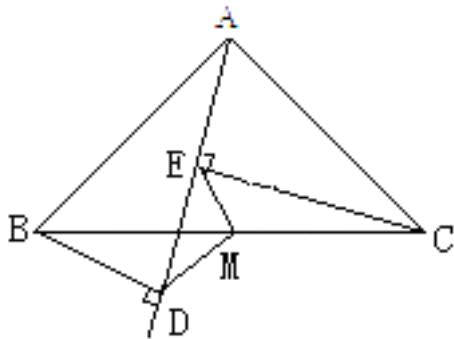
171、topic: 如图,在平面直角系中点A(1,3),点B(3,1),点P、Q分别在x轴、y轴上运动,求四边形PBAQ周长的最小值.#%#



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: $ME = MD$.

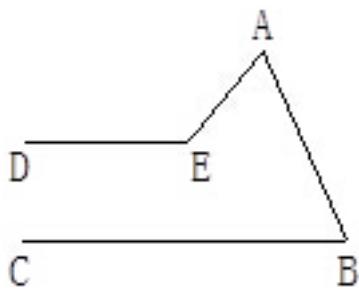


graph:

```
{"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 $\angle AED = \angle A + \angle B$.

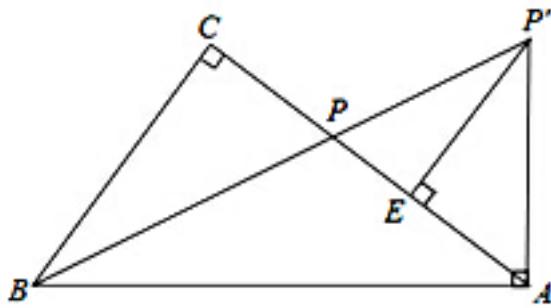


graph:

```
{"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 { $\angle AED = \angle BAE + \angle ABC$ }]

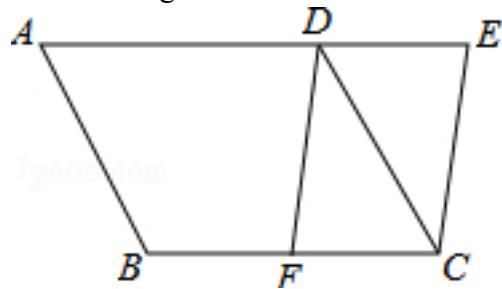
174、topic: 如图,在 $\text{Rt} \triangle ABC$ 中, $\angle C = 90^\circ$, 点 P 为 AC 边上的一点, 将线段 AP 绕点 A 顺时针方向旋转(点 P 对应点 P')当 AP 旋转至 $AP' \perp AB$ 时, 点 B 、 P 、 P' 恰好在同一直线上, 此时作 $P'E \perp AC$ 于点 E . (1) 求证: $\angle CBP = \angle ABP$; (2) 若 $AB - BC = 4$, $\angle A = 8^\circ$ 求 AE 的长; (3) 当 $\angle ABC = 60^\circ$, $BC = 2$ 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:ΔABC[Optional.of(C)], EqualityRelation{ $\angle C = (1/2 * \pi)$ }, 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{ $\angle ABC = ((1/3 * \pi))$ }, 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{ $\angle C = \angle B$ }], 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 $AB=3, AD=4, \angle A=60^\circ$,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###B###C###E", "1": "F###C###D###E"}}]}]

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

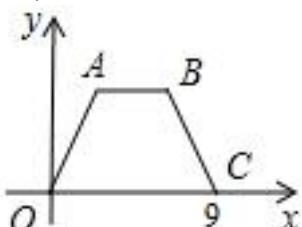
NLP: PointOnLineRelation {point=E, line=AD, isConstant=false, extension=true}, ParallelogramRelation {parallelogram=Parallelogram:ABCD}, EqualityRelation {DE=(1/2)*AD}, SegmentRelation:CE, MiddlePointOfSegmentRelation {middlePoint=F, segment=BC}, SegmentRelation :FD, EqualityRelation {CE=v_0}, EqualityRelation {AB=3}, EqualityRelation {AD=4}, EqualityRelation {∠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,\$∠BAC=25°\$,请直接写出\$∠DCA\$的度数.

graph:
 {"stem": {"pictures":[], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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"}]}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"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=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}}, 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:CD, CircleCenterRelation {point=O, conic=Circle[$\odot O$] {center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, (ExpressRelation:[key:]1), PointCoincidenceRelation {point1=D, point2=O}, EqualityRelation {AC=2}, RadiusRelation {radius=null, circle=Circle[$\odot O$] {center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, length=Express:[r]}, 求值(大小): (ExpressRelation:[key:]r), CircleCenterRelation {point=O, conic=Circle[$\odot O$] {center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, (ExpressRelation:[key:]2), NegativeRelation {relation=PointCoincidenceRelation {point1=D, point2=O}}, EqualityRelation {∠CAO=(5/36*Pi)}, 求角的大小: AngleRelation {angle=∠ACD}, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]∠ACD)}

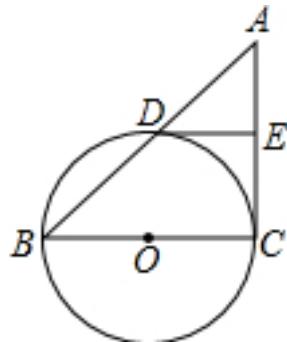
177、topic: 如图,在梯形ABCO中,已知\$AB // OC\$, \$AO=BC=5\$,点A到x轴的距离是4,点C的坐标是(9,0),求点B的坐标.?



graph:
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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}

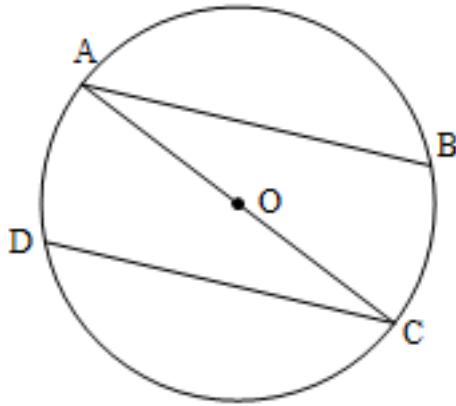
178、topic: 如图,已知BC是 $\odot O$ 的直径,AC切 $\odot O$ 于点C,AB交 $\odot O$ 于点D,E为AC的中点,连接DE.
 (1)若AD=DB,OC=5,求切线AC的长;
 (2)求证:ED是 $\odot O$ 的切线.



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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, LineContactCircleRelation{line=AC, 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(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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, 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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(D), outpoint=Optional.of(E)}]

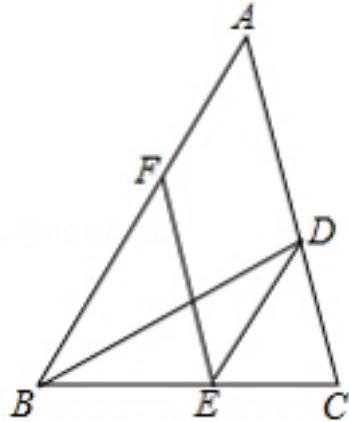
179、topic: 如图,AC是 $\odot O$ 的直径,AB,CD是 $\odot O$ 的两条弦,且 $\widehat{AD}=\widehat{BC}$,求 \widehat{DAB} 所对的圆周角的度数.



graph:
 {"stem": {"pictures": [{"picturename": "1000083401_Q_1.jpg", "coordinates": {"A": "-1.08,0.85", "B": "1.38,0.0", "C": "1.08,-0.85", "D": "-1.38,0.0", "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": {}, "subsystems": []}}

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{ \cap AD= \cap 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.

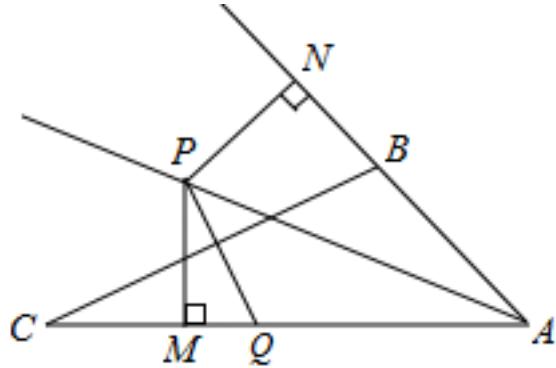


graph:
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NLP: TriangleRelation: $\triangle ABC$, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation{point=F, line=AB, isConstant=false, extension=false}, LineParallelRelation [iLine1=DE, iLine2=AB], LineParallelRelation [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)}

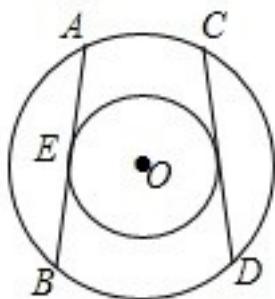
181、topic: 如图,在 $\triangle ABC$ 中, $\angle BAC$ 的角平分线与BC的垂直平分线PQ相交于点P,过点P分别作PN $\perp AB$ 于点N,PM $\perp AC$ 于M,求证:BN=CM.##



graph:
 {"stem": {"pictures": [{"picturename": "1000040631_Q_1.jpg", "coordinates": {"A": "-8.00,2.00", "B": "-10.00,5.00", "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"}, "collinearations": {"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.

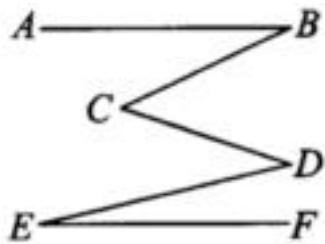


graph:
 {"stem": {"pictures": [{"picturename": "1000008260_Q_1.jpg", "coordinates": {"A": "-1.21,3.81", "B": "-2.70,-2.95", "C": "1.21,3.81", "D": "2.70,-2.95", "E": "-1.95,0.43", "O": "0.00,0.00"}, "collinearations": {"0": "D##C", "1": "E##B##A"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle":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

NLP: ChordOfCircleRelation{chord=AB, circle=Circle[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: $AB \parallel EF$.

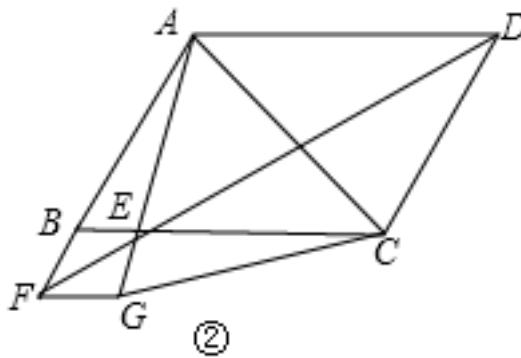
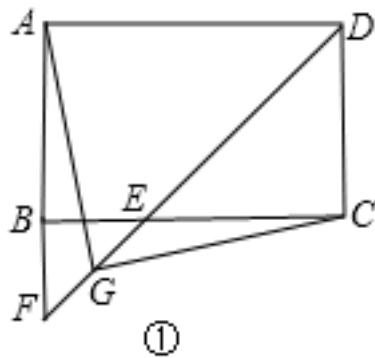


graph:

{"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)若 $\angle ADC=90^\circ$,G是EF的中点,连接AG、CG.?(2)求证: $BE=BF$.?(2)请判断 $\triangle AGC$ 的形状,并说明理由;?(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.



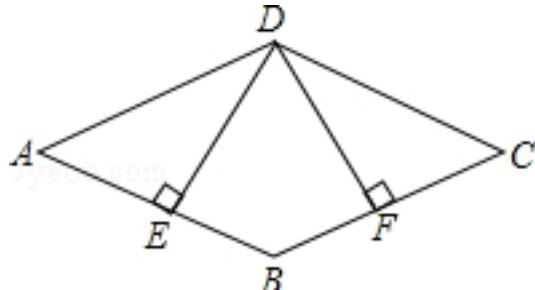
graph:

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

entRelation: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=SOLVEENCLOSEDSHAPE}, ShapeJudgeConclusionRelation{geoEle= $\triangle AGC$ }

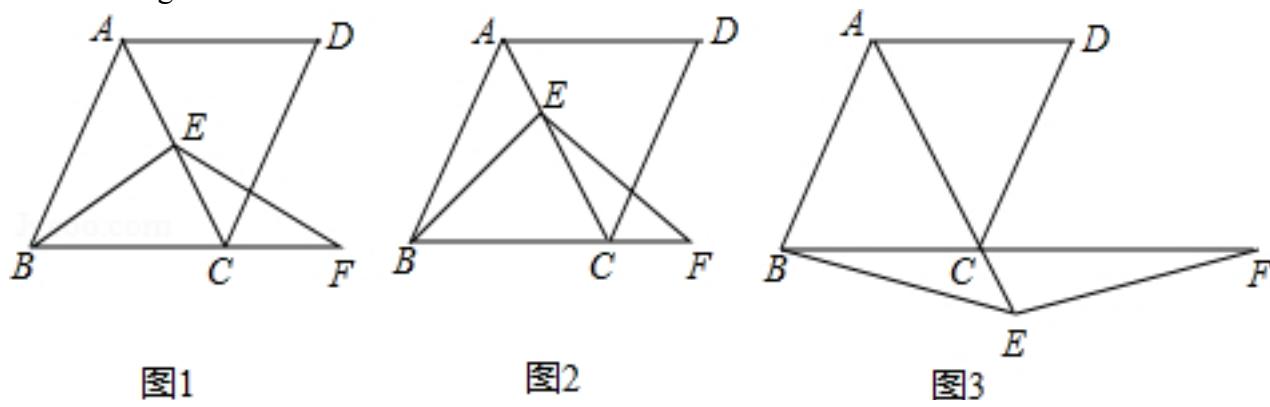
185、topic: 如图,四边形ABCD是菱形,DE \perp AB于E,DF \perp BC于F.求证:DE=DF.#%#



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.#%#

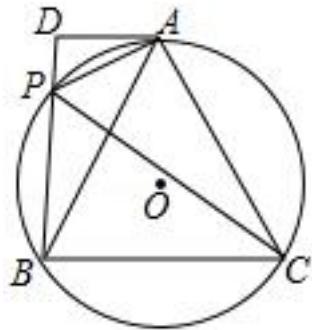


graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000041575_Q_1.jpg", "coordinates": {"A": "-10.00,3.73", "B": "-11.00,2.00", "C": "-9.00,2.00", "D": "-8.00,3.73", "E": "-9.50,2.87", "F": "-8.00,2.00"}, "collineations": {"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": []}], "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": "-8.00,6.00"}, "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": []}]}}]

"-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}]]

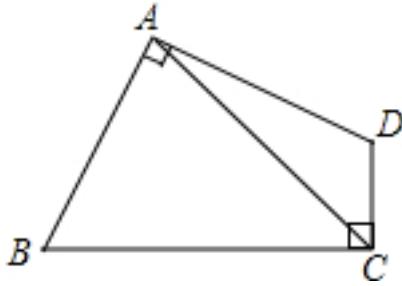
187、topic: 如图,A、P、B、C是 $\odot O$ 上的四个点, $\angle APC = \angle BPC = 60^\circ$, 过点A作 $\odot O$ 的切线交BP的延长线于点D. ?%#(1)求证: $\triangle ADP \sim \triangle BDA$; ?%#(2)试探究线段PA、PB、PC之间的数量关系, 并证明你的结论; ?%#(3)若 $AD=2$, $PD=1$, 求线段BC的长.



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=△ADP, triangleB=△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))}}

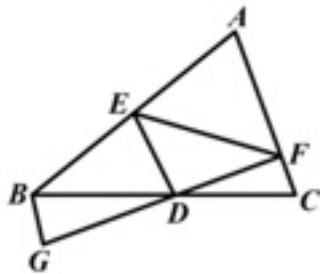
188、topic: 如图,四边形ABCD中, $\angle BAD = \angle BCD = 90^\circ$, $AB = AD$, 若四边形ABCD的面积是 $24 \{ \{ cm \}^2 \}$. 则AC的长是多少cm. #%#



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)}

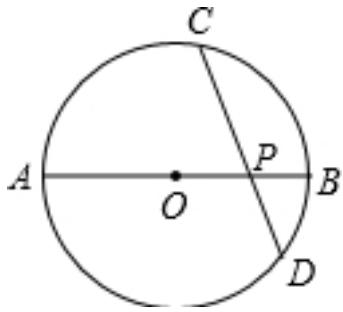
189、topic: 如图,在 $\triangle ABC$ 中,点E、F分别在AB、AC上, $DE \perp DF$,点D是BC的中点,延长FD到点G,使 $DG=DF$,连接BG.?(1)求证: $\triangle BGD \cong \triangle CFD$?#%(2)试比较 $BE+CF$ 与 EF 的大小.



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##G##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]]}}}

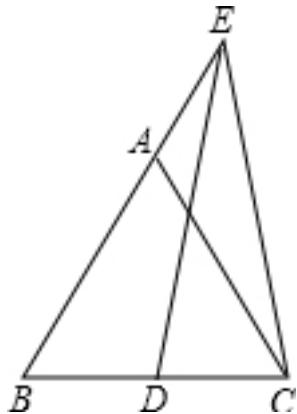
190、topic: 如图,已知AB是 $\odot O$ 的直径,弦CD和AB相交于P, $\angle APC=60^\circ$, $BP=2$, $AP=8$,求CD的长.



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)}

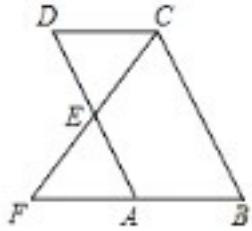
191、topic: 如图, $\triangle ABC$ 为等边三角形, 点E在BA的延长线上, 点D在BC边上, 且 $ED=EC$. 若 $\triangle ABC$ 的边长为4, $AE=2$, 求 BD 的长. #%#



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)}

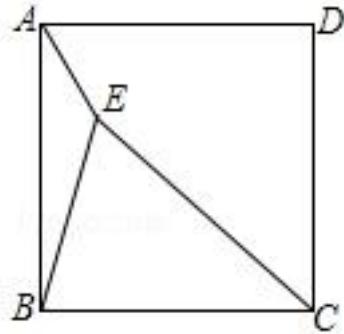
192、topic: 如图, 已知四边形ABCD是平行四边形, 点F在BA的延长线上, 连结CF交AD于点E?
 (1)求证: $\triangle CDE \sim \triangle FAE$?
 (2)当E是AD的中点, 且 $BC=2CD$ 时, 求证: $\angle F = \angle BCF$



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{ $\angle AFE = \angle BCE$ }]]

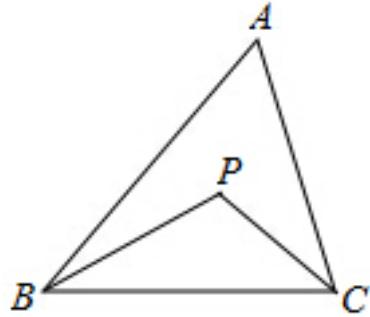
193、topic: 如图, 点E为正方形\$ABCD\$内一点, 连接\$AE\$、\$BE\$、\$CE\$,\$已知\$
 $AE=1, BE=2, CE=3$?
 (1)求\$\angle AEB\$;
 (2)求\$ABCD\$的边长.



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)}

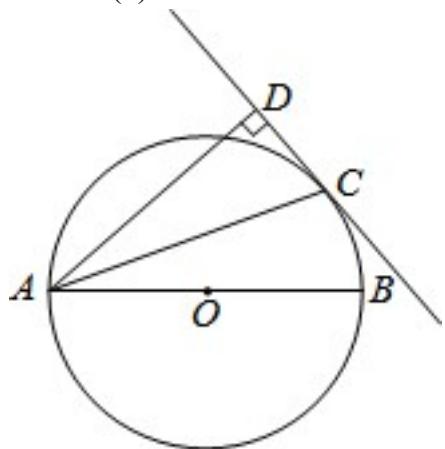
194、topic: 如图,已知点P是 $\triangle ABC$ 内一点.连结PB、PC.求证:(1) $AB+AC > PB+PC$;(2) $\angle BPC > \angle A$.



graph:
 {"stem": {"pictures": [{"picturename": "1000022503_Q_1.jpg", "coordinates": {"A": "0.00,5.00", "B": "-5.00,0.0", "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", "radius": "r"}]}, "appliedproblems": {}, "substems": []}}

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

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.求证:AC平分 $\angle BAD$;(2)若 $CD=1$, $AC=\sqrt{10}$,求 $\odot O$ 的半径长.

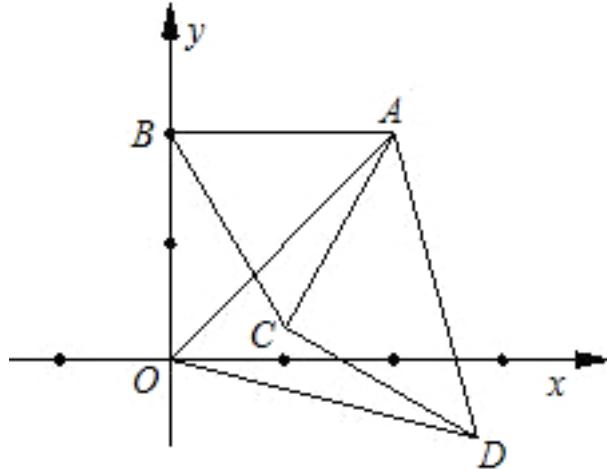


graph:
 {"stem": {"pictures": [{"picturename": "1000008233_Q_1.jpg", "coordinates": {"A": "-3.33,0.00", "B": "3.33,0.0", "C": "1.83,2.78", "D": "1.21,3.57", "O": "0.00,0.00"}, "collineations": {"0": "D##A", "1": "C##A", "2": "A##B"}, "variable-equals": {}, "circles": [{"center": "O", "radius": "r"}]}, "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}, 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=[]}, PointOnCircleRelation {circle=Circle[$\odot O$] {center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, points=[D]}, PerpendicularLineRelation {line1=Line[AD], line2=Line[CD]}]

points=[], EqualityRelation{CD=1}, EqualityRelation{AC=(10^(1/2))}, 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:
 AngleBisectorRelation{line=AC, angle=∠DAO, angle1=∠CAD, angle2=∠
 CAO}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AO)}

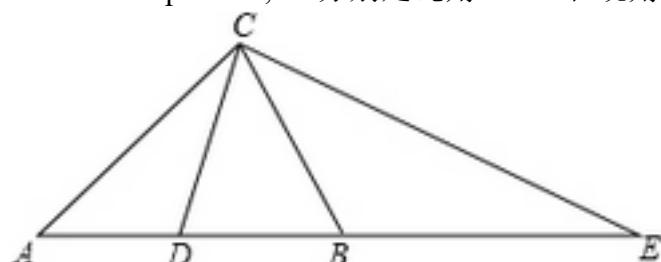
196、topic: 如图,已知A(a,b),AB⊥y轴于B,且满足 $\sqrt{a-2}+\{(b-2)\}^2=0$ (1)求A点坐标;(2)分别以AB,AO为边作两个等边三角形△ABC和△AOD,试判定线段AC和DC的数量关系和位置关系.



graph:
 {"stem": {"pictures": [{"picturename": "1000034408_Q_1.jpg", "coordinates": {"A": "2,2", "B": "0,2"}, "collinearations": {"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": "0.00,0.00"}, "collinearations": {"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△AEC和锐角△ABC的中线,且AC=AB.求证:CE=2CD.



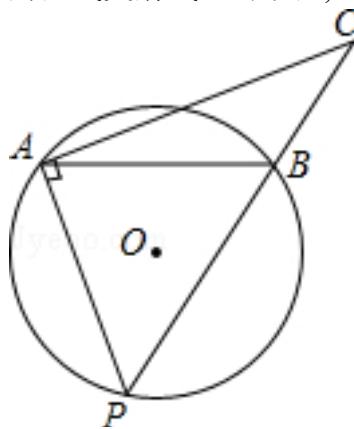
graph:
 {"stem": {"pictures": [{"picturename": "1000040366_Q_1.jpg", "coordinates": {"A": "-6.91,2.17", "B": "-2.91,2.", "C": "0,0", "D": "-4.45,1.08", "E": "-3.45,1.08"}]}]}

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": {}, "subsystems": []}

NLP:

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

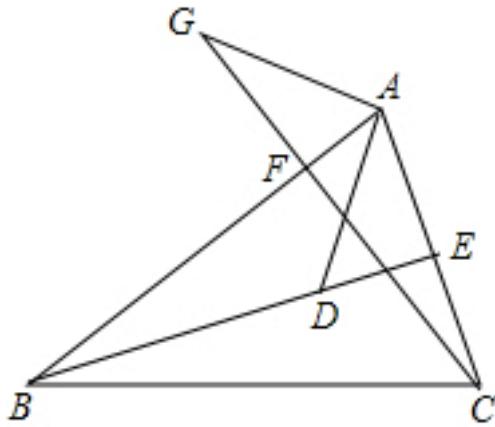
198、topic: 如图,在半径为5的 $\odot O$ 中,弦AB=8,P是弦AB所对的优弧上的动点,连接AP,过点A作AP的垂线交射线PB于点C,当 ΔPAB 是等腰三角形时,求线段BC的长. #%%



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": {}, "subsystems": []}}

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: ΔPAB [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)}}

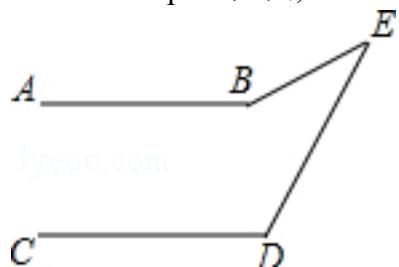
199、topic: 如图,在 $\triangle ABC$ 中,BE、CF分别是AC、AB两边上的高,在BE上截取BD=AC,在CF的延长线上截取CG=AB,连接AD、AG. #%%(1)求证: $\triangle ABD \cong \triangle GCA$; #%%(2)请你确定 $\triangle ADG$ 的形状,并证明你的结论. #%%



graph:
 {"stem": {"pictures": [{"picturename": "1000030766_Q_1.jpg", "coordinates": {"A": "-7.38,5.45", "B": "-11.00,2.00", "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: $\triangle ABC$, 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= $\triangle ABD$, triangleB= $\triangle GCA$ }, ShapeJudgeConclusionRelation {geoEle= $\triangle ADG$ }]

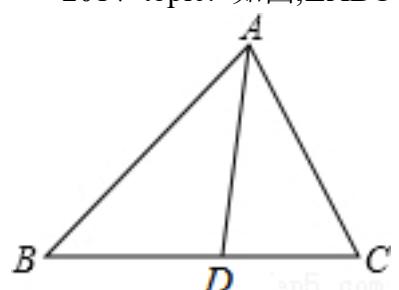
200、topic: 如图, $AB \parallel CD$, 求证: $\angle BED = \angle B - \angle D$. #%#



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 { $\angle BED = \angle BAE - \angle CDE$ }]

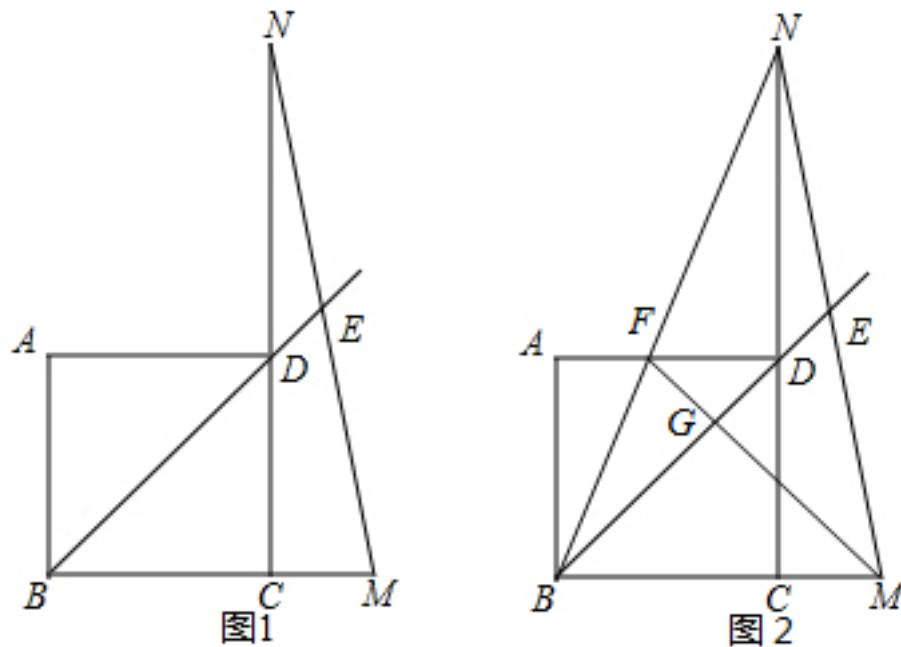
201、topic: 如图, $\triangle ABC$ 中, AD 是 $\angle BAC$ 的平分线. 请说明 $AB:AC = BD:CD$. #%#



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##D##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: TriangleRelation: ΔABC , AngleBisectorRelation {line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, 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.

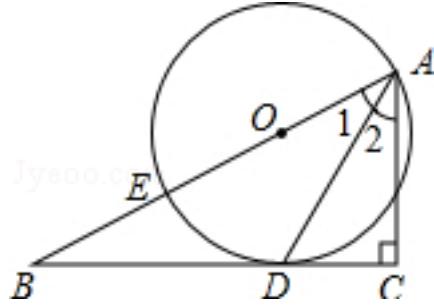


graph:
 {"stem": {"pictures": [{"picturename": "95A12E4267434E4A8E45A89FE515F5D2.jpg", "coordinates": {"A": "-13.00,7.00", "B": "-13.00,3.00", "C": "-9.00,3.00", "D": "-9.00,7.00", "E": "-7.00,9.00", "F": "-11.67,7.00", "G": "-10.00,6.00", "M": "-5.00,3.00", "N": "-9.00,15.00"}, "collineations": {"0": "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", "questionreli": "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 ΔABC 的斜边AB上,以AE为直径的 $\odot O$ 与直角边BC相切于点

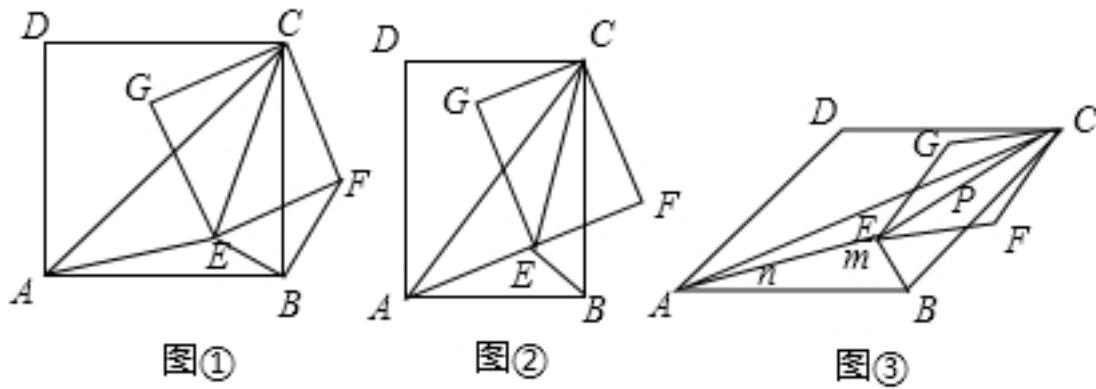
D. (1) 求证: AD 平分 $\angle BAC$; (2) 若 $BE=2$, $BD=4$, 求 $\odot O$ 的半径.



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": "\u03b1=\u03b2", "1": "\u03b2=\u03b3"}, "circles": "[]"}, "appliedproblems": "[]", "substems": "[]"}}

NLP: DiameterRelation{diameter=AE, circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, RightTriangleRelation:RightTriangle:△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_O)^2+(y-y_O)^2=r_O^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_O)^2+(y-y_O)^2=r_O^2}}, ProveConclusionRelation:[证明: AngleBisectorRelation{line=AD, angle=∠CAO, angle1=∠CAD, angle2=∠DAO}], SolutionConclusionRelation{relation=圆的半径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}}]}

204、topic: 已知 AC, EC 分别为四边形 $ABCD$ 和 $EFCG$ 的对角线, 点 E 在 $\triangle ABC$ 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 . (2) 若 $BE=1, AE=2$, 求 CE 的长. (3) 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)



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

```
###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###C","11":"E###B","12":"F###B"}, "variable>equals":{}, "circles":[]}, "appliedproblems":{}, "subsystems":[]}]
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NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD},已知条件QuadrilateralRelation{quadrilateral=CFEG},TriangleRelation:△ABC,PositionOfPoint2RegionRelation{point=E, region=EnclosedRegionRelation{name=ABC, closedShape=△ABC}, position=inner},EqualityRelation{∠CAE+∠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=∠BAD=∠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=△CAE, triangleB=△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.#%#

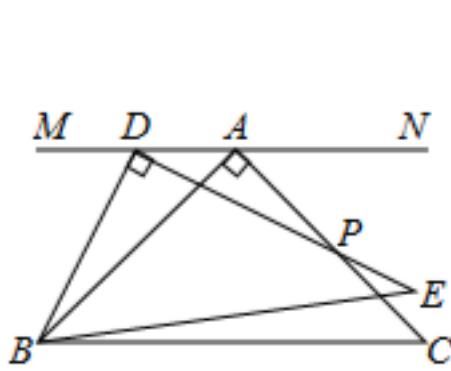


图1

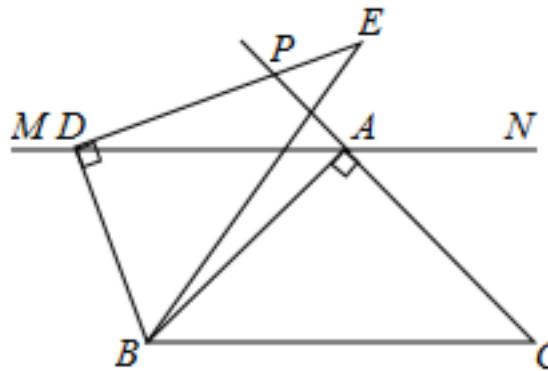


图2

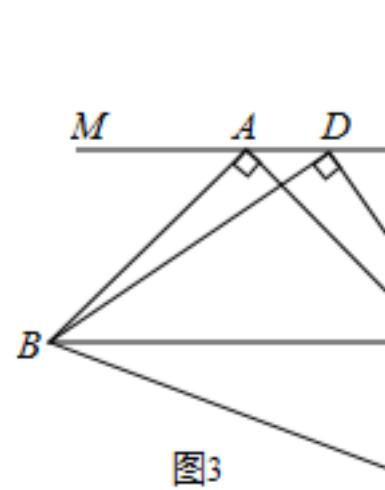


图3

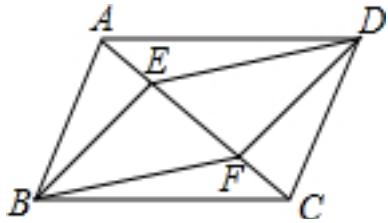
```
graph:
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```

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": {}}, {"substem id": "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,IsoscelesRightTriangleRelation:IsoscelesRightTriangle:IsoscelesTriangle: ΔABC [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}]]

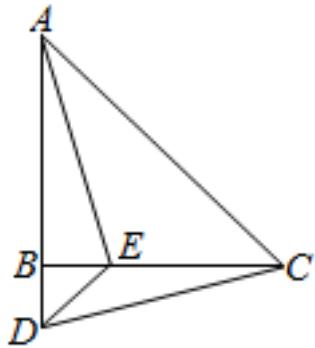
206、topic: 如图, $\square ABCD$ 中, 点E,F在直线AC上, $BE \parallel DF$.#%#(1)求证: 四边形BEDF是平行四边形;#%#(2)若 $AB \perp AC$, $AB=4$, $BC=2\sqrt{13}$, 当四边形BEDF为矩形时, 求线段AE的长.#%#



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: 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: $\angle BAE = \angle BCD$.#%#

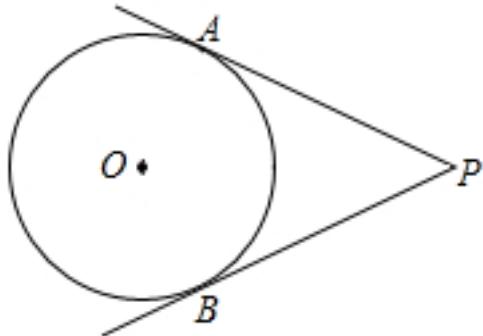


graph:

```
{"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: ΔABC , 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=C D}, 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. #%#



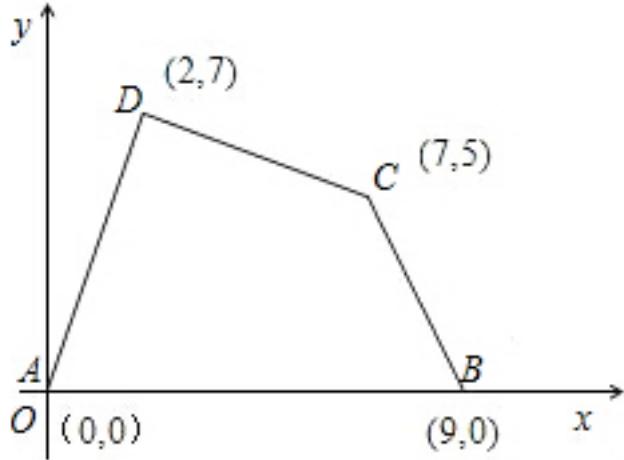
graph:

```
{"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=O, analytic= $(x-x_O)^2 + (y-y_O)^2 = r_O^2$ }}, EqualityRelation {AP=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:[4], DistanceOfDualPointsRelation {pointA=P, pointB=Q_0, distance=Express:[8]}, 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)}, PointOnLineRelation {point=P, line=PA, isConstant=false, extension=false}, PointOnLineRelation {point=P, line=PB, isConstant=false, extension=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:] $\angle APB$)}{}

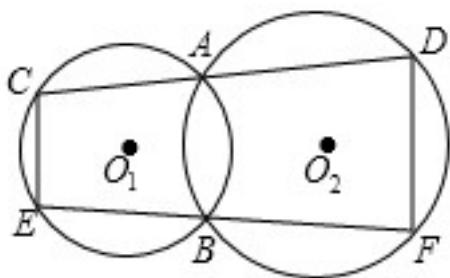
209、topic: 在如图所示的直角坐标系中,四边形ABCD各顶点的坐标分别是A(0,0),B(9,0),C(7,5),D(2,7),求这个四边形的面积.



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"}, "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//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": []}}

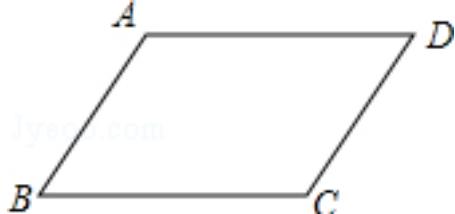
NLP: PointOnLineRelation{point=A, line=CD, isConstant=false}, PointOnLineRelation{point=B, line=EF, isConstant=false}, CircleCrossRelation{conic1=Circle[$\odot O_1$]{center=O_1},

```

analytic=(x-x_O_1)^2+(y-y_O_1)^2=r_O_1^2}, conic2=Circle[O_2]{center=O_2,
analytic=(x-x_O_2)^2+(y-y_O_2)^2=r_O_2^2},corssPoints=[A, B],
corssPointNum=2},LineCrossCircleRelation{line=CD, circle=O_1, crossPoints=[C],
crossPointNum=1},LineCrossCircleRelation{line=CD, circle=O_2, crossPoints=[D],
crossPointNum=1},LineCrossCircleRelation{line=EF, circle=O_1, crossPoints=[E],
crossPointNum=1},LineCrossCircleRelation{line=EF, circle=O_2, crossPoints=[F],
crossPointNum=1},ProveConclusionRelation:[证明: LineParallelRelation [iLine1=CE, iLine2=DF]]

```

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



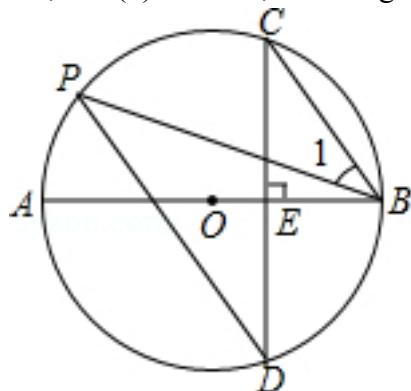
```

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": {}, "subsystems": []}

```

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.#%#



```

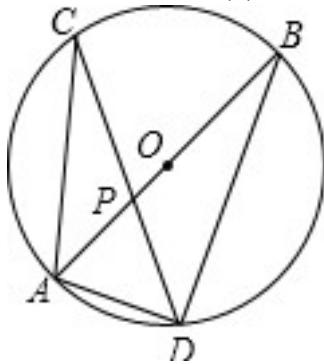
graph:
{"stem": {"pictures": [{"picturename": "1000080878_Q_1.jpg", "coordinates": {"A": "-2.50,0.00", "B": "2.50,0.00", "C": "0.70,2.40", "D": "0.70,-2.40", "E": "0.69,0.00", "O": "0.00,0.00", "P": "-2.11,1.35"}, "collineations": {"0": "B##C", "1": "A##O##E##B", "2": "P##B", "3": "P##D", "4": "C##E##D"},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

```

NLP: ChordOfCircleRelation{chord=CD, circle=Circle[O]{center=O}, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, chordLength=null, straightLine=null}, DiameterRelation{diameter=AB, circle=Circle[O]{center=O}, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, LinePerpRelation{line1=CD, line2=AB, crossPoint=E}, PointOnCircleRelation{circle=Circle[O]{center=O}, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, points=[P]}, EqualityRelation{ $\angle CBP = \angle$

$BCE\}$, EqualityRelation $\{BC=3\}$, EqualityRelation $\{\sin(\angle BPD)=(3/5)\}$, 圆的直径:
 CircleRelation $\{\text{circle}=\text{Circle}[\odot O]\{\text{center}=O,$
 $\text{analytic}=(x-x_O)^2+(y-y_O)^2=r_O^2\}\}$, ProveConclusionRelation:[证明: LineParallelRelation
 $[\text{iLine1}=CB, \text{iLine2}=PD]]$, SolutionConclusionRelation $\{\text{relation}=\text{圆的直径: CircleRelation}\{\text{circle}=\text{Circle}[\odot O]\{\text{center}=O, \text{analytic}=(x-x_O)^2+(y-y_O)^2=r_O^2\}\}\}$

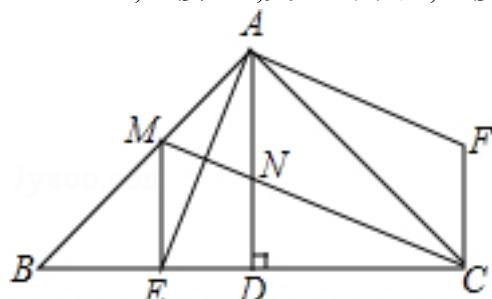
213、topic: 如图,在 $\odot O$ 中,直径AB与弦CD相交于点P, $\angle CAB=40^\circ$, $\angle APD=65^\circ$. #%(1)求 $\angle B$ 的大小; #%(2)已知圆心O到BD的距离为3,求AD的长.



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

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

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 $DE=DN$. #%#



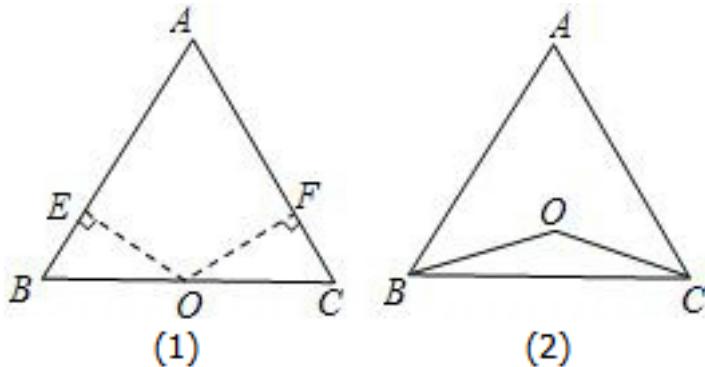
```

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

```

NLP: TriangleRelation: ΔABC , 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= ΔABC , 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 ΔABC 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 ΔABC 的内部,请说明 $AB = AC$ 的理由;#%#(3)若点O在 ΔABC 的外部,AB=AC成立吗?请说明理由.#%#



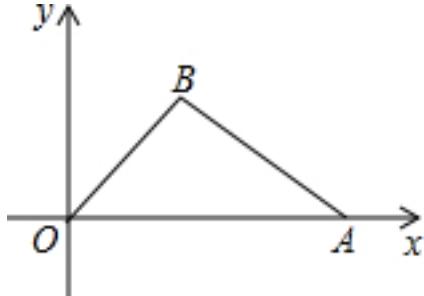
```

graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000063718_Q_1.jpg", "coordinates": {"A": "4.68,3.28", "B": "3.11,0.55", "C": "6.26,0.55", "O": "4.68,0.55", "E": "3.50,1.24", "F": "5.86,1.24"}, "collinearities": {"0": "A###B###E", "1": "A###C###F", "2": "O###B###C", "3": "O###E", "4": "O###F"}, "variable-equals": {}, "circles": []}, {"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"}, "collinearities": {"0": "A###B", "1": "A###C", "2": "C###B", "3": "O###B", "4": "O###C"}, "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"}, "collinearities": {"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: ΔABC , PositionOfPoint2RegionRelation {point=O, region=EnclosedRegionRelation{name=ABC, closedShape= ΔABC , position=inner}}, TriangleRelation: ΔABC , PositionOfPoint2RegionRelation {point=O, region=EnclosedRegionRelation{name=ABC, closedShape= ΔABC , 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]]]

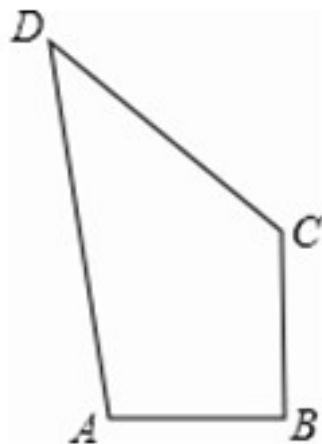
216、topic: 如图,在直角坐标平面内,O为原点,点A的坐标为(10,0),点B在第一象限内,BO=5,\$\sin \angle BOA=\frac{3}{5}\$,求:(1)点B的坐标;(2)\$\cos \angle BAO\$的值.



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(\angle 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)\$)}

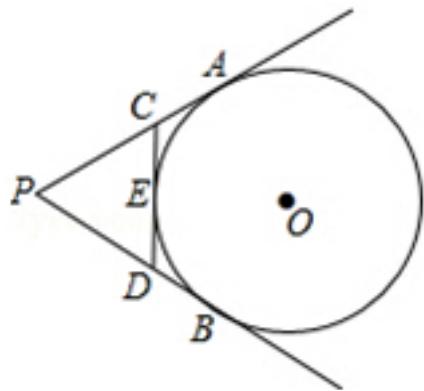
217、topic: 如图,在四边形\$ABCD\$中,\$\angle ABC=90^\circ\$,\$AB=3\sqrt{2}\$,\$BC=\sqrt{7}\$,\$DC=12\$,\$AD=13\$,求四边形\$ABCD\$的面积.



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=(7^(1/2))},EqualityRelation{CD=12},EqualityRelation{AD=13},求值(大小):
 (ExpressRelation:[key:]v_0),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_ABCD)}

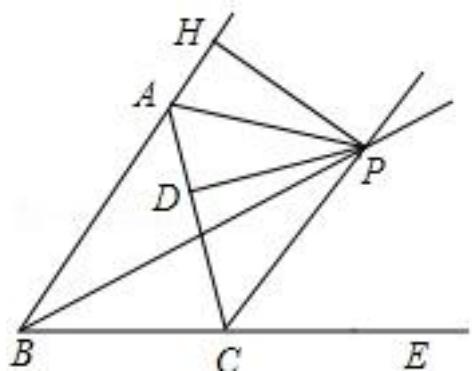
218、topic: 如图,PA、PB切 $\odot O$ 于A、B两点,CD切 $\odot O$ 于点E,交PA、PB于C、D.若 $\odot O$ 的半径为r, $\triangle PCD$ 的周长等于 $3r$,求 $\tan \angle APB$ 的值.



graph:
 {"stem": {"pictures": [{"picturename": "1000025033.jpg", "coordinates": {"A": "-2.22,3.33", "B": "-2.22,-3.33", "C": "-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_ΔCDP=v_0}, 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)}, LineContactCircleRelation {line=CD, 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()}, LineCrossRelation [crossPoint=Optional.of(C), iLine1=CD, iLine2=PA], LineCrossRelation [crossPoint=Optional.of(D), iLine1=CD, iLine2=PB], RadiusRelation {radius=null, circle=Circle[$\odot O$]{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, $\triangle ABC$ 中, $\angle ABC$ 的平分线与 $\angle ACB$ 的外角平分线交于P点,PD \perp AC于点D,PH \perp BA于点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 $\angle HAC$ 的平分线上. #

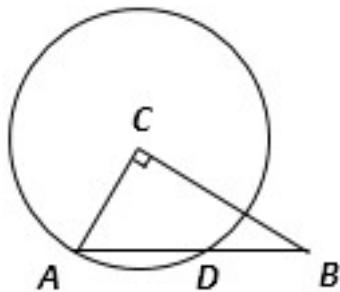


graph:
 {"stem": {"pictures": [{"picturename": "1000031272_Q_1.jpg", "coordinates": {"A": "-7.55,4.51", "B": "-9.00,2.51", "C": "-5.55,2.51", "D": "-6.55,3.51", "E": "-7.55,1.51", "H": "-8.00,4.00", "P": "-8.55,3.51"}]}, "appliedproblems": {}, "substems": []}}

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= $\angle ABC$, angle1= $\angle ABP$, angle2= $\angle CBP$ }, AngleBisectorRelation{line=CP, angle= $\angle DCE$, angle1= $\angle ECP$, angle2= $\angle DCP$ }, LineRoleRelation{Segment=M_1N_1, roleType=ANGULAR_BISECTOR}, TriangleRelation: $\triangle ABC$, 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= $\angle DAH$, angle1= $\angle DAP$, angle2= $\angle HAP$ }, 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}]]

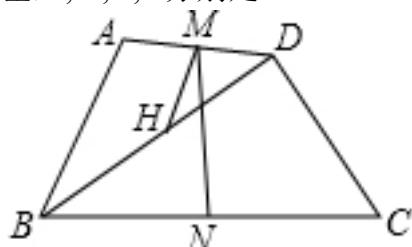
220、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB = 90^\circ$, $AC = 3$, $BC = 4$, 以点C为圆心,CA为半径的圆与AB交于点D,求AD的长度.



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):

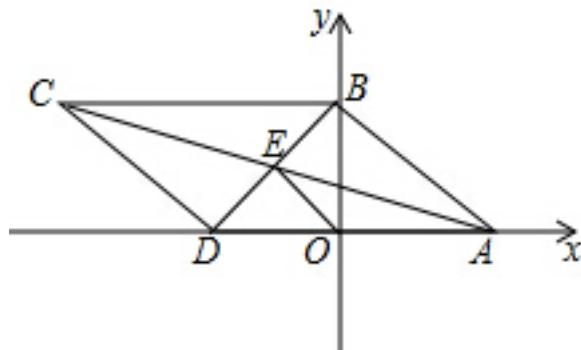
(ExpressRelation:[key:]v_0),EqualityRelation{MN=v_1},求值(大小):

(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//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_{\triangle 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

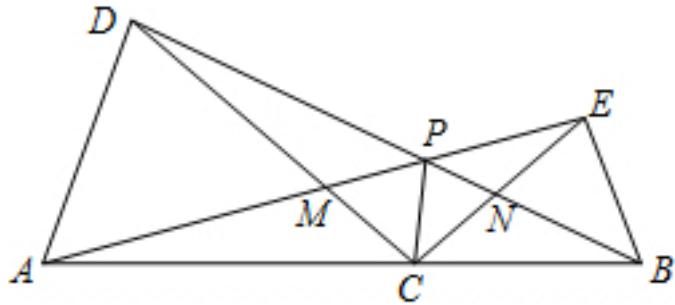
isLinearFunction:false],EqualityRelation{AD=BC},LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD],EqualityRelation{AO=BO},PointRelation:C(-(3^(1/2))-1,(3^(1/2))),坐标

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) $\angle APC = \angle BPC$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000072758_Q_1.jpg", "coordinates": {"A": "-14.00,2.00", "B": "-6.00,2.00", "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": [{"center": "O", "pointincircle": "C###A###B"}]}, "appliedproblems": {}, "subsystems": []}], "appliedproblems": {}, "subsystems": []}

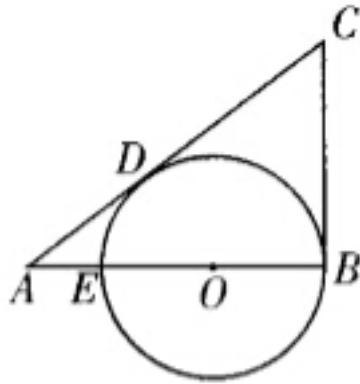
NLP: PointRelation:A,PointRelation:B,PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{AC=CD}, EqualityRelation{BC=CE}, 已知条件 AcuteAngleRelation: $\angle ACM/ACUTE_ANGLE$, 已知条件 AcuteAngleRelation: $\angle BCN/ACUTE_ANGLE$, EqualityRelation{ $\angle ACM = \angle BCN$ }, 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": {}, "subsystems": []}], "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]]

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.

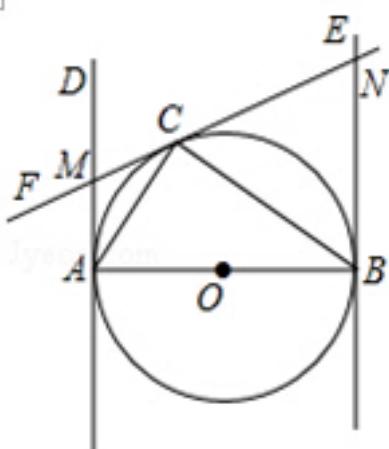


graph:

{"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###E###O##A", "1": "A##D##C", "2": "B##C"}, "variable-equals": {}, "circles": [{"center": "O", "pointincircle": "B##D##E"}]}, "appliedproblems": {}, "subsystems": []}}

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

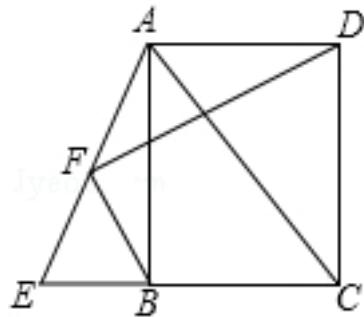
{"stem": {"pictures": [{"picturename": "C43D89C512B94B54A08EBDB96A4C4749.jpg", "coordinates": {"A": "-14.00,5.00", "B": "-10.00,5.00", "C": "-13.00,6.73", "D": "-14.00,7.75", "E": "-10.00,10.08", "F": "-15.58,5.24", "M": "-14.00,6.15", "N": "-10.00,8.46", "O": "-12.00,5.00"}, "collineations": {"0": "B##O##A", "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{ $\angle CBO = (1/6 * \pi)$ }, 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"}, "variables": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

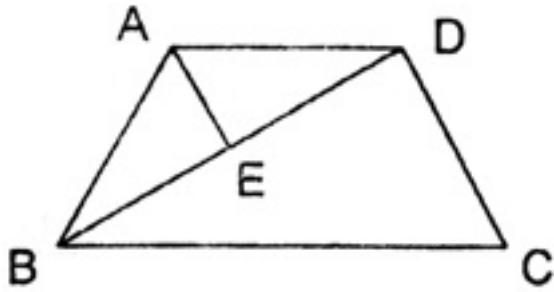
```

```

NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=CB, isConstant=false}, extension=false}, EqualityRelation{CE=AC}, MiddlePointOfSegmentRelation{middlePoint=F, segment=AE}, 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"}}]

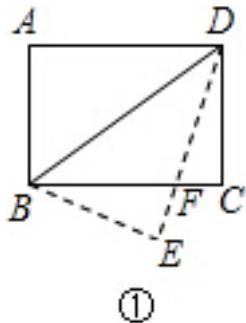
NLP: TrapezoidRelation{trapezoid=Trapezoid:ABCD, isRandomOrder:true}, LineParallelRelation [iLine1=AD, iLine2=BC], MultiEqualityRelation [multiExpressCompare=AB=CD=AD, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation { $\angle BCD = ((1/3 * \pi))$ }, LinePerpRelation {line1=AE, 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 $\cap AE$ }, 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:v_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{ $(DE)^2 = DF \cdot DB$ }], 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.



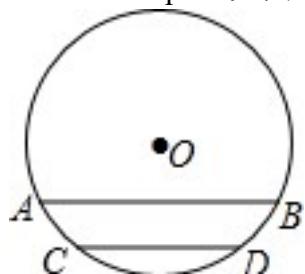
graph:

```
{"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"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: $\widehat{AC} = \widehat{BD}$

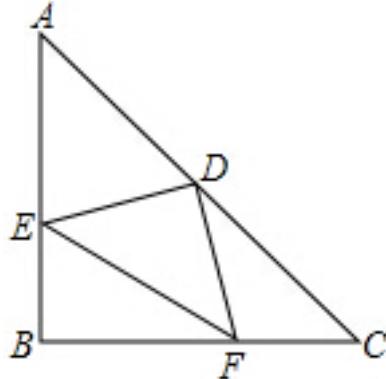


graph:

```
{"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"}, "collineations": {"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.



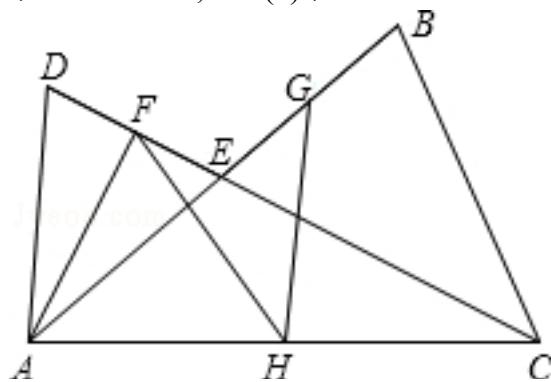
graph:

```
{"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"}, "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}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: ΔABC
 $C[Optional.of(B)][Optional.of(B)]$, EqualityRelation { $\angle EBF = (1/2 * \pi)$ }, MiddlePointOfSegmentRelation {middlePoint=D, segment=AC}, LinePerpRelation {line1=D E, 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 \perp DE;#%#(2)求证: FH=GH.#%#



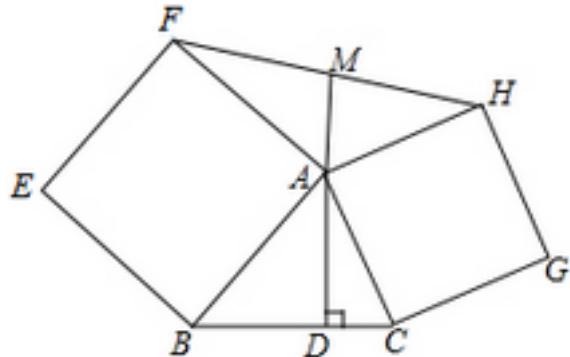
graph:

```
{"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}, LinePerpRelation {line1=AF, line2=DE}, EqualityRelation {FH=GH}

ePoint=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}]

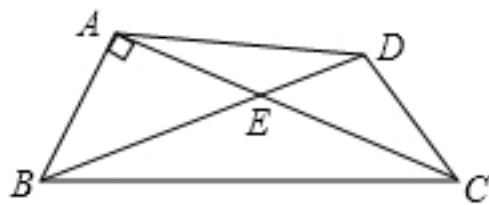
234、topic: 如图,分别以 $\triangle ABC$ 的边AB,AC为一边在三角形外作正方形ABEF和ACGH,M为FH的中点.求证: $MA \perp BC$.#%#



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}]

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": {}, "subsystems": []}}

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):

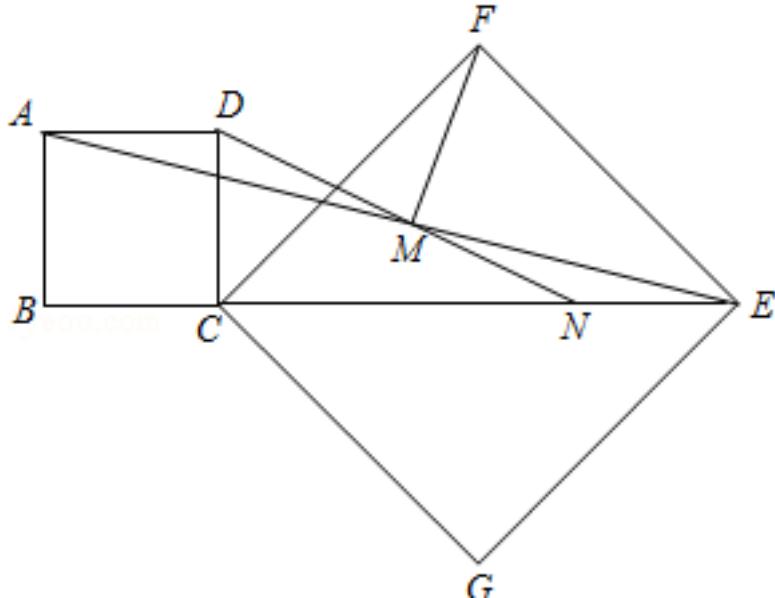
(ExpressRelation:[key:]v_0),求值(大小):

(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 $DM \perp MF$. #%#



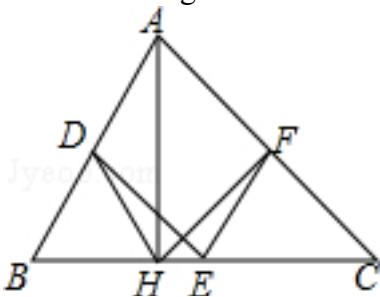
graph:

{"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": "-2.00,0.0", "C": "3.00,0.00", "D": "-1.00,1.50", "E": "0.50,0.00", "F": "1.50,1.50", "H": "0.00,0.00"}, "collineations": {"0": "A##B", "1": "A##C", "2": "B##D", "3": "C##E", "4": "D##F", "5": "B##H", "6": "C##H", "7": "D##H", "8": "E##H", "9": "F##H"}}, "appliedproblems": {}, "substems": []}}

A###D###B","1":"A###F###C","2":"B###H###E###C","3":"D###H","4":"D###E","5":"F###H","6":"F##E","7":"A###H"},"variable>equals":{},"circles":[]}]}, "appliedproblems":{}}, "substems":[]}]}

NLP: TriangleRelation:△ABC, PointRelation:D, LinePerpRelation{line1=AH, line2=BH, crossPoint=H}, ProveConclusionRelation:[证明: EqualityRelation{∠DHF=∠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\$.

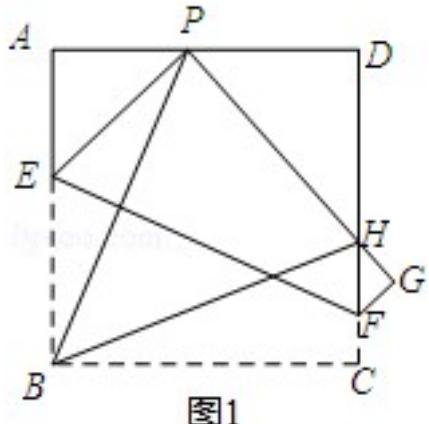


图 1

graph:

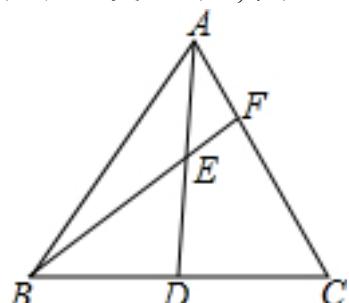
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{"stem":{"pictures":[{"picturename":"1000027628_Q_1.jpg","coordinates":{"A": "-4.00,4.00","B": "-4.00,0.00","C": "0.00,0.00","D": "0.00,4.00","E": "-4.00,2.43","P": "-2.14,4.00","F": "0.00,0.57","G": "0.24,1.09","H": "0.00,1.38"}],"collineations":{"0": "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_ΔDHP=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{ $\angle APB = \angle BPH$ }],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. #%#

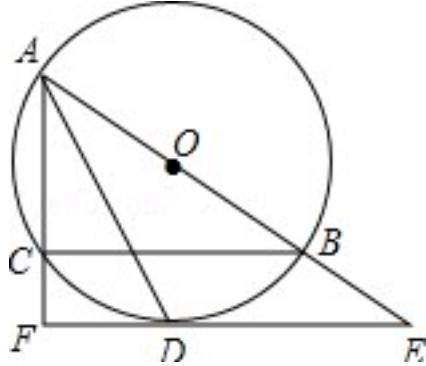


graph:

{"stem": {"pictures": [{"picturename": "1000062208_Q_1.jpg", "coordinates": {"A": "-3.73,6.43", "B": "-7.99,0.0", "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": "[]"}}

NLP: TriangleRelation: ΔABC , 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. #%#

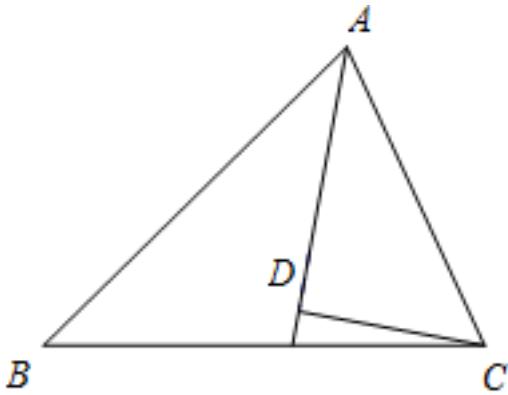


graph:

{"stem": {"pictures": [{"picturename": "1000008238_Q_1.jpg", "coordinates": {"A": "-2.00,3.00", "B": "2.00,0.0", "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"}, "collineations": {"0": "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= $\triangle ABC$, 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, 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: $\angle ACD > \angle ABC$. #%#

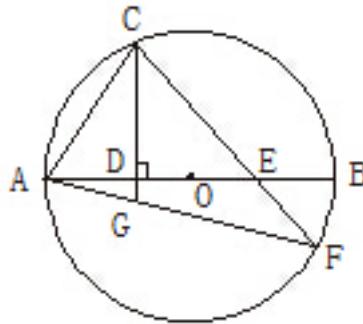


graph:

{"stem": {"pictures": [{"picturename": "1000051288_Q_1.jpg", "coordinates": {"A": "-4.00, 6.00", "B": "-7.00, 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": []}], "appliedproblems": {}, "substems": []}}

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

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.



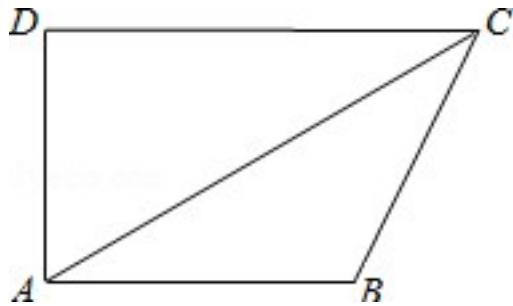
graph:

{"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*AF}]

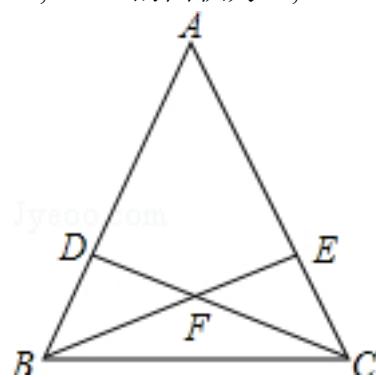
243、topic: 在四边形ABCD中,\$AB // CD\$,\$\angle D=90^\circ\$,\$\angle DCA=30^\circ\$,CA平分\$\angle DCB\$,\$AD=4cm\$,求AB的长度.



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)}

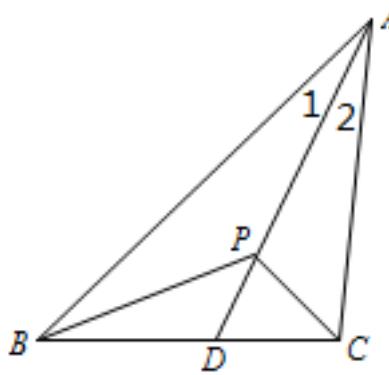
244、topic: 如图,在 $\triangle ABC$ 中,点D、E分别在AB、AC上,且CD与BE相交于点F.已知 $\triangle BDF$ 的面积为10, $\triangle BCF$ 的面积为20, $\triangle CEF$ 的面积为16,求四边形区域ADFE的面积.#%#



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##E##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}

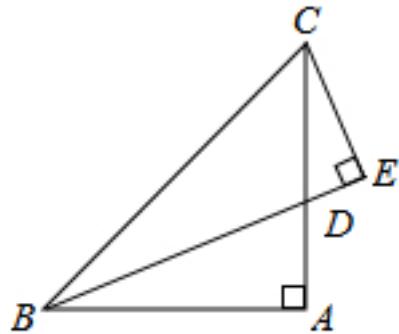
245、topic: 如图,在 $\triangle ABC$ 中,\$AB>AC\$,AD是 $\angle BAC$ 的平分线,P为AD上一点.求证:\$AB-AC>PB-PC\$.



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

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}]

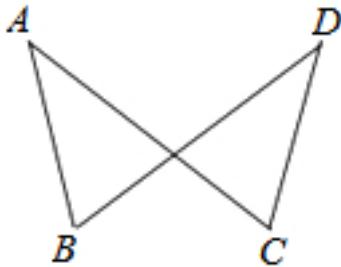
246、topic: 如图,已知, $\angle BAC=90^\circ$, $AB=AC$,BD是 $\angle ABC$ 的平分线,且 $CE \perp BD$ 交BD延长线于点E.求证: $BD=2CE$.



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

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: $\angle ABD = \angle DCA$.

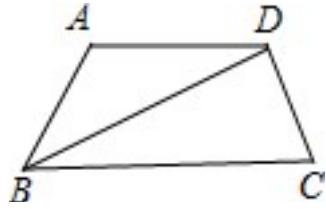


graph:

```
{"stem": {"pictures": [{"picturename": "1000072656_Q_1.jpg", "coordinates": {"A": "-11.00,8.00", "B": "-9.00,4.00", "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": {}, "substems": []}}
```

NLP: EqualityRelation{AB=CD}, EqualityRelation{BD=AC}, ProveConclusionRelation:[证明:
EqualityRelation{ $\angle ABD = \angle DCA$ }]

248、topic: 如图,在梯形\$ABCD\$中, \$AD//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.

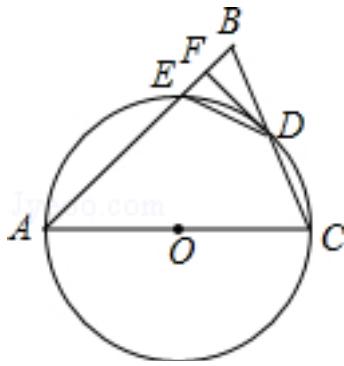


graph:

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```

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.

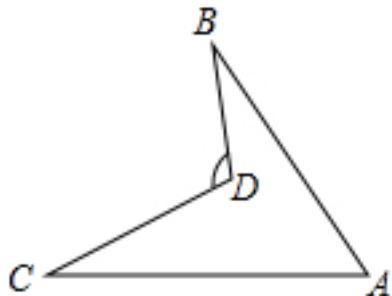


graph:

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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: $\triangle ABC$, 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:Jv_0], ProveConclusionRelation:[证明: LineContactCircleRelation{line=DF, 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(F)}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:JAC)})}

250、topic: 如图,求证:(1) $\angle BDC > \angle A$;(2) $\angle BDC = \angle B + \angle C + \angle A$.

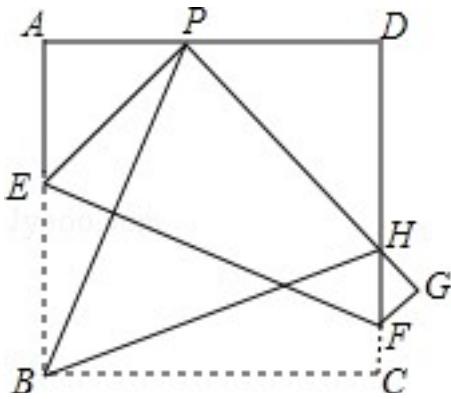


graph:

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NLP: ProveConclusionRelation:[证明: InequalityRelation{ $\angle BDC > \angle BAC$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\angle BDC = \angle ABD + \angle ACD + \angle BAC$ }]]

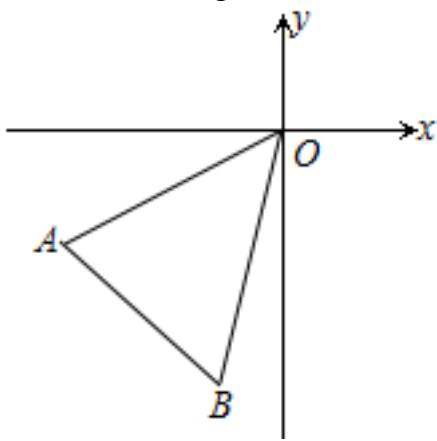
251、topic: 如图,现有一张边长为4的正方形纸片ABCD,点P为AD边上的一点(不与点A、点D重合),将正方形纸片折叠,使点B落在P处,点C落在G处,PG交DC于H,折痕为EF,联结BP、BH.(1)求证: $\angle APB = \angle BPH$;(2)求证: $AP + HC = PH$;(3)当AP=1时,求PH的长.



graph:
 {"substems": [{"questionrelied": "1"}, {"questionrelied": "2"}], "stem": {"pictures": [{"variable>equals": {}, "picturename": "1000001148_Q_1.jpg", "collineations": {"9": "B##C", "8": "F##G", "7": "B##H", "6": "P##B", "5": "F##E", "4": "P##E", "3": "D##H##F##C", "2": "P##H##G", "1": "A##E##B", "0": "A##P##D"}, "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{ $\angle APB = \angle BPH$ }], ProveConclusionRelation:[证明: EqualityRelation{ $AP + CH = HP$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]HP)}}

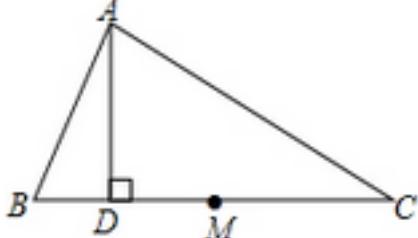
252、topic: 如图,平面直角坐标系中,A(-3,-2),B(-1,-4)①求 $\triangle OAB$ 的面积②延长AB交y轴于点P,求点P的坐标;③点Q在y轴上,以A、B、O、Q为顶点的四边形面积为6,求点Q的坐标.



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

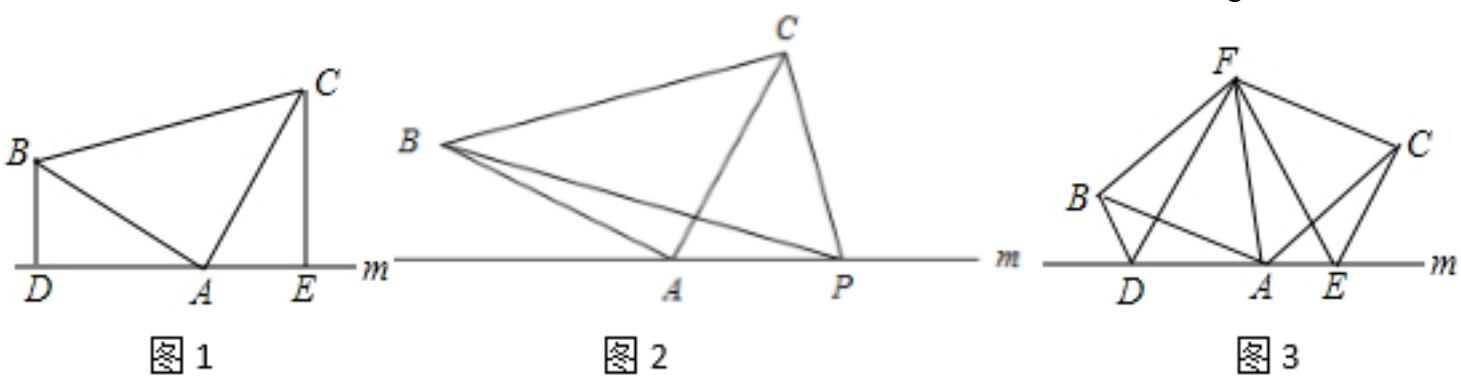
NLP: CoorSysTypeRelation [name=xOy, types=直角坐标系], PointRelation:A(-3,-2), PointRelation:B(-1,-4), 求值(大小): (ExpressRelation:[key:]S_ΔABO)), 坐标

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

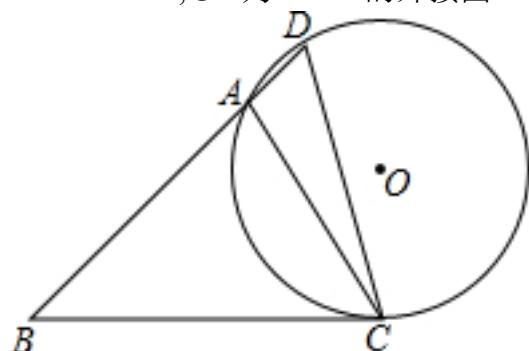
254、topic: 如图,已知,在 $\triangle ABC$ 中, $AB=AC$, 直线m经过点A. (1)如图1,若 $\angle BAC=90^\circ$, $BD \perp m$, $CE \perp m$, 垂足分别为点D,E. 求证: $\triangle ABD \cong \triangle CAE$. (2)如图2,若 $\angle BAC=90^\circ$, P为m上的点,且 $AP=10\text{cm}$, $\triangle PAC$ 、 $\triangle PAB$ 的面积分别为 60cm^2 和 30cm^2 , 求 $\triangle ABC$ 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.


graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"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": []}, {"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": []}], "appliedproblems": {}, "substems": []}}

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],"appliedproblems":{}}, {"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": {}}]}
```

NLP: TriangleRelation: ΔABC , 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 { $S_{\Delta ABC}=v_0$ }, (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 { $S_{\Delta ACP}=60*c$ }, EqualityRelation { $S_{\Delta ABP}=30*c$ }, 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: ΔABF , RegularTriangleRelation:RegularTriangle: ΔACF , SegmentRelation:BD, SegmentRelation:CE, MultiEqualityRelation [multiExpressCompare= $\angle ADB=\angle AEC=\angle BAC$, originExpressRelationList=[], keyWord=null, result=null], ProveConclusionRelation: [证明: TriangleCongRelation {triangleA= ΔABD , triangleB= ΔCAE }], SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]S $_{\Delta ABC}$)}, SolveGeoShapeConclusionRelation {iPolygon= ΔDEF , iPolygonType=SOLVEENCLOSESHAPE}

255、topic: 如图,在 ΔABC 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 ΔACD 的外接圆. #%(1)求BC的长;#%#(2)求 $\odot O$ 的半径. #%#

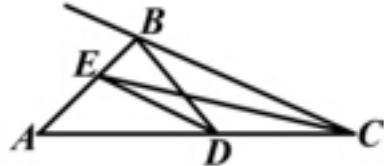


graph:
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NLP: TriangleRelation: ΔABC , EqualityRelation { $\angle ABC=(1/4*\pi)$ }, EqualityRelation { $\angle ACB=(1/3*\pi)$ }, EqualityRelation { $AB=3*(2^{(1/2)})$ }, PointOnLineRelation {point=D, line=BA, isConstant=false, extension=true}, EqualityRelation { $\angle ADC=\angle ACB$ }, InscribedShapeOfCircleRelation {closedShape= ΔACD , 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)}

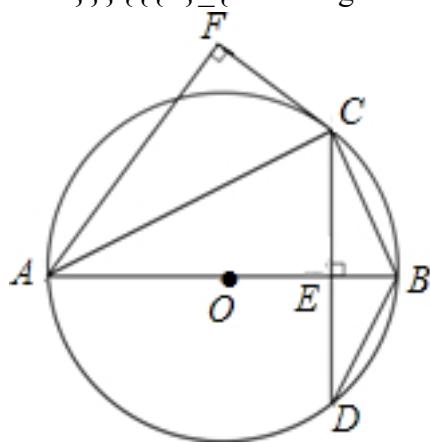
256、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC=100^\circ$, $\angle ACB=20^\circ$, CE平分 $\angle ACB$, D是AC上一点,若 $\angle CBD=20^\circ$,求 $\angle ADE$ 的度数.



graph:
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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"}, "collinearations": {"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": {}, "substems": []}}

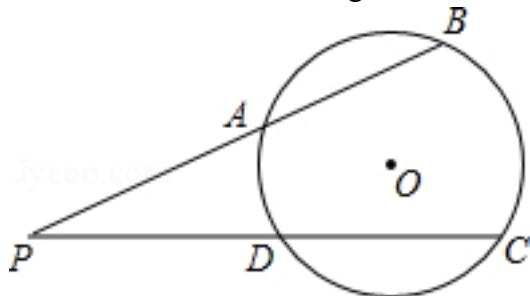
NLP: ChordOfCircleRelation{chord=CD, circle=Circle[$\odot O$]{center=O},

```

analytic=(x-x_O)^2+(y-y_O)^2=r_O^2},
chordLength=null,straightLine=null},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_ $\Delta$ BCD)/S_ $\Delta$ 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_ $\Delta$ BCD)/S_ $\Delta$ 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. #%#



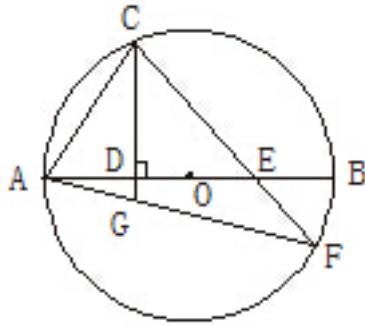
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graph:
[{"stem": {"pictures": [{"picturename": "1000040041_Q_1.jpg", "coordinates": {"A": "-4.98,0.48", "B": "0.98,4.9", "C": "3.00,-4.00", "D": "-3.00,-4.00", "P": "-11.00,-4.00", "O": "0.00,0.00"}, "collinearities": {"0": "P###D###C", "1": "P###A###B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "B###A###D###C"}]}, "appliedproblems": {}, "substems": []}]

```

NLP: RadiusRelation{radius=null, circle=Circle[\odot O]{center=O,
analytic=(x-x_O)^2+(y-y_O)^2=r_O^2},
length=Express:[5]}, 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=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.

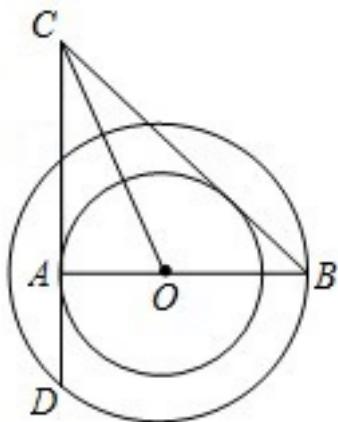


graph:

{"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).#%#



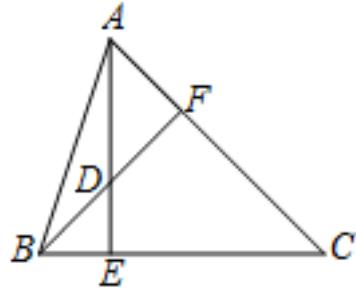
graph:

{"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"}, "collineations": {"0": "C###O", "1": "C###B", "2": "C#A###D", "3": "A###O###B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "D###B"}]}, "appliedproblems": {}, "substems": []}}

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))\}

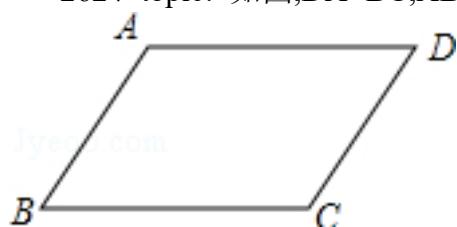
261、topic: 如图,在 $\triangle ABC$ 中, $AF:FC=1:2$, D 是 BF 的中点, AD 的延长线与 BC 交于点 E , 求 $BE:EC$ 的值. #



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\{middlePoint=t=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)\}

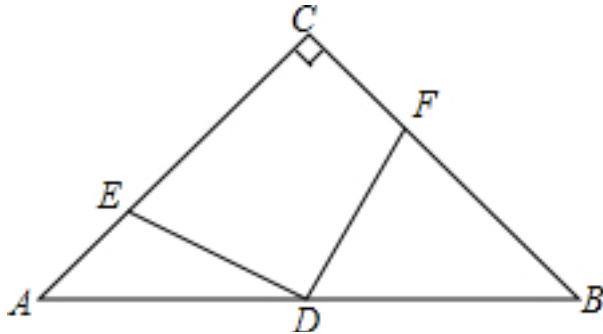
262、topic: 如图, $DA=BC$, $AB=CD$, 求证: $\angle A+\angle D=180^\circ$. #



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=(P1)\}]

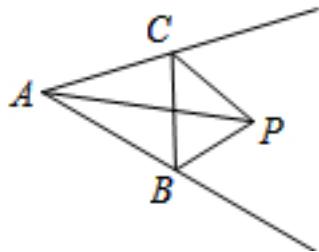
263、topic: 如图, 在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=BC$, 点 D 为 AB 的中点, $AE=CF$. 求证: $DE \perp DF$. #



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 $\{line1 = DE, line2 = DF, crossPoint = D\}$]

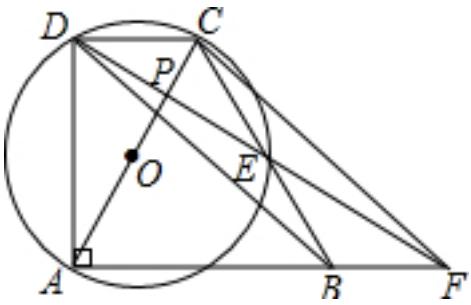
264、topic: 如图,PB、PC分别是 $\triangle ABC$ 的外角平分线,它们相交于点P,连接AP.(1)求证:AP是 $\angle A$ 的平分线;(2)若 $AB=6, AC=4, BC=3$,求 $\{S_{\triangle PAB}, S_{\triangle PBC}, S_{\triangle PAC}\}$ 的值.



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, $AB \parallel CD, \angle DAB = 90^\circ$,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.

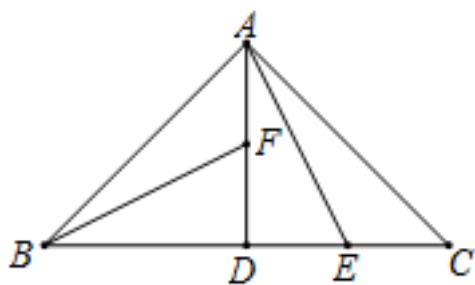


graph:

{"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"}, "collinearities": {"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= $\triangle ACD$, circle=Circle[$\odot O$] {center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, RightTrapezoidRelation {rightTrapezoid=RightTrapezoid:ABCD 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], 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 $\triangle BAC$ 中,已知AB=AC, $\angle BAC=90^\circ$,AD $\perp BC$ 于点D,点F、E分别在AD、DC上,且AF=CE,连结BF,AE. #%(1)求证: $\triangle ABF \cong \triangle CAE$;%#%(2)判断BF与AE具有怎样的位置关系?并说明理由.%#



graph:

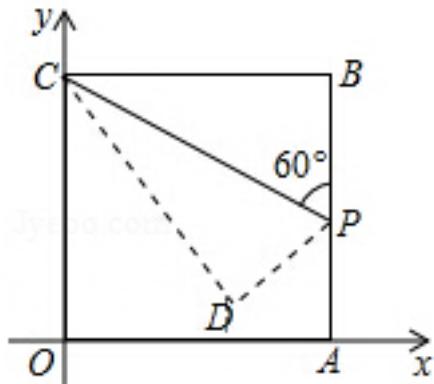
{"stem": {"pictures": [{"picturename": "1000037589_Q_1.jpg", "coordinates": {"A": "-6.00,8.00", "B": "-9.00,5.00", "C": "-3.00,5.00", "D": "-6.00,5.00", "E": "-4.50,5.00", "F": "-6.00,6.50"}, "collinearities": {"0": "A##F##D", "1": "B##D##E##C", "2": "B##A", "3": "A##C", "4": "A##E", "5": "B##F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

RightTriangleRelation:RightTriangle: $\triangle BAC$ [Optional.of(A)], EqualityRelation {AB=AC}, EqualityRelation { $\angle BAC = (1/2 * \pi)$ }, 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, ProveConclusionRe

lation:[证明: TriangleCongRelation{triangleA=△ABF, triangleB=△CAE}], JudgePostionConclusionRelation: [data1=BF, data2=AE]

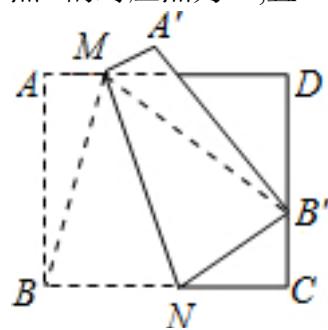
267、topic: 如图,在平面直角坐标系中, OABC是正方形,点A的坐标是\$(4,0)\$,点P在AB边上,且\$\angle CPB=60^\circ\$,将\$\triangle CPB\$沿CP折叠,使得点B落在点D处,求点D的坐标.



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.%#

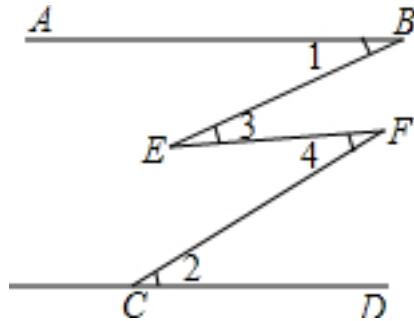


graph:
 {"stem": {"pictures": [{"picturename": "10000802666_Q_1.jpg", "coordinates": {"A": "-2.00,3.00", "B": "-2.00,0.00", "C": "1.00,0.00", "D": "1.00,3.00", "M": "-1.33,3.00", "N": "-0.33,0.00", "A'": "-0.80,3.40", "B'": "1.00,1.00"}, "collineations": {"0": "A##M##D", "1": "A##B", "2": "B##N##C", "3": "C##B'##D", "4": "M##N", "5": "M##A", "6": "A##B", "7": "N##B"}, "variable>equals": {}, "circles": "[]"}, "appliedproblems": {}, "substems": "[]"}}

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)}

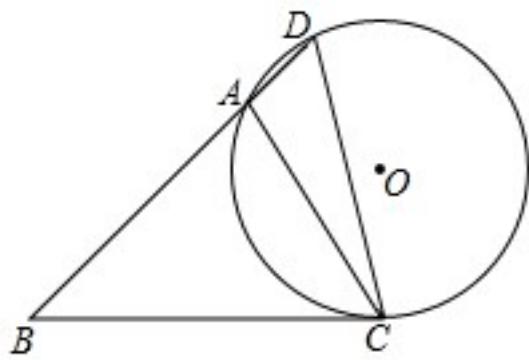
269、topic: 如图,已知 $AB \parallel CD$, $\angle 1 = \angle 2$,求证: $\angle 3 = \angle 4$.#%#



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"}, "collinearities": {"0": "A##B", "1": "F##E", "2": "B##E", "3": "D##C", "4": "F##C"}, "variable>equals": {"0": "\angle 1 = \angle ABE", "1": "\angle 2 = \angle DCF", "2": "\angle 3 = \angle BEF", "3": "\angle 4 = \angle EFC"}, "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"}, "collinearities": {"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": []}}

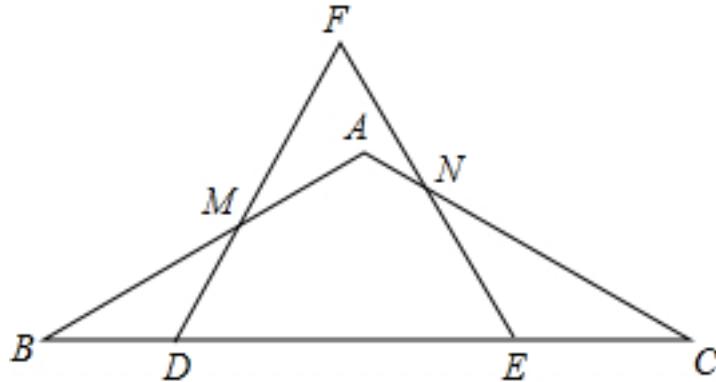
NLP: TriangleRelation: $\triangle ABC$, EqualityRelation { $\angle ABE = (1/4 * \pi)$ }, EqualityRelation { $\angle ACE = (1/3 * \pi)$ }, EqualityRelation { $AB = 3 * (2^{(1/2)})$ }, PointOnLineRelation {point=D, line=BA, isConstant=false, extension=true}, EqualityRelation { $\angle ADH = \angle ACE$ }, 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)}

```

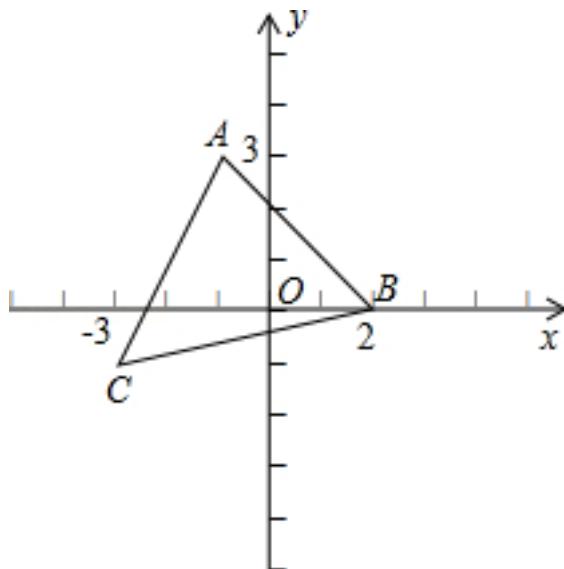
271、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, $\angle B=30^\circ$, $BC=8$,点D在边BC上,点E在线段DC上, $DE=4$, $\triangle DEF$ 是等边三角形,边DF交边AB于点M,边EF交边AC于点N.
(1)求证: $\triangle BMD \sim \triangle CNE$;
(2)设 $BD=x$,五边形ANEDM的面积为y,求y与x之间的函数解析式(要求写出自变量x的取值范围).#%#



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###D###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

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]]}}}

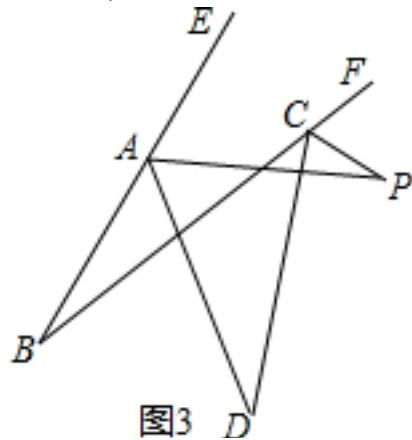
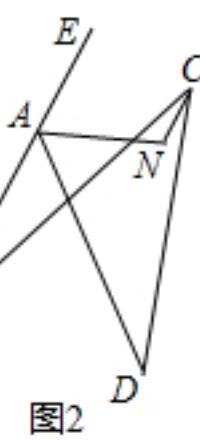
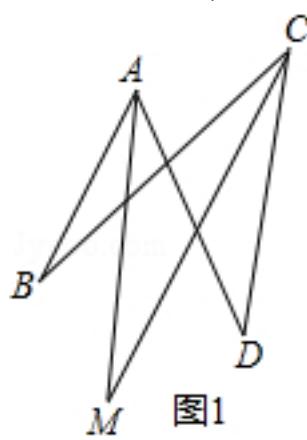
272、topic: 如图,已知平面直角坐标系中 $A(-1,3)$, $B(2,0)$, $C(-3,-1)$.#%#(1)在图中作出 $\triangle ABC$ 关于y轴的对称图形\$\vartriangle \{A\}_1\{B\}_1\{C\}_1\$,并写出点\$\{A\}_1\$、\$\{B\}_1\$、\$\{C\}_1\$的坐标;#%#(2)在y轴上找一点P,使PA+PC最短,并求出最短距离.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000081497_Q_1.jpg", "coordinates": {"A": "-1.00,3.00", "B": "2.00,0.0", "C": "-3.00,-1.00", "O": "0.00,0.00"}, "collinearities": {"0": "B##C", "1": "A##B", "2": "A##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

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.#%#

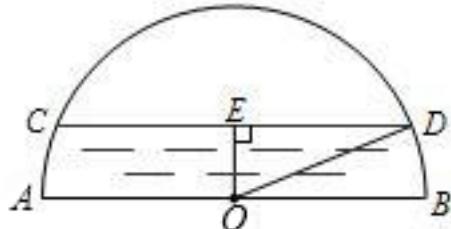


graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000038443_Q_1.jpg", "coordinates": {"A": "-5.54,5.34", "B": "-7.46,2.28", "C": "-2.25,6.35", "D": "-4.37,1.46", "M": "-6.07,1.41"}, "collinearities": {"0": "A##B", "1": "A##D", "2": "A##M", "3": "B##C", "4": "C##M", "5": "C##D"}, "variable-equals": {}, "circles": []}], "substemid": "2", "questionrelies": "", "pictures": [{"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", "P": "-5.54,1.41"}]}]}

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": "", "pictures": [{"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=AM, angle= $\angle BAD$, angle1= $\angle BAM$, angle2= $\angle DAM$ }, AngleBisectorRelation{line=CM, 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= $\angle DAM_5$, angle2= $\angle EAM_5$ }, AngleBisectorRelation{line=CM, 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:] $\angle APC$)}

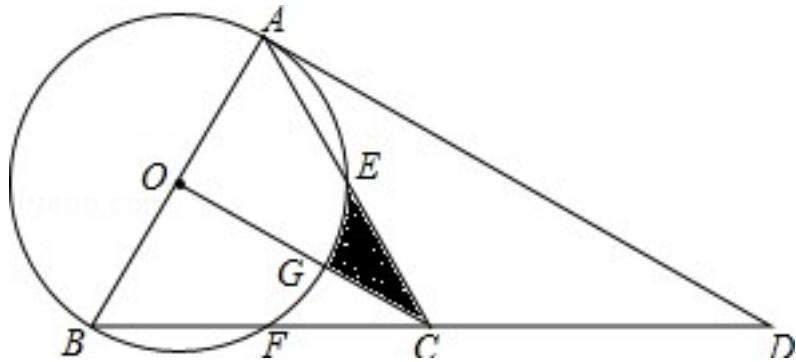
274、topic: 如图是一个半圆形桥洞截面示意图,圆心为O,直径AB是河底线,弦CD是水位线,CD//AB,且AB=26m,OE⊥CD于点E.水位正常时测得OE:CD=5:24#%(1)求CD的长;#%#(2)现汛期来临,水面要以每小时4m的速度上升,则经过多长时间桥洞会刚刚被灌满?#%#



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"}, "collineations": {"0": "O###E", "1": "O###D", "2": "D###E###C", "3": "A###O###B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C###D"}]}, "appliedproblems": {}}, "substems": []}]}

NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O}, analytic= $(x-x_O)^2 + (y-y_O)^2 = r_O^2$, 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.

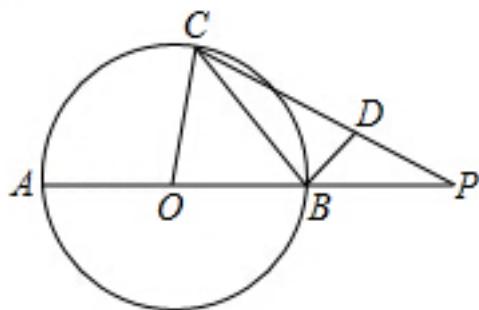


graph:
 {"stem": {"pictures": [{"picturename": "1000026755_Q_1.jpg", "coordinates": {"A": "1.88,4.92", "B": "-0.62,0.59", "C": "4.38,0.59", "D": "9.38,0.59", "E": "3.13,2.76", "F": "1.88,0.59", "G": "2.79,1.51", "O": "0.63,2.76"}, "collinearities": {"0": "A##O##B", "1": "A##E##C", "2": "A##D", "3": "O##C", "4": "B##F##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)}

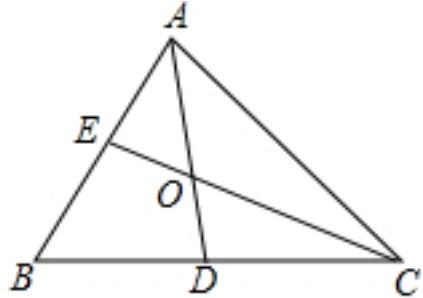
276、topic: 如图,AB是 $\odot O$ 的直径,延长AB至点P,使 $BP=OB$,BD垂直于弦BC,垂足为点B,点D在PC上.设 $\angle PCB=\alpha$, $\angle POC=\beta$.?#%#求证: $\tan\alpha \cdot \tan\frac{\beta}{2} = \frac{1}{3}$.



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"}, "collinearities": {"0": "B##A##D##P", "1": "C##P##D", "2": "C##O", "3": "D##B"}, "variable-equals": {"0": "\angle \alpha = \angle PCB", "1": "\angle \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{ $\tan(\alpha)*\tan((\beta)/2)=(1/3)$ }]

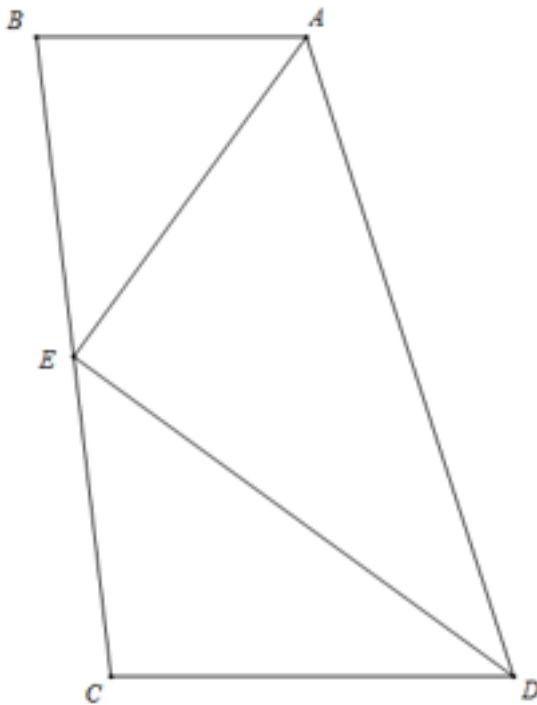
277、topic: 如图,在 $\triangle ABC$ 中, $\angle ABC=60^\circ$,AD,CE分别平分 $\angle BAC$, $\angle ACB$,AD,CE交于O. #(1)求 $\angle AOC$ 的度数; #(2)求证: $AC=AE+CD$. #



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", "questionrelies": "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{ $AC=AE+CD$ }]

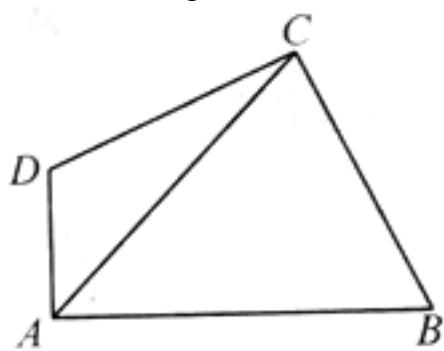
278、topic: 如图,已知 $AB//CD$,AE、DE分别 $\angle BAD$ 和 $\angle ADC$ 的平分线,求证: $AB+CD=AD$. #



graph:
 {"stem": {"pictures": [{"picturename": "1000040372_Q_1.jpg", "coordinates": {"A": "-2.73,10.08", "B": "-6.75,1.08", "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}]

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.%#

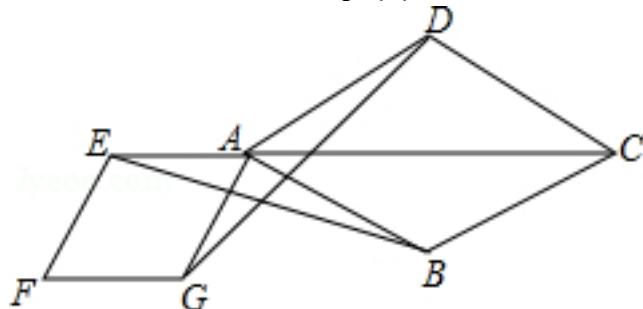


graph:
 {"stem": {"pictures": [{"picturename": "1000031261_Q_1.jpg", "coordinates": {"A": "-10.50,2.00", "B": "0.00,2.00", "C": "-3.00,6.00", "D": "-7.99,5.74"}, "collineations": {"0": "A##D", "1": "A##B", "2": "A##C", "3": "B##C", "4": "D##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

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)}

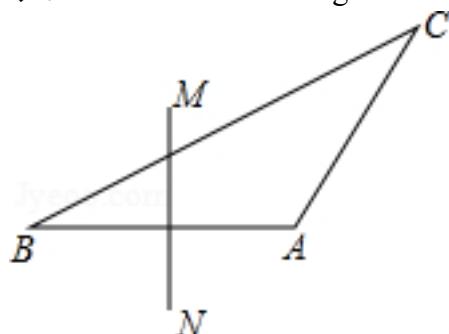
280、topic: 如图,点E是菱形ABCD对角线CA的延长线上任意一点,以线段AE为边作一菱形AEFG,且菱形AEFG \sim 菱形ABCD,连接EB、GD. #%(1)求证:EB=GD; #%(2)若 $\angle DAB=60^\circ$, $AB=2$, $AG=\sqrt{3}$,求GD的长. #%#



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

NLP: QuadrilateralSimilarRelation [quadrilateralA=Rhombus:AEFG, quadrilateralB=Rhombus:ABCD], SegmentRelation:EB, SegmentRelation:GD, EqualityRelation{DG=v_0}, E qualityRelation{ $\angle BAD=(1/3*\pi)$ }, 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: $CM=2BM$. #%#

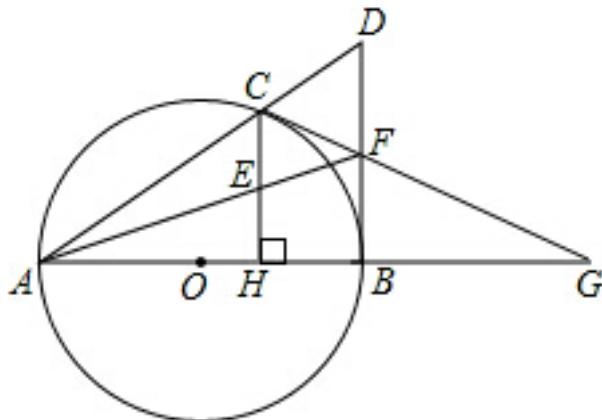


graph:
 {"stem": {"pictures": [{"picturename": "1000041472_Q_1.jpg", "coordinates": {"A": "3.40,0.00", "B": "0.00,0.00", "C": "5.20,3.12", "M": "1.70,2.01", "N": "1.70,-0.98"}, "collineations": {"0": "A##B", "1": "A##C", "2": "C##B", "3": "M##N"}, "variable>equals": {}, "circles": [], "appliedproblems": {}, "substems": []}]}}

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, $CH \perp AB$ 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.



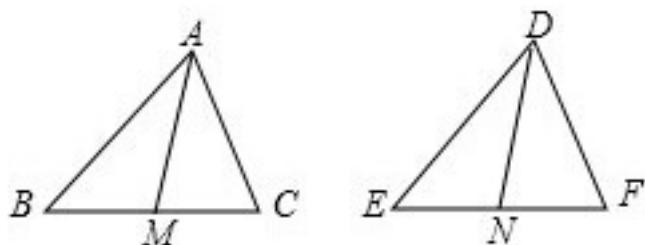
graph:

```
{"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###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=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]}, 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:

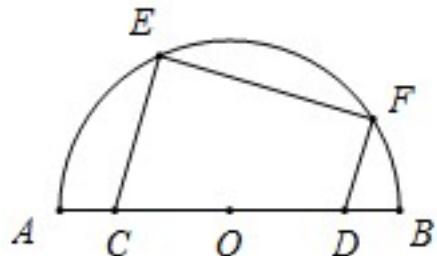
```
{"stem": {"pictures": [{"picturename": "1000035725_Q_1.jpg", "coordinates": {"A": "0.00,2.04", "B": "-1.83,0.00", "C": "1.00,0.00", "M": "-0.41,0.00", "D": "0.00,-2.96", "E": "-1.83,-5.00", "F": "1.00,-5.00", "N": "-0.41,-5.00"}, "collineations": {"0": "A##B", "1": "B##M##C", "2": "C##A", "3": "M##A", "4": "D##E", "5": "E##N##"}]}
```

F","6":"F###D","7":"N###D"},"variable>equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}

NLP:

TriangleRelation: ΔABC , TriangleRelation: ΔDEF , EqualityRelation {AB=DE}, EqualityRelation {AC=DF}, EqualityRelation {AM=DN}, MidianLineOfTriangleRelation {midianLine=AM, triangle= ΔABC , top=A, bottom=BC}, MidianLineOfTriangleRelation {midianLine=DN, triangle= ΔDEF , top=D, bottom=EF}, ProveConclusionRelation:[证明: TriangleCongRelation {triangleA= ΔABC , triangleB= ΔDEF }]

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": "-4.00,0.00", "D": "4.00,0.00", "E": "-3.00,4.00", "F": "4.53,2.12", "O": "0.00,0.00"}, "collinearations": {"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": {}, "subsystems": []}}

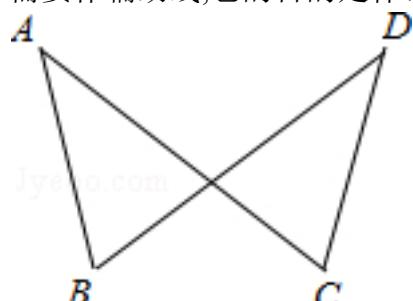
NLP: SegmentRelation:AB,ChordOfCircleRelation {chord=EF, circle=null, chordLength=null,straightLine=null},LinePerpRelation {line1=CE, line2=EF, crossPoint=E},LinePerpRelation {line1=DF, line2=EF, crossPoint=F},ProveConclusionRelation:[证明: EqualityRelation {AC=BD}]

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?%#

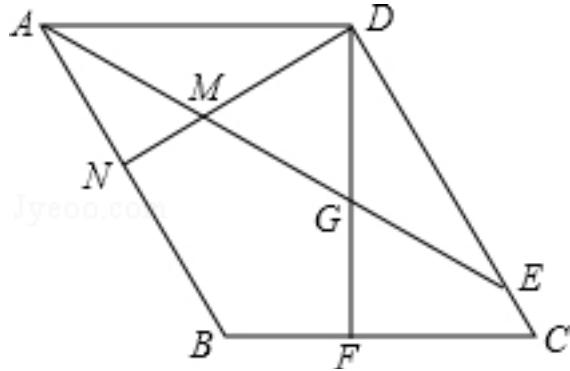


graph:

{"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:
 $AB=CF+DM$. #%#



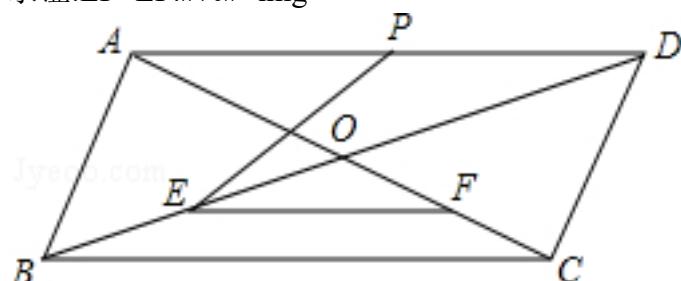
graph:

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

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD}, AngleBisectorRelation{line=AE, angle= $\angle DAN$, 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}]

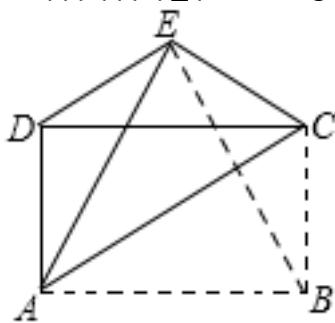
288、topic: 平行四边形ABCD的对角线相交于点O,E、F、P分别为OB、OC、AD的中点,且AC=2AB, 求证: $EP=EF$. #%#



graph:

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}]

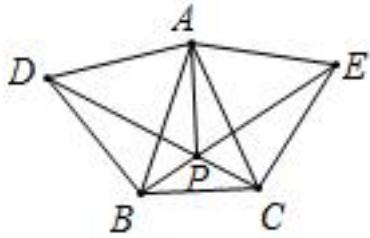
289、topic: 如图,已知在矩形ABCD中,AB=2a,把矩形沿直线AC折叠,点B落在点E处,连接DE、BE,△ABE是等边三角形.
 #%(1)求点E到CD的距离;
 #%(2)求 $\frac{\text{S}_{\triangle DCE}}{\text{S}_{\triangle ABE}}$ 的值.
 #%#



```
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:

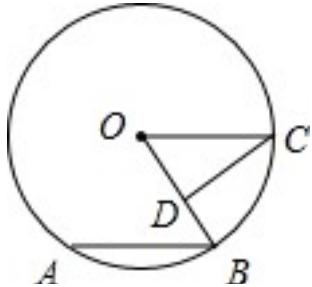
{"stem": {"pictures": [{"picturename": "1000021372_Q_1.jpg", "coordinates": {"A": "1.00,2.00", "B": "0.00,0.00", "C": "2.00,0.00", "D": "-1.23,1.87", "E": "3.23,1.87", "P": "1.00,0.58"}, "collineations": {"0": "E###P###B", "1": "A###P", "2": "D###A", "3": "A###B", "4": "A###C", "5": "P###C###D", "6": "B###C", "7": "D###B", "8": "A###E", "9": "C###E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: ΔABC , EqualityRelation: $\{AB=AC\}$, RegularTriangleRelation: RegularTriangle: ΔABD , RegularTriangleRelation: RegularTriangle: ΔACE , 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= $\angle DPE$, angle1= $\angle APD$, angle2= $\angle APE$ }]

291、topic: 如图,已知点A、B、C在 $\odot O$ 上, $CD \perp OB$ 于D, $\angle A=2\angle O$,若 $\angle C=40^\circ$,求 $\angle B$ 的度数.

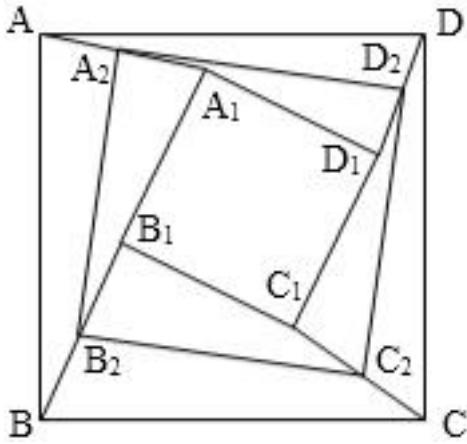


graph:

{"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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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, $\{A_2\}$ 、 $\{B_2\}$ 、 $\{C_2\}$ 、 $\{D_2\}$ 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", "A[1]": "4.00,6.00", "B[1]": "3.00,3.00", "C[1]": "6.00,2.00", "D[1]": "7.00,5.00", "A[2]": "2.50,6.50", "B[2]": "2.00,1.50", "C[2]": "7.00,1.00", "D[2]": "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": []}}
```

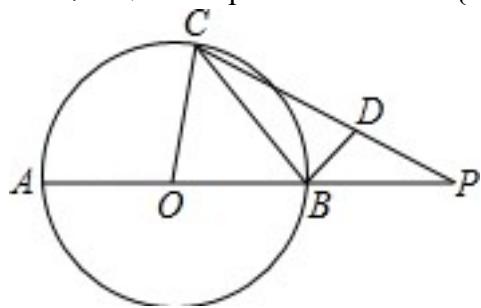
NLP:

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 $\tan \alpha \cdot \tan \frac{\beta}{2} = \frac{1}{3}$.



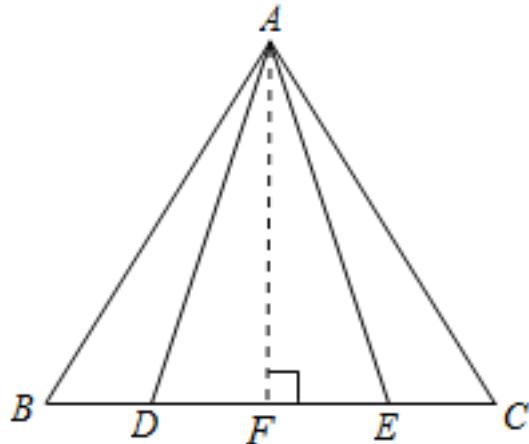
graph:

```
{"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=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{ $\angle BCD=\alpha$ }, EqualityRelation{ $\angle POC=\beta$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\tan(\alpha)*\tan((\beta)/2)=(1/3)$ }]

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.#%#

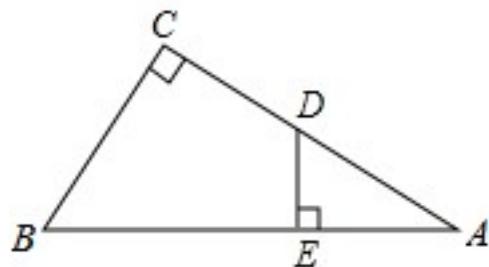


graph:

{"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: $(BC)^2=(BE)^2-(AE)^2$.



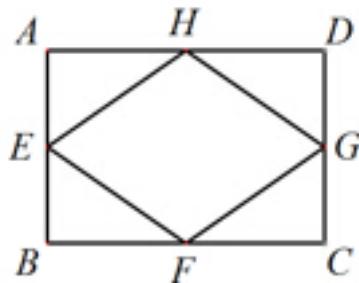
graph:

{"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=D E, 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.?



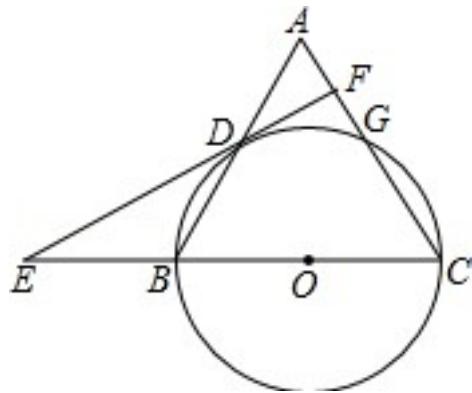
graph:

{"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.



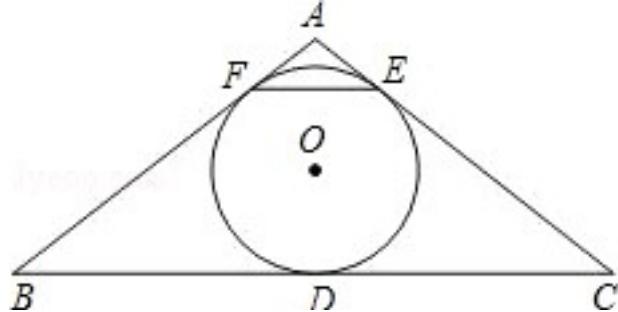
graph:

{"stem": {"pictures": [{"picturename": "1000026226_Q_1.jpg", "coordinates": {"A": "2.20,9.60", "B": "-5.00,0.0", "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: ΔABC [Optional.of(C)],MultiEqualityRelation[multiExpressCompare=AC=BC=10, originExpressRelationList=[], keyWord=null, result=null],EqualityRelation{AB=12},DiameterRelation{diameter=BC, circle=Circle[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(D), outpoint=Optional.absent()}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\cos(\angle BED)$)}

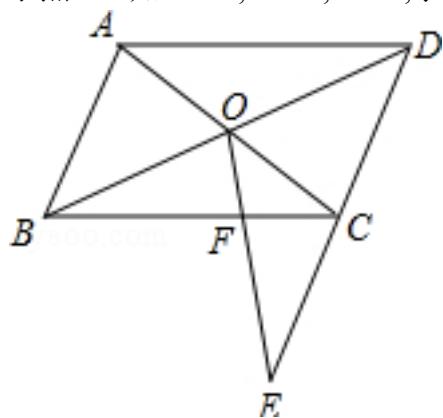
298、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$,内切圆 O 与边 BC 、 AC 、 AB 分别切于 D 、 E 、 F .#%#(1)求证:
 $BF=CE$;<#%#(2)若 $\angle C=30^\circ$, $CE=2\sqrt{3}$,求 AC .#%#



graph:
{"stem": {"pictures": [{"picturename": "1000008275_Q_1.jpg", "coordinates": {"A": "0.00,2.00", "B": "-3.46,0.0", "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": []}], "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.#%#

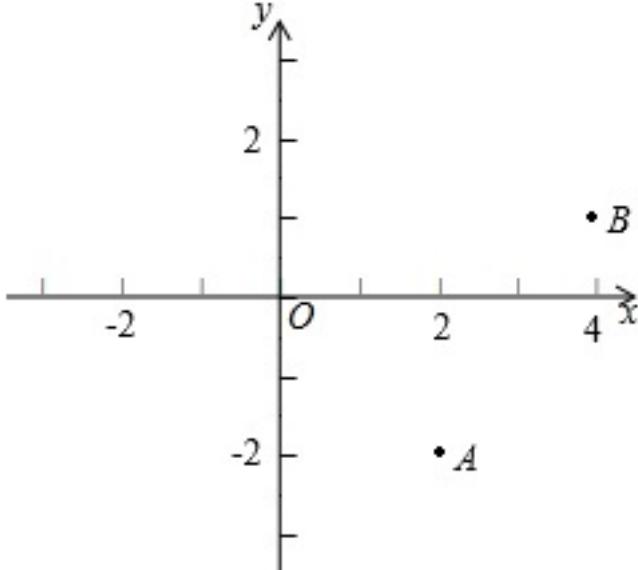


graph:
{"stem": {"pictures": [{"picturename": "1000050808_Q_1.jpg", "coordinates": {"A": "-6.00,6.00", "B": "-8.00,3.00", "C": "-4.00,3.00", "D": "-2.00,6.00", "E": "-4.83,1.76", "F": "-4.91,3.00", "O": "-5.00,4.50"}, "collineations": {"0": "B##A", "1": "A##D", "2": "A##C##O", "3": "B##O##D", "4": "O##E##F", "5": "B##C##F", "6": "E##D##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}], "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)}

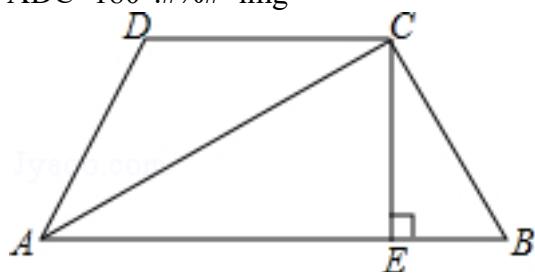
300、topic: 如图,已知两点\$A(2,-2)\$、\$B(4,1)\$,点P是y轴上一点,求\$PA+PB\$的最小值.



graph:
 {"stem": {"pictures": [{"picturename": "1000006956_Q_1.jpg", "coordinates": {"A": "2.00,-2.00", "B": "4.00,1.00", "O": "0.00,0.00"}, "collineations": {}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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)}

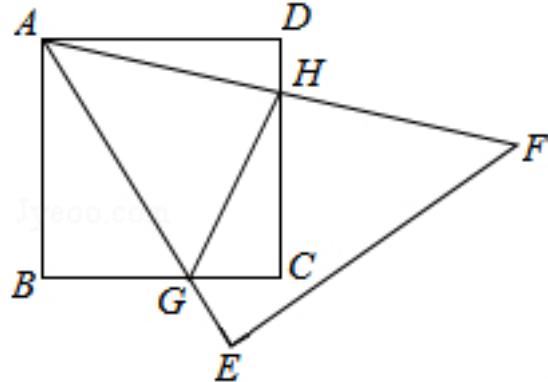
301、topic: 如图,四边形ABCD中,AC平分 $\angle BAD$, $CE \perp AB$ 于点E, $AD+AB=2AE$.求证: $\angle B+\angle ADC=180^\circ$.#%#



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"}, "collineations": {"0": "A##D", "1": "A##E##B", "2": "A##C", "3": "B##C", "4": "D##C", "5": "E##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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{ $\angle CBE + \angle ADC = \pi$ }]

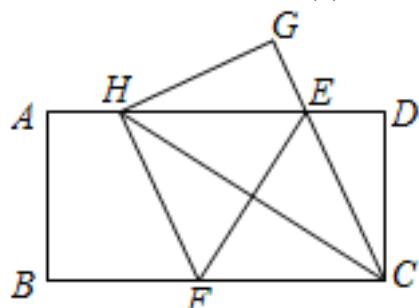
302、topic: 如图,已知正方形ABCD和等腰直角三角形AEF, $\angle E=90^\circ$, AE和BC交于点G, AF和CD交于点H,正方形ABCD的面积为 1cm^2 ,求 $\triangle CGH$ 的周长.#%#



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(F)], SquareRelation{square=Square:ABCD}, EqualityRelation{ $\angle FEG = (1/2)\pi$ }, 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}\$.#%#

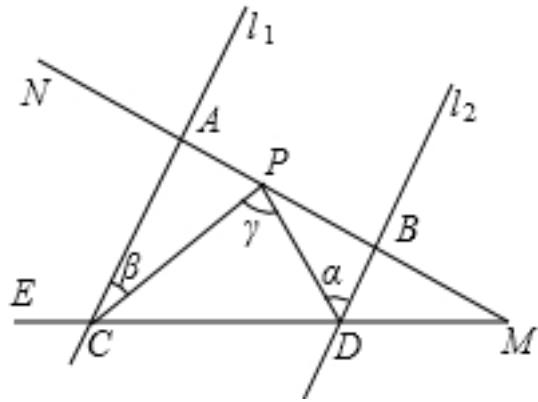


graph:
 {"stem": {"pictures": [{"picturename": "1000061936_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "8.00,0.00", "D": "0.00,8.00", "E": "2.00,0.00", "F": "8.00,4.00", "G": "2.00,4.00", "H": "0.00,4.00"}, "collineations": {"0": "A##B", "1": "B##C##G", "2": "D##H##C", "3": "A##D", "4": "A##G##E", "5": "E##F", "6": "A##H##F", "7": "G##H"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

,"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}),"collinearities":{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 $\{1\}_1$ 平行 $\{1\}_2$, MN 分别和直线 $\{1\}_1$ 、 $\{1\}_2$ 交于点A、B, ME 分别和直线 $\{1\}_1$ 、 $\{1\}_2$ 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"}, "collineations": {"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", "1": "\u03b2=\u03b2", "2": "\u03b3=\u03b3"}, "circles": []}, "appliedproblems": {}, "substems": []}

```

NLP: PointRelation:P,PointRelation:A,NegativeRelation{relation=PointCoincidenceRelation{point1=B, point2=M}},LineParallelRelation [iLine1=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false, iLine2=StraightLine[l_2] analytic :y=k_1_2*x+b_1_2 slope:null b:null isLinearFunction:false],LineCrossRelation [crossPoint=Optional.of(A), iLine1=MN, iLine2=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false],LineCrossRelation [crossPoint=Optional.of(B), iLine1=MN, iLine2=StraightLine[l_2] analytic :y=k_1_2*x+b_1_2 slope:null b:null isLinearFunction:false],LineCrossRelation [crossPoint=Optional.of(C), iLine1=ME, iLine2=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false],LineCrossRelation [crossPoint=Optional.of(D), iLine1=ME, iLine2=StraightLine[l_2] analytic :y=k_1_2*x+b_1_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:]($\angle \alpha / \angle \beta$)),求值(大小): (ExpressRelation:[key:]($\angle \beta / \angle \gamma$)),求值(大小): (ExpressRelation:[key:]($\angle \alpha / \angle \beta$)),求值(大小): (ExpressRelation:[key:]($\angle \beta / \angle$))

γ)),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:])($\angle \alpha / \angle \beta$)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:])($\angle \beta / \angle \gamma$)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:])($\angle \alpha / \angle \beta$)},SolutionConclusionRelation{relation=求值(大小): (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.#%#

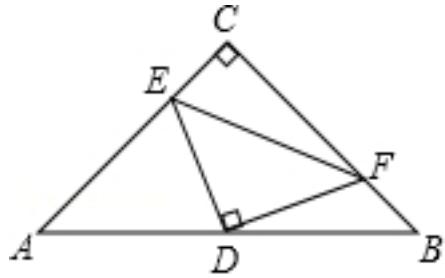


图1

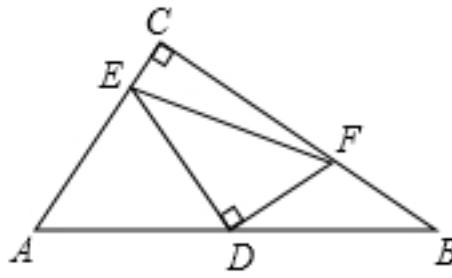
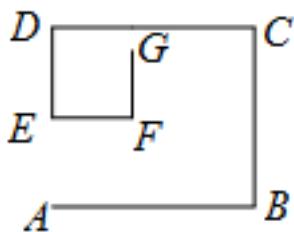


图2

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000031541_Q_1.jpg", "coordinates": {"A": "-13.00,0.00", "B": "-5.00,0.00", "C": "-9.00,4.00", "D": "-9.00,0.00", "E": "-10.00,3.00", "F": "-6.00,1.00"}, "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": "0.00,0.00", "B": "7.00,0.00", "C": "2.73,3.41", "D": "3.50,0.00", "E": "2.00,2.50", "F": "5.50,1.20"}, "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": {}}]}

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 // GF,BC // DE,EF // DC,DC // AB,求证: $\angle B = \angle F$.#%#

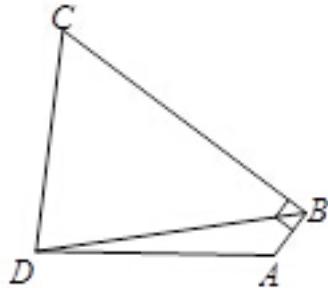


graph:
 {"stem": {"pictures": [{"picturename": "1000051247_Q_1.jpg", "coordinates": {"A": "-5.00,2.69", "B": "-2.00,2.69", "C": "-2.00,5.34", "D": "-5.00,5.34", "E": "-5.00,4.00", "F": "-3.81,4.00", "G": "-3.81,5.00"}, "collineations": {"0": "D##C", "1": "F##G", "2": "E##D", "3": "E##F", "4": "A##B", "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 { $\angle ABC = \angle EFG$ }]

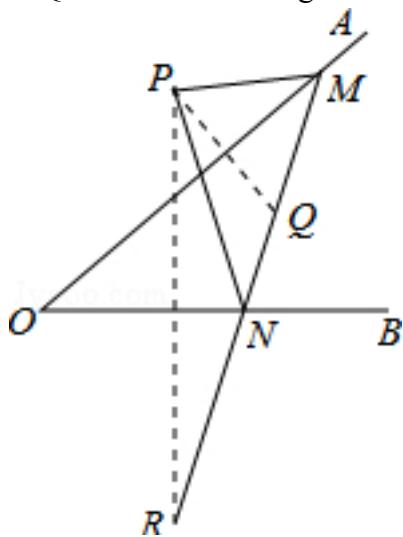
307、topic: 如图, BD是四边形ABCD的对角线,\$AB \perp BC\$,\$\angle C=60^\circ\$,\$AB=1\$,\$BC=3+\sqrt{3}\$,\$CD=2\sqrt{3}\$.?(1)求\$\angle ABD\$的度数;?(2)求AD的长.



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=2.5cm,PN=3cm,MN=4cm,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##M", "6": "O##M##A"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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.%#

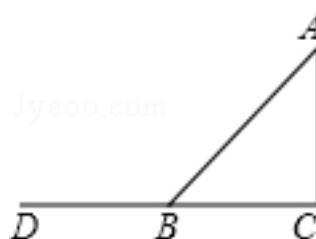


图1

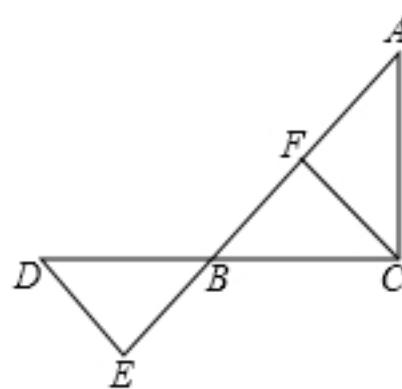


图2

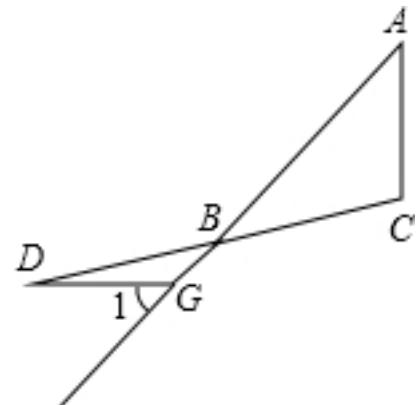
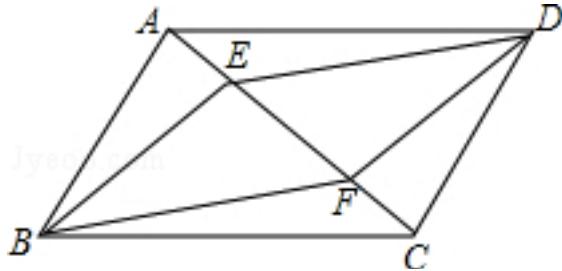


图3

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": "\u00b71=\u00b7DGI"}, "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]

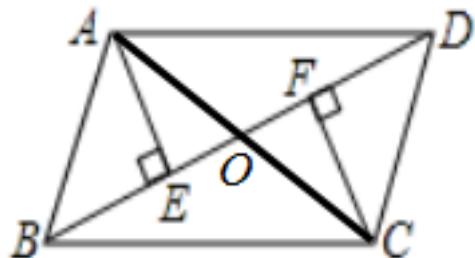
310、topic: 已知:如图,在平行四边形ABCD中,点E、F在AC上,且AE=CF.求证:四边形BEDF是平行四边形.



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.

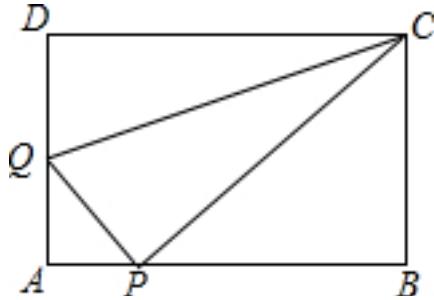


graph:
 {"stem": {"pictures": [{"picturename": "1000034181_Q_1.jpg", "coordinates": {"A": "-14.00,6.00", "B": "-16.00,3.00", "C": "-12.00,3.00", "D": "-10.00,6.00", "E": "-13.20,4.40", "F": "-12.80,4.60"}, "collineations": {"0": "B##D", "1": "A##E", "2": "E##C", "3": "A##F", "4": "F##C", "5": "A##B", "6": "A##D", "7": "C##D", "8": "B##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionreliances": "", "pictures": [{"picturename": "1000034181_Q_1.jpg", "coordinates": {"O": "-13.00,4.50"}}, {"picturename": "1000034181_Q_1.jpg", "coordinates": {"O": "-13.00,4.50"}}], "variable>equals": {}, "circles": []}, {"substemid": "2", "questionreliances": "", "pictures": [{"picturename": "1000034181_Q_1.jpg", "coordinates": {"O": "-13.00,4.50"}}, {"picturename": "1000034181_Q_1.jpg", "coordinates": {"O": "-13.00,4.50"}], "variable>equals": {}, "circles": []}]}]

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= $\triangle CDF$ }], 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 \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. #%



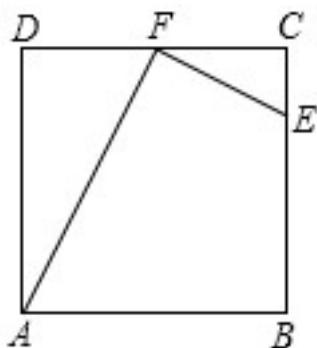
graph:

```
{"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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: $AF \perp EF$.



graph:

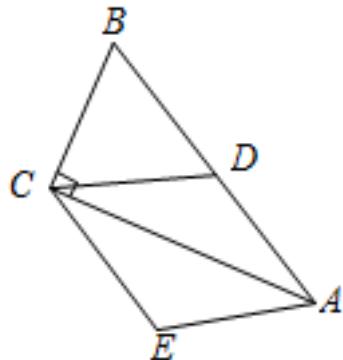
```
{"stem": {"pictures": [{"picturename": "1000007025_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "4.00,4.00", "D": "0.00,4.00", "E": "4.00,3.00", "F": "2.00,4.00"}, "collineations": {"0": "A###F", "1": "D###C###F", "2": "C###E###B", "3": "A###B", "4": "E###F"}, "variable>equals": {}, "circles": []}], "appliedproblem": {}}
```

s":{}}, "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}]

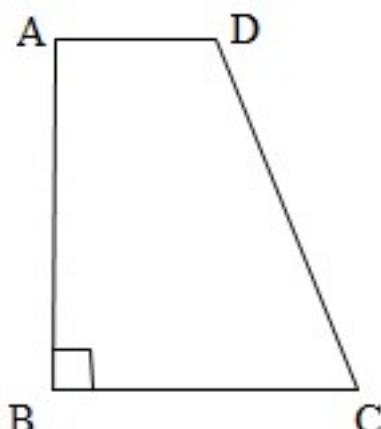
314、topic: 如图,在Rt $\triangle ABC$ 中, $\angle ACB=90^\circ$, D为AB的中点,且 $AE \parallel CD$, $CE \parallel AB$.#%#(1)证明:四边形ADCE是菱形;#%#(2)若 $\angle B=60^\circ$, $BC=6$,求菱形ADCE的高.#%#



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"}, "collinearities": {"0": "A###D###B", "1": "B###C", "2": "C###E", "3": "E###A", "4": "C###D", "5": "C###A"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation{ $\angle ACB=(1/2*\pi)$ }, MiddlePointOfSegmentRelation{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)}

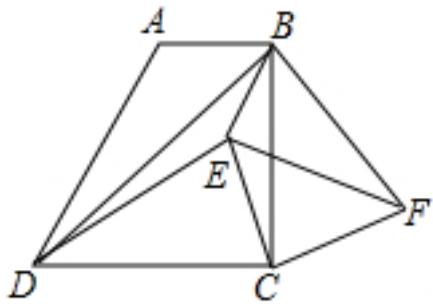
315、topic: 如图,在直角梯形ABCD中, $AD \parallel BC$, $AB \perp BC$, $AD=1$, $BC=3$, $CD=4$.求证:以CD为直径的圆与AB相切.



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

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()}]

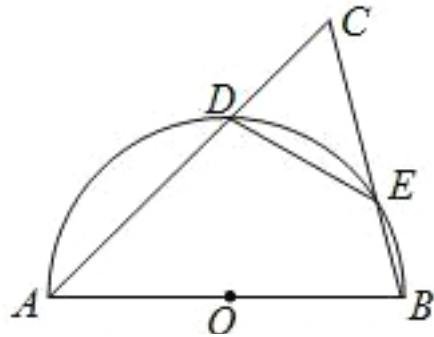
316、topic: 如图,在四边形ABCD中,AB//CD, $\angle ECF = \angle BCD = 90^\circ$, CE=CF=5,BC=7, BD平分 $\angle ABC$. #%(E是 $\triangle BCD$ 内一点,F是四边形ABCD外一点(E可以在 $\triangle BCD$ 的边上).#%(1)求证:DC=BC.#%(2)若 $\angle BEC = 135^\circ$,设BE=a,DE=b,求a与b满足的关系式.#%(3)当E落在线段BD上时,求DE的长.#%#



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

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{DE=v_0}, PointOnLineRelation{point=E, line=BD, isConstant=false, extension=false}, 求值(大小): (ExpressRelation:[key:v_0]), ProveConclusionRelation:[证明: 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 $2\sqrt{3}$.(1)求证: $\triangle CDE \sim \triangle CBA$;(2)求DE的长.

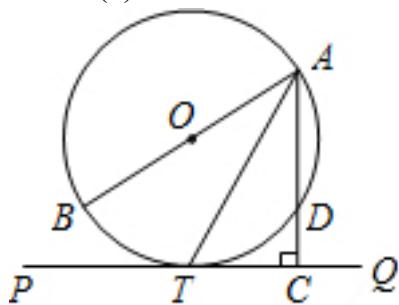


graph:

```
{"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}),"collineations":{"0":"A###O##B","1":"A##D##C","2":"C##E##B","3":"D##E"}, "variable>equals":{},"circles":[{"center":"O","pointin circle":"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:[$2\sqrt{3}$]}, 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"}],"collineations":{"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":{}}, "subsystems":[]}
```

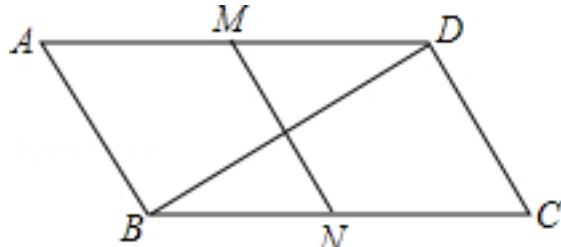
```

NLP: DiameterRelation{diameter=AB, circle=Circle[ $\odot$ O]{center=O,
analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, LineContactCircleRelation{line=PQ,
circle=Circle[ $\odot$ O]{center=O, 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=O},
 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)}

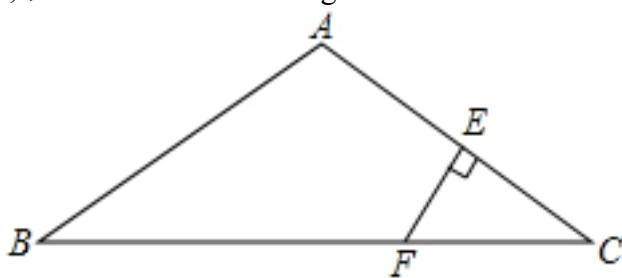
319、topic: 如图,在平行四边形ABCD中,\$\angle C = 60^\circ\$,M、N分别是AD、BC的中点,\$BC = 2CD\$.?(1)求证:四边形MNCD是平行四边形;?(2)求证: \$BD = \sqrt{3} MN\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000010825_Q_1.jpg", "coordinates": {"A": "-1.50,4.33", "B": "1.00,0.0", "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": {}, "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}]]

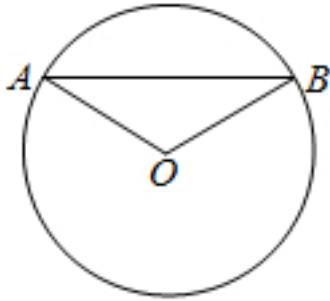
320、topic: 如图,已知在 $\triangle ABC$ 中,AB=AC, $\angle BAC=120^\circ$,AC的垂直平分线EF交AC于点E,交BC于点F,求证: $BF=2CF$.#



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{ \angle 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 $OA=20\text{cm}$, $\angle O=120^\circ$,求 $\triangle AOB$ 的面积.#%#

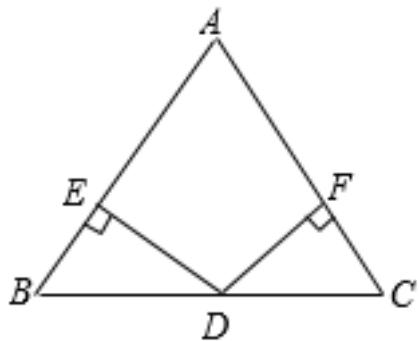


graph:

{"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{ $S_{\Delta ABO}=v_0$ }, 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}, RadiusRelation{radius=OA, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=Express:[20]}, EqualityRelation{ $\angle AOB=(2/3\pi)$ }, 求值(大小): (ExpressRelation:[key]: v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key]: $S_{\Delta ABO}$)}

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 $DE \perp AB$, $DF \perp AC$ 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.#%#

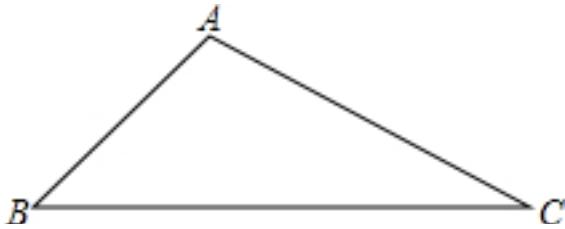


graph:

{"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##E##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= $\angle DAF$ }]

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

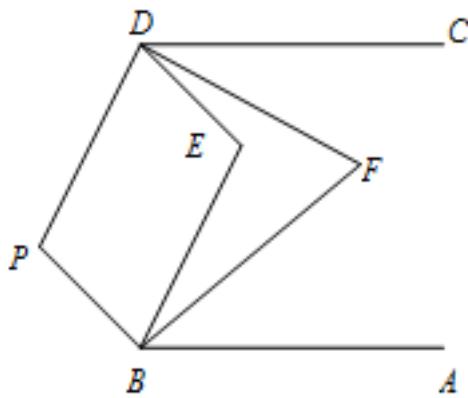


graph:

{"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.#%#

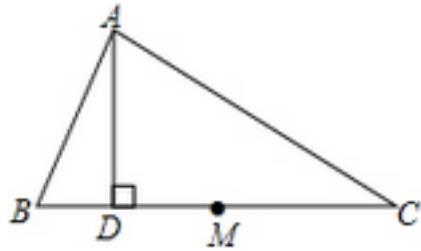


graph:

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

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= $\angle BPD$ }, AngleRelation{angle= $\angle BED$ }, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle BPD$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle BED$), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] $\angle BPD$)}

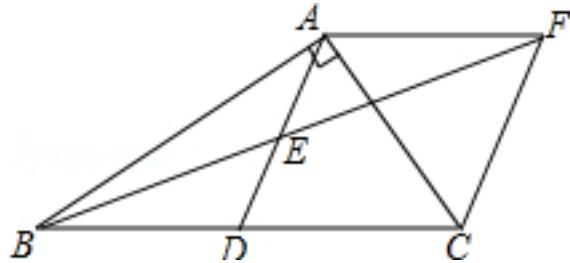
325、topic: 如图,在三角形ABC中, $\angle B = 2\angle C$,AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$



graph:
 {"stem": {"pictures": [{"picturename": "1000040694_Q_1.jpg", "coordinates": {"A": "-9.03,4.35", "B": "-11.00,2.00", "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": {}, "substems": []}}

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

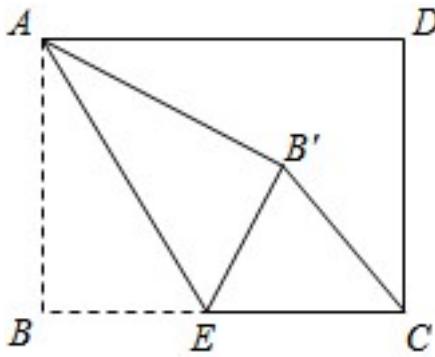
326、topic: 在Rt ΔABC 中, $\angle BAC = 90^\circ$, D是BC的中点,E是AD的中点,过点A作AF//BC交BE的延长线于点F.(1)求证: $\triangle AEF \cong \triangle DEB$;(2)证明四边形ADCF是菱形;(3)若AC=4,AB=5,则菱形ADCF的面积.



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: ΔABC [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:△CEB'[Optional.of(B')], 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]BE)}

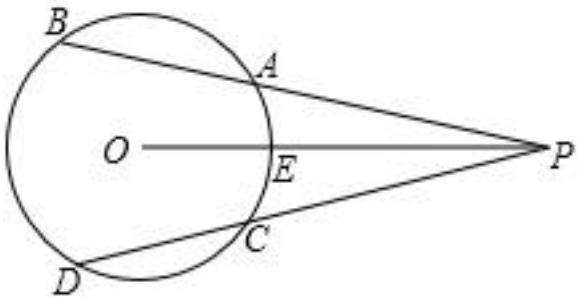
328、topic: 如图,O是\$△ABC\$的内心,BO的延长线和\$△ABC\$的外接圆相交于点D,连接DC,DA,OA,OC,四边形OADC为平行四边形.?#%#(1)求证:\$△BOC\cong△CDA\$;?#%#(2)若\$AB=2\$,求\$\widehat{AB}\$的长度.

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=△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/△ABC/InnerCentre, LineCrossCircleRelation{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}, 求值(大小): (ExpressRelation:[key:] \widehat{AB}), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△BOC, triangleB=△CDA}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] \widehat{AB})

329、topic: 如图所示,已知点P是\$○O\$外的一点,PB与\$○O\$相交于点A、B,PD与\$○O\$相交于C、D,\$AB=CD\$.求证:?#%#(1)PO平分\$∠BPD\$;?#%#(2)\$PA=PC\$;?#%#(3)\$\widehat{AE}=\widehat{CE}\$

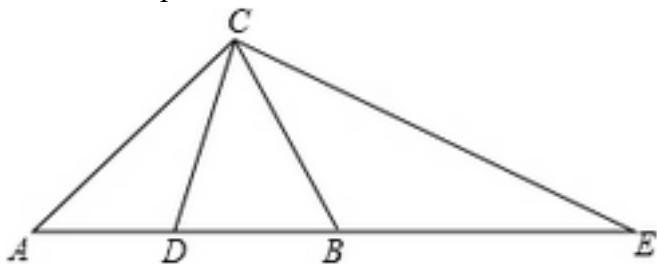


graph:

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

NLP: 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=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{ $\angle AEC = \angle CED$ }]]

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



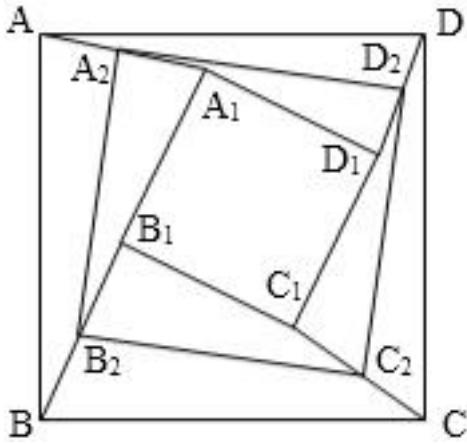
graph:

{"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", "A[1]": "4.00,6.00", "B[1]": "3.00,3.00", "C[1]": "6.00,2.00", "D[1]": "7.00,5.00", "A[2]": "2.50,6.50", "B[2]": "2.00,1.50", "C[2]": "7.00,1.00", "D[2]": "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:

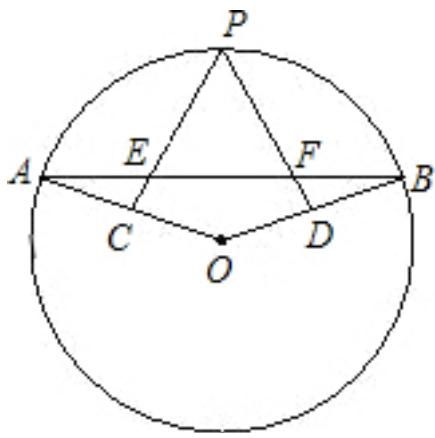
```
SquareRelation{square=Square:ABCD}, SquareRelation{square=Square:A_1B_1C_1D_1}, PointRelation:A_2, PointRelation:B_2, SegmentRelation:CC_1, ProveConclusionRelation:[证明:  
SquareRelation{square=Square:A_2B_2C_2D_2}]
```

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:

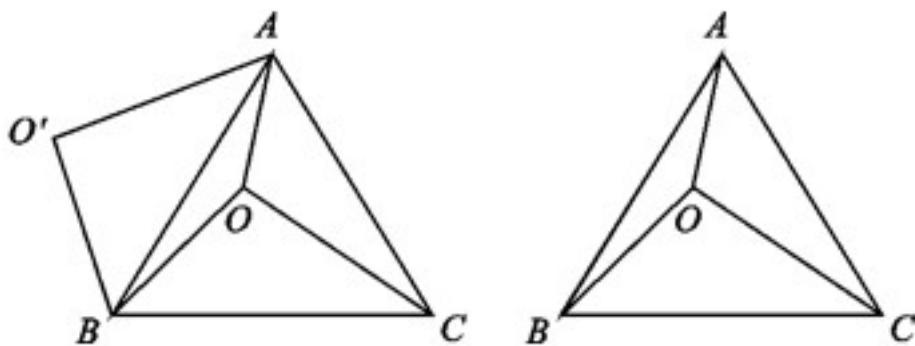
{"stem": {"pictures": [{"picturename": "1000080914_Q_1.jpg", "coordinates": {"A": "-10.79,0.87", "B": "-1.83,1.13", "C": "-8.52,-0.29", "D": "-4.04,-0.16", "O": "-6.24,-1.46", "E": "-7.85,0.96", "F": "-4.78,1.04", "P": "-6.39,3.65"}, "collineations": {"0": "O###C###A", "1": "O###D###B", "2": "A###E###F###B", "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{middlePoint=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:

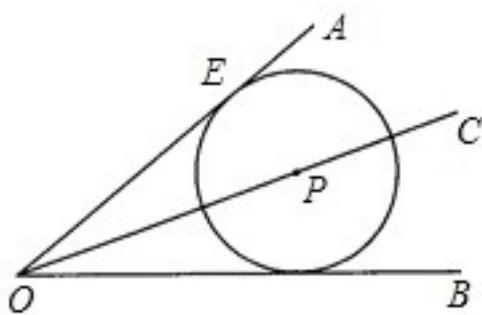
{"stem": {"pictures": [{"picturename": "1000027560_Q_1.jpg", "coordinates": {"A": "0.91,2.86", "B": "-2.65,-3.00", "C": "4.00,-3.00", "B'": "-3.92,0.79", "O": "0.00,0.00"}, "collineations": {"0": "B###O", "1": "B###B", "2": "A###B", "3": "A###O", "4": "C###O", "5": "C###B", "6": "A###C", "7": "A###B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblem": ""}]}}

s":{}}, {"substemid": "3", "questionreplies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "4", "questionreplies": "3", "pictures": [], "appliedproblems": {}}]}

NLP: 已知条件

QuadrilateralRelation{quadrilateral=AOBO'}, EqualityRelation{S_AOBO'=v_0}, RegularTriangleRelation:RegularTriangle:△ABC, PositionOfPoint2RegionRelation{point=O, region=EnclosedRegionRelation{name=ABC, closedShape=△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{∠AOB=(5/6*Pi)}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_AOBO')}

335、topic: 如图,已知:OC平分\$∠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.

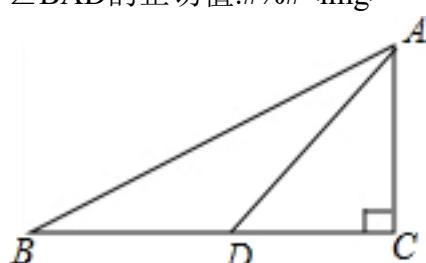


graph:

{"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"}, "collinearities": {"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=∠BOE, angle1=∠BOC, angle2=∠COE}, PointOnLineRelation{point=P, line=OC, isConstant=false, extension=false}, LineContactCircleRelation{line=OA, circle=Circle[○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[○P]{center=P, analytic=(x-x_P)^2+(y-y_P)^2=r_P^2}, contactPoint=Optional.absent(), outpoint=Optional.absent()}]

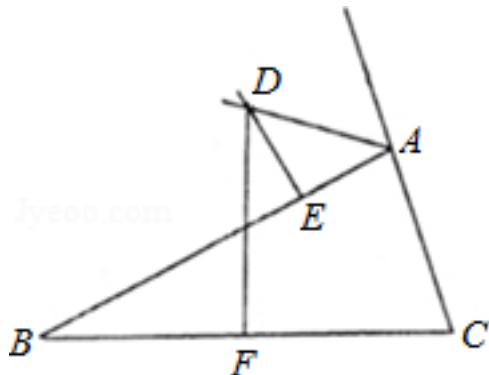
336、topic: 如图,在Rt△ABC中,\$\angle C=90^\circ\$, \$\sin B=\frac{3}{5}\$,点D在BC上,且\$\angle ADC=45^\circ\$,DC=6,求∠BAD的正切值.



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:△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($\angle BAD$))}

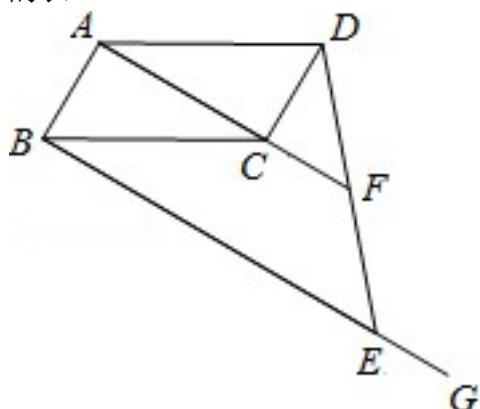
337、topic: 如图,△ABC的边BC的中垂线DF交△BAC的外角平分线AD于点D,F为垂足,DE \perp AB于点E,且AB>AC,求证:BE-AC=AE. #



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= $\angle CAE$, angle1= $\angle DAE$, angle2= $\angle CAD$ }, ProveConclusionRelation:[证明: EqualityRelation{BE-AC=AE}]

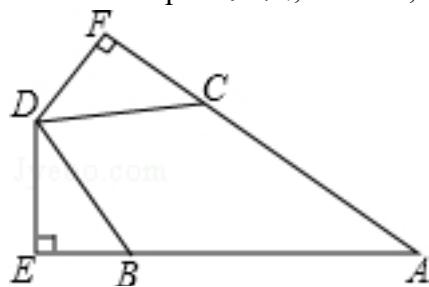
338、topic: 如图,在平行四边形ABCD中,过点B作\$BG \parallel AC\$,在BG上取点E,连接DE交AC的延长线于点F.?(1)求证:\$DF=EF\$;?(2)如果\$AD=2\$,\$\angle ADC=60^\circ\$,\$AC \perp DC\$于点C\$,AC=2CF\$,求BE的长.



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 { \angle 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)}

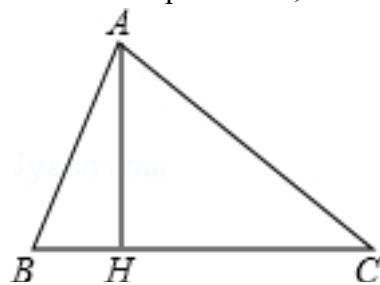
339、topic: 如图,AB=AC,BD=CD,DE \perp AB于点E,DF \perp AC于点F,试说明:DE=DF.#%#



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.#%#

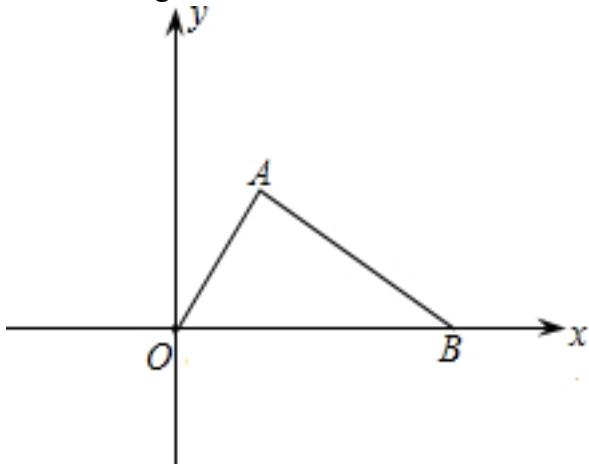


graph:
 {"stem": {"pictures": [{"picturename": "8F3DB04F266D4E70BD140F338FFAF1CB.jpg", "coordinates": {"A": "-12.38,7.46", "B": "-14.00,3.00", "C": "-6.00,3.00", "H": "-12.38,3.00"}, "collineations": {"0": "A##B", "1": "C##A", "2": "A##H", "3": "B##H##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "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:] $\angle ABH$)}

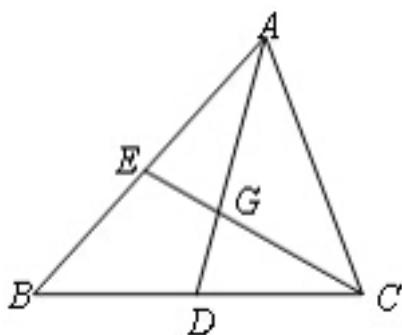
341、topic: 在平面直角坐标系中,点A在第一象限,点B的坐标为(3,0), $OA=2$, $\angle AOB=60^\circ$.#%(1)求点A的坐标及线段AB的长;#%(2)若在x轴上有一点P,使得 $\triangle PAB$ 为等腰三角形,请你直接写出点P的坐标.#%#



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,\$\triangle ABC\$中,\$D\$、\$E\$分别是边\$BC\$、\$AB\$的中点,\$AD\$、\$CE\$相交于\$G\$.#%#求证: $\frac{GE}{GC} = \frac{GD}{GA} = \frac{1}{2}$

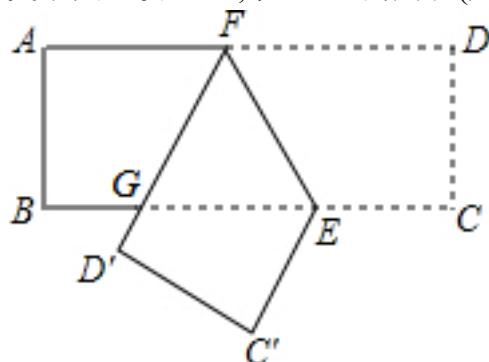


graph:
 {"stem": {"pictures": [{"picturename": "1000010780_Q_1.jpg", "coordinates": {"A": "0.00,6.03", "B": "-5.00,0.0", "C": "2.00,0.00", "D": "-1.50,0.00", "E": "-2.50,3.02", "G": "-1.00,2.01"}, "collineations": {"0": "B###A###E", "1": "C###G###E", "2": "D###A###G", "3": "B###C###D", "4": "C###A"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: ΔABC , 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 ΔEFG 的周长(用含t的代数式表示).#%#

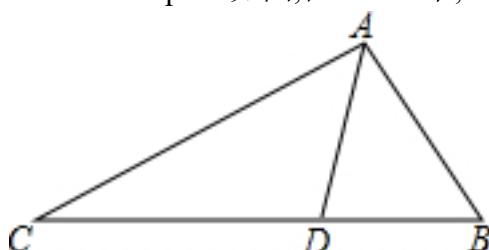


graph:
 {"stem": {"pictures": [{"picturename": "1000061934_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "0.00,0.00", "C": "9.00,0.00", "D": "9.00,3.00", "E": "6.00,0.00", "F": "4.27,3.00", "G": "2.54,0.00", "C'": "4.50,-2.60", "D'": "1.90,-1.10"}, "collineations": {"0": "A##B", "1": "C##D", "2": "E##F", "3": "E##C", "4": "D##C", "5": "A##F##D", "6": "F##G##D", "7": "B##G##E##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

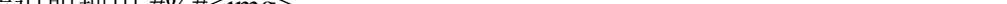
EqualityRelation {C_ΔEFG=v_2}, (ExpressRelation:[key:]t), RectangleRelation {rectangle=Rectangle:ABCD}, PointOnLineRelation {point=E, line=BC, isConstant=false, extension=false}, EqualityRelation {BE=2*CE}, PointRelation:D', LineCrossRelation [crossPoint=Optional.of(G), iLine1=D'F, iLine2=BE], EqualityRelation {AB=t}, 求值(大小): (ExpressRelation:[key:]v_2), SolutionConclusionRelation {relation=求值(大小)}: (ExpressRelation:[key:]C_ΔEFG)

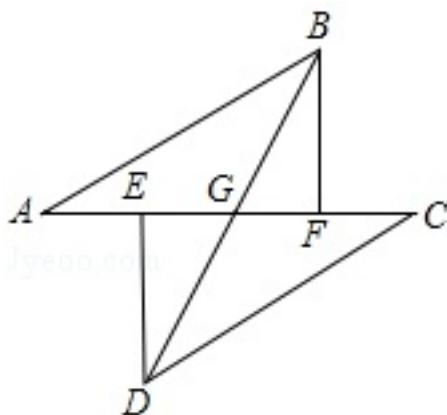
344、topic: 如图,在 ΔABC 中, $\angle B=2\angle C$,AD是 $\angle CAB$ 平分线.求证: $AC=AB+BD$.#%#



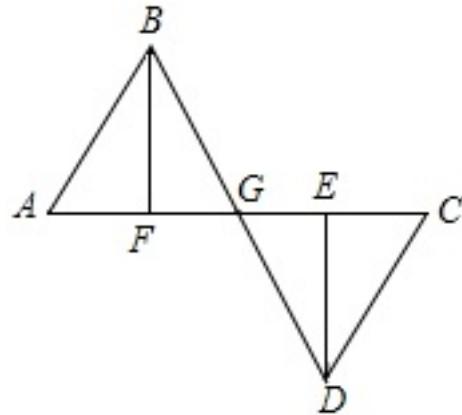
```
graph: [{"stem": {"pictures": [{"picturename": "1000063622_Q_1.jpg", "coordinates": {"A": "-1.08,0.00", "B": "0.15,-2.14", "C": "-4.79,-2.14", "D": "-1.66,-2.14"}, "collineations": {"0": "A###B", "1": "A###C", "2": "C###D###B", "3": "A###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}]}]
```

NLP: TriangleRelation:△ABC, EqualityRelation{ $\angle ABD = 2 * \angle ACD$ }, AngleBisectorRelation{line=AD, angle= $\angle BAC$, angle1= $\angle BAD$, angle2= $\angle CAD$ }, 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)

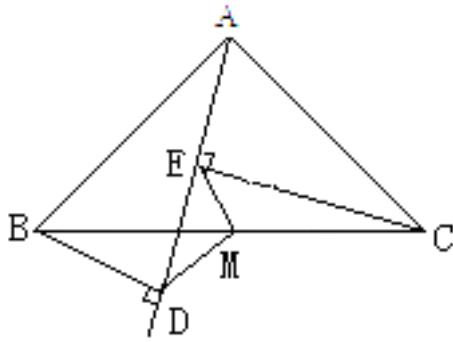
```

graph:
{"stem":{"pictures":[],"appliedproblems":{},"subsystems":[{"substemid":"1","questionrelies":"","pictures":[{"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: $ME = MD$. #%

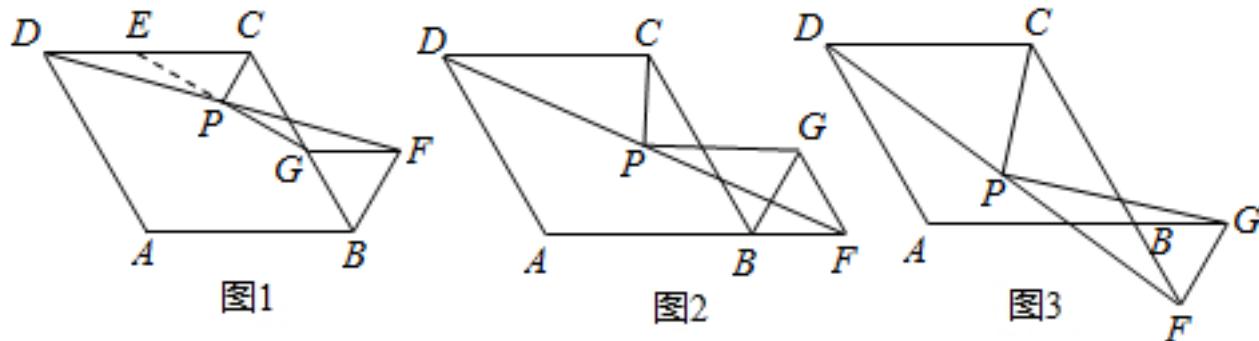


graph:

{"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)



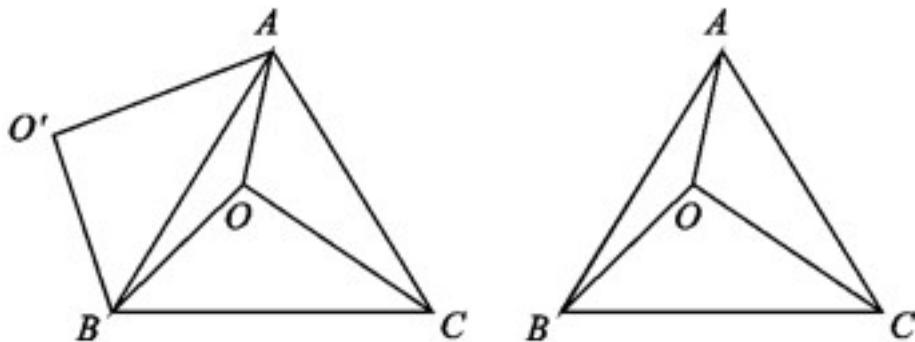
graph:

{"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##F", "7": "P##G", "8": "P##C", "9": "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": {}, "subsystems": []}}

NLP:

RegularTriangleRelation: RegularTriangle: $\triangle BGF$, RhombusRelation {rhombus=Rhombus:ABCD}, EqualityR

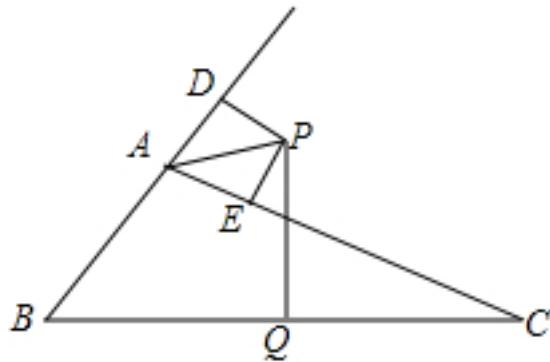
348、topic: 如图,O是等边 $\triangle ABC$ 内一点, $OA=3$, $OB=4$, $OC=5$,将线段BO绕点B逆时针旋转 60° 得到线段 BO' .(1)求点O与 O' 的距离;(2)证明: $\angle AOB=150^\circ$;(3)求四边形 $AOBO'$ 的面积.(4)直接写出 $\triangle AOC$ 与 $\triangle AOB$ 的面积和为 .



```
graph: {"stem": {"pictures": [{"picturename": "1000027560_Q_1.jpg", "coordinates": {"A": "0.91,2.86", "B": "-2.65,-3.00", "C": "4.00,-3.00", "B2": "-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=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')}}

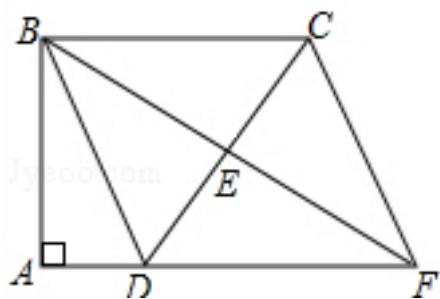
349、topic: 如图, $\triangle ABC$ 的外角 $\angle DAC$ 的平分线交 BC 边的垂直平分线于 P 点, $PD \perp AB$ 于 D , $PE \perp AC$ 于 E .
(1) 求证: $BD = CE$;
(2) 若 $AB = 6\text{cm}$, $AC = 10\text{cm}$, 求 AD 的长.



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

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.

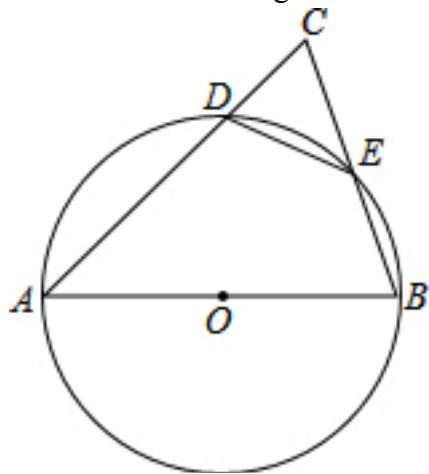


graph:
 {"stem": {"pictures": [{"picturename": "A1AEFF80AD0F4B48860835EB0452987.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-14.00,5.80", "C": "-11.00,5.80", "D": "-13.00,3.00", "E": "-12.00,4.40", "F": "-10.00,3.00"}, "collinearations": {"0": "B###A", "1": "A###D###F", "2": "B###F###E", "3": "B###C", "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=1}, EqualityRelation{BC=3}, MiddlePointOfSegmentRelation{middlePoint=E, segment=CD}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=AD], 已知条件 QuadrilateralRelation{quadrilateral=BDFC}, EqualityRelation{S_BDFC=v_0}, IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle BCD$ [Optional.of(B)], 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: ParallelogramRelation{parallelogram=Parallelogram:BDFC}], SolutionConclusionRelation{relation=求值}

(大小): (ExpressRelation:[key:J_S_BCFD})

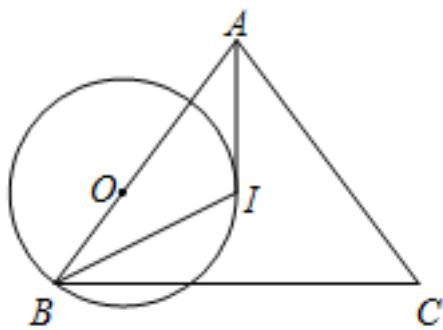
351、topic: 如图,AB是 $\odot O$ 的直径,且弦 $BE=DE$, AD 、 BE 的延长线交于点C,求证: $AC=AB$.#%#



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}]

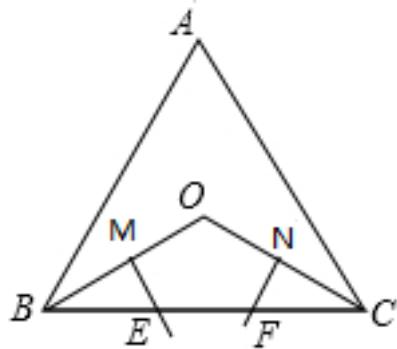
352、topic: 如图,在 $\triangle ABC$ 中,I是内心,O是AB边上一点, $\odot O$ 经过B点且与AI相切于I点.#%#(1)求证: $AB=AC$;(2)若 $BC=16$, $\odot O$ 的半径是5,求AI的长.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000052561_Q_1.jpg", "coordinates": {"A": "3.20,6.96", "B": "-0.66,1.1", "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:△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= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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])}

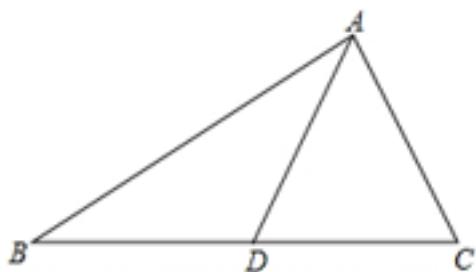
353、topic: 如图,△ABC为等边三角形,∠ABC、∠ACB的平分线相交于点O,BO、CO的垂直平分线交BC于点E、F,垂足分别为M、N,求证:BE=EF=FC.#%#



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=∠ABE, angle1=∠ABO, angle2=∠EBO}, AngleBisectorRelation {line=CO, angle=∠ACF, angle1=∠ACO, angle2=∠FCO}, RegularTriangleRelation:RegularTriangle:△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,△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.#%#



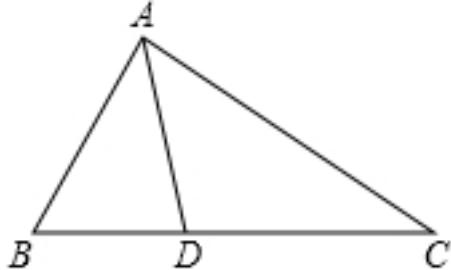
graph:
 {"stem": {"pictures": [{"picturename": "A831C413A2FD4ECC9D15C5AA78B28282.jpg", "coordinates": {"A": "-9.69,5.49", "B": "-14.00,3.00", "C": "-8.00,3.00", "D": "-11.00,3.00"}, "collineations": {"0": "B##A", "1": "A##D", "2": "C##A", "3": "B##D##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

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

NLP:

TriangleRelation:△ABC,MiddlePointOfSegmentRelation{middlePoint=D,segment=BC},EqualityRelation{AC=3},ProveConclusionRelation:[证明:
InequalityRelation{AB+AC>2*AD}],ProveConclusionRelation:[证明: EqualityRelation{AB=5}]

355、topic: 已知在△ABC中, $\angle B=2\angle C$, $\angle BAC$ 的平分线AD交BC边于点D.求证: $AC=AB+BD$.#%#

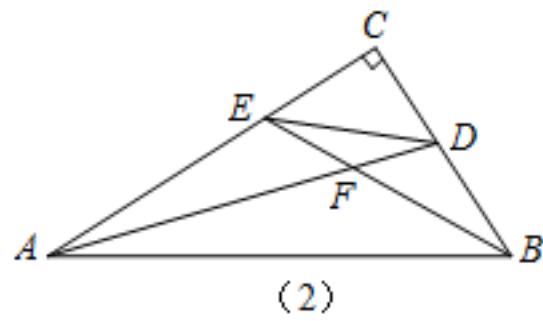
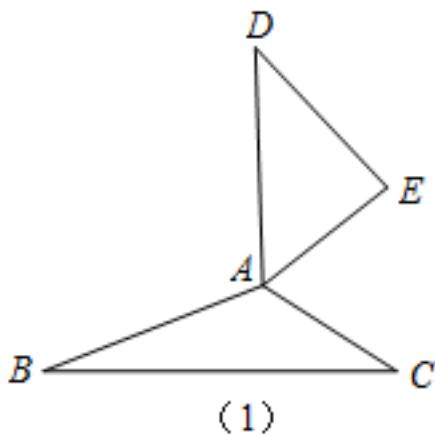


graph:

{"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=∠BAC,angle1=∠BAD,angle2=∠CAD},TriangleRelation:△ABC,EqualityRelation{∠ABD=2*∠ACD},LineCrossRelation[crossPoint=Optional.of(D), iLine1=AD, iLine2=BC],ProveConclusionRelation:[证明:
EqualityRelation{AC=AB+BD}]

356、topic: (1)如图(1),在△BAC和△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△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:

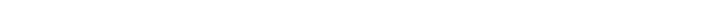
{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000063728_Q_1.jpg", "coordinates": {"A": "6.72,0.00", "B": "4.47,-0.98", "C": "7.88,-0.98", "D": "6.57,2.45", "E": "8.04,0.76"}, "collineations": {"0": "A###D", "1": "A###C", "2": "B###C", "3": "A###E", "4": "A###B", "5": "D###E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": "[]"}}, {"substemid": "2", "questionrelies": "", "pictures": [], "appliedproblems": {}}]}

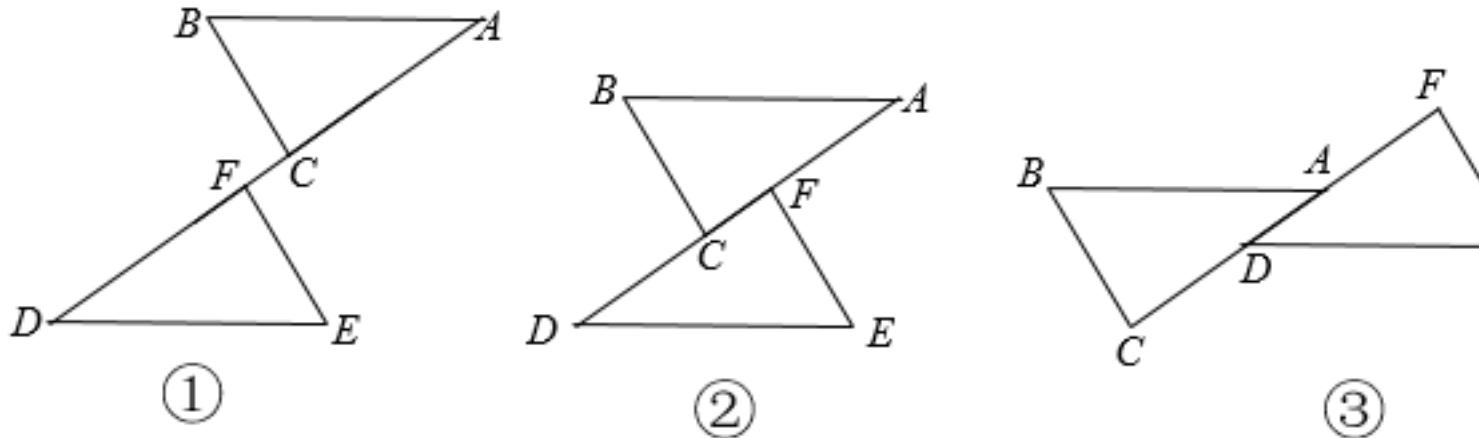
onreliies": "", "pictures": [{"picturename": "1000063728_Q_1.jpg", "coordinates": {"A": "1.77,2.78", "B": "5.21,2.78", "C": "4.09,4.39", "D": "4.59,3.66", "E": "3.25,3.80", "F": "3.92,3.45"}, "collineations": {"0": "A###D###F", "1": "A###E###C", "2": "B###D###C", "3": "F###B###E", "4": "A###B", "5": "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_ΔABF=v_3}, RightTriangleRelation:RightTriangle:ΔABC[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}]

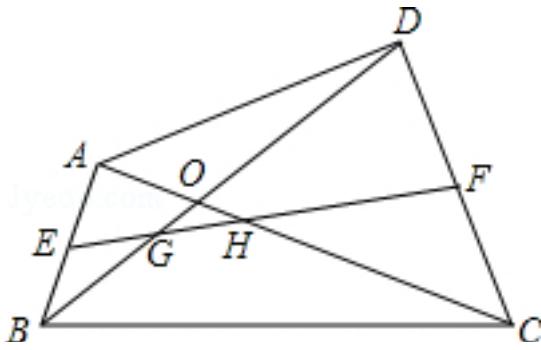
357、topic: 如图①,点C、F在直线AD上,且 $AF=DC$, $AB=DE$, $BC=EF$.
 (1)试证明 $AB \parallel DE$;(2)观察图②、③,指出它们是怎样由图①变换得到的?
 (3)在满足已知条件的情况下,根据图②,试证明 $BC \parallel EF$.




graph:

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.

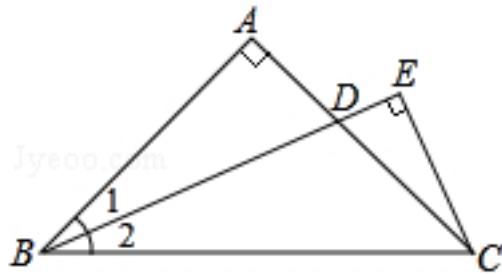


graph:

{"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},MiddlePointOfSegmentRelation{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. #%#



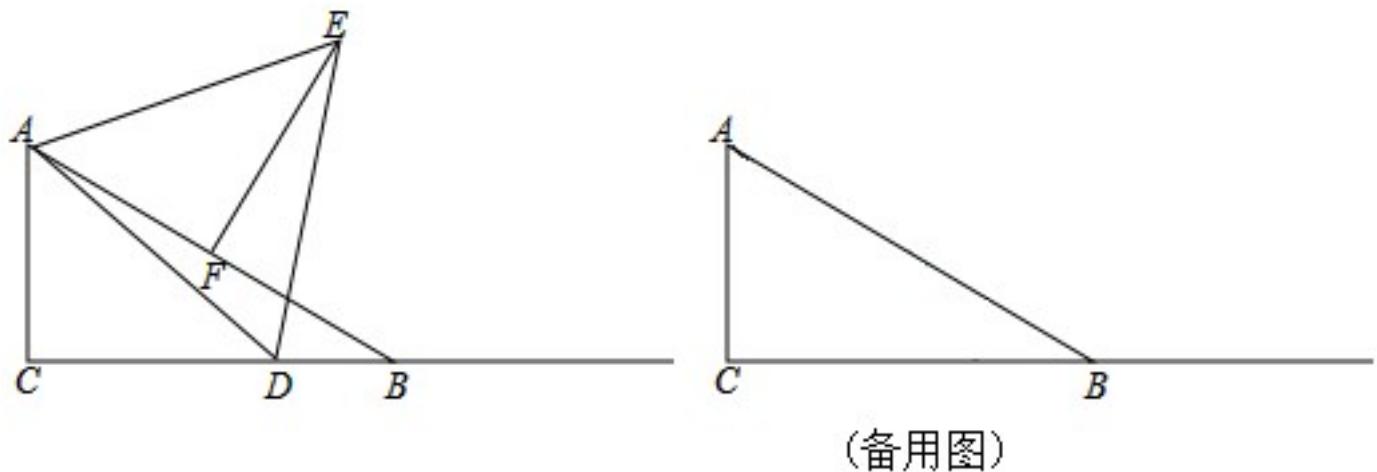
graph:

{"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": "\angle 1=\angle ABD", "1": "\angle 2=\angle 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\$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.

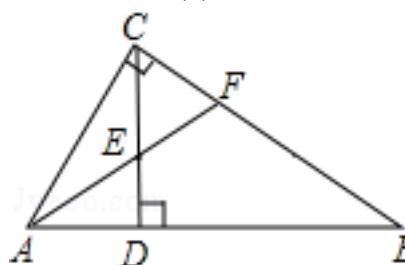


(备用图)

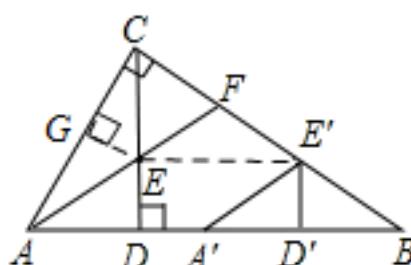
graph:
 {"stem": {"pictures": [{"picturename": "1000026737_Q_1.jpg", "coordinates": {"A": "0.00,5.00", "B": "8.66,0.00", "C": "0.00,0.00", "D": "5.00,0.00", "E": "6.83,6.84", "F": "4.33,2.50"}, "collineations": {"0": "C###D###B", "1": "C###A", "2": "A###F###B", "3": "E###F", "4": "A###E", "5": "D###E", "6": "A###D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}

NLP: RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)],EqualityRelation{ $\angle ACD = (1/2 * \pi)$ },EqualityRelation{ $\angle DBF = (1/6 * \pi)$ },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{ $S_{\triangle ADE} = v_0$ },EqualityRelation{ $\angle DAF = (1/12 * \pi)$ },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:] $S_{\triangle ADE}$)}

361、topic: 如图(1),Rt△ABC中, $\angle ACB=90^\circ$, $CD \perp AB$, 垂足为D, AF平分 $\angle CAB$, 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)



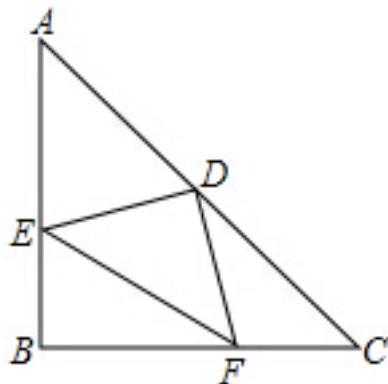
(2)

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": [{"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: ΔABC [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= ΔADE , afterData= $\Delta A'D'E'$, 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: ΔABC [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 = \frac{1}{2}\$,\$\cos 30^\circ = \frac{\sqrt{3}}{2}\$则\$\{\sin\}^2 + \{\cos\}^2 = 1\$;①#%#\$\sin 45^\circ = \frac{\sqrt{2}}{2}\$,\$\cos 45^\circ = \frac{\sqrt{2}}{2}\$则\$\{\sin\}^2 + \{\cos\}^2 = 1\$;②#%#\$\sin 60^\circ = \frac{\sqrt{3}}{2}\$,\$\cos 60^\circ = \frac{1}{2}\$则\$\{\sin\}^2 + \{\cos\}^2 = 1\$.....#%#观察上述等式,

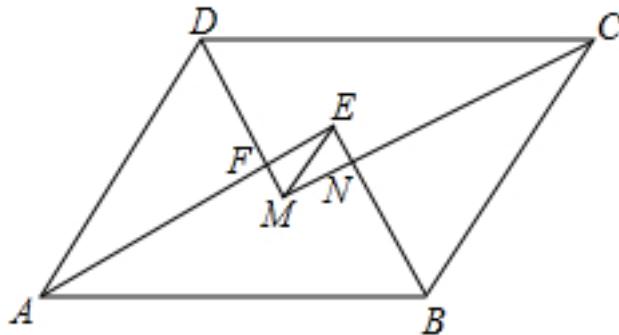
猜想:对任意锐角A,都有 $\sin^2 A + \cos^2 A = 1$.④(1)如图,在锐角三角形ABC中,利用三角函数的定义及勾股定理

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:
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NLP:
 EqualityRelation{ $\sin^2 A + \cos^2 A = 1$ },KnowledgePointWordRelation{knowledgeWord=KNOWLEDGE_WORD {knowledgeDesc='勾股定理', knowledgeId='330303'}},AcuteTriangleRelation:AcuteTriangle: $\triangle ABC$,InequalityRelation{ $\cos(\angle CAD) > 0$ },已知条件AcuteAngleRelation: $\angle BAC/ACUTE_ANGLE$,EqualityRelation{ $\sin(\angle CAD) = \frac{3}{5}$ },求值(大小): (ExpressRelation:[key:] $\cos(\angle CAD)$),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\cos(\angle CAD)$)}

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=3cm,EF=4cm,求AB的长度.#%#



graph:
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NLP: AngleBisectorRelation{line=DM,angle= $\angle ADC$, angle1= $\angle ADM$, angle2= $\angle CDM$ },ParallelogramRelation{parallelogram=Parallelogram:ABCD},InequalityRelation{AB>AD},SegmentRelation:AE,SegmentRelation:BE,AngleRelation{angle= $\angle ABC$ },AngleRelation{angle= $\angle BCD$ },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]:

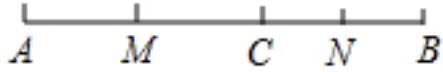
RectangleRelation{rectangle=Rectangle:EFMN}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]AB)}

365、topic: 在 $\triangle ABC$ 中, $AB \neq AC$, D 、 E 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.#%#

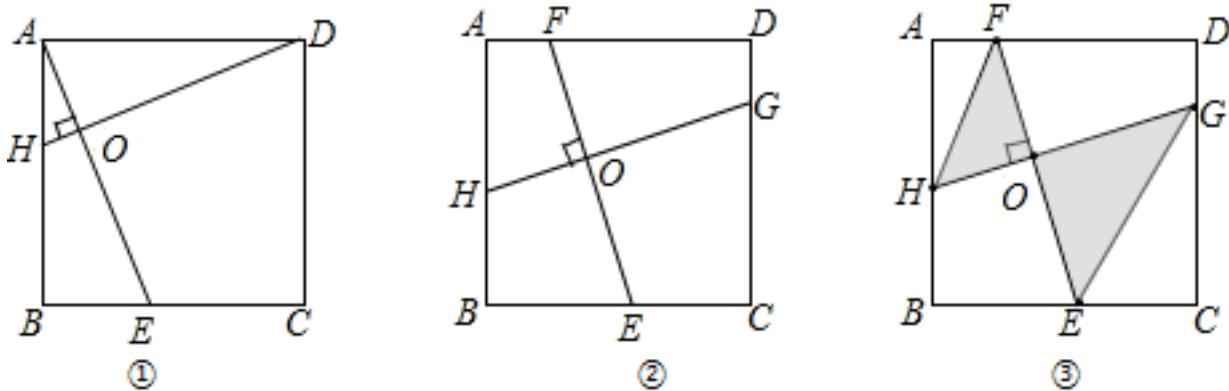


graph:
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NLP:
 MiddlePointOfSegmentRelation {middlePoint=M, segment=AC}, MiddlePointOfSegmentRelation {middlePoint=N, segment=BC}, EqualityRelation { $MN = v_0$ }, PointOnLineRelation {point=C, line=AB, isConstant=false, extension=false}, EqualityRelation { $AC = 9$ }, 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

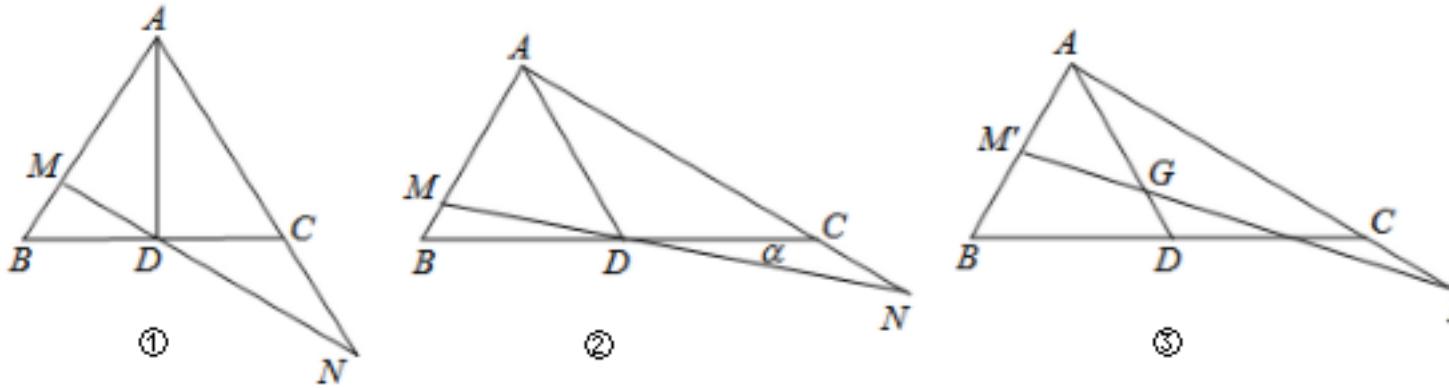
⊥ HG于点O,探究线段EF与HG的数量关系,并说明理由;#%#综合运用:#%#(3)在(2)的条件下,HF // GE,如图③所示,已知BE=EC=2,EO=2FO,求图中阴影部分的面积.#%#



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△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 $AM=xAB$, $AN=yAC$ ($x,y \neq 0$).#%#(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 $AG=nAD$, $AM'=x'AB$, $AN'=y'AC$ ($x',y' \neq 0$),猜想: $\frac{1}{x'} + \frac{1}{y'} = \frac{2}{n}$ 是否成立?并说明理由.#%#

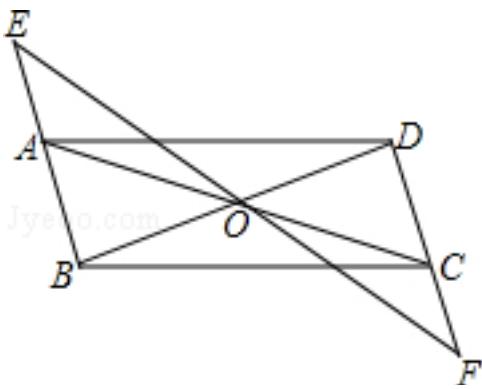


graph:

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```

NLP: TriangleRelation: ΔABC , 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= ΔABC , top=A, bottom=BC}, RegularTriangleRelation:RegularTriangle: ΔABC , EqualityRelation { $\alpha=(1/6*\pi)$ }, PointCoincidenceRelation {point1=G, point2=A}, PointOnLineRelation {point=G, line=StraightLine[l_0]} analytic : $y=k_{1_0}x+b_{1_0}$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false}, LineCrossRelation [crossPoint=Optional.of(M'), iLine1=StraightLine[l_0] analytic : $y=k_{1_0}x+b_{1_0}$ slope:null b:null isLinearFunction:false, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(N'), iLine1=StraightLine[l_0] analytic : $y=k_{1_0}x+b_{1_0}$ 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= ΔAMN , triangleB= ΔDMA }], 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: $\Delta AOE \cong \Delta COF$; #%(2)求证:四边形AECF是平行四边形. #%#

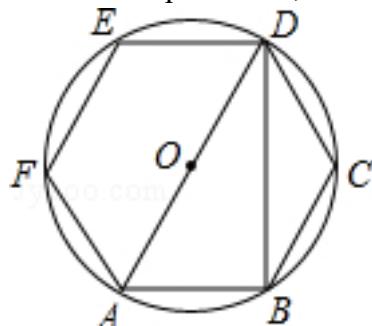


graph:

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

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=△AOE, triangleB=△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.#%#

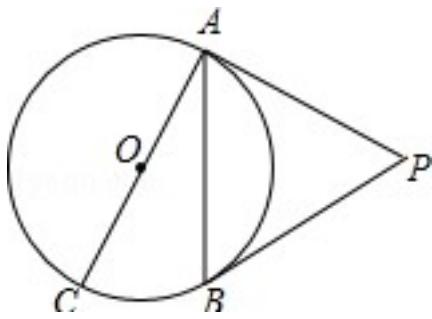


graph:

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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.

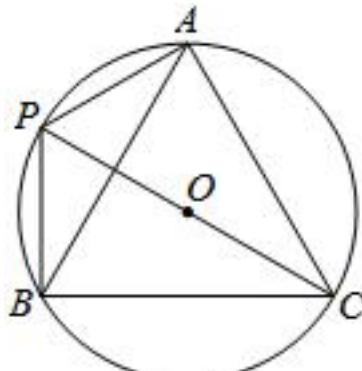


graph:

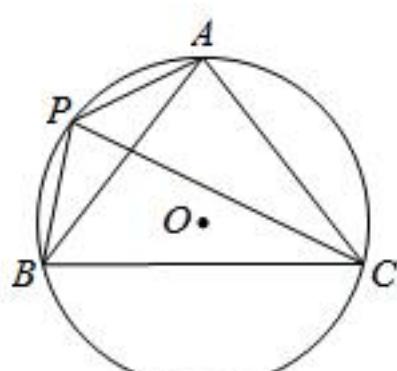
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NLP: LineContactCircleRelation {line=PA, circle=Circle[$\odot O$] {center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(A), outpoint=Optional.of(P)}, LineContactCircleRelation {line=PB, circle=Circle[$\odot O$] {center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, 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.



图①



图②

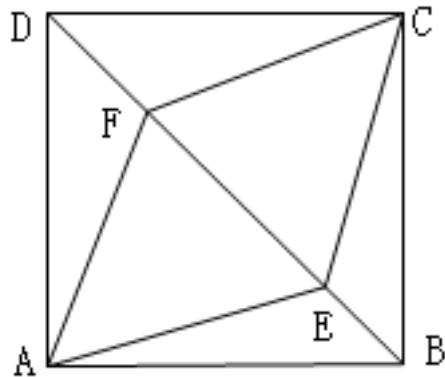
graph:

{"stem": {"pictures": [], "appliedproblems": {}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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###C###P"}]}], "appliedproblems": {}, "subsystems": [{"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000024972(2).jpg", "coordinates": {"A": "0.00,16.00", "B": "-12.00,0.00", "C": "12.00,0.00", "O": "0.00,3.50", "P": "-10.00,11.00"}, "collineations": {"0": "P###A", "1": "P###B", "2": "C###B", "3": "B###A", "4": "A###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 \cap AB, SegmentRelation:PA, SegmentRelation:PB, SegmentRelation:PC, EqualityRelation{ $\angle BPO=(1/3\pi)$ }, EqualityRelation{ $\sin(\angle BPO)=(24/25)$ }, 求值(大小): (ExpressRelation:[key:]tan($\angle BAP$)), ProveConclusionRelation:[证明: EqualityRelation{AC=($3^{(1/2)}*AP$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]tan($\angle BAP$))}]

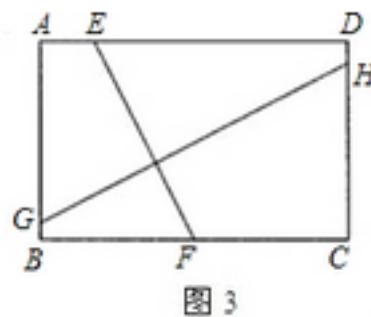
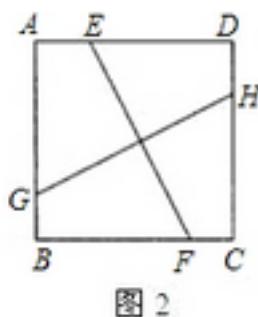
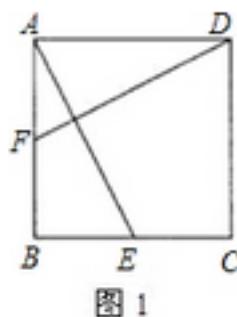
373、topic: 已知:如图,E,F是正方形ABCD的对角线BD上的两点,且BE=DF.求证:四边形AECF是菱形.##



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"}, "collineations": {"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 \perp 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 \perp 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 \perp GH,求 $\frac{EF}{GH}$ 的值.##

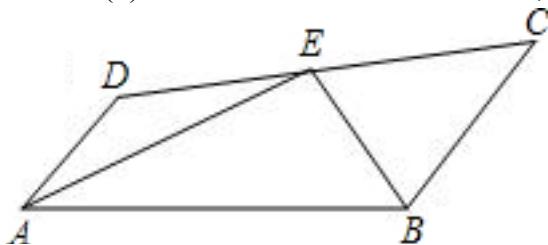


graph:

```
{"stem":{"pictures":[],"appliedproblems":{}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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.#%#

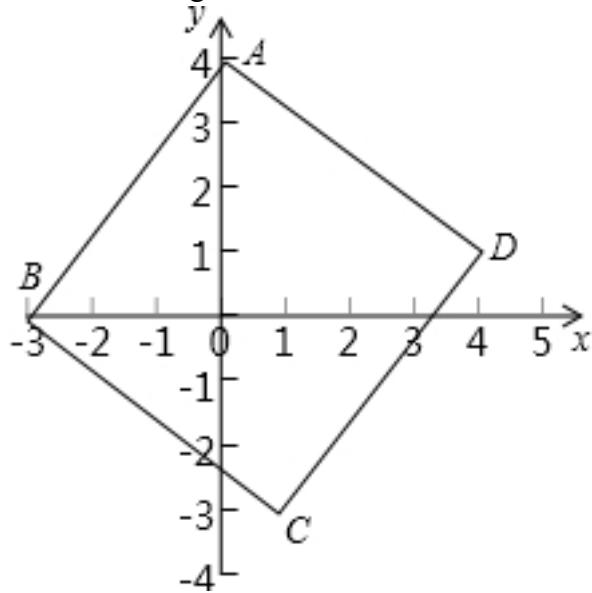


graph:
 {"stem": {"pictures": [{"picturename": "CC7C7051D87C463686BEEE9C76F4F82E.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-7.00,3.00", "C": "-4.92,6.41", "D": "-12.44,5.56", "E": "-8.68,5.99"}, "collineations": {"0": "B##A", "1": "E##A", "2": "A##D", "3": "B##C", "4": "B##E", "5": "C##D##E"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, "substems": [{"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= $\angle CBE$ }, EqualityRelation { $\angle AEB = (1/2 * \pi)$ }, EqualityRelation {AD=x}, EqualityRelation {BC=y}, EqualityRelation { $((x-3)^2 + |y-4| = 0)$ }, 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"}, "collineations": {"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_1 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 $\frac{BC}{BP}=n \left(n > 1 \right)$ 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.#%#

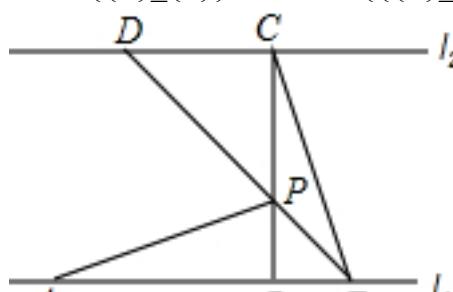


图1

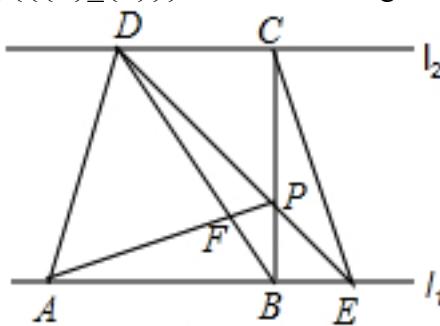


图2

```

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

```

NLP: PointRelation:A,LineParallelRelation [iLine1=StraightLine[1_1] analytic : $y=k_1 \cdot 1 \cdot x + b_1 \cdot 1$ slope:null b:null isLinearFunction:false, iLine2=StraightLine[1_2] analytic : $y=k_1 \cdot 2 \cdot x + b_1 \cdot 2$ 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,PointOnLineRelation {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:]2),EqualityRelation {((BC)/(BP))=2},EqualityRelation {((BC)/(BP))=n, Condition: [[n>1]]},EqualityRelation {S_ΔADP=S_1},EqualityRelation {S_ΔCEP=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 $O'E'F'G'$,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.

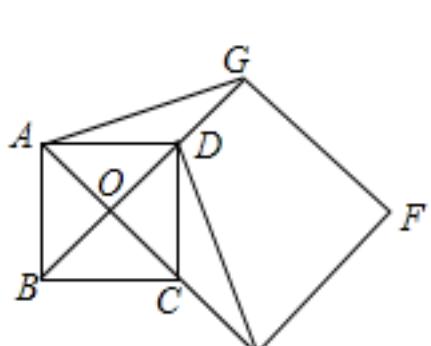


图1

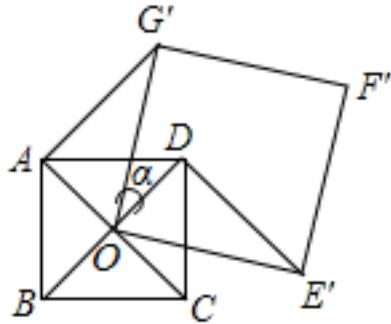


图2

```

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", "10": "A##O##C", "11": "B##O##D"}], "variable-equals": {"0": "\angle \alpha = \angle DOG"}, "circles": []}, "appliedproblems": {}}]

```

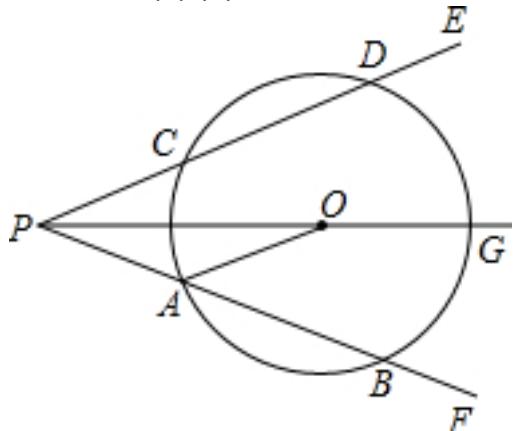
NLP: SquareRelation {square=Square:ABCDintersection : O},PointOnLineRelation {point=E, line=OC,

```

isConstant=false,
extension=false},EqualityRelation{GO=2*DO},EqualityRelation{EO=2*CO},SquareRelation{square=Square:EFGO},SegmentRelation:AG,SegmentRelation:DE,ThreeItemsInequalityRelation{multiExpressCompare:(0*Pi)<α<(2*Pi)},SquareRelation{square=Square:ABCD},求值(大小):
(ExpressRelation:[key:]α),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:]α)}

```

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.#%#



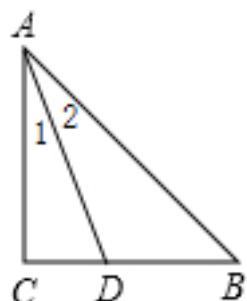
```

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"}, "collinearities": {"0": "P###C###D###E", "1": "P###O###G", "2": "A###F###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: 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": "\u00b71=\u00b7DAC", "1": "\u00b72=\u00b7DAB"}, "circles": "[]"}, "appliedproblems": "[]", "substems": "[]"}}

NLP: RightTriangleRelation:RightTriangle: ΔABC [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 $DE=6\text{cm}$, $AE=3\text{cm}$,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": "[]", "substems": "[]"}}

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 ΔABC 和 ΔADE 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.%#

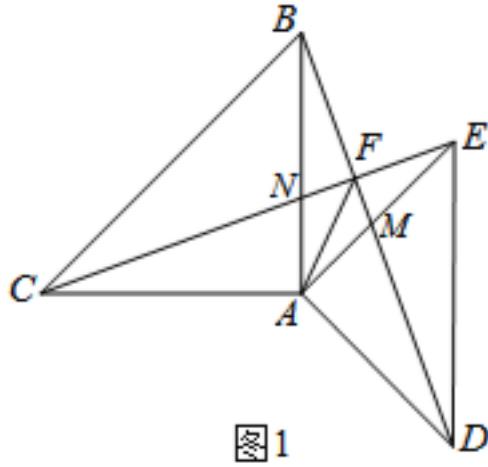


图1

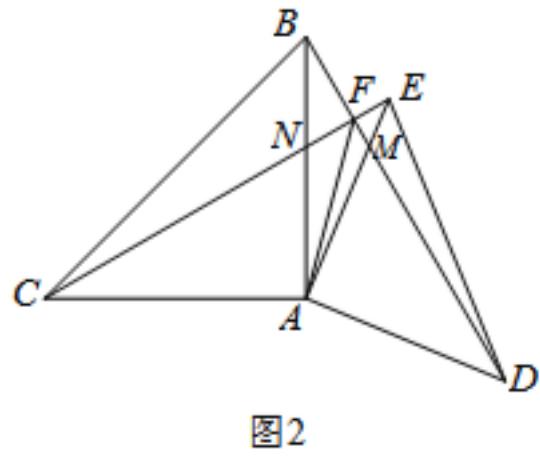


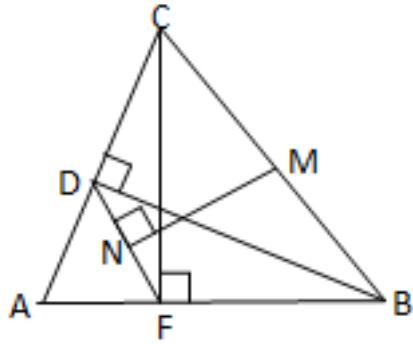
图2

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"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": []}], "appliedproblems": {}}]}

NLP:

IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: ΔABC [Optional.of(A)][Optional.of(A)], IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: ΔADE [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 ΔABC 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: $MN \perp DF$.%#

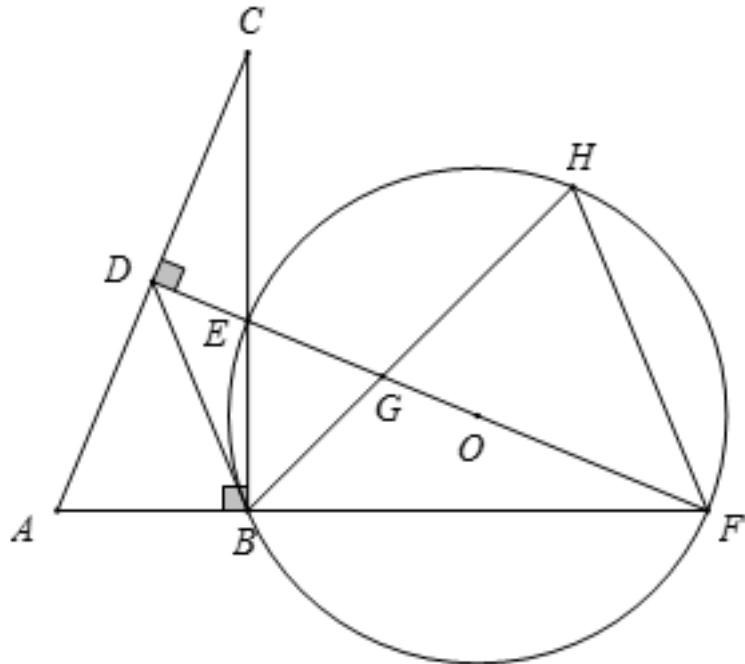


graph:

{"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"}, "collineations": {"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": {}}, "subproblems": []}}

NLP: TriangleRelation: ΔABC , 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, $\angle ABC=90^\circ$, $\angle ACB=60^\circ$, $\angle BAC=30^\circ$. 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. #%#



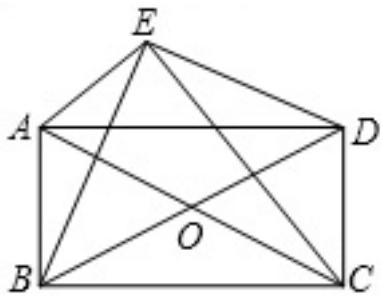
graph:

{"stem": {"pictures": [{"picturename": "1000039748_Q_1.jpg", "coordinates": {"A": "-2.25,0.00", "B": "0.00,0.0", "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": "2.5,2.5"}}], "appliedproblems": {}}}

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", "point": "circle": "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: ΔABC [Optional.of(B)], EqualityRelation { $\angle ABE = (1/2 * \pi)$ }, PointRelation: E, PointRelation: F, EqualityRelation {BF=BC}, InscribedShapeOfCircleRelation {closedShape= ΔBEF , circle=Circle[$\odot O$] {center=O, analytic= $(x-x_O)^2 + (y-y_O)^2 = r_O^2$ }}, SegmentRelation: BD, PointRelation: F, EqualityRelation {AB=1}, 求值(大小): (ExpressRelation:[key:]GH*BH), ProveConclusionRelation: [证明: TriangleCongRelation {triangleA= ΔABC , triangleB= ΔEBF }], JudgePostionConclusionRelation: [data1=BD, data2=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:]GH*BH)}

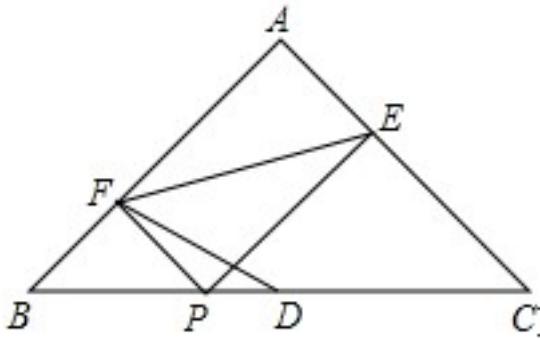
385、topic: 已知:如图,AC、BD相交于点O,且O是AC、BD的中点,点E在四边形ABCD外,且 $\angle AEC = \angle BED = 90^\circ$.#%#求证:四边形ABCD是矩形.#%#



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\backslash 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\$.



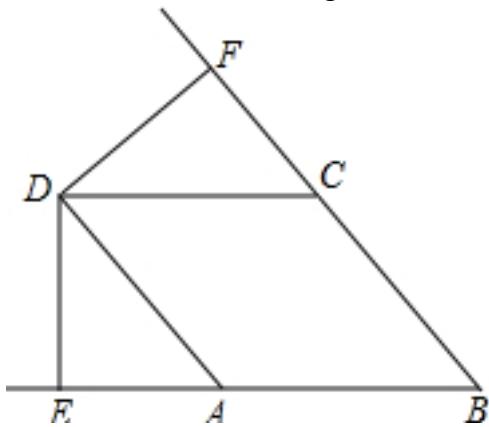
graph:

{"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"}, "collineations": {"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: ΔABC [Optional.of(A)][Optional.of(A)], EqualityRelation { $\angle EAF = (1/2 * \pi)$ }, 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 \perp AB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.#%#

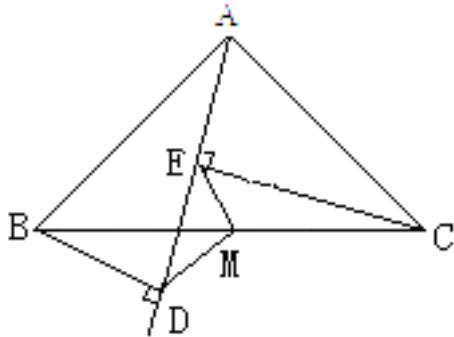


graph:

{"stem": {"pictures": [{"picturename": "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"}, "collineations": {"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: $ME=MD$.#%#

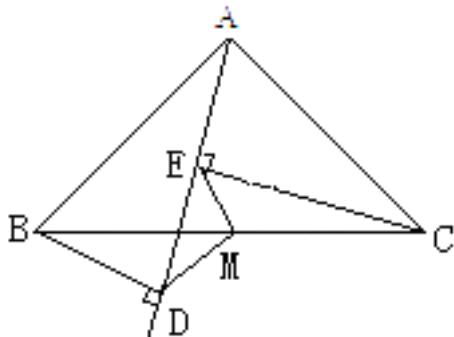


graph:

{"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: $ME=MD$.#%#

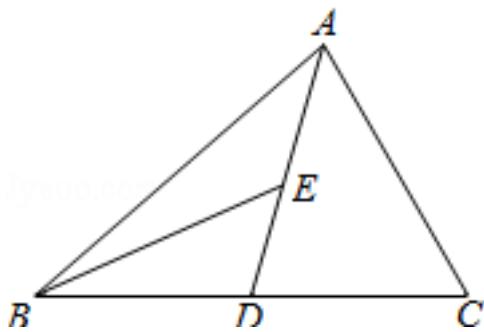


graph:

{"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}]

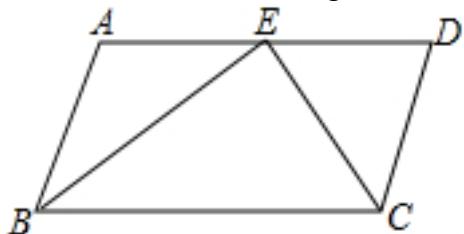
390、topic: 如图,AD为 $\triangle ABC$ 的中线,BE为 $\triangle ABD$ 的中线.#%#(1) $\angle ABE=15^\circ$, $\angle BAD=35^\circ$,求 $\angle BED$ 的度数;#%#(2)在 $\triangle BED$ 中作BD边上的高;#%#(3)若 $\triangle ABC$ 的面积为60, $BD=5$,求点E到BC边的距离.



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##A", "2": "B##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, $AB \parallel CD$, 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": []}}

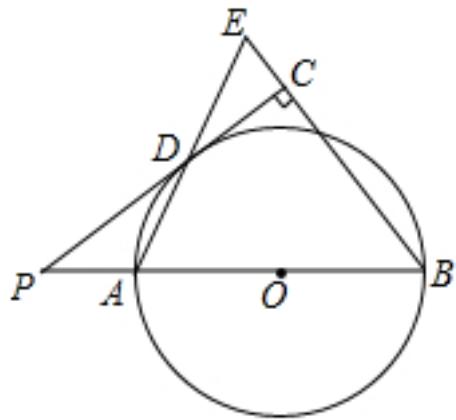
NLP: LineParallelRelation [iLine1=AB, iLine2=CD], AngleBisectorRelation {line=CE, angle= $\angle BCD$, angle1= $\angle BCE$, angle2= $\angle DCE$ }, AngleBisectorRelation {line=BE, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, PointOnLineRelation {point=E, line=AD, isConstant=false, 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 $SCE = AE + BC$; #

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. #%#

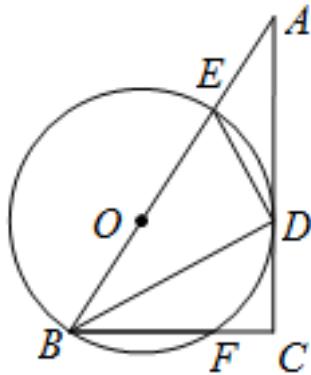


graph:
 {"stem": {"pictures": [{"picturename": "1000052553_Q_1.jpg", "coordinates": {"A": "-5.17,-0.66", "B": "0.83,-0.66", "C": "-2.07,3.18", "D": "-3.97,1.74", "E": "-2.78,4.13", "O": "-2.17,-0.66", "P": "-7.17,-0.66"}, "collineations": {"0": "A###D###E", "1": "B###C###E", "2": "P###D###C", "3": "P###A###O###B"}, "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>equals": {}, "circles": [{"center": "O", "pointincircle": "B##F##D##E"}]}], "appliedproblems": {}, "substems": []}}

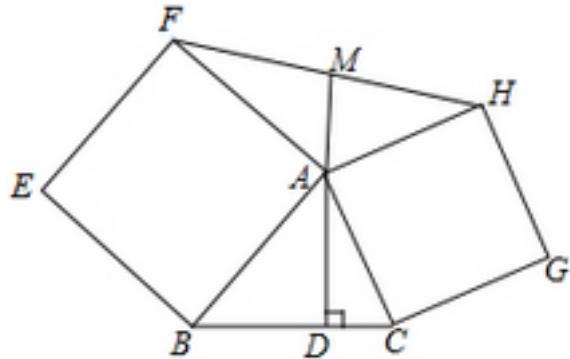
NLP: AngleBisectorRelation {line=BD, angle= $\angle FBO$, angle1= $\angle DBF$, angle2= $\angle DBO$ }, TriangleRelation: $\triangle ABC$, EqualityRelation {BC=9}, EqualityRelation {AC=12}, EqualityRelation {AB=15}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=BD, iLine2=AC], LinePerpRelation {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: $MA \perp BC$.#%#



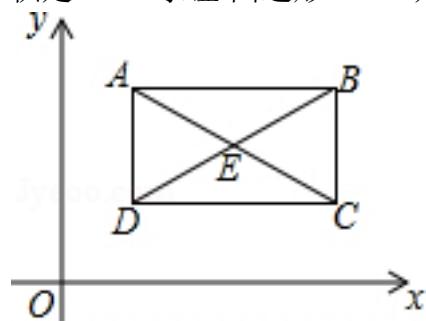
graph:

```
{"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", "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: ΔABC , SquareRelation {square=Square:ABEF}, SquareRelation {square=Square:ACGH}, M 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 $AB \parallel CD$, $CD=4$, $BE=DE$, ΔAEB 的面积是2.求证:四边形ABCD是矩形.



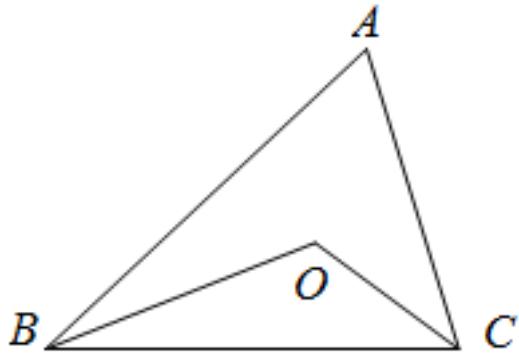
graph:

```
{"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_ΔABE=2}, ProveConclusionRelation: [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.

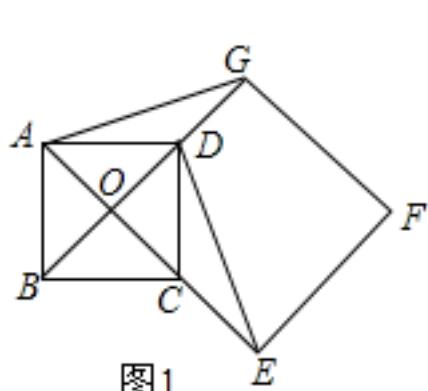


图1

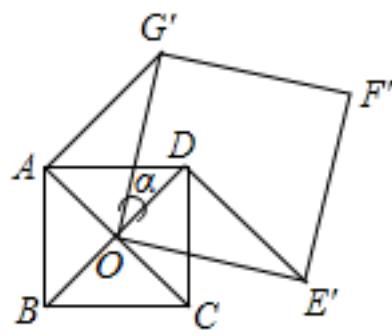


图2

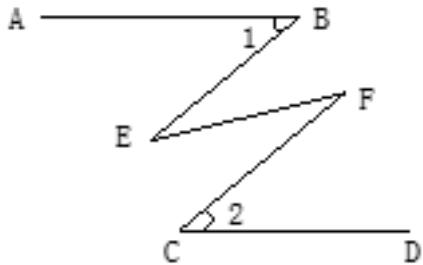
graph:

{"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": "A##O##C##E", "9": "B##O##D##G"}, "variable>equals": {"0": "\u00b2\u03b1=\u00b2\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)<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//CD, $\angle 1 = \angle 2$, 试说明 $\angle BEF$ 和 $\angle EFC$ 的大小关系. #%

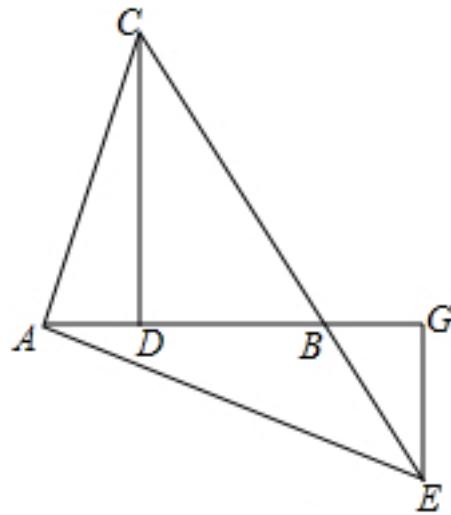
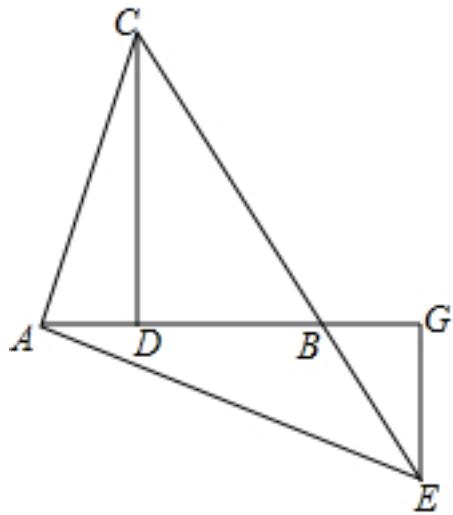


graph:

```
{"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":"∠1=∠ABE","1":"∠2=∠DCF"},"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) $AD=BG$

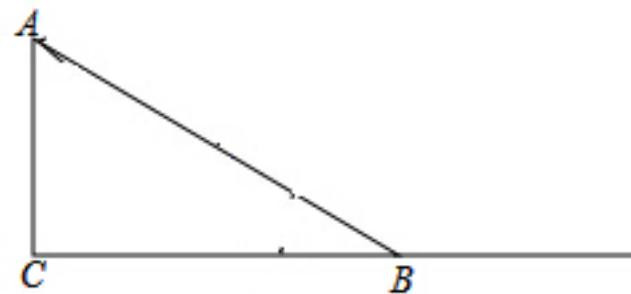
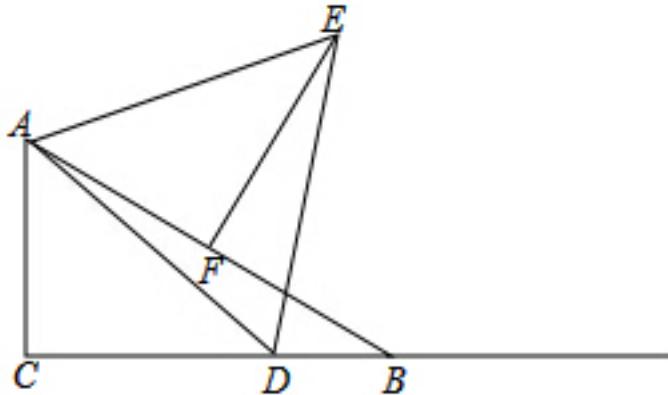


graph:

```
{"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###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: ΔABC , 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 $\{line=EC, angle=\angle AEG, angle1=\angle AEC, angle2=\angle CEG\}$], ProveConclusionRelation: [证明: EqualityRelation $\{AD=BG\}$]

401、topic: 在 $\text{Rt}\triangle ABC$ 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"}, "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: ΔABC [Optional.of(C)], EqualityRelation $\{\angle ACD=(1/2*\pi)\}$, EqualityRelation $\{\angle DBF=(1/6*\pi)\}$, EqualityRelation $\{AB=10\}$, PointOnLineRelation $\{point=D, line=CB, isConstant=false, extension=false\}$, RegularTriangleRelation: RegularTriangle: ΔADE , 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 $\{S_{\Delta ADE}=v_0\}$, EqualityRelation $\{\angle DAF=(1/12*\pi)\}$, 求值(大小): (ExpressRelation: [key:] v_0), ProveConclusionRelation: [证明: TriangleCongRelation $\{triangleA=\Delta AEF, triangleB=\Delta ADC\}$], SolutionConclusionRelation $\{relation=\text{求值(大小)}: (\text{ExpressRelation: [key:] } (y^2)-(x^2))\}$, SolutionConclusionRelation $\{relation=\text{求值(大小)}: (\text{ExpressRelation: [key:] } S_{\Delta ADE})\}$

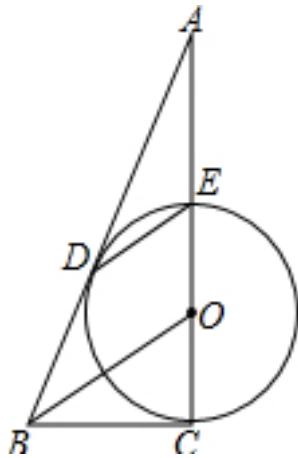
402、topic: 如图, 已知 $\odot O$ 的直径AB垂直于弦CD, 过点C的切线与直径AB的延长线相交于点P, 连结PD. ①求证: PD是 $\odot O$ 的切线; ②求证: $\{PD\}^2=PB \cdot PA$; ③若 $SPD=4$, $\tan \angle CDB=\frac{1}{2}$, 求直径AB的长.

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": "C##D", "2": "C##P", "3": "D##P", "4": "O##P", "5": "A##B"}]}

": "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 // 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. #%#

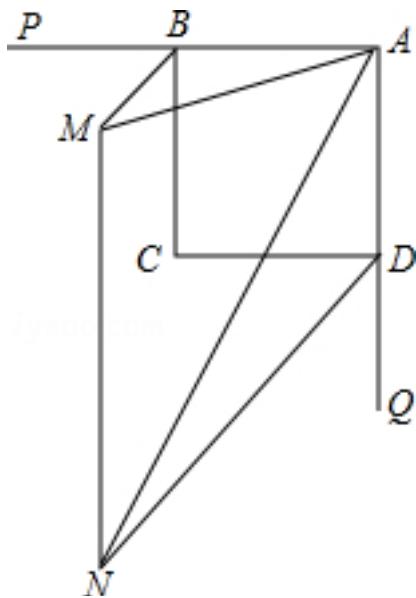


graph:

{"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"}, "collinearities": {"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.

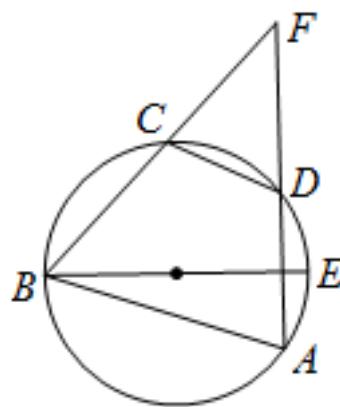


graph:

```
{"stem":{"pictures":[{"picturename":"1000010830_Q_1.jpg","coordinates":{"A":"15.00,5.00","B":"10.00,5.00","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":{}}, "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\$.

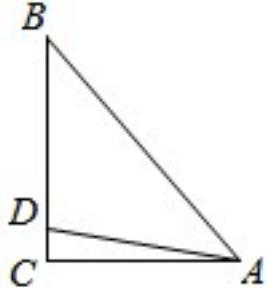


graph:

```
{"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":"A###B","1":"B###C###F","2":"F###D###A","3":"B###O###E","4":"B###D","5":"D###C"}}, "variable-equations":{}, "circles": [{"center": "O", "pointincircle": "A###E###D###C###B"}]}, "appliedproblems": {}, "substeps": []}}
```

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{ $\cap AE = \cap DE$ }, LineCrossRelation[crossPoint=Optional.of(F), iLine1=AD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{AB*CD=DF*BC}]]

406、topic: 如图,在 $\text{Rt}\triangle ABC$ 中,已知 $\angle C=90^\circ$, $\angle CAD=\angle BAD$, $DC=3$, $BD=5$,求AC的长.



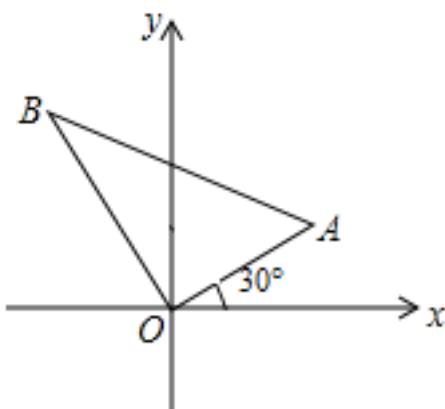
graph:

{"stem": {"pictures": [{"picturename": "1000006716_Q_1.jpg", "coordinates": {"A": "1.00,0.00", "B": "-5.00,8.0", "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": {}, "substems": []}}

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, $\text{Rt}\triangle ABO$ 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": {}, "substems": []}}

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_ΔABO)}

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: $DE \perp AG$;(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.%

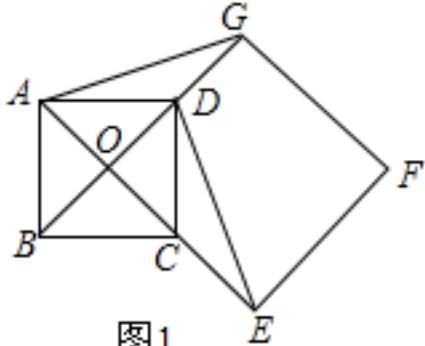


图1

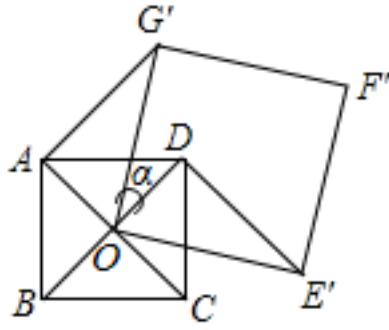


图2

graph:

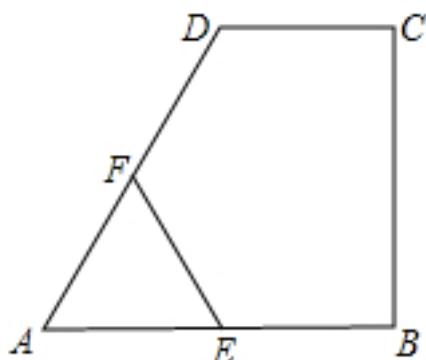
```
{"stem": {"pictures": [{"picturename": "1000061933_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "4.00,4.00", "E": "6.00,-2.00", "F": "10.00,2.00", "G": "6.00,6.00", "O": "2.00,2.00"}, "collinearations": {"0": "A##B", "1": "B##C", "2": "A##G", "3": "A##D", "4": "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"}, "collinearations": {"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=\u0322DOG"}, "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 ΔAEF 与多边形BCDFE的面积之比.%

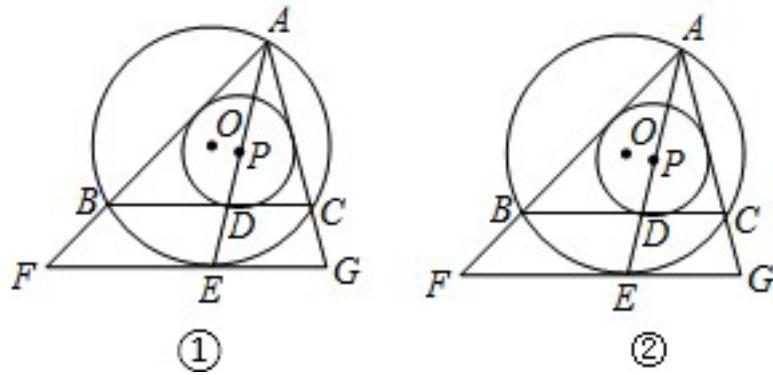


graph:

```
{"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": []}], "appliedproblem": {"s": {}}, "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.

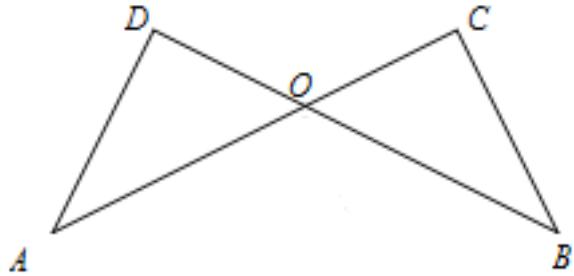


graph:

```
{"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: $\Delta ABC/\text{Circle}[\odot O_1]$ {center=O_1, analytic= $(x-x_{O_1})^2+(y-y_{O_1})^2=r_{O_1}^2$ }Points: [],InscribedShapeOfCircleRelation{closedShape= ΔABC , circle=Circle $[\odot O]$ {center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }},LineCrossRelation[crossPoint=Optional.of(D), iLine1=AP, iLine2=BC],LineCrossCircleRelation{line=AP, circle= $\odot O$, crossPoints=[E], crossPointNum=1},PointRelation:G,求值(大小): (ExpressRelation:[key:](EP/DE)),求值(大小): (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 $\angle DAO=\angle CBO$.#%#

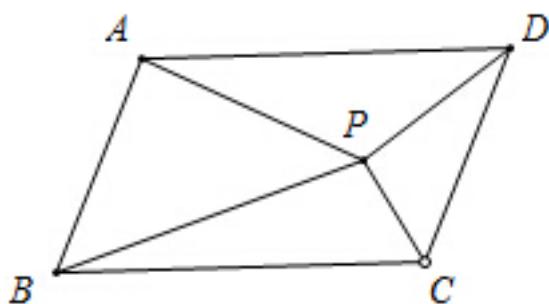


graph:

```
{"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: $\angle PAB = \angle PCB$

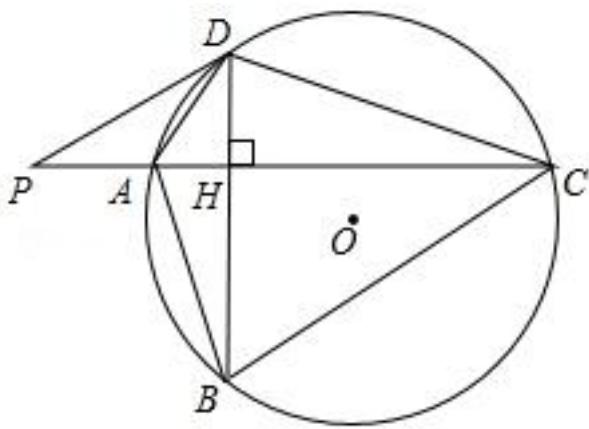


graph:

```
{"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{ $\angle BAP = \angle BCP$ }]

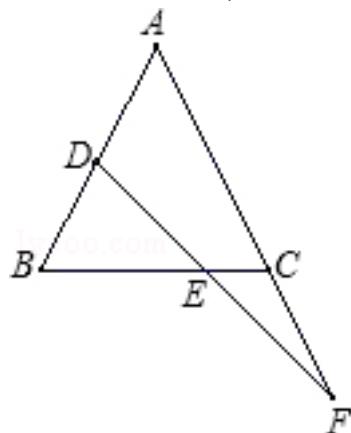
413、topic: 如图, $\odot O$ 的半径 $r=25$,四边形\$ABCD\$内接于 $\odot O$, $AC \perp BD$ 于点H,P为CA延长线上的一点,且 $\angle PDA = \angle ABD$.?%#(1)试判断PD与 $\odot O$ 的位置关系,并说明理由;?%#(2)若 $\tan \angle ADB = \frac{3}{4}$, $\angle PA = \frac{4\sqrt{3}-3}{3} \angle A$,求BD的长;?%#(3)在(2)的条件下,求四边形\$ABCD\$的面积.



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"}, "collineations": {"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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ },
 length=Express:[25],InscribedShapeOfCircleRelation {closedShape=ABCD, circle=Circle[$\odot O$]}{center=O, 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 { $\tan(\angle ADH) = (3/4)$ },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=O, 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: $BD=CF$.#%#

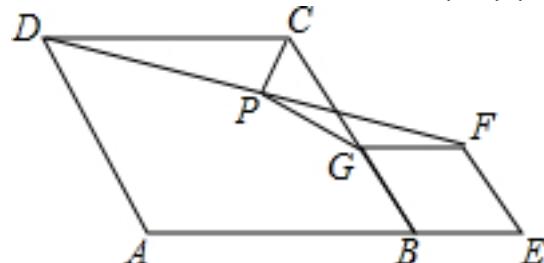


graph:
 {"stem": {"pictures": [{"picturename": "1000031148_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-10.00,3.00", "C": "-6.00,3.00", "D": "-8.94,4.59", "E": "-6.95,3.00", "F": "-4.97,1.43"}, "collineations": {"0": "A###D###B", "1": "D###E###F", "2": "A###C", "3": "B###C", "4": "E###F"}]}, "substems": "[]"}]

B","1":"A###C###F","2":"D###E###F","3":"B###E###C"}, "variable>equals":{}, "circles":[]}, "appliedproblems":{}, "substems":[]}]

NLP: TriangleRelation: ΔABC , 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}]

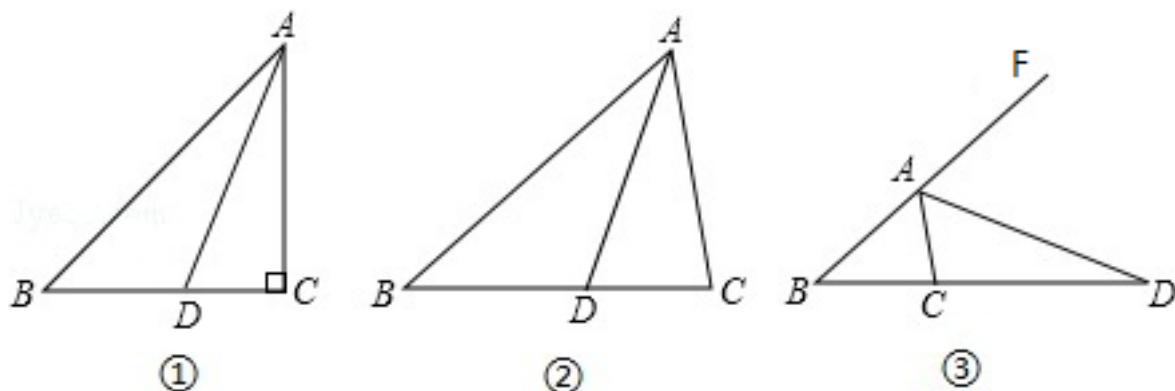
415、topic: 如图,在菱形ABCD和菱形BEFG中,点A、B、E在同一直线上,点P是线段DF的中点,连接PG、PC.若 $\angle ABC=60^\circ$,求 $\frac{PG}{PC}$ 的值.#%#



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

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 ΔABC 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 $\angle C\neq90^\circ$,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 ΔABC 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.#%#

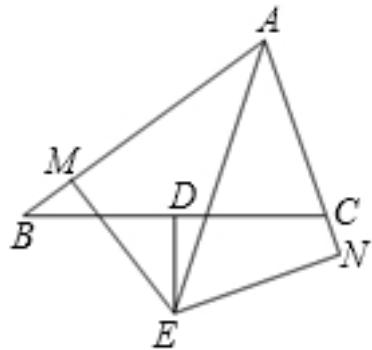


graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "1", "pictures": []}]}}

[{"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": "3.36,0.0"}, "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": []}], "appliedproblems": {}}, {"variable-equals": {}, "circles": []}, {"appliedproblems": {}}]}

NLP: TriangleRelation: ΔABC , 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))}

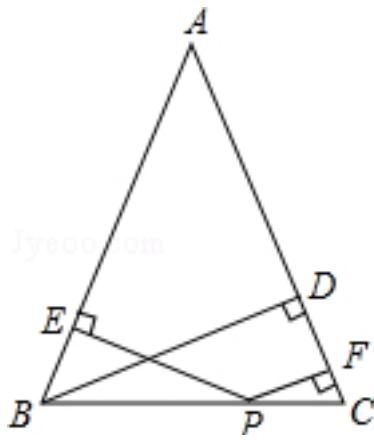
417、topic: 如图, $BD=DC$, $DE \perp BC$, 交 $\angle BAC$ 的平分线于点E, $EM \perp AB$, $EN \perp AC$, 垂足分别为M、N. 求证: $BM=CN$. #%#



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

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: $PE+PF=BD$. #%#



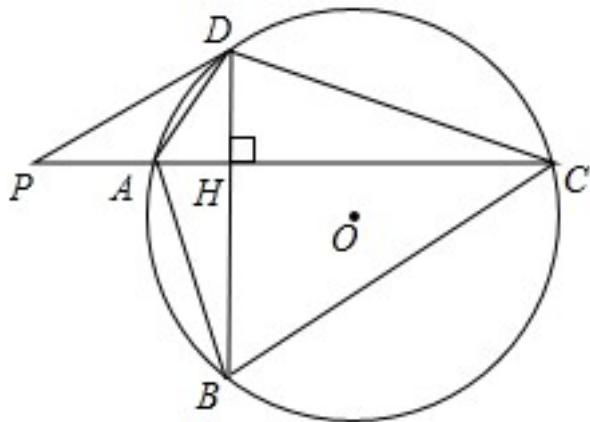
graph:

{"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": []}], "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 $\tan \angle ADB = \frac{\sqrt{3}}{3}$, $\{PA\} = \frac{4\sqrt{3}-3}{3}AH$, 求BD的长; (3) 在(2)的条件下, 求四边形ABCD的面积.



graph:

{"stem": {"pictures": [{"picturename": "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": []}}

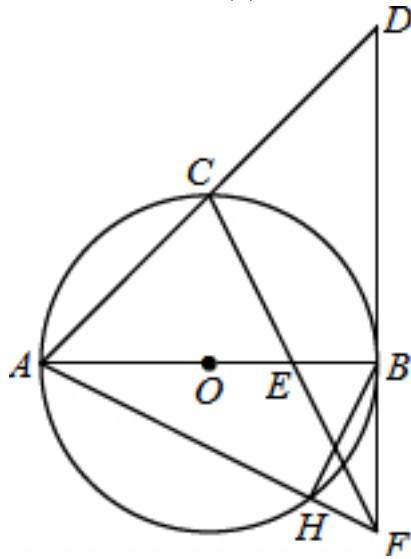
NLP: RadiusRelation {radius=null, circle=Circle[$\odot O$] {center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=Express:[25]}, InscribedShapeOfCircleRelation {closedShape=ABCD, circle=Circle[$\odot O$] {center=O,

```

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{∠ADP=∠ABH},EqualityRelation{BD=v_0},EqualityRelation{tan(∠
ADH)=(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_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)}

```

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. #%#



```

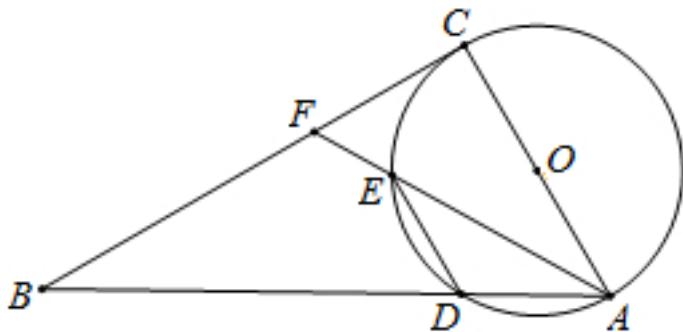
graph:
{"stem": {"pictures": [{"picturename": "1000060760_Q_1.jpg", "coordinates": {"A": "-2.00,0.00", "B": "2.00,0.00", "C": "0.00,2.00", "D": "2.01,4.00", "E": "1.00,0.00", "F": "2.01,-2.01", "H": "1.20,-1.60", "O": "0.00,0.00"}, "colineations": {"0": "A###C##D", "1": "A###H##F", "2": "D##B##F", "3": "C##E##F", "4": "H##B", "5": "A##O##E##B"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##C##H##B"}]}], "appliedproblems": {}, "subsystems": []}

```

NLP: LineContactCircleRelation{line=BD, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(B), outpoint=Optional.of(D)}, DiameterRelation{diameter=AB, circle=Circle[○O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^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.

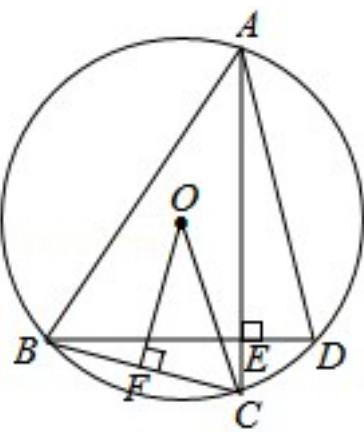



graph:

```
{"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"},"collineations":{"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: ΔABC [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) $AD = 2FO$.



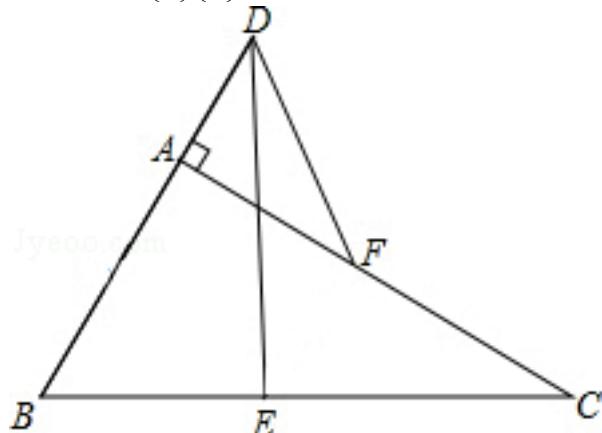
graph:

```
{"stem":{"pictures":[{"picturename":"1000008182_Q_1.jpg","coordinates":{"A":2.02,5.65,"B":-4.41,-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=△AEB, triangleB=△OFC}],ProveConclusionRelation:[证明: EqualityRelation{AD=2*FO}]]

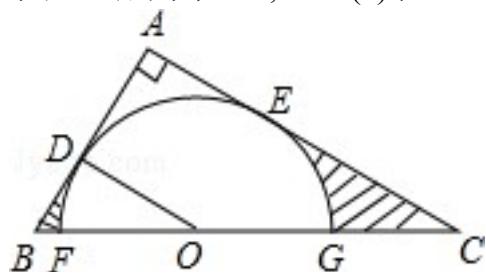
423、topic: 如图,在Rt△ABC中,∠BAC=90°,E、F分别是BC、AC的中点,延长BA到点D,使\$AD=\frac{1}{2}AB\$,连接DE、DF.求证:AF与DE互相平分.#%#



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": {}, "subsystems": []}}

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,ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=AF, iLine2=DE, crossPoint=Optional.absent()]],ProveConclusionRelation:[LineDecileSegmentRelation [iLine1=DE, iLine2=AF, crossPoint=Optional.absent()]]]

424、topic: 如图,在\$Rt△ABC\$中,\$∠A=90°\$,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∠BOD=\frac{2}{3}\$. ?%#(1)求\$☉O\$的半径OD;?%#(2)求证:AE是\$☉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": {}, "subsystems": []}}

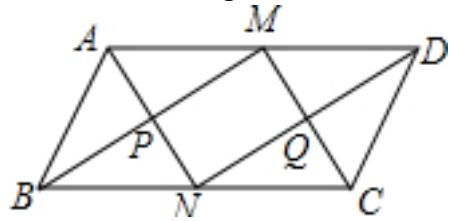
NLP: CircleCenterRelation{point=O, conic=Circle[☉O]{center=O,

```

analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}},RightTriangleRelation:RightTriangle:ΔABC[Optional.of(A)],Equ
alityRelation{∠DAE=(1/2*Pi)},PointOnLineRelation{point=O, line=BC, isConstant=false,
extension=false},LineContactCircleRelation{line=AB, circle=Circle[○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,E
qualityRelation{BD=2},EqualityRelation{AE=3},EqualityRelation{tan(∠
DOF)=(2/3)},ProveConclusionRelation:[证明: LineContactCircleRelation{line=AE, circle=Circle[○
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□ ABCD的对边AD、BC的中点,且AD=2AB,求证:四边形PMQN为矩形. #



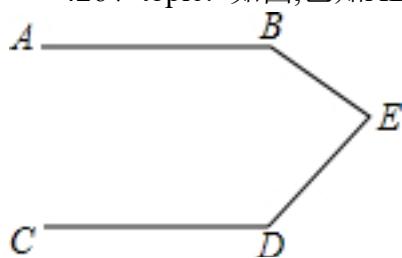
```

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 // CD,那么∠B+∠BED+∠D等于多少度?为什么?#



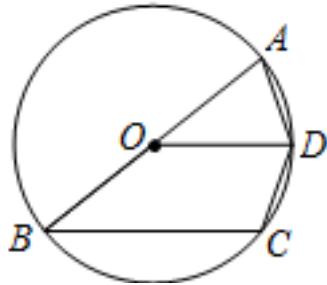
```

graph:
{"stem": {"pictures": [{"picturename": "41D26106C74E45BABD3364FDEFA6C062.jpg", "coordinates": {"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": "A##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:]∠ABE+∠BED+∠CDE),SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠ABE+∠BED+∠CDE)}

427、topic: 如图,C、D是以AB为直径的 $\odot O$ 上的两点,且 $OD \parallel BC$.求证: $AD=DC$.#%#

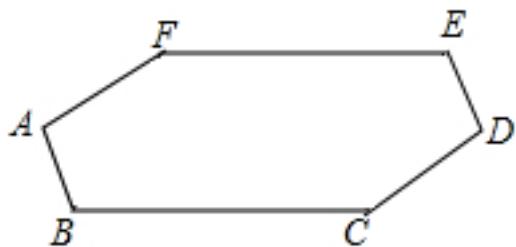


graph:

{"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_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, 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: $\angle B=\angle E$.#%#



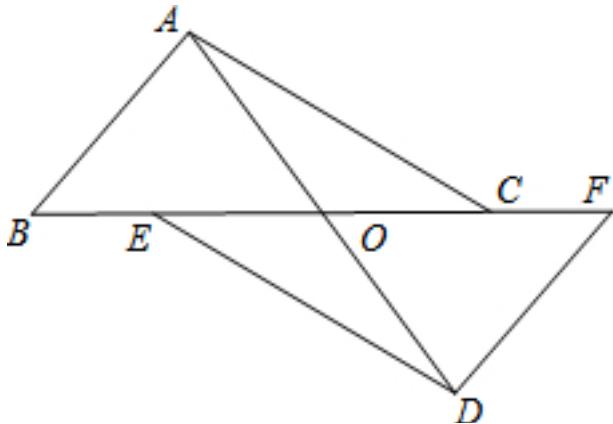
graph:

{"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{ $\angle ABC=\angle DEF$ }]

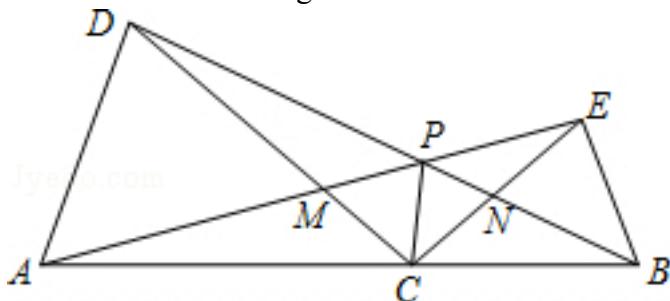
429、topic: 已知:如图,AD、BF相交于点O,点E、C在BF上,BE=FC,AC=DE,AB=DF.求证: $OA=OD, OB=OF$.#%#



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##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}, EqualityRelation {BO=FO}, ProveConclusionRelation: [证明: EqualityRelation {AO=DO}]

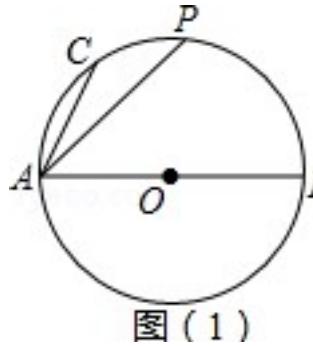
430、topic: 如图,点C为线段AB上任意一点(不与点A、B重合)分别以AC、BC为一腰在AB的同侧作等腰 $\triangle ACD$ 和等腰 $\triangle BCE$, $CA=CD, CB=CE, \angle ACD$ 与 $\angle BCE$ 都是锐角且 $\angle ACD=\angle BCE$,连接AE交CD于点M,连接BD交CE于点N,AE与BD交于点P,连接PC.
 #%(1)求证: $\triangle ACE \cong \triangle DCB$;%#%(2)求证: $\angle APC=\angle BPC$.%#%#



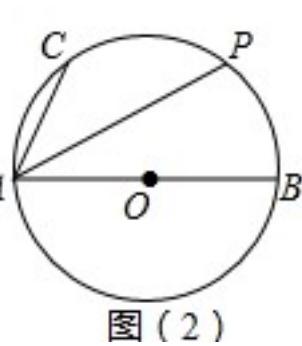
graph:
 {"stem": {"pictures": [{"picturename": "48543683E4D8491D8721087C3027BEEA.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-5.00,3.00", "C": "-8.00,3.00", "D": "-12.91,6.44", "E": "-5.54,4.72", "M": "-9.35,3.95", "N": "-6.85,3.80", "P": "-7.87,4.25"}, "collineations": {"0": "C##A##B", "1": "A##M##P##E", "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: $\angle ACM/ACUTE_ANGLE$, 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], 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, $\angle AOB=13^\circ$, $\angle ACB=5^\circ$. ?%#(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)

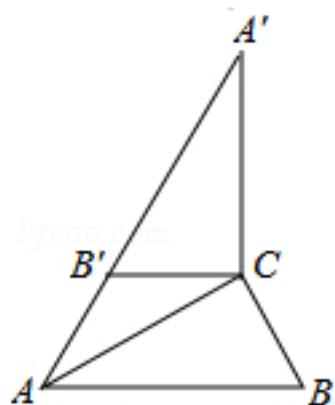


图(2)

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": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000024956.jpg", "coordinates": {"P": "6.50,6.50"}, "collineations": {"0": "A###P"}, "variable>equals": {}, "circles": []}, {"picturename": "1000024956.jpg", "coordinates": {"P": "9.00,6.00"}, "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.#%#



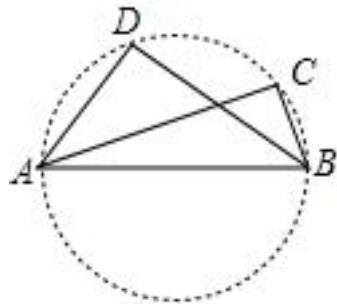
graph:

{"stem": {"pictures": [{"picturename": "1000031476_Q_1.jpg", "coordinates": {"A": "-11.00,3.00", "B": "-7.00,3.00", "C": "-8.00,4.73", "D": "-8.00,8.20", "O": "-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": [{"center": "O", "pointincircle": "C##D##A"}]}, "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,△ABC和△ABD都为直角三角形,且∠C=∠D=90°.求证:A、B、C、D四点在同一个圆上.



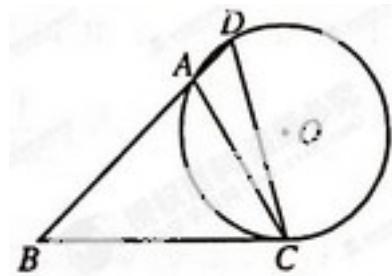
graph:

{"stem": {"pictures": [{"picturename": "1000024874_Q_1.jpg", "coordinates": {"A": "-10.93,4.18", "B": "-0.98,4.07", "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": [{"center": "O", "pointincircle": "C##D##A"}]}, "appliedproblems": {}, "substems": []}}

NLP:

RightTriangleRelation:RightTriangle:△ABC[Optional.of(C)], RightTriangleRelation:RightTriangle:△ABD[Optional.of(D)], PointRelation:B, PointRelation:C

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



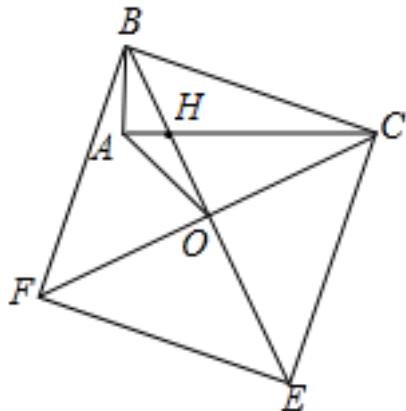
graph:

{"stem": {"pictures": [{"picturename": "1000010402_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "-3.00,0.0", "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:△ABC, EqualityRelation{∠ABC=(1/4*Pi)}, EqualityRelation{∠

$ACB = (1/3 * \pi)$, 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)}

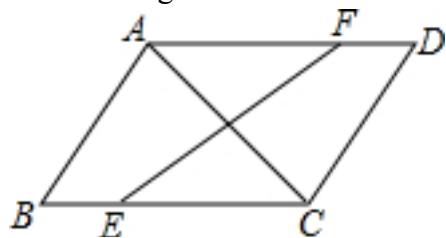
435、topic: 如图,以Rt $\triangle ABC$ 的斜边BC为一边在 $\triangle ABC$ 的同侧作正方形BCEF,设正方形的中心为点O,连接AO.如果 $AB=4$, $AO=6\sqrt{2}$,求AC的长. # % #



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"}, "collinearations": {"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:BCEF}, 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. # % #

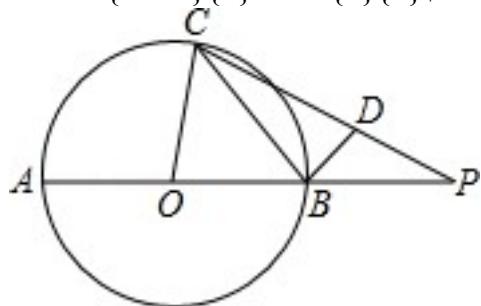


graph:
{"stem": {"pictures": [{"picturename": "1000081625_Q_1.jpg", "coordinates": {"A": "1.00,4.00", "B": "0.00,0.00", "C": "2.00,0.00", "D": "3.00,4.00", "E": "1.00,1.00", "F": "2.00,3.00", "O": "1.50,2.00", "M": "1.50,1.50", "N": "2.50,2.50"}}, "appliedproblems": {}, "substems": []}}

,"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()]]]

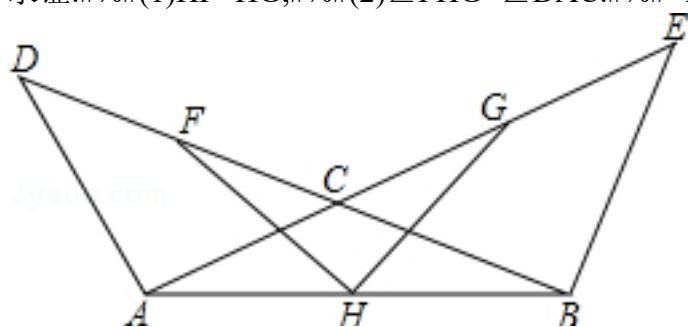
437、topic: 如图,AB是 $\odot O$ 的直径,延长AB至P,使 $BP=OB$, BD 垂直于弦 BC ,垂足为点B,点D在PC上.设 $\angle PCB=\alpha$, $\angle POC=\beta$.求证 $\tan \alpha \cdot \tan \frac{\beta}{2} = \frac{1}{3}$.



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 { $\tan(\alpha) \cdot \tan(\beta/2) = 1/3$ }]]

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) $\angle FHG=\angle DAC$.

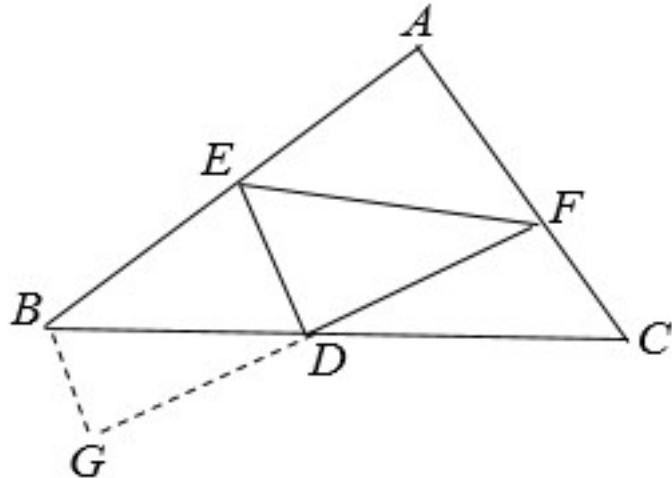


graph:

```
{"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}]

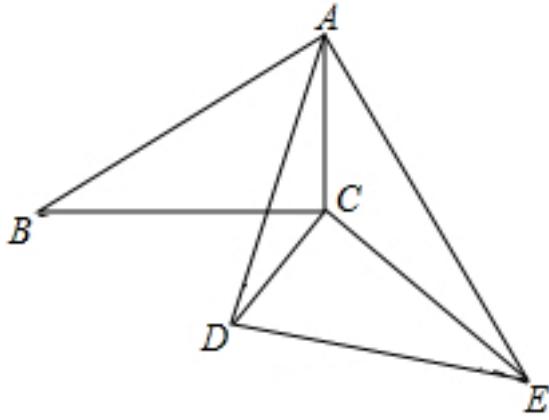
439、topic: 如图, $\triangle ABC$ 中, E、F 分别在 AB、AC 上, $DE \perp DF$, D 是 BC 的中点, 延长 FD 到 G, 使 $DG=DF$.?#%#(1)求证: $\triangle BGD \cong \triangle CFD$?#%#(2)试比较 $BE+CF$ 与 EF 的大小.



graph:
{"stem": {"pictures": [{"picturename": "1000026552_Q_1.jpg", "coordinates": {"A": "0.49,2.53", "B": "-2.50,0.0", "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: $\triangle ABC$, 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=△BGD, triangleB=△CFD}], SolutionConclusionRelation {relation=数字比较大小: DualExpressRelation {expresses=[Express:[EF], Express:[BE+CF]]}}}

440、topic: 如图, 已知 $∠ACB=∠DCE=90^\circ$, $∠ABC=∠CED=∠CAE=30^\circ$, $AC=3$, $AE=8$, 求 AD 的长. #%#

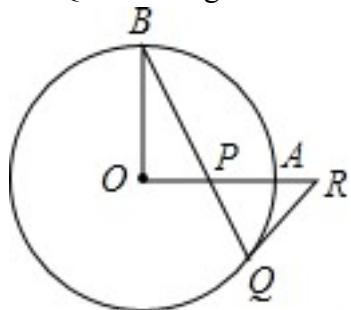


graph:

{"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", "pointincircle": "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)}

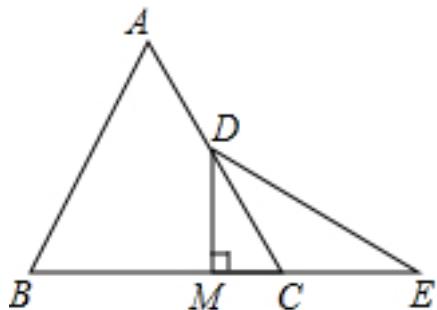
442、topic: 如图,已知线段AB.(1)作图:延长线段AB到C,使得AC=3AB;(2)当AB的长等于2cm时,求线段BC的长.#%#



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)}

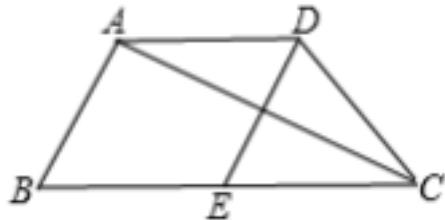
443、topic: 如图,在等边三角形ABC中,D是AC的中点,E是BC延长线上一点,且CE=CD,DM \perp BC,垂足为M.求证:M是BE的中点.#%#



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##E", "1": "A###D###C", "2": "B###A", "3": "D###E", "4": "D###M"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 RegularTriangleRelation:RegularTriangle:△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 \parallel 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.#%#

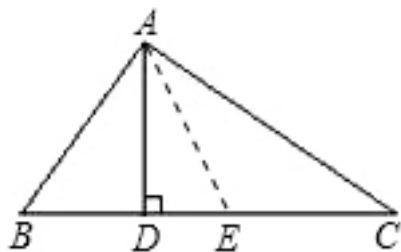


graph:

{"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"}, "collineations": {"0": "A##D", "1": "A##C", "2": "A##B", "3": "B##E##C", "4": "D##E", "5": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "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.#%#

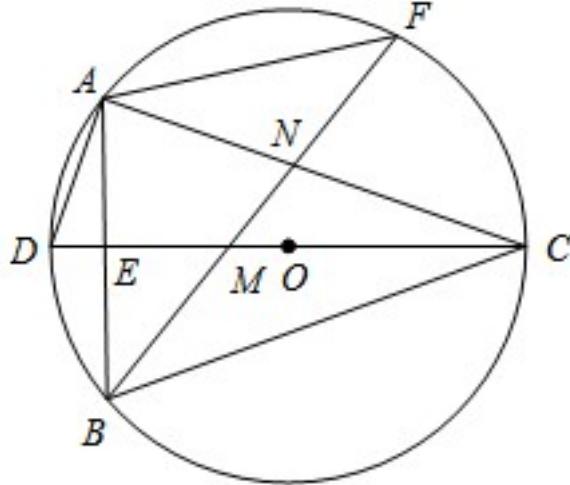


graph:

{"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"}, "collineations": {"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)}

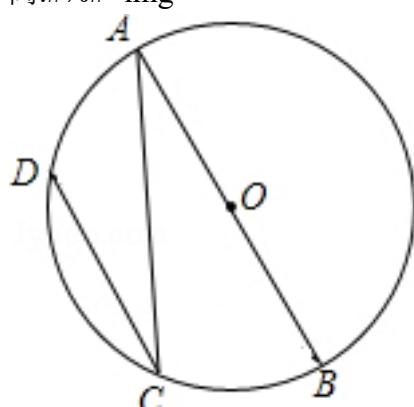
446、topic: 已知:如图,\$\triangle ABC\$内接于\$\odot O\$,直径\$CD\perp AB\$,垂足为E,弦BF交CD于点M,交AC于点N,且\$BF=AC\$.?%#(1)求证:\$AD\cdot BE=DE\cdot BC\$;?%#(2)请判断线段BM、MN、MF之间有怎样的等量关系,并给予证明;?%#(3)当\$\angle ACB=30^\circ\$,\$\odot O\$半径为4时,求\$\frac{\{\{S\}_1\}\backslash vartriangle ANF}{\{\{S\}_1\}\backslash vartriangle ABF}\$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"}, "collineations": {"0": "D###A", "1": "A###E###B", "2": "A###N###C", "3": "A###F", "4": "B###N##F", "5": "B###C", "6": "C###O###M###E###D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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 $\triangle ABF$)}

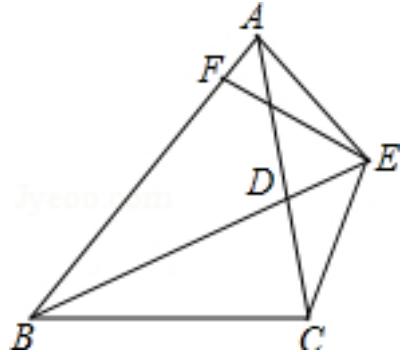
447、topic: 如图,已知 $\odot O$ 的直径AB=d,弦AC=a, $\widehat{AD} = \widehat{BC}$,求A,D两点间的距离.
 %



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

NLP: DistanceOfDualPointsRelation{pointA=A, pointB=D, distance=Express:[v_0]}, DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=Express:[AB=d]}, 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}, 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])}

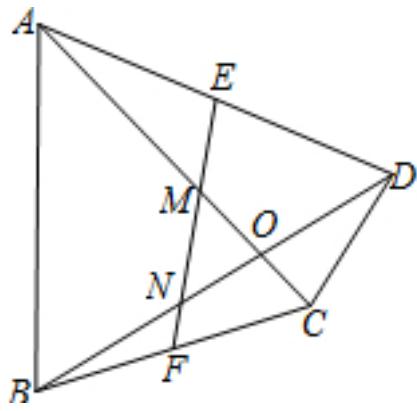
448、topic: 已知:如图, BD为 $\triangle ABC$ 的角平分线,且 $BD=BC$,E为BD延长线上的一点, $BE=BA$,过E作 $EF \perp AB$,F为垂足. #%(1)求证: $\triangle ABD \cong \triangle EBC$; #%(2)求证: $\angle BCE + \angle BCD = 180^\circ$; #%(3)求证: $BA+BC=2BF$. #%#



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": {}, "substems": [{"substemid": "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{ $\angle BCE + \angle BCD = \pi$ }], 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. #%#



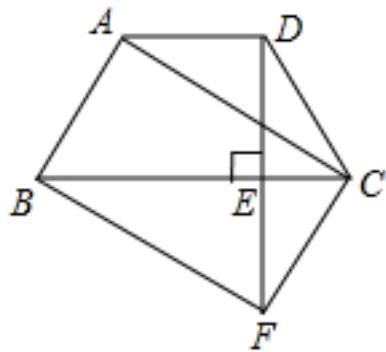
```

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"}, "collineations": {"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.



```

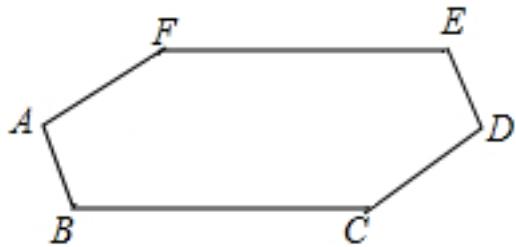
graph:
{"stem": {"pictures": [{"picturename": "1000062130_Q_1.jpg", "coordinates": {"A": "-3.00,2.00", "B": "-4.00,0.00", "C": "1.00,0.00", "D": "0.00,2.00", "E": "0.00,0.00", "F": "0.00,-2.00"}, "collineations": {"0": "B##C##E", "1": "F##E##D", "2": "A##B", "3": "A##C", "4": "A##D", "5": "F##B", "6": "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: ParallelogramRelation{parallelogram=Parallelogram:ABFC}]]

RectangleRelation{rectangle=Rectangle:ABFC}]

451、topic: 已知:如图,AB=DE,BC=EF,CD=FA,∠A=∠D.求证:∠ABC=∠DEF.#%#

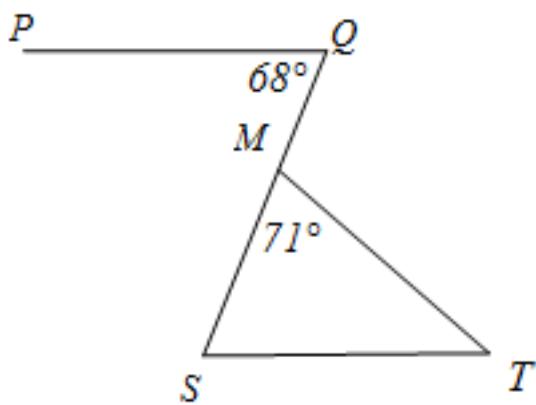


graph:
 {"stem": {"pictures": [{"picturename": "1000030751_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-12.00,2.00", "C": "-6.00,2.00", "D": "-4.00,4.00", "E": "-5.00,6.00", "F": "-11.00,6.00"}, "collineations": {"0": "A##B", "1": "B##C", "2": "C##D", "3": "D##E", "4": "E##F", "5": "A##F"}, "variable>equals": {}, "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{∠MQP=(17/45*Pi)},EqualityRelation{∠SMT=(71/180*Pi)},求角的大小: AngleRelation{angle=∠MST},求角的大小: AngleRelation{angle=∠MTS},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠MST)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠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△ABC中,∠BAC=90°,AB=AC,直线l经过点A,BD⊥直线l,CE⊥直线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,那结论是否成立呢?如图2,将(1)中的条件改为:在△ABC中,AB=AC,D、E三点都在直线l上,并且有∠BDA=∠AEC=∠

$BAC = \alpha$, 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. #%#

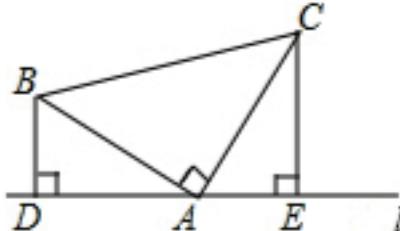


图1

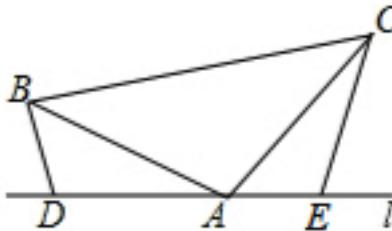


图2

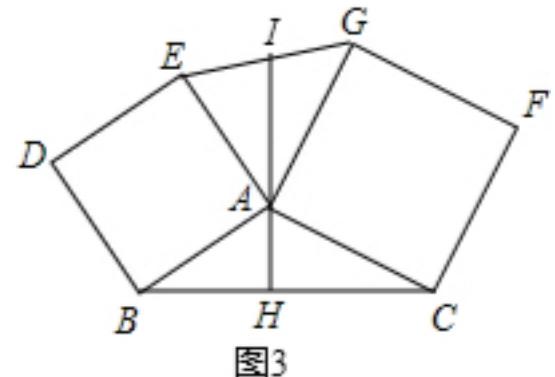


图3

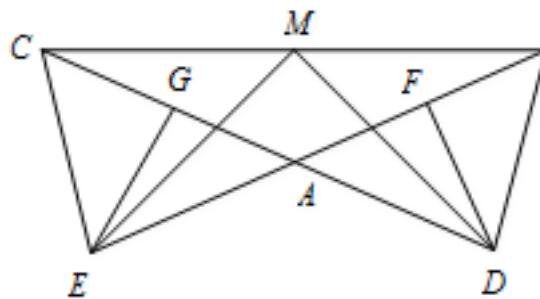
graph:

```
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```

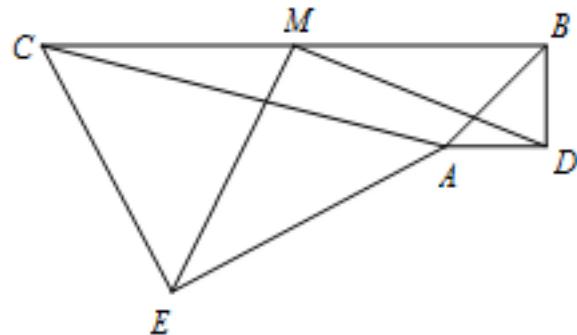
NLP: (ExpressRelation:[key:]1), TriangleRelation: $\triangle ABC$, EqualityRelation $\angle BAC = (1/2 * \pi)$, EqualityRelation $\{AB = AC\}$, PointOnLineRelation {point=A, line=StraightLine[l]}
 analytic: $y = k_1 * x + b_1$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false}, 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[l]} analytic: $y = k_1 * x + b_1$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false}, PointOnLineRelation {point=A, line=StraightLine[l]} analytic: $y = k_1 * x + b_1$ slope:null b:null isLinearFunction:false, isConstant:false, extension=false}, PointOnLineRelation {point=E, line=StraightLine[l]} 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:
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```

NLP:

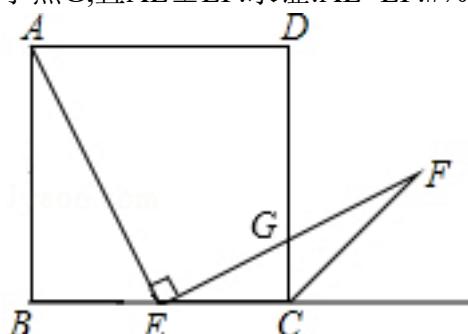
IsoscelesTriangleRelation: IsoscelesTriangle: ΔABC [Optional.of(A)], EqualityRelation {AB=AC}, LineRoleRelation {Segment=AB, roleType=HYPOTENUSE}, LineRoleRelation {Segment=AC, roleType=HYPOTENUSE}, IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\Delta AC E$ [Optional.of(E)][Optional.of(E)], 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: $\Delta AC E$ [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.%#

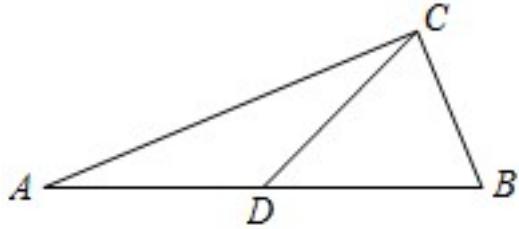


graph:

```
{"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"}, "collineations": {"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": {}, "substems": []}}
```

NLP: AngleBisectorRelation {line=M_0N_0, angle=∠α, 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.



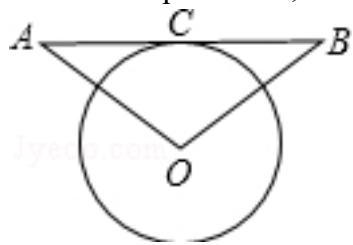
graph:

```
{"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"}, "collineations": {"0": "A###C", "1": "D###A###B", "2": "B###C", "3": "A###E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

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, $AB=10$ cm, 求OA的长.

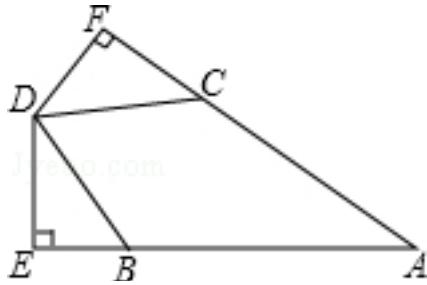


graph:

```
{"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=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(C), outpoint=Optional.absent()}, EqualityRelation {AO=BO}, DiameterRelation {diameter=null, circle=Circle[$\odot O$] {center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^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.

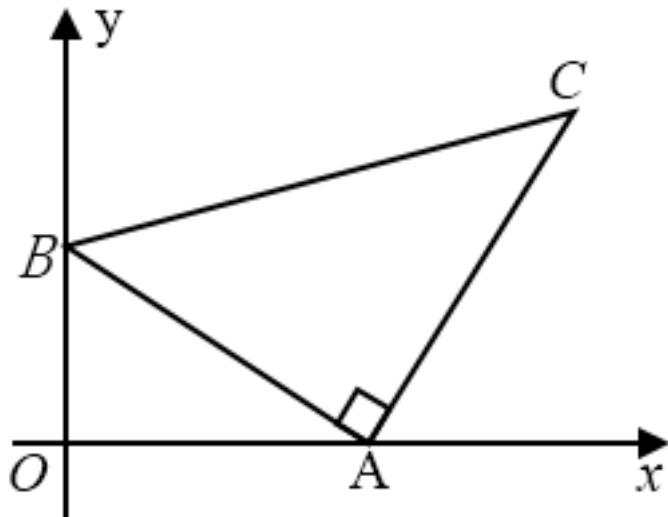


graph:

{"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△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.



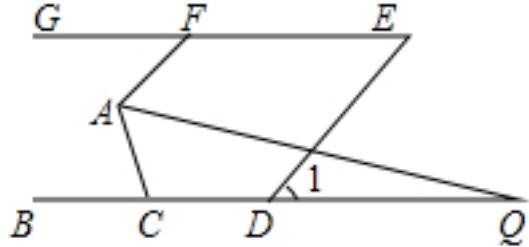
graph:

{"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": "0.00,1.00", "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": []}]}]}

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: ΔABC[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 $BC \parallel GE, AF \parallel DE, \angle 1=50^\circ$.(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.

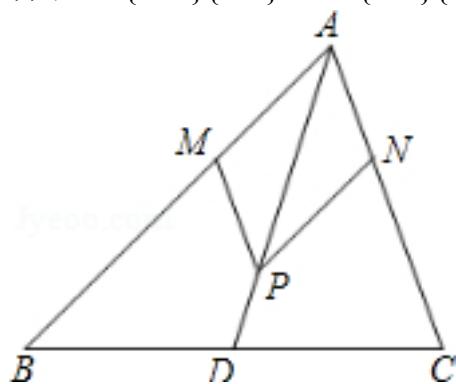


graph:

{"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"}, "collinearities": {"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: $\frac{AM}{AB}+\frac{AN}{AC}=\frac{AP}{AD}$.

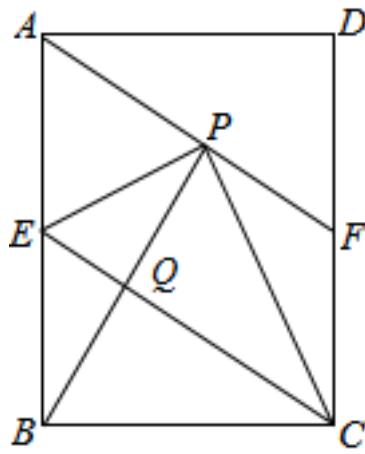


graph:

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

NLP: TriangleRelation: ΔABC , 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 ΔAEP 是等边三角形,连接BP,求证: $\Delta APB \cong \Delta EPC$; #%(3)若矩形ABCD的边 $AB=6, BC=4$,求 ΔCPF 的面积. #%#

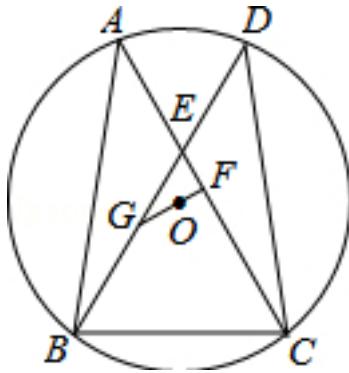


graph:
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NLP:
 RectangleRelation {rectangle=Rectangle:ABCD}, MiddlePointOfSegmentRelation {middlePoint=E, segment=AB}, PointCoincidenceRelation {point1=B, point2=P}, SegmentRelation:EC, LineCrossRelation [crossPoint=Optional.of(F), iLine1=CD, iLine2=AP], RegularTriangleRelation:RegularTriangle: ΔAEP , SegmentRelation:BP, EqualityRelation { $S_{\Delta CFP}=v_0$ }, 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= ΔAPB , triangleB= ΔEPC }], SolutionConclusionRelation {relation=求值(大

小): (ExpressRelation:[key:]S_ΔCFP)}

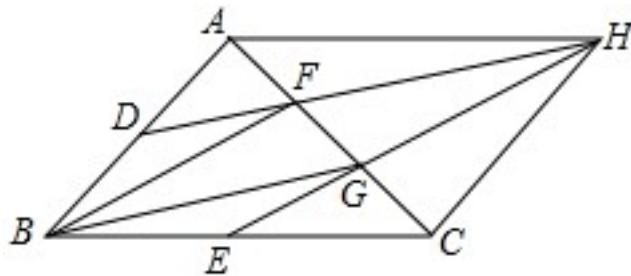
463、topic: 如图,\$\odot O\$是\$\triangle ABC\$的外接圆,弦BD交AC于点E,连接CD,且\$AE=DE\$,\$BC=CE\$.(1)求\$\angle ACB\$的度数;(2)过点O作\$OF \perp AC\$于点F,延长FO交BE于点G,\$DE=3\$,\$EG=2\$,求AB的长.



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

NLP: ChordOfCircleRelation{chord=BD, 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= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, 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.



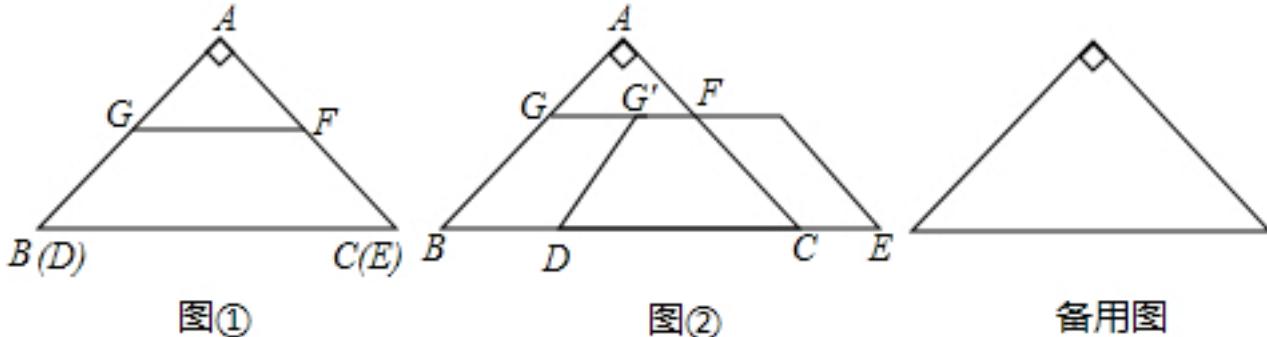
graph:
 {"stem": {"pictures": [{"picturename": "1000023709.jpg", "coordinates": {"A": "4.00,5.00", "B": "0.00,0.00", "C": "10.00,0.00", "D": "2.00,2.50", "E": "5.00,0.00", "F": "6.00,3.33", "G": "8.06,1.62", "H": "14.00,5.00"}, "collinearities": {"0": "A##D##B", "1": "A##H", "2": "H##C", "3": "B##F", "4": "G##B", "5": "F##A##G##C", "6": "F##H##D", "7": "E##G##H", "8": "E##C##B"}, "variable>equals": {}, "circles": [{"center": "F", "pointincircle": "A##C##B##D"}]}, "appliedproblems": {}, "substems": []}]}

NLP:

TriangleRelation: ΔABC , MiddlePointOfSegmentRelation {middlePoint=D, segment=AB}, MiddlePointOfSegmentRelation {middlePoint=E, segment=BC}, SegmentAliquotsPointRelation {aliquotsNum='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 ΔABC 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 ΔABC ,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\$ $\{G'B\}^2$ \$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 ΔABC 重合部分的面积S.#%#



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

NLP: RightTriangleRelation:RightTriangle: ΔABC [Optional.of(A)], EqualityRelation { $\angle FAG=(1/2*\pi)$ }, 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,\$ $\angle EAF=45^\circ$ \$,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.

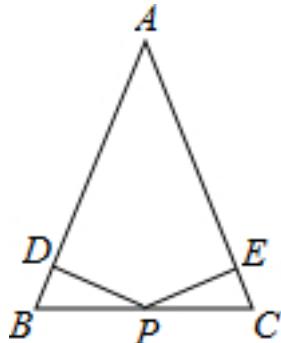
graph:

```
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```

": "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{M N=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)}

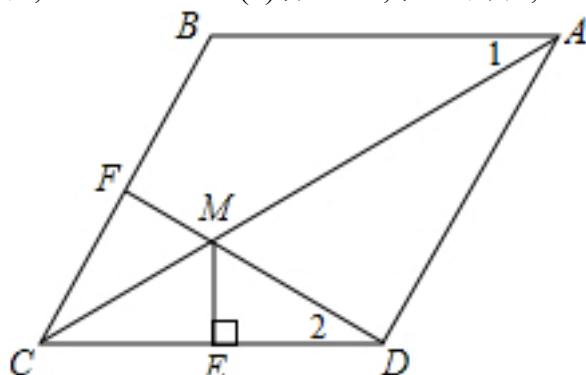
467、topic: 已知:如图,在等腰 $\triangle ABC$ 中,AB=AC,P为BC的中点,PD \perp AB于点D,PE \perp AC于点E,求证:PD=PE. #%#



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"}, "collinear": {"0": "D###B###A", "1": "C###A###E", "2": "B###P###C", "3": "P###D", "4": "P###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}}, "substems": []}]

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. #%#

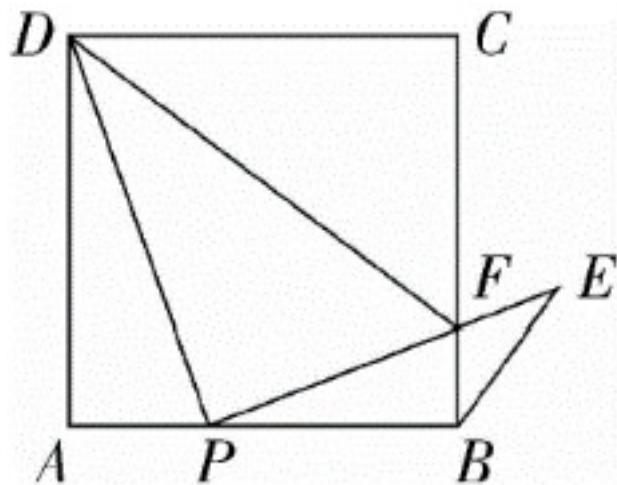


graph:
 {"stem": {"pictures": [{"picturename": "1000034573_Q_1.jpg", "coordinates": {"A": "3.67,1.16", "B": "-0.33,1.16", "C": "-2.33,-2.30", "D": "1.67,-2.30", "E": "-0.33,-2.30", "F": "-1.33,-0.57", "M": "-0.33,-1.15"}, "collineations": {"0": "B###A", "1": "B###F###C", "2": "F###M###D", "3": "A###M###C", "4": "C###E###D", "5": "M###E", "6": "D###A"}, "variable>equals": {"0": "\u00b21=\u00b2BAC", "1": "\u00b22=\u00b2FDC"}, "circles": []}, "substems": [{"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{\u00b2BAM=\u00b2EDM}, 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.

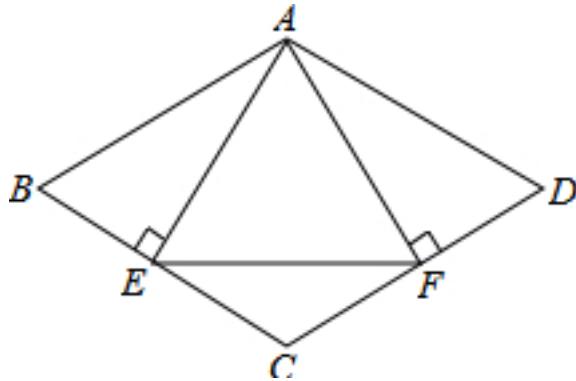


graph:
 {"stem": {"pictures": [{"picturename": "100004773_Q_1.jpg", "coordinates": {"A": "-6.56,0.21", "B": "-0.95,0.21", "C": "-0.95,5.82", "D": "-6.56,5.82", "E": "1.32,2.49", "F": "-0.95,1.56", "P": "-4.29,0.21"}, "collineations": {"0": "P###F###E", "1": "A###P###B", "2": "C###F###B", "3": "A###D", "4": "D###C", "5": "D###F", "6": "D###P", "7": "B###E"}, "variable>equals": {"0": "((AP)/(AB))"}, "circles": []}, "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=\u00b2EBF}, 求值(大小):
 (ExpressRelation:[key:]((AP)/(AB))), ProveConclusionRelation:[证明: EqualityRelation{\u00b2ADP=\u00b2BPF}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:] \u00b2EBF), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]((AP)/(AB)))}

470、topic: 如图,在菱形ABCD中,AB=4,\u00b2B=60\u00b0,AE \perp BC,AF \perp CD,垂足分别为点E、F,连接EF,求

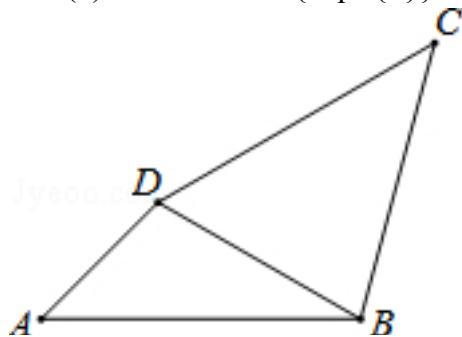
ΔAEF 的面积. #%#



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"}, "collinearities": {"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_ ΔAEF =v_0}, RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{AB=4},
 EqualityRelation{ $\angle ABE=(1/3*\pi)$ }, 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_ ΔAEF)}

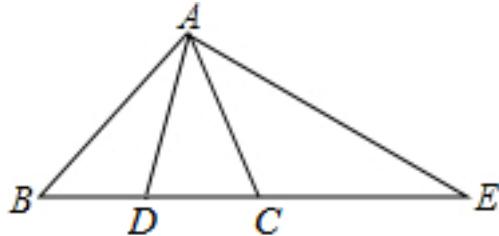
471、topic: 如图,在四边形ABCD中, $\angle A=\angle C=45^\circ$, $\angle ADB=\angle ABC=105^\circ$. #%(1)若 $AD=2$,求 AB ;
 #%(2)若 $AB+CD=2\sqrt{3}+2$,求 AB . #%#



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"}, "collinearities": {"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)}

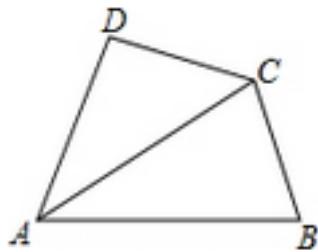
472、topic: 如图,AD是 $\triangle ABC$ 的中线,点E在BC的延长线上,CE=AB, $\angle BAC=\angle BCA$.求证:AE=2AD.



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: ΔABC , PointOnLineRelation {point=E, line=BC, isConstant=false, extension=true}, EqualityRelation {CE=AB}, EqualityRelation { $\angle BAC=\angle ACD$ }, MidianLineOfTriangleRelation {midianLine=AD, triangle= ΔABC , top=A, bottom=BC}, ProveConclusionRelation: [证明: EqualityRelation {AE=2*AD}]

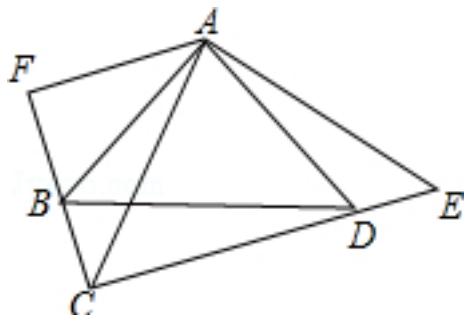
473、topic: 四边形ABCD中,已知AB=a,AD=b,且a>b,对角线AC平分 $\angle BAD$,DC=BC,求证: $\angle B+\angle D=180^\circ$.



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= $\angle BAD$, angle1= $\angle BAC$, angle2= $\angle CAD$ }, EqualityRelation {CD=BC}, ProveConclusionRelation: [证明: EqualityRelation { $\angle ABC+\angle ADC=(\pi)$ }]

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.求证: $\triangle ABC \cong \triangle ADE$;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##D##E", "5": "E##A", "6": "A##F", "7": "F##B##C"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:
 IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: ΔABD [Optional.of(A)][Optional.of(A)], IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: ΔACE [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= ΔABC , triangleB= ΔADE }], 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.%#

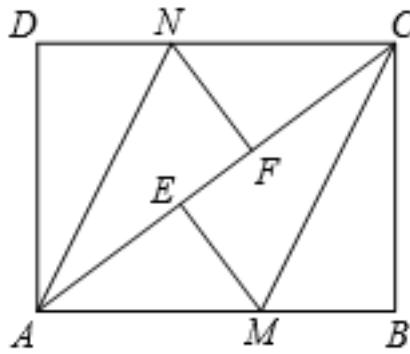


图 (1)

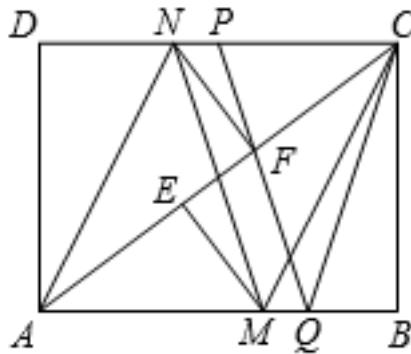


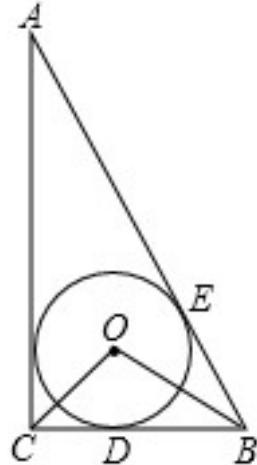
图 (2)

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": "100001262_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)}

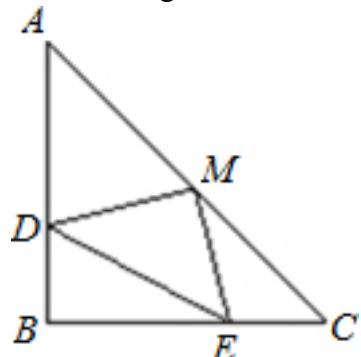
476、topic: 如图,已知\$Rt\triangle ABC\$中, \$\angle ACB=90^\circ\$, \$\odot O\$是\$Rt\triangle ABC\$的内切圆,其半径为1,E,D是切点,若\$\angle BOC=105^\circ\$,求AE的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000008280_Q_1.jpg", "coordinates": {"A": "-2.73,4.73", "B": "0.00,0.0", "C": "-2.73,0.00", "E": "-0.87,1.50", "D": "-1.73,0.00", "O": "-1.73,1.00"}, "collineations": {"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[$\odot O_0$]{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[$\odot O$]{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)}

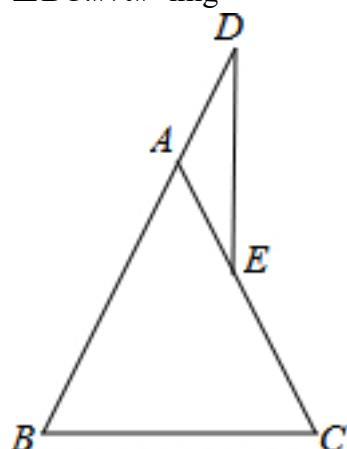
477、topic: 如图,在\$△ABC\$中,\$∠B=90^\circ\$,\$AB=BC\$,\$BD=CE\$,\$M\$是边\$AC\$的中点.求证:\$△DEM\$是等腰三角形.



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"}, "collineations": {"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)]]

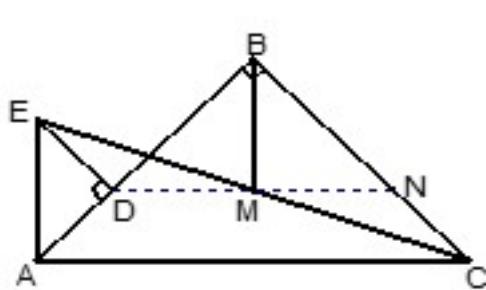
478、topic: 已知:如图,在 $\triangle ABC$ 中, $AB=AC$, E 在 AC 上, D 在 BA 的延长线上, $AD=AE$,连结 DE ,求证: $DE \perp BC$.#%#



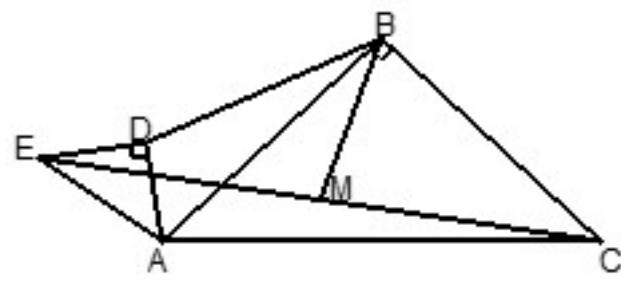
graph:
 {"stem": {"pictures": [{"picturename": "1000040425_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "-1.56,0.00", "C": "1.56,0.00", "D": "0.63,4.20", "E": "0.63,1.80"}, "collineations": {"0": "D###A###B", "1": "B###C", "2": "C###E###A", "3": "D###E"}, "variable>equals": {}, "circles": "[]"}, "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 = }]

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

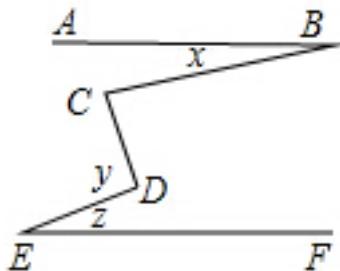


图②

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": "", "pictures": [{"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: ΔABC [Optional.of(B)][Optional.of(B)], IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: ΔADE [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= ΔEDM , triangleB= ΔCNM }], SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:](BD/BM))}

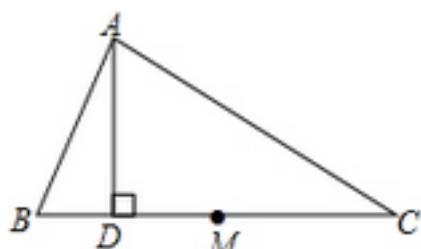
480、topic: 如图,已知 $AB \parallel EF$, $\angle C=90^\circ$,求证: $x+y-z=90^\circ$.



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": {}}, "subsystems": []}

NLP: LineParallelRelation [iLine1=AB, iLine2=EF], EqualityRelation { $\angle BCD = (1/2 * \pi)$ }, ProveConclusionRelation: [证明: EqualityRelation { $x+y-z=(1/2 * \pi)$ }]

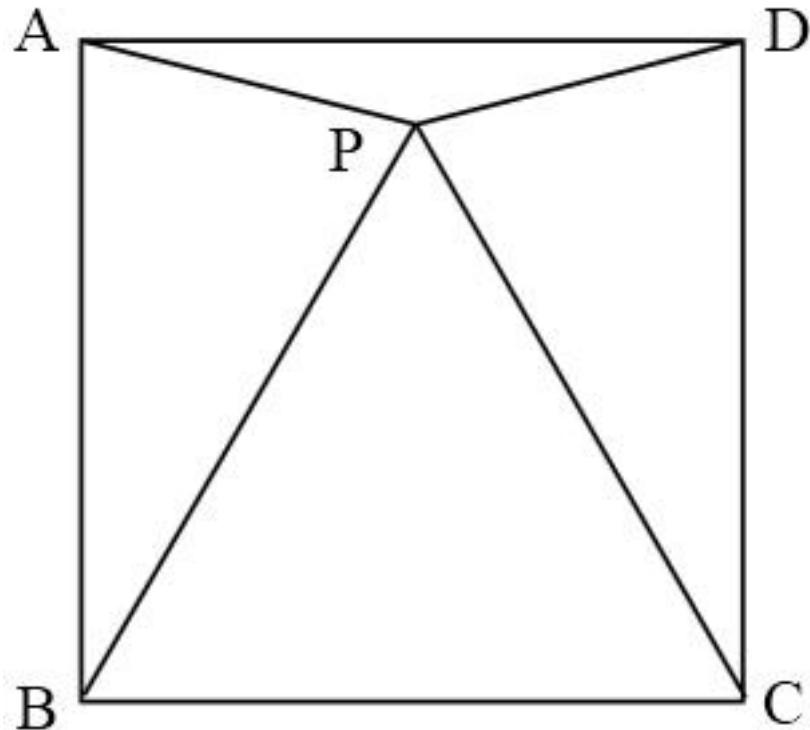
481、topic: 如图,在三角形ABC中, $\angle B = 2\angle C$,AD是三角形的高,点M是边BC的中点,求证: $DM = \frac{1}{2}AB$.



graph:
 {"stem": {"pictures": [{"picturename": "1000040694_Q_1.jpg", "coordinates": {"A": "-9.03,4.35", "B": "-11.00,2.00", "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": {}, "substems": []}}

NLP: TriangleRelation: ΔABC , 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}]

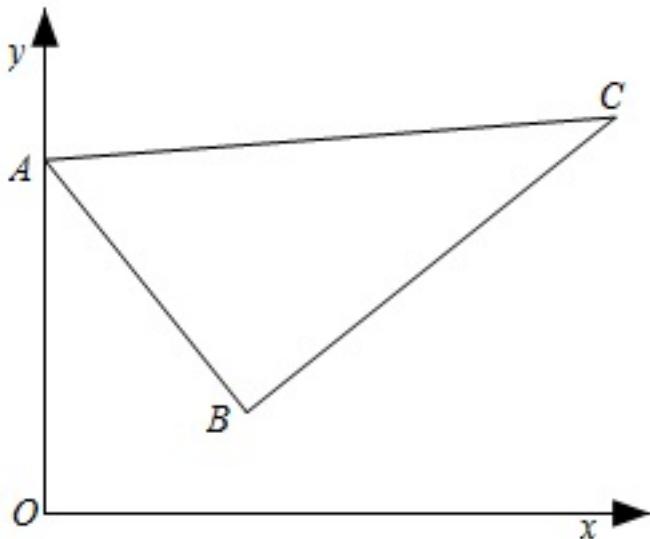
482、topic: 已知:如图,P是正方形ABCD内点, $\angle PAD = \angle PDA = 15^\circ$.求证: $\triangle PBC$ 是正三角形.



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: ΔPBC]

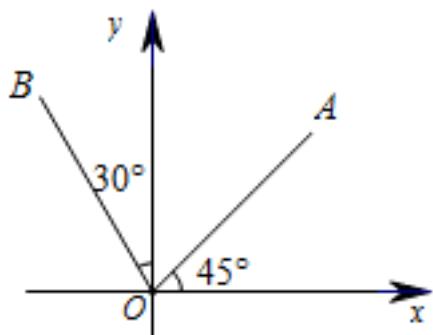
483、topic: 如图,将等腰直角 ΔABC 放在直角坐标系中,其中 $\angle B=90^\circ$, $A(0,10)$, $B(8,4)$,求AB的长及点C的坐标.



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: ΔABC
 [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}

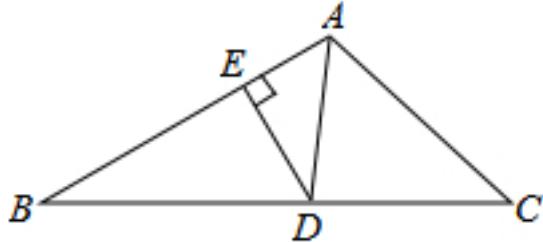
484、topic: 如图所示,在直角坐标系中,线段OA的长度为6,OB的长度为8,求点A,点B的坐标.



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}

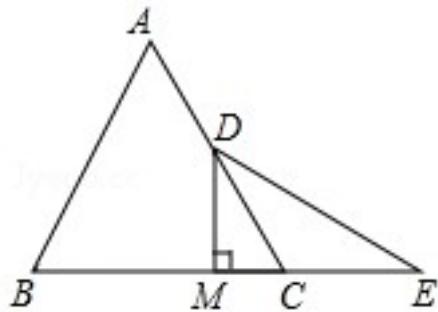
485、topic: 如图,AD是 $\triangle ABC$ 中 $\angle BAC$ 的角平分线,DE $\perp AB$ 于点E,\$\{\{S\}_{\backslash vartriangle ABC}\}=7\$,DE=2,AB=4,求AC的长度.#%#



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)}

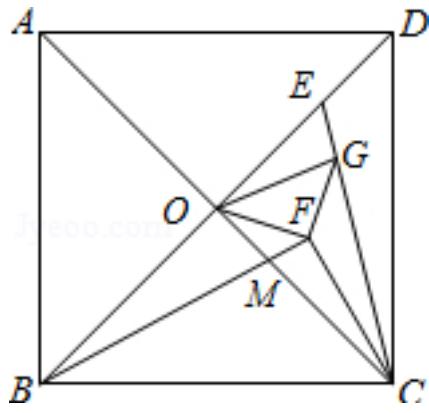
486、topic: 如图,已知等边三角形ABC中,D是AC的中点,E是BC延长线上的一点,且CE=CD,DM \perp BC,垂足为M.求证:M是BE的中点.#%#



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", "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}]

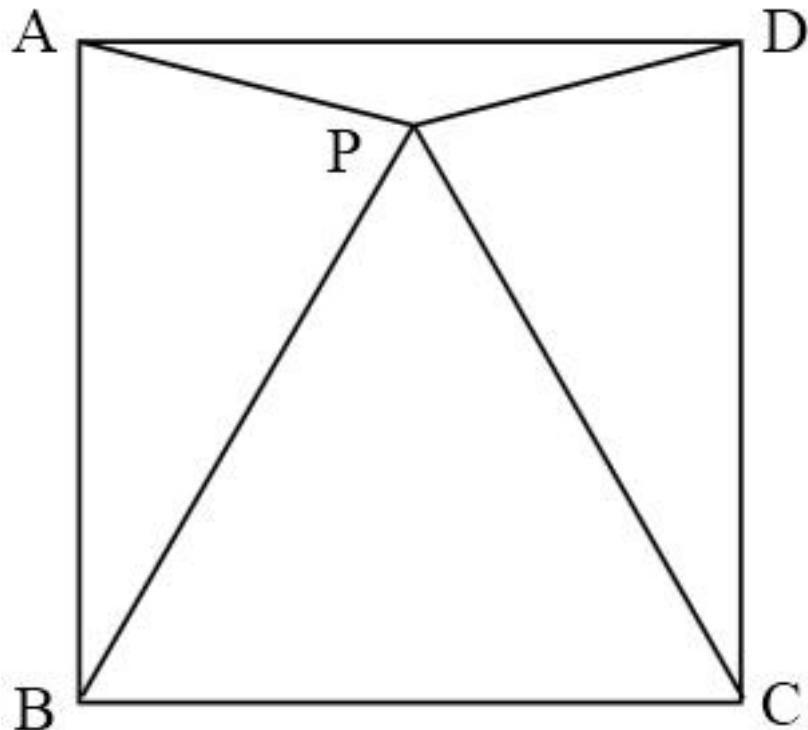
487、topic: 如图,正方形ABCD的对角线相交于点O.点E是线段DO上一点,连接CE.点F是 $\angle OCE$ 的平分线上一点,且BF \perp CF与CO相交于点M.点G是线段CE上一点,且CO=CG.#%#(1)若OF=4,求FG的长;#%#(2)求证:BF=OG+CF.#%#



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_0N_0, angle=∠GCM, angle1=∠GCM_0, angle2=∠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.

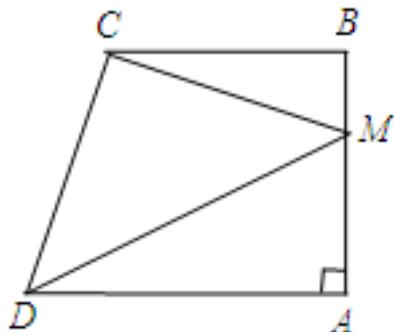


graph:

{"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):

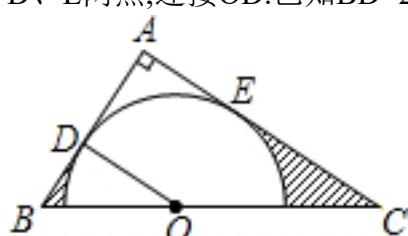
(ExpressRelation:[key]:v_0), EqualityRelation {AC=v_1}, SegmentRelation:AC, 求值(大小):

(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.%#



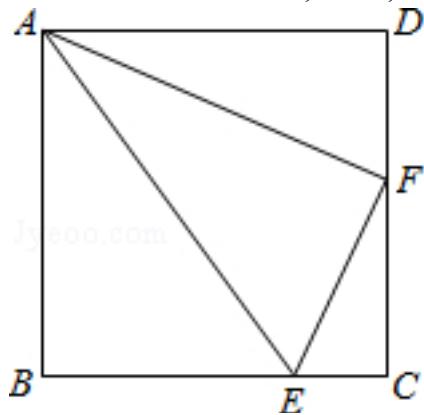
```

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"}, "collineations": {"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 $\angle DAE$ %(1)若正方形ABCD的边长为4,BE=3,求EF的长?%#(2)求证:AE=EC+CD.%#



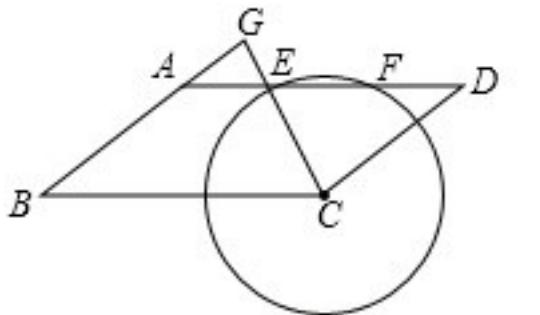
```

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": []}

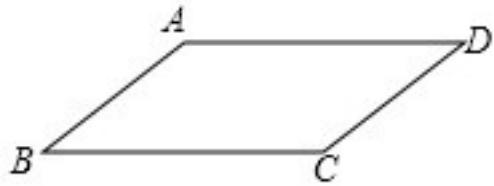
```

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.



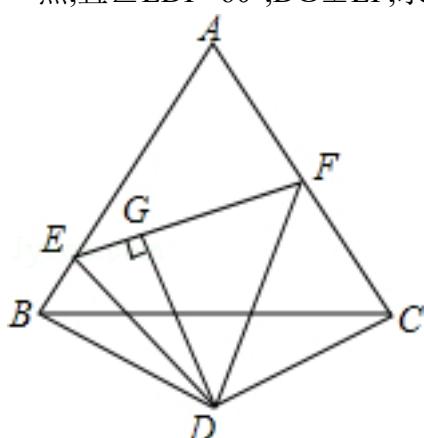
①



②

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}, EqualityRelation {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.absent()], 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": {}, "subsystems": []}}

NLP:

RegularTriangleRelation:RegularTriangle:△ABC, RegularTriangleRelation:RegularTriangle:△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=△BED, triangleB=△GED}]

494、topic: #%(1)如图1,已知 $\angle ACB = \angle DCE = 90^\circ$, $AC = BC = 6$, $CD = CE = 3$, $\angle CAE = 45^\circ$,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. #%#

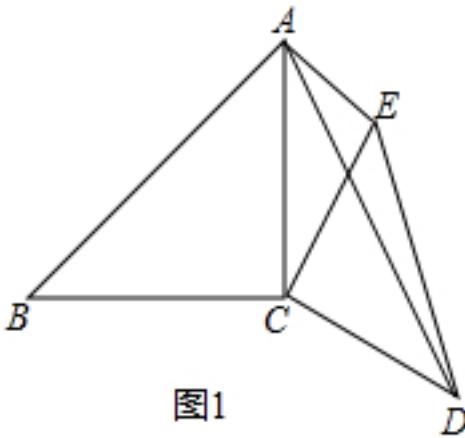


图1

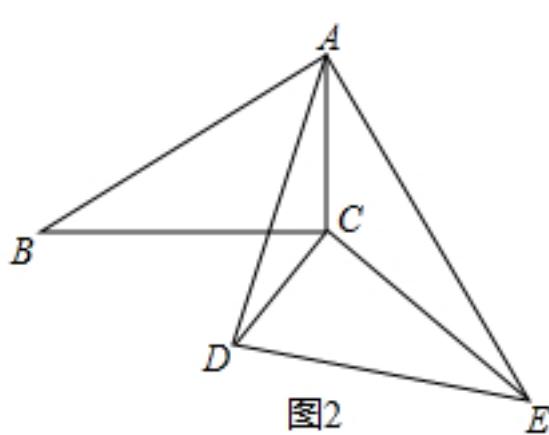


图2

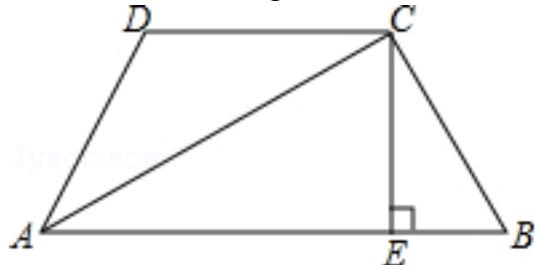
graph:

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

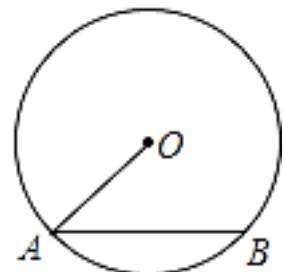
495、topic: 如图,四边形ABCD中,AC平分 $\angle BAD$, $CE \perp AB$ 于点E, $AD+AB=2AE$,则 $\angle B$ 与 $\angle ADC$ 互补.为什么?



graph:
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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: $\angle CBE/\angle ADC$

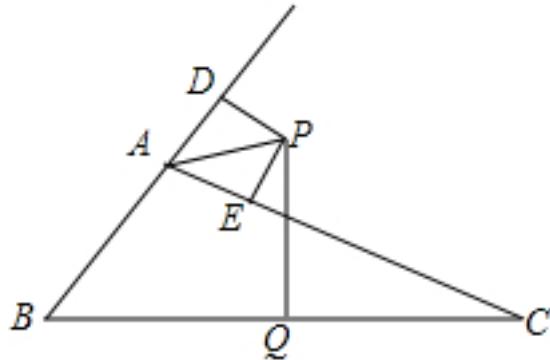
496、topic: 如图,已知 $\odot O$ 的半径为30mm,弦AB=36mm,求点O到AB的距离及 $\angle OAB$ 的余弦值.



graph:
 {"stem": {"pictures": [{"picturename": "1000083361_Q_1.jpg", "coordinates": {"A": "-1.77,-2.42", "B": "1.83,-2.38", "O": "0.00,0.00"}, "collinearities": {"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 $AB = 6\text{cm}$, $AC = 10\text{cm}$, 求 AD 的长.

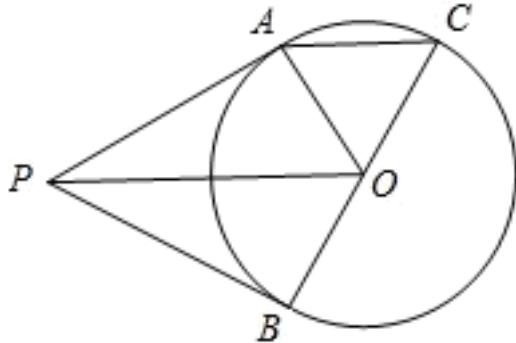


graph:

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

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: $AC // OP$.



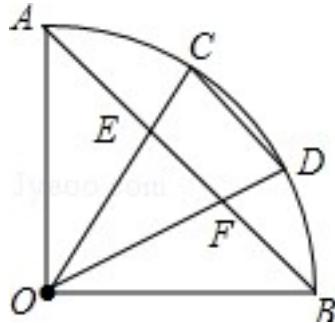
graph:

{"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"}, "collinearations": {"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= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LinePerpRelation{line1=OP, line2=AC, crossPoint=Optional.of(O)}, LinePerpRelation{line1=OP, line2=BC, crossPoint=Optional.of(O)}, LinePerpRelation{line1=AC, line2=BC, crossPoint=Optional.of(O)}, LinePerpRelation{line1=BC, line2=AC, crossPoint=Optional.of(O)}}, ProveConclusionRelation:[证明: LinePerpRelation{line1=OP, line2=AC, crossPoint=Optional.of(O)}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]OP)}

analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null},ProveConclusionRelation:[证明:
LineParallelRelation [iLine1=AC, iLine2=OP]]

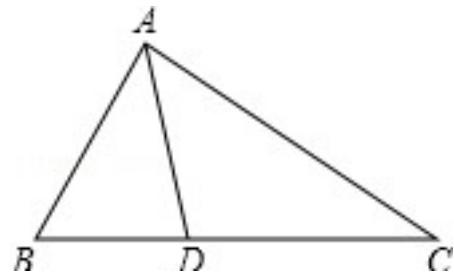
499、topic: 如图, $\angle AOB=90^\circ$, C、D是 \widehat{AB} 的三等分点, AB分别交OC、OD于点E、F, 求证: $AE=CD$. #%#



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}]

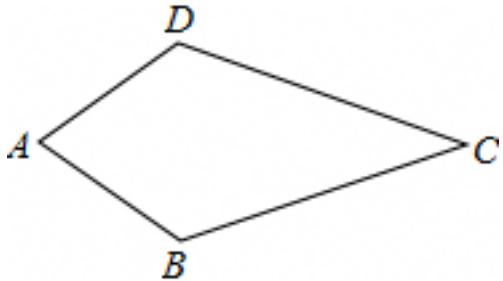
501、topic: 如图, 在 $\triangle ABC$ 中, $\angle ABC=90^\circ$, 以AB的中点O为圆心、OA为半径的圆交AC于点D, E是BC的中点, 连接DE, OE. 求证: $B\{C\}^2=CD\cdot 2OE$. #%#

graph:

NLP:

MiddlePointOfSegmentRelation{middlePoint=O,segment=AB},TriangleRelation:△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{(BC) $^2=CD^2+EO^2$ }]

502、topic: 如图,在四边形ABCD中,AB=AD,BC=CD,试说明 $\angle B=\angle D$.#%#



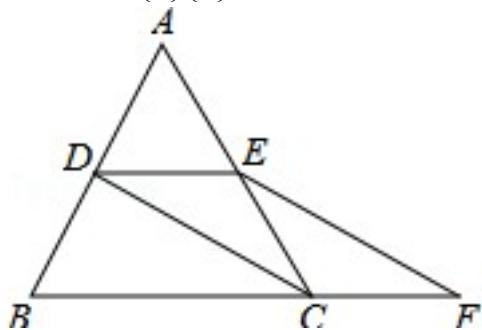
graph:

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

NLP: 已知条件

QuadrilateralRelation{quadrilateral=ABCD},EqualityRelation{AB=AD},EqualityRelation{BC=CD},ProveConclusionRelation:[证明: EqualityRelation{ $\angle ABC=\angle ADC$ }]

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:

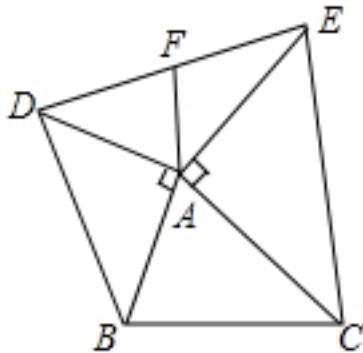
{"stem": {"pictures": [{"picturename": "1000026643_Q_1.jpg", "coordinates": {"A": "-2.50,4.33", "B": "-5.00,0.00", "C": "0.00,0.00", "D": "-3.75,2.17", "E": "-1.25,2.17", "F": "2.50,0.00"}, "collineations": {"0": "C##B##F", "1": "A##B##D", "2": "C##E##A", "3": "D##C", "4": "D##E", "5": "E##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}

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{DE=CF}

on{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)}

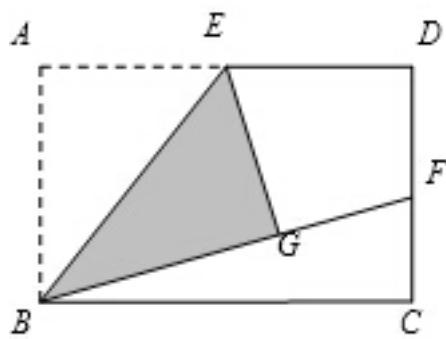
504、topic: 如图,AB=AD,AC=AE, $\angle BAD = \angle CAE = 90^\circ$,点F为DE的中点,求证;BC=2AF. #



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.

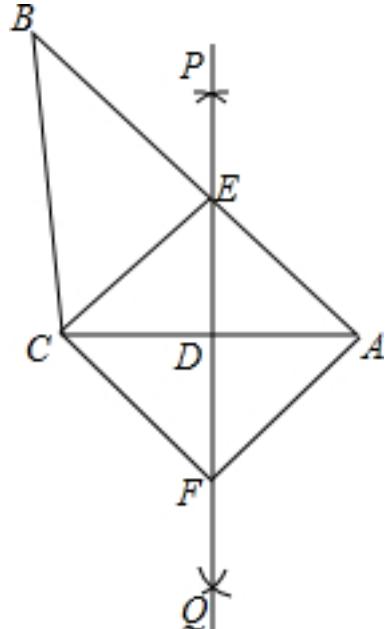


graph:
 {"stem": {"pictures": [{"picturename": "1000027805_Q_1.jpg", "coordinates": {"A": "0.00,3.00", "B": "0.00,0.00", "C": "4.24,0.00", "D": "4.24,3.00", "E": "2.12,3.00", "F": "4.24,1.50", "G": "2.83,1.00"}, "collineations": {"0": "B###G###F", "1": "D###F###C", "2": "A###E###D", "3": "B###A", "4": "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)])}

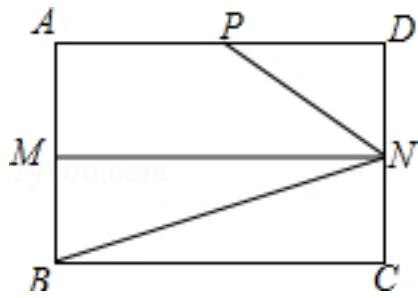
506、topic: 如图,已知 $\triangle ABC$,直线PQ垂直平分AC,与边AB交于点E,连接CE,过点C作 $CF \parallel BA$ 交PQ于点F,连接AF. #%(1)求证: $\triangle AED \cong \triangle CFD$; #%(2)求证:四边形AECF是菱形; #%(3)若 $AD=3, AE=5$,则菱形AECF的面积是多少? #%(#



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_AECF=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])}

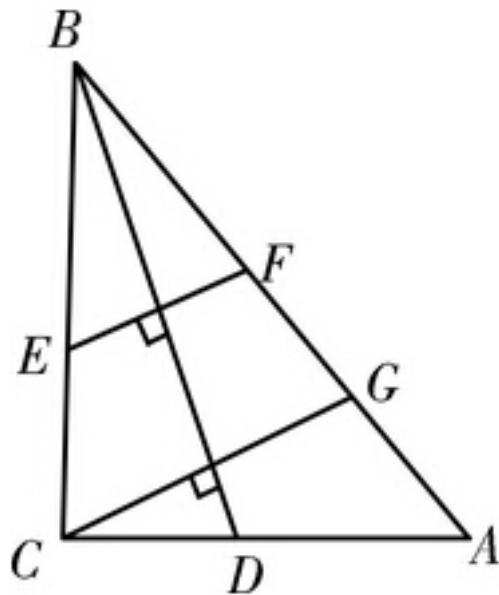
507、topic: 如图,在矩形ABCD中,AB=4,AD=6,M、N分别是AB、CD的中点,P是AD上的点,且 $\angle PNB=3\angle CBN$. #%(1)求证: $\angle PNM=2\angle CBN$; #%(2)求线段AP的长. #%(#



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 $\triangle ABC$, $∠ACB=90^\circ$, $CE=CD$, $EF \perp BD$ 交 AB 于 F , $CG \perp BD$ 交 AB 于 G .
 求证 $AG=GF$.

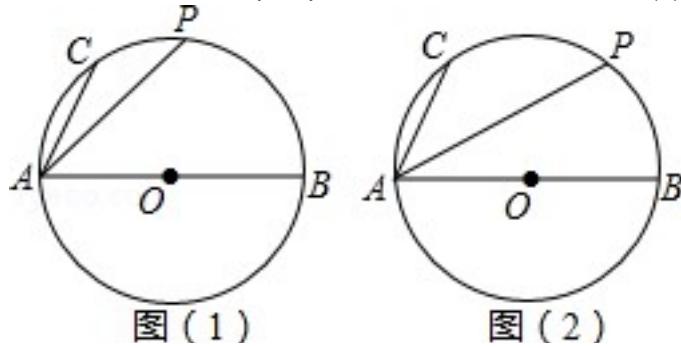


graph:
 {"stem": {"pictures": [{"picturename": "1000023380_Q_1.jpg", "coordinates": {"A": "6.00,0.00", "B": "0.00,6.00", "C": "0.00,0.00", "D": "3.00,0.00", "E": "0.00,3.00", "F": "2.00,4.00", "G": "4.00,2.00"}, "collineations": {"0": "C##E##B", "1": "A##D##C", "2": "F##G##B##A", "3": "B##D", "4": "F##E", "5": "C##G"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP:
 IsoscelesRightTriangleRelation: IsoscelesRightTriangle: IsoscelesTriangle: $\triangle ABC$ [Optional.of(C)] [Optional.of(C)], EqualityRelation{∠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}]

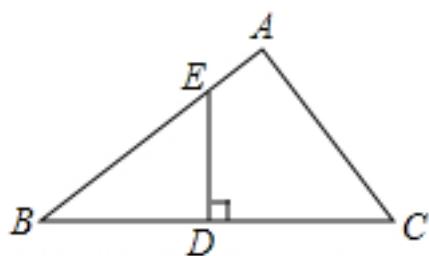
509、topic: 如图,AB是 $\odot O$ 的直径,C、P是 \widehat{AB} 上两点, $AB=13$, $AC=5$. (1)如图(1),若点P是 \widehat{AB} 的中点,求PA的长;#%#(2)如图(2),若点P是 \widehat{BC} 的中点,求PA的长.



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"}]}, {"picturename": "1000024956.jpg", "coordinates": {"P": "6.50,6.50"}, "collineations": {"0": "A###P"}, "variable>equals": {}, "circles": []}, {"picturename": "1000024956.jpg", "coordinates": {"P": "9.00,6.00"}, "collineations": {"0": "A###P"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000024956.jpg", "coordinates": {"P": "6.50,6.50"}, "collineations": {"0": "A###P"}, "variable>equals": {}, "circles": []}, {"picturename": "1000024956.jpg", "coordinates": {"P": "9.00,6.00"}, "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)}

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: $\angle A = 90^\circ$.#%#



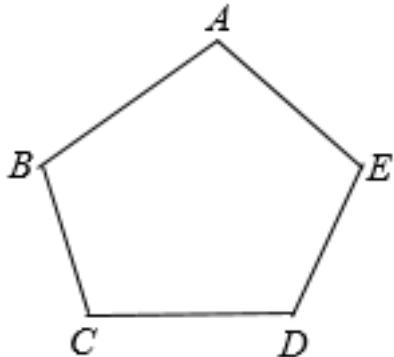
graph:
 {"stem": {"pictures": [{"picturename": "1000080248_Q_1.jpg", "coordinates": {"A": "-10.42,1.53", "B": "-14.68, -1.01", "C": "-8.96,-0.92", "D": "-11.82,-0.97", "E": "-11.84,0.69"}, "collineations": {"0": "A###E###B", "1": "A#B###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "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#B###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}

```
##C","2":"B###D###C","3":"D###E"},"variable-equals":{},"circles":[]],"appliedproblems":{},"substems":[]}
```

NLP:

TriangleRelation: ΔABC , 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 { $\angle CAE = (1/2 * \pi)$ }]

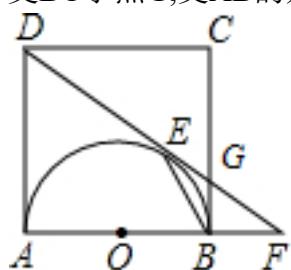
511、topic: 在图中,探求 $\angle A + \angle B + \angle C + \angle D + \angle E$ 的度数. #%#



```
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 $BF = 4\text{cm}$,求BE的长. #%#

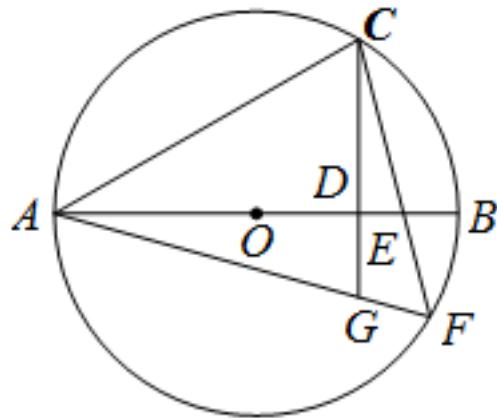


```
graph:
{"stem": {"pictures": [{"picturename": "1000080889_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "4.00,0.00", "C": "4.00,4.00", "D": "0.00,4.00", "E": "3.20,1.60", "F": "5.33,0.00", "G": "4.00,1.00", "O": "2.00,0.00"}, "collineations": {"0": "A###D", "1": "D###E###G###F", "2": "D###C", "3": "C###G###B", "4": "A###O###B###F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

NLP: SquareRelation {square=Square:ABCD}, CircleCenterRelation {point=O, conic=Circle[$\odot O_0$] {center=O_0, analytic=(x-x_O_0) 2 +(y-y_O_0) 2 =r_O_0 2 }}, LineContactCircleRelation {line=DF, circle=Circle[$\odot O_0$] {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)}

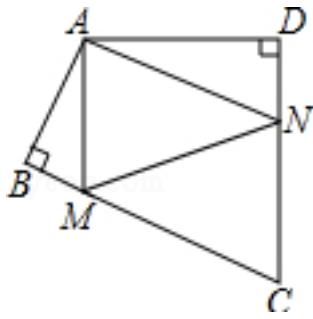
513、topic: 如图,已知AB是 $\odot O$ 的直径,C是 $\odot O$ 上任一点,连接AC,过点C作直线CD \perp AB于D,且 $AD > DB$,点E是DB上任一点(除D、B外),直线CE交 $\odot O$ 于点F,连接AF与直线CD交于点G. (1)求证: $\{AC\}^2 = AG \cdot AF$; (2)若点E是AD(点A除外)上任一点,上述结论是否成立?若成立,请画出图形给予证明;若不成立,请说明理由.



graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000060740_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "4.00,0.00", "C": "2.00,3.46", "D": "2.00,0.00", "E": "3.00,0.00", "F": "3.54,-1.87", "G": "2.00,-1.48", "O": "0.00,0.00"}, "collineations": {"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": "6.00,0.00", "B": "14.00,0.00", "C": "12.00,3.46", "D": "12.00,0.00", "E": "11.00,0.00", "F": "9.85,-4.00", "G": "12.00,-6.24", "O": "10.00,0.00", "R": "12.00,-3.46"}, "collineations": {"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##F##R"}]}]}, "appliedproblems": {}}]}

NLP: PointOnLineRelation {point=C, line=CD, isConstant=false, extension=false}, 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}, InequalityRelation {AD>BD}, 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}]

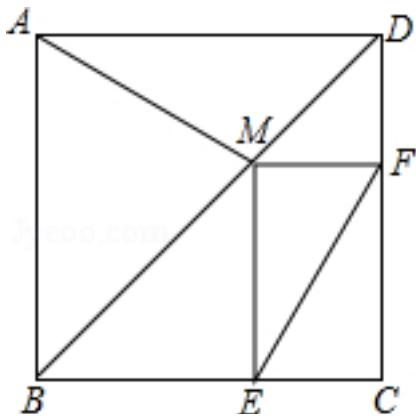
514、topic: 如图,在四边形ABCD中, $\angle BAD=120^\circ$, $\angle B=\angle D=90^\circ$,在BC,CD上分别找一点M,N,当 $\triangle AMN$ 周长最小时,试求 $\angle AMN+\angle ANM$ 的度数.



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_ΔAMN=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)}

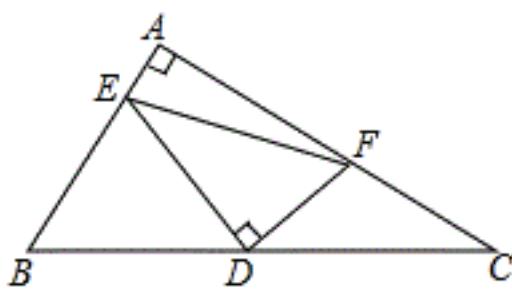
515、topic: 如图,在正方形ABCD中,点M是对角线BD上的一点,过点M作ME//CD交BC于点E,作MF//BC交CD于点F.求证:AM=EF.#%#



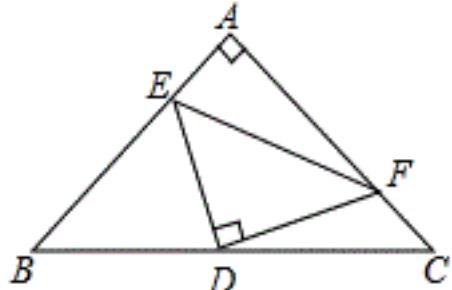
graph:
 {"stem": {"pictures": [{"picturename": "1000035175_Q_1.jpg", "coordinates": {"A": "-7.83,6.69", "B": "-7.83,1.48", "C": "-2.59,1.48", "D": "-2.62,6.69", "E": "-4.33,1.48", "F": "-2.61,4.96", "M": "-4.35,4.96"}, "collineations": {"0": "D##F##C", "1": "B##E##C", "2": "B##M##D", "3": "B##A", "4": "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)

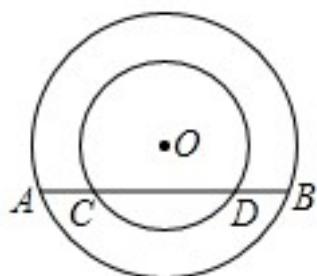


图(2)

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000062299_Q_1.jpg", "coordinates": {"A": "-11.07,4.62", "B": "-13.00,0.00", "C": "0.00,0.00", "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": []}, {"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": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"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": {}}}

NLP: RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation $\{\angle EAF = (1/2 * \pi)\}$, 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{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": []}], "appliedproblems": {}}}

ble-equals": {}, "circles": [{"center": "O", "pointincircle": "C##D"}, {"center": "O", "pointincircle": "A##B"}]}], "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}, 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": []}, "appliedproblems": {}}, "substems": []}

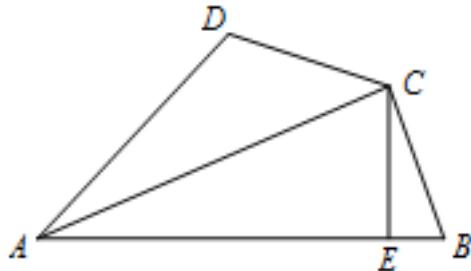
NLP: EqualityRelation{AM=v_0}, EqualityRelation{AB=10}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=false}, EqualityRelation{BC=4}, MiddlePointOfSegmentRelation{middlePoint=M, segment=AC}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AM)}

519、topic: 如图,在 $\triangle ABC$ 中,AB=AC,D是BC的中点,过A点的直线EF//BC,且AE=AF,求证:DE=DF.

graph:
 {"stem": {"pictures": [{"coordinates": {"A": "0,2", "B": "-1,0", "C": "1,0", "D": "0,0", "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"}}], "appliedproblems": {}}, "substems": []}

NLP: PointOnLineRelation{point=A, line=EF, isConstant=false, extension=false}, TriangleRelation: $\triangle ABC$, EqualityRelation{AB=AC}, MiddlePointOfSegmentRelation{middlePoint=D, segment=BC}, LineParallelRelation [iLine1=EF, iLine2=BC], EqualityRelation{AE=AF}, ProveConclusionRelation:[证明: EqualityRelation{DE=DF}]

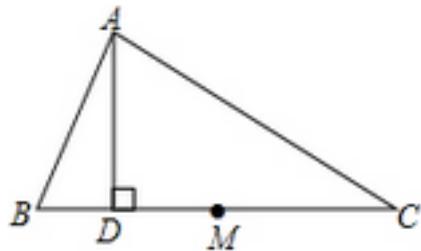
520、topic: 如图,在四边形ABCD中,AC平分 $\angle BAD$,过C作 $CE \perp AB$ 于E,并且 $AE = \frac{1}{2}(AB + AD)$,则 $\angle ABC + \angle ADC$ 等于多少?



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: $DM = \frac{1}{2}AB$.

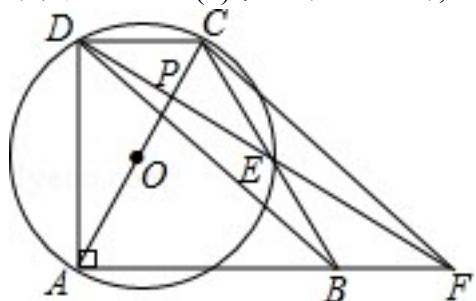


graph:

{"stem": {"pictures": [{"picturename": "1000040694_Q_1.jpg", "coordinates": {"A": "-9.03,4.35", "B": "-11.00,2.00", "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": {}, "substems": []}}

NLP: TriangleRelation: ΔABC ,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 // 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.

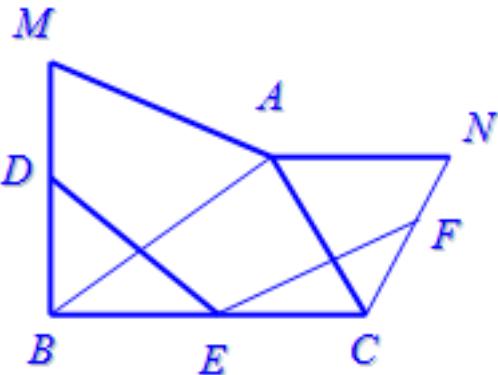


graph:

```
{"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"}]}, "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "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:ABCD randomOrder:true}, LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation { $\angle BAD = (1/2 \cdot \pi)$ }, EqualityRelation { $\angle ABE = (1/3 \cdot \pi)$ }, 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.##



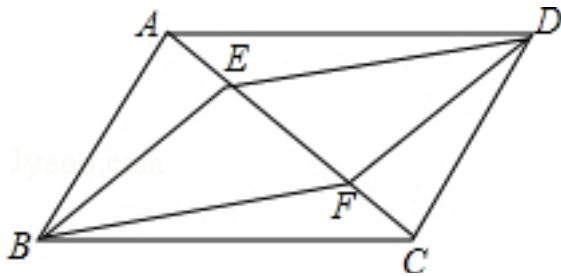
graph:

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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.##

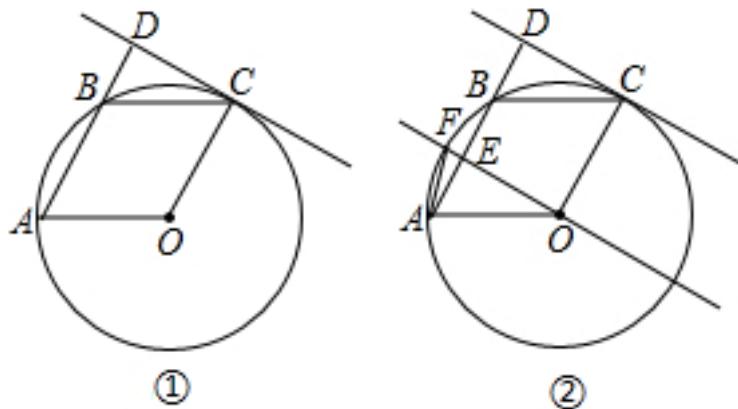


graph:

{"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.



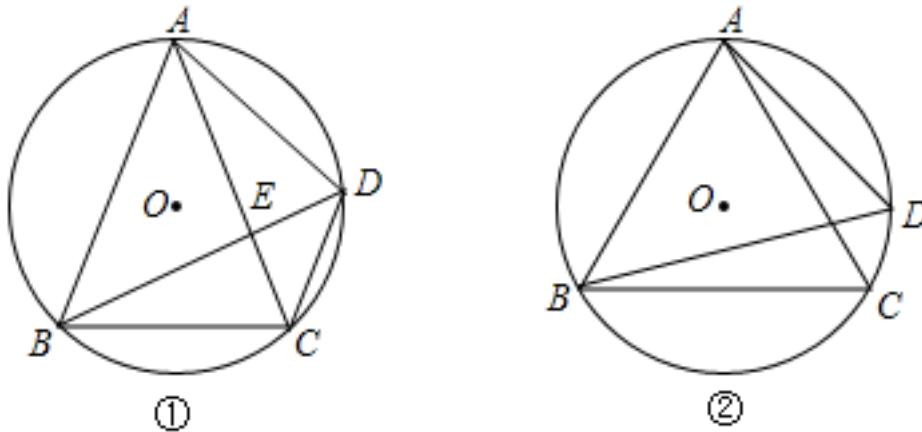
graph:

{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000080979_Q_1.jpg", "coordinates": {"A": "-9.57,-2.36", "B": "-8.00,1.45", "C": "-3.92,1.99", "D": "-7.21,3.35", "O": "-5.49,-1.82"}, "collineations": {"0": "O###A", "1": "A###B###D", "2": "C###D", "3": "O###C", "4": "B###C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###C"}]}], "appliedproblems": {}, "substemid": "2", "questionrelies": "1", "pictures": [{"picturename": "1000080979_Q_2.jpg", "coordinates": {"E": "-8.79,-0.45", "F": "-9.30,-0.24"}, "collineations": {"0": "A###F###B###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=EO, isConstant=false, extension=false},LineCrossRelation[crossPoint=Optional.of(E), iLine1=AB, iLine2=EO],LineParallelRelation[iLine1=CD, iLine2=EO],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BDC$)},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BAF$)}

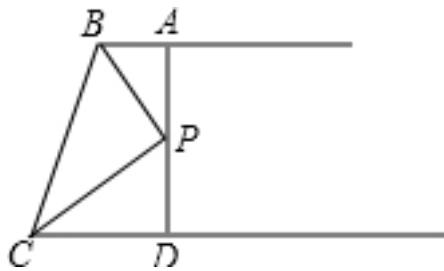
526、topic: 如图, $\triangle ABC$ 内接于 $\odot O$, $AB=AC$, D 在劣弧 AC 上, $\angle ABD=45^\circ$. #%(1)如图①, BD 交 AC 于点 E , 连接 AD 、 CD , 若 $AB=BD$, 求证: $CD=\sqrt{2}DE$. #%(2)如图②, 连接 AD 、 CD , 已知 $\tan \angle CAD=\frac{1}{5}$, 求 $\sin \angle BDC$. #%#



graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000080943_Q_1.jpg", "coordinates": {"A": "-10.40, -0.58", "B": "-12.05, -5.48", "C": "-8.12, -5.21", "D": "-7.43, -3.18", "E": "-8.78, -3.86", "O": "-10.21, -3.37"}, "collineations": {"0": "B##A", "1": "A##E##C", "2": "A##D", "3": "B##E##D", "4": "B##C", "5": "D##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000080943_Q_3.jpg", "coordinates": {"A": "7.38, -0.50", "B": "4.47, -5.12", "C": "10.51, -4.98", "D": "10.73, -3.71", "G": "7.46, -3.78"}, "collineations": {"0": "B##A", "1": "A##C", "2": "A##D", "3": "B##D", "4": "B##C", "5": "D##C"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##B##C##D"}]}]}, {"appliedproblems": {}}, {"substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000080943_Q_3.jpg", "coordinates": {"A": "7.38, -0.50", "B": "4.47, -5.12", "C": "10.51, -4.98", "D": "10.73, -3.71", "G": "7.46, -3.78"}, "collineations": {"0": "B##A", "1": "A##C", "2": "A##D", "3": "B##D", "4": "B##C", "5": "D##C"}, "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}, 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{ $\tan(\angle DAE)=\frac{1}{5}$ }, 求值(大小): (ExpressRelation:[key:] $\sin(\angle CDE)$), ProveConclusionRelation:[证明: EqualityRelation{CD=($2^{(1/2)}\times DE$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\sin(\angle CDE)$)}

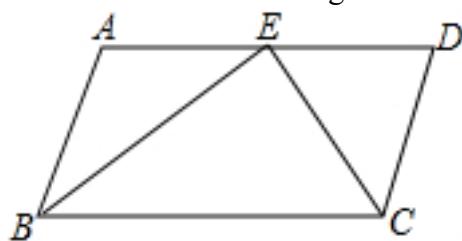
527、topic: 如图, 已知 $AB \parallel CD$, BP 和 CP 分别平分 $\angle ABC$ 和 $\angle DCB$, AD 过点 P 与 AB 垂直, 求证: P 是 AD 的中点. #%#



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}]

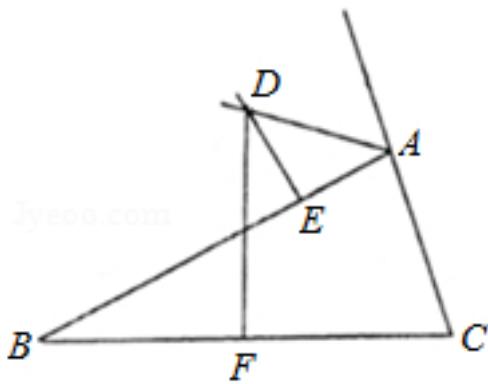
528、topic: 如图,AB//CD,BE,CE分别是 $\angle ABC$ 和 $\angle BCD$ 的平分线,点E在AD上,求证: $BC=AB+CD$.%#



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\$.

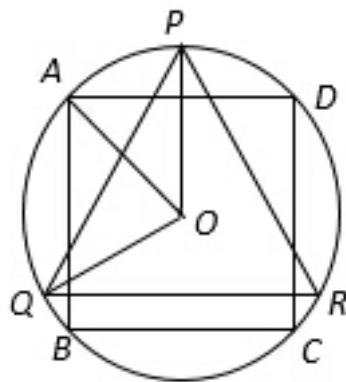


graph:

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NLP: TriangleRelation: ΔBAC , TriangleRelation: ΔABC , 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 $\angle AOQ$ 的度数.



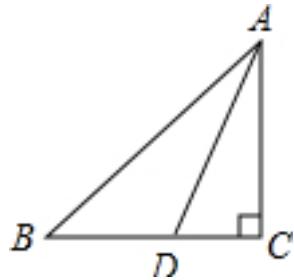
graph:

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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= $\angle AOQ$ }, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key]: $\angle AOQ$)}{}

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

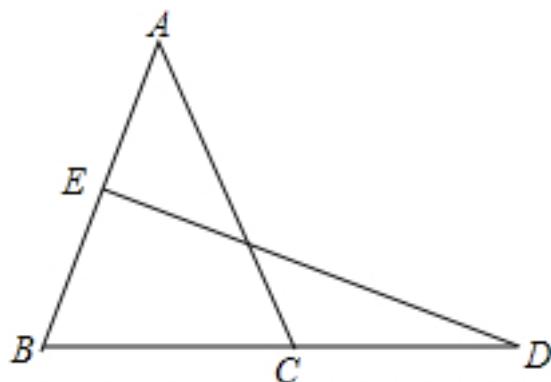
证: $AB = AC + CD$. #%%#



graph:
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NLP: TriangleRelation: ΔABC , EqualityRelation { $\angle ACD = (1/2 * \pi)$ }, EqualityRelation { $AC = BC$ }, TriangleRelation: ΔABC , AngleBisectorRelation {line = AD, angle = $\angle BAC$, angle1 = $\angle CAD$, angle2 = $\angle BAD$ }, ProveConclusionRelation: [证明:
 EqualityRelation { $AB = AC + CD$ }]

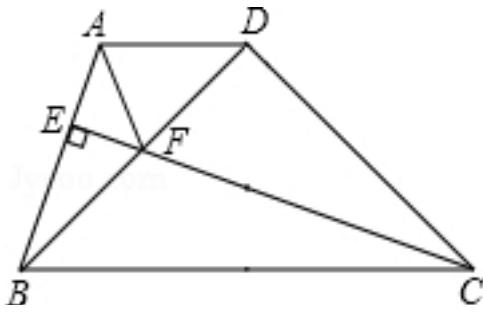
532、topic: 已知:如图,在 ΔABC 中, $AB=AC=6$, $BC=4$, AB 的垂直平分线交 AB 于点 E ,交 BC 的延长线于点 D .#%#(1)求 $\angle D$ 的正弦值;#%#(2)求点 C 到直线 DE 的距离.#%#



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

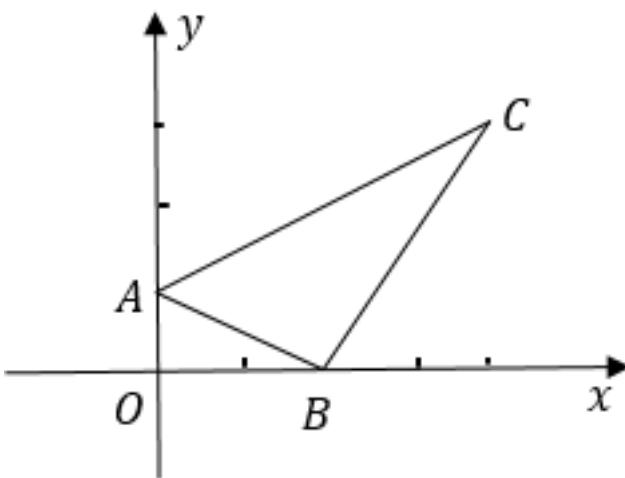
NLP: MiddlePerpendicularRelation [iLine1 = DE, iLine2 = AB, crossPoint = Optional.of(E)], TriangleRelation: ΔABC , MultiEqualityRelation [multiExpressCompare = $AB = AC = 6$, originExpressRelationList = [], keyWord = null, result = null], EqualityRelation { $BC = 4$ }, LineCrossRelation [crossPoint = 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 ΔBDC 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": {}, "subsystems": []}, "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.

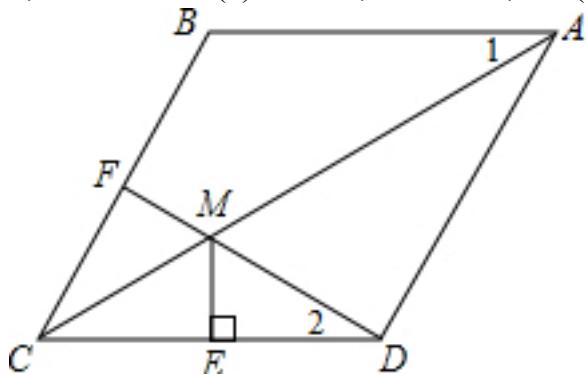


graph:
 {"stem": {"pictures": [{"picturename": "1000020150_Q_1.jpg", "coordinates": {"A": "0.00,1.00", "B": "2.00,0.00", "C": "4.00,3.00", "O": "0.00,0.00"}, "collineations": {"0": "A##C", "1": "A##B", "2": "B##C", "3": "O##A", "4": "O##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}, "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.%(



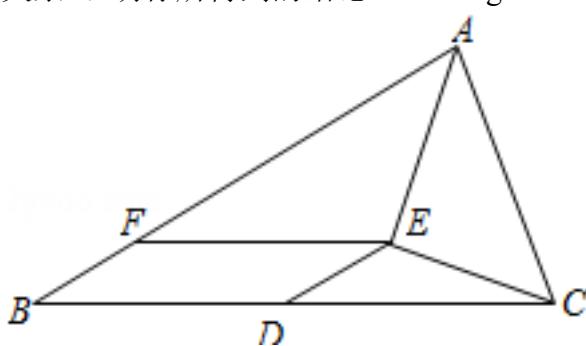
graph:

{"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": "\u00b41=\u00b4BAC", "1": "\u00b42=\u00b4CDF"}, "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": {}, "substems": []}}

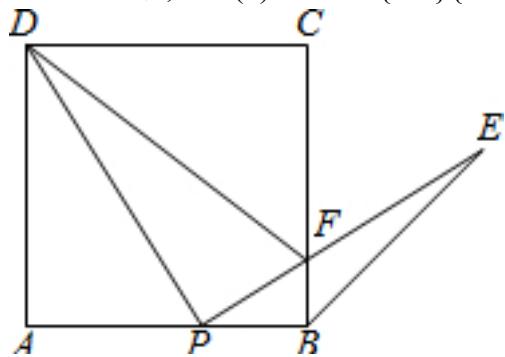
NLP:

TriangleRelation: ΔABC , MiddlePointOfSegmentRelation {middlePoint=D, segment=BC}, TriangleRelation: ΔABC , PositionOfPoint2RegionRelation {point=E, region=EnclosedRegionRelation {name=ABC, closedShape= ΔABC }, 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, $\Delta PFD \sim \Delta BFP$? 并说明理由. #%#



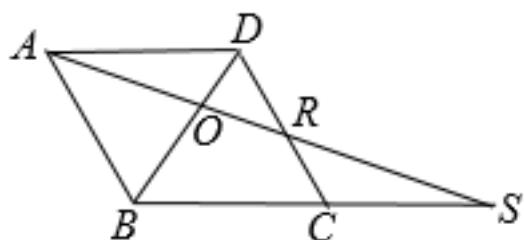
graph:

{"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= ΔPFD , triangleB= ΔBFP }, 求值(大小): (ExpressRelation:[key:](AP/(AB))), ProveConclusionRelation:[证明: EqualityRelation { $\angle ADP = \angle BPE$ }], SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:](AP/(AB)))}, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:](AP/(AB)))}}

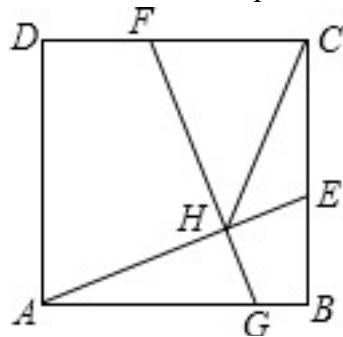
538、topic: 已知如图:在菱形ABCD中,O是对角线BD上的一点.连接AO并延长,与DC交于点R,与BC的延长线交于点S.若AD=4, $\angle DCB=60^\circ$, BS=10. #%(1)求AS的长度; #%(2)求OR的长度. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000040744_Q_1.jpg", "coordinates": {"A": "-1.00,1.73", "B": "0.00,0.0", "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 {∠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)}

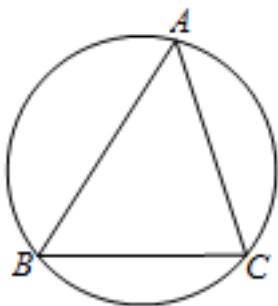
539、topic: 如图,正方形\$ABCD\$中,E、F分别为边BC、DC上的点,且\$BE=FD\$,连接AE,过点F作\$FH\perp AE\$,交AB于点G,连接CH.%(1)若\$DF=2\$, \$\tan \angle EAB = \frac{1}{3}\$,求\$AE\$的值.%(2)求证: \$EH + FH = \sqrt{2} CH\$.%(#



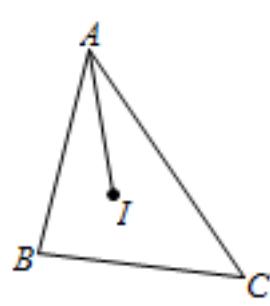
graph:
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NLP: SquareRelation {square=Square:ABCD}, PointOnLineRelation {point=E, line=BC, isConstant=false, extension=false}, PointOnLineRelation {point=F, line=DC, isConstant=false, extension=false}, EqualityRelation {BE=DF}, SegmentRelation:AE, LinePerpRelation {line1=FH, line2=AE, crossPoint=H}, LineCrossRelation [crossPoint=Optional.of(G), iLine1=FH, iLine2=AB], SegmentRelation:CH, EqualityRelation {DF=2}, EqualityRelation {tan(∠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△ABC外接圆的直径;%(2)如图(2),点\$I\$为△ABC的内心,若BA=BC,求\$AI\$的长.%(#



(1)

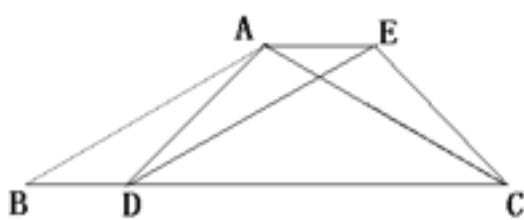


(2)

graph:
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NLP: AcuteTriangleRelation:AcuteTriangle: $\triangle ABC$, EqualityRelation $\{BC=5\}$, EqualityRelation $\{\sin(\angle BAC)=(4/5)\}$, InscribedShapeOfCircleRelation $\{\text{closedShape}=\triangle ABC, \text{circle}=\text{Circle}[\odot O_0]\}$ {center= O_0 , analytic= $(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2$ }, 圆的直径: CircleRelation $\{\text{circle}=\text{Circle}[\odot O_0]\}$ {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.



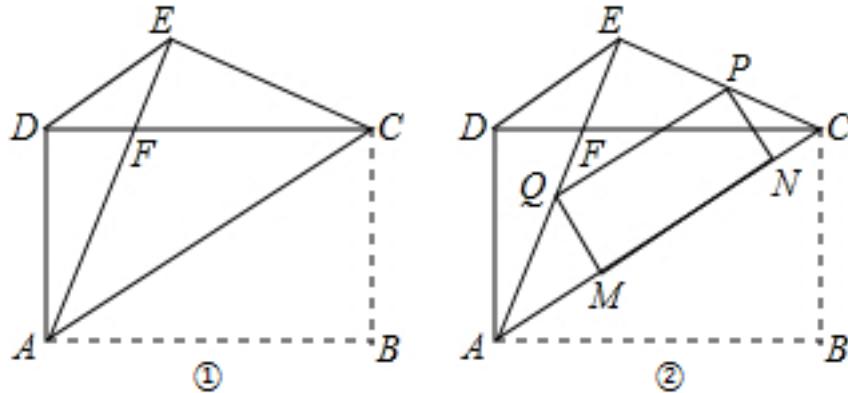
第 18 题

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": {}}, "subsystems": []}

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{ $\angle ABD=(1/6\pi)$ },EqualityRelation{ $\angle ADC=(1/4\pi)$ },EqualityRelation{BD=10},求值(大小):
 (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle BAD$, triangleB= $\triangle AEC$ }],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_ABDE)}

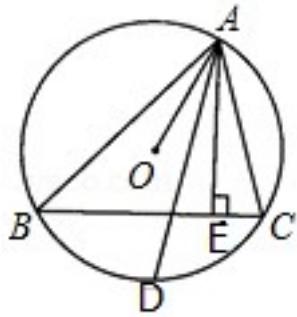
542、topic: 如图①,矩形ABCD中,AB=4,AD=3,把矩形沿直线AC折叠,使点B落在点E处,AE交CD于点F,连接DE.①求证: $\triangle DEC \cong \triangle EDA$;②求DF的值;③如图②,若P为线段EC上一动点,过点P作 $\triangle AEC$ 的内接矩形,使其顶点Q落在线段AE上,顶点M、N落在线段AC上,当线段PE的长为何值时,矩形PQMN的面积最大?并求出其最大值. #%



graph:
 {"stem": {"pictures": [{"picturename": "1000050484_Q_1.jpg", "coordinates": {"A": "-9.00,6.00", "B": "-5.00,6.00", "C": "-5.00,9.00", "D": "-9.00,9.00", "E": "-7.88,9.84", "F": "-8.13,9.00"}, "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": "-6.51,9.42", "Q": "-8.42,8.00", "M": "-7.68,7.00", "N": "-5.77,8.42"}, "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[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= $\triangle DEC$, triangleB= $\triangle EDA$ }],SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]DF)},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]EP)}

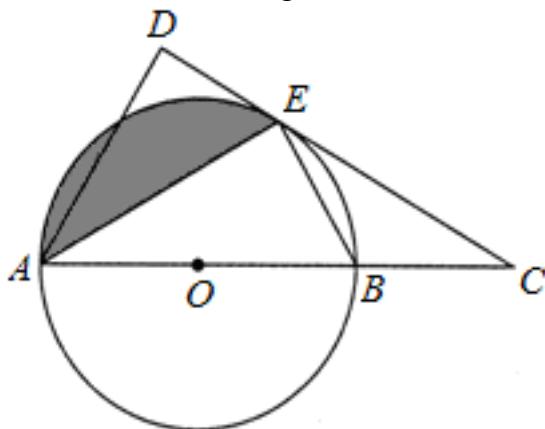
543、topic: 已知:如图,\$\triangle ABC\$内接于\$\odot O\$,D为\$\widehat{BC}\$的中点,\$AE \perp BC\$于E.求证:AD平分\$\angle OAE\$.



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 \cap BC, LinePerpRelation{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.

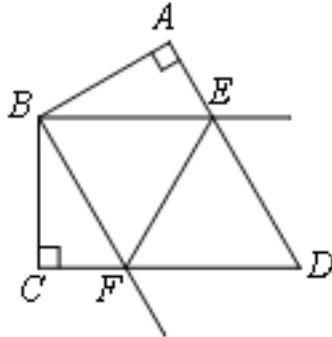


graph:
 {"stem": {"pictures": [{"picturename": "1000060829_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "6.00,0.00", "D": "-0.75,3.90", "O": "0.00,0.00", "E": "1.50,2.60", "F": "-1.50,2.60"}, "collineations": {"0": "B###C###A###O", "1": "C###D###E", "2": "A###F###D", "3": "E###A", "4": "E###A", "5": "E###O"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A###B###E###F"}]}, "appliedproblems": {}, "substems": []}]}

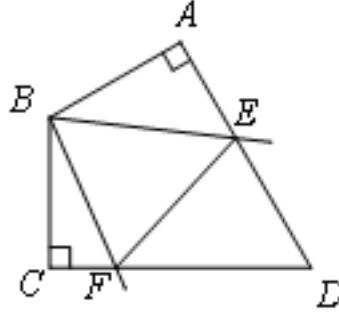
NLP: DiameterRelation{diameter=AB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, PointOnLineRelation{point=C, line=AB, isConstant=false, extension=true}, LineContactCircleRelation{line=CD, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, contactPoint=Optional.of(E), outpoint=Optional.absent()}, LinePerpRelation{line1=AD, line2=CD, crossPoint=D}, EqualityRelation{AB=3}, EqualityRelation{ $\angle ABE=(1/3)\pi$ }, EqualityRelation{AD=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明:]

AngleBisectorRelation{line=AE,angle= \angle FAO, angle1= \angle EAF, angle2= \angle EOA}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AD)}

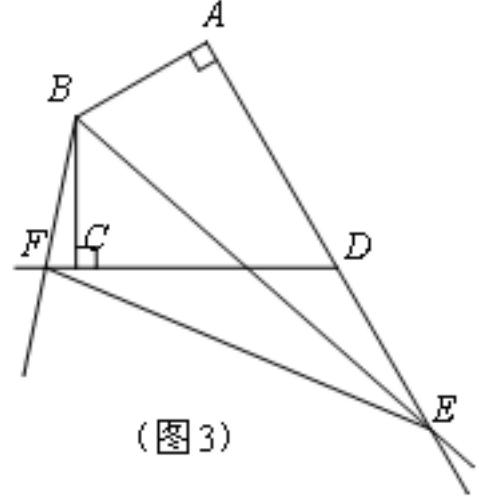
545、topic: 已知四边形ABCD中, $BA \perp AD$ 于A, $BC \perp CD$ 于C, $BA=BC$, $\angle ABC=120^\circ$, $\angle EBF=60^\circ$. 现将 $\angle EBF$ 绕B点旋转, 它的两边分别交直线AD, CD于E, F. #%(1)当 $\angle EBF$ 绕B点旋转到 $AE=CF$ 时(如图1), 求证: $\angle ABE=\angle CBF=30^\circ$; #%(2)当 $\angle EBF$ 绕B点旋转到 $AE \neq CF$ 时, #%(1)在图2的情况下, 请探究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)



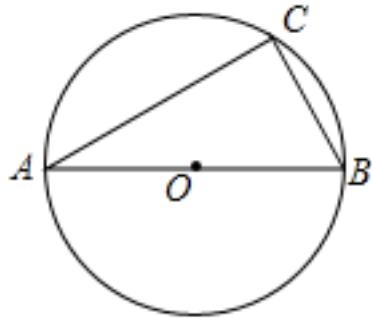
(图3)

graph:
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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{ $\angle ABC=(2/3*\pi)$ }, EqualityRelation{ $\angle EBF=(1/3*\pi)$ }, 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= $\angle ABE=\angle CBF=(1/6*\pi)$, originExpressRelationList=[], keyWord=null, result=null]], SolutionConclusionRelation{relation=求值(大小): (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=2cm, $\angle ABC=60^\circ$. #%(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

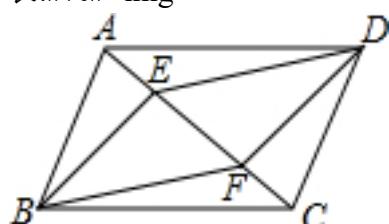
度从A点出发沿着AB方向运动,同时动点F以1cm/s的速度从B点出发沿BC方向运动,设运动时间为t(s)
 $(0 < t < 2)$,连接EF,当t为何值时, $\triangle BEF$ 为直角三角形?#%#



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"}, "collineations": {"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"}, "collineations": {"0": "D##C", "1": "A##D##O##B", "2": "C##O"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substemid": "3", "questionrelies": "", "pictures": [{"picturename": "1000060821_Q_1.jpg", "coordinates": {"E": "0.00,0.00", "F": "1.50,0.87"}, "collineations": {"0": "F##E", "1": "A##E##O##B", "2": "C##F##B"}, "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}, 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}, EqualityRelation{BC=2}, EqualityRelation{ $\angle CBO=(1/3\pi)$ }, 圆的直径: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, EqualityRelation{BD=v_0}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, SegmentRelation:CD, 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)}, 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"}}, "appliedproblems": {}}}

lineations": {"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.#%#

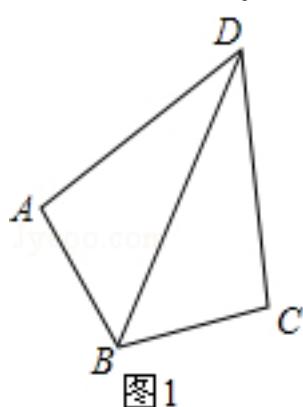


图1

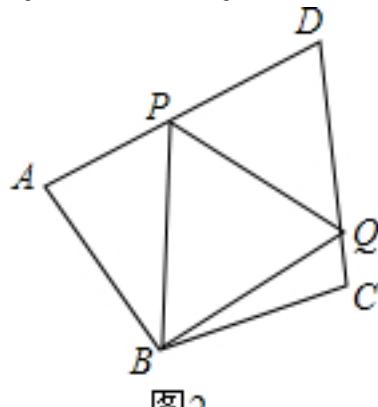


图2

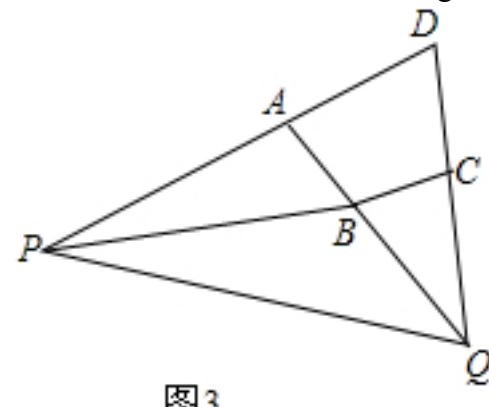


图3

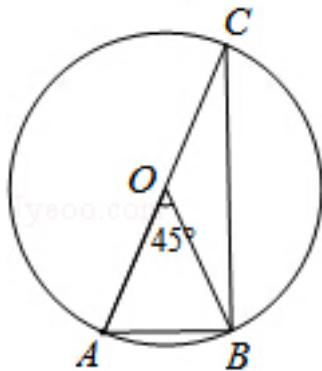
graph:

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NLP: 已知条件 QuadrilateralRelation {quadrilateral=ABCD}, EqualityRelation { $\angle ABC + \angle ADC = (Pi)$ }, EqualityRelation { $\angle BAD + \angle BCD = (Pi)$ }, EqualityRelation { $AB = BC$ }, EqualityRelation { $CD = v_0$ }, (ExpressRelation:[key:1]), SegmentRelation:BD, EqualityRelation { $\angle BAD = (1/2 * Pi)$ }, 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{ $[\angle PBQ, \angle ADC]$ }]

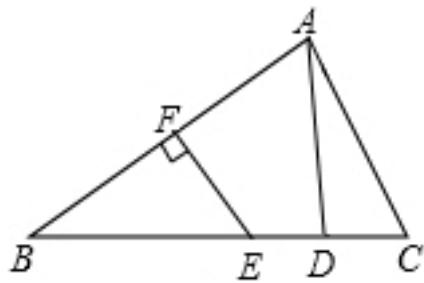
549、topic: 如图,在半径为1的 $\odot O$ 中, $\angle AOB = 45^\circ$, 求 $\sin C$ 的值.



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{ $\angle AOB = (1/4\pi)$ }, 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: $BE = AC$. #

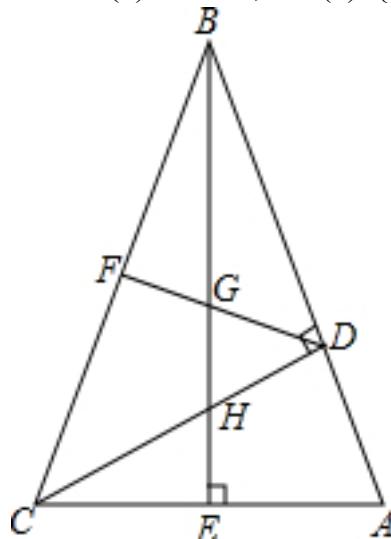


graph:
 {"stem": {"pictures": [{"picturename": "1000072737_Q_1.jpg", "coordinates": {"A": "-7.67, 8.60", "B": "-14.23, 4.00", "C": "-6.00, 4.00", "D": "-7.67, 4.00", "E": "-9.34, 4.00", "F": "-10.95, 6.30"}, "collineations": {"0": "A##C", "1": "A##D", "2": "E##F", "3": "A##F##B", "4": "C##D##E##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: MiddlePerpendicularRelation [iLine1=EF, iLine2=AB, crossPoint=Optional.of(F)], TriangleRelation: $\triangle ABC$, 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) $\{(BG)^2\}-\{(GE)^2\}=\{(EA)^2\}$.%#

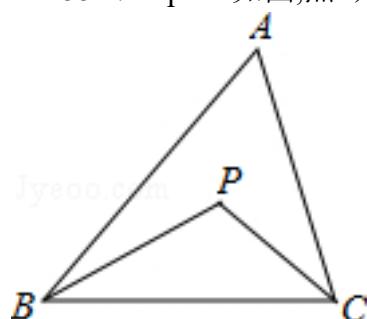


graph:

{"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##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 $\{\text{line1}=CD$,
 $\text{line2}=AB$, $\text{crossPoint}=D\}$, LinePerpRelation $\{\text{line1}=BE$, $\text{line2}=AC$,
 $\text{crossPoint}=E\}$, MiddlePointOfSegmentRelation $\{\text{middlePoint}=F$, $\text{segment}=BC\}$, LineCrossRelation
 $[\text{crossPoint}=\text{Optional.of}(G)$, $\text{iLine1}=BE$, $\text{iLine2}=DF\}$, LineCrossRelation $[\text{crossPoint}=\text{Optional.of}(H)$,
 $\text{iLine1}=BE$, $\text{iLine2}=DC\}$, EqualityRelation $\{\angle DBG=\angle FBG\}$, ProveConclusionRelation:[证明:
 $\text{EqualityRelation}\{BH=AC\}$], ProveConclusionRelation:[证明:
 $\text{EqualityRelation}\{(BG)^2-(EG)^2=((AE)^2\}$]]

552、topic: 如图,点P是 $\triangle ABC$ 内一点.试说明 $AB+AC>PB+PC$.%#



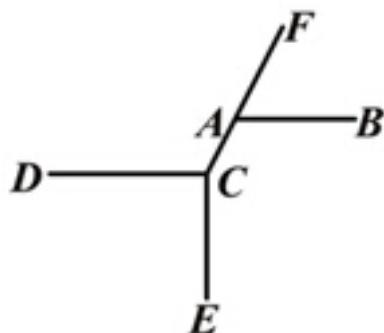
graph:

{"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: $\triangle ABC$, PositionOfPoint2RegionRelation $\{\text{point}=P$,
 $\text{region}=\text{EnclosedRegion}\{\text{name}=ABC}$, $\text{closedShape}=\triangle ABC\}$,

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: $CD \parallel AB$.

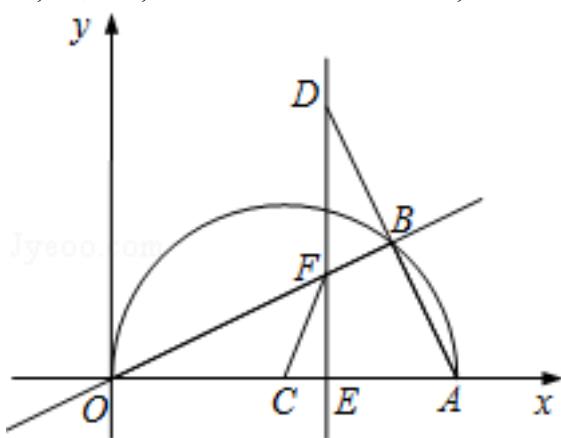


graph:

```
{"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":{},"substeps":[]}}
```

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.

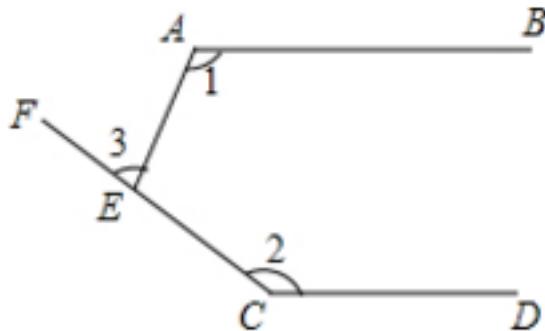


graph:

bstemid": "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"}, "collineations": {"0": "D###F##E", "1": "O##F##B", "2": "O##E##C##A", "3": "A##B##D"}, "variable>equals": {}, "circles": []}, "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:] \cap 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:] \cap AB)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]EF)}, SolutionConclusionRelation{relation=坐标PointRelation:E}

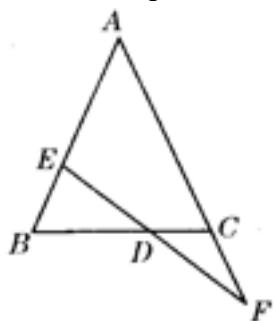
555、topic: 如图,AB//CD, $\angle 1=115^\circ$, $\angle 2=140^\circ$,求 $\angle 3$ 的度数.##



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": " $\angle 1 = \angle BAE", "1": " $\angle 2 = \angle ECD", "2": " $\angle 3 = \angle 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:] $\angle AEF$)}

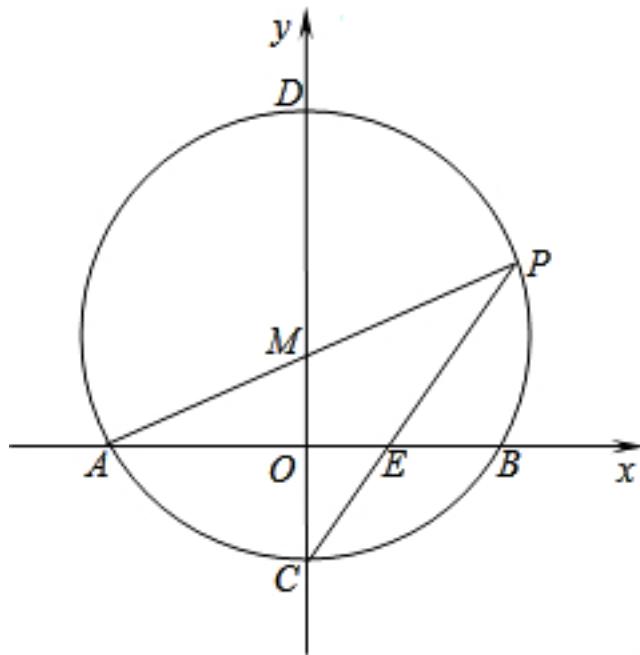
556、topic: 如图,已知 $\angle B = \angle ACB$, $DE = DF$,求证:BE=CF.##



graph:
 {"stem": {"pictures": [{"picturename": "1000040001_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-10.00,2.00", "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: $BE = 2OE$.#%#

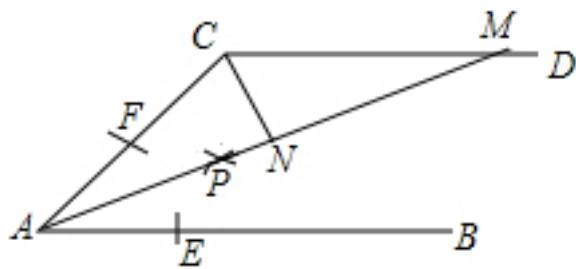


graph:
 {"stem": {"pictures": [{"picturename": "1000052507_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "0.00,-1.73", "D": "0.00,5.19", "E": "1.00,0.00", "P": "3.00,3.46", "O": "0.00,0.00", "M": "0.00,1.73"}, "collineations": {"0": "A###O##E##B", "1": "D##M##O##C", "2": "A##M##P", "3": "P##E##C"}, "variable>equals": {}, "circles": [{"center": "M", "pointincircle": "A##C##B##P##D"}]}, "appliedproblems": {}, "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 b: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.
 M.%(1)若 $\angle ACD=114^\circ$,求 $\angle MAB$ 的度数;%(2)若 $CN \perp AM$,垂足为N,求证: $\triangle CAN \cong \triangle CMN$.#%#

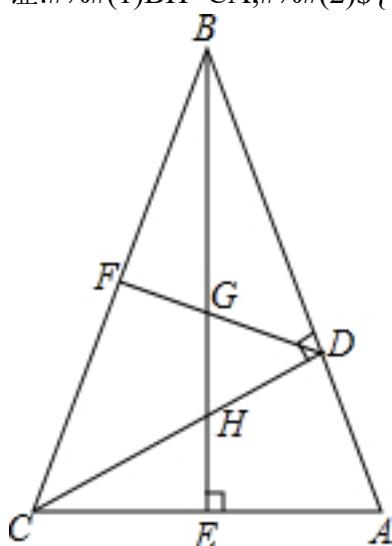


graph:
 {"stem": {"pictures": [{"picturename": "1000072666_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "5.00,0.00", "C": "1.34,3.00", "D": "6.00,3.00", "E": "1.00,0.00", "F": "0.41,0.91", "M": "4.63,3.00", "N": "2.31,1.50", "P": "1.63,1.06"}, "collineations": {"0": "B###E##A", "1": "A##F##C", "2": "C##M##D", "3": "C##N", "4": "A##P##M"}, "variable>equals": {}, "circles": [{"center": "O_0", "radius": "M_1N_1"}, {"center": "O_1", "radius": "C_1M_1"}], "appliedproblems": {}, "subsystems": []}}

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": "-9.42,3.0", "C": "0.0,0.0", "D": "-4.0,-1.32", "E": "-7.25,-1.32", "F": "-6.5,-1.32", "G": "-6.5,-0.66", "H": "-5.5,-0.66", "I": "-5.5,-1.32"}], "appliedproblems": {}, "subsystems": []}}

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: ΔABC , 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 { $\angle DBG = \angle FBC$ }, ProveConclusionRelation:[证明: EqualityRelation {BH=AC}], ProveConclusionRelation:[证明: EqualityRelation {((BG)^2) - ((EG)^2) = ((AE)^2)}]

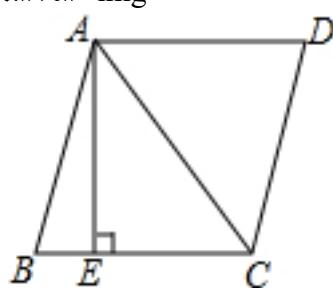
560、topic: 已知,线段\$AB=10cm\$,直线AB上有一点C,且\$BC=4cm\$,M是线段AC的中点,求线段AM的长.



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

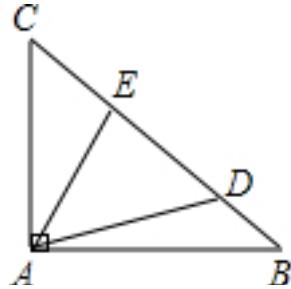
561、topic: 如图,在菱形ABCD中,AB=5,对角线AC=6.若过点A作AE \perp BC,垂足为点E,求AE的长.%#



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

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)}

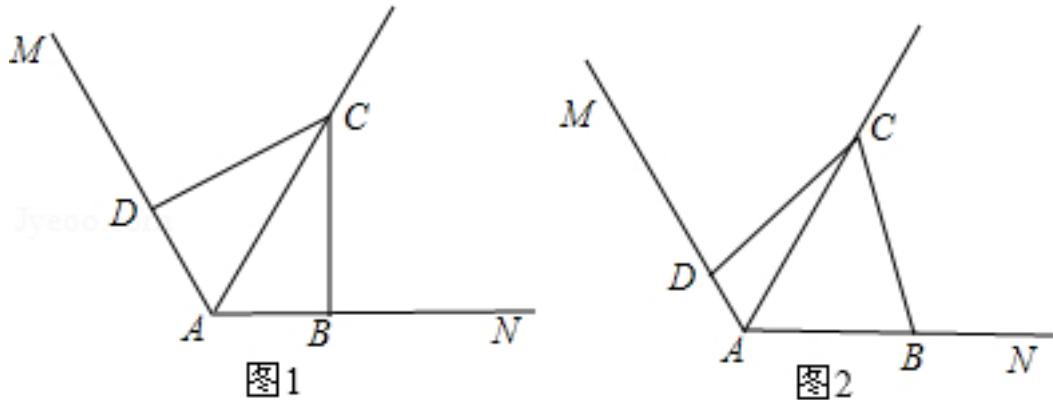
562、topic: 如图,在Rt $\triangle ABC$ 中,已知 $\angle BAC=90^\circ$, $AC=AB$, $\angle DAE=45^\circ$,且 $BD=3$, $CE=4$,求 DE 的长.#%#



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

NLP:
 EqualityRelation{DE=v_0}, RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(A)], EqualityRelation{ $\angle BAC=(1/2*\pi)$ }, EqualityRelation{AC=AB}, EqualityRelation{ $\angle DAE=(1/4*\pi)$ }, 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.#%#

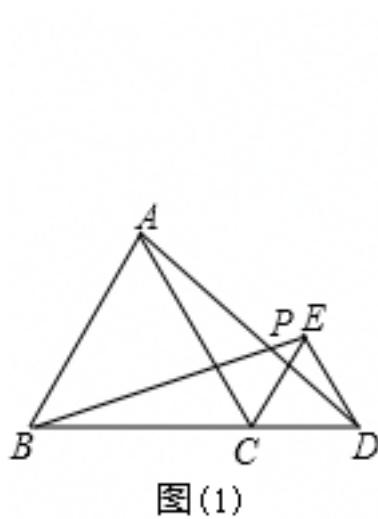


graph:
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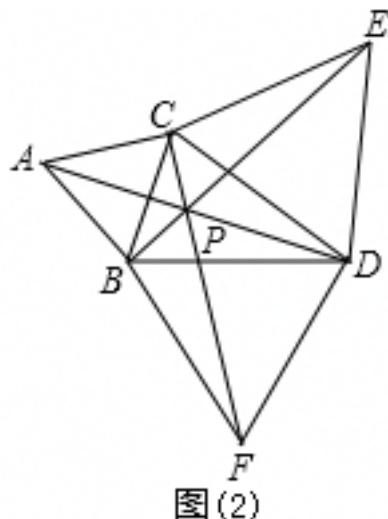
oblems":{}]}]

NLP: EqualityRelation{ $\angle MAN = (2/3 * \pi)$ }, AngleBisectorRelation{line=AC, angle= $\angle MAN$, angle1= $\angle CAM$, angle2= $\angle CAN$ }, 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);#%#①AD=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)

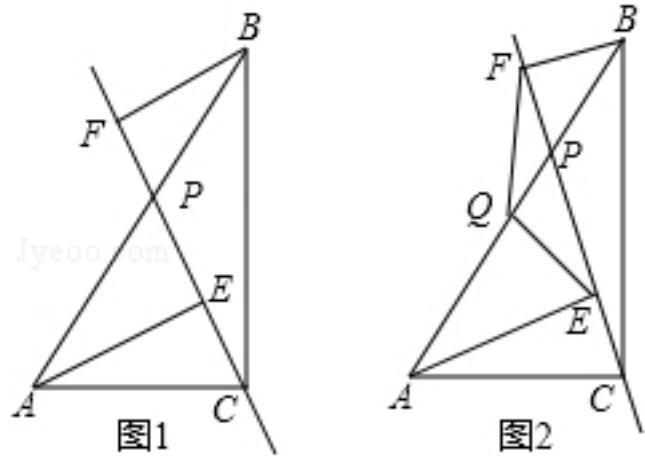
graph:

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

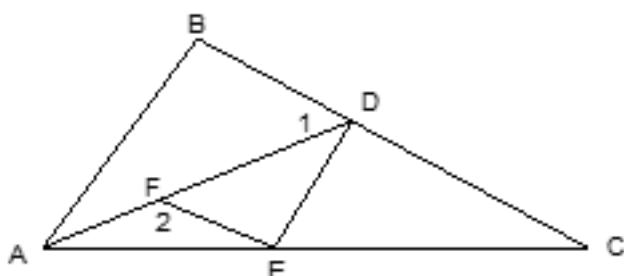


graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000031963_Q_1.jpg", "coordinates": {"A": "-13.00,3.00", "B": "-10.00,8.00", "C": "-10.00,3.00", "E": "-10.79,4.32", "F": "-12.21,6.68", "P": "-11.50,5.50"}, "collineations": {"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": "", "pictures": [{"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.

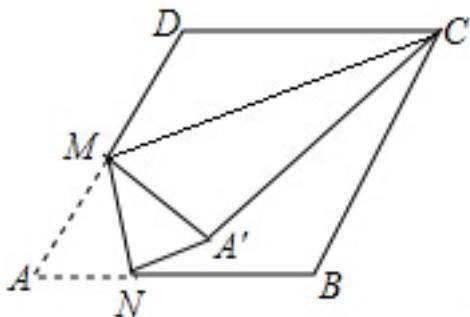


graph:

{"stem": {"pictures": [{"picturename": "1000035801_Q_1.jpg", "coordinates": {"A": "-4.29, -1.64", "B": "-2.41, 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": "\u00b21=\u00b2BDA", "1": "\u00b22=\u00b2AFE"}, "circles": [], "appliedproblems": {}, "substems": []}]}}

NLP: EqualityRelation{\u00b2BDF+\u00b2AFE=(Pi)}, EqualityRelation{\u00b2ABD=\u00b2DEF}, EqualityRelation{\u00b2BAE=(11/36*Pi)}, 求角的大小: AngleRelation{angle=\u00b2CED}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] \u00b2CED)}

567、topic: 如图,在边长为2的菱形ABCD中,\u00b2A=60\u00b0,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.#%#

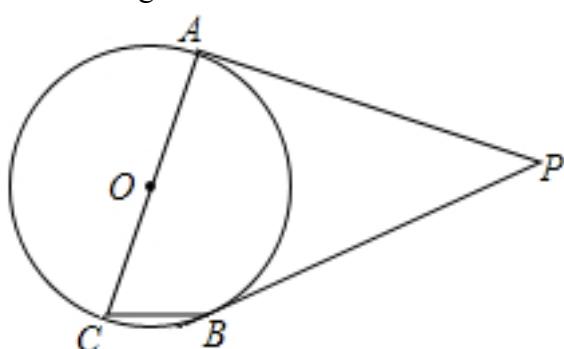


graph:

{"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{\u00b2MAN=(1/3*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])}

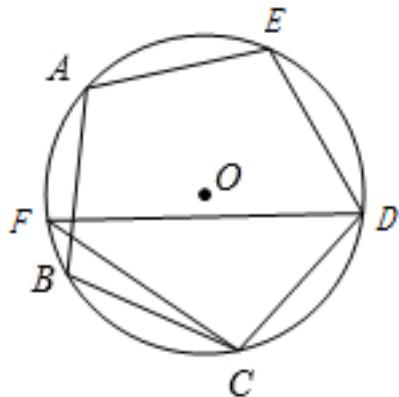
568、topic: 如图,PA、PB是\odot O的切线,点A、B为切点,AC是\odot O的直径,\u00b2ACB=70\u00b0,求\u00b2P的度数.#%#



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:] $\angle APB$)}

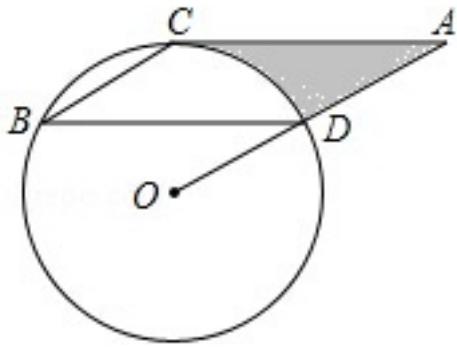
569、topic: 如图,正五边形ABCDE内接于 \odot O,点F在 \widehat{AB} 上,求 $\angle CFD$ 的度数.#%#



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##F##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:] $\angle CFD$)}

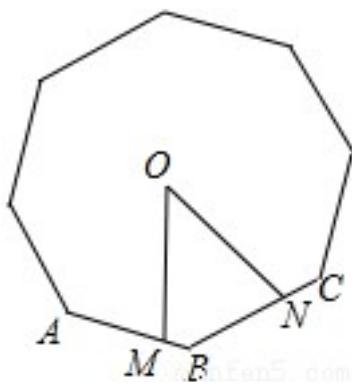
570、topic: 如图,点B、C、D都在 $\odot O$ 上,过点C作 $CA \parallel BD$ 交OD的延长线于点A,连接BC, $\angle B = \angle A = 30^\circ$, $BD = 2\sqrt{3}$. (1)求证:AC是 $\odot O$ 的切线; (2)求由线段AC、AD与弧CD所围成的阴影部分的周长.(结果保留 π)



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=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=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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, contactPoint=Optional.of(C), outpoint=Optional.of(A)}]

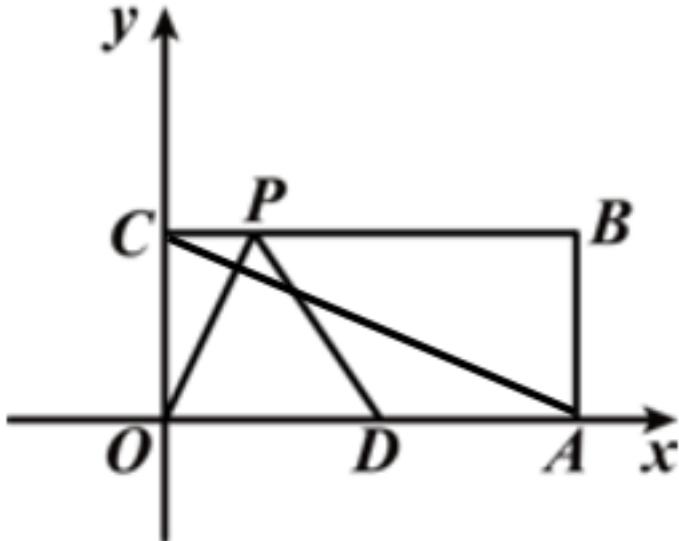
571、topic: 如图,点M、N分别是正八边形相邻的边AB、BC上的点,切\$ AM=BN \$,点O是正八边形的中心,求\$ \angle MON \$的度数.



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": "10.00,4.00", "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: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}

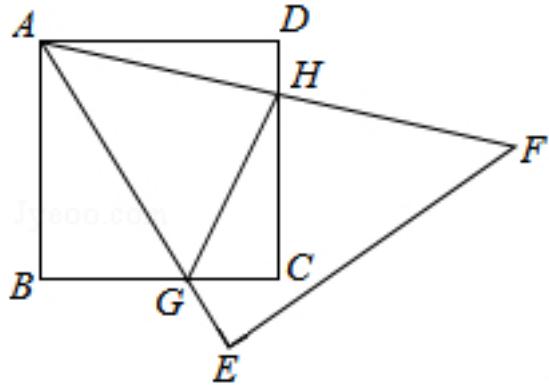
573、topic: 已知:如图,D是\$\triangle ABC\$的外角平分线CD与BA延长线的交点.求证:\$\angle ECD=90^\circ+\frac{1}{2}(\angle B-\angle CAD)\$

graph:
 {"stem": {"pictures": [{"picturename": "1000082702_Q_1.jpg", "coordinates": {"A": "-3.86,1.85", "B": "-5.48,0.64", "C": "-3.31,0.65", "D": "-1.31,3.77", "E": "0.16,0.66"}, "collineations": {"0": "B##A##D", "1": "B##C##E"}}], "appliedproblems": {}, "substems": []}}

E","2":"D###C","3":"A###C"},"variable>equals":{},"circles":[]],"appliedproblems":{},"subsystems":[]}]

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)}]

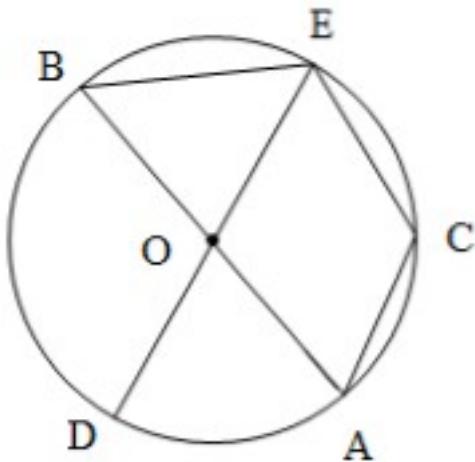
574、topic: 如图,已知正方形ABCD和等腰直角三角形△AEF,∠E=90°,AE和BC交于点G,AF和CD交于点H,正方形ABCD的面积为\$1\{cm^2\}\$,求△CGH的周长.#%#



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": {}, "subsystems": []}]}

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//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###C", "1": "A###D", "2": "B###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}]}

A","1":"O###D###E","2":"A###C","3":"E###C"},"variable-equals":{},"circles": [{"center":"O","pointincircle": "A###B###C###D###E"}]}],"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}}, DiameterRelation{diameter=DE, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, LineParallelRelation [iLine1=AC, iLine2=DE], LineCrossCircleRelation{line=AC, circle= $\odot O$, 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": {}, "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)}

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.

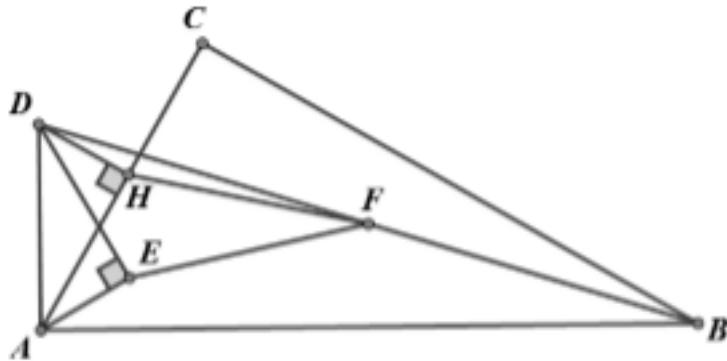


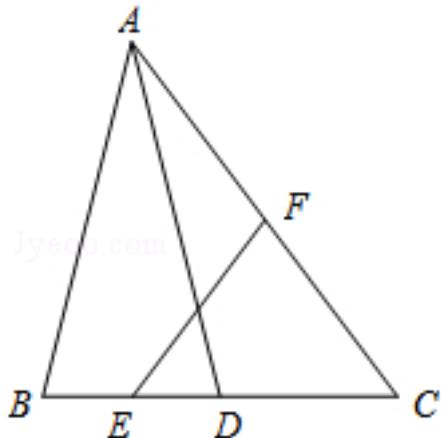
图 1

graph:
 {"stem": {"pictures": [{"picturename": "1000038411_Q_1.jpg", "coordinates": {"A": "-8.68,2.03", "B": "0.74,1.3", "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": {}, "subsystems": [{"subsystem": "2", "questionreplies": "", "pictures": [{"picturename": "1000038411_Q_1.jpg", "coordinates": {}}, {"collineation": "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:CEF]

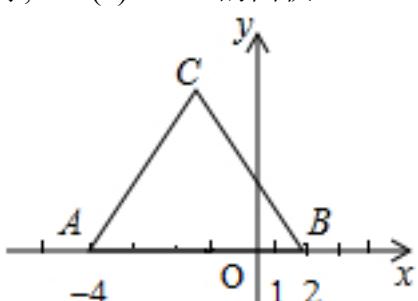
578、topic: 如图,已知在 $\triangle ABC$ 中,点D是边BC的中点,点E、F分别是BD、AC的中点,且 $AB=AD, AC=10, \sin C = \frac{4}{5}$ (1)求线段EF的长;(2)求 $\angle B$ 的余弦值.



graph:
 {"stem": {"pictures": [{"picturename": "1000039075_Q_1.jpg", "coordinates": {"A": "0.00,8.00", "B": "-2.00,0.0", "C": "6.00,0.00", "D": "2.00,0.00", "E": "0.00,0.00", "F": "3.00,4.00"}, "collinearities": {"0": "E##B##D##C", "1": "A##F##C", "2": "D##A", "3": "E##F", "4": "A##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

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($\angle DCF$)=(4/5)}, EqualityRelation{EF=v_0}, 求值(大小): (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]EF)}

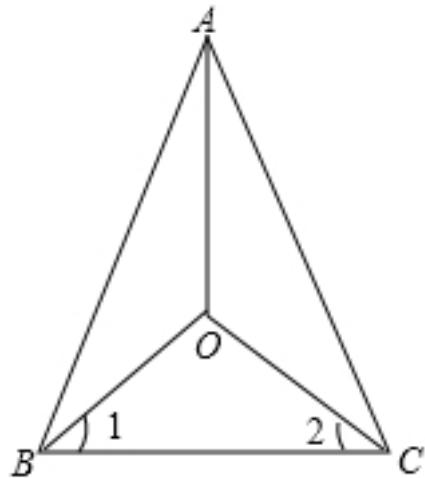
579、topic: 如图,已知等边 $\triangle ABC$ 的两个顶点的坐标为A(-4,0),B(2,0).试求:(1)点C的坐标;(2) $\triangle ABC$ 的面积.



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

NLP: PointRelation:B(2,0),坐标PointRelation:C,EqualityRelation{S_ΔABC=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_ΔABC)}

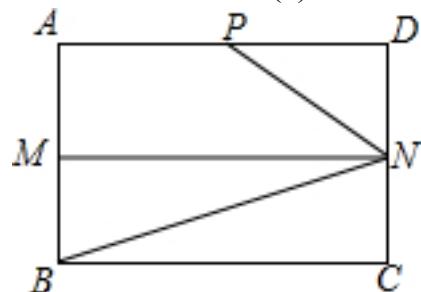
580、topic: 如图,OA平分∠BAC,∠1=∠2.求证:△ABC是等腰三角形.%#



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": "\u00b21=\u00b2OBC", "1": "\u00b22=\u00b2OCB"}, "circles": "[]"}], "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=OA,angle=∠BAC,angle1=∠BAO,angle2=∠CAO},EqualityRelation{∠CBO=∠BCO},ProveConclusionRelation:[IsoscelesTriangleRelation:IsoscelesTriangle:△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.%#



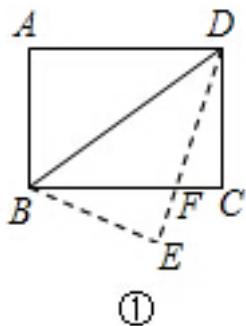
graph:
 {"stem": {"pictures": [{"picturename": "1000036624_Q_1.jpg", "coordinates": {"A": "-4.21,4.58", "B": "-4.21,0.00", "C": "0.00,0.00", "D": "4.21,0.00", "M": "0.00,2.29", "N": "4.21,2.29", "P": "2.10,4.58"}], "appliedproblems": {}, "substems": []}}

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

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{ $\angle BNP=3*\angle CBN$ },EqualityRelation{AP=v_0},求值(大小): (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: EqualityRelation{ $\angle MNP=2*\angle CBN$ }],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.



①

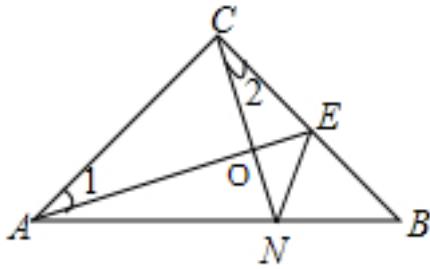
graph:

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

583、topic: 如图, $\triangle ABC$ 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: $AE = CN + EN$.

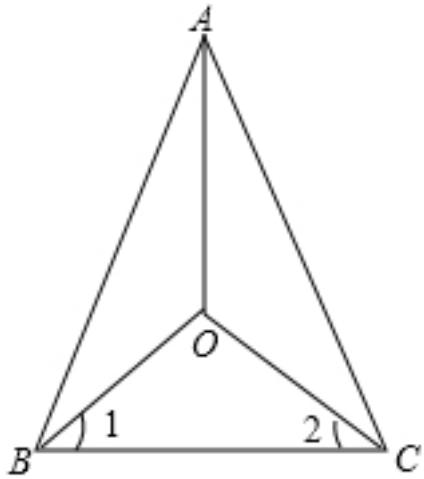


graph:

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

NLP: TriangleRelation: $\triangle ABC$, 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: $\triangle ABC$ 是等腰三角形.%#

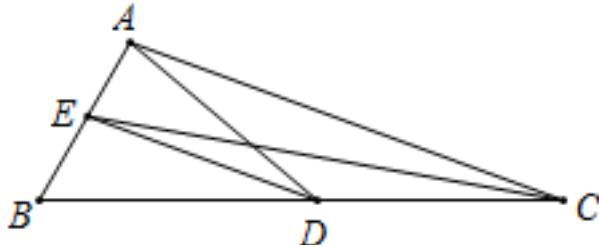


graph:

{"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": "\u00b21=\u00b2OBC", "1": "\u00b22=\u00b2OCB"}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation {line= OA, angle= $\angle BAC$, angle1= $\angle BAO$, angle2= $\angle CAO$ }, EqualityRelation { $\angle CBO = \angle BCO$ }, ProveConclusionRelation: [IsoscelesTriangleRelation: IsoscelesTriangle: $\triangle ABC$ [Optional.of(A)]]

585、topic: 如图,在 $\triangle ABC$ 中, $\angle BAC=100^\circ$, $\angle ACB=20^\circ$,CE是 $\angle ACB$ 的平分线,D是BC上一点,若 $\angle DAC=20^\circ$,求 $\angle CED$ 的度数.%#

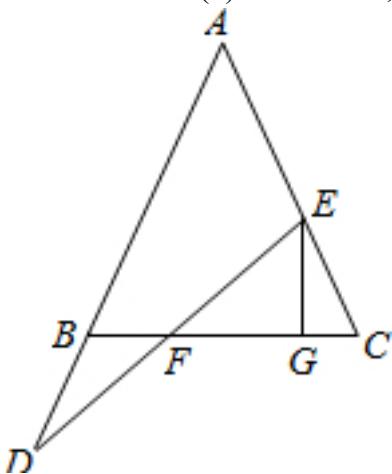


graph:

{"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: $\triangle ABC$, EqualityRelation { $\angle CAE = (5/9\pi)$ }, EqualityRelation { $\angle ACD = (1/9\pi)$ }, AngleBisectorRelation {line=CE, angle= $\angle ACD$, angle1= $\angle ACE$, angle2= $\angle DCE$ }, PointOnLineRelation {point=D, line=BC, isConstant=false, extension=false}, EqualityRelation { $\angle CAD = (1/9\pi)$ }, 求角的大小: AngleRelation {angle= $\angle CED$ }, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:] $\angle CED$)}

586、topic: 如图,在 $\triangle ABC$ 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 $\perp BC$ 于G.若 $\angle A=50^\circ$, $\angle D=30^\circ$,求 $\angle GEF$ 的度数;(2)若BD=CE,求证:FG=BF+CG.



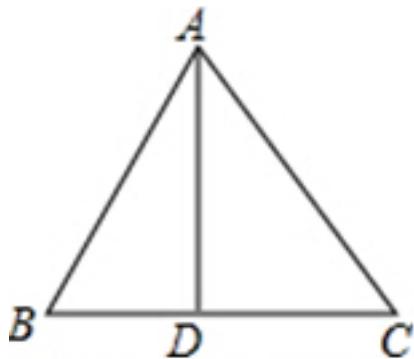
graph:

{"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": "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: $\triangle ABC$, 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 { $\angle BAE = (5/18\pi)$ }, EqualityRelation { $\angle BDF = (1/6\pi)$ }, 求角的大小: AngleRelation {angle= $\angle FEG$ }, EqualityRelation { $BD=CE$ }, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:] $\angle FEG$)}, 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 $AB=13$, $AD=12$, $AC=15$,

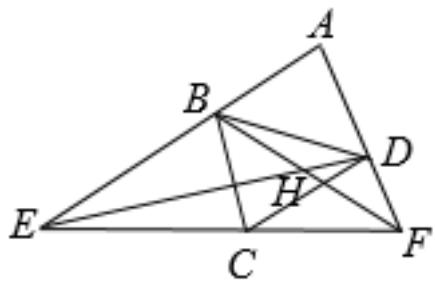
\$BD=5\$?#%(1)求证: \$\triangle ABD\$是直角三角形?#%(2)求CD的长及点D到AC的距离



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, $\angle A=60^\circ$,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 $\{B, D\}^2 = DH \cdot DE$ 的理由. #%#

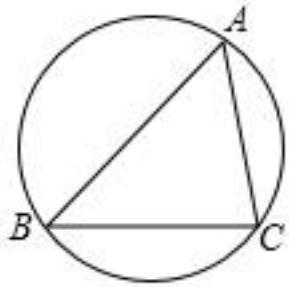


graph:
{"stem": {"pictures": [{"picturename": "1000040745_Q_1.jpg", "coordinates": {"A": "3.89,1.85", "B": "2.43,0.49", "C": "2.88,-1.46", "D": "4.34,-0.10", "E": "0.23,-1.57", "F": "4.65,-1.39", "H": "3.48,-0.41"}, "collineations": {"0": "A##B##E", "1": "E##C##F", "2": "F##D##A", "3": "B##C", "4": "C##D", "5": "B##D", "6": "B##H##F", "7": "D##H##E"}, "variable>equals": {}}, "circles": {}, "appliedproblems": {}, "substems": []}]}

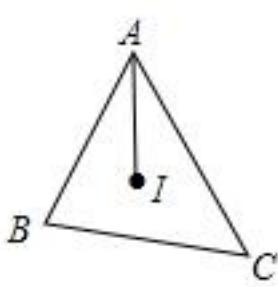
NLP: RhombusRelation {rhombus=Rhombus:ABCD}, EqualityRelation { $\angle BAD = (1/3 * \pi)$ }, PointOnLineRelation {point=C, line=EF, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(E), iLine1=EF, iLine2=AB], LineCrossRelation [crossPoint=Optional.of(F), iLine1=EF, iLine2=AD], 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}])

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.



图①



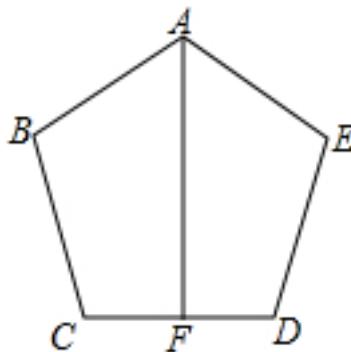
图②

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000008261_Q_1.jpg", "coordinates": {"A": "0.62,6.22", "B": "-2.50,-5.73", "C": "2.50,-5.73", "O": "0.00,0.00"}, "collineations": {"0": "A##C", "1": "B##A", "2": "B##C"}, "variable>equals": {}}, {"circle": [{"center": "O", "pointincircle": "B##C##A"}]}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "1000008261_Q_2.jpg", "coordinates": {"A": "4.95,5.58", "B": "3.00,2.00", "C": "6.96,1.01", "I": "4.83,2.80"}, "collineations": {"0": "A##C", "1": "B##A", "2": "B##C"}, "variable>equals": {}}, {"circle": []}], "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,\$\angle B=\angle E\$,AF\$\perp\$CD,垂足为F,求证:F是CD的中点.

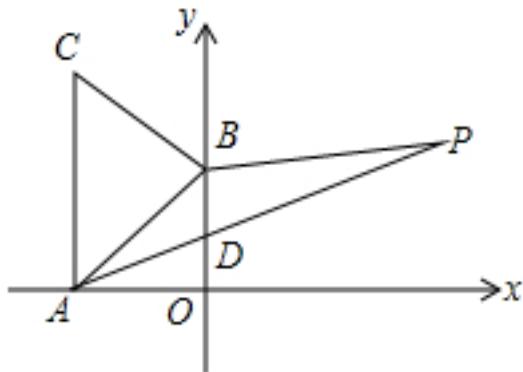


graph:
 {"stem": {"pictures": [{"picturename": "1000072669_Q_1.jpg", "coordinates": {"A": "3.50,5.00", "B": "1.00,3.00", "C": "2.00,0.00", "D": "5.00,0.00", "E": "6.00,3.00", "F": "3.50,0.00"}, "collineations": {"0": "F##A", "1": "A##B", "2": "B##C", "3": "C##D", "4": "D##E", "5": "E##F"}}], "appliedproblems": {}}}

#B","2":"B###C","3":"C###F###D","4":"D###E","5":"E###A"},"variable>equals":{},"circles":[]}],"applied problems":{},"substems":[]}]

NLP: EqualityRelation{AB=AE}, EqualityRelation{BC=DE}, EqualityRelation{ $\angle ABC = \angle AED$ }, 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, $\triangle ABC$ 为等边三角形, 点 \$P(3, a)\$ 在第一象限内. #%(1) 求 $\triangle ABC$ 的面积; #%(2) 用含 a 的代数式表示 $\triangle ABP$ 的面积; #%(3) 若 \$2S_{\triangle ABP} = S_{\triangle ABC}\$, AP 交 y 轴于点 D, 求点 D 的坐标. #%#



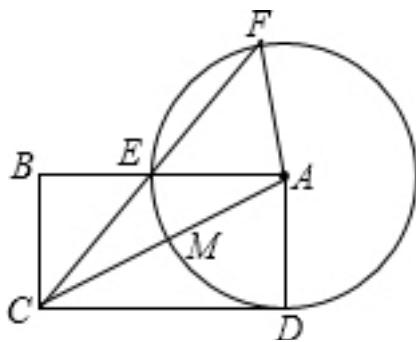
graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000070687_Q_1.jpg", "coordinates": {"A": "-1.73,0.00", "B": "0.00,1.00", "C": "-1.73,2.00", "O": "0.00,0.00"}, "collineations": {"0": "A###O", "1": "A###B", "2": "A###C", "3": "C###B", "4": "B###O"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "pictures": [{"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: $\triangle ABC$, PointInDomRelation [point=P(3,a), local=FIRST_QUADRANT], EqualityRelation{S_ $\triangle ABC$ = v_0}, 求值(大小):

(ExpressRelation:[key:]v_0), EqualityRelation{S_ $\triangle ABP$ = v_1}, 表达式之间的关系:

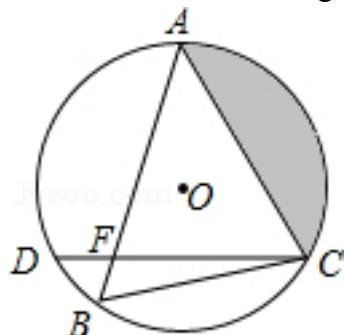
DualExpressRelation{expresses=[Express:[v_1], Express:[a]]}, EqualityRelation{2*S_(*(_*($\triangle ABP$))=S_ $\triangle ABC$)}, LineCrossRelation [crossPoint=Optional.of(D), iLine1=AP, iLine2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false], 坐标PointRelation:D, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]S_ $\triangle ABC$)}, 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"}, "collineations": {"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": {}, "substems": []}}

NLP: RadiusRelation{radius=AD, circle=Circle[$\odot A$]}{center=A, analytic= $(x-x_A)^2+(y-y_A)^2=r_A^2$ },
 length=null}, RectangleRelation{rectangle=Rectangle:ABCD}, LineCrossCircleRelation{line=AC, circle= $\odot O_0$, crossPoints=[M], crossPointNum=1}, LineCrossCircleRelation{line=AB, circle= $\odot O_0$, crossPoints=[E], crossPointNum=1}, LineCrossCircleRelation{line=CE, circle= $\odot A$, crossPoints=[F], crossPointNum=1}, EqualityRelation{CM=2}, EqualityRelation{AB=4}, 圆的半径:
 CircleRelation{circle=Circle[$\odot A$]}{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[$\odot A$]}{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 $\odot O$ 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 $\odot O$ 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": [{"center": "O", "pointincircle": "A", "pointincircle": "B", "pointincircle": "C", "pointincircle": "D"}]}, "appliedproblems": {}, "substems": []}}

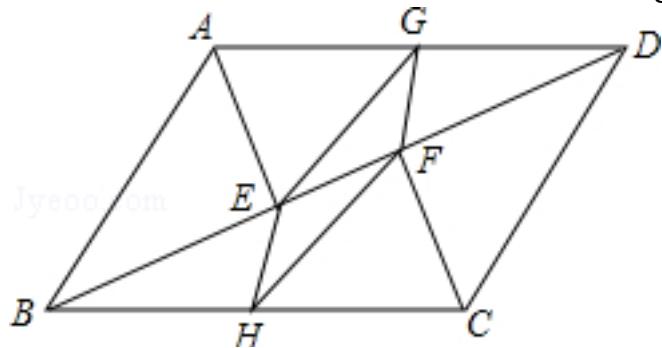
NLP: ChordOfCircleRelation{chord=AB, circle=Circle[$\odot O$]}{center=O,

```

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{ $\cap$ AD= $\cap$ 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*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"}, "collinearations": {"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": {}, "subsystems": []}}

```

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD},MiddlePointOfSegmentRelation{middlePoint=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.

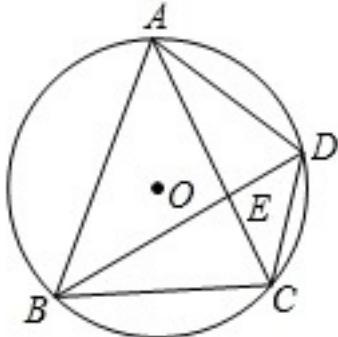


图1

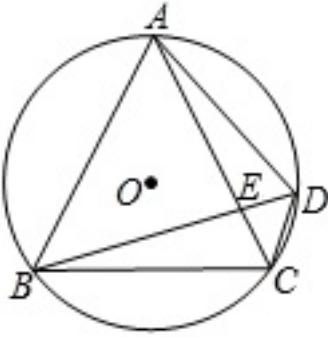
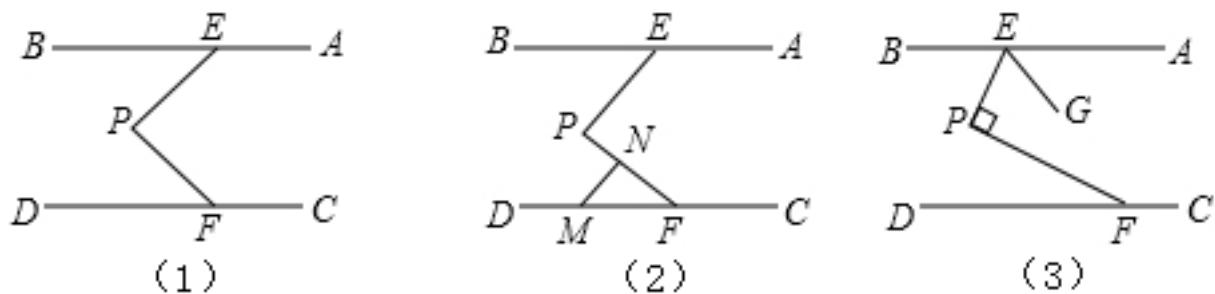


图2

graph:
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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{ $\angle ABE=(1/4\pi)$ }, (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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null}, InscribedShapeOfCircleRelation{closedShape= $\triangle ABC$, circle=Circle[$\odot O_1$]{center=O_1, analytic= $(x-x_{O_1})^2+(y-y_{O_1})^2=r_{O_1}^2$ }}, 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), $AB \parallel CD$,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.%#

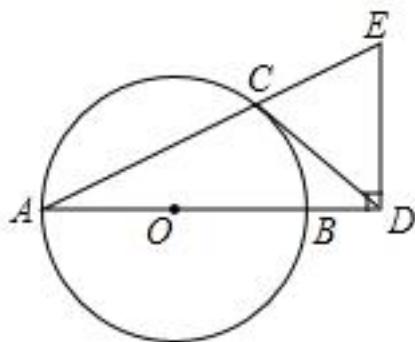


graph:
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"-10.00,4.00","M": "-12.00,2.00","N": "-11.00,3.00","P": "-12.00,4.00"}, "collineations": {"0": "B###A###E", "1": "D###C###M###F", "2": "E###G", "3": "P###E", "4": "P###N###F", "5": "M###N"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]

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 {∠FMN=∠BEP}, LineCrossRelation [crossPoint=Optional.of(N), iLine1=MN, iLine2=PF], JudgeTwoAnglesConnectRelation { [∠EPN, ∠MNP]}, PointRelation:F, EqualityRelation {∠EPN=(1/2*Pi)}, 求值(大小): (ExpressRelation:[key:](∠AEG/∠MFN)), ProveConclusionRelation:[证明: EqualityRelation {∠EPN=∠BEP+∠MFN}], ProveConclusionRelation:[证明: JudgeTwoAnglesConnectRelation { [∠EPN, ∠MNP]}], SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:](∠AEG/∠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.

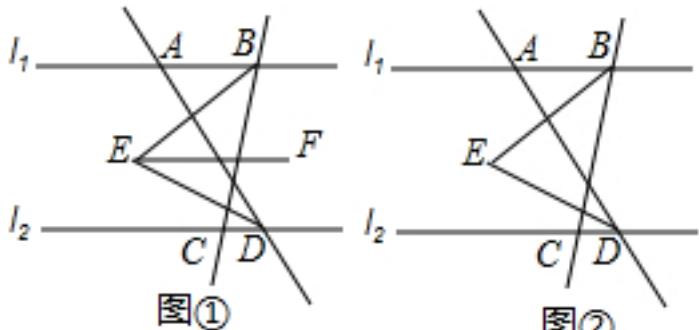


graph:

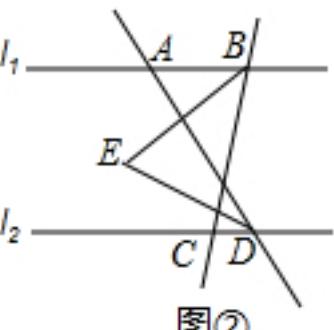
{"stem": {"pictures": [{"picturename": "1000024998.jpg", "coordinates": {"A": "-3.00,0.00", "B": "3.00,0.00", "C": "1.80,2.40", "D": "5.00,0.00", "E": "5.00,4.00", "O": "0.00,0.00"}, "collineations": {"0": "B###O###D###A", "1": "D###C", "2": "E###D", "3": "E###C###A"}, "variable-equals": {}, "circles": [{"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}, 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)}

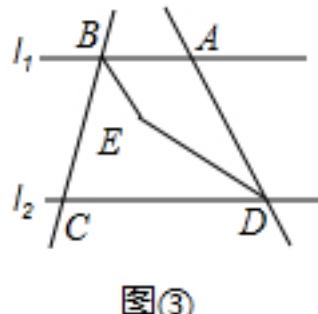
598、topic: 已知直线 $\{l\}_1 \parallel \{l\}_2$,点A是 $\{l\}_1$ 上的动点,点B在 $\{l\}_1$ 上,点C、D在 $\{l\}_2$ 上,∠ABC,∠ADC的平分线交于点E(不与点B,D重合).#%(1)若点A在点B的左侧,∠ABC=80°,∠ADC=50°,过点E作EF// $\{l\}_1$,如图①所示,求∠BED的度数.#%(2)若点A在点B的左侧,∠ABC=α°,∠ADC=50°,如图②所示,求∠BED的度数;#%(3)若点A在点B的右侧,∠ABC=α°,∠ADC=50°,如图③所示,求∠BED的度数.#%#



图①



图②



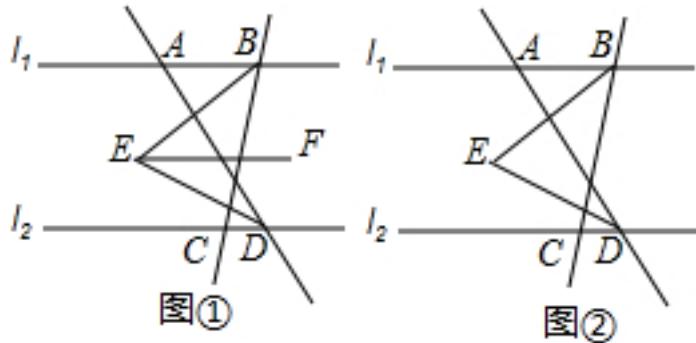
图③

graph:
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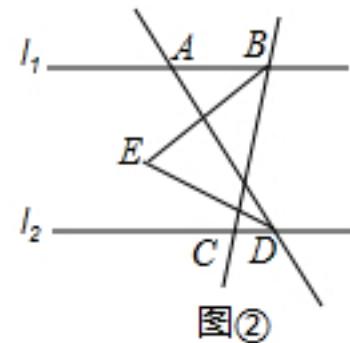
NLP: AngleBisectorRelation {line=BE,angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, AngleBisectorRelation {line=DE,angle= $\angle ADC$, angle1= $\angle ADE$, angle2= $\angle CDE$ }, PointRelation:B, PointRelation:D, LineParallelRelation [iLine1=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false, iLine2=StraightLine[l_2] analytic :y=k_1_2*x+b_1_2 slope:null b:null isLinearFunction:false], PointOnLineRelation {point=A, line=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation {point=B, line=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation {point=C, line=StraightLine[l_2] analytic :y=k_1_2*x+b_1_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 $\{l\}_2$, 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)

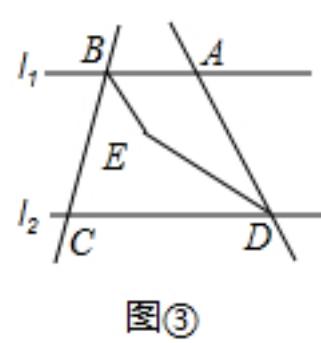
若点A在点B的左侧, $\angle ABC = \alpha^\circ$, $\angle ADC = 60^\circ$, 如图②所示, 求 $\angle BED$ 的度数(直接写出计算的结果, 用含 α 的式子表示); #%#(3)若点A在点B的右侧, $\angle ABC = \alpha^\circ$, $\angle ADC = 60^\circ$, 如图③所示, 求 $\angle BED$ 的度数(用含 α 的式子表示). #%#



图①



图②



图③

graph:
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NLP: AngleBisectorRelation {line=BE, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, AngleBisectorRelation {line=DE, angle= $\angle ADC$, angle1= $\angle ADE$, angle2= $\angle CDE$ }, PointRelation:B, PointRelation:D, LineParallelRelation [iLine1=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false, iLine2=StraightLine[l_2] analytic :y=k_1_2*x+b_1_2 slope:null b:null isLinearFunction:false], PointOnLineRelation {point=A, line=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation {point=B, line=StraightLine[l_1] analytic :y=k_1_1*x+b_1_1 slope:null b:null isLinearFunction:false, isConstant=false, extension=false}, PointOnLineRelation {point=C, line=StraightLine[l_2] analytic :y=k_1_2*x+b_1_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 { $\angle ADC = (1/3\pi)$ }, 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 { $\angle ADC = (1/3\pi)$ }, 求角的大小: AngleRelation {angle= $\angle BED$ }, PositionRelation [A在B的右方], EqualityRelation { $\angle ABC = 1/180\alpha\pi$ }, EqualityRelation { $\angle ADC = (1/3\pi)$ }, 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:] $\angle BED$)}

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 $SE \cdot EC = EB \cdot ED$; #%(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. #%#

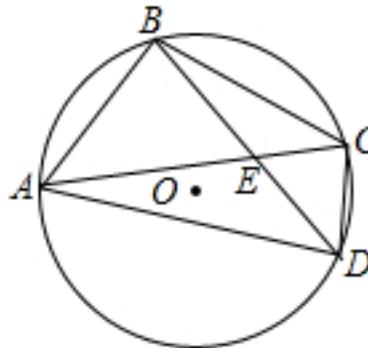


图1

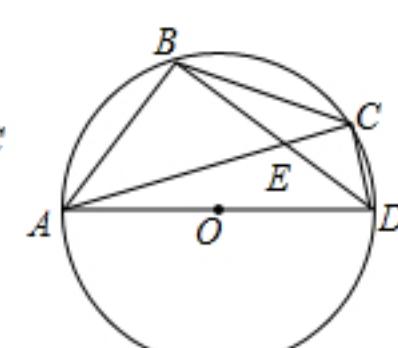


图2

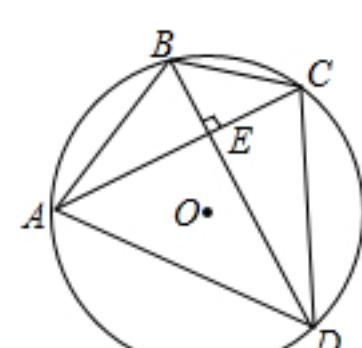
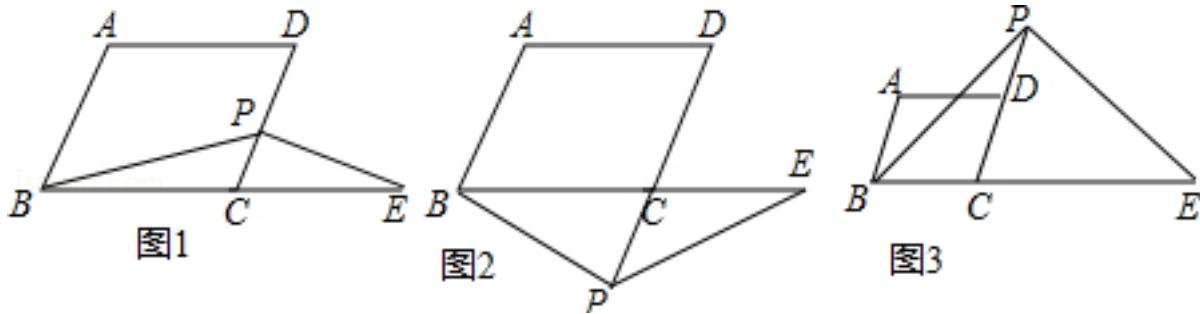


图3

graph:
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NLP: PointRelation:D, LineCrossRelation [crossPoint=Optional.of(E), iLine1=AC, iLine2=BD], (ExpressRelation:[key:]1), (ExpressRelation:[key:]2), EqualityRelation { $\cap AB = \cap BC$ }, DiameterRelation {diameter=AD, circle=Circle[$\odot O$] {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)}

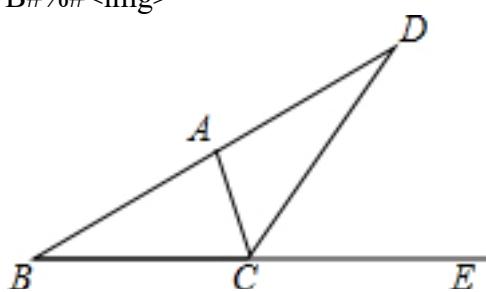
601、topic: 已知平行四边形ABCD中, $\angle A=120^\circ$, 点P为边DC所在直线上一点, 点E为边BC所在直线上一点, 且 $PB=PE$. #%(1)当点P在DC边上时(如图1), 求证: $CE-PC=AD$; #%(2)当点P在DC延长线上时(如图2), PC, CE与AD又有怎样的数量关系? 请写出你的猜想, 并证明; #%(3)当点P在CD延长线上时(如图3), PC, CE与AD又有怎样的数量关系? 请写出你的猜想, 并证明. #%#



graph:
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NLP: ParallelRelation{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: $\angle BAC > \angle ABC$

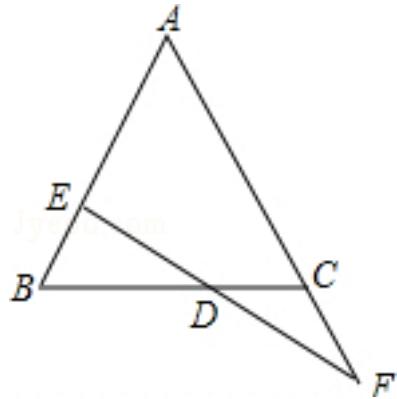


graph:
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NLP: ProveConclusionRelation:[证明: InequalityRelation{ $\angle BAC > \angle ABC$ }]

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: $DE = DF$ #

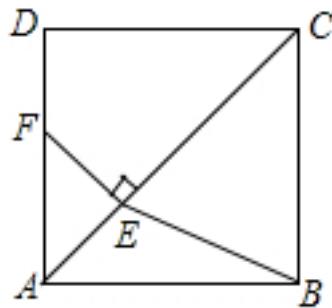


graph:
 {"stem": {"pictures": [{"picturename": "1000040369_Q_1.jpg", "coordinates": {"A": "-2.81,2.75", "B": "-6.56,0.58", "C": "-1.56,0.58", "D": "-2.81,0.58"}, "collineations": {"0": "A##C", "1": "A##D", "2": "A##B", "3": "C##D##B"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

TriangleRelation: ΔABC , EqualityRelation { $AB = AC$ }, EqualityRelation { $BE = CF$ }, ProveConclusionRelation: [证明: EqualityRelation { $DE = DF$ }]

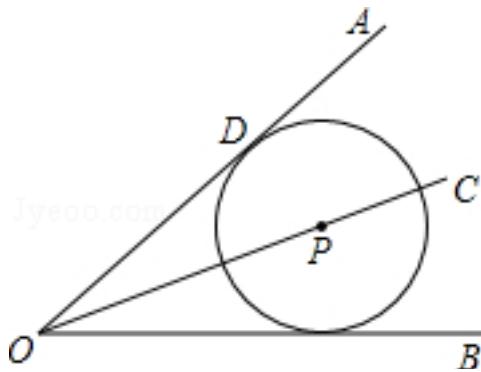
604、topic: 如图,在正方形ABCD中,点E是对角线AC上一点,且 $CE = CD$,过点E作 $EF \perp AC$ 交AD于点F,连接BE. #&(1)求证: $DF = AE$;
 #&(2)当 $AB = 2$ 时,求 $B\{E\}^2$ 的值.#&



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:

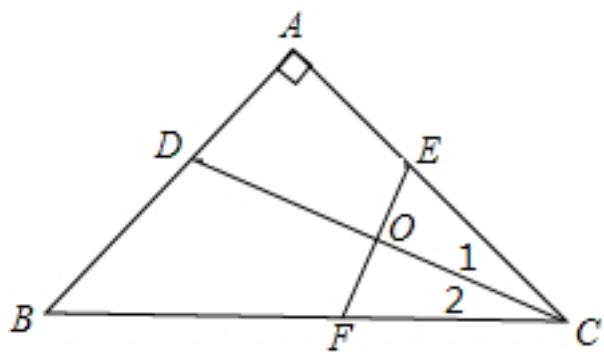
```
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```

```

NLP: AngleBisectorRelation{line=OC,angle=∠BOD, angle1=∠BOC, angle2=∠
COD},PointOnLineRelation{point=P, line=OC, isConstant=false,
extension=false},LineContactCircleRelation{line=OA, circle=Circle[ ⊙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[ ⊙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: $BF=2AD$. #%#



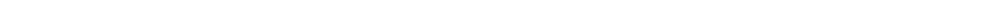
graph:

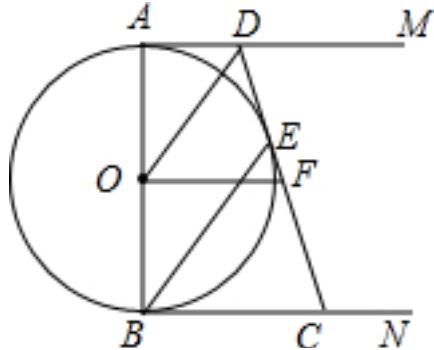
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```

```

NLP: TriangleRelation:△ABC,EqualityRelation{∠
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: $OD \parallel BE$;
 (2)猜想: OF 与 CD 有何数量关系? 并说明理由.




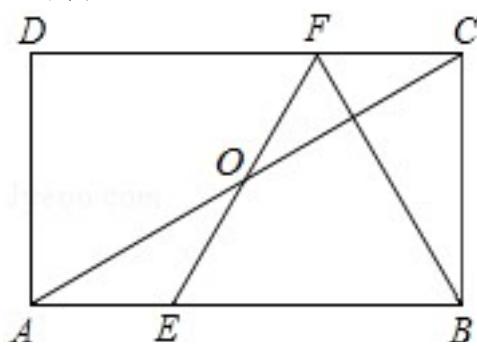
graph:

```
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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=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.



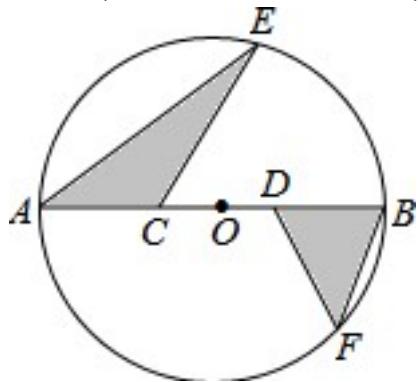
graph:

```
{"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{∠BEO=2*∠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)}

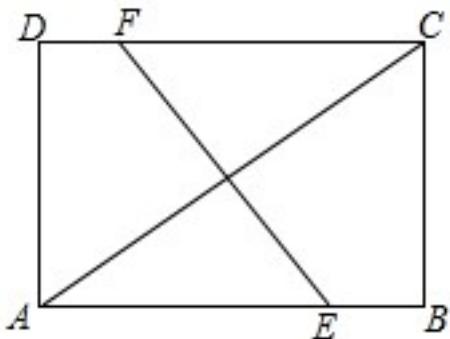
609、topic: 如图,半径为\$6cm\$的\$\odot O\$中,点C、D为直径AB的三等分点,点E、F分别在AB两侧的半圆上,\$\angle BCE=\angle BDF=60^\circ\$,连接AE、BF,求图中两个阴影部分的面积.



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"}, "collinearities": {"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"}]}, "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}, 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=∠ECO=∠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.



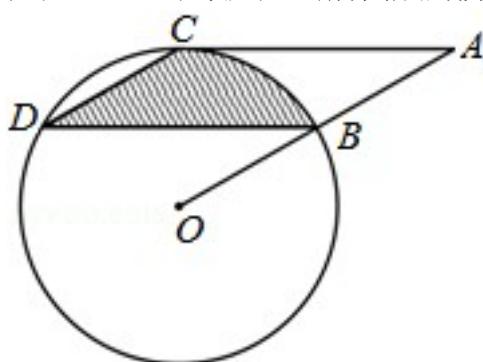
graph:

{"stem": {"pictures": [{"picturename": "1000005477_Q_1.jpg", "coordinates": {"A": "-10.00, -1.46", "B": "2.66, -1.46", "C": "2.66, 5.58", "D": "-10.00, 5.58", "E": "-0.25, -1.46", "F": "-7.09, 5.58"}, "collineations": {"0": "A###E##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 {∠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\$的延长线于点\$A\$,连接\$CD\$,且\$\angle CDB=\angle OBD=30^\circ\$,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\$).

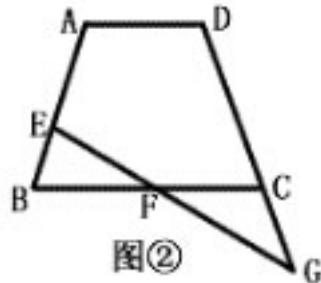
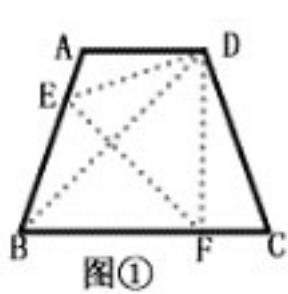


graph:

{"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"}, {"center": "O", "pointincircle": "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[\$\odot 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[\$\odot O\$]{center=O, analytic=\$(x-x_O)^2+(y-y_O)^2=r_O^2\$}, contactPoint=Optional.of(C), outpoint=Optional.of(A)}]

612、topic: 如图,在梯形ABCD中,已知\$AD \parallel BC\$, \$AB=DC\$, \$E\$、\$F\$分别是\$AB\$和\$BC\$边上的点.如图①,以\$EF\$为对称轴翻折梯形\$ABCD\$,使点\$B\$与点\$D\$重合,且\$DF \perp BC\$.若\$AD=4\$, \$BC=8\$,求梯形\$ABCD\$的面积;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.



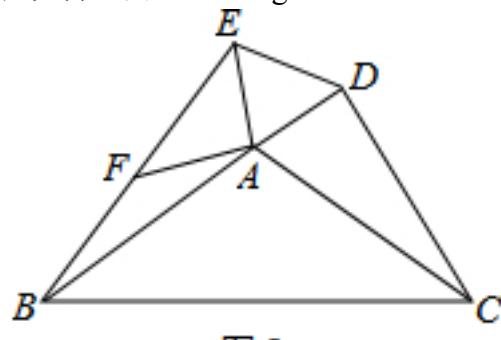
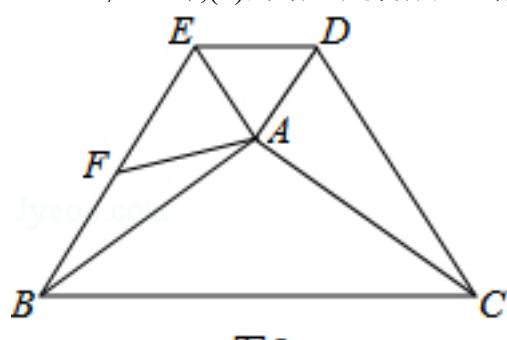
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graph:
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```

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=Express:[k], numberType=POSITIVE}}, LineCrossRelation[crossPoint=Optional.of(G), iLine1=EF, iLine2=DC], EqualityRelation{FG=k*EF}, 求值(大小): (ExpressRelation:[key:])(BE/CG)), SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]S_ABCD)}, SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:])(BE/CG))}

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. #%#



```

graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "C7026E663875497DBE2F186B3EBC0216_1.jpg", "coordinates": {"A": "-12.00,9.00", "B": "-14.00,3.00", "C": "-6.00,3.00", "D": "-8.00,9.00", "E": "-12.50,7.50", "F": "-8.00,3.00"}, "collineations": {"0": "B##E##A", "1": "A##D", "2": "B##D", "3": "C##D", "4": "B##F##C", "5": "E##D", "6": "E##F", "7": "F##D"}, "variable>equals": {}, "circles": []}, {"picturename": "C7026E663875497DBE2F186B3EBC0216_2.jpg", "coordinates": {"A": "-12.00,9.00", "B": "-14.00,3.00", "C": "-6.00,3.00", "D": "-8.00,9.00", "E": "-13.36,4.91", "F": "-9.00,3.00", "G": "-5.49,1.46"}, "collineations": {"0": "B##E##A", "1": "A##D", "2": "C##D##G", "3": "B##F##C", "4": "E##F##G"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "C7026E663875497DBE2F186B3EBC0216_2.jpg", "coordinates": {"A": "-12.00,9.00", "B": "-14.00,3.00", "C": "-6.00,3.00", "D": "-8.00,9.00", "E": "-13.36,4.91", "F": "-9.00,3.00", "G": "-5.49,1.46"}, "collineations": {"0": "B##E##A", "1": "A##D", "2": "C##D##G", "3": "B##F##C", "4": "E##F##G"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}

```

```
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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. #%#

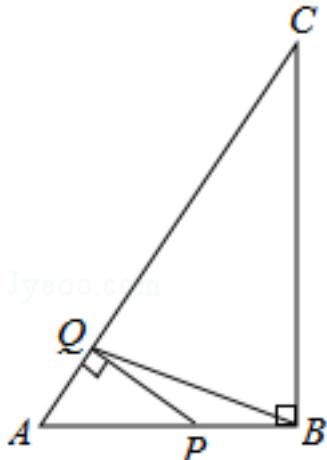


图1

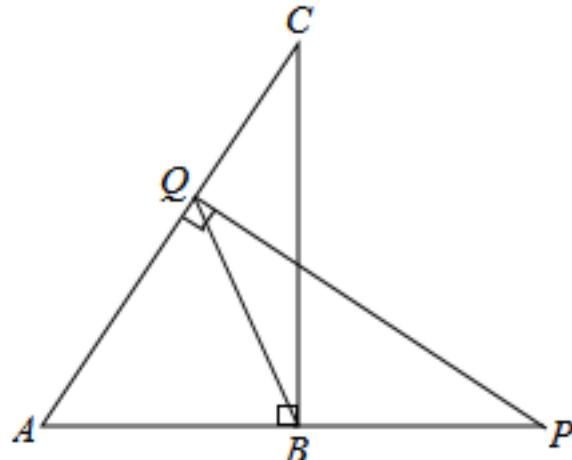
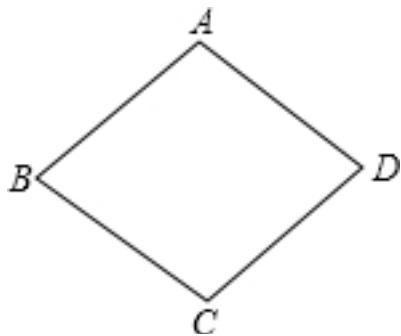


图2

```
graph:
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```

NLP: LinePerpRelation {line1=PQ, line2=AC, crossPoint=Q}, TriangleRelation: $\triangle ABC$, EqualityRelation { $\angle CBP = (1/2 * Pi)$ }, 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: $\triangle PQB$ [Optional.of(P)], 求值(大小): (ExpressRelation:[key:]v_1), ProveConclusionRelation: [证明: TriangleSimilarRelation {triangleA= $\triangle AQP$, triangleB= $\triangle ABC$ }], SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]AP)}

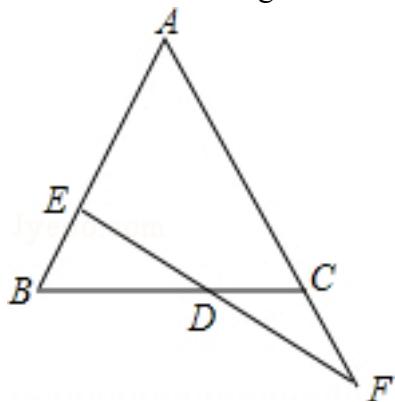
615、topic: 如图, 已知菱形ABCD, 画一个矩形, 使得A,B,C,D四点分别在矩形的四条边上, 且矩形的面积为菱形ABCD面积的2倍. #%#



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

NLP:
 RhombusRelation{rhombus=Rhombus:ABCD}, EqualityRelation{S_ABCD=v_0}, RhombusRelation{rhombus=Rhombus:ABCD}, PointRelation:A, PointRelation:B, PointRelation:C

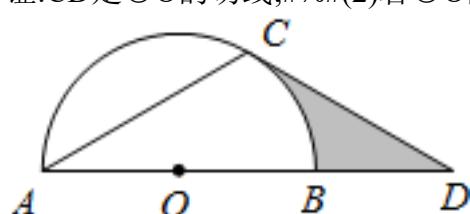
616、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, EF 交 AB 于 E , 交 AC 的延长线于 F , 且 $BE=CF$, 求证: $DE=DF$ # % #



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##D##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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. # % #



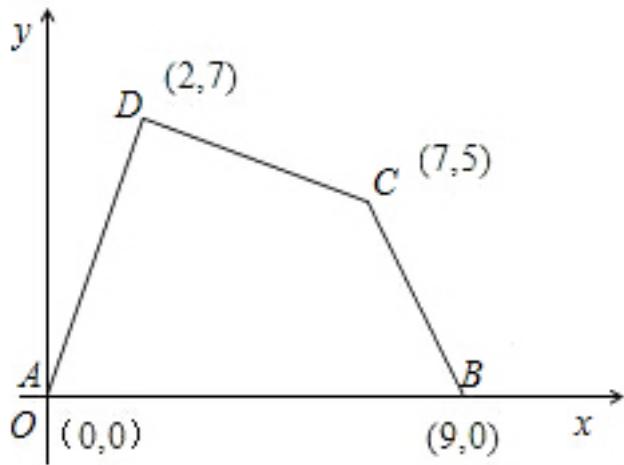
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graph:
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```

NLP: DiameterRelation{diameter=AB, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}, PointOnLineRelation{point=D, line=AB, isConstant=false, extension=true}, PointOnCircleRelation{circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, points=[C]}, EqualityRelation{AC=CD}, EqualityRelation{ $\angle ACD=(2/3\pi)$ }, RadiusRelation{radius=null, circle=Circle[\odot O]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=Express:[2]}}, ProveConclusionRelation:[证明: 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)}]

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.



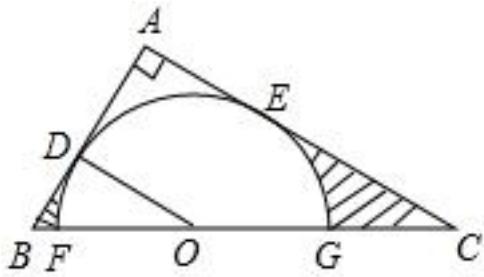
```

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}\$. 求图中两部分阴影面积的和.

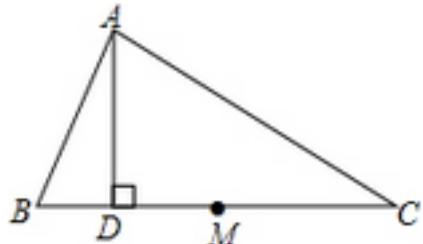


graph:

```
{"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"}]}, "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:OD, 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= $(x-x_O)^2+(y-y_O)^2=r_O^2$, 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: $DM = \frac{1}{2}AB$.#%#

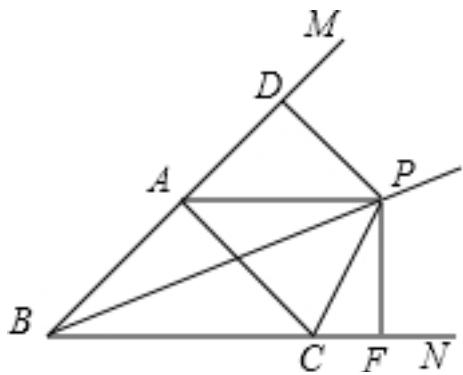


graph:

```
{"stem": {"pictures": [{"picturename": "1000040694_Q_1.jpg", "coordinates": {"A": "-9.03,4.35", "B": "-11.00,2.00", "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": {}, "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.#%#

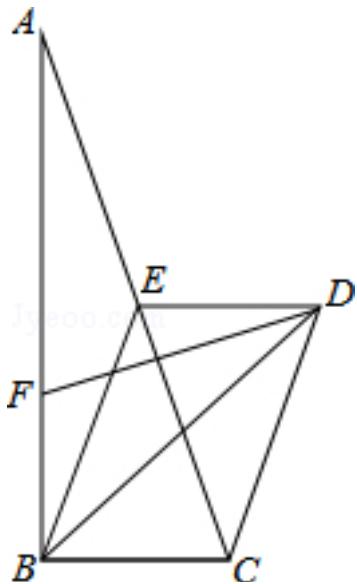


graph:

```
{"stem":{"pictures":[{"picturename":"1000063720_Q_1.jpg","coordinates":{"A":"3.71,1.79","B":"2.20,0.48","C":"4.87,0.48","D":"4.63,2.57","F":"5.40,0.48","P":"5.40,1.66","M":"5.21,3.07","N":"6.19,0.48"}, "collinearities":{"0":"A###B###D##M","1":"B##C##F##N","2":"A##C","3":"P##C","4":"A##P","5":"P##D","6":"P##F","7":"P##B"}, "variable-equals":{}}, "circles":[]}, "appliedproblems":{}}, "substems":[]}
```

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: $\angle CAD/\Delta ABC$,ExternalAngleOfTriangleRelation: $\angle ACF/\Delta ABC$,LinePerpRelation{line1=PD, line2=BM, crossPoint=D},LinePerpRelation{line1=PF, line2=BN, crossPoint=F},ProveConclusionRelation:[证明: AngleBisectorRelation{line=BP,angle= $\angle ABC$, angle1= $\angle ABP$, angle2= $\angle CBP$ }]

622、topic: 如图, $\triangle ABC$ 是直角三角形, 且 $\angle ABC=90^\circ$, 四边形 $BCDE$ 是平行四边形, E 为 AC 的中点, BD 平分 $\angle ABC$, 点 F 在 AB 上, 且 $BF=BC$. 求证: (1) $DF=AE$; (2) $DF \perp AC$.



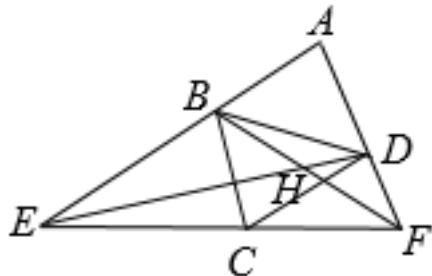
graph:

```
{"stem":{"pictures":[{"picturename":"1000031848_Q_1.jpg","coordinates":{"A":-7.00,11.00,"B":-7.00,2.00,"C":-4.00,2.00,"D":-2.50,6.50,"E":-5.50,6.50,"F":-7.00,5.00}),"collineations":{"0":"A###F##B","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: ΔABC [Optional.of(B)], EqualityRelation { $\angle CBF = (1/2 * \pi)$ }, ParallelogramRelation { parallelogram=Parallelogram:BCDE }, MiddlePointOfSegmentRelation { middlePoint=E, segment=AC }, AngleBisectorRelation { line=BD, angle= $\angle CBF$, angle1= $\angle CBD$, angle2=

$\angle DBF}$, 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=}]

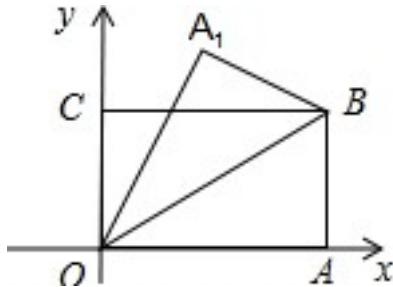
623、topic: 已知:如图,四边形ABCD是菱形, $\angle A=60^\circ$,直线EF经过点C,分别交AB、AD的延长线于E、F两点,连接ED、FB相交于点H. #(1)如果菱形的边长是3,DF=2,求BE的长; #(2)除 $\triangle AEF$ 外, $\triangle BEC$ 与图中哪一个三角形相似,找出来并证明; #(3)请说明 $\triangle BHD \sim \triangle BDE$ 的理由.



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", "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

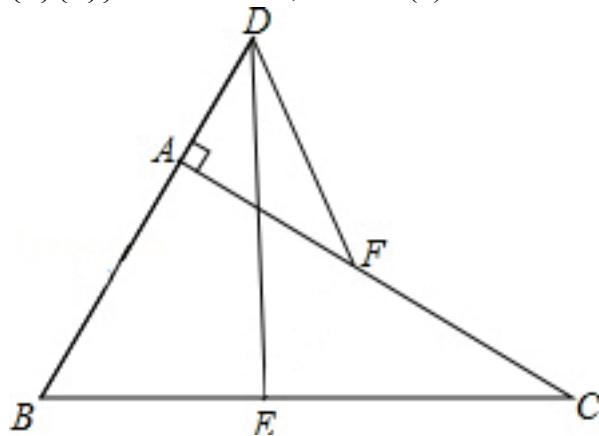
系],SymmetricRelation{preData=A,afterData=A_1,symmetric=StraightLine[BO]
 analytic : $y=k_{OB}x+b_{OB}$ slope:null b:null isLinearFunction:false,
 pivot=},RectangleRelation{rectangle=Rectangle:OABC},EqualityRelation{AO=(3^(1/2))},EqualityRelation
 {AB=1},坐标PointRelation:A_1,SolutionConclusionRelation{relation=坐标PointRelation:A_1}

625、topic: $\odot O$ 的半径为8cm,锐角 $\triangle ABC$ 的三点均在 $\odot O$ 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[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=Express:[8]},InscribedShapeOfCircleRelation{closedShape=AcuteTriangle: $\triangle ABC$, circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}},EqualityRelation{BC=8*(3^(1/2))},求角的大小: AngleRelation{angle= $\angle BAC$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BAC$)}

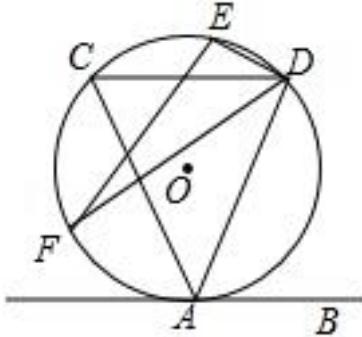
626、topic: 如图,在 $\text{Rt } \triangle ABC$ 中, $\angle BAC=90^\circ$,E,F分别是BC,AC的中点,延长BA到点D,使 $AD=\frac{1}{2}AB$.连接DE,DF.求证:AF与DE互相平分;若 $BC=4$,求DF的长.



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"}, "collineations": {"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: $\triangle ABC$ [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,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)}

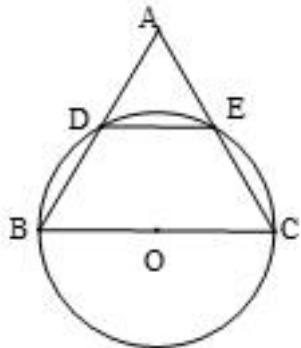
627、topic: 如图,直线AB与 $\odot O$ 相切于点A,弦 $CD \parallel AB$,E、F为圆上的两点,且 $\angle CDE = \angle ADF$.若 $\odot O$ 的半径为 $\frac{5}{2}$, $CD=4$,求弦EF的长.



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"}, "collinearities": {"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: $BD=DE=EC$.

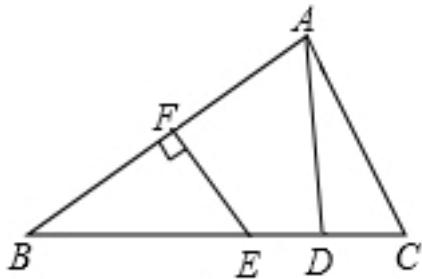


graph:
 {"stem": {"pictures": [{"picturename": "E82377BAFEB549D3991384CD21A73D29.jpg", "coordinates": {"A": "-11.00,7.46", "B": "-13.00,4.00", "C": "-9.00,4.00", "D": "-12.00,5.73", "E": "-10.00,5.73", "O": "-11.00,4.00"}, "collinearities": {"0": "B##D##A", "1": "C##E##A", "2": "B##O##C", "3": "D##E"}, "variable>equals": {}, "circles": [{"center": "O", "pointincircle": "A##D##E##C"}]}, "appliedproblems": {}, "substems": []}}

"circles": [{"center": "O", "pointincircle": "C###D###B###E"}]}], "appliedproblems": {}}, "substems": []}

NLP: DiameterRelation{diameter=BC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, 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]]

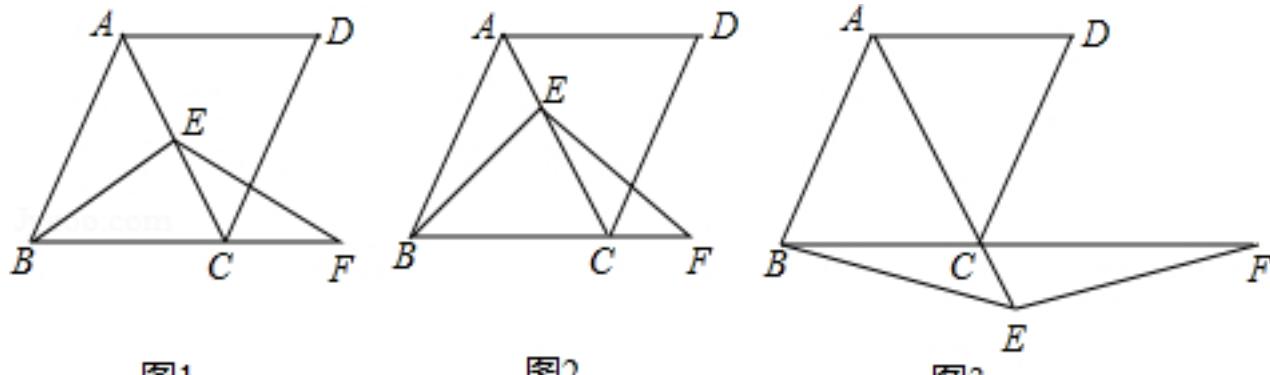
629、topic: 如图,在 $\triangle ABC$ 中,AB的垂直平分线EF交BC于点E,交AB于点F,D是线段CE的中点, $\angle CAD=20^\circ$, $\angle ACB$ 的补角是 110° .求证: $BE=AC$.#%#



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"}, "collinearities": {"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: $\triangle ABC$, LineCrossRelation [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

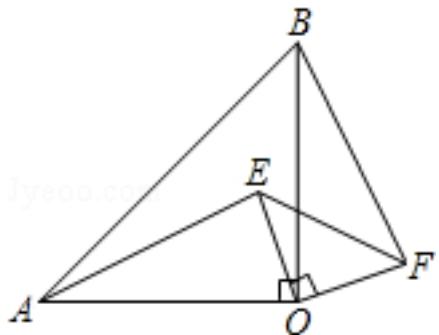


graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": []}]}

{"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": []}, "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}]

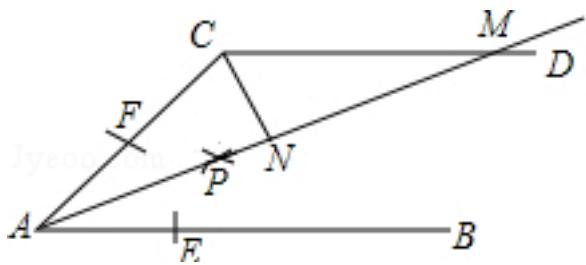
631、topic: 如图所示,已知,等腰直角 $\triangle OAB$ 中, $\angle AOB=90^\circ$,等腰直角 $\triangle EOF$ 中, $\angle EOF=90^\circ$,连接AE、BF.试说明:(1)AE=BF;(2) $AE \perp BF$.



graph:
{"stem": {"pictures": [{"picturename": "1000033735_Q_1.jpg", "coordinates": {"A": "-16.00,-21.00", "B": "-13.00,-18.00", "C": "-13.47,-19.72", "D": "-11.72,-20.53", "E": "-13.00,-21.00", "F": "-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: $\triangle ACN \cong \triangle MCN$.

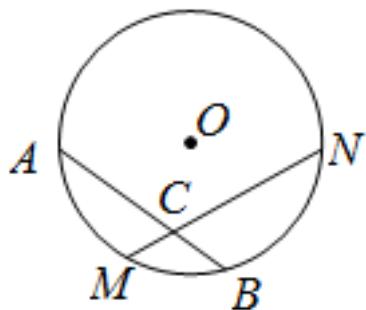


graph:

```
{"stem": {"pictures": [{"picturename": "1000033294_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "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": {}}, "subsystems": []}
```

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.



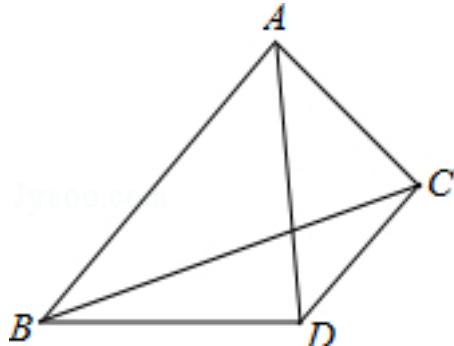
graph:

```
{"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:]∠ ACM)}

634、topic: 如图,△ABC中,AB=2AC,AD平分∠BAC,且AD=BD.求证:DC⊥AC. #

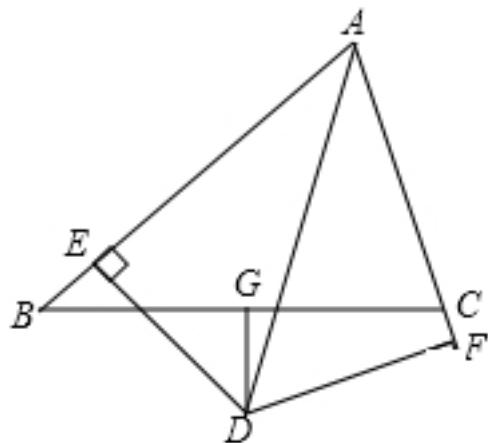


graph:

{"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": {}, "subsystems": []}}

NLP: TriangleRelation:△ABC, EqualityRelation{AB=2*AC}, AngleBisectorRelation{line=AD, angle=∠BAC, angle1=∠BAD, angle2=∠CAD}, EqualityRelation{AD=BD}, ProveConclusionRelation:[证明: LinePerpRelation{line1=DC, line2=AC, crossPoint=C}]

635、topic: 如图,在△ABC中,已知AD平分∠BAC,分别过点D作DE⊥AB于点E,DF⊥AC,交AC的延长线于点F. #(1)求证:△AED≌△AFD;(2)过点D作DG⊥BC于点G,若BE=CF, BG=5cm,求BC的长. #



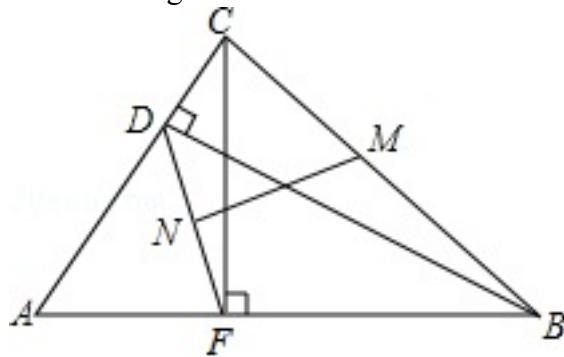
graph:

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NLP: TriangleRelation:△ABC, AngleBisectorRelation{line=AD, angle=∠CAE, angle1=∠CAD, angle2=∠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=△AED, triangleB=△AFD}], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]BC)}

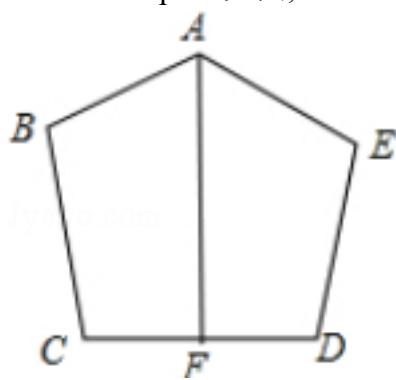
636、topic: 如图,在 $\triangle ABC$ 中, BD 、 CF 分别是高, M 为 BC 的中点, N 为 DF 的中点,求证: $MN \perp DF$.



graph:
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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}]

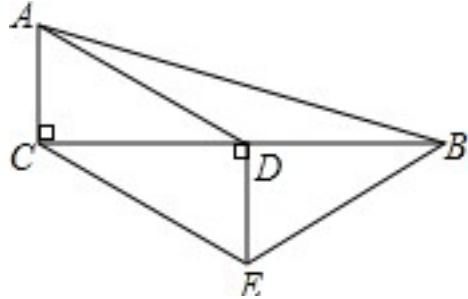
637、topic: 如图, $AB=AE$, $BC=ED$, $\angle B=\angle E$, $AF \perp CD$, F 为垂足, 求证: $CF=DF$.



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"}, "collineations": {"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}]

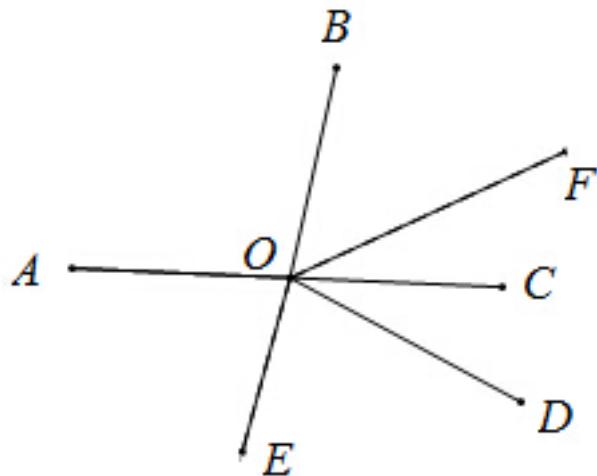
638、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$,D是BC的中点, $DE \perp BC$, $CE \parallel AD$,若 $AC=3$, $CE=5$,则三角形 $\triangle CEB$ 的周长是多少?



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"}, "collineations": {"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_ΔBCE=v_0}, TriangleRelation:△ABC, EqualityRelation { $\angle ACD=(1/2*\pi)$ }, MiddlePointOfSegmentRelation {middlePoint=D, segment=BC}, LinePerpRelation {line1=D E, 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_ΔBCE)}

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.

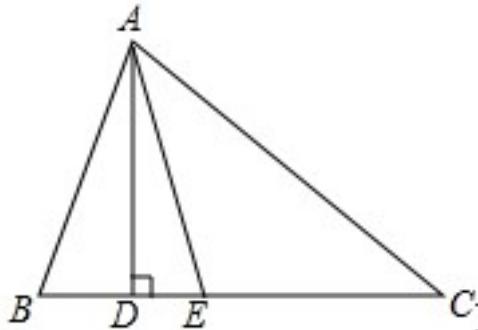


graph:
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NLP:
 SegmentRelation:OB, SegmentRelation:OC, SegmentRelation:OD, SegmentRelation:OE, SegmentRelation:OF, EqualityRelation { $\angle AOB=(5/9*\pi)$ }, AngleBisectorRelation {line=OF, angle= $\angle BOC$, angle1= $\angle BOF$, angle2= $\angle COF$ }, EqualityRelation { $\angle AOE = \angle DOE$ }, EqualityRelation { $\angle EOF = (7/9*\pi)$ }, 求角的大小:

AngleRelation{angle= $\angle COD$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle COD$)}

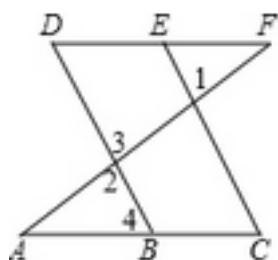
640、topic: 如图,在 $\triangle ABC$ 中, $AD \perp BC$, AE 平分 $\angle BAC$,完成下列问题?
 (1)若 $\angle B=70^\circ$, $\angle C=34^\circ$,求 $\angle DAE$ 、 $\angle AEC$ 的度数;
 (2)若 $\angle B > \angle C$,试猜想 $\angle DAE$ 与 $\angle B-\angle C$ 有何关系?请证明你的猜想



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: $\angle A=\angle F$.

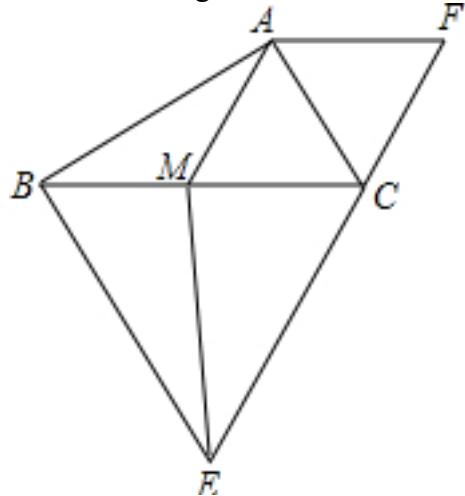


graph: {"stem": {"pictures": [{"picturename": "1000050438_Q_1.jpg", "coordinates": {"A": "-7.00,2.00", "B": "-4.82,2.00", "C": "-3.00,2.00", "D": "-6.23,5.45", "E": "-4.42,5.45", "F": "-2.59,5.45", "G": "-5.35,3.29", "H": "-3.97,4.37"}, "collinearities": {"0": "A##B##C", "1": "D##E##F", "2": "D##G##B", "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{ $\angle BAG = \angle EFH$ }]

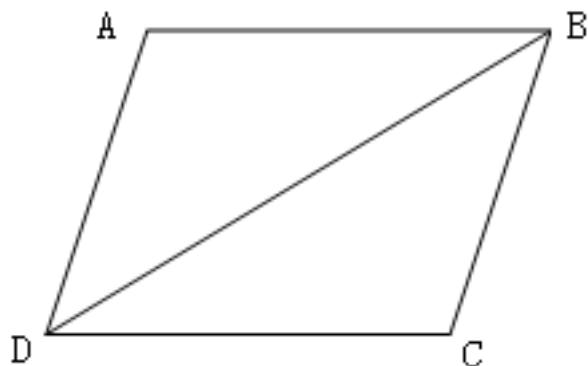
642、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=60^\circ$,分别以 $\triangle ABC$ 的两边为边向外作等边 $\triangle BCE$ 和 $\triangle ACF$,过点A作 $AM \parallel FC$ 交 BC 于点M,连接 EM .求证:#%#(1)四边形 $AMCF$ 是菱形;#%#(2) $\triangle ACB \cong \triangle MCE$.#%#



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

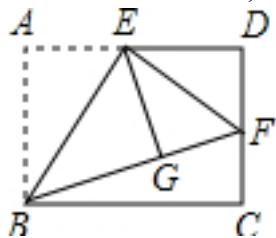
NLP: EqualityRelation{AD=BC}, LineParallelRelation [iLine1=AD, iLine2=BC], ProveConclusionRelation:[证明: EqualityRelation{ $\angle BAD = \angle BCD$ }]

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

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}]

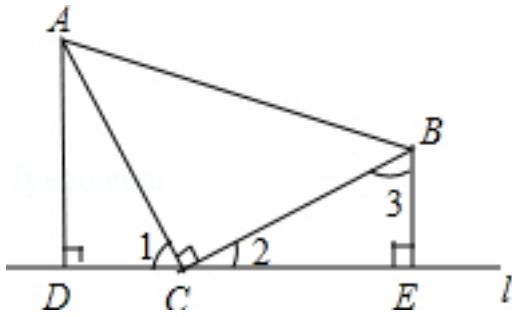
645、topic: 如图,在矩形ABCD中,点E是AD的中点,将 $\triangle ABE$ 沿直线BE折叠后得到 $\triangle GBE$,延长BG交CD于点F.若 $AB=6$, $BC=4\sqrt{6}$,求FD的长度. #%#



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

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. #%#

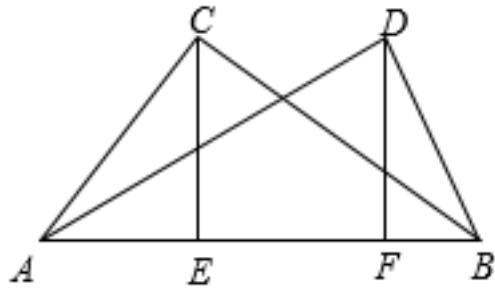


graph:

```
{"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: ΔABC , 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= ΔACD , triangleB= ΔCBE }]

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: $AE = BF$.%#

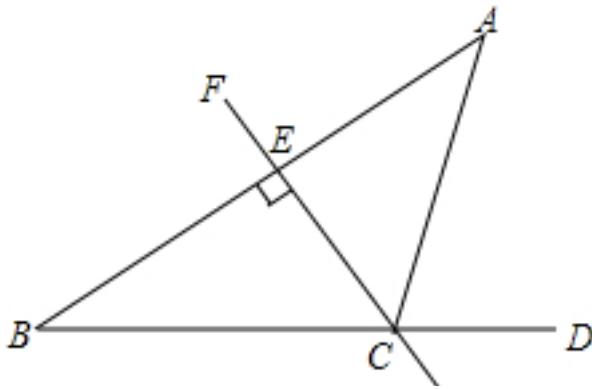


graph:

```
{"stem": {"pictures": [{"picturename": "1000042047_Q_1.jpg", "coordinates": {"A": "-13.00,2.00", "B": "-7.00,2.00", "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}]

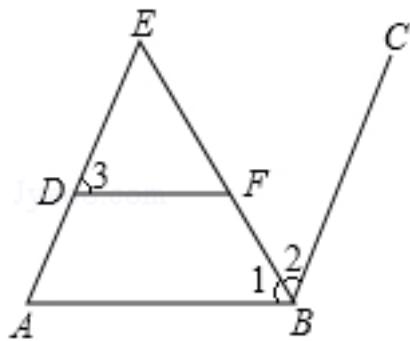
648、topic: 已知:如图, $CF \perp AB$ 于E, 且 $AE = EB$, 已知 $\angle B = 40^\circ$, 求 $\angle ACD$ 、 $\angle DCF$ 的度数.%#



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"}, "collinear": {"0": "A###B###E", "1": "A###C", "2": "B###C###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:] $\angle DCE$)}

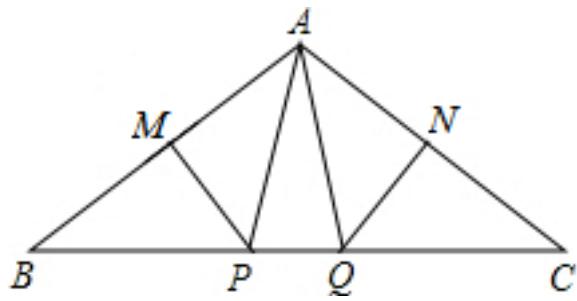
649、topic: 如图, $\angle E = \angle 1$, $\angle 3 + \angle ABC = 180^\circ$, BE是 $\angle ABC$ 的角平分线, 求证: $DF \parallel AB$. #%#



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"}, "collinear": {"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]]]

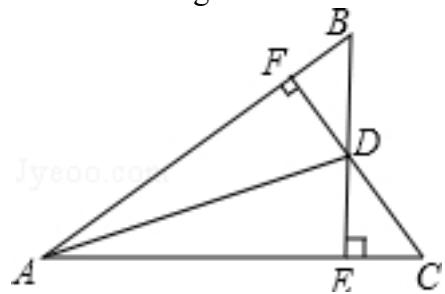
650、topic: 如图, $\angle BAC = 110^\circ$, 若MP、NQ分别垂直平分AB、AC, 求 $\angle PAQ$ 的度数. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000072735_Q_1.jpg", "coordinates": {"A": "-6.00,8.00", "B": "-11.00,5.00", "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"}, "collineations": {"0": "A##P", "1": "A##Q", "2": "M##P", "3": "N##Q", "4": "A##M##B", "5": "A##N##C", "6": "B##P##Q##C"}, "variable-equals": {}, "circles": {}, "appliedproblems": {}, "substems": []}]}}

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:] $\angle PAQ$)}

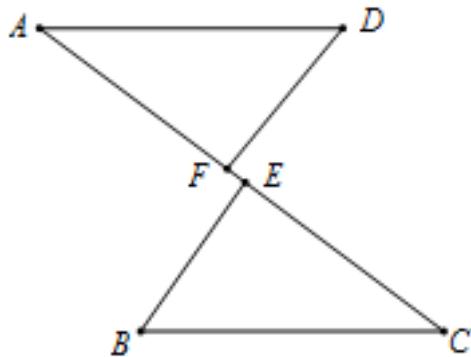
651、topic: 如图,已知BE \perp AC于E,CF \perp AB于F,BE、CF相交于点D,若BD=CD,求证:AD平分 $\angle BAC$.#%#



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

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= $\angle DAF$ }]

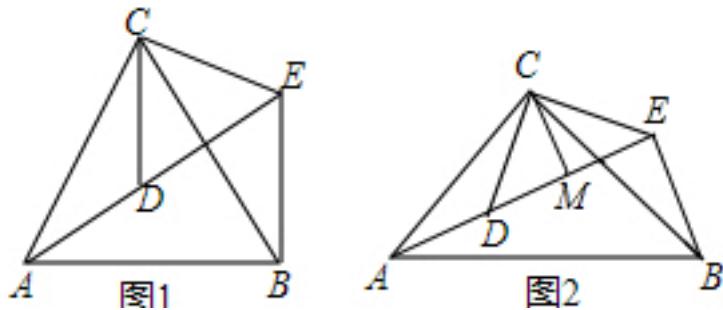
652、topic: 如图,AE=CF,AD=BC,DF=BE,求证:AD//BC.#%#



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": {}, "subsystems": []}}

NLP:
 EqualityRelation{AE=CF}, EqualityRelation{AD=BC}, EqualityRelation{DF=BE}, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AD, iLine2=BC]]]

653、topic: 如图1, $\triangle ABC$ 和 $\triangle DCE$ 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 $\angle AEB$ 的度数; (3)如图2, $\triangle ACB$ 和 $\triangle DCE$ 均为等腰三角形,且 $\angle ACB=\angle DCE=90^\circ$,点A、D、E在同一直线上,CM为 $\triangle DCE$ 中DE边上的高,连接BE,请判断 $\angle AEB$ 的度数及线段CM、AE、BE之间的数量关系,并说明理由.

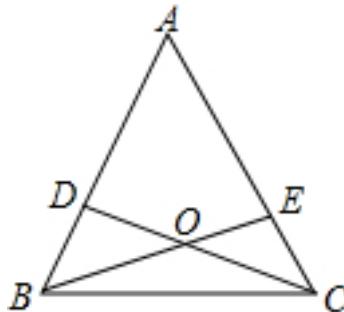


graph:
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NLP:
 RegularTriangleRelation:RegularTriangleRelation: $\triangle ABC$, RegularTriangleRelation:RegularTriangleRelation: $\triangle DCE$, PointOnLineRelation{point=A, line=StraightLine[n_0]} analytic: $y = k_{n_0}x + b_{n_0}$ slope=null b=null 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: ΔACB[Optional.of(A)], IsoscelesTriangleRelation: IsoscelesTriangle: ΔDCE[Optional.of(E)], MultiEqualityRelation [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: ΔDCE, 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))}

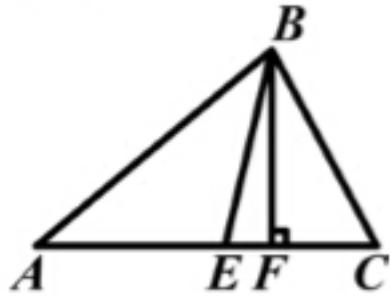
654、topic: 已知:如图,AB=AC,AD=AE,BE与CD相交于点O.求证:△ABE≌△ACD. #



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": []}, "appli edproblems": {}}, "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: ∠EBF=1/2(∠C-∠A).

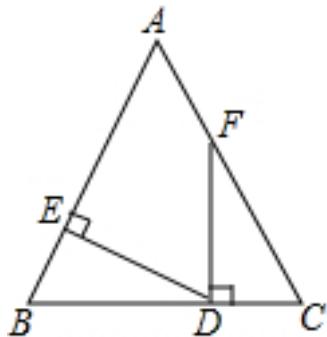


graph:

{"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": {}, "subsystems": []}}

NLP: TriangleRelation: ΔABC , AngleBisectorRelation {line=BE, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, InequalityRelation { $\angle BCF > \angle BAE$ }, LinePerpRelation {line1=BF, line2=AF, crossPoint=F}, ProveConclusionRelation: [证明: EqualityRelation { $\angle EBF = (1/2) * (\angle BCF - \angle BAE)$ }]

656、topic: 如图, ΔABC 中, $\angle A = 50^\circ$, $AB = AC$, $DF \perp BC$, $DE \perp AB$, 求 $\angle EDF$ 的度数.

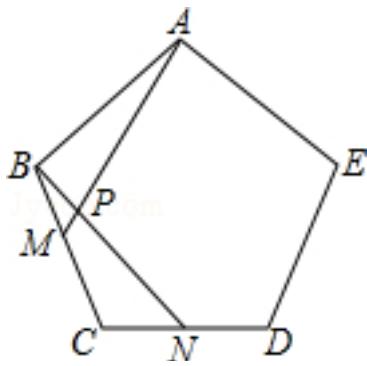


graph:

{"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": {}, "subsystems": []}}

NLP: TriangleRelation: ΔABC , EqualityRelation { $\angle EAF = (5/18 * \pi)$ }, EqualityRelation { $AB = AC$ }, LinePerpRelation {line1=DF, line2=BC, crossPoint=D}, LinePerpRelation {line1=DE, line2=AB, crossPoint=E}, 求角的大小: AngleRelation {angle= $\angle EDF$ }, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:] $\angle EDF$)}]

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: $\Delta ABM \cong \Delta BCN$; #%(2)求 $\angle APN$ 的度数. #%#

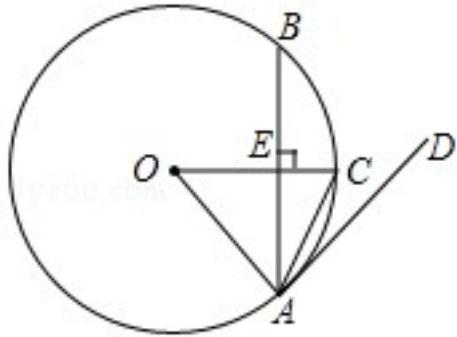


graph:

{"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": []}}

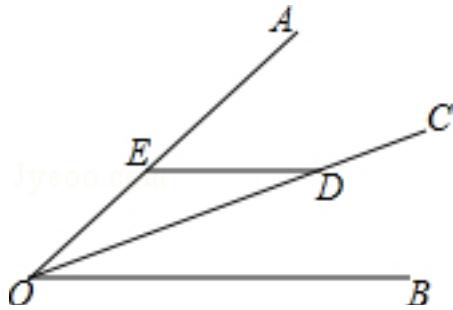
NLP: RadiusRelation {radius=OC, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$, length=null}}, CircleRelation {circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, LinePerpRelation {line1=OC, line2=AB, crossPoint=E}, ChordOfCircleRelation {chord=AB, circle=null, 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(∠CAE))},JudgePostionConclusionRelation: [data1=AD, data2=Circle[ ⊙
O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}]

```

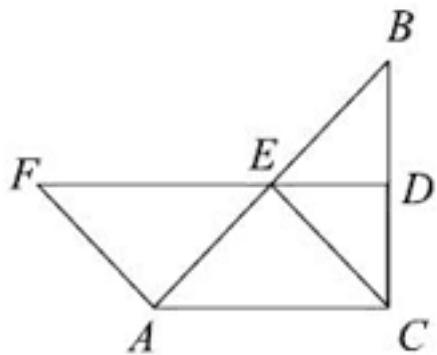
659、topic: 如图,D是 $\angle AOB$ 的平分线OC上一点,过点D作 $DE \parallel OB$ 交射线OA于点E,已知 $\angle BOD=25^\circ$,求 $\angle OED$ 的度数.#%#



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": {}, "subsystems": []}}

NLP: AngleBisectorRelation {line=OC,angle=∠BOE, angle1=∠BOC, angle2=∠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 {∠BOD=(5/36*Pi)}, 求角的大小: AngleRelation {angle=∠DEO}, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]∠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.#%#

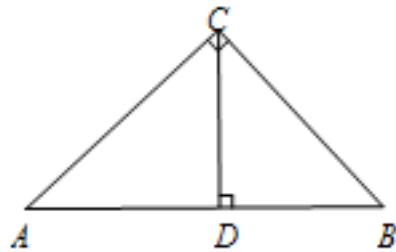


graph:
{"stem": {"pictures": [{"picturename": "1000041787_Q_1.jpg", "coordinates": {"A": "-11.00,4.00", "B": "-8.00,7.00", "C": "-8.00,4.00", "D": "-8.00,5.50", "E": "-9.50,5.50", "F": "-12.50,5.50"}, "collineations": {"0": "A###C", "1": "A###F", "2": "A###E###B", "3": "B###D###C", "4": "C###E", "5": "F###E###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: MiddlePerpendicularRelation [iLine1=DE, iLine2=BC,

crossPoint=Optional.of(D)],TriangleRelation:△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:] $\angle DBE$)}

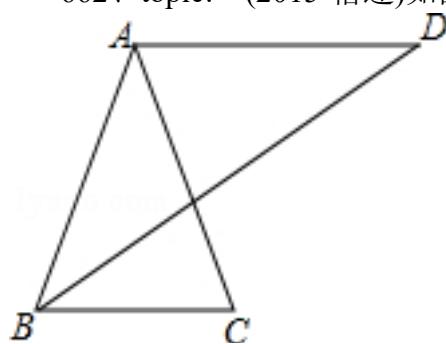
661、topic: 如图,在 $\triangle ABC$ 中, $\angle ACB=90^\circ$, $AC=16$, $BC=12$, $CD \perp AB$,垂足为D.求AB、CD的长.#%#



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:△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)}

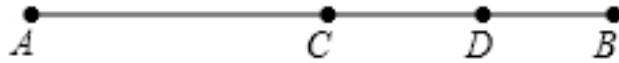
662、topic: (2015·宿迁)如图,已知 $AB=AC=AD$,且 $AD \parallel BC$,求证: $\angle C=2\angle D$.#%#



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": []}}

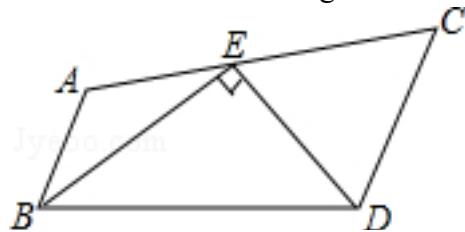
NLP:

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.#%#

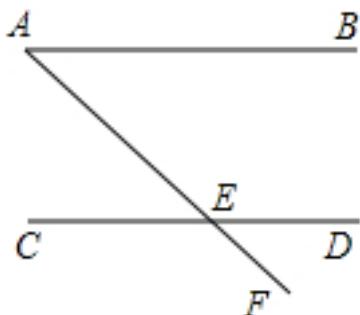


graph:

{"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= $\angle CDB$, 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.#%#

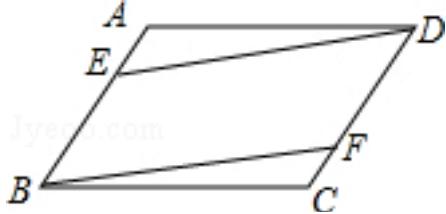


graph:

{"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 $SAE = CFS$.?#%#(1)求证: $\triangle ADE \cong \triangle CBF$?#%#(2)求证:四边形BFDE是平行四边形.

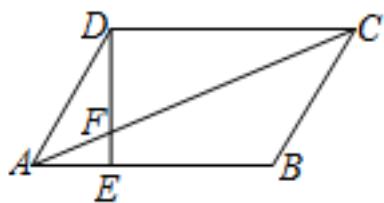


graph:

{"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"}, "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 $\frac{C}{\triangle AEF}$?#%#(2)如果 $S_{\triangle AEF}=6\text{cm}^2$,求 $S_{\triangle CDF}$.?#%#



graph:

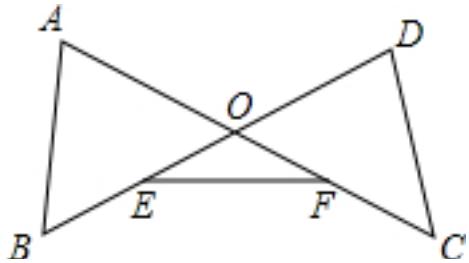
{"stem": {"pictures": [{"picturename": "1000062179_Q_1.jpg", "coordinates": {"A": "-1.00,0.00", "B": "2.00,0.00", "C": "3.00,2.00", "D": "0.00,2.00", "E": "0.00,0.00", "F": "0.00,0.50"}, "collineations": {"0": "A###E###B", "1": "F###A###C", "2": "F###E###D", "3": "D###C", "4": "B###C", "5": "A###D"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP:

ParallelogramRelation {parallelogram=Parallelogram:ABCD}, EqualityRelation {(AE)/(BE)=(1)/(2)}, 求值(大小): (ExpressRelation:[key:]C_ΔAEF)/C_ΔCDF), EqualityRelation {S_ΔAEF=6}, 求值(大小): (ExpressRelation:[key:]S_ΔCDF)), SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]C_ΔAEF)/C_ΔCDF)}, SolutionConclusionRelation {relation=求值(大小):

(ExpressRelation:[key:]S_△CDF))}

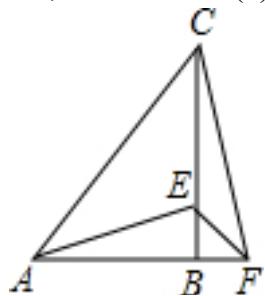
668、topic: 如图,已知线段AC与BD相交于点O,连接AB、DC,点E为OB的中点,点F为OC的中点,连接EF.
 (1)添加条件 $\angle A=\angle D$, $\angle OEF=\angle OFE$.求证:AB=DC;
 (2)分别将“ $\angle A=\angle D$ ”记为①,“ $\angle OEF=\angle OFE$ ”记为②,“AB=DC”记为③,添加条件①、③,以②为结论构成命题1,添加条件②、③,以①为结论构成命题2.命题1是_____命题,命题2是_____命题(选填“真”或“假”).



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:

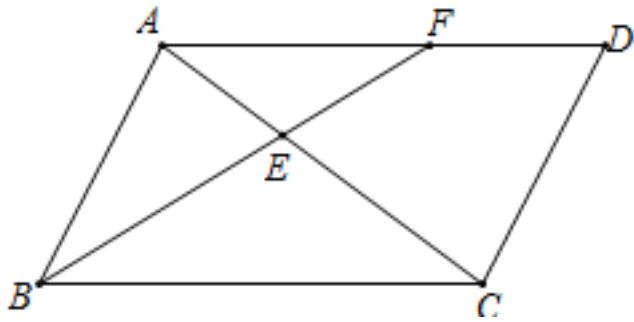
669、topic: 如图,在 $\triangle ABC$ 中,AB=BC, $\angle ABC=90^\circ$,F为AB延长线上一点,点E在BC上,BE=BF,连结AE,EF和CF.
 (1)求证:AE=CF;
 (2)若 $\angle CAE=30^\circ$,求 $\angle EFC$ 的度数.



graph:
 {"stem": {"pictures": [{"picturename": "1000063717_Q_1.jpg", "coordinates": {"A": "-4.00, 0.00", "B": "0.00, 0.0", "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:△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:] $\angle CFE$)}

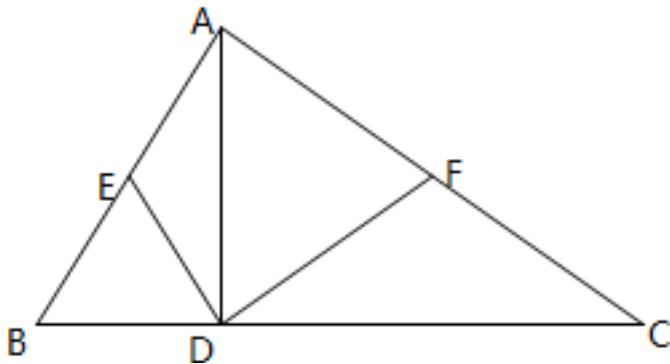
670、topic: 如图,在 $\square ABCD$ 中, $\angle ABC$ 的平分线BF分别与AC、AD交于点E、F.
 (1)求证:AB=AF;
 (2)当AB=3,BC=5时,求 $\frac{AE}{AC}$ 的值.



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"}, "collineations": {"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:][(AB)/(AC)]), ProveConclusionRelation:[证明: EqualityRelation {AB=AF}], SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:][(AB)/(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. #%#

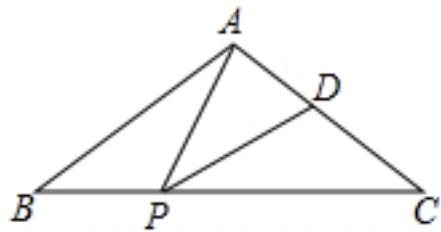


graph:
 {"stem": {"pictures": [{"picturename": "1000072718_Q_1.jpg", "coordinates": {"A": "1.80,2.40", "B": "0.00,0.00", "C": "5.00,0.00", "D": "1.80,0.00", "E": "0.90,1.20", "F": "3.40,1.20"}, "collineations": {"0": "B##E##A", "1": "B##D##C", "2": "C##F##A", "3": "D##E", "4": "D##F", "5": "A##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, 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.

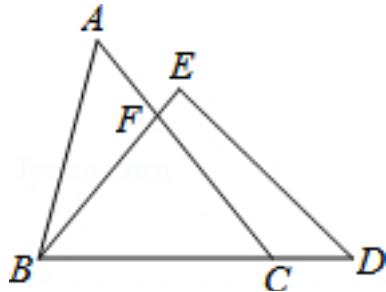


graph:

{"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: ΔABC , EqualityRelation {AB=AC}, PointOnLineRelation {point=P, line=BC, isConstant=false, extension=false}, PointOnLineRelation {point=D, line=AC, isConstant=false, extension=false}, EqualityRelation { $\angle APD = \angle ABP$ }, 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 ΔABC 和 ΔBDE 中,点C在边BD上,边AC交边BE于点F.若 $AC=BD, AB=ED, BC=BE$, 求证: $\angle ACB = \frac{1}{2}\angle AFB$.

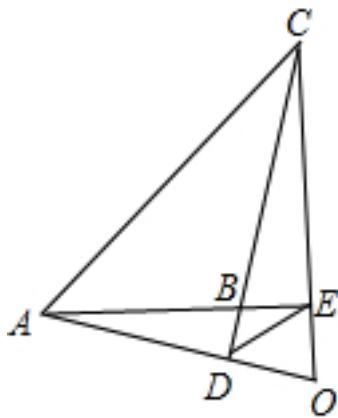


graph:

{"stem": {"pictures": [{"picturename": "1000030733_Q_1.jpg", "coordinates": {"A": "-9.29,5.54", "B": "-10.00,2.00", "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: ΔABC , TriangleRelation: ΔBDE , PointOnLineRelation {point=C, line=BD, isConstant=false, extension=false}, LineCrossRelation [crossPoint=Optional.of(F), iLine1=AC, iLine2=BE], EqualityRelation {AC=BD}, EqualityRelation {AB=ED}, EqualityRelation {BC=BE}, ProveConclusionRelation:[证明: EqualityRelation { $\angle BCF = (1/2) * \angle AFB$ }]

674、topic: 如图,点O是 ΔABC 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: $\Delta ODE \sim \Delta OCA$.

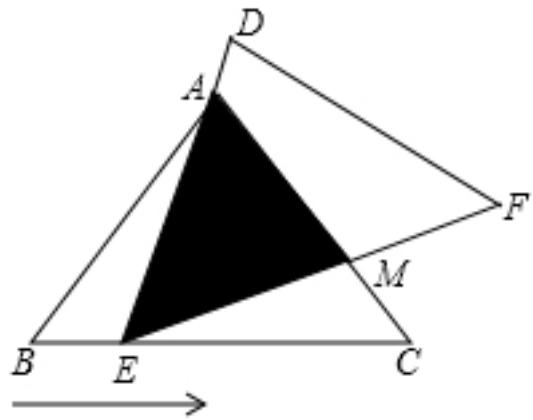


graph:

```
{"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 $\triangle ABC$ 中,已知 $AB=AC=5, BC=6$,且 $\triangle ABC \cong \triangle DEF$,将 $\triangle DEF$ 与 $\triangle ABC$ 重合在一起, $\triangle ABC$ 不动, $\triangle DEF$ 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: $\triangle ABE \sim \triangle ECM$;
(2)探究:在 $\triangle DEF$ 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:

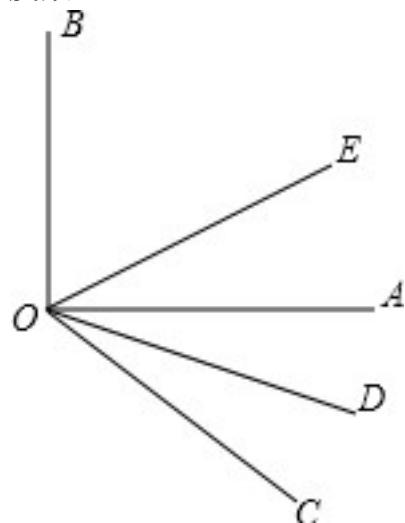
```
{"stem": {"pictures": [{"picturename": "1000041748_Q_1.jpg", "coordinates": {"A": "-6.00,6.00", "B": "-9.00,2.00", "C": "-3.00,2.00", "D": "-5.76,6.47", "E": "-8.00,2.00", "F": "-2.10,3.07", "M": "-3.60,2.80"}, "collineations": {"0": "A###M###C", "1": "B###E###C", "2": "A###B", "3": "D##A##E", "4": "E##M##F", "5": "D##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}
```

NLP: TriangleRelation:△ABC, MultiEqualityRelation [multiExpressCompare=AB=AC=5, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BC=6}, TriangleCongRelation{triangleA=△ABC, triangleB=△DEF}, TriangleRelation:△ABC, TriangleRelation:△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=△ABE, triangleB=△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.

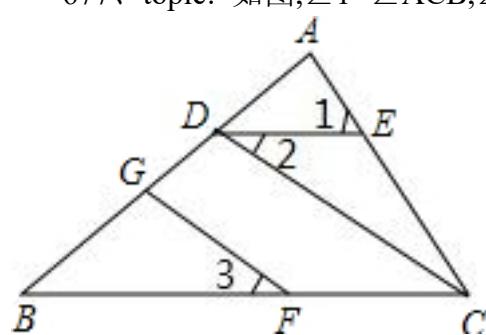


graph:

```
{"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: $\angle BDC+\angle DGF=180^\circ$.

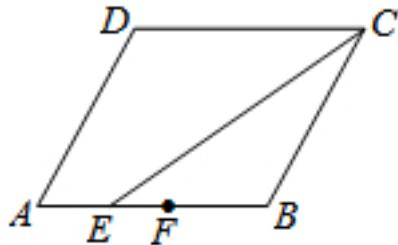


graph:

```
{"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": "\u00b21=\u00b2ACB", "1": "\u00b22=\u00b2CDE", "2": "\u00b23=\u00b2BFG"}, "circles": []}, "appliedproblems": {}, "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 $\square ABCD$ 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. #%#



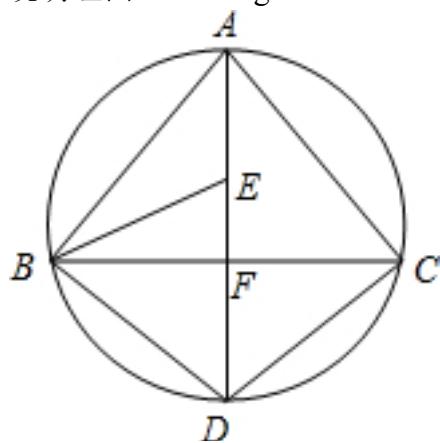
graph:

{"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"}, "collinearities": {"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. #%#

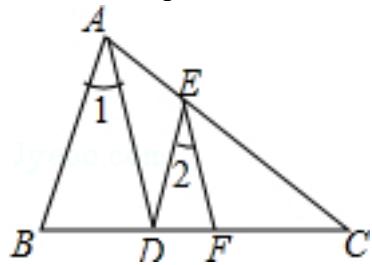


graph:

{"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= $\angle ABE$, 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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, RadiusRelation{radius=DB, circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, length=null}, ProveConclusionRelation:[证明: EqualityRelation{BD=CD}], ProveConclusionRelation:[证明: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[B]}], ProveConclusionRelation:[证明: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, points=[E]}], ProveConclusionRelation:[证明: PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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. #%#

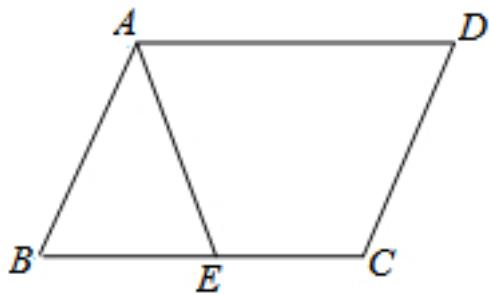


graph:

{"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"}, "collinear": {"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. #%#

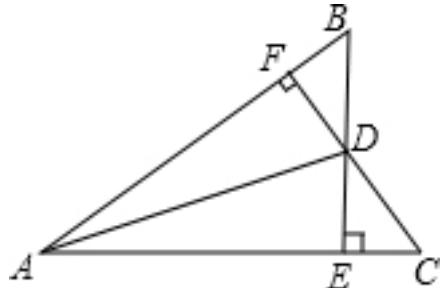


graph:

{"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"}, "collinear": {"0": "E##B##C", "1": "B##A", "2": "A##E", "3": "C##D", "4": "A##D"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: ParallelogramRelation{parallelogram=Parallelogram:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, SegmentRelation:AE, EqualityRelation{AB=AE}, ProveConclusionRelation:[证明: EqualityRelation{ $\angle DAE = \angle ADC$ }]

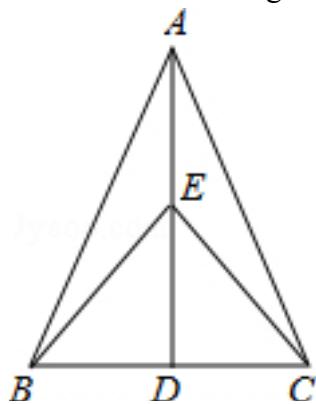
682、topic: 如图,已知BE \perp AC于E,CF \perp AB于F,BE、CF相交于点D,若BD=CD.##求证:AD平分 $\angle BAC$.##



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

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= $\angle DAF$ }]

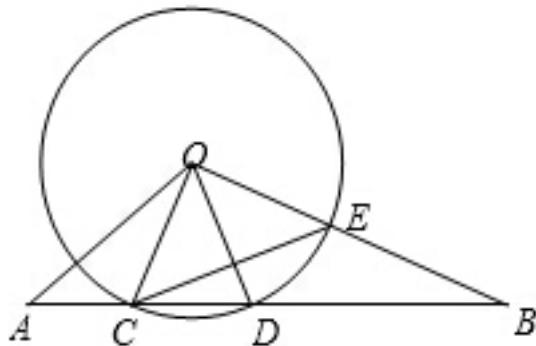
683、topic: 如图,在 $\triangle ABC$ 中,AB=AC,D是BC的中点,点E在AD上,用轴对称的性质说明:BE=CE.##



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

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}]

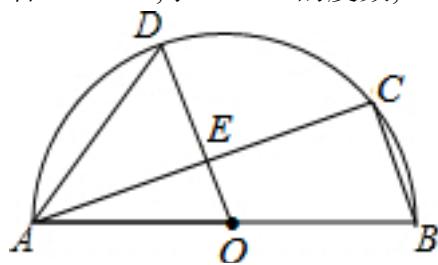
684、topic: 如图, $\odot O$ 的半径为 6, 线段 AB 与 $\odot O$ 相交于点 C 、 D , $AC=4$, $\angle BOD=\angle A$, OB 与 $\odot O$ 相交于点 E , 设 $OA=x$, $CD=y$. (1) 求 BD 长; (2) 求 y 关于 x 的函数解析式; (3) 当 $CE \perp OD$ 时, 求 AO 的长.



graph:

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{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 $OD \parallel BC$, 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.

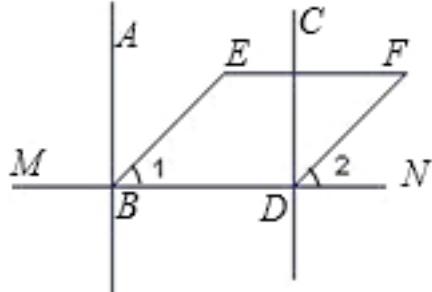


graph:

```
{"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": {}, "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}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, 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)}

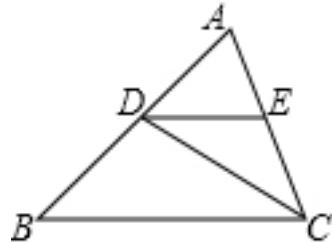
686、topic: 如图,已知:AB \perp MN,CD \perp MN,垂足为B,D,BE,DF分别平分 $\angle ABN$, $\angle CDN$.试说明:BE//DF. #%#



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

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. #%#

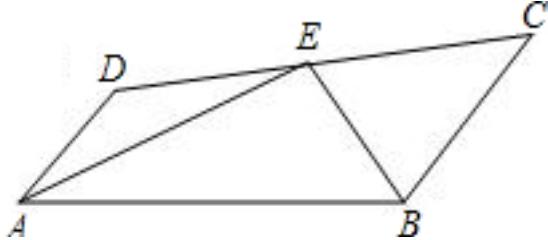


graph:
 {"stem": {"pictures": [{"picturename": "1000063423_Q_1.jpg", "coordinates": {"A": "1.17,2.60", "B": "-2.92,-0.37", "C": "2.62,-0.37", "D": "-0.35,1.49", "E": "1.71,1.49"}, "collineations": {"0": "B##A##D", "1": "E##A##C", "2": "C##B", "3": "C##D", "4": "E##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: TriangleRelation: $\triangle ABC$, TriangleRelation: $\triangle ABC$, LineParallelRelation [iLine1=DE, iLine2=BC], LineCrossRelation [crossPoint=Optional.of(E), iLine1=DE, iLine2=AC], EqualityRelation{ \angle

AED=(16/45*Pi}), EqualityRelation{ $\angle DAE=(4/9*Pi)$ }, 求角的大小: AngleRelation{angle= $\angle BDC$ }, AngleBisectorRelation{line=CD, angle= $\angle BCE$, angle1= $\angle BCD$, angle2= $\angle DCE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BDC$)}

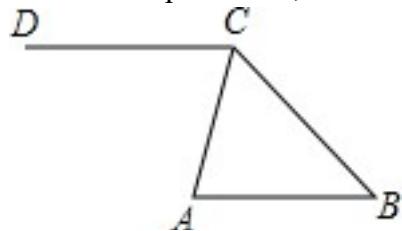
688、topic: 如图:E在线段CD上,EA,EB分别平分 $\angle DAB$ 和 $\angle CBA$, $\angle AEB=90^\circ$. 设AD=x,BC=y, 且 $((x-3)^2+|y-4|=0$. (1)求AD和BC的长. (2)你认为AD和BC还有什么关系? 并验证你的结论.



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": {}}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}, {"substemid": "3", "questionrelies": "1", "pictures": [], "appliedproblems": {}}], "graph": {}}}

NLP: PointOnLineRelation{point=E, line=CD, isConstant=false, extension=false}, AngleBisectorRelation{line=EA, angle= $\angle DAB$, angle1= $\angle BAE$, angle2= $\angle DAE$ }, AngleBisectorRelation{line=EB, angle= $\angle ABC$, angle1= $\angle ABE$, angle2= $\angle CBE$ }, EqualityRelation{ $\angle AEB=(1/2*Pi)$ }, EqualityRelation{AD=x}, EqualityRelation{BC=y}, EqualityRelation{ $((x-3)^2+|y-4|=0$ }, 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))}}

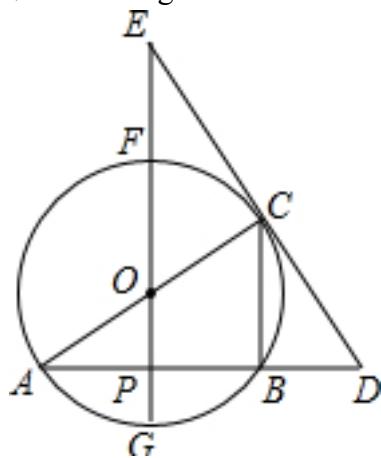
689、topic: 如图,已知 $\angle ACD=70^\circ$, $\angle ACB=60^\circ$, $\angle ABC=50^\circ$. 求证: $AB \parallel CD$



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

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 $\sqrt{5}$. 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. #

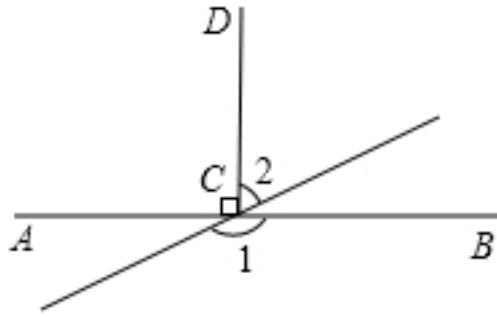


graph:

```
{"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##C##G##B##F"}]}, "appliedproblems": {}, "substems": []}}
```

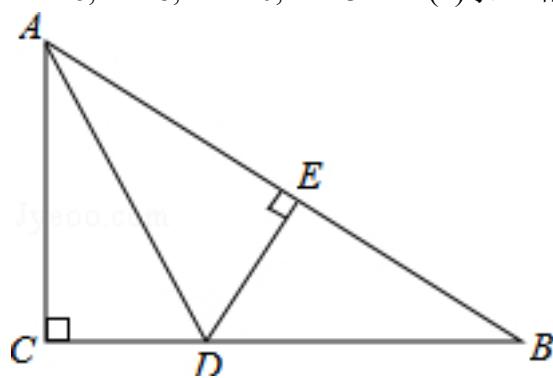
NLP: CircleRelation{circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}}, DiameterRelation{diameter=FG, circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null}, DiameterRelation{diameter=AC, circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, 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}, LinePerpRelation{line1=FG, line2=AB, crossPoint=P}, EqualityRelation{AB=4}, RadiusRelation{radius=null, circle=Circle[$\odot O$]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^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(∠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=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, contactPoint=Optional.of(C), outpoint=Optional.absent()}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]DE)}

691、topic: 如图, $CD \perp AB$, 垂足为 C , $∠1=130^\circ$, 求 $∠2$ 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"}, "collineations": {"0": "A##B", "1": "E##F", "2": "C##D"}, "variable-equals": {"0": "\u00221=\u0022BCF", "1": "\u00222=\u0022DCE"}, "circles": [], "appliedproblems": {}, "substems": []}], "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 $\triangle ABC$ 中, $\angle C=90^\circ$,AD平分 $\angle CAB$,DE $\perp AB$ 于E,若 $AC=6$, $BC=8$, $AB=10$, $CD=3$.(1)求DE的长;(2)求 $\triangle ADB$ 的面积.

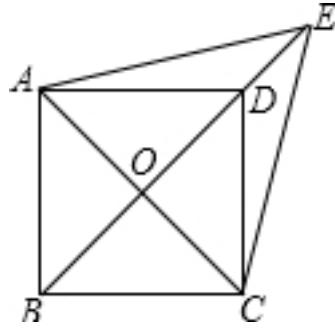


graph:
 {"stem": {"pictures": [{"picturename": "4AD58AC2681C42258AB272C9A119593A.jpg", "coordinates": {"A": "-14.00,9.00", "B": "-6.00,3.00", "C": "-14.00,3.00", "D": "-11.00,3.00", "E": "-9.20,5.40"}, "collineations": {"0": "A##B##E", "1": "A##C", "2": "D##A", "3": "C##B##D", "4": "D##E"}, "variable-equals": {}, "circles": [], "appliedproblems": {}, "substems": []}], "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

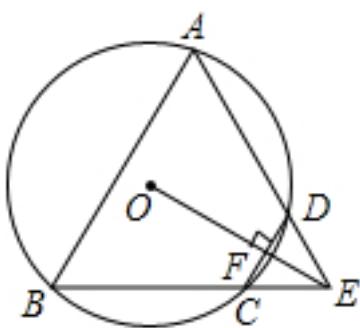
角形.%(1)求证:四边形ABCD是菱形;%(2)当 $\angle AED$ 与 $\angle EAD$ 满足什么数量关系时,四边形ABCD是正方形?试说明你的理由.%(



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}, RegularTriangleRelation:RegularTriangle:△ACE, SquareRelation{square=Square:ABCD}, JudgeTwoAnglesConnectRelation{[$\angle AED, \angle DAE$]}, ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:ABCD}], ProveConclusionRelation:[证明: JudgeTwoAnglesConnectRelation{[$\angle AED, \angle DAE$]})]

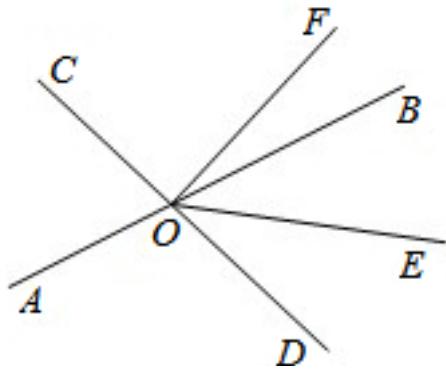
694、topic: 如图,四边形ABCD是 $\odot O$ 的内接四边形,BC的延长线与AD的延长线交于点E,且 $DC=DE$.%(1)求证: $\angle A=\angle AEB$;%(2)连接OE,交CD于点F,OE \perp CD,求证: $\triangle ABE$ 是等边三角形.%(



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

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:△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.#%#

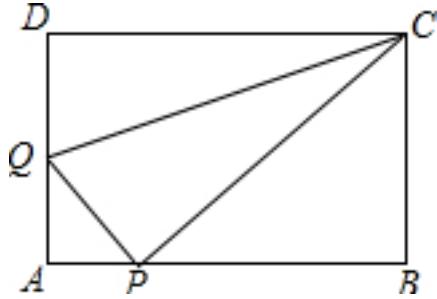


graph:

{"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,连接CQ.当 $\triangle CDQ \cong \triangle CPQ$ 时,求AQ的长.#%#



graph:

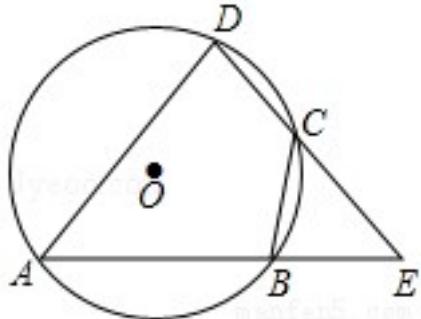
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NLP:

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=ACDQ, triangleB=CPQ}, 求值(大小): (ExpressRelation:[key:Jv_0]), SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]AQ)}

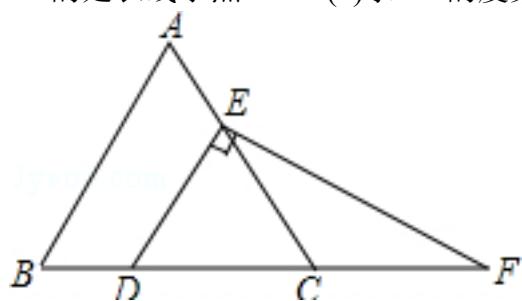
697、topic: 如图,已知A、B、C、D是 $\odot O$ 上的四点,延长DC、AB相交于点E,若 $BC=BE$.求证: $\triangle ADE$ 是等腰三角形.



graph:
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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]}, 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.

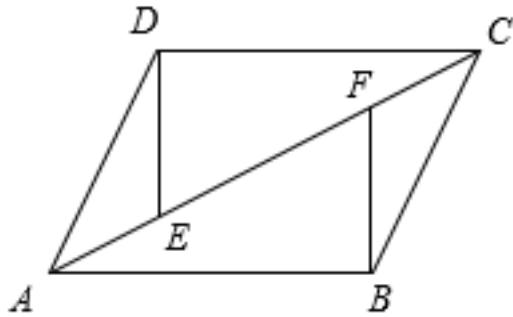


graph:
 {"stem": {"pictures": [{"picturename": "1000031175_Q_1.jpg", "coordinates": {"A": "-8.50, 6.60", "B": "-10.00, 4.00", "C": "-7.00, 4.00", "D": "-9.00, 4.00", "E": "-8.00, 5.73", "F": "-5.00, 4.00"}, "collineations": {"0": "B###D###C###F", "1": "A###B", "2": "A###E###C", "3": "E###F", "4": "E###D"}, "variable>equals": {}, "circles": {}, "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.##

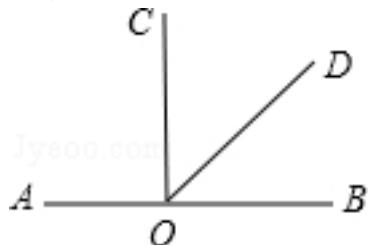


graph:

{"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", "1": "F##C", "2": "D##E", "3": "A##D", "4": "B##C", "5": "F##B", "6": "A##B", "7": "C##D"}, "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: 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.##

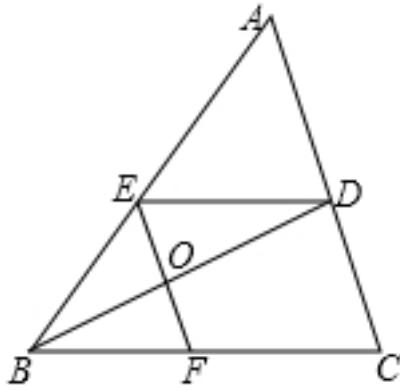


graph:

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

NLP: (ExpressRelation:[key:]AOB),EqualityRelation{($\angle AOD$)/($\angle BOD$)=(3)/(1)},AngleBisectorRelation{line=OD,angle= $\angle COB$, 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]

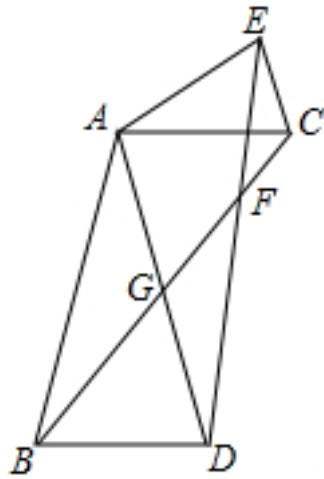
701、topic: 已知:如图, $\triangle ABC$ 中, $\angle B$ 的平分线BD交AC于点D,DE//BC,EF//AC,EF交BD于点O.求证:BE=CF.##



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": {}, "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], LineParallelRelation [iLine1=EF, iLine2=AC], LineCrossRelation [crossPoint=Optional.of(O), iLine1=EF, iLine2=BD], ProveConclusionRelation:[证明: EqualityRelation{BE=CF}]

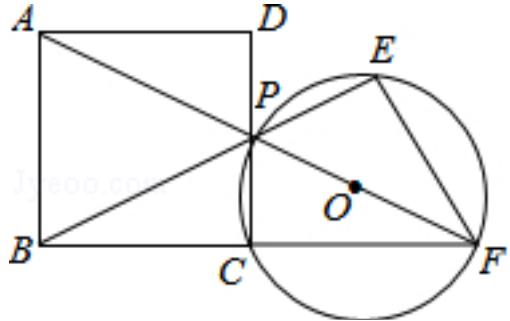
702、topic: 如图,在 $\triangle ABD$ 和 $\triangle ACE$ 中, $AB=AD$, $AC=AE$, $\angle BAD=\angle CAE$, 连接 BC 、 DE 相交于点 F , BC 与 AD 相交于点 G . 证明: $\triangle ABC \cong \triangle ADE$. #%#



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"}, "collineations": {"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}, EqualityRelation{ $\angle BAG=\angle CAE$ }, 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.

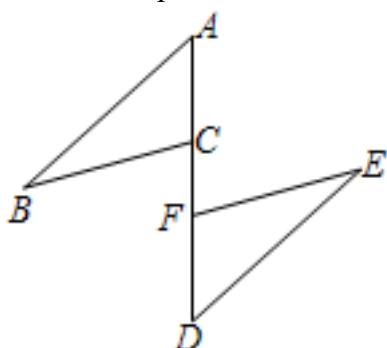


graph:

{"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": {"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: $\triangle ABC \cong \triangle DEF$.#%#



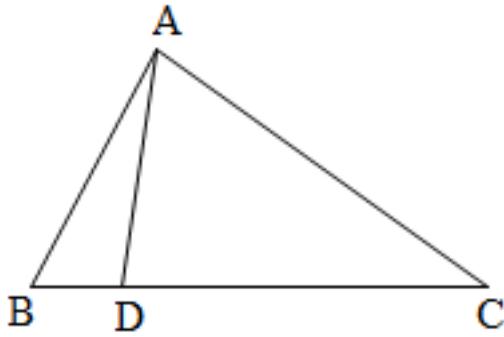
graph:

{"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"}, "collinearations": {"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= $\triangle DEF$ }]

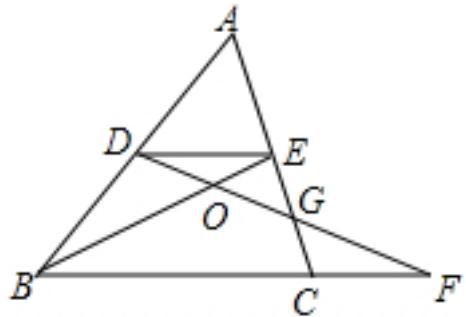
705、topic: 如图,D为 $\triangle ABC$ 的边BC上一点,且 $\angle BAD = \angle C$,求证: $\frac{AD^2}{AC^2} = \frac{BD}{BC}$



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: $\triangle ABC$, SegmentRelation: BC , PointOnLineRelation {point=D, line= BC , isConstant=false, extension=false}, EqualityRelation { $\angle BAD = \angle ACD$ }, ProveConclusionRelation: [证明: EqualityRelation { $((AD)^2)/((AC)^2) = (BD)/(BC)$ }]]

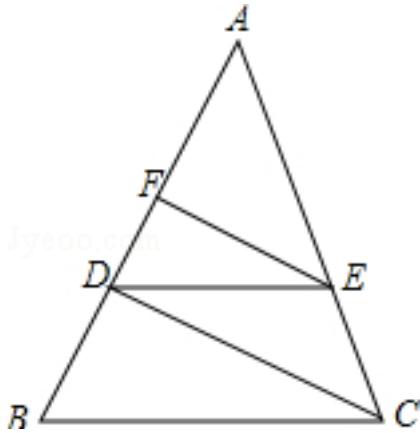
706、topic: 如图,在 $\triangle ABC$ 中,点D,E分别是边AB,AC的中点,DF过EC的中点G并与BC的延长线交于点F,BE与DF交于点O.已知 $\triangle ADE$ 的面积为2,求四边形BOGC的面积.



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: $\triangle ABC$, 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 { $S_{\triangle ADE} = 2$ },求值(大小): (ExpressRelation:[key:] v_0), SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:] S_{BCGO})}

707、topic: 如图, $\triangle ABC$ 中, $DE \parallel BC$, $EF \parallel CD$. 求证: AD 是 AB 和 AF 的比例中项.

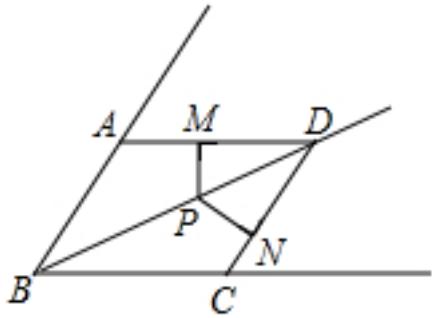


graph:

{"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: $PM=PN$.

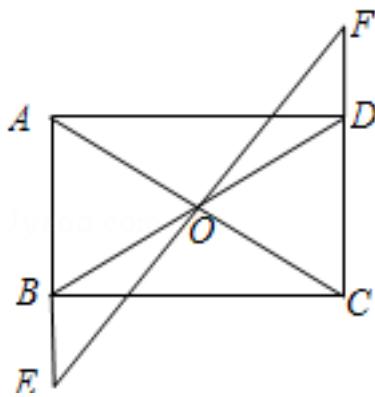


graph:

{"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: $\triangle BOE \cong \triangle DOF$; (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.

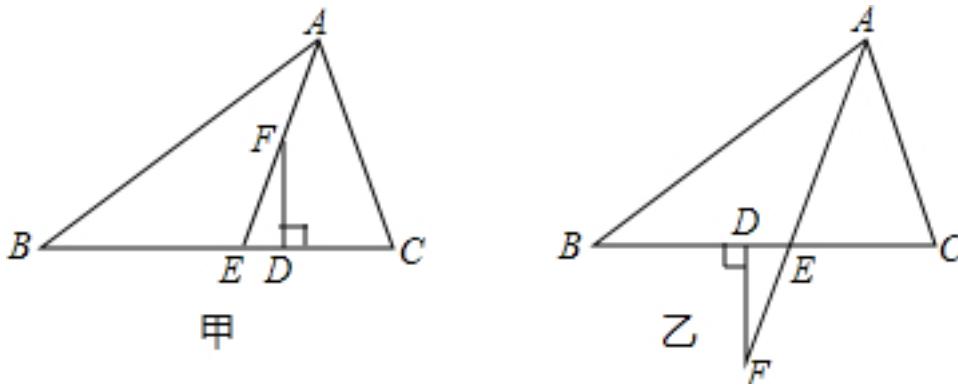


graph:

{"subsystems": [{"questionrelies": "1"}], "stem": {"pictures": [{"variable>equals": {}, "picturename": "1000001146_Q_1.jpg", "collineations": {"2": "E###O###F", "1": "B###O###D", "3": "B###A###E", "4": "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=△BOE, triangleB=△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.#%#

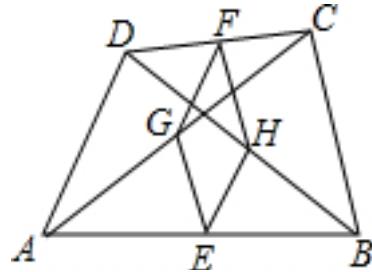


graph:

{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": []}, {"substemid": "2", "questionrelies": "", "pictures": [{"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": []}]}]}

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{ $\angle DFE = (1/2) * (\angle ACD - \angle ABE)$ }]

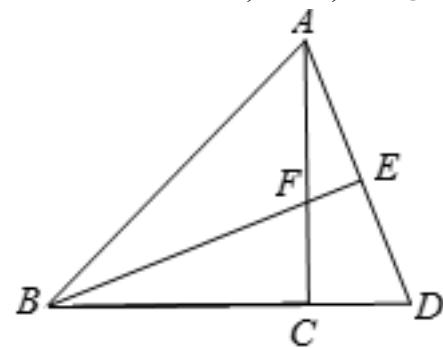
711、topic: 已知:如图,在四边形ABCD中,AD=BC,点E,F,G,H分别是AB,CD,AC,BD的中点.求证:四边形EGFH是菱形.#%#



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

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#%#

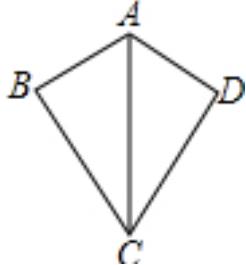


graph:
 {"stem": {"pictures": [{"picturename": "1000042046_Q_1.jpg", "coordinates": {"A": "-4.30,17.54", "B": "-9.84,12.00", "C": "-4.30,12.00", "D": "-2.00,12.00", "E": "-3.15,14.77", "F": "-4.30,14.30"}, "collineations": {"0": "A###E###D", "1": "A###B", "2": "A###F###C", "3": "B###F###E", "4": "B###C###D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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: $\angle DAC = \angle BAC$.#%#

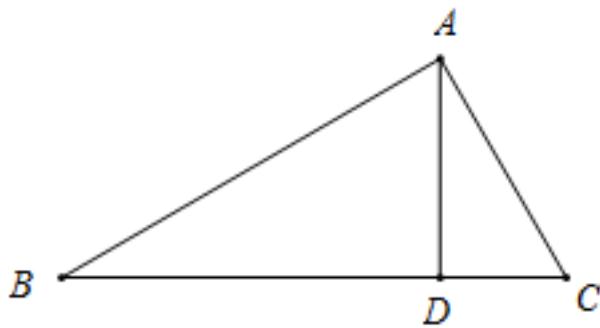


graph:

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

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: $BD=AC+CD$.#%#

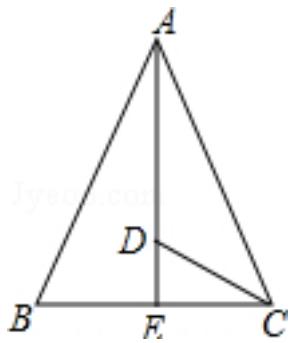


graph:

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

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.#%#

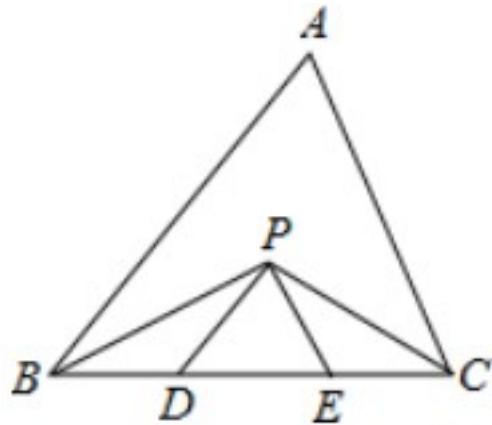


graph:

{"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": {}, "substem": "[]"}}

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:

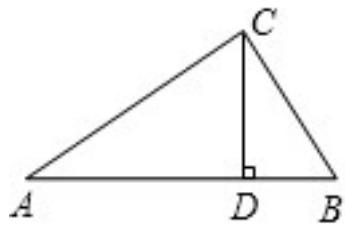
[{"circles": [], "variable>equals": {}, "picturename": "1000002899_Q_1.jpg", "collineations": {"3": "P##C", "2": "P##B", "1": "A##C", "0": "A##B", "6": "B##D##E##C", "5": "P##E", "4": "P##D"}, "coordinates": {"D": "-3.20,-2.00", "E": "-1.20,-2.03", "P": "-1.75,-0.20", "A": "-1.01,3.65", "B": "-5.50,-1.96", "C": "0.71,-2.06"}}]

NLP:

EqualityRelation {C_ΔDEP=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_ΔDEP)}

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

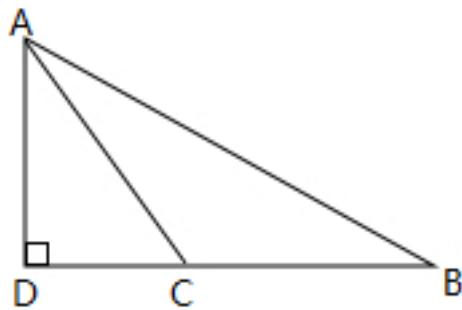
ΔABC 的周长.



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_ΔABC=v_1}, TriangleRelation:ΔABC, 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_ΔABC)}

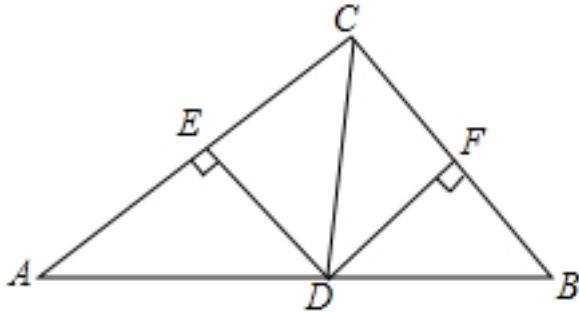
718、topic: 如图,在钝角三角形ABC中, $CB=9$, $AB=17$, $AC=10$, $AD \perp BC$, 垂足为D. 求CD的长.%#



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:ΔABC[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)}

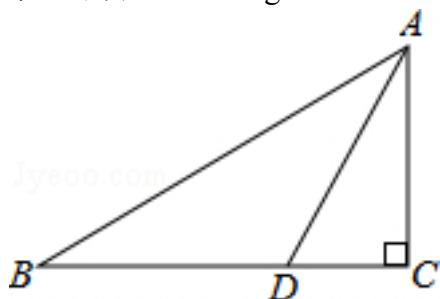
719、topic: (2015·广西)如图,在 ΔABC 中, CD 平分 $\angle ACB$ 交 AB 于点D, $DE \perp AC$ 于点E, $DF \perp BC$ 于点F, 且 $BC=4$, $DE=2$, 求 ΔBCD 的面积.%#



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##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_ΔBCD=v_0}, TriangleRelation:ΔABC, 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_ΔBCD)}

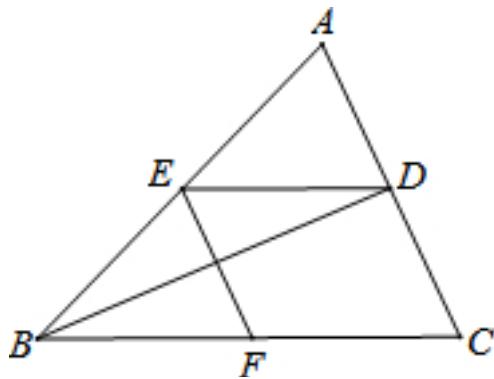
720、topic: (2015·大连)如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$, $AC=2$,点D在BC上, $\angle ADC=2\angle B$, $AD=\sqrt{5}$,求BC的长. #%#



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:ΔABC, 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)}

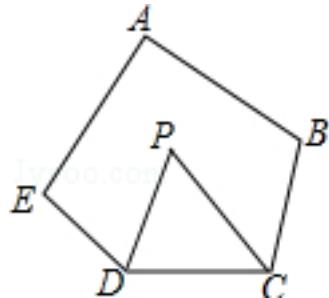
721、topic: 已知:如图,BD是 $\triangle ABC$ 的角平分线,点E、F分别在AB、BC上,且 $ED \parallel BC$, $EF \parallel AC$. #%#



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": []}}

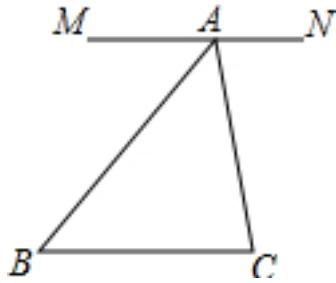
NLP: TriangleRelation: ΔABC , PointOnLineRelation {point=E, line=AB, isConstant=false, extension=false}, PointOnLineRelation {point=F, line=BC, isConstant=false, extension=false}, LineParallelRelation [iLine1=ED, iLine2=BC], LineParallelRelation [iLine1=EF, iLine2=AC], AngleBisectorRelation {line=BD, 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": []}}

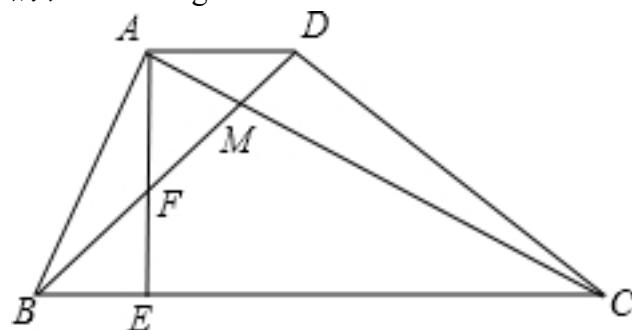
NLP: PolygonRelation {polygon=ABCDE}, EqualityRelation { $\angle BAE+\angle ABC+\angle AED=(5/3\pi)$ }, AngleBisectorRelation {line=DP, angle= $\angle CDE$, angle1= $\angle CDP$, angle2= $\angle EDP$ }, AngleBisectorRelation {line=CP, angle= $\angle BCD$, angle1= $\angle BCP$, angle2= $\angle DCP$ }, 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": {}, "subsystems": []}}

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"}, "collineations": {"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{ $(AB)^2 = BF \cdot BD$ }], SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]EF)}

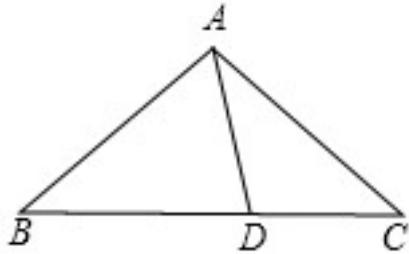
725、topic: 如图, $\angle B = \angle ACB$, $CD \perp AB$ 于点D, CE平分 $\angle ACB$, 若 $\angle DCE = 42^\circ$, 求 $\angle BAC$ 的度数.

graph:

{"stem": {"pictures": [{"picturename": "1000021712_Q_1.jpg", "coordinates": {"A": "1.46,2.03", "B": "-1.65,0.0", "C": "5.00,0.00", "D": "3.02,3.04", "E": "0.28,1.26"}, "collineations": {"0": "C##D", "1": "E##B##D##A", "2": "E##C", "3": "C##A", "4": "B##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

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.

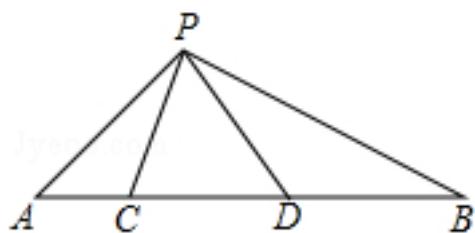


graph:

{"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: $\triangle ABC$, MultiEqualityRelation[multiExpressCompare=AB=BD=AC, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{AD=CD}, 求角的大小: AngleRelation{angle= $\angle ADB$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ADB$)}

727、topic: 如图,点C,D在线段AB上, $\triangle PCD$ 是等边三角形,且 $\triangle ACP \sim \triangle PDB$,求 $\angle APB$ 的度数.

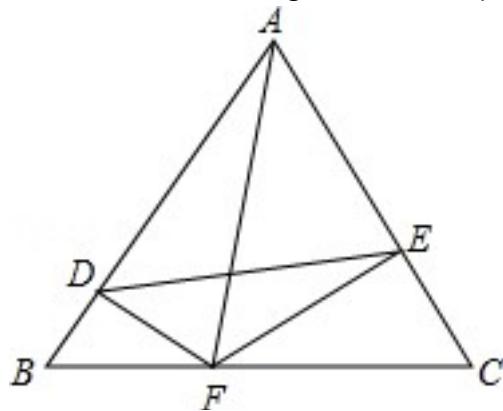


graph:

{"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: $\triangle PCD$, TriangleSimilarRelation{triangleA= $\triangle ACP$, triangleB= $\triangle PDB$ }, 求角的大小: AngleRelation{angle= $\angle APB$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle APB$)}

728、topic: $\triangle ABC$ 为等边三角形,边长为 a , $DF \perp AB$, $EF \perp AC$ (1)求证: $\triangle BDF \sim \triangle CEF$; #(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"}, "collineations": {"0": "B##A##D", "1": "B##F##C", "2": "D##F", "3": "D##E", "4": "E##F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

RegularTriangleRelation:RegularTriangle: $\triangle ABC$,EqualityRelation $\{AB=a\}$,LinePerpRelation $\{\text{line1}=DF, \text{line2}=AB, \text{crossPoint}=D\}$,LinePerpRelation $\{\text{line1}=EF, \text{line2}=AC, \text{crossPoint}=\}$,EqualityRelation $\{a=4\}$,EqualityRelation $\{BF=m\}$,已知条件

QuadrilateralRelation $\{\text{quadrilateral}=ADFE\}$,EqualityRelation $\{S_{ADFE}=S\}$,表达式之间的关系:

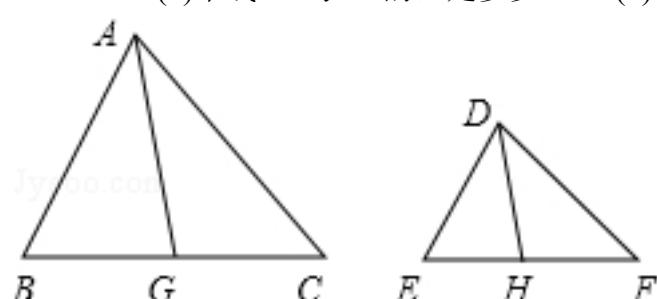
DualExpressRelation $\{\text{expresses}=[\text{Express}:[S], \text{Express}:[m]]\}$,求值(大小):

(ExpressRelation:[key:]m),ExtremumRelation [key=Express:[S], value=null, extremumType=MAX],MultiPointConcyclicRelation $\{\text{circle}=, \text{pointSet}=[A, D, F, E]\}$,EqualityRelation $\{\tan(\angle EDF)=((3^{(1/2)})/2)\}$,圆的直径: CircleRelation $\{\text{circle}=Circle[\odot O_0]\{\text{center}=O_0, \text{analytic}=(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2\}$,ProveConclusionRelation:[证明:

TriangleSimilarRelation $\{\text{triangleA}=\triangle BDF, \text{triangleB}=\triangle CEF\}$],SolutionConclusionRelation $\{\text{relation}=表达式之间的关系: DualExpressRelation\{\text{expresses}=[\text{Express}:[S], Express:[m]]\}, SolutionConclusionRelation\{\text{relation}=求值(大小):$

(ExpressRelation:[key:]m), SolutionConclusionRelation\{\text{relation}=圆的直径: CircleRelation\{\text{circle}=Circle[\odot O_0]\{\text{center}=O_0, \text{analytic}=(x-x_{O_0})^2+(y-y_{O_0})^2=r_{O_0}^2\}\}

729、topic: 如图,在 $\triangle ABC$ 和 $\triangle DEF$ 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) $\triangle ABC$ 与 $\triangle DEF$ 的面积比是多少? #



graph:

{"stem": {"pictures": [{"picturename": "1000050782_Q_1.jpg", "coordinates": {"A": "-6.00,5.00", "B": "-8.00,2.00", "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: ΔABC , TriangleRelation: ΔDEF , 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 $_{\Delta ABC}$ =v_0}, EqualityRelation {S $_{\Delta DEF}$ =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.?(1)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.#%#

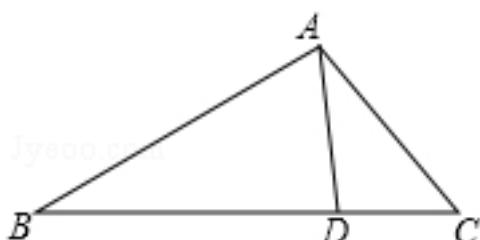


graph:

{"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_2}), EqualityRelation {MN=v_3}, 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_4}), 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})

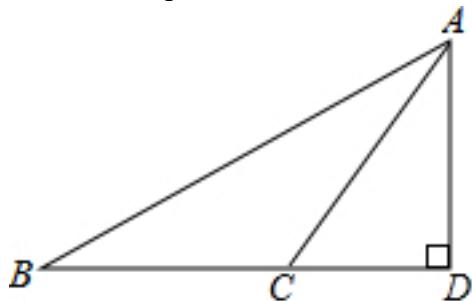
731、topic: 如图,D是 ΔABC 的边BC上一点,已知AB=4,AD=2, $\angle DAC = \angle B$,若 ΔABD 的面积为a,求 ΔACD 的面积.#%#



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

NLP: EqualityRelation{S_ΔACD=v_0}, TriangleRelation: ΔABC, PointOnLineRelation{point=D, line=BC, isConstant=false}, EqualityRelation{AB=4}, EqualityRelation{AD=2}, EqualityRelation{∠CAD=∠ABD}, EqualityRelation{S_ΔABD=a}, 求值(大小):
 (ExpressRelation:[key:]v_0), SolutionConclusionRelation{relation=求值(大小)}:
 (ExpressRelation:[key:]S_ΔACD)}

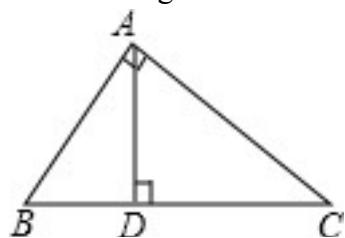
732、topic: 如图,已知CB=9,AB=17,AC=10,AD⊥BC于点D,求AD的长.%#



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

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△ABC中,∠BAC=90°,AB=15,AC=20,AD⊥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": {}, "substems": []}}

NLP: TriangleRelation: ΔABC, EqualityRelation{∠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)}

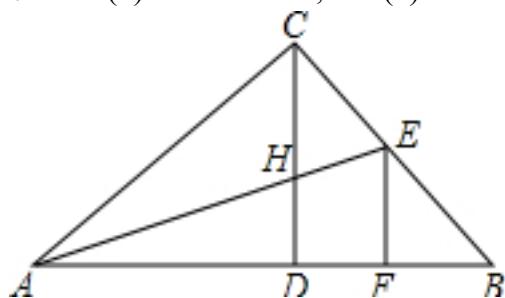
734、topic: 如图,已知A、B、C是数轴上三点,点C表示的数为6,BC=4,AB=12. #(1)写出数轴上点A、B表示的数; #(2)动点P、Q分别从A、C同时出发,点P以每秒6个单位长度的速度沿数轴向右匀速运动,点Q以每秒3个单位长度的速度沿数轴向左匀速运动,M为AP的中点,点N在线段CQ上,且 $SCN=\frac{1}{3}CQ$.设运动时间为t($t>0$)秒. #①求数轴上点M、N表示的数(用含t的式子表示); #②t为何值时,原点O恰为线段PQ的中点. #



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"}, "collinear": {"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) $CH=EF$. #

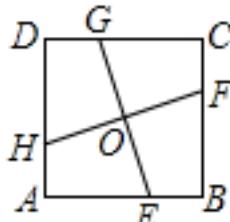


graph:
 {"stem": {"pictures": [{"picturename": "1000041261_Q_1.jpg", "coordinates": {"A": "-4.02, -0.13", "B": "4.25, -0.13", "C": "-0.13, 4.00", "D": "-0.13, -0.13", "E": "1.65, 2.32", "F": "1.65, -0.13", "H": "-0.13, 1.55"}, "collinear": {"0": "A##F##D##B", "1": "A##C", "2": "A##E##H", "3": "D##H##C", "4": "F##E", "5": "E##C##B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

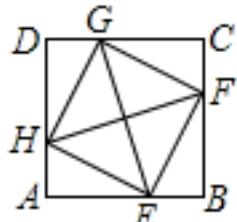
NLP: RightTriangleRelation:RightTriangle: $\triangle ABC$ [Optional.of(C)], EqualityRelation { $\angle ACE=(1/2*\pi)$ }, LinePerpRelation {line1=CD, line2=AB, crossPoint=D}, LineCrossRelation

[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= $\angle CAD$, angle1= $\angle CAE$, angle2= $\angle DAE$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\angle ACH = \angle EBF$ }], ProveConclusionRelation:[证明: EqualityRelation{CH=EF}]

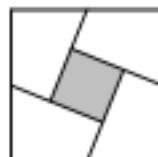
736、topic: 如图①,在正方形ABCD中,E、F、G、H分别为AB、BC、CD、DA上的点,HA=EB=FC=GD,连接EG、FH,交点为O. #%(1)如图②,连接EF、FG、GH、HE,试判断四边形EFGH的形状,并证明你的结论; #%(2)将正方形ABCD沿线段EG、HF剪开,再把得到的四个四边形按图③的方式拼接成一个四边形,若正方形ABCD的边长为3cm,HA=EB=FC=DG=1cm,则图③中阴影部分的面积为_____ \$ {{c}}
m}^2} #



图①



图②

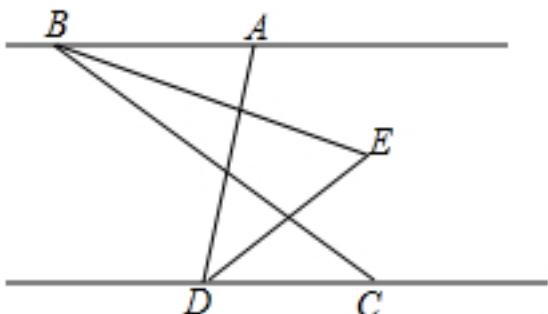


图③

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "1000041044_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": "3.00,2.00", "G": "1.00,3.00", "H": "0.00,1.00", "O": "1.50,1.50"}, "collinear": {"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}, MultiEqualityRelation [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 $\angle ABC$,DE平分 $\angle ADC$, $\angle BAD=80^\circ$,试求:(1) $\angle EDC$ 的度数;(2)若 $\angle BCD=n^\circ$,试求 $\angle BED$ 的度数(用含n的式子表示). #

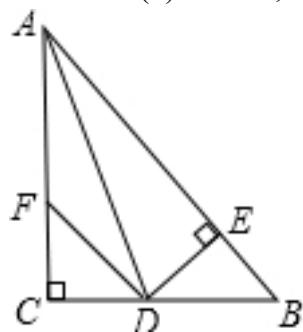


graph:

```
{"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": {}, "substs": []}}
```

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.

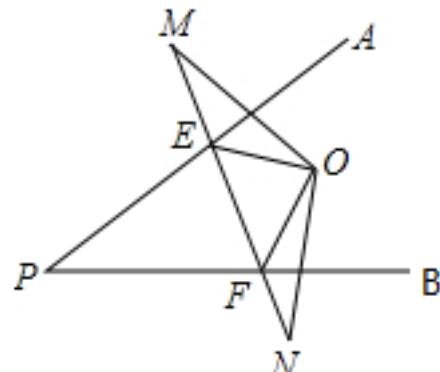


graph:

```
{"stem": {"pictures": [{"picturename": "1000038045_Q_1.jpg", "coordinates": {"A": "0.00,4.00", "B": "5.00,-1.0", "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": {}, "substs": []}}
```

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation { $\angle DCF = (1/2 * \pi)$ }, AngleBisectorRelation {line=AD, angle= $\angle EAF$, 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}]

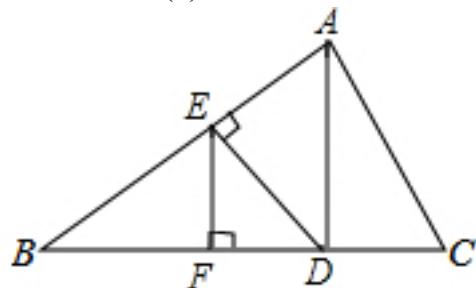
739、topic: 如图所示,已知O是 $\angle APB$ 内的一点,M、N分别是点O关于PA、PB的对称点,连接MN,与PA、PB分别相交于点E、F,已知MN=5cm. (1)求 $\triangle OEF$ 的周长;(2)连接PM、PN,判断 $\triangle PMN$ 的形状,并说明理由;(3)若 $\angle APB=\alpha$,求 $\angle MPN$ (用含 α 的代数式表示).



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_ΔEFO=v_0},求值(大小):
 (ExpressRelation:[key:]v_0),SegmentRelation:PM,SegmentRelation:PN,(ExpressRelation:[key:]α),Equality
 Relation{∠EPF=α},求角的大小: AngleRelation{angle=∠MPN},SolutionConclusionRelation{relation=求
 值(大小): (ExpressRelation:[key:]C_ΔEFO)},SolveGeoShapeConclusionRelation{iPolygon=△PMN,
 iPolygonType=SOLVEENCLOSESHAPE},SolutionConclusionRelation{relation=求值(大小):
 (ExpressRelation:[key:]∠MPN)}

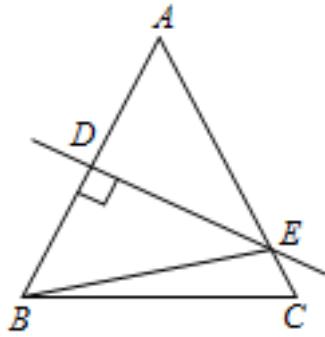
740、topic: 如图,EF⊥BC,DE⊥AB,∠B=∠ADE=30°.#%#(1)用“三角形内角和等于180°”求∠FED的度数;#%#(2)求证:AD//EF.#%#



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=∠EBF=∠ADE=(1/6*Pi), originExpressRelationList=[], keyWord=null, result=null],求角的大小: AngleRelation{angle=∠DEF},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠DEF)},ProveConclusionRelation:[证明: LineParallelRelation [iLine1=AD, iLine2=EF]]]

741、topic: 如图,在△ABC中,AB=AC,D是AB的中点,DE⊥AB,垂足为D,已知△BCE的周长是8,且AC-BC=2,求AB,BC的长.#%#



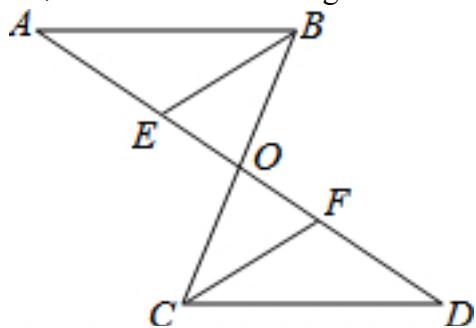
graph:

{"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: ΔABC , EqualityRelation {AB=AC}, MiddlePointOfSegmentRelation {middlePoint=D, segment=AB}, LinePerpRelation {line1=DE, line2=AB, crossPoint=D}, EqualityRelation {C_ ΔBCE =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 // CD,AB=CD,AD、BC相交于点O,BE // CF,BE、CF分别交AD于点E、F.求证:BE=CF. #%#

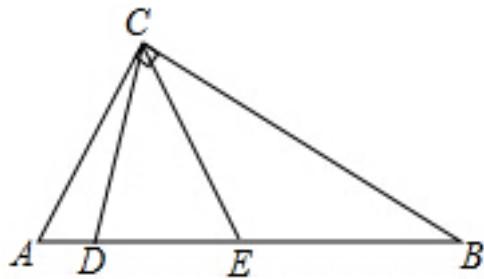


graph:

{"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": {"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.

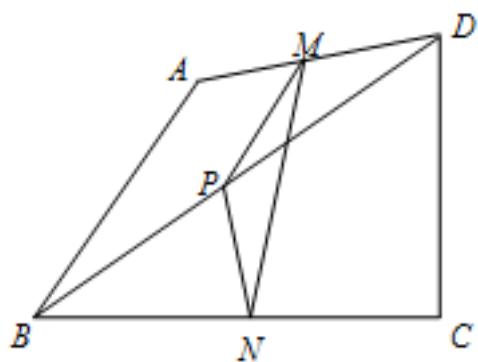


graph:

{"stem": {"pictures": [{"picturename": "1000022489_Q_1.jpg", "coordinates": {"A": "-3.00,0.00", "B": "5.33,0.0", "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: $\angle PNM = \angle PMN$.



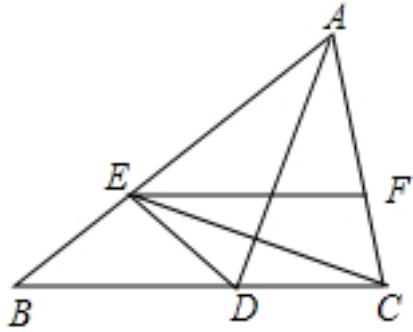
graph:

{"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.

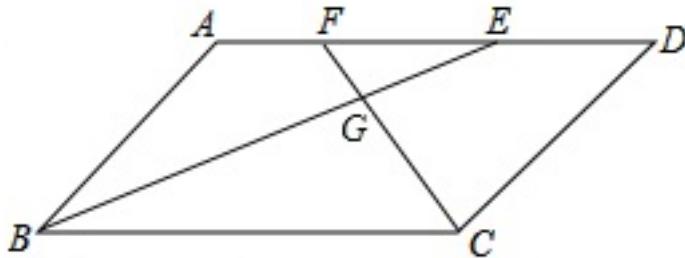


graph:

{"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", "questionrelied": "", "pictures": [{"picturename": "1000037592_Q_1.jpg", "coordinates": {"F": "-6.51,4.94"}, "collineations": {"0": "A##F##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}]}}

NLP: TriangleRelation: ΔABC , 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= ΔAED , triangleB= ΔACD }], 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. #%#



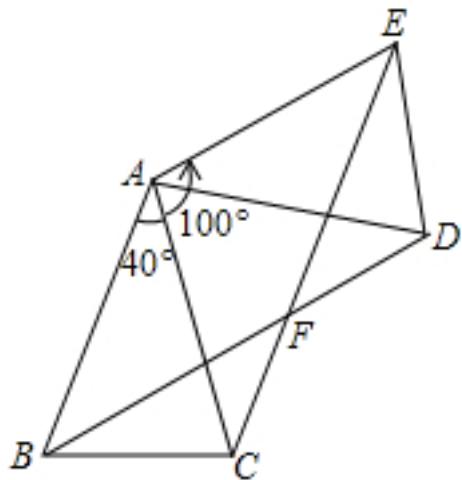
graph:

{"stem": {"pictures": [{"picturename": "1000080059_Q_1.jpg", "coordinates": {"A": "0.00,1.77", "B": "-1.75,0.00", "C": "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, ΔABC 中, $AB=AC$, $\angle BAC=40^\circ$, 将 ΔABC 绕点A按逆时针方向旋转 100° , 得到 ΔADE ,

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//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

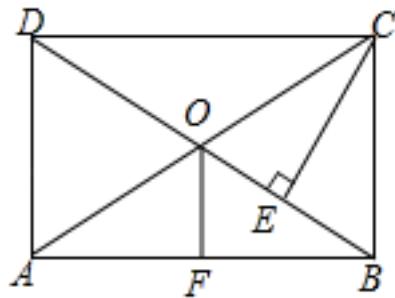
由 $AB // CD, MN // EF, PQ // EF$, 易证四边形 $MNQP$ 是平行四边形. 要证 $MNQP$ 是菱形, 只要证 $NM = NQ$. 由已知条件: _____ 和 $MN // EF$, 可证 $NG = NF$, 故只要证 $GM = FQ$, 即证 $\triangle MGE \cong \triangle QFH$, 易证 _____, _____, 故只要证 $\angle MGE = \angle QFH, \angle QFH = \angle GEF$ 即可.

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=MNQP}, ProveConclusionRelation:[证明: RectangleRelation {rectangle=Rectangle:EGFH}]}

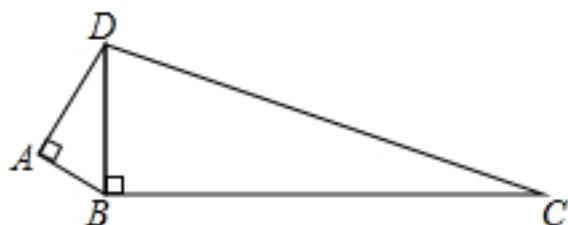
749、topic: 如图所示,矩形ABCD中,对角线AC、BD交于O点,CE \perp BD于E,OF \perp AB于F,DE:BE=3:1,OF=2cm,求AC的长.##



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"}, "collinearities": {"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.##

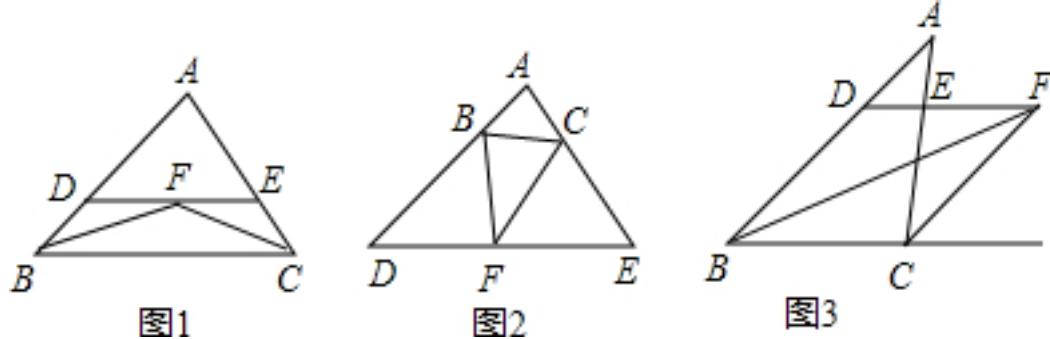


graph:

{"stem": {"pictures": [{"picturename": "1000070781_Q_1.jpg", "coordinates": {"A": "-1.20,1.60", "B": "0.00,0.0", "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": {}, "subsystems": []}}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{ $\angle BAD = (1/2 * \pi)$ }, EqualityRelation{ $\angle CBD = (1/2 * \pi)$ }, EqualityRelation{AD=3}, EqualityRelation{AB=4}, EqualityRelation{BC=12}, EqualityRelation{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.#%#



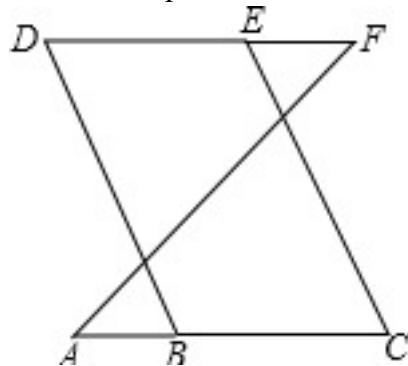
graph:

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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:](BD/CE)), 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))}

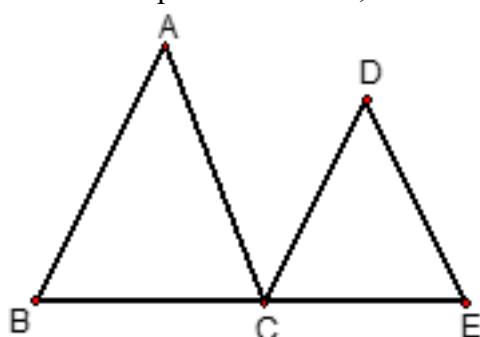
752、topic: 如图,已知 $\angle A=\angle F$, $\angle C=\angle D$,求证: $BD \parallel CE$.



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"}, "collinearations": {"0": "D##E##F", "1": "F##A", "2": "D##B", "3": "E##C", "4": "A##B##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: EqualityRelation { $\angle BAF=\angle AFE$ }, EqualityRelation { $\angle BCE=\angle BDE$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=BD, iLine2=CE]]

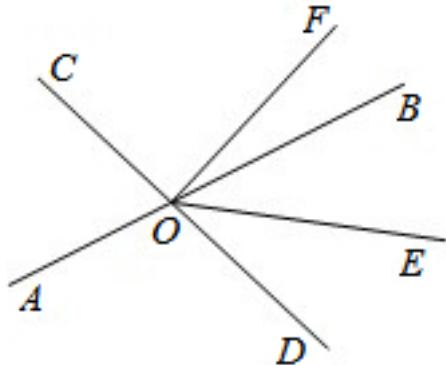
753、topic: 已知:如图,AB // CD, $\angle A=\angle D$,试说明AC // DE成立的理由.%#



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

NLP: LineParallelRelation [iLine1=AB, iLine2=CD], EqualityRelation { $\angle BAC = \angle CDE$ }, ProveConclusionRelation: [证明: LineParallelRelation [iLine1=AC, iLine2=DE]]

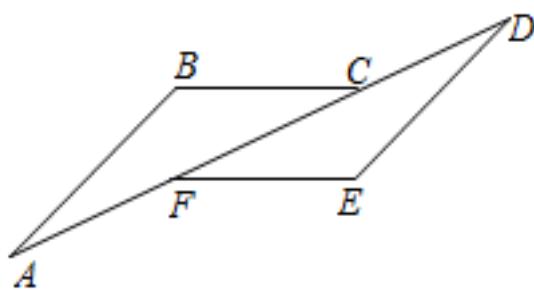
754、topic: 如图,直线AB,CD相交于点O,OE平分 $\angle BOD$, $\angle AOC=72^\circ$, $OF \perp CD$,垂足为O,求 $\angle EOF$ 的度数.%#



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

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.%#

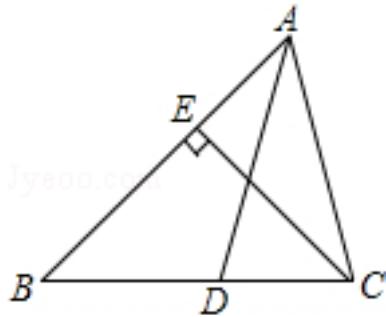


graph:
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ms":{},"substems":[]}

NLP: TriangleCongRelation{triangleA=△ABC, triangleB=△DEF}, PointRelation:A, PointRelation:F, PointRelation:C, EqualityRelation{∠ABC=(3/4*Pi)}, EqualityRelation{∠BAF=(1/9*Pi)}, 求角的大小: AngleRelation{angle=∠CFE}, 求角的大小: AngleRelation{angle=∠DEF}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠CFE)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠DEF)}

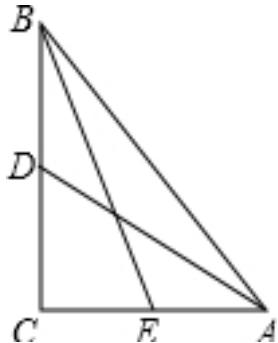
756、topic: 如图,AD是△ABC的角平分线,CE是△ABC的高,∠BAC=60°,∠BCE=40°,求∠ADB的度数. #%#



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

NLP: TriangleRelation:△ABC, TriangleRelation:△ABC, EqualityRelation{∠CAE=(1/3*Pi)}, EqualityRelation{∠DCE=(2/9*Pi)}, 求角的大小: AngleRelation{angle=∠ADB}, AngleBisectorRelation{line=AD, angle=∠CAE, angle1=∠CAD, angle2=∠DAE}, LinePerpRelation{line1=CE, line2=BE, crossPoint=E}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠ADB)}

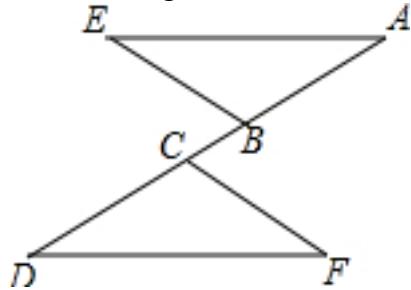
757、topic: 如图,Rt△ABC中,∠C=90°,AD、BE分别是BC、AC边上的中线,\$AD=2\sqrt{10}\$,BE=5,求\$\{AB\}^2\$的值. #%#



graph:
{"stem": {"pictures": [{"picturename": "1000080219_Q_1.jpg", "coordinates": {"A": "1.00,0.00", "B": "-2.00,2.00", "C": "-2.00,0.00", "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": {}}, "substems": []}

NLP: RightTriangleRelation:RightTriangle: ΔABC [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))}

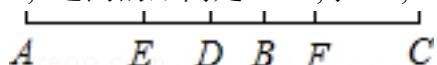
758、topic: 已知:如图,点A、B、C、D在一条直线上,AC=DB,AE=DF,BE=CF.求证:AE//DF,BE//CF. #



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"}, "collinearations": {"0": "A###B###C###D", "1": "A###E", "2": "E###B", "3": "C###F", "4": "D###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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. #

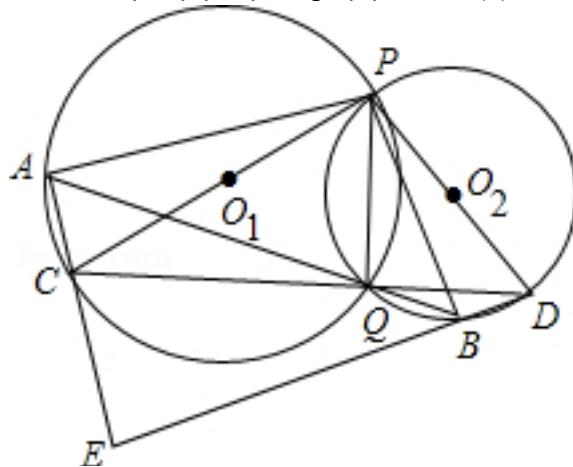


graph:
 {"stem": {"pictures": [{"picturename": "1000083103_Q_1.jpg", "coordinates": {"A": "-4.97,0.56", "B": "-1.97,0.59", "C": "1.03,0.62", "D": "-2.97,0.58", "E": "-3.47,0.57", "F": "-0.97,0.60"}, "collinearations": {"0": "A###E###D###B###F###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "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

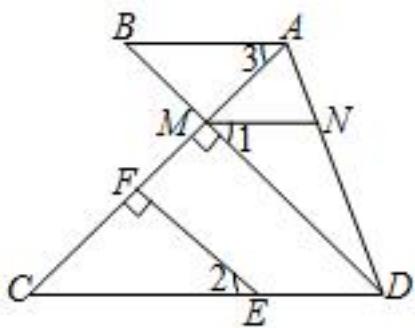
于点A、B,连接AP、BP、AC、DB,且AC与DB的延长线交于点E.?(1)求证:\$\frac{PA}{PB}=\sqrt{2}\$?(2)若\$PQ=2\$,试求\$\angle E\$度数.



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= $\odot O_1$, crossPoints=[A], crossPointNum=1}, LineCrossCircleRelation{line=AB, circle= $\odot O_2$, 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)}

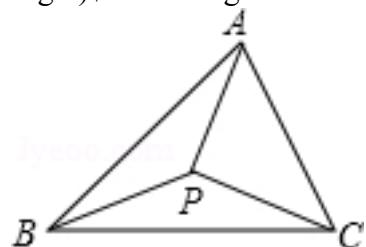
761、topic: 如图,已知EF⊥AC于点F,DB⊥AC于点M,∠1=∠2,∠3=∠C,求证:AB//MN.%(



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": "\u00b21=\u00b2DMN", "1": "\u00b22=\u00b2CEF", "2": "\u00b23=\u00b2BAM"}, "circles": []}, "appliedproblems": {}, "substems": []}, "NLP": LinePerpRelation {line1=EF, line2=AC, crossPoint=F}, LinePerpRelation {line1=DB, line2=AC, crossPoint=M}, EqualityRelation {\u00b2DMN=\u00b2CEF}, EqualityRelation {\u00b2BAM=\u00b2ECF}, ProveConclusionRelation: [证明: LineParallelRelation [iLine1=AB, iLine2=MN]]]

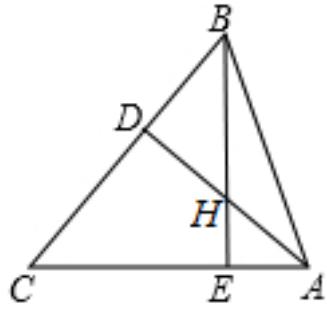
762、topic: 如图,已知P是 $\triangle ABC$ 内一点,试说明 $PA+PB+PC > \frac{1}{2}(AB+BC+AC)$



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": {}, "substems": []}, "NLP": TriangleRelation: $\triangle ABC$, PositionOfPoint2RegionRelation {point=P, region=EnclosedRegionRelation {name=ABC, closedShape= $\triangle ABC$ }, position=inner}, ProveConclusionRelation: [证明: InequalityRelation {AP+BP+CP>(1/2)*(AB+BC+AC)}]

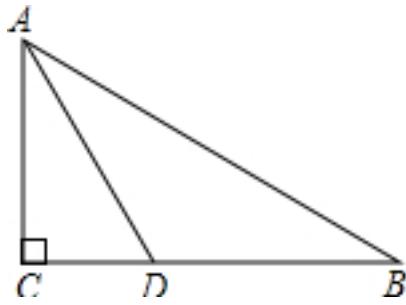
763、topic: 如图,在 $\triangle ABC$ 中, $\angle BAC:\angle ABC=7:6$, $\angle ABC$ 比 $\angle C$ 大 10° ,BE、AD是 $\triangle ABC$ 的高,交点H,求 $\angle DHB$ 的度数.



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: ΔABC , EqualityRelation $\{(\angle BAE)/(\angle ABD) = (7)/(6)\}$, TriangleRelation: ΔABC ,
 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:] $\angle BHD$)}

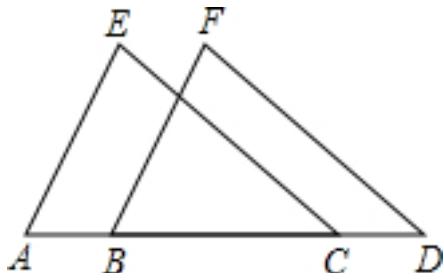
764、topic: 如图所示, ΔABC 中, $\angle C=90^\circ$, $\angle B=30^\circ$, AD 是 ΔABC 的角平分线, 若 $AC=\sqrt{3}$, 求线段 AD 的长. #%#



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: ΔABC , EqualityRelation { $\angle ACD = (1/2)\pi$ }, EqualityRelation { $\angle ABD = (1/6)\pi$ }, TriangleRelation: ΔABC , 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, $AB=CD$, $AE \parallel BF$, $CE \parallel DF$. 求证: $AE=BF$. #%#

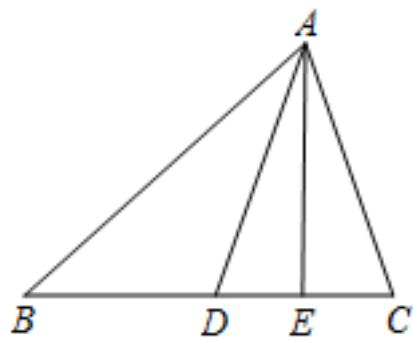


graph:

{"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": {}, "subsystems": []}}

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.%#

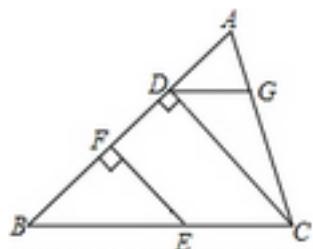


graph:

{"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": {}, "subsystems": []}}

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:] $\angle DAE$)}

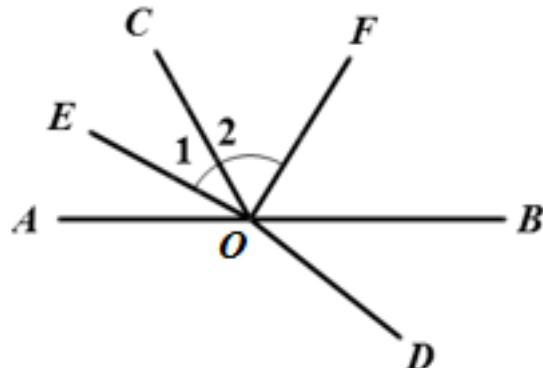
767、topic: 如图,CD \perp AB,EF \perp AB,垂足分别是D、F, $\angle BEF = \angle CDG$, 试说明 $\angle B + \angle BDG = 180^\circ$.%#



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

NLP: LinePerpRelation{line1=CD, line2=AB, crossPoint=D}, LinePerpRelation{line1=EF, line2=AB, crossPoint=F}, EqualityRelation{ $\angle BEF = \angle CDG$ }, ProveConclusionRelation:[证明: EqualityRelation{ $\angle EBF + \angle FDG = (\text{Pi})$ }]

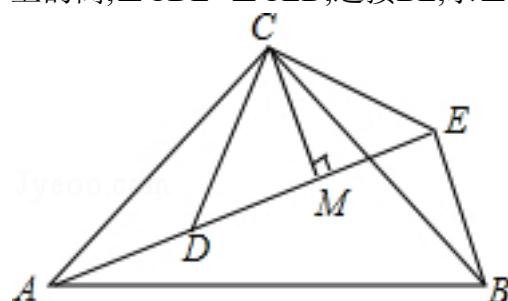
768、topic: 如图,AB、DC相交于点O,OE、OF分别平分 $\angle AOC$ 、 $\angle BOC$,试说明 $OE \perp OF$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000030601_Q_1.jpg", "coordinates": {"O": "-7.75,2.00", "C": "-10.00,5.00", "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"}, "collineations": {"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": {}, "substems": []}]}

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.#%#

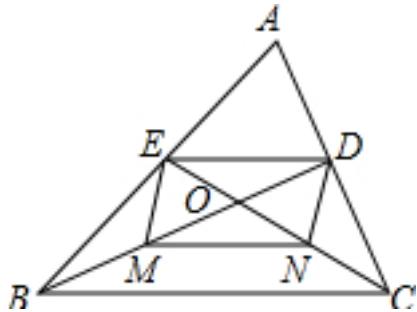


graph:
 {"stem": {"pictures": [{"picturename": "1000040012_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "4.00,4.00", "D": "2.80,1.14", "E": "6.86,2.80", "M": "4.83,1.97"}, "collineations": {"0": "A###D###M###B", "1": "C###E###M", "2": "D###E"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}]}

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:] $\angle BEM$)}

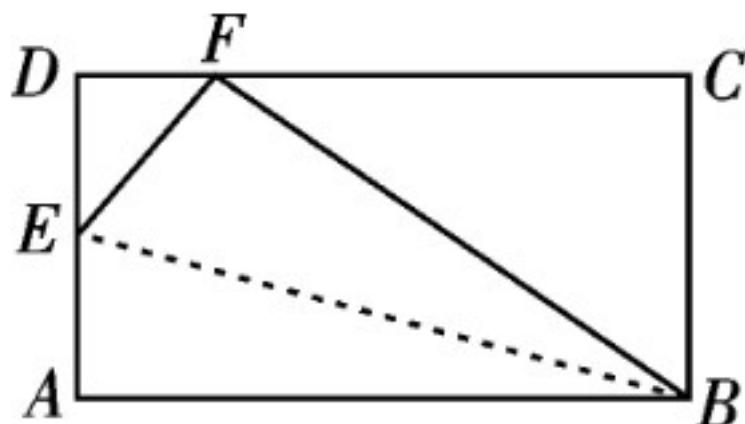
770、topic: 如图, $\triangle ABC$ 的边AC、AB上的中线BD、CE相交于点O, M、N分别是BO、CO的中点, 顺次连接点D、E、M、N. #求证: 四边形DEMN是平行四边形. #



graph:
 {"stem": {"pictures": [{"picturename": "1000034239_Q_1.jpg", "coordinates": {"A": "-8.00,6.00", "B": "-11.00,3.00", "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}]

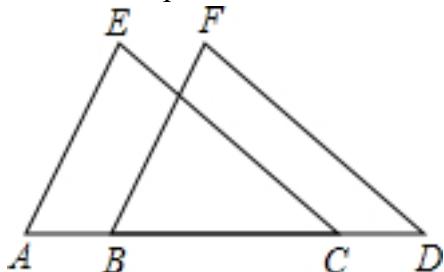
771、topic: 如图, 已知矩形纸ABCD, 若把 $\triangle ABE$ 沿折痕BE向上翻折, A点恰好落在CD边上, 设此点为F, 这时 $AE:ED=5:3$, $BE = 5\sqrt{5}$, 求此矩形的长和宽.



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))}}

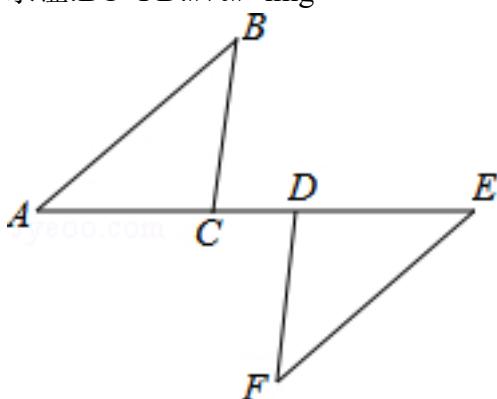
772、topic: 如图,点A,B,C,D在一条直线上,AB=CD,AE//BF,CE//DF.求证:AE=BF.#%#



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#", "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, $\triangle ABC$ 和 $\triangle EFD$ 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:

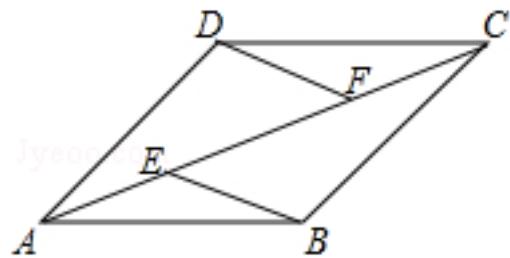
{"stem": {"pictures": [{"picturename": "1000030877_Q_1.jpg", "coordinates": {"A": "-5.00,0.00", "B": "-2.59,2.01", "C": "-3.00,0.00", "D": "-2.00,0.00", "E": "0.00,0.00", "F": "-2.41,-2.01"}, "collineations": {"0": "A###B", "1": "B###C", "2": "A###C###D###E", "3": "D###F", "4": "E###F"}, "variable>equals": {}, "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,

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": "-2.20, -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: $BH=GF$.#%#

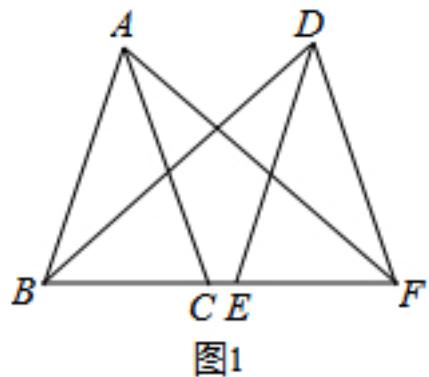


图1

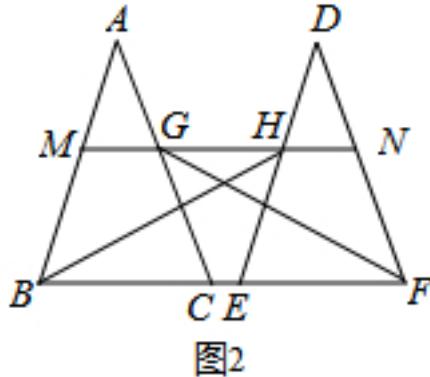


图2

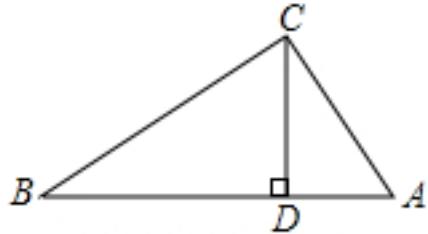
graph:

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

NLP:

TriangleRelation: ΔABC , EqualityRelation: $AB=AC$, TranslateRelation: {preData= ΔABC , afterData= ΔDEF , 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}]]}

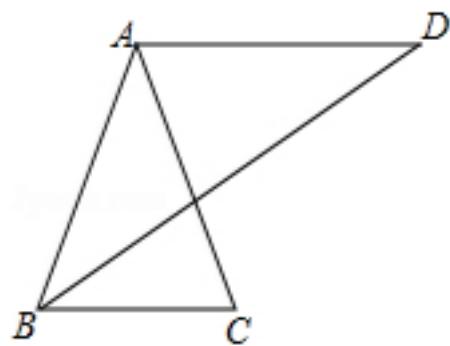
776、topic: 在 ΔABC 中, $\angle ACB=90^\circ$, CD 是 AB 边上的高, $AB=13\text{cm}$, $BC=12\text{cm}$, $AC=5\text{cm}$, 求: #(1) ΔABC 的面积; #(2) CD 的长. #



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

NLP: TriangleRelation: ΔABC , EqualityRelation { $\angle ACB=(1/2*\text{Pi})$ }, LinePerpRelation {line1= CD, line2= AB, crossPoint= D}, EqualityRelation {AB=13}, EqualityRelation {BC=12}, EqualityRelation {AC=5}, LinePerpRelation {line1= CD, line2= BD, crossPoint= D}, EqualityRelation { $S_{\Delta ABC}=v_0$ }, 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:] $S_{\Delta ABC}$), SolutionConclusionRelation {relation= 求值(大小)}:
 (ExpressRelation: [key:]CD)}

777、topic: 如图, 已知 $AB=AC=AD$, 且 $AD \parallel BC$, 求证: $\angle C=2\angle D$. #

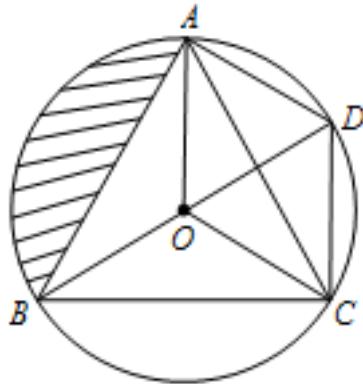


graph:
 {"stem": {"pictures": [{"picturename": "1000027144_Q_1.jpg", "coordinates": {"A": "2.00,5.00", "B": "0.00,0.00", "C": "4.00,0.00", "D": "7.39,5.00"}, "collineations": {"0": "A##B", "1": "C##B", "2": "A##C", "3": "A##D"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

"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{ $\angle ACB=2*\angle ADB$ }]

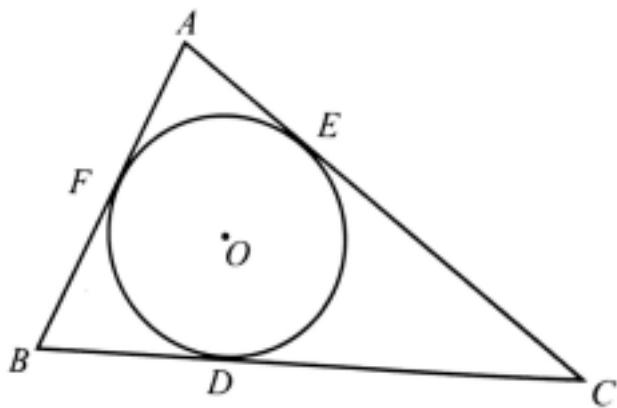
778、topic: 如图,O是 $\triangle ABC$ 的内心,BO的延长线和 $\triangle ABC$ 的外接圆相交于D,连接DC、DA、OA、OC,四边形OADC为平行四边形.%(1)求证: $\triangle BOC \cong \triangle CDA$ %(2)若AB=2,求阴影部分的面积.%(



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": {}}, "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=Circle[$\odot O_0$]{center= 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= $\triangle BOC$, triangleB= $\triangle CDA$ }]

779、topic: 如图, $\odot O$ 是 $\triangle ABC$ 的内切圆,D,E,F为切点,且AB=9cm,BC=14cm,CA=13cm,求AF,BD,CE的长.%(

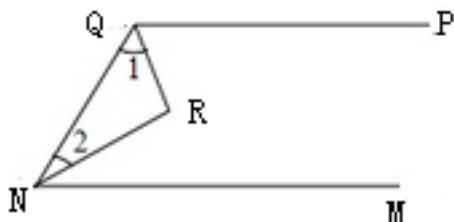


graph:
 {"stem": {"pictures": [{"picturename": "1000083383_Q_1.jpg", "coordinates": {"A": "-0.71,2.74", "B": "-2.93,-1.0", "C": "1.67,-1.0", "O": "0.0,0.0", "D": "1.67,-1.0", "E": "0.0,2.74", "F": "-2.93,-1.0"}}, "appliedproblems": {}}, "substems": []}}

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"}, "collineations": {"0": "A###F###B", "1": "B###D###C", "2": "C###E###A"}, "variable-equals": {}, "circles": [{"center": "O", "pointsincircle": "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: $\triangle ABC$ /Circle[\odot O]{center=O, 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)}

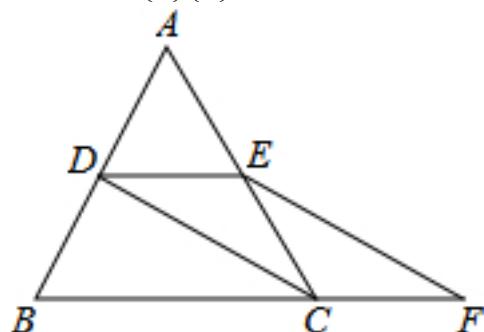
780、topic: 如图,已知QR平分 $\angle PQN$,NR平分 $\angle QNM$, $\angle 1+\angle 2=90^\circ$,求证:PQ//MN. #%#



graph:
 {"stem": {"pictures": [{"picturename": "1000050441_Q_1.jpg", "coordinates": {"M": "-3.00,2.00", "N": "-8.00,2.00", "P": "-3.00,5.00", "Q": "-7.00,5.00", "R": "-5.92,3.50"}, "collineations": {"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 $SCF = \frac{1}{2}BC$,连接CD和EF.求证:四边形DEFC是平行四边形. #%#



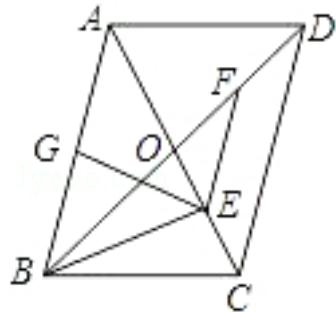
graph:
 {"stem": {"pictures": [{"picturename": "1000031905_Q_1.jpg", "coordinates": {"A": "-6.32,1.86", "B": "-7.30,0.16", "C": "-5.30,0.16", "D": "-6.80,1.02", "E": "-5.81,1.01", "F": "-4.30,0.16"}, "collineations": {"0": "A###D###B", "1": "B###C###F", "2": "A###E###C", "3": "D###E", "4": "D###C", "5": "E###F"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

es":[]],"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}]

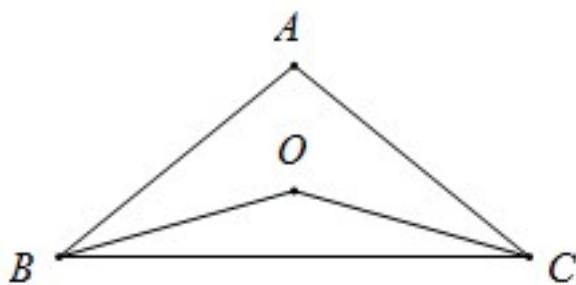
782、topic: 如图平行四边形ABCD中,对角线AC、BD交于点O, $BD=2AD$, E、F、G分别为OC、OD、AB的中点.求证:(1) $BE \perp AC$;(2) $EG=EF$



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{middlePoint=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 $\angle BOC = \underline{\hspace{2cm}}$,并用所学的三角形的有关知识说明理由.

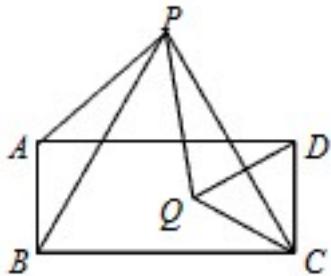


graph:

{"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: ΔABC , 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,\$\vartriangle PBC\$和\$\vartriangle QCD\$都是等边三角形,且点\$P\$在矩形上方,点\$Q\$在矩形内.求证: $\angle PBA = \angle PCQ = 30^\circ$; $PA = PQ$.



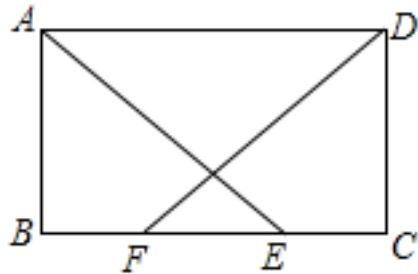
graph:

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

NLP:

RectangleRelation {rectangle=Rectangle:ABCD}, RegularTriangleRelation:RegularTriangle: ΔPBC , RegularTriangleRelation:RegularTriangle: ΔQCD , 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}]

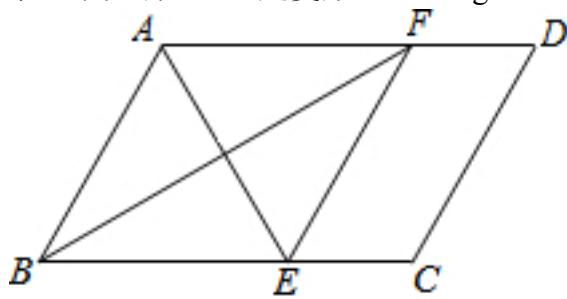
785、topic: (2015·济南)如图,在矩形ABCD中,BF=CE,求证:AE=DF.



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"}, "collinearities": {"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}]

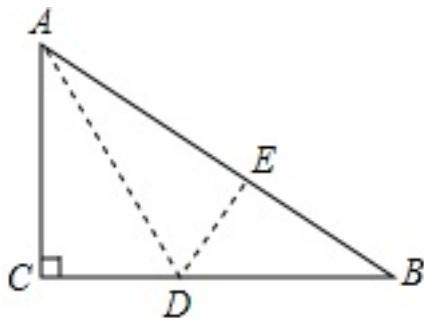
786、topic: 已知:如图,在 $\square ABCD$ 中, $\angle BAD$ 的平分线交 BC 于点 E , $\angle ABC$ 的平分线交 AD 于点 F .#%#求证:四边形 $ABEF$ 是菱形.#%#



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"}, "collinearities": {"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": {}, "subsystems": []}}

NLP: AngleBisectorRelation{line=AE, angle= $\angle BAF$, angle1= $\angle BAE$, angle2= $\angle EAF$ }, AngleBisectorRelation{line=BF, angle= $\angle ABE$, angle1= $\angle ABF$, angle2= $\angle EBF$ }, ParallelogramRelation{parallelogram=Parallelogram:ABCD}, ProveConclusionRelation:[证明: RhombusRelation{rhombus=Rhombus:ABEF}]

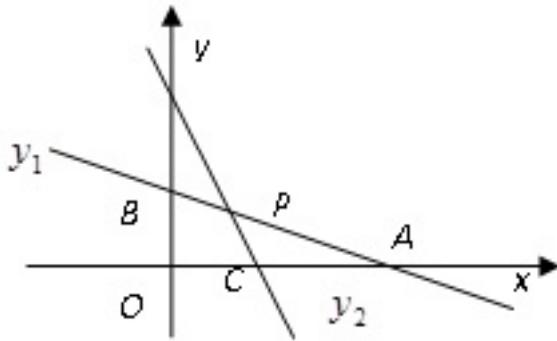
787、topic: 如图,有一块直角三角形纸片,已知两直角边 $AC=6\text{cm}$, $BC=8\text{cm}$,现将直角边 AC 沿直线 AD 折叠,使它恰好落在斜边 AB 上,且与 AE 重合,求 CD 的长.



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 $y_2 = kx + b$ ($k \neq 0$) 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.



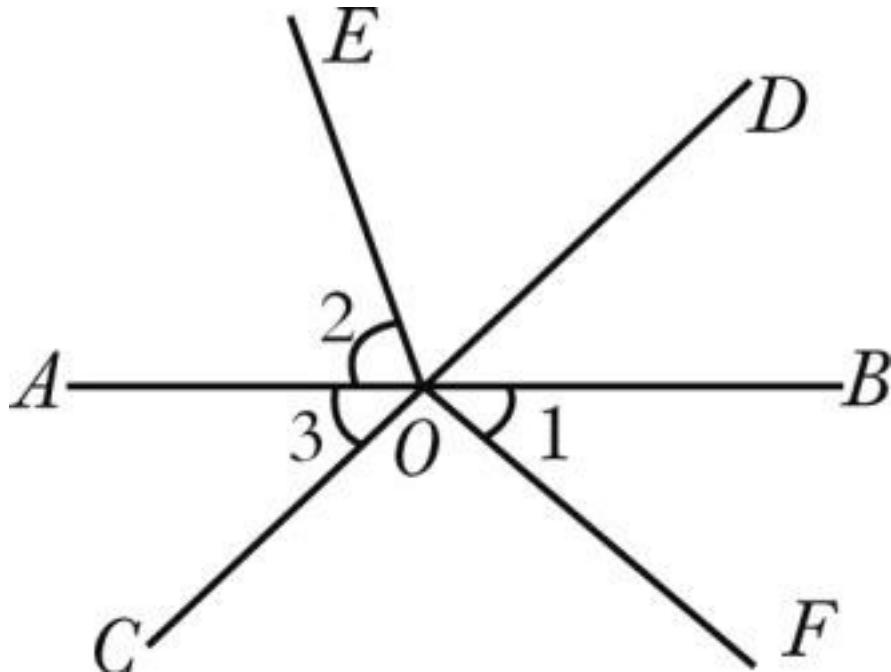
graph:

[{"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_ΔABO=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_ΔABO), 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.

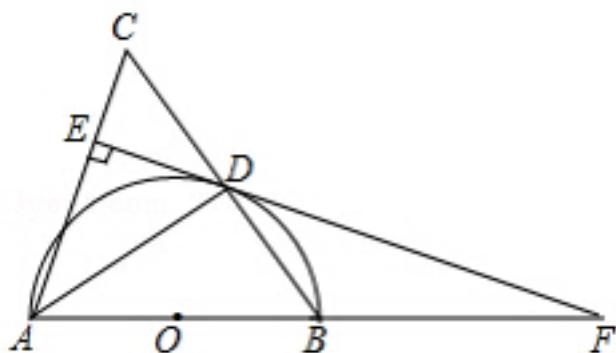


graph:

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```

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.

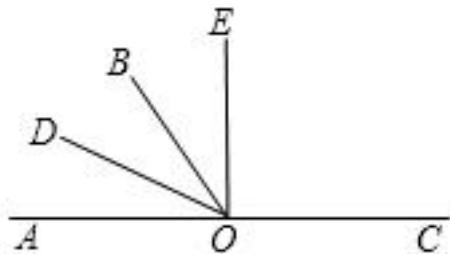


graph:

```
{"stem": {"pictures": [{"picturename": "1000010208_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "10.00,0.00", "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": {}, "subsystems": [{"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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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.

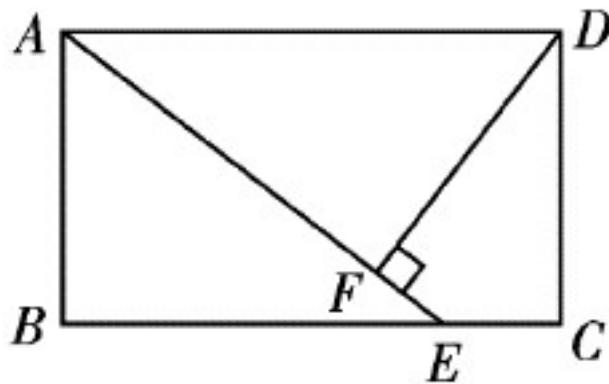


graph:

```
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```

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": []}}

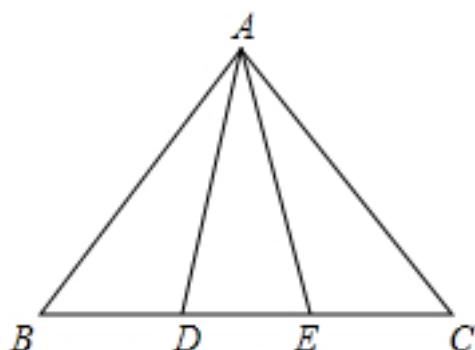
NLP: RectangleRelation{rectangle=Rectangle:ABCD}, PointOnLineRelation{point=E, line=BC, isConstant=false, extension=false}, LinePerpRelation{line1=DF, line2=AE, crossPoint=F}, EqualityRelation{DF=v_0}, EqualityRelation{AB=6}, EqualityRelation{AD=12}, EqualityRelation{BE=8}, 求值(大小): (ExpressRelation:[key:]v_0), 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.%#

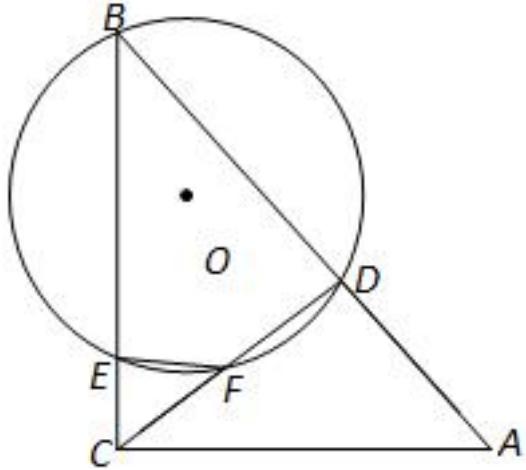


graph:

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

NLP: PointOnLineRelation {point=D, line=BC, isConstant=false, extension=false}, PointOnLineRelation {point=E, line=BC, isConstant=false, extension=false}, TriangleRelation: ΔABC , EqualityRelation {AD=AE}, EqualityRelation {BD=CE}, ProveConclusionRelation: [IsoscelesTriangleRelation: IsoscelesTriangle: ΔABC [Optional.of(A)]]

795、topic: 已知:如图,四边形BEFD内接于 $\odot O$, 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: $EF \parallel AC$.

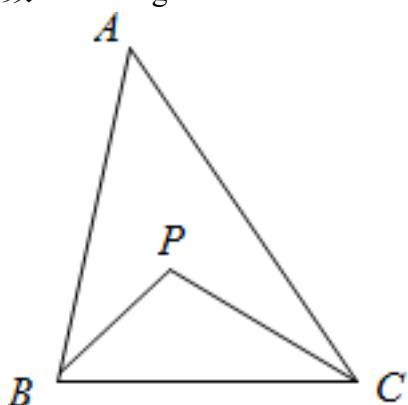


graph:

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

NLP: InscribedShapeOfCircleRelation {closedShape=BDFA, circle=Circle[$\odot O$]} {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 { $(AC)^2=AD \cdot AB$ }, ProveConclusionRelation: [证明: LineParallelRelation [iLine1=EF, iLine2=AC]]]

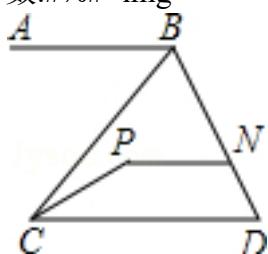
796、topic: 如图,在 ΔABC 中, $\angle ABC=80^\circ$, $\angle ACB=50^\circ$, BP 平分 $\angle ABC$, CP 平分 $\angle ACB$,求 $\angle BPC$ 的度数.##



graph:
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NLP: TriangleRelation: ΔABC , EqualityRelation $\{\angle ABC = (4/9\pi)\}$, EqualityRelation $\{\angle ACB = (5/18\pi)\}$, AngleBisectorRelation {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]: $\angle BPC$)}{}

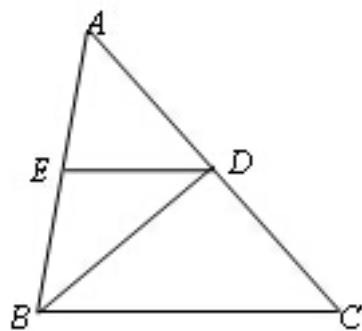
797、topic: 如图, $AB \parallel CD$, $\angle ABC = 50^\circ$, $\angle CPN = 150^\circ$, $\angle PNB = 60^\circ$, $\angle NDC = 60^\circ$, 求 $\angle BCP$ 的度数.



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, $AB = BC = 12\text{cm}$, $\angle ABC = 80^\circ$, BD 是 $\angle ABC$ 的平分线, $DE \parallel BC$. (1) 求 $\angle EDB$ 的度数; (2) 求 DE 的长.

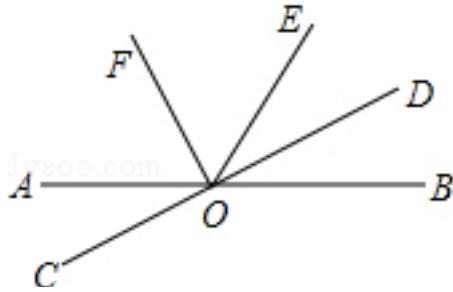


graph:
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s":[]}

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)}

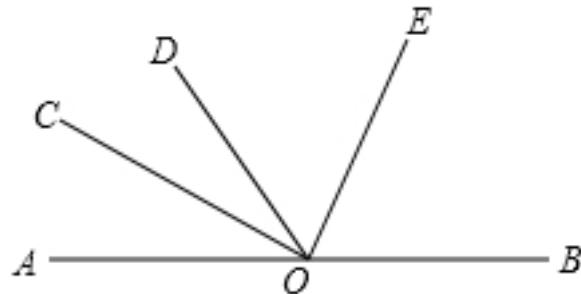
799、topic: 如图,直线AB、CD相交于点O, $\angle DOE = \angle BOD$, OF平分 $\angle AOE$,若 $\angle AOC=28^\circ$,求 $\angle EOF$ 的度数.##



graph:
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NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], EqualityRelation { $\angle DOE = \angle BOD$ }, AngleBisectorRelation {line=OF, angle= $\angle AOE$, angle1= $\angle AOF$, angle2= $\angle EOF$ }, EqualityRelation { $\angle AOC = (7/45\pi)$ }, 求角的大小: AngleRelation {angle= $\angle EOF$ }, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:] $\angle EOF$)}

800、topic: 如图,AB为一条直线,OC是 $\angle AOD$ 的平分线,OE在 $\angle BOD$ 内,\$\angle DOE:\angle BOD=1:3\$, $\angle COE=72^\circ$,求 $\angle EOB$ 的度数.##

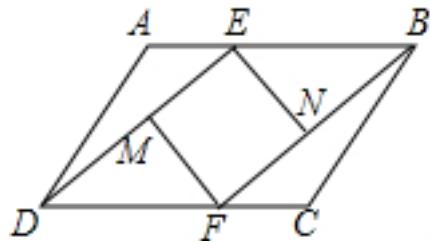


graph:
{"stem": {"pictures": [{"picturename": "1000072560_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "6.00,0.00", "C": "0.57,1.76", "D": "2.07,2.85", "E": "3.93,2.85", "O": "3.00,0.00"}, "collineations": {"0": "A##O##B", "1": "O##C", "2": "O##D", "3": "O##E"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}}

NLP: SegmentRelation:AB, AngleBisectorRelation {line=OC, angle= $\angle AOD$, angle1= $\angle AOC$, angle2=

$\angle COD}$, EqualityRelation $\{(\angle DOE)/(\angle BOD) = (1)/(3)\}$, EqualityRelation $\{\angle COE = (2/5 \cdot \pi)\}$, 求角的大小:
 AngleRelation $\{angle = \angle BOE\}$, SolutionConclusionRelation $\{relation = \text{求值(大小)}: (\text{ExpressRelation}:[\text{key}: \angle BOE])\}$

801、topic: 如图, $\square ABCD$ 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 $\{\text{parallelogram} = \text{Parallelogram:ABCD}\}$, EqualityRelation $\{AE = CF\}$, MiddlePointOfSegmentRelation $\{\text{middlePoint} = M, \text{segment} = DE\}$, MiddlePointOfSegmentRelation $\{\text{middlePoint} = N, \text{segment} = BF\}$, ProveConclusionRelation: [证明: ParallelogramRelation $\{\text{parallelogram} = \text{Parallelogram:EMFN}\}$]

802、topic: 如图1, 在 $\triangle OAB$ 中, $\angle OAB = 90^\circ$, $\angle AOB = 30^\circ$, $OB = 8$. 以 OB 为边, 在 $\triangle OAB$ 外作等边 $\triangle OBC$, 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.

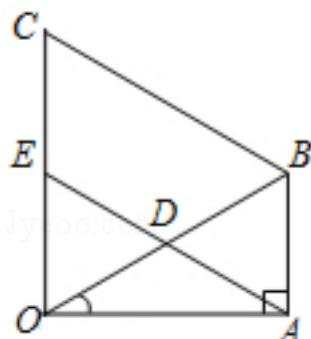


图1

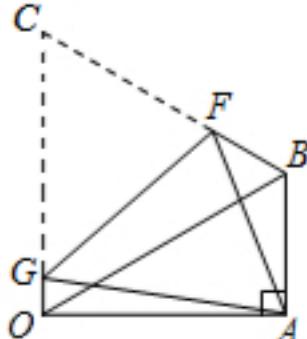
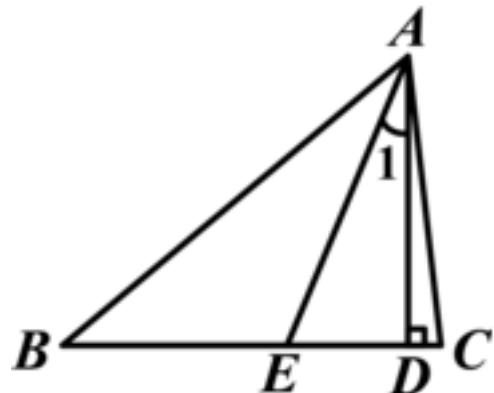


图2

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:△OAB, EqualityRelation { $\angle BAO = (1/2 * \pi)$ }, EqualityRelation { $\angle AOD = (1/6 * \pi)$ }, EqualityRelation { $BO = 8$ }, TriangleRelation:△OAB, RegularTriangleRelation:RegularTriangle:△OBC, MiddlePointOfSegmentRelation {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, 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)}

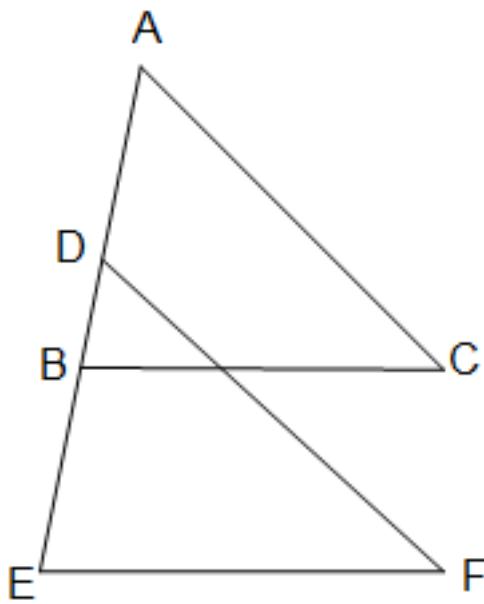
803、topic: 如图,在 $\triangle ABC$ 中, $\angle BAE = \angle CAE$, $\angle ADC = 90^\circ$, $\angle B = 40^\circ$, $\angle C = 84^\circ$. #(1)求 $\angle 1$ 的度数; #(2)通过确定三角形中的最大内角的度数来确定图中各三角形的形状. #



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"}, "collinear": {"0": "B###A", "1": "A##C", "2": "A##D", "3": "A##E", "4": "B##C##D##E"}, "variable>equals": {"0": "\u00b21 = \u00b2DAE"}, "circles": []}, "appliedproblems": {}, "substems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]}]

NLP: TriangleRelation:△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": "-10.00,5.00", "C": "-7.00,5.00", "D": "-9.57,6.30", "E": "-11.00,2.00", "F": "-8.00,2.00"}, "collineations": {"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{∠ACB=∠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.

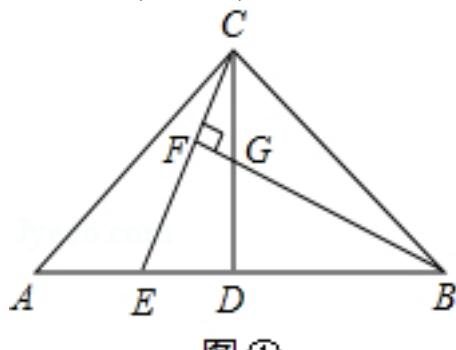


图 ①

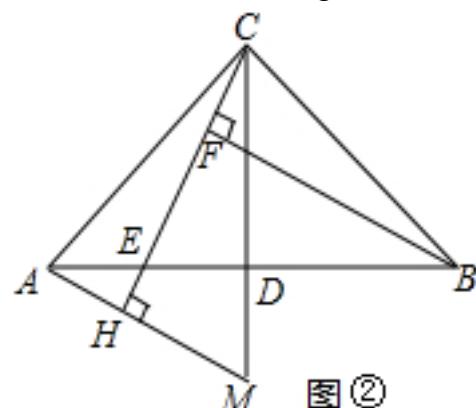


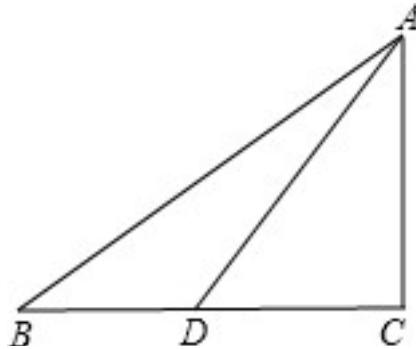
图 ②

graph:

}]

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]

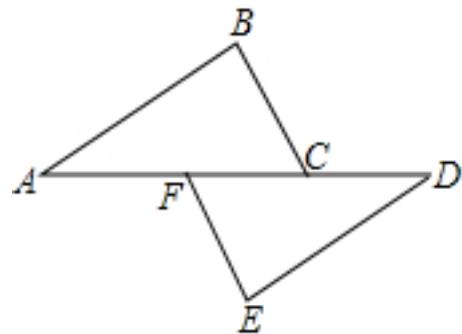
806、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$,点D在BC上, $BD=4$, $AD=BC$, $\cos \angle ADC = \frac{3}{5}$.求:(1)DC的长;(2) $\sin B$ 的值.



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"}, "collinearities": {"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: $BC \parallel EF$.#%#

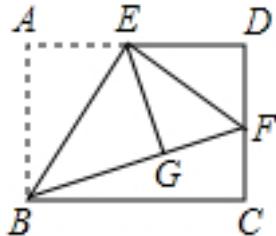


graph:
 {"stem": {"pictures": [{"picturename": "C242FD0D2E964F3D98304042EF088C39.jpg", "coordinates": {"A": "-14.00,5.00", "B": "-11.00,8.00", "C": "-10.00,5.00", "D": "-7.00,5.00", "E": "-10.00,2.00", "F": "-11.00,5.00"}, "collinearities": {"0": "B##A", "1": "A##F##D##C", "2": "C##B", "3": "E##D", "4": "E##F"}, "variable>equals": {}, "circles": []}}

ls":{},"circles":[]],"appliedproblems":{},"substems":[]}

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]]]

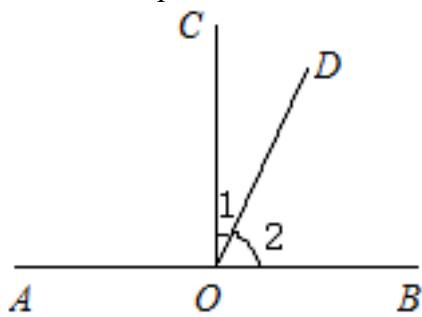
808、topic: 如图,矩形ABCD中,E是AD的中点,将 $\triangle ABE$ 沿直线BE折叠后得到 $\triangle GBE$,延长BG交CD于点F. (1)求证:DF=GF; (2)若AB=6, $BC^2=96$,求DF的长.



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 \perp AB, $\angle 2 - \angle 1 = 34^\circ$.求 $\angle AOD$ 的度数.

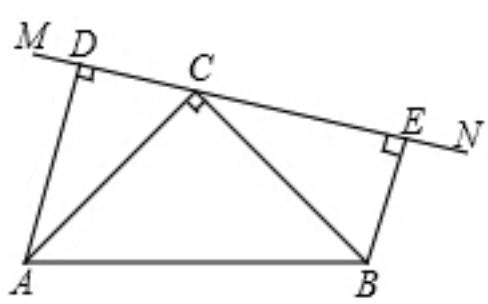


graph:
 {"stem": {"pictures": [{"picturename": "1000051544_Q_1.jpg", "coordinates": {"A": "-7.73,0.79", "B": "-1.08,0.90", "C": "-4.47,4.13", "D": "-2.93,3.76", "O": "-4.42,0.85"}, "collineations": {"0": "O###C", "1": "O###D", "2": "A###O###B"}, "variable>equals": {"0": "\angle 1 = \angle COD", "1": "\angle 2 = \angle BOD"}, "circles": {}}, "appliedproblems": {}}, "substems": []}

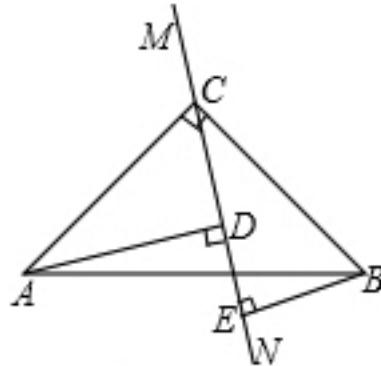
NLP: PointOnLineRelation{point=O, line=AB, isConstant=false, extension=false}, LinePerpRelation{line1=CO, line2=AB, crossPoint=O}, EqualityRelation{ $\angle BOD - \angle$

COD=(17/90*Pi)},求角的大小: AngleRelation{angle= $\angle AOD$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOD$)}

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



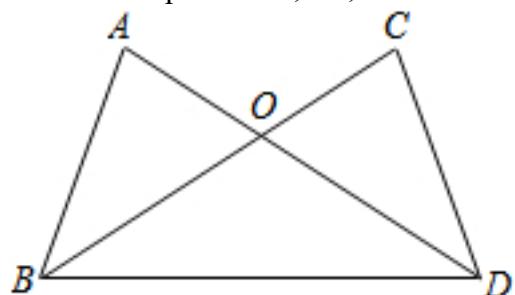
图②

graph:

```
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "C41333792E6043348BFBF16357B829A9_1.jpg", "coordinates": {"A": "-13.00,3.00", "B": "-7.00,3.00", "C": "-10.00,6.00", "D": "-11.91,6.58", "E": "-6.42,4.91", "M": "-14.58,7.39", "N": "-4.57,4.35"}, "collinearities": {"0": "B##A", "1": "A##D", "2": "C##A", "3": "B##E", "4": "B##C", "5": "M##N##D##E##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "C41333792E6043348BFBF16357B829A9_2.jpg", "coordinates": {"A": "-13.00,3.00", "B": "-7.00,3.00", "C": "-10.00,6.00", "D": "-9.38,4.57", "E": "-8.43,2.38", "M": "-10.53,7.22", "N": "-7.99,1.37"}, "collinearities": {"0": "B##A", "1": "A##D", "2": "C##A", "3": "B##E", "4": "B##C", "5": "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: $AB=CD$.%#

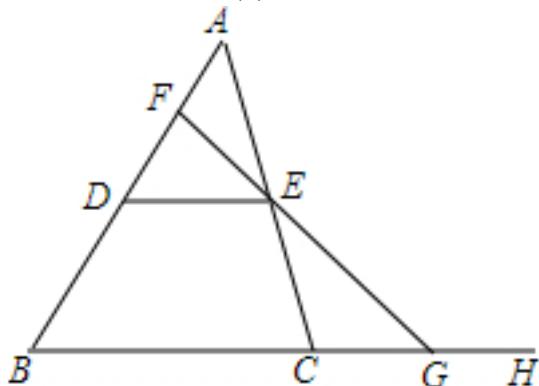


graph:

{"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 {∠DBO=∠BDO}, ProveConclusionRelation: [证明: EqualityRelation {AB=CD}]

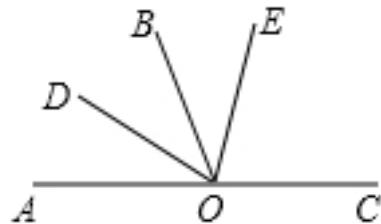
812、topic: 已知:如图,点D,E分别在AB、AC上,DE // BC,F是AD上一点,FE的延长线交BC的延长线于点G.求证:(1)∠EGH>∠ADE;(2)∠EGH=∠ADE+∠A+∠AEF.



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": "D##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}, 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 {∠EGH>∠EDF}], ProveConclusionRelation: [证明: EqualityRelation {∠EGH=∠EDF+∠EAF+∠AEF}]

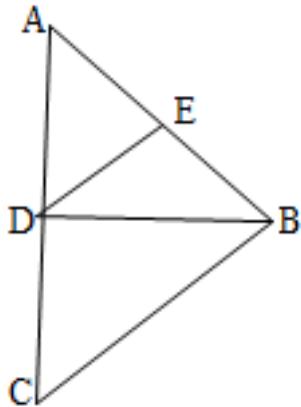
813、topic: 已知∠AOB+∠BOC=180°,OD是∠AOB的平分线,OE在∠BOC内,∠BOE=\$\frac{1}{2}\$∠EOC, ∠DOE=72°,求∠EOC的度数.



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

NLP: EqualityRelation{ $\angle AOB + \angle BOC = (\text{Pi})$ }, AngleBisectorRelation{line=OD, angle= $\angle AOB$, angle1= $\angle AOD$, angle2= $\angle BOD$ }, EqualityRelation{ $\angle BOE = (1/2) * \angle COE$ }, EqualityRelation{ $\angle DOE = (2/5 * \text{Pi})$ }, 求角的大小: AngleRelation{angle= $\angle COE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle COE$)}

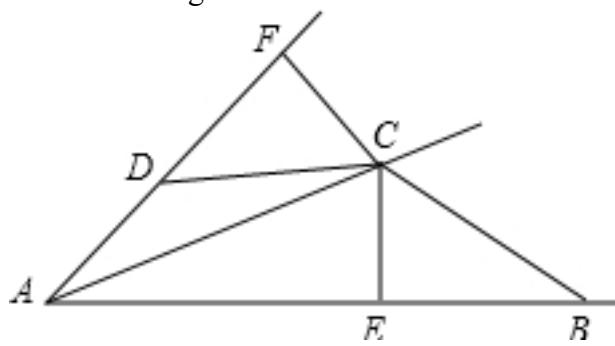
814、topic: 如图,在 $\triangle ABC$ 中, $AB=BC=12\text{cm}$, $\angle ABC=80^\circ$, BD 是 $\angle ABC$ 的平分线, $DE \parallel BC$.求: $\angle EDB$ 的度数; DE 的长.



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##E", "2": "E##D", "3": "B##D", "4": "C##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substs": []}}

NLP: TriangleRelation: $\triangle ABC$, MultiEqualityRelation [multiExpressCompare= $AB=BC=12$, originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{ $\angle CBE = (4/9 * \text{Pi})$ }, 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: $\triangle BCE \cong \triangle DCF$.

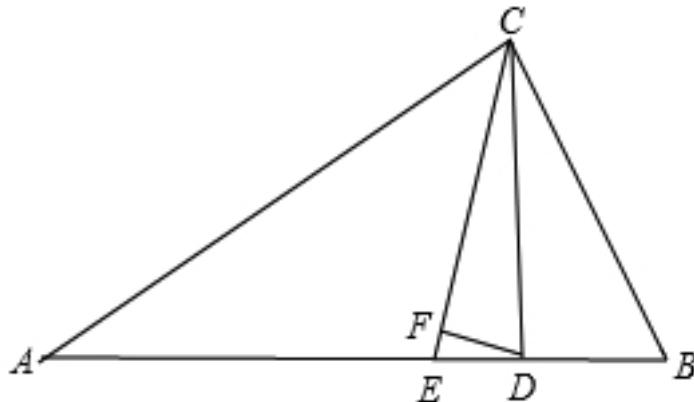


graph:
 {"stem": {"pictures": [{"picturename": "1000030793_Q_1.jpg", "coordinates": {"A": "-10.00,0.00", "B": "-1.00,0.00", "C": "-4.34,2.34", "D": "-8.36,1.64", "E": "-4.34,0.00", "F": "-6.00,4.00"}, "collineations": {"0": "A##D##F", "1": "A##C", "2": "A##E##B", "3": "F##C", "4": "D##C", "5": "E##C", "6": "B##C"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substs": []}}

{},"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)##

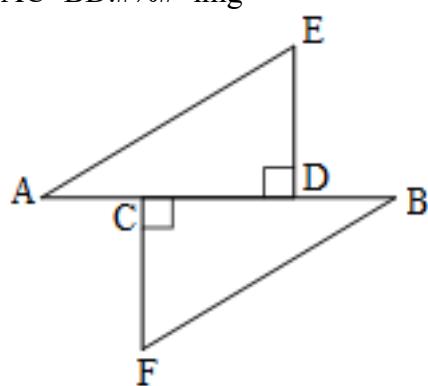


graph:

{"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"}, "collinearities": {"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 // BF,且AE=BF.求证 $AC=BD$.##

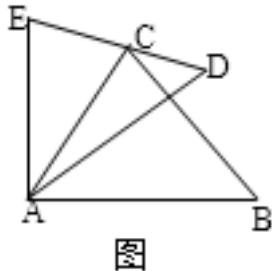


graph:

{"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: $\triangle EAD \cong \triangle CAB$.#%#



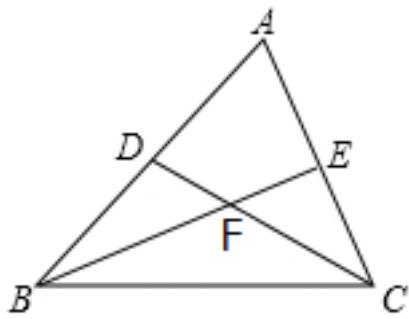
图

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###A", "3": "E###A", "4": "A###D", "5": "D###C###E"}, "variable>equals": {}, "circles": []}, {"appliedproblems": {}, "substems": []}]}

NLP: EqualityRelation{AE=AC}, EqualityRelation{AD=AB}, EqualityRelation{ $\angle CAE = \angle BAD$ }, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA= $\triangle EAD$, triangleB= $\triangle CAB$ }]

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.#%#

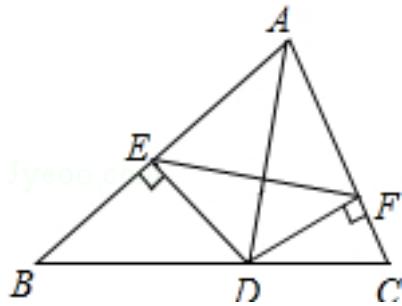


graph:

{"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: $\triangle ABC$, AngleBisectorRelation{line=BE, angle= $\angle CBD$, angle1= $\angle CBE$, angle2= $\angle DBE$ }, AngleBisectorRelation{line=CD, angle= $\angle BCE$, angle1= $\angle BCD$, angle2= $\angle DCE$ }, LineCrossRelation [crossPoint=Optional.of(F), iLine1=BE, iLine2=CD], EqualityRelation{ $\angle DAE = (1/3 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle BFC$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BFC$)}]

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: $\triangle ABC$, 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}, 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()]]]

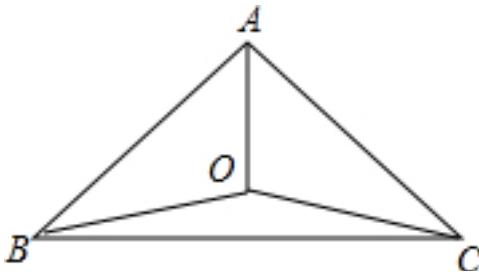
821、topic: 如图,已知线段AB=8cm,点C是AB上任一点,点M、N分别是AC和CB的中点,求MN的长度.



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)}

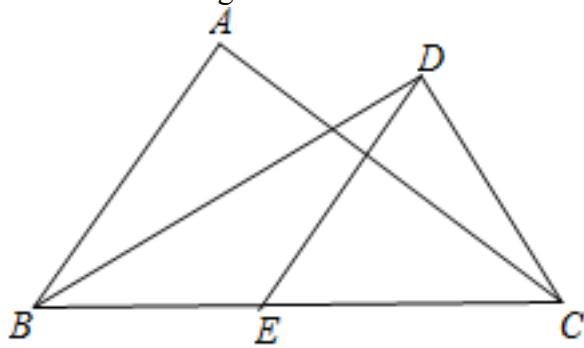
822、topic: 如图,已知AB=AC,BO=CO, $\angle BOC=160^\circ$,求 $\angle AOB$ 的度数.



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:] $\angle AOB$)}

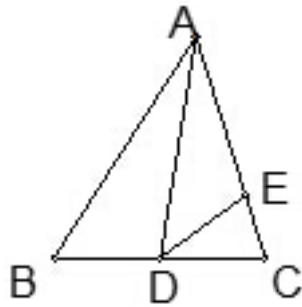
823、topic: 如图:在 $\triangle ABC$ 中, BD 平分 $\angle ABC$, $BD \perp CD$ 于 D , $DE \parallel AB$ 交 BC 于 E , 求证 $BE=CE$. #%#



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

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 $\angle BAC$ 的平分线,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": {}, "substems": [{"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 { $(AD)^2 = AB * AE$ }]

825、topic: 如图, $AB = AE$, $AC = AD$, $BC = DE$, C,D在BE边上.求证: $\angle CAE = \angle DAB$.

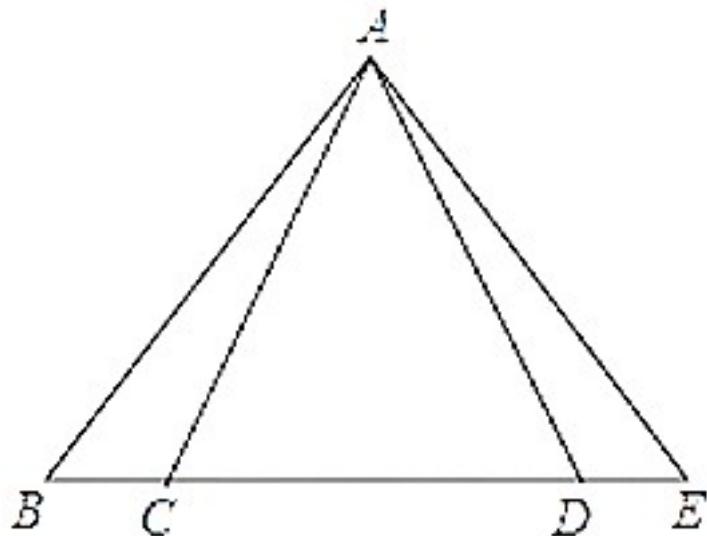


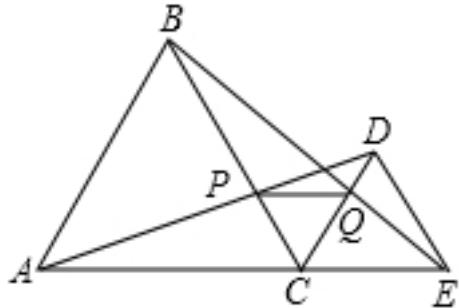
图 4-3-18

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{ $\angle CAE = \angle BAD$ }]

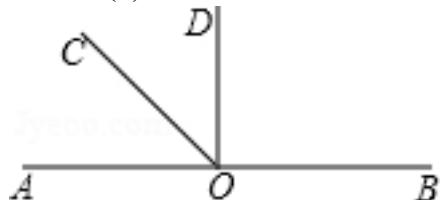
826、topic: 如图,C为线段AE上一动点(不与点A、E重合),在AE同侧分别作等边 $\triangle ABC$ 和等边 $\triangle CDE$,AD与BC相交于点P,BE与CD相交于点Q,连接PQ.求证: $\triangle PCQ$ 为等边三角形.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000038156_Q_1.jpg", "coordinates": {"A": "-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": {}, "subsystems": []}}

NLP: PointRelation:A,PointRelation:E,PointOnLineRelation{point=C, line=AE, isConstant=false, extension=false},RegularTriangleRelation:RegularTriangle: $\triangle ABC$,RegularTriangleRelation:RegularTriangle: $\triangle CDE$,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: $\triangle PCQ$]

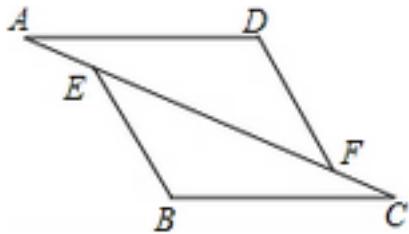
827、topic: 如图,O是直线AB上的一点,\$\angle AOC=\frac{1}{3}\angle BOC\$,OC是 $\angle AOD$ 的平分线.#%#(1)求 $\angle COD$ 的度数;#%#(2)试判断OD与AB的位置关系,并说明理由.#%#



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##B", "1": "O##B", "2": "O##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

NLP: PointOnLineRelation{point=O, line=AB, isConstant=false, extension=false},EqualityRelation{ $\angle AOC = (1/3) \angle BOC$ },AngleBisectorRelation{line=OC,angle= $\angle AOD$, angle1= $\angle AOC$, angle2= $\angle COD$ },求角的大小: AngleRelation{angle= $\angle COD$ },SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle COD$)},JudgePostionConclusionRelation: [data1=OD, data2=AB]

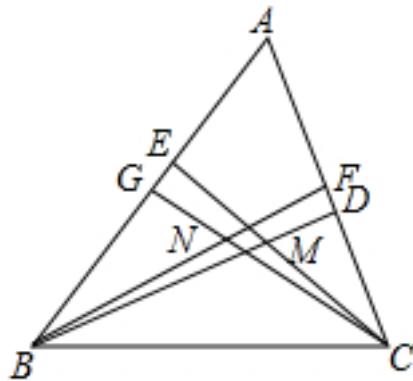
828、topic: 如图,已知:在 $\triangle AFD$ 和 $\triangle CEB$ 中,点A,E,F,C在同一直线上,AE=CF, $\angle B=\angle D$, $AD \parallel BC$.求证: $AD=BC$.#%#



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: $\triangle AFD$, TriangleRelation: $\triangle CEB$, PointRelation: A, PointRelation: E, PointRelation: F, EqualityRelation {AE=CF}, EqualityRelation { $\angle CBE = \angle ADF$ }, LineParallelRelation [iLine1=AD, iLine2=BC], ProveConclusionRelation: [证明: EqualityRelation {AD=BC}]

829、topic: 锐角 $\triangle ABC$ 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 $\angle BMC=100^\circ$.#%#求:(1) $\angle A$ 的度数;#%#(2) $\angle BNC$ 的度数.#%#

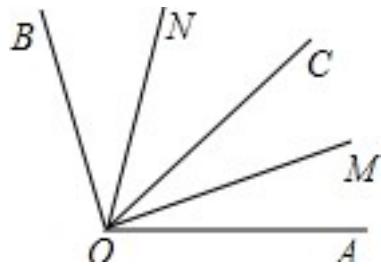


graph:
 {"stem": {"pictures": [{"picturename": "28.jpg", "coordinates": {"A": "-12.00,7.00", "B": "-15.00,2.00", "C": "-4.9,0.90", "D": "-9.43,4.77", "E": "-12.83,5.61", "F": "-11.24,6.34", "G": "-13.44,4.60", "M": "-12.20,5.23", "N": "-11.48,3.75"}, "collineations": {"0": "A##F##D##C", "1": "E##M##C", "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:] $\angle BNC$)}
 (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.

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.

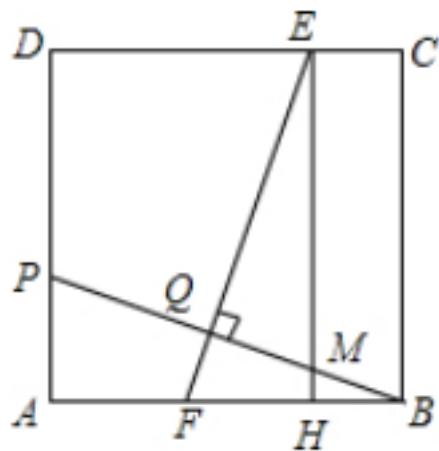
数.?(3)如果 $\angle MON$ 的大小改变, $\angle AOB$ 的大小是否随之改变?它们之间有怎样的大小关系?请写出来.



graph:
 {"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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 { $\angle MON = (2/5\pi)$ }, 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"}, "collineations": {"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": {}, "substems": []}}

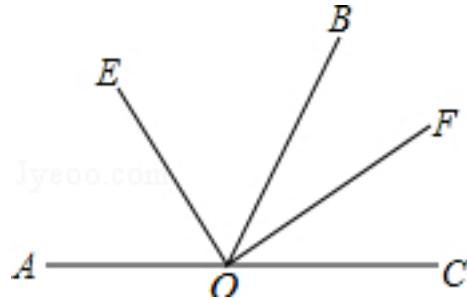
NLP: MiddlePerpendicularRelation [iLine1=FQ, iLine2=BP, crossPoint=Optional.of(Q)], SquareRelation {square=Square:ABCD}, PointOnLineRelation {point=P, pointOnLine=BP}, PointOnLineRelation {point=Q, pointOnLine=FQ}, PerpendicularLineRelation {line1=BP, line2=FQ}, PerpendicularLineRelation {line1=FQ, line2=EH}, PerpendicularLineRelation {line1=EH, line2=AB}

```

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.#%#



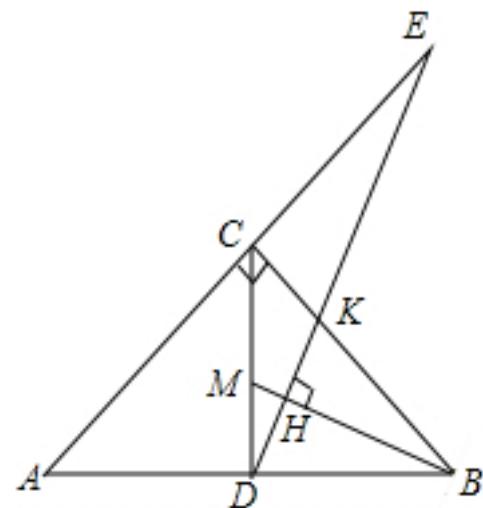
```

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"}, "collinear": {"0": "A###O###C", "1": "O###E", "2": "O###B", "3": "O###F"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substeps": []}}

```

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": "3.00,4.00", "D": "3.00,0.00", "E": "0.00,4.00", "H": "3.00,2.00", "M": "2.00,2.00"}}, "appliedproblems": {}, "substeps": []}}

```

```
","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"},"collinearities":{"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:△ABC[Optional.of(C)],EqualityRelation{∠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=△AED, triangleB=△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\$△ACE\$是等边三角形.?(1)求证:四边形\$ABCD\$是菱形;?(2)如图2,若\$∠AED=2∠EAD\$,\$AC=6\$.求DE的长.

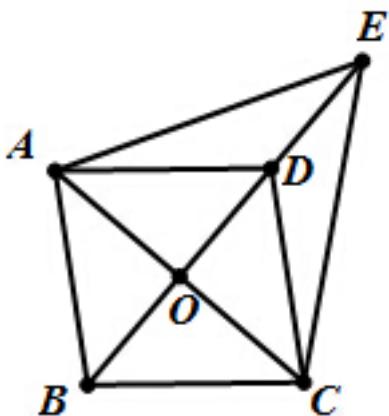
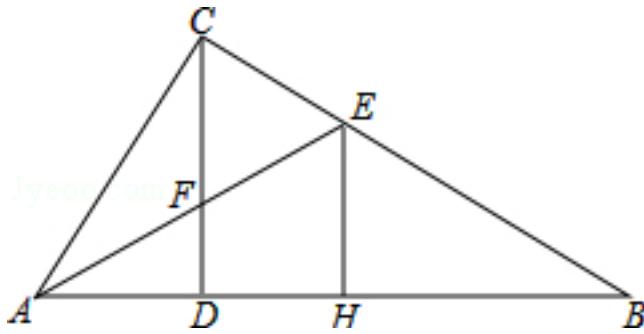


图 1

```
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"}, "collinearities": {"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:△ACE,EqualityRelation{DE=v_0},(ExpressRelation:[key:]2),EqualityRelation{∠AED=2*∠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)}

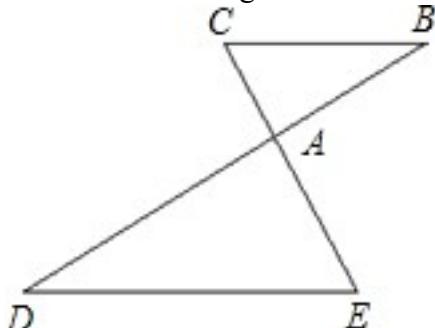
835、topic: 如图,在△ABC中,\$∠ACB=90°\$,\$CD \perp AB\$于点D,\$∠CAB\$的平分线交CD于点F,交BC于点E,过点E作\$EH \perp AB\$于点H.求证:\$EC=CF=EH\$.#%#



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, $\angle CED$ 与 $\angle BDA$ 交于点 A, $AC=2$, $AE=3$, $AB=4$, $AD=6$, 求证: $\triangle ADE \sim \triangle ABC$.



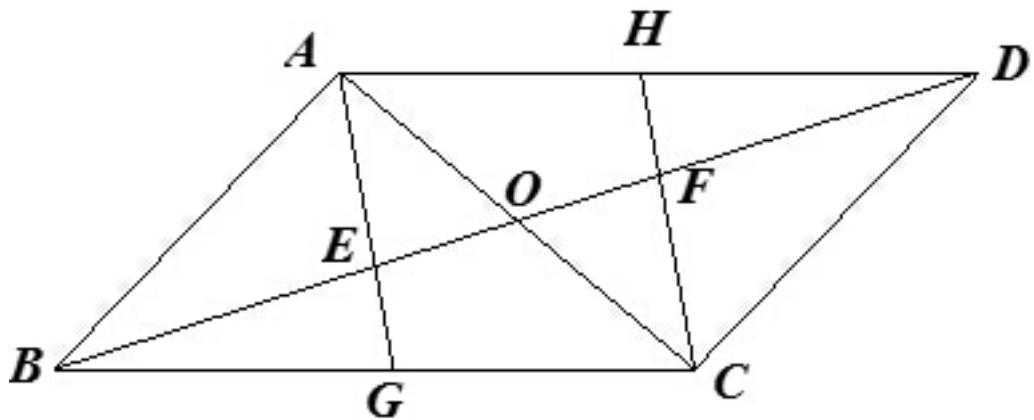
graph:
 {"stem": {"pictures": [{"picturename": "1000005822_Q_1.jpg", "coordinates": {"A": "-0.59,1.37", "B": "1.18,2.28", "C": "-1.00,2.28", "D": "-3.26,0.00", "E": "-0.00,0.00"}, "collineations": {"0": "B###A###D", "1": "C###A###E", "2": "B###C", "3": "D###E"}, "variable>equals": {}, "circles": []}], "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.



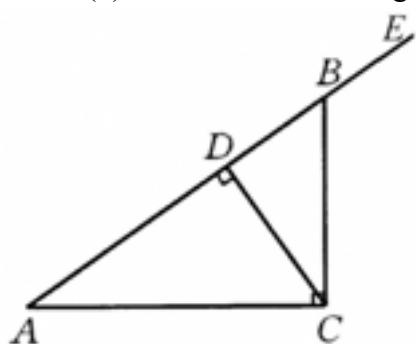
```

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###F###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.



```

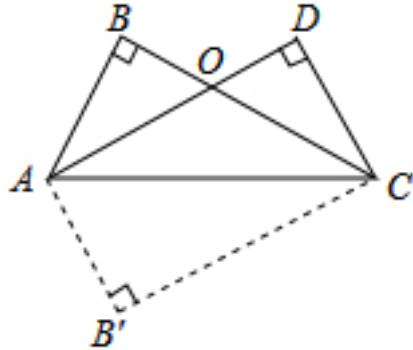
graph:
{"stem": {"pictures": [{"picturename": "DEB5F45F03144B9FBA63ED3778F9D0D2.jpg", "coordinates": {"A": "0,0", "B": "0,5", "C": "3,0", "D": "3,3", "E": "1.5,4", "F": "1.5,3.5"}}]}

```

```
:"-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: ΔABC , EqualityRelation $\{\angle ACB = (1/2 * \pi)\}$, LinePerpRelation $\{\text{line1}=CD, \text{line2}=AB, \text{crossPoint}=D\}$, EqualityRelation $\{\angle BCD = (7/36 * \pi)\}$, 求角的大小: AngleRelation $\{\text{angle} = \angle CBE\}$, 求角的大小: AngleRelation $\{\text{angle} = \angle CAD\}$, SolutionConclusionRelation $\{\text{relation} = \text{求值(大小)}: (\text{ExpressRelation}[\text{key}:] \angle CBE)\}$, SolutionConclusionRelation $\{\text{relation} = \text{求值(大小)}: (\text{ExpressRelation}[\text{key}:] \angle CAD)\}$

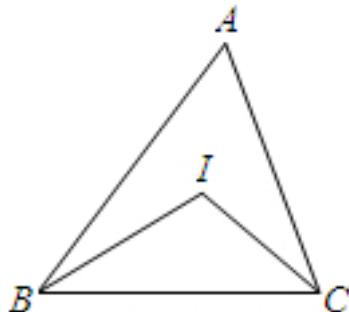
839、topic: 把长方形AB'CD沿对角线AC折叠,得到如图所示的图形,已知 $\angle BAO=30^\circ$,求 $\angle AOC$ 和 $\angle BAC$ 的度数.#%#



```
graph:
{"stem": {"pictures": [{"picturename": "1000073072_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "1.80,2.40", "C": "1.80,-2.40", "D": "5.00,0.00", "O": "3.20,2.40", "O2": "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 $\{\text{angle} = \angle AOC\}$, 求角的大小: AngleRelation $\{\text{angle} = \angle BAC\}$, SolutionConclusionRelation $\{\text{relation} = \text{求值(大小)}: (\text{ExpressRelation}[\text{key}:] \angle AOC)\}$, SolutionConclusionRelation $\{\text{relation} = \text{求值(大小)}: (\text{ExpressRelation}[\text{key}:] \angle BAC)\}$

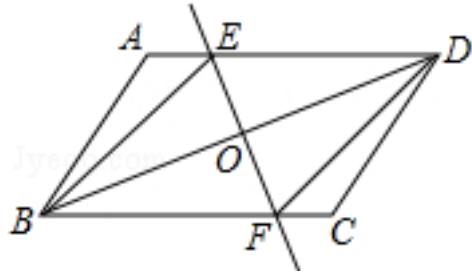
840、topic: 如图,在 ΔABC 中, $\angle ABC$ 与 $\angle ACB$ 的平分线相交于点I,当 $\angle ABC=70^\circ$, $\angle ACB=50^\circ$ 时,求 $\angle BIC$ 的度数.#%#



```
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:] $\angle BIC$)}

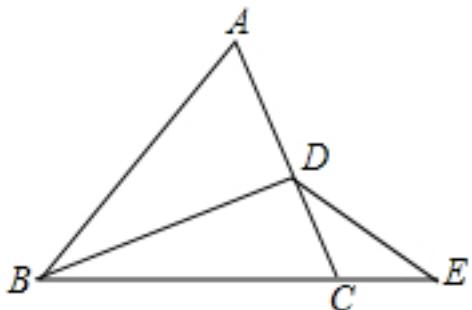
841、topic: 如图,在 $\square ABCD$ 中,O为对角线BD的中点,过点O的直线EF分别交AD,BC于E,F两点,连接BE,DF. (1)求证: $\triangle DOE \cong \triangle BOF$; (2)当 $\angle DOE$ 等于多少度时,四边形BFDE为菱形? 请说明理由. #



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"}, "collinearities": {"0": "B##A", "1": "B##E", "2": "D##C", "3": "F##D", "4": "A##E##D", "5": "B##F##C", "6": "B##O##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:] $\angle DOE$)}

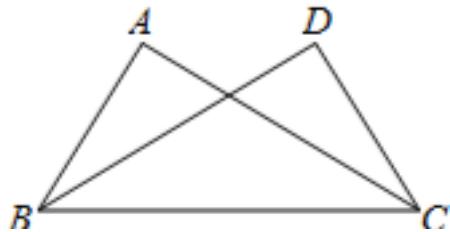
842、topic: 如图,已知点D在AC上,点E在BC的延长线上,求证: $\angle ADB > \angle CDE$. #



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"}, "collinearities": {"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: $\triangle ABC \cong \triangle DCB$.#%#



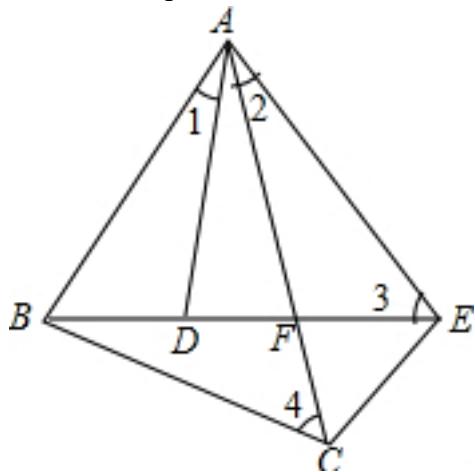
graph:

{"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: $\triangle ABD \sim \triangle ACE$.#%#

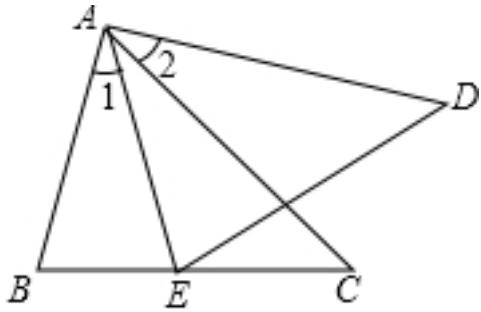


graph:

{"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": " $\angle 1 = \angle BAD$ ", "1": " $\angle 2 = \angle EAF$ ", "2": " $\angle 3 = \angle AEF$ ", "3": " $\angle 4 = \angle BCF$ "}, "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: $\triangle ABC \cong \triangle AED$.#%#

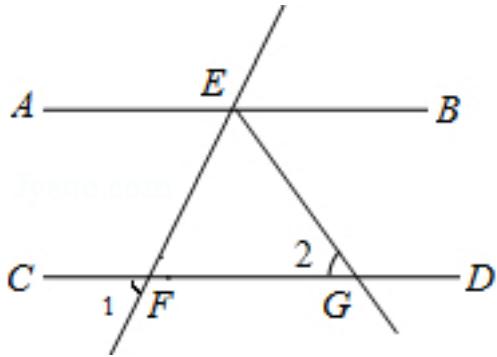


graph:

```
{"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"}, "collinearities": {"0": "A##B", "1": "D##A", "2": "E##B##C", "3": "A##C", "4": "D##E", "5": "A##E"}, "variable>equals": {"0": "\u03b81=\u03b8BAE", "1": "\u03b82=\u03b8CAD"}, "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.%#

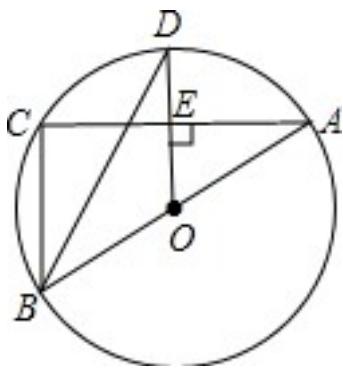


graph:

```
{"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"}, "collinearities": {"0": "A##B", "1": "C##F##G##D", "2": "E##G", "3": "E##F"}, "variable>equals": {"0": "\u03b81=\u03b8EFG", "1": "\u03b82=\u03b8EGF"}, "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: $BC=OD$.

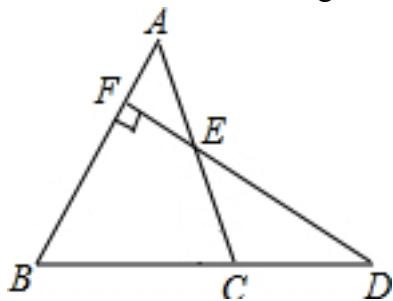


graph:

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

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}}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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.#%#

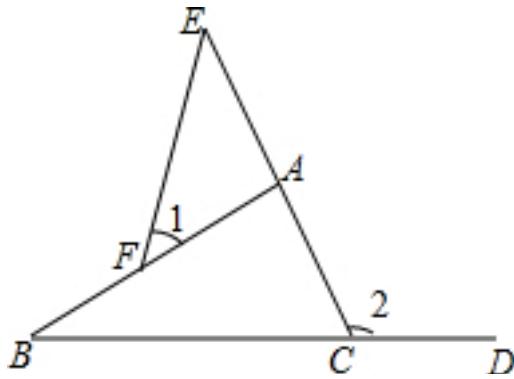


graph:

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

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: $\angle 1 < \angle 2$ #%#

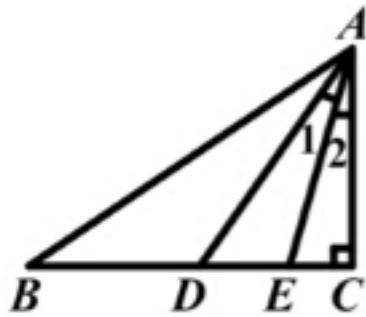


graph:

{"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###D", "1": "C###A###E", "2": "B###F###A", "3": "E###F"}, "variable>equals": {"0": "\u03b1=\u03b1EFA", "1": "\u03b2=\u03b1ECD"}, "circles": []}, "appliedproblems": {}, "substems": []}}

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.

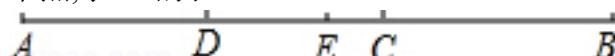


graph:

{"stem": {"pictures": [{"picturename": "1000022491_Q_1.jpg", "coordinates": {"A": "5.00,6.75", "B": "-5.00,0.0", "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": {}, "substems": []}}

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:]\u03b1BAD)}

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.

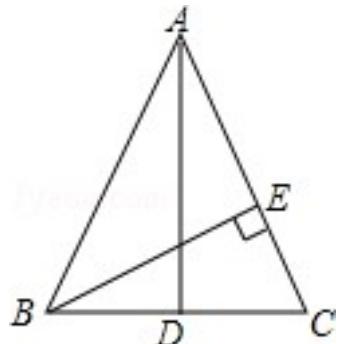


graph:

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

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)}

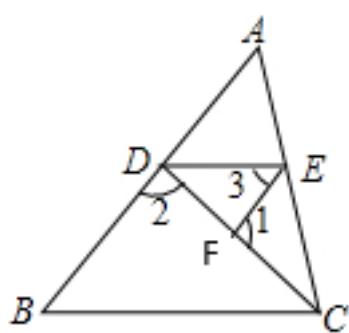
852、topic: 如图,在 $\triangle ABC$ 中, $AB=AC$, AD 是 BC 边上的中线, $BE \perp AC$ 于点 E .求证 $\angle CBE = \angle BAD$.



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

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{ $\angle DBE = \angle BAD$ }]

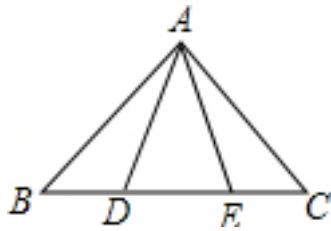
853、topic: 如图,已知 $\angle 1 + \angle 2 = 180^\circ$, $\angle 3 = \angle B$,求证: $DE \parallel BC$.#%#



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

NLP: EqualityRelation{ $\angle CFE + \angle BDF = (\text{Pi})$ }, EqualityRelation{ $\angle DEF = \angle CBD$ }, ProveConclusionRelation:[证明: LineParallelRelation [iLine1=DE, iLine2=BC]]]

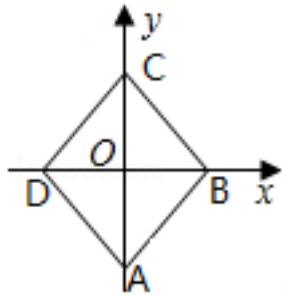
854、topic: 如图,已知点D、E在 $\triangle ABC$ 的边BC上,AB=AC, $BD=CE$,求证: $AD=AE$.#%#



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}]

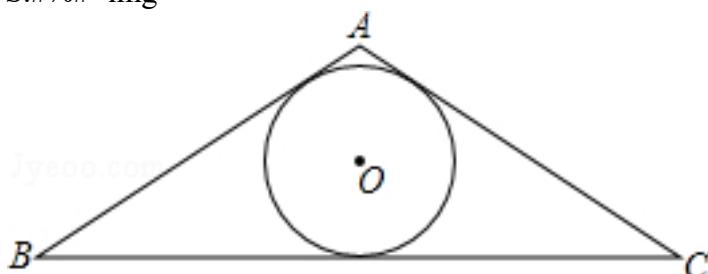
855、topic: 如图,正方形ABCD以(0,0)为中心,边长为4,求各顶点的坐标.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000070673_Q_1.jpg", "coordinates": {"A": "0.00,-2.83", "B": "2.83,0.0", "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 l ,求 $\triangle ABC$ 的面积 S .#%#

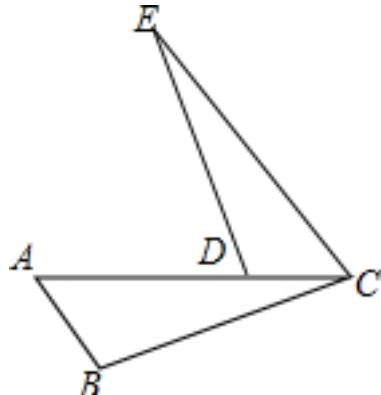


graph:

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

NLP: CircumscribedShapeOfCircleRelation: $\Delta ABC / \text{Circle}[\odot O] \{ \text{center}=O, \text{analytic}=(x-x_O)^2+(y-y_O)^2=r_O^2 \}$ Points: [], EqualityRelation { $C_{\Delta ABC}=v_0$ }, EqualityRelation { $S_{\Delta ABC}=S$ }, RadiusRelation {radius=null, circle=Circle[$\odot O$] {center=O, 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": {}, "substems": []}}

NLP: LineParallelRelation [iLine1=AB, iLine2=EC], EqualityRelation {AC=CE}, EqualityRelation { $\angle ABC=\angle CDE$ }, ProveConclusionRelation: [证明: EqualityRelation {BC=DE}]

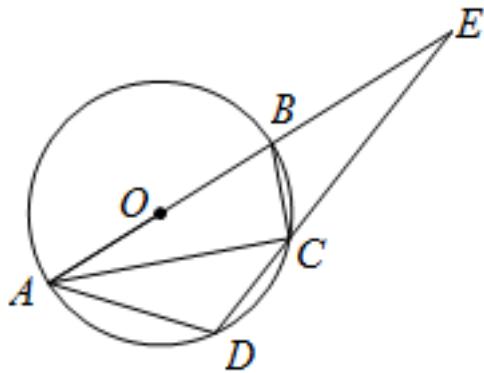
858、topic: 在 ΔABC 中, $\angle A=90^\circ$, $BC=10$, $AC=8$, 求 ΔABC 中的最短边与最长边之比.

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

NLP: TriangleRelation: ΔABC , 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: $BE=AD$.#%#

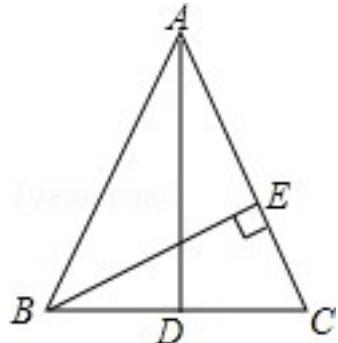


graph:

{"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 $\angle CBE = \angle BAD$.



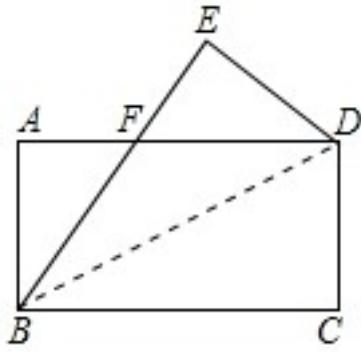
graph:

{"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.



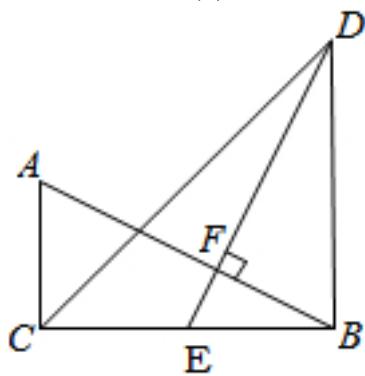
graph:

```
{"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 $DB = 8\text{cm}$,求AC的长.%#

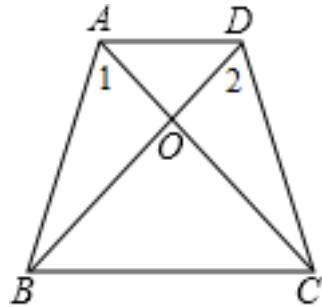


graph:

```
{"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)}

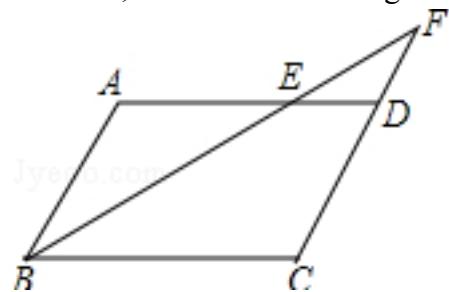
863、topic: 已知:如图,在四边形ABCD中,AC、BD相交于点O,AB=DC, $\angle 1=\angle 2$.求证:AC=BD. #



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": "\u22121=\u2212BAC", "1": "\u22122=\u2212BDC"}, "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}]

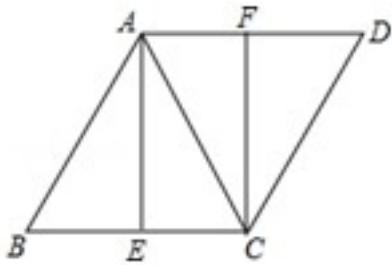
864、topic: 如图,在平行四边形ABCD中,若AB=6,AD=10, $\angle ABC$ 的平分线交AD于点E,交CD的延长线于点F,求DF的长. #



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:

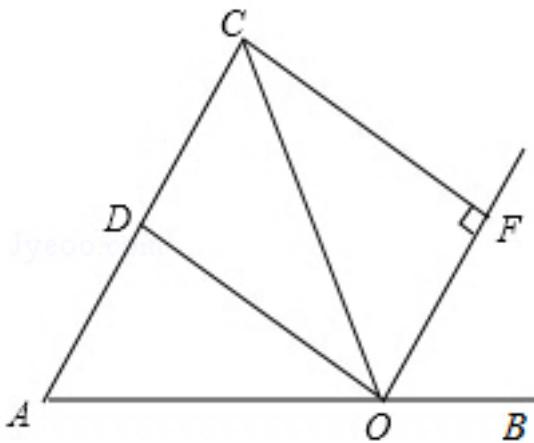
{"stem": {"pictures": [{"picturename": "1000005420_Q_1.jpg", "coordinates": {"A": "-4.00,5.27", "B": "-6.67,-0.64", "C": "-0.19,-0.61", "D": "2.49,5.32", "E": "-3.43,-0.62", "F": "-0.75,5.29"}, "collineations": {"0": "A##F##D", "1": "B##E##C", "2": "A##B", "3": "A##E", "4": "A##C", "5": "F##C", "6": "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{∠ABE=(1/3*Pi)}, EqualityRelation{AB=4}, 求值(大小):

(ExpressRelation:[key:]v_0), ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△ABE, triangleB=△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\$∠AOC\$交AC于点D,OF平分\$∠COB\$, \$CF \perp OF\$于点F.求证:四边形\$CDOF\$是矩形.

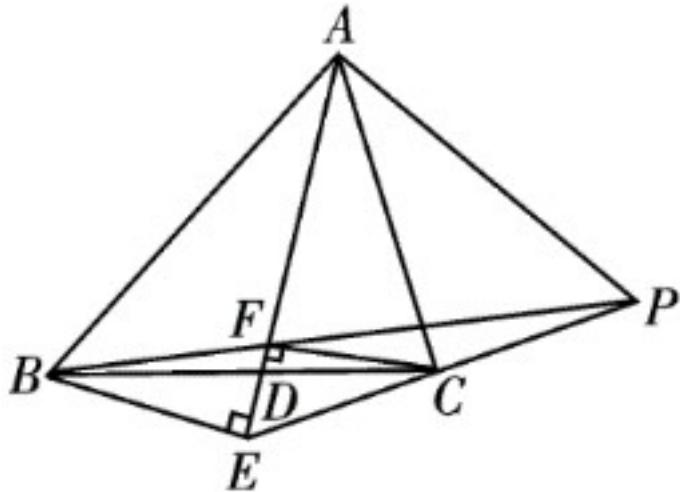


graph:

{"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: $CF \parallel AP$.

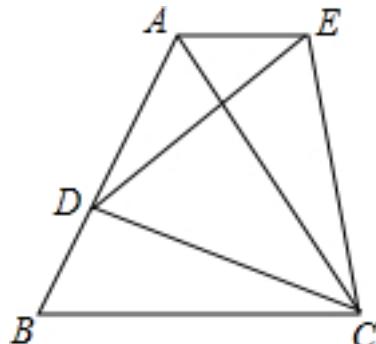


graph:

{"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"}, "collineations": {"0": "B###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: $\triangle ABC$, 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= $\angle BAC$, angle1= $\angle CAD$, angle2= $\angle BAD$ }, 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: $AE \parallel BC$.



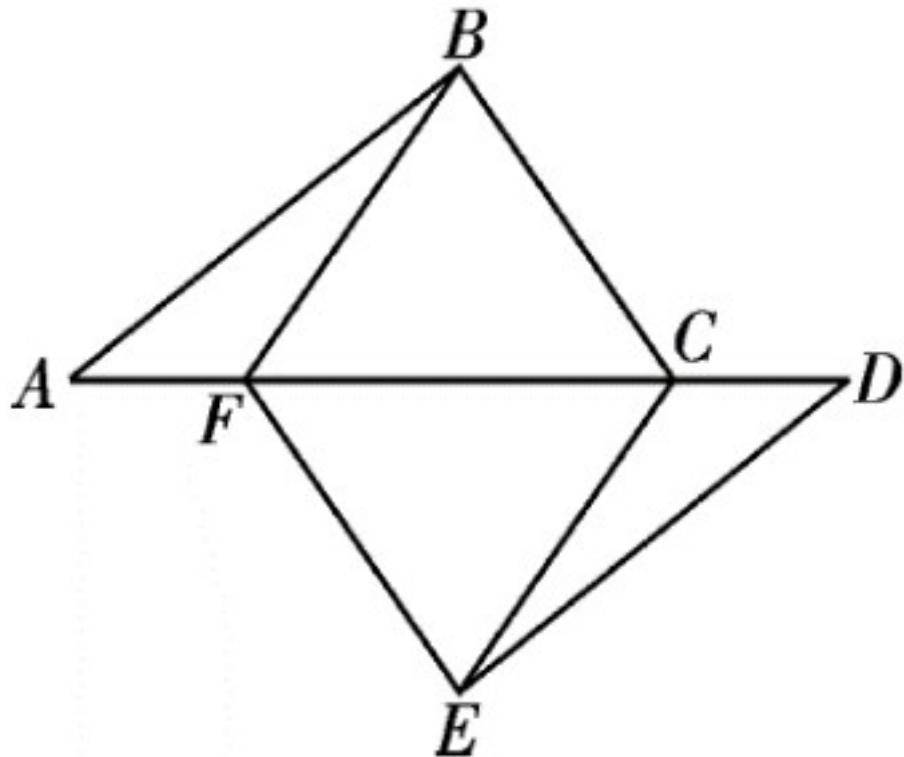
graph:

{"stem": {"pictures": [{"picturename": "1000063604_Q_1.jpg", "coordinates": {"A": "3.00,5.20", "B": "0.00,0.00", "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}, RegularTriangleRelation:RegularTriangle: $\triangle CDE$, PointOnLineSameSideRelation {pointSet=[E, A], line=DC}, SegmentRelation: AE, ProveConclusionRelation: [证明: LineParallelRelation [iLine1=AE,

iLine2=BC]]

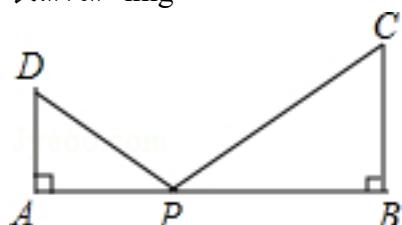
869、topic: 如图,已知点A、F、C、D在同一直线上,点B和点E分别在直线AD的两侧,且 $AB=DE$,
 $\angle A=\angle D$, $AF=DC$.?(1)求证:四边形BCEF是平行四边形;?(2)若 $\angle ABC=90^\circ$, $AB=4$, $BC=3$,当AF为何值时,四边形BCEF是菱形.



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": {}, "substems": [{"questionrelies": "1"}]}}

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},EqualityRelation{ $\angle ABC=(1/2\pi)$ },EqualityRelation{AB=4},EqualityRelation{BC=3},RhombusRelation{rhombus=Rhombus:BCEF},求值(大小): (ExpressRelation:[key:]AF),ProveConclusionRelation:[证明: ParallelleogramRelation{parallelogram=Parallelogram:BCEF}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]AF)}

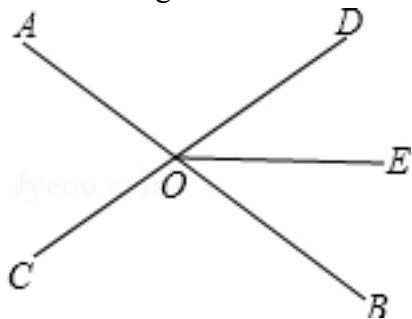
870、topic: 如图,已知 $\angle A=\angle B=90^\circ$, $AB=7$, $AD=2$, $BC=3$,点P在AB上,且 $\triangle PAD \sim \triangle PBC$,求AP的长.?



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

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:Jv_0]), SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:JAP])}

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###O#D", "1": "A###O###B", "2": "O###E"}, "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{ $\angle AOD - \angle AOC = (1/9 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle AOE$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:J $\angle AOE$])}

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.
 .#%#

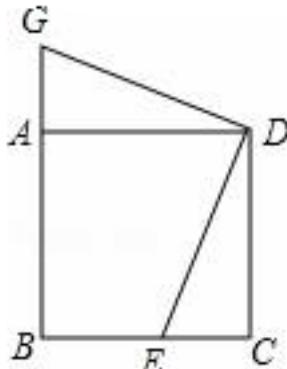


图1

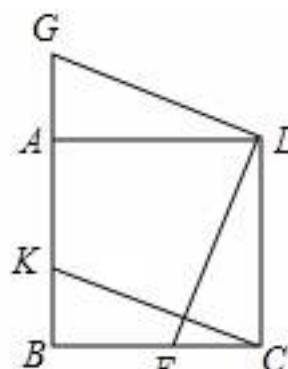
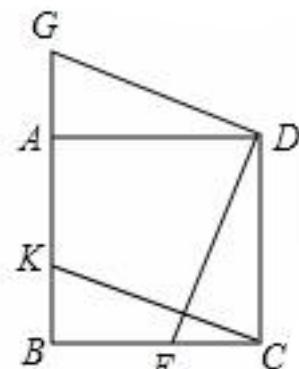


图2

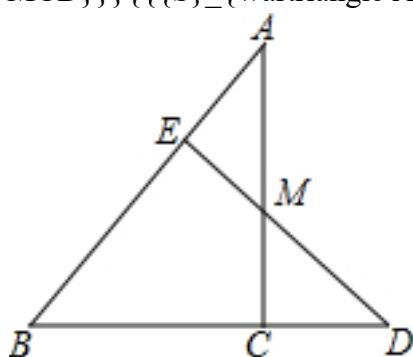


备用图

graph:
 {"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"picturename": "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": []}], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "", "pictures": [{"picturename": "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", "6": "C###K"}, "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.



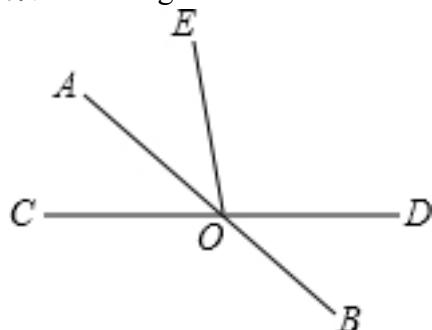
graph:
 {"stem": {"pictures": [{"picturename": "1000062110_Q_1.jpg", "coordinates": {"A": "7.00,12.93", "B": "3.00,6.00", "C": "7.00,6.00", "D": "9.00,6.00", "E": "6.00,11.20", "M": "7.00,9.46"}, "collineations": {"0": "A###E###B", "1": "B###C###D", "2": "D###M###E", "3": "A###M###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}}}

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

NLP:

TriangleRelation:△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_△CDM)/S_△ABC),ProveConclusionRelation:[证明:
EqualityRelation{BC=2*CD}],SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:]S_△CDM)/S_△ABC)}

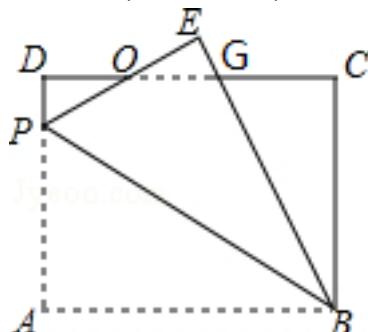
874、topic: 如图,直线AB、CD相交于点O,若OA平分∠COE,∠EOD=100°,求∠AOE的度数.#%#



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=∠COE, angle1=∠AOC, angle2=∠AOE},EqualityRelation{∠DOE=(5/9*Pi)},求角的大小: AngleRelation{angle=∠AOE},SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠AOE)}

875、topic: 如图,矩形ABCD中,AB=8,BC=6,P为AD上一点,将△ABP沿BP翻折至△EBP,PE与CD相交于点O,且OE=OD,BE交CD于点G,求AP的长.#%#

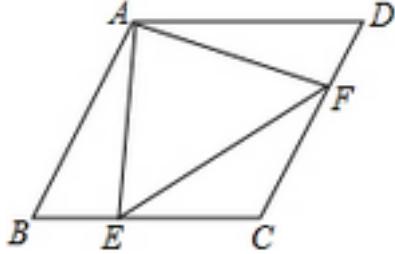


graph:
{"stem": {"pictures": [{"picturename": "1000031195_Q_1.jpg", "coordinates": {"A": "-7.00,2.00", "B": "-3.00,2.00", "C": "-3.00,5.00", "D": "-7.00,5.00", "E": "-5.29,6.06", "G": "-4.69,5.00", "O": "-6.38,5.00", "P": "-7.00,4.39"}, "collineations": {"0": "A##P##D", "1": "A##B", "2": "P##O##E", "3": "D##O##G##C", "4": "B##C", "5": "B##G##E", "6": "B##P"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

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: $\angle AEF = \angle AFE$.#%#

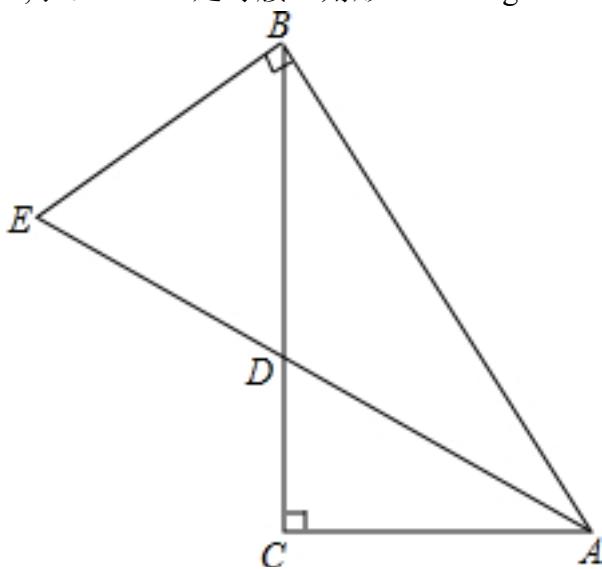


graph:

```
{"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"}, "collinearities": {"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{ $\angle AEF = \angle AFE$ }]

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.#%#

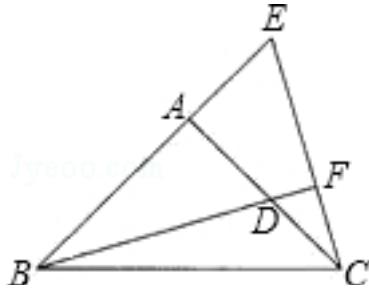


graph:

{"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)]]

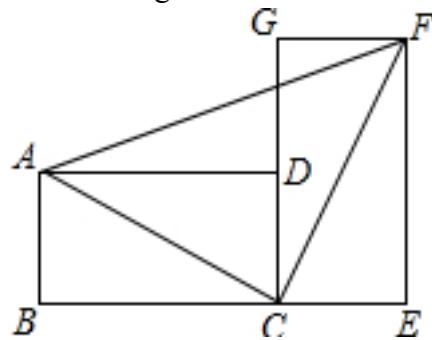
878、topic: 如图, $\angle BAC = 90^\circ$, $AB = AC$, 点D在AC上, 点E在BA的延长线上, $BD = CE$, BD 的延长线交CE于点F, 求证: $BF \perp CE$. #%#



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. #%#

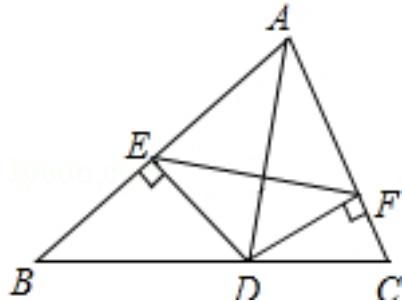


graph:
 {"stem": {"pictures": [{"picturename": "1000050613_Q_1.jpg", "coordinates": {"A": "-8.00,5.00", "B": "-8.00,3.00", "C": "-4.00,3.00", "D": "-4.00,5.00", "E": "-2.00,3.00", "F": "-2.00,7.00", "G": "-4.00,7.00"}, "collineations": {"0": "G###D###C", "1": "B###C###E", "2": "D###A", "3": "A###B", "4": "E###F", "5": "G###F", "6": "A###F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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.



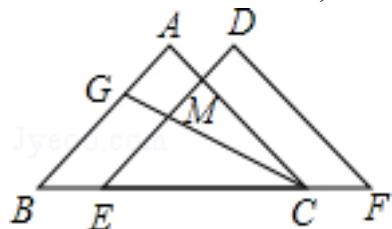
graph:

{"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"}, "collineations": {"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.



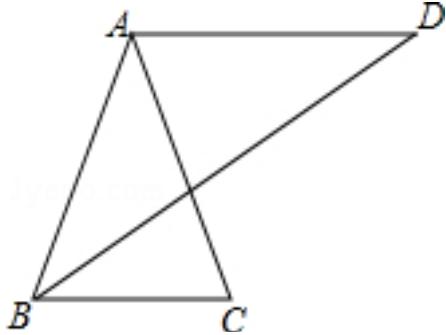
graph:

{"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:] $\angle ECM$)}

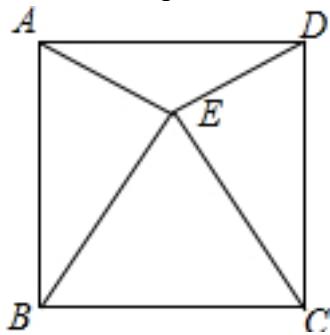
882、topic: 如图,已知AB=AC=AD,且AD // BC,求证: $\angle C=2\angle D$.#%#



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 { $\angle ACB=2*\angle ADB$ }]

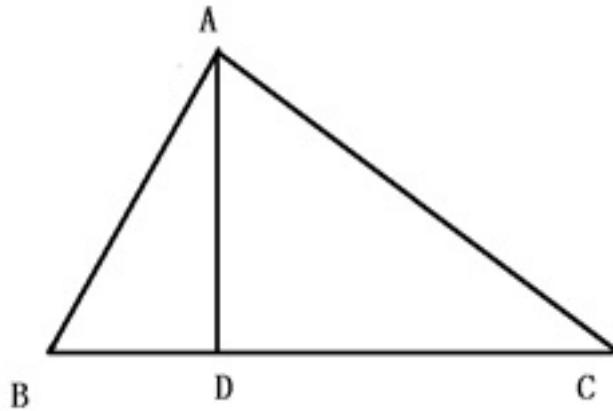
883、topic: 如图,四边形ABCD是正方形, $\triangle CBE$ 是等边三角形,求 $\angle AEB$ 的度数.#%#



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": "20.00,0.0", "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": {}}], "appliedproblems": {}}}

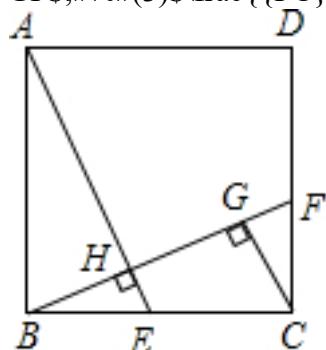
NLP: TriangleRelation: $\triangle ABC$, LinePerpRelation {line1=AD, line2=BC, crossPoint=D}, EqualityRelation {AB=25}, EqualityRelation {AC=30}, EqualityRelation {AD=24}, SolutionConclusionRelation {relation=求值(大小)}:

(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//AE,交BF于G.求证:(1)CG=BH;(2) $\frac{FC}{AB}^2 = \frac{BF}{GF}$

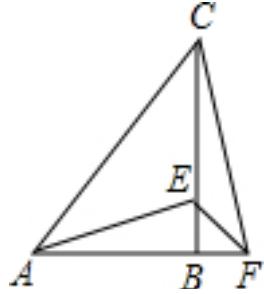


graph:
 {"stem": {"pictures": [{"picturename": "1000062212_Q_1.jpg", "coordinates": {"A": "-11.03,0.00", "B": "-11.03, -4.02", "C": "-7.01,-4.02", "D": "-7.01,0.00", "E": "-9.34,-4.02", "F": "-7.01,-2.30", "G": "-7.63,-2.57", "H": "-9.60,-3.41"}, "collineations": {"0": "A##B", "1": "C##G", "2": "A##D", "3": "B##E##C", "4": "C##F##D", "5": "A##H##E", "6": "B##H##G##F"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "2", "pictures": [], "appliedproblems": {}}, {"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}], "appliedproblems": {}}}

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))}]

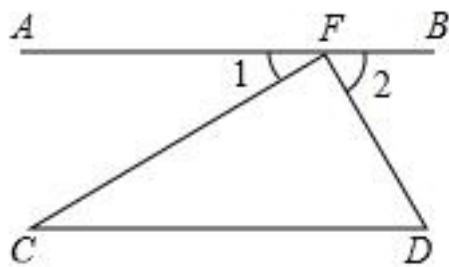
886、topic: 已知:如图,在 $\triangle ABC$ 中, $AB=BC$, $\angle ABC=90^\circ$, F 为 AB 延长线上一点,点 E 在 BC 上, $BE=BF$,连接 AE , EF 和 CF .
(1)求证: $AE=CF$;
(2)若 $\angle CAE=30^\circ$,求 $\angle EFC$ 的度数.



graph:
 {"stem": {"pictures": [{"picturename": "1000063717_Q_1.jpg", "coordinates": {"A": "-4.00,0.00", "B": "0.00,0.0", "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 { $\angle ABE=(1/2*\pi)$ },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:] $\angle CFE$)}

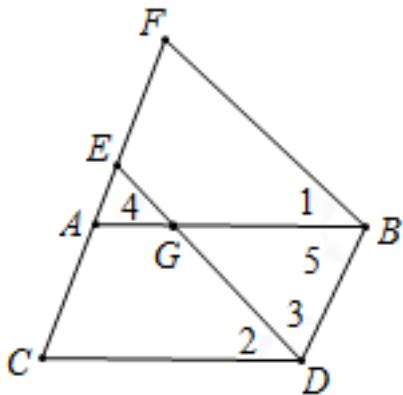
887、topic: 如图,已知 $\angle 1$ 和 $\angle D$ 互余, $CF \perp DF$,求证: $AB \parallel CD$.



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: $DE \parallel BF$.

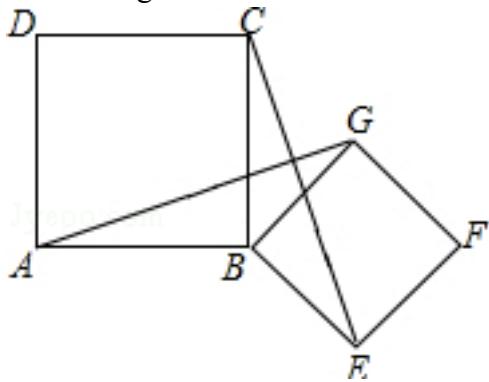


graph:

{"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": "\u00b21 = \u00b2FBA", "1": "\u00b22 = \u00b2CDE", "2": "\u00b23 = \u00b2EDB", "3": "\u00b24 = \u00b2EGA", "4": "\u00b25 = \u00b2ABD"}, "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: ① $AG = CE$; ② $AG \perp CE$.



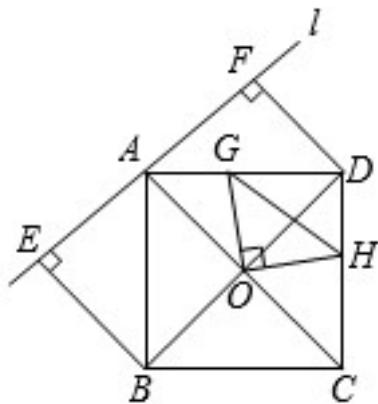
graph:

{"stem": {"pictures": [{"picturename": "1000030761_Q_1.jpg", "coordinates": {"A": "-12.00, 3.00", "B": "-8.00, 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"}, "collineations": {"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=}]]

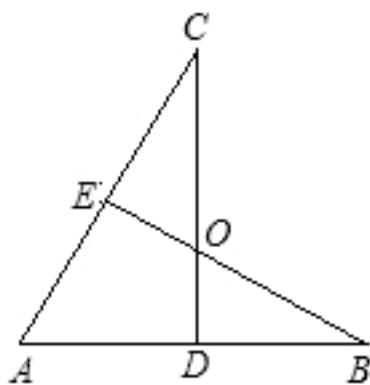
890、topic: 如图,直线 l 经过正方形 $ABCD$ 的顶点A,分别过此正方形的顶点B、D作 $BE \perp l$ 于点E、 $DF \perp l$ 于点F.(1)求证: $BE+DF=EF$;(2)以正方形对角线的交点O为端点,引两条相互垂直的射线分别与AD,CD交于G,H两点,若 $EF=2$, $S_{\triangle ABE}=\frac{1}{2}$,求线段GH长度的最小值.



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"}, "collineations": {"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[], analytic: $y=k_1x+b_1$, slope:null, b:null, isLinearFunction:false, isConstant:false, extension:false}, SquareRelation{square=Square:ABCD}, SquareRelation{square=Square:ABCD}, PointOnLineRelation{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:O, EqualityRelation{EF=2}, EqualityRelation{S_{\triangle 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: $OC=OB$.

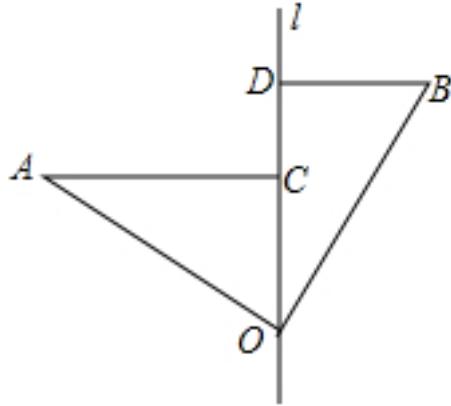


graph:
 {"stem": {"pictures": [{"picturename": "1000032847_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "3.61,0.00", "C": "0.00,3.61", "D": "1.80,0.00", "E": "0.00,1.80", "O": "1.80,1.80"}}, "appliedproblems": {}, "substems": []}}

,"C":"1.78,3.14","D":"1.78,0.00","E":"0.88,1.55","O":"1.78,1.04"},"collineations":[{"0":"A###D###B","1":"B###O###E","2":"A###E###C","3":"C###O###D"}],"variable-equals":{}, "circles":[]}, "appliedproblems":{}, "substems":[]}]

NLP: AngleBisectorRelation{line=M_0N_0,angle= $\angle DAE$, angle1= $\angle DAM_0$, angle2= $\angle EAM_0$ }, 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}]

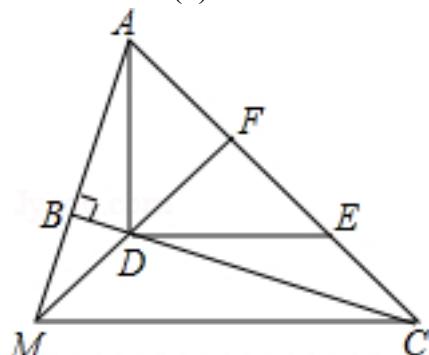
892、topic: 如图, $\angle AOB=90^\circ$, $OA=OB$, 直线 l 经过点O, 分别过A、B两点作 $AC \perp l$ 、 $BD \perp l$, 垂足分别为C、D. 求证: $OC=BD$. #



graph:
 {"stem": {"pictures": [{"picturename": "1000072642_Q_1.jpg", "coordinates": {"A": "-10.00,5.00", "B": "-4.00,7.00", "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=O, line=StraightLine[]} analytic : $y=k_1*x+b_1$ 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. #

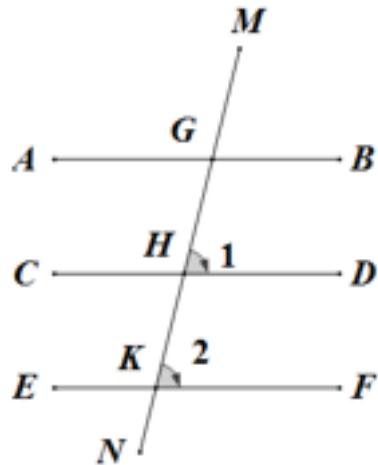


graph:
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:"B###D###C"},"variable>equals":{},"circles":[]}],"appliedproblems":{},"substems":[]}]

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: $AB \parallel CD$.#%#

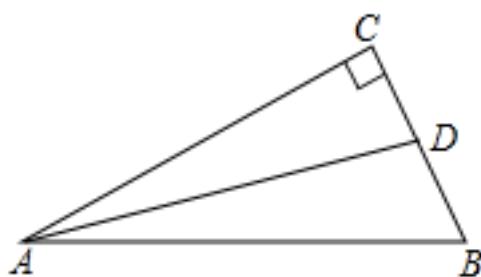


graph:

{"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": " $\angle 1 = \angle GHD$ ", "1": " $\angle 2 = \angle HKF$ "}, "circles": []}], "appliedproblems": {}}, "substems": []}]

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.#%#



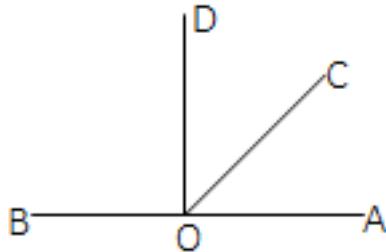
graph:

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

#A"},"variable>equals":{},"circles":[]],"appliedproblems":{},"substems":[]}

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:] $\angle ADC$)}

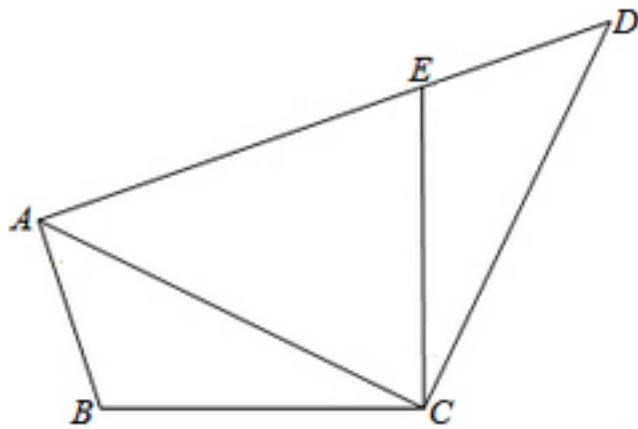
896、topic: 如图,O为直线AB上一点, $\angle BOC = 3 * \angle AOC$,OC平分 $\angle AOD$.#%#(1)求 $\angle AOC$ 的度数;#%#(2)猜测OD与AB的位置关系,并说明理由.#%#



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: $\triangle ABC \cong \triangle DEC$.#%#

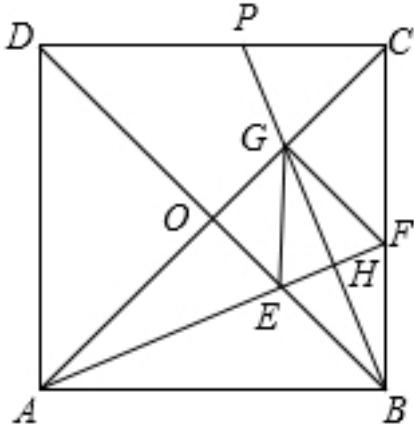


graph:
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NLP: 已知条件QuadrilateralRelation {quadrilateral=ABCD}, PointOnLineRelation {point=E, line=AD, isConstant=false, extension=false}, MultiEqualityRelation [multiExpressCompare= $\angle BAE = \angle BCE = \angle ACD$]

ACD=(1/2*Pi), originExpressRelationList=[], keyWord=null, result=null], EqualityRelation{BC=CE}, ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△ABC, triangleB=△DEC}]

898、topic: 如图,正方形ABCD的对角线相交于点O,∠CAB的平分线分别交BD、BC于点E、F,作BH⊥AF于点H,分别交AC、CD于点G、P,连接GE、GF.①求证:△OAE≌△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:
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NLP: SquareRelation{square=Square:ABCDintersection : O}, AngleBisectorRelation{line=AH, angle=∠BAO, angle1=∠BAH, angle2=∠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=△OAE, triangleB=△OBG}], ProveConclusionRelation:[RhombusRelation{rhombus=Rhombus:BFGE}]

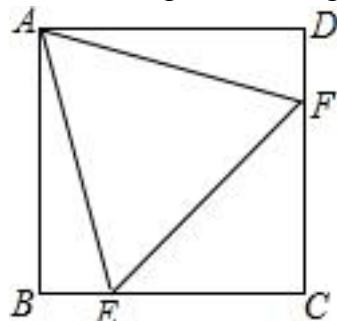
899、topic: 如图所示,在平面直角坐标系中,AB交y轴于点C,连接OB.①如图①所示,已知\$A(-2,0)\$、\$B(2,4)\$,求\$△AOB\$的面积;②如图②所示,点D在x轴上,\$∠OBD=∠OBC\$,求\$\frac{∠BDA-∠BAD}{∠BOC}\$的值;③如图③所示,\$BM \perp x\$轴于点M,点N在y轴上,\$∠MNB=∠MBN\$,点P在x轴

graph:
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" :"N###B","1":"O###P###M","2":"O###N","3":"N###M","4":"N###P","5":"B###M"},"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_ΔABO=v_0}, PointRelation:A(-2,0), Point Relation: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{∠OBD=∠CBO}, 求值(大小): (ExpressRelation:[key:]((∠BDA-∠BAD)/(∠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{∠MNB=∠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_ΔABO)}, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]((∠BDA-∠BAD)/(∠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\$.#%#



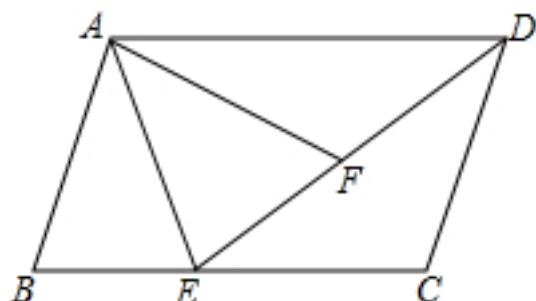
graph:

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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{∠CEF=∠CFE}]

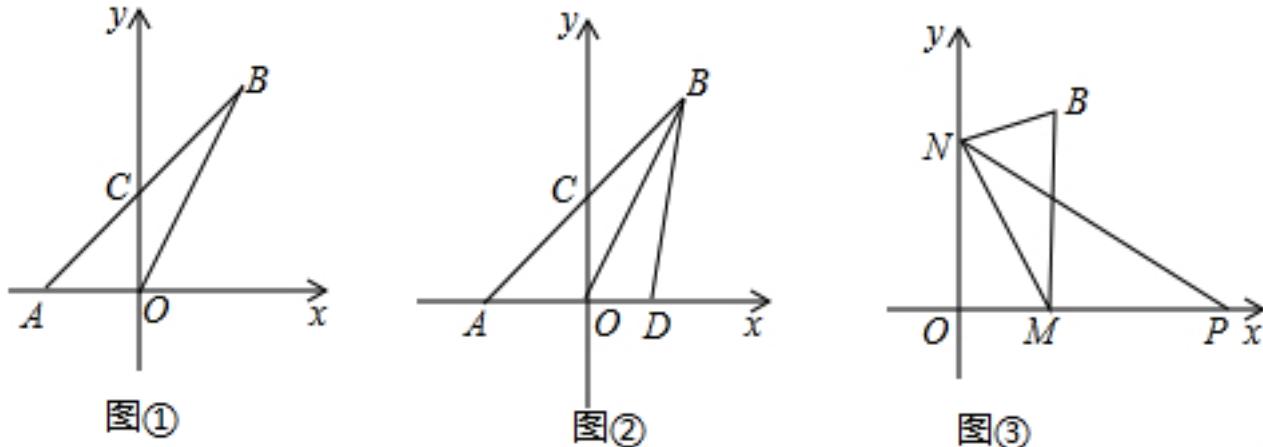
901、topic: 如图,在平行四边形ABCD中,∠B=∠AFE,EA是∠BEF的角平分线,求证:#%#(1)△ABE ≅△AFE;#%#(2)∠FAD=∠CDE.#%#



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

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=△ABE, triangleB=△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△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⊥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.

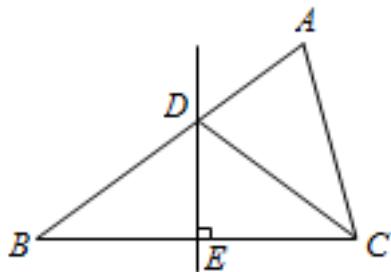


graph:
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NLP: LineCrossRelation [crossPoint=Optional.of(C), iLine1=AB, iLine2=StraightLine[Y] analytic :x=0 slope: b: isLinearFunction:false], SegmentRelation:OB, EqualityRelation {S \triangle ABO=v_0}, PointRelation:A(-2,0), Point Relation:B(2,4), 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_ ΔABO)},SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:](($\angle BDA - \angle BAD$)/($\angle BOC$))),SolutionConclusionRelation{relation=求值(大小):
(ExpressRelation:[key:] $\angle BNP$)}}

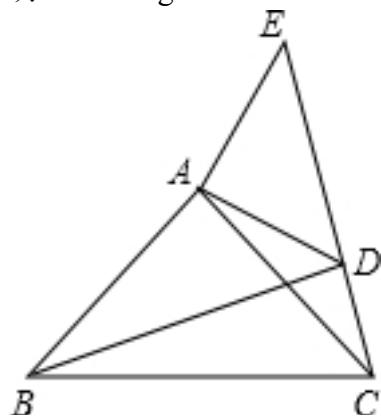
903、topic: 如图所示,在 ΔABC 中,AB=5cm,AC=3cm,BC的垂直平分线分别交AB,BC于点D,E,求 ΔACD 的周长.#%#



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_ ΔACD =v_1}, TriangleRelation: ΔABC , EqualityRelation{A B=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_ ΔACD)}

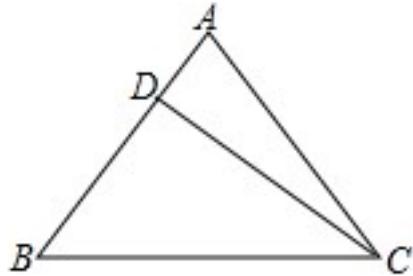
904、topic: 已知:如图,在 ΔABC 、 ΔADE 中, $\angle BAC = \angle DAE = 90^\circ$,AB=AC,AD=AE,点C、D、E三点在同一直线上,连接BD.#%#求证:(1) $\Delta BAD \cong \Delta CAE$;%#(2)试猜想BD、CE有何特殊位置关系,并证明.#%#



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: ΔABC , TriangleRelation: ΔADE , 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= ΔBAD , triangleB= ΔCAE }], JudgePostionConclusionRelation: [data1=BD, data2=CE]

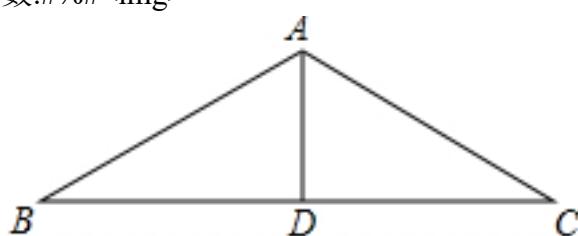
905、topic: 如图所示, ΔABC 中 $AB=AC$, $BC=20$, D 为 AB 上一点, 且 $CD=16$, $BD=12$, 求 ΔABC 的面积. #%#



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

NLP:
 EqualityRelation {S_ ΔABC = v_0}, TriangleRelation: ΔABC , EqualityRelation {AB=AC}, EqualityRelation {B C=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_ ΔABC)

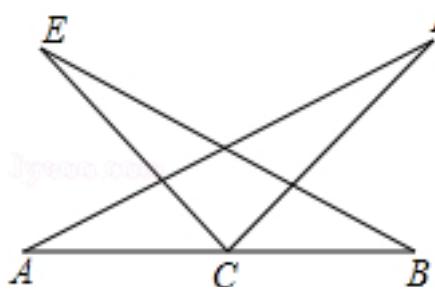
906、topic: 如图所示, 在 ΔABC 中, $AB=AC$, D 是 BC 边上的中点, $\angle B=30^\circ$, 求 $\angle BAD$ 和 $\angle ADC$ 的度数. #%#



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

NLP:
 TriangleRelation: ΔABC , EqualityRelation {AB=AC}, MiddlePointOfSegmentRelation {middlePoint=D, segment=BC}, EqualityRelation { $\angle B=(1/6 * \pi)$ }, 求角的大小: AngleRelation {angle= $\angle BAD$ }, 求角的大小: AngleRelation {angle= $\angle ADC$ }, SolutionConclusionRelation {relation=求值(大小)}: (ExpressRelation:[key:] $\angle BAD$), SolutionConclusionRelation {relation=求值(大小)}: (ExpressRelation:[key:] $\angle ADC$)

907、topic: 如图,C是AB的中点,AD=BE,CD=CE, $\angle A=40^\circ$.求 $\angle B$ 的度数.#%#



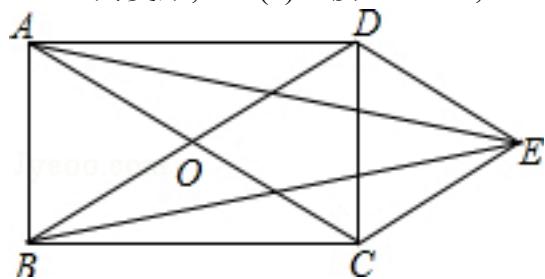
graph:

```
{"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": {}, "subsystems": []}}
```

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.#%#

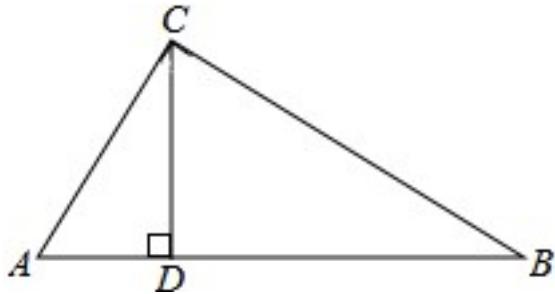


graph:

```
{"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": {}, "subsystems": []}}
```

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}]

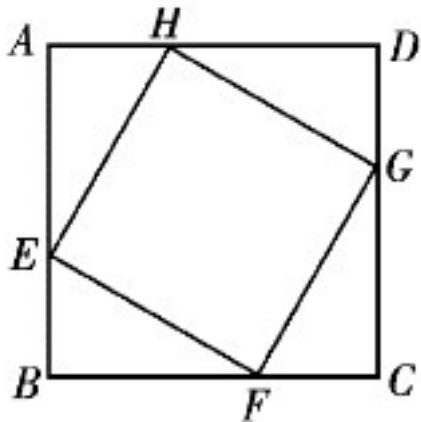
909、topic: 如图,在 $\triangle ABC$ 中,已知 $\angle ACB=90^\circ$, $AB=10\text{cm}$, $BC=6\text{cm}$, $CD \perp AB$ 于点D. 求:(1)AC的长;(2)CD的长.



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

NLP: TriangleRelation: ΔABC , 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)}

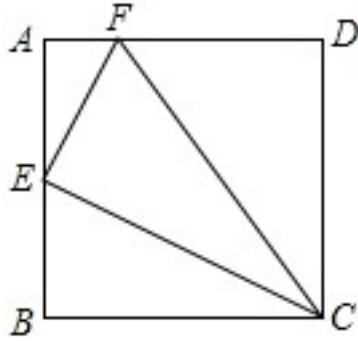
910、topic: 如图,把一个边长为2的正方形ABCD的各个角去掉,得到的四边形EFGH仍是一个正方形,\$AE = \frac{3}{2}\$.?(1)求正方形EFGH的边长;?(2)求小正方形与原正方形的相似比.



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

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.



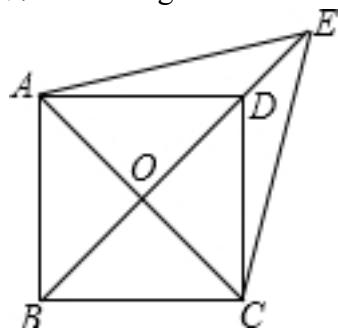
graph:

```
{"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. #%#

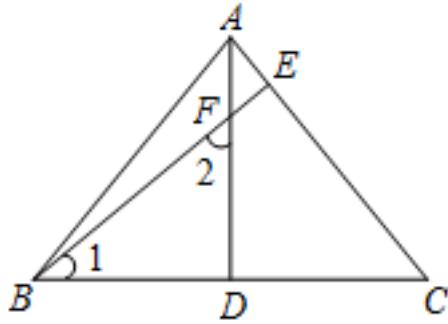


graph:

```
{"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\$},ProveConclusionRelation:[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. #

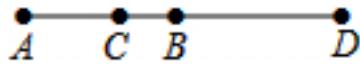


graph:

{"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": "\u00b21=\u00b2CBE", "1": "\u00b22=\u00b2BFD"}, "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. #

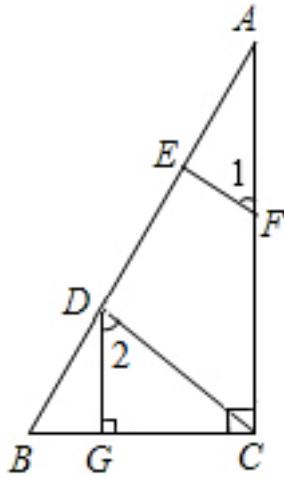


graph:

{"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)

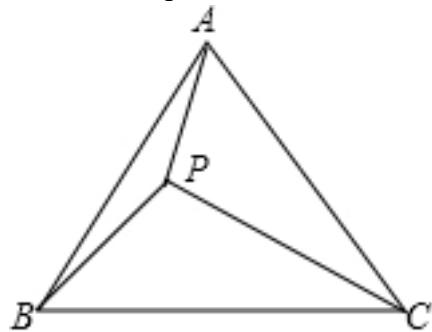
915、topic: 如图,已知 $DG \perp BC, AC \perp BC, EF \perp AB, \angle 1=\angle 2$,求证: $CD \perp AB$. #



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: $\triangle ABC$, PositionOfPoint2RegionRelation{point=P, region=EnclosedRegionRelation{name=ABC, closedShape= $\triangle ABC$ }, position=inner}, EqualityRelation{AP=3}, EqualityRelation{BP=4}, EqualityRelation{CP=5}, 求角的大小: AngleRelation{angle= $\angle APB$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle APB$)}
 (ExpressRelation:[key:] $\angle APB$)

917、topic: 如图1,在 $\triangle OAB$ 中, $\angle OAB=90^\circ$, $\angle AOB=30^\circ$, $OB=8$.以OB为边,在 $\triangle OAB$ 外作等边 $\triangle OBC$,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.#%#

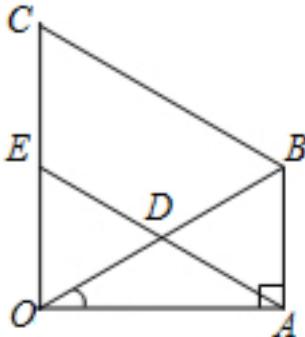


图 1

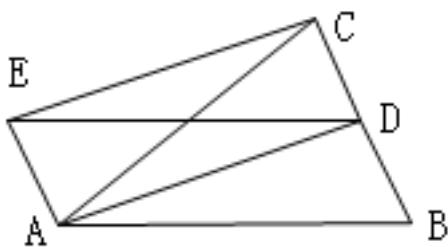
```

graph:
{"stem": {"pictures": [], "appliedproblems": {}}, "subsystems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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": "", "pictures": [{"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: ΔOAB , EqualityRelation $\{\angle BAO = (1/2 * \pi)\}$, EqualityRelation $\{\angle AOD = (1/6 * \pi)\}$, EqualityRelation $\{BO = 8\}$, TriangleRelation: ΔOAB , RegularTriangleRelation: RegularTriangle: ΔOBC , 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. #%#



```

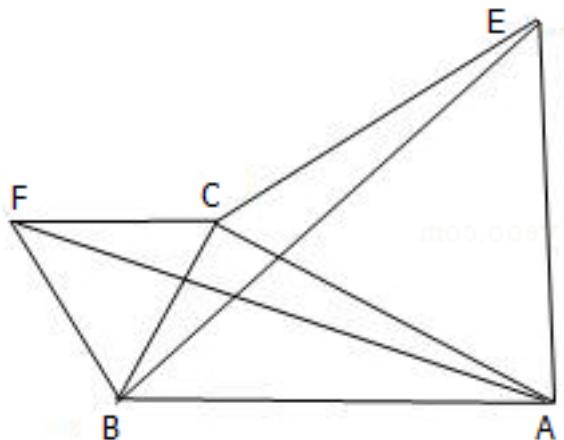
graph:
{"stem": {"pictures": [{"picturename": "1000050586_Q_1.jpg", "coordinates": {"A": "-6.08,4.00", "B": "-2.47,4.00", "C": "-4.08,7.00", "D": "-3.28,5.50", "E": "-6.86,5.47"}, "collineations": {"0": "C##D##B", "1": "D##E", "2": "A##B", "3": "A##D", "4": "E##C", "5": "C##A", "6": "A##E"}, "variable-equals": {}, "circles": []}], "appliedproblems": {}}, {"subsystems": []}

```

NLP:
TriangleRelation: ΔABC , EqualityRelation $\{AB=AC\}$, MiddlePointOfSegmentRelation {middlePoint=D, segm

ent=BC},ParallelogramRelation{parallelogram=Parallelogram:ABDE},ProveConclusionRelation:[证明:
RectangleRelation{rectangle=Rectangle:ADCE}]

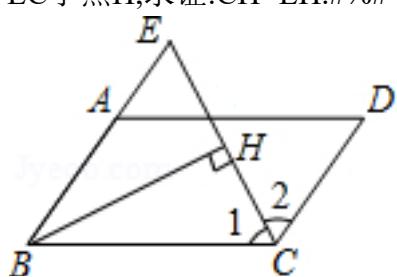
919、topic: 如图,分别以Rt \triangle ABC的直角边AC、BC为边,在Rt \triangle ABC外作两个等边三角形 \triangle ACE和 \triangle BCF,连结BE、AF.求证:BE=AF.#%#



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: \triangle ABC[Optional.of(C)],LineRoleRelation{Segment=AC, roleType=RIGHTLEG},LineRoleRelation{Segment=BC, roleType=RIGHTLEG},RightTriangleRelation:RightTriangle: \triangle ABC[Optional.of(C)],RegularTriangleRelation:RegularTriangle: \triangle ACE,RegularTriangleRelation:RegularTriangle: \triangle BCF,SegmentRelation:BE,SegmentRelation:AF,ProveConclusionRelation:[证明: EqualityRelation{BE=AF}]

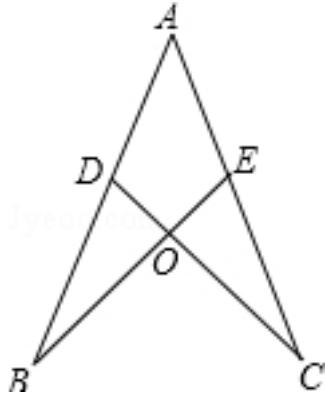
920、topic: (2015·自贡)在平行四边形ABCD中, \angle BCD的平分线与BA的延长线相交于点E,BH \perp EC于点H,求证:CH=EH.#%#



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###B", "1": "B###C", "2": "C###D", "3": "A###D", "4": "B###H", "5": "E###H###C"}, "variable>equals": {"0": "\u00b2=1=\u00b2=ECB", "1": "\u00b2=2=\u00b2=ECD"}, "circles": []}], "appliedproblems": {}, "substems": []}}

NLP: AngleBisectorRelation{line=CH,angle= \angle BCD, angle1= \angle BCH, angle2= \angle DCH},ParallelogramRelation{parallelogram=Parallelogram:ABCD},LinePerpRelation{line1=BH, line2=EC, crossPoint=H},ProveConclusionRelation:[证明: EqualityRelation{CH=EH}]

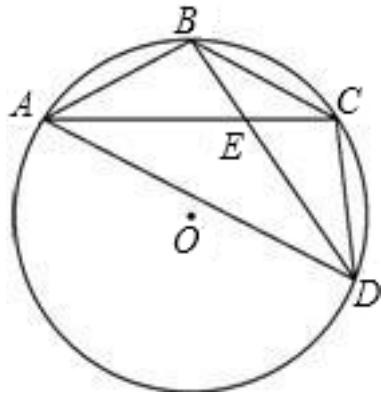
921、topic: 如图,点\$D\$在\$AB\$上,点\$E\$在\$AC\$上,\$AB=AC\$,\$AD=AE\$.求证:\$\angle B=\angle C\$.



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"}, "collinearities": {"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 { $\angle DBO = \angle ECO$ }]

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\$\angle ADC\$; #%(2)若BE=3,ED=6,求AB的长. #%#

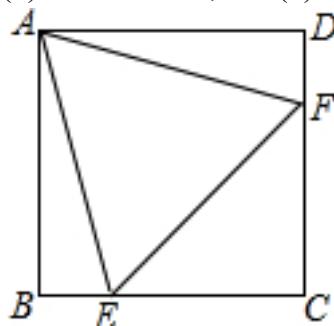


graph:
 {"stem": {"pictures": [{"picturename": "1000035146_Q_1.jpg", "coordinates": {"A": "-5.20,0.40", "B": "-2.60,4.50", "C": "2.60,4.50", "D": "5.20,0.40", "O": "0.00,0.00", "E": "0.00,3.00"}, "collinearities": {"0": "B###E###D", "1": "C###A###E", "2": "A###D", "3": "A###B", "4": "B###C", "5": "C###D"}, "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)}

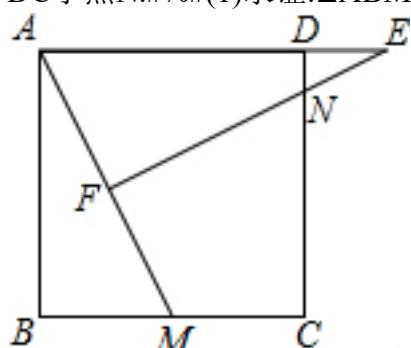
923、topic: 如图,在正方形ABCD中,边长为2的等边三角形AEF的顶点E、F分别在BC和CD上. #%(1)求证:CE=CF; #%(2)求 $\angle AEB$ 的度数; #%(3)求正方形ABCD的面积. #%#



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"}, "collineations": {"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": {}, "subsystems": []}}

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:]CE=CF)}, 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. #%#

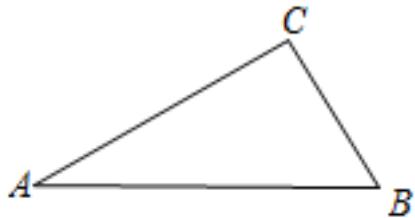


graph:
 {"stem": {"pictures": [{"picturename": "1000081342_Q_1.jpg", "coordinates": {"A": "0.00,12.00", "B": "0.00,0.0", "C": "12.00,0.00", "D": "12.00,12.00", "E": "16.90,12.00", "F": "2.50,6.00", "M": "5.00,0.00", "N": "12.00,9.96"}, "collineations": {"0": "A##D##E", "1": "A##F##M", "2": "A##B", "3": "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, extension=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)}

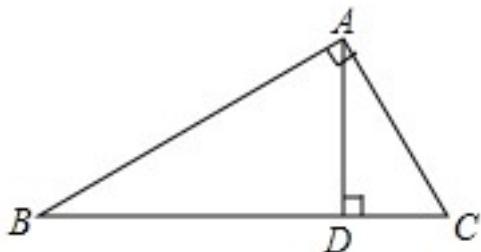
925、topic: 如图, $\angle A$ 与 $\angle B$ 互为余角, 且 $\angle B=2\angle A$. 求 $\angle A$ 、 $\angle B$ 的度数. #%#



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

NLP: AngleComplementRelation: $\angle BAC/\angle ABC$, EqualityRelation{ $\angle ABC=2*\angle BAC$ }, 求角的大小: AngleRelation{angle= $\angle BAC$ }, 求角的大小: AngleRelation{angle= $\angle ABC$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle BAC$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle ABC$)}

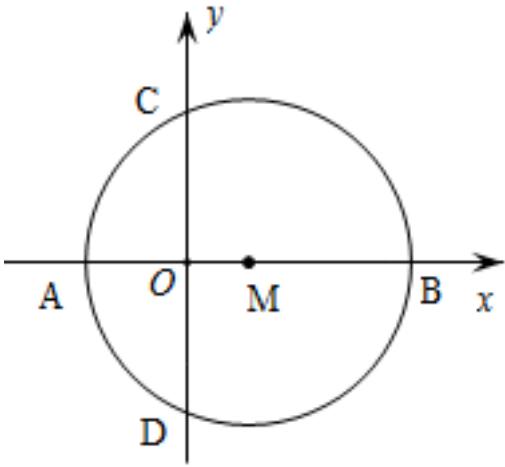
926、topic: 如图, 在 $\triangle ABC$ 中, 已知 $\angle BAC=90^\circ$, $AD \perp BC$ 于点D. 试说明: $BC^2-AC^2=BD^2+AD^2$.



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

NLP: TriangleRelation: $\triangle ABC$, EqualityRelation{ $\angle BAC=(1/2*\pi)$ }, 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. #%#

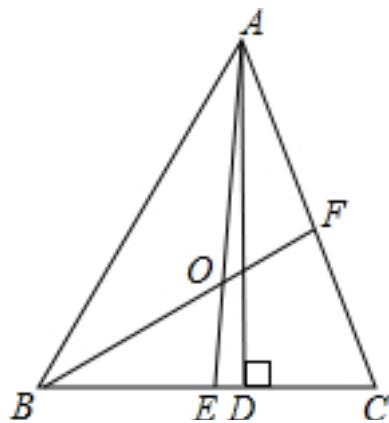


graph:

```
{"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.#%#

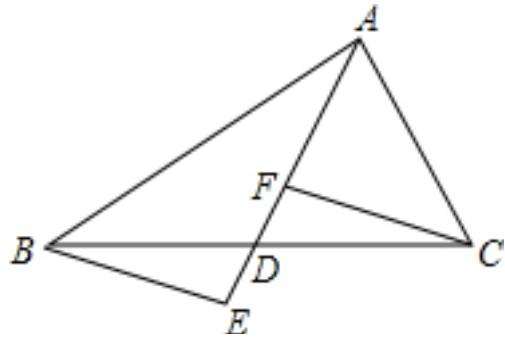


graph:

```
{"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]:) $\angle AOB$ }

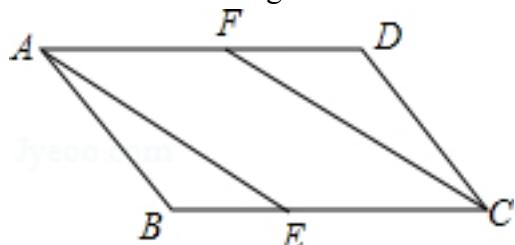
929、topic: 如图,在 $\triangle ABC$ 中,D是BC边的中点,F、E分别是AD及其延长线上的点,CF//BE.求证: $\triangle BDE \cong \triangle CDF$.请连接BF、CE,试判断四边形BECF是何种特殊四边形,并说明理由.



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###D##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": "-8.00,2.00", "C": "-4.00,2.00", "D": "-6.00,4.00", "E": "-6.59,2.00", "F": "-7.41,4.00"}, "collineations": {"0": "A###F###D", "1": "A###B", "2": "C###D", "3": "B###E###C", "4": "A###E", "5": "C###F"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP: ParallelRelation {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.

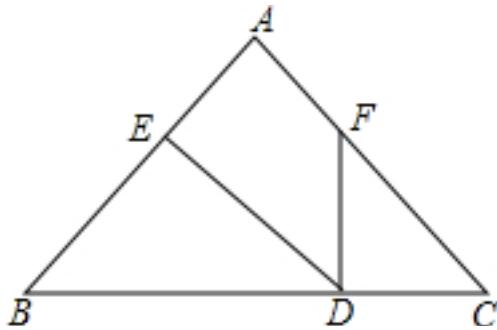


graph:

```
{"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": {}}, {"subsystems": []}}
```

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. #%#

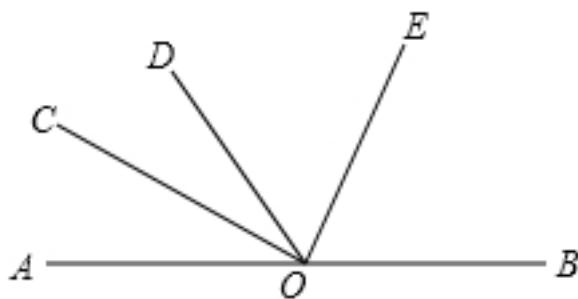


graph:

```
{"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:△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.#%#



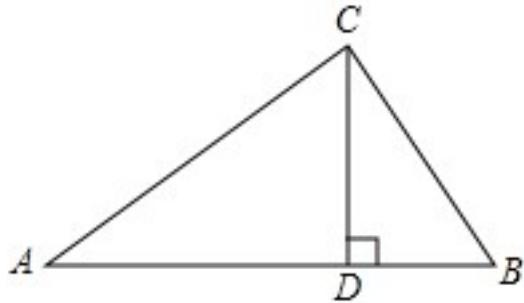
graph:

```
{"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": "B###A###O", "2": "C###D###E"}]}
```

"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:] $\angle BOE$)}

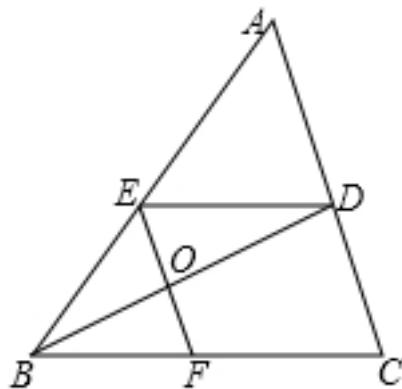
934、topic: 如图,在 $\triangle ABC$ 中, $CD \perp AB$ 于点D,若 $AD=2BD$, $AC=3$, $BC=2$,求 $(BD)^2$ 的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000006983_Q_1.jpg", "coordinates": {"A": "0.00,10.00", "B": "2.89,0.0", "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//BC,交AB于点E,EF//AC交BC于点F,EF交BD于点O.求证:BE=CF. #

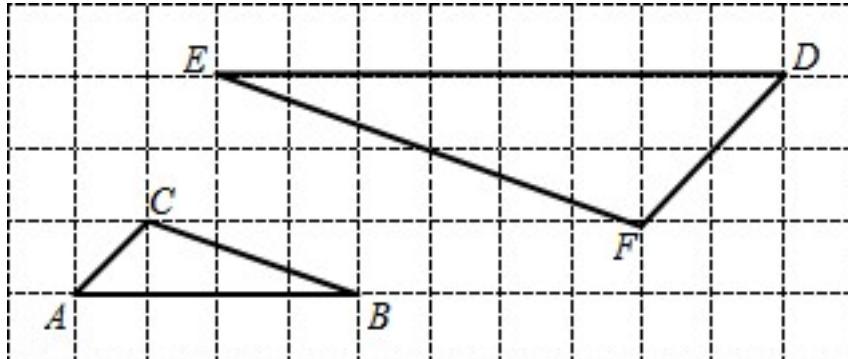


graph:
 {"stem": {"pictures": [{"picturename": "1000034194_Q_1.jpg", "coordinates": {"A": "-4.58,6.01", "B": "-7.00,2.00", "C": "-3.00,2.00", "D": "-3.73,3.85", "E": "-5.88,3.85", "F": "-5.16,2.00", "O": "-5.49,2.85"}, "collineations": {"0": "A###E###B", "1": "B###F###C", "2": "C###D###A", "3": "E###D", "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}]

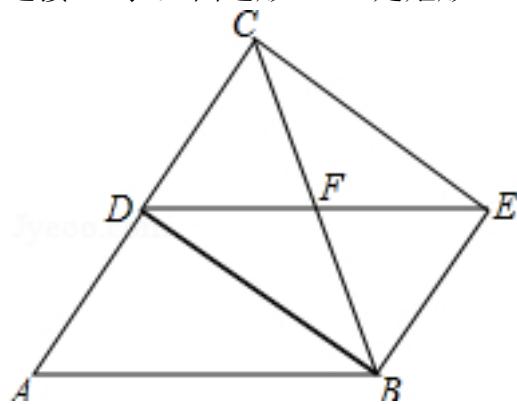
936、topic: 如图, 网格图中每个方格都是边长为1的正方形. 若\$A\$,\$B\$,\$C\$,\$D\$,\$E\$,\$F\$都是格点, 试说明\$ \triangle ABC \sim \triangle DEF \$.



graph:
 {"stem": {"pictures": [{"picturename": "1000005836_Q_1.jpg", "coordinates": {"A": "-12.00,5.00", "B": "-8.00,5.00", "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 $BEDC$ 是矩形. #%#

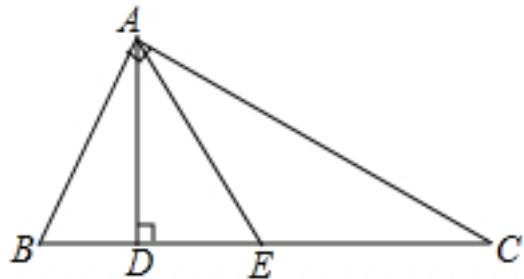


graph:
 {"stem": {"pictures": [{"picturename": "1000036632_Q_1.jpg", "coordinates": {"A": "-7.06,2.73", "B": "-3.10,2.75", "C": "-4.48,6.47", "D": "-5.57,4.60", "E": "-1.80,4.63", "F": "-3.79,4.61"}, "collineations": {"0": "A###B", "1": "B###E", "2": "E###C", "3": "B###D", "4": "C###D###A", "5": "D###F###E", "6": "B###F###C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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": "[]", "substs": [{"substemid": "1", "questionrelies": "", "pictures": "[]", "appliedproblems": "[]"}, {"substemid": "2", "questionrelies": "", "pictures": "[]", "appliedproblems": "[]"}, {"substemid": "3", "questionrelies": "", "pictures": "[]", "appliedproblems": "[]"}]}]

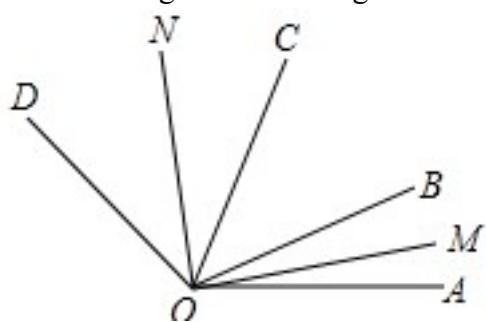
NLP:

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_ $\triangle ABE$ =v_1}, 求值(大小):

(ExpressRelation:[key:]v_1), EqualityRelation{C_ $\triangle ACE$ =v_2}, EqualityRelation{C_ $\triangle ABE$ =v_3}, EqualityRelation{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_ $\triangle ABE$)}, 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.

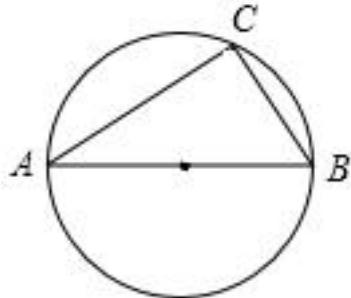


graph:
 {"stem": {"pictures": [{"picturename": "1000006454_Q_1.jpg", "coordinates": {"A": "-0.85,-0.53", "B": "-2.30,3.37", "C": "-8.04,5.40", "D": "-13.02,-0.64", "M": "-0.72,1.74", "O": "-6.93,-0.58", "N": "-11.80,3.43"}, "collineations": "[]"}]}

ns": {"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:[$\angle AOB$], Express:[$\angle BOC$], Express:[$\angle COD$]], value=null}, Proportion{proportionFactor=[Express:[2], Express:[3], Express:[4]], value=null}], keyWordList=[=]}, AngleBisectorRelation{line=OM, angle= $\angle AOB$, angle1= $\angle AOM$, angle2= $\angle BOM$ }, AngleBisectorRelation{line=ON, angle= $\angle COD$, angle1= $\angle CON$, angle2= $\angle DON$ }, EqualityRelation{ $\angle MON = (2/3 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle AOB$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOB$)}}

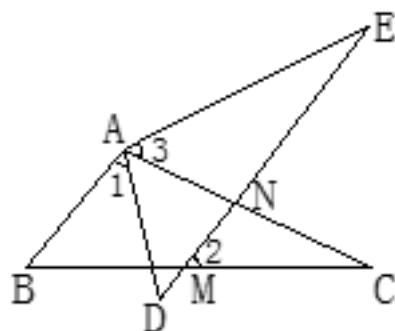
940、topic: 如图,若\$Rt\triangle ABC\$的三个顶点A、B、C在\$\odot O\$上,求证:\$Rt\triangle ABC\$斜边AB的中点是\$\odot O\$的圆心.



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"}, "collineations": {"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[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }}, PointOnCircleRelation{circle=Circle[$\odot O$]{center=O, analytic= $(x-x_O)^2+(y-y_O)^2=r_O^2$ }, 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.

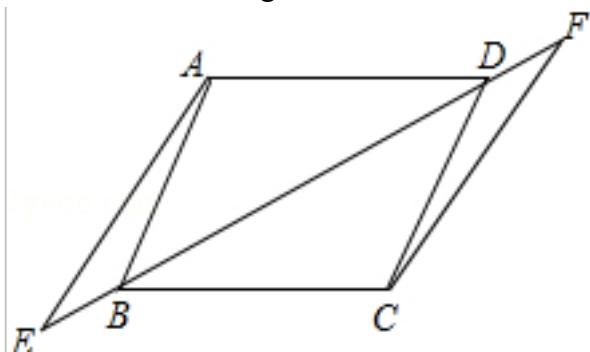


graph:
 {"stem": {"pictures": [{"picturename": "1000042045_Q_1.jpg", "coordinates": {"A": "-10.13,5.50", "B": "-11.00,4.00", "C": "-6.00,4.00", "D": "-9.83,3.79", "E": "-6.00,7.01", "M": "-9.58,4.00", "N": "-8.50,4.91"}, "collineations": {"0": "A##C", "1": "B##C", "2": "A##O##B"}, "variable>equals": {}, "circles": []}}, "appliedproblems": {}, "substems": []}}

```
": {"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": " $\angle 1 = \angle BAD$ ", "1": " $\angle 2 = \angle NMC$ ", "2": " $\angle 3 = \angle EAN$ "}, "circles": []}, "appliedproblems": {}, "substems": []}
```

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:] $\angle CNE$)}

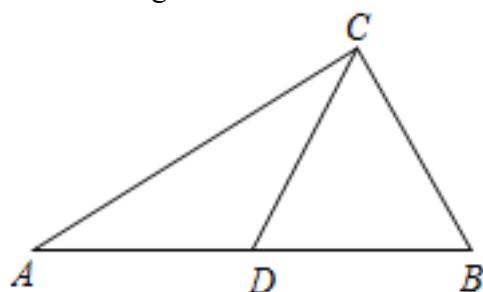
942、topic: 如图,已知四边形ABCD是平行四边形,点E、B、D、F在同一直线上,且 $BE=DF$.#%#求证: $AE=CF$.#%#



```
graph:
"stem": {"pictures": [{"picturename": "1000084521_Q_1.jpg", "coordinates": {"A": "-0.53, 3.36", "B": "-1.64, 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": {}, "substems": []}]
```

NLP:
ParallelogramRelation {parallelogram=Parallelogram:ABCD}, PointRelation:E, PointRelation:B, PointRelation:D, EqualityRelation {BE=DF}, ProveConclusionRelation: [证明: EqualityRelation {AE=CF}]

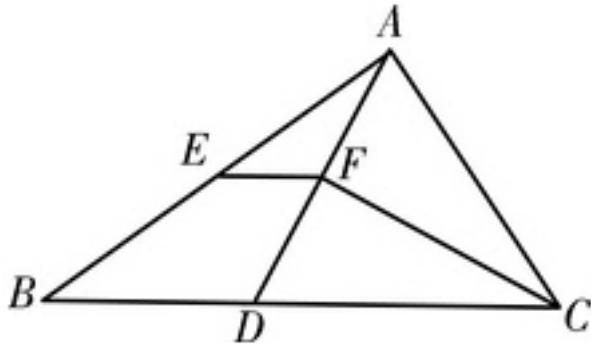
943、topic: 如图,在 $\triangle ABC$ 中,CD为边AB上的中线,且 $CD = \frac{1}{2}AB$,求证: $\triangle ABC$ 是直角三角形.#%#



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

NLP: TriangleRelation: ΔABC , LineDecileSegmentRelation [iLine1=CD, iLine2=AB, crossPoint=Optional.of(D)], EqualityRelation {CD=(1/2)*AB}, ProveConclusionRelation: [证明: RightTriangleRelation: RightTriangle: ΔABC [Optional.of(C)]]

944、topic: 如图,已知 ΔABC 中,CF平分 $\angle ACB$,CA=CD,EF//BD.求证:AE=EB.

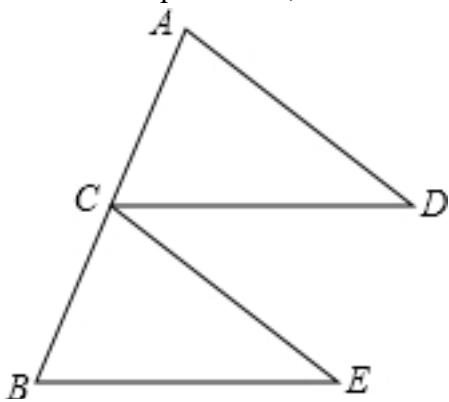


graph:

{"stem": {"pictures": [{"picturename": "1000023379_Q_1.jpg", "coordinates": {"A": "5.00,6.00", "B": "-3.00,0.0", "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": {}, "substems": []}}

NLP: TriangleRelation: ΔABC , 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: $\Delta ACD \cong \Delta CBE$.



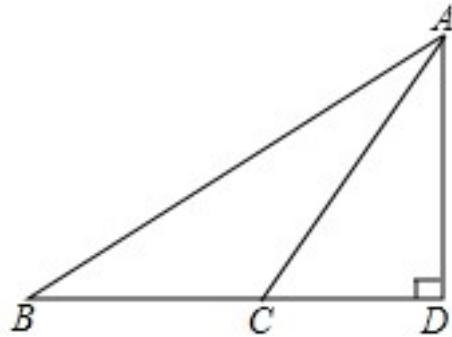
graph:

{"stem": {"pictures": [{"picturename": "1000035890_Q_1.jpg", "coordinates": {"A": "-8.00,4.00", "B": "-10.00,0.00", "C": "-9.00,2.00", "D": "-6.00,2.00", "E": "-7.00,0.00"}, "collineations": {"0": "B##C##A", "1": "B##E", "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= ΔACD , triangleB= ΔCBE }]

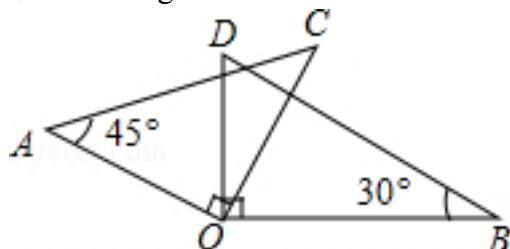
946、topic: 如图,在 $\triangle ABD$ 中, $\angle D=90^\circ$,C是BD上一点,已知 $BC=9$, $AB=17$, $AC=10$,求AD的长.



graph:
 {"stem": {"pictures": [{"picturename": "1000006706_Q_1.jpg", "coordinates": {"A": "6.00,8.00", "B": "-9.00,0.0", "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": {}, "subsystems": []}}

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)}

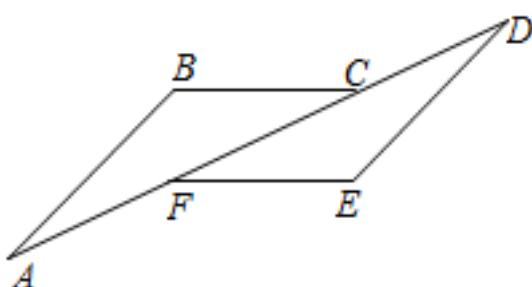
947、topic: 将一副三角板按如图所示方式放置(直角顶点重合),求 $\angle AOB+\angle DOC$ 的度数.#%#



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##A##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": [{"center": "O", "pointincircle": "A###B###C"}}], "appliedproblems": {}, "substems": []}}

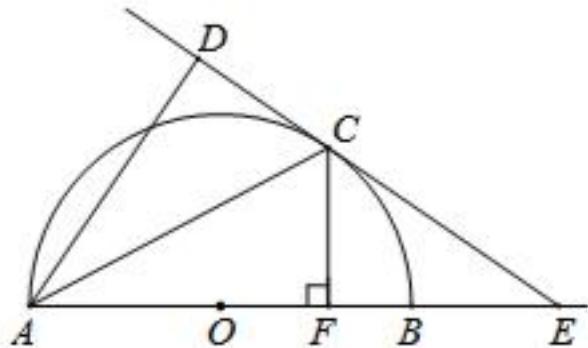
NLP: TriangleCongRelation{triangleA=ΔABC, triangleB=ΔDEF}, PointRelation:A, PointRelation:F, PointRelation:C, EqualityRelation{∠ABC=(3/4*Pi)}, EqualityRelation{∠BAF=(1/9*Pi)}, 求角的大小: AngleRelation{angle=∠CFE}, 求角的大小: AngleRelation{angle=∠DEF}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠CFE)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠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⊥DE.#%#

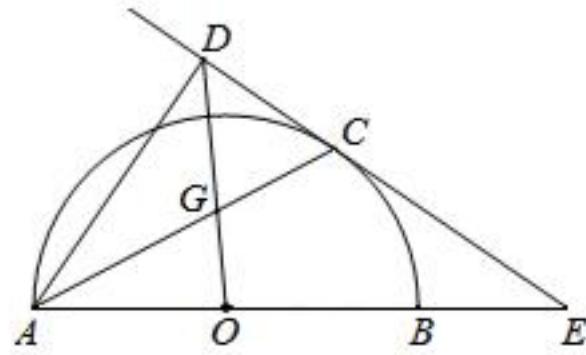
graph:

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∠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⊥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:

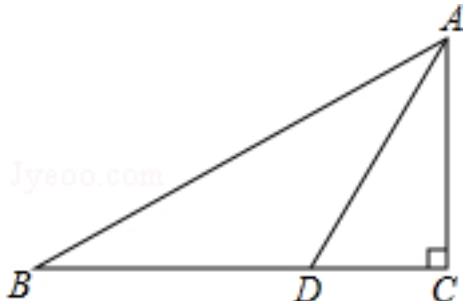
{"stem": {"pictures": [{"picturename": "1000060682_Q_1.jpg", "coordinates": {"A": "0.00,0.00", "B": "8.00,0.00", "C": "6.00,3.46", "D": "3.00,5.20", "O": "4.00,0.00", "E": "12.00,0.00", "F": "6.00,0.00", "G": "3.60,2.08"}, "collineations": {"0": "A###O###F###B###E", "1": "D###C###E", "2": "A###G###C", "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[O]}, center=O,

```

analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}, length=null},CircleCenterRelation{point=O, conic=Circle[ $\odot$ ]
O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^2}},PointOnCircleRelation{circle=Circle[ $\odot$ 
O]{center=O, analytic=(x-x_O)^2+(y-y_O)^2=r_O^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{middle
Point=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=O,
analytic=(x-x_O)^2+(y-y_O)^2=r_O^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))}
```

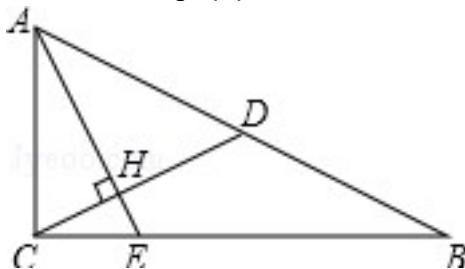
951、topic: 如图,在 $\triangle ABC$ 中, $\angle C=90^\circ$, $\angle B=30^\circ$, $AB=4\sqrt{3}$, AD 平分 $\angle BAC$,交 BC 于点 D ,求 AD 的长. #%#



```
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:△ABC,EqualityRelation{∠ACD=(1/2*Pi)},EqualityRelation{∠ABD=(1/6*Pi)},EqualityRelation{AB=4*(3^(1/2))},AngleBisectorRelation{line=AD,angle=∠BAC,angle1=∠BAD,angle2=∠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)}

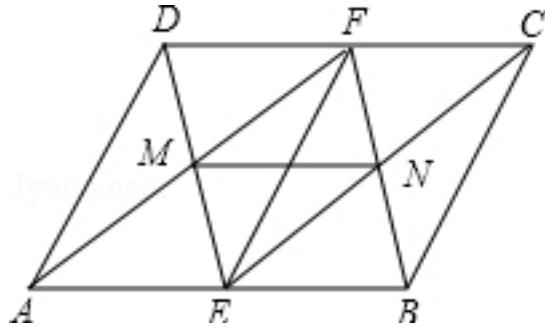
952、topic: 如图,已知\$Rt\vartriangle ABC\$中,\$\angle ACB=90^\circ\$,\$CD\$是斜边\$AB\$上的中线,过点A作\$AE\bot CD\$,\$AE\$分别与\$CD\$,\$CB\$相交于点H、E,\$AH=2CH\$.(1)求\$\sin B\$的值; #(2)如果\$CD=\sqrt{5}\$,求\$BE\$的值.



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:ΔABC[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)}

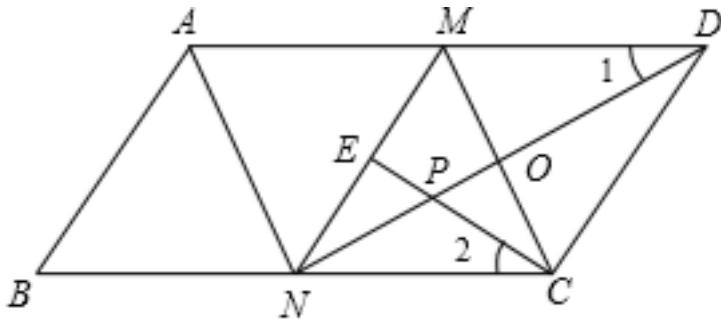
953、topic: 如图,已知在□ ABCD中,EF//BC,分别交AB、CD于E、F两点,DE、AF交于M,CE、BF交于N.求证:\$MN=\frac{1}{2}AB\$.



graph:
 {"stem": {"pictures": [{"picturename": "1000034240_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-9.00,4.00", "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□ 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. (1)求证:\$\triangle ABN \cong \triangle CDM\$; (2)过点C作\$CE \bot MN\$于点E,交DN于点P,若\$PE=1\$, \$\angle 1=\angle 2\$,求AN的长.

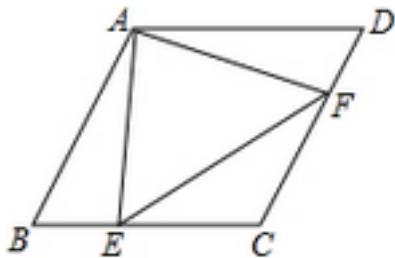


graph:
 {"stem": {"pictures": [{"picturename": "1000040877_Q_1.jpg", "coordinates": {"A": "-4.13,3.57", "B": "-5.61,1.03", "C": "0.29,1.02", "D": "1.77,3.62", "E": "-1.91,2.29", "M": "-1.16,3.57", "N": "-2.65,1.03", "O": "-0.46,2.30", "P": "-1.18,1.87"}, "collineations": {"0": "A###B", "1": "B###N###C", "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": "\u00221=\u0022ADN", "1": "\u00222=\u0022NCE"}, "circles": []}, "appliedproblems": {}, "substems": []}}

NLP:

ParallelogramRelation{parallelogram=Parallelogram:ABCD},MiddlePointOfSegmentRelation{middlePoint=M,segment=AD},MiddlePointOfSegmentRelation{middlePoint=N,segment=BC},EqualityRelation{\u0022ANP=((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{\u0022MDO=\u0022NCP},求值(大小):
 (ExpressRelation:[key:]v_0),ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=\u0024ABN, triangleB=\u0024CDM}],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: $\angle AEF=\angle AFE$.#%#

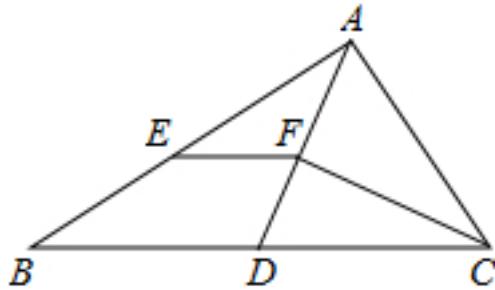


graph:
 {"stem": {"pictures": [{"picturename": "1000041806_Q_1.jpg", "coordinates": {"A": "0.49,-0.14", "B": "0.11,-0.87", "C": "0.96,-0.87", "D": "1.35,-0.14", "E": "0.44,-0.87", "F": "1.22,-0.38"}, "collineations": {"0": "E###F", "1": "D###F###C", "2": "A###D", "3": "B###E###C", "4": "A###B", "5": "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{\u0022AEF=\u0022AFE}]

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.%#

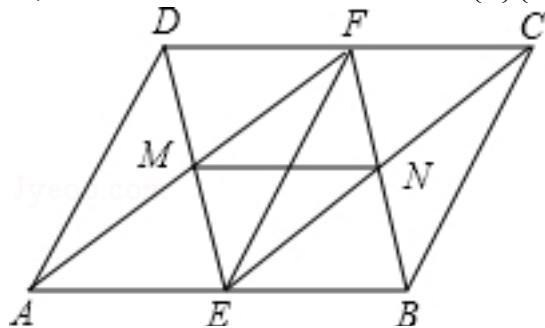


graph:

{"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\$.%#

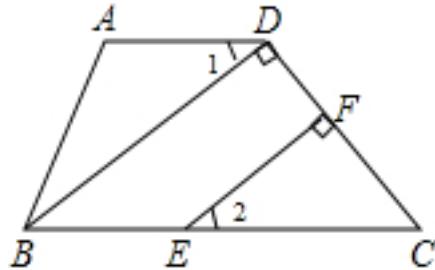


graph:

{"stem": {"pictures": [{"picturename": "1000034240_Q_1.jpg", "coordinates": {"A": "-13.00,4.00", "B": "-9.00,4.00", "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: ParallellogramRelation {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 { $MN = (1/2)AB$ }]

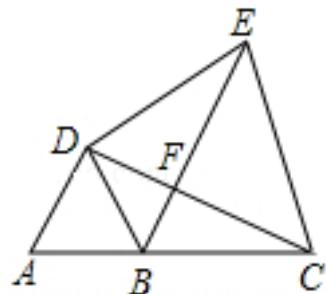
958、topic: 如图,在四边形ABCD中, $\angle A=104^\circ-\angle 2$, $\angle ABC=76^\circ+\angle 2$, $BD \perp CD$ 于D, $EF \perp CD$ 于F.试说明: $\angle 1=\angle 2$.



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": "\u00b21=\u00b2ADB", "1": "\u00b22=\u00b2FEC"}, "circles": []}, "appliedproblems": {}, "substems": []}]}

NLP: 已知条件QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{ $\angle BAD=(26/45*\pi)-\angle CEF$ }, EqualityRelation{ $\angle ABE=(19/45*\pi)+\angle CEF$ }, 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"}, "collineations": {"0": "A##D", "1": "C##A##B", "2": "D##B", "3": "D##C##F", "4": "E##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:△ABD, RegularTriangleRelation:RegularTriangle:△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:

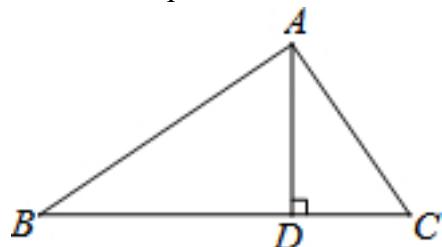
{"stem": {"pictures": [{"picturename": "1000081142_Q_1.jpg", "coordinates": {"A": "0.00,2.00", "B": "12.00,2.00", "C": "4.00,2.00", "D": "2.00,2.00", "E": "8.00,2.00"}, "collineations": {"0": "A###D###C###E###B"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "substems": []}}

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

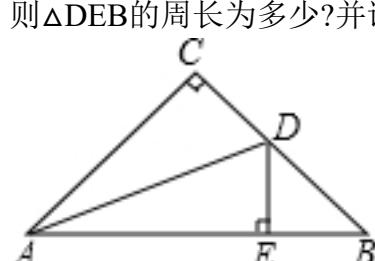
NLP:

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. #

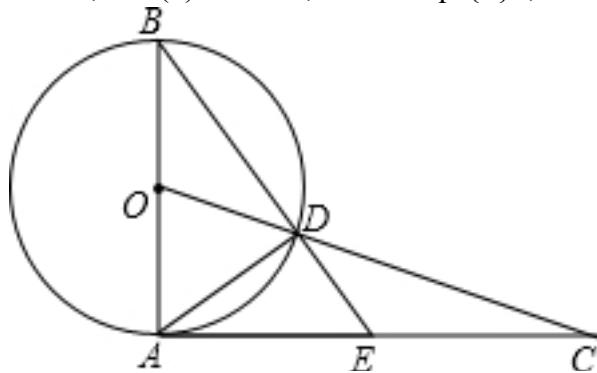


graph:

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

NLP: EqualityRelation{C_ΔBDE=v_0}, TriangleRelation: ΔABC, EqualityRelation{∠ACD=(1/2*Pi)}, EqualityRelation{AC=BC}, AngleBisectorRelation{line=AD, angle=∠CAE, angle1=∠CAD, angle2=∠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_ΔBDE)}

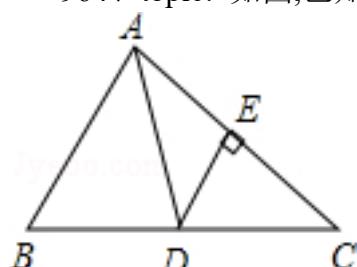
963、topic: 如图,AB是 $\odot O$ 的直径,过点A作 $\odot O$ 的切线并在其上取一点C,连接OC交 $\odot O$ 于点D,BD的延长线交AC于点E,连接AD. #%(1)求证: $\triangle CDE \sim \triangle CAD$; #%(2)若 $AB=2$, $AC=2\sqrt{2}$,求AE的长. #%#



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=ΔCDE, triangleB=ΔCAD}], SolutionConclusionRelation{relation=求值(大小)}: (ExpressRelation:[key:]AE)}

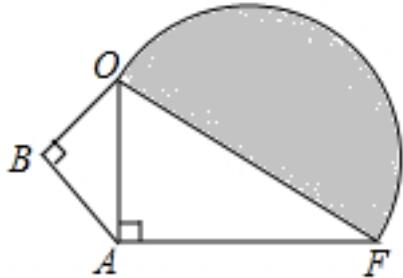
964、topic: 如图,已知DE是AC的垂直平分线,AB=10cm,BC=11cm,求 $\triangle ABD$ 的周长. #%#



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_ΔABD=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_ΔABD)}

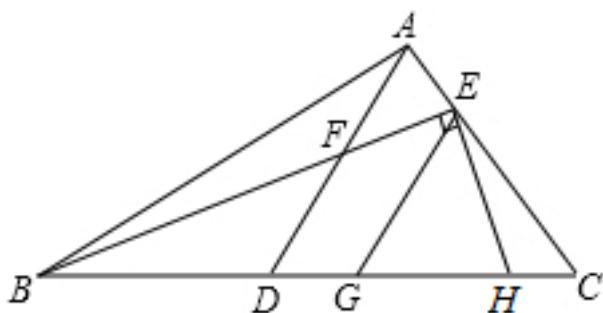
965、topic: 如图,已知 $\angle B = \angle OAF = 90^\circ$, $BO = 3\text{cm}$, $AB = 4\text{cm}$, $AF = 12\text{cm}$,求图中半圆的面积.#%#



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.#%#

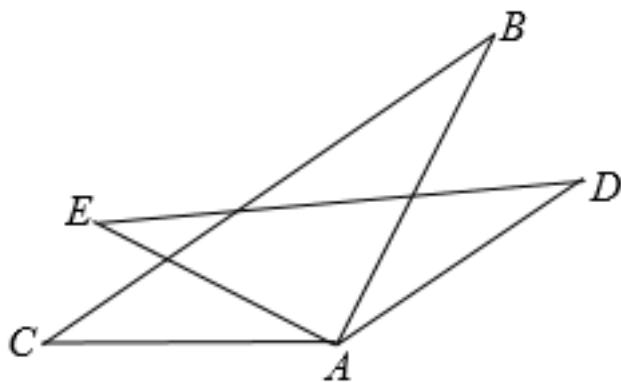


graph:
 {"stem": {"pictures": [{"picturename": "E5298FABEB71425FBABB95397088A58A.jpg", "coordinates": {"C": "-7.00,3.00", "B": "-14.00,3.00", "A": "-10.38,6.04", "D": "-11.85,3.00", "E": "-9.33,5.10", "F": "-11.25,4.23", "G": "-10.34,3.00", "H": "-8.39,3.00"}, "collineations": {"0": "B##G##H##D##C", "1": "C##E##A", "2": "E##G##H##B##D##C"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

```
#F###B","3":"B###A","4":"A###F###D","5":"G###E","6":"E###H"},"variable-equals":{},"circles":[]}], "appliedproblems":{}}, "subsystems": [{"substemid": "2", "questionrelies": "1", "pictures": [], "appliedproblems": {}}]]
```

NLP: TriangleRelation: ΔABC , 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=BFD}, EqualityRelation {angle=BAF=angleDBF}, EqualityRelation {angle=ECH=(7/30*Pi)}, 求角的大小: AngleRelation {angle=BAE}, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]angleBFD)}, SolutionConclusionRelation {relation=求值(大小): (ExpressRelation:[key:]angleBAE)}

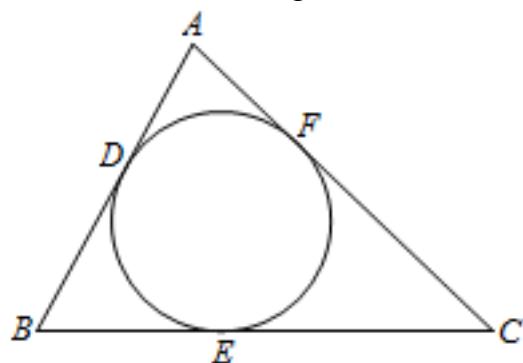
967、topic: 如图, $\angle CAE = \angle BAD$, $\angle B = \angle D$, $AC = AE$, 求证: $BC = DE$. #%#



```
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"}, "collinearities": {"0": "B###A", "1": "C###A", "2": "D###A", "3": "E###A", "4": "D###E", "5": "C###B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "subsystems": []}]}
```

NLP: EqualityRelation {angleCAE=angleBAD}, EqualityRelation {angleABC=angleADE}, EqualityRelation {AC=AE}, ProveConclusionRelation: [证明: EqualityRelation {BC=DE}]

968、topic: 如图, 已知圆与 $\triangle ABC$ 的各边分别切于点D、E、F, 且 $AB=7$, $BC=5$, $AC=8$, 求 AD 、 BE 、 CF 的长. #%#



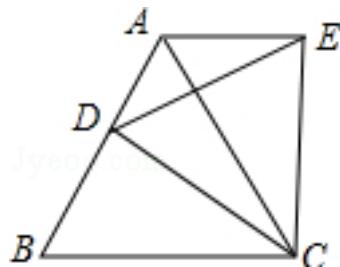
graph:

```
{"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", "pointin": "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)}

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 // 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.

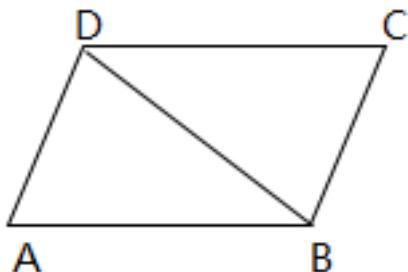


```
graph:
{"stem": {"pictures": [{"picturename": "1000031525_Q_1.jpg", "coordinates": {"A": "-8.50,2.60", "B": "-10.00,0.00", "C": "-7.00,0.00", "D": "-9.14,1.50", "E": "-6.77,2.60"}, "collineations": {"0": "A##B##D", "1": "A##C", "2": "B##C", "3": "D##E", "4": "D##C", "5": "E##C", "6": "A##E"}, "variable-equals": {}, "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 $\angle A=\angle C$.

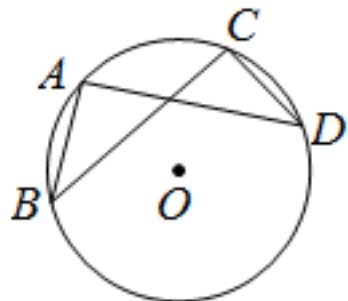


```
graph:
{"stem": {"pictures": [{"picturename": "EA54A17FB3CD4DBBA07F4468DFC5F7A9.jpg", "coordinates": {"A": "-14.00,3.00", "B": "-10.00,3.00", "C": "-9.00,6.00", "D": "-13.00,6.00"}, "collineations": {"0": "B##A", "1": "D##A", "2": "B##C", "3": "C##D", "4": "D##B"}, "variable-equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}
```

},"substems":[]}]

NLP: 已知条件
QuadrilateralRelation{quadrilateral=ABCD}, EqualityRelation{AB=CD}, EqualityRelation{AD=BC}, ProveConclusionRelation:[证明: EqualityRelation{ \angle BAD= \angle BCD}]

971、topic: 如图,在 $\odot O$ 中,AB=CD,求证AD=BC.#%#

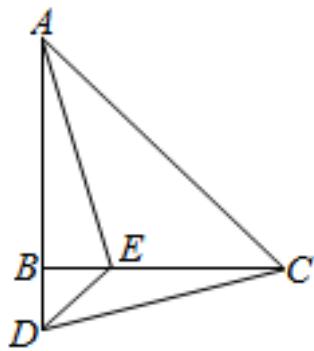


graph:

{"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=O, 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.#%#



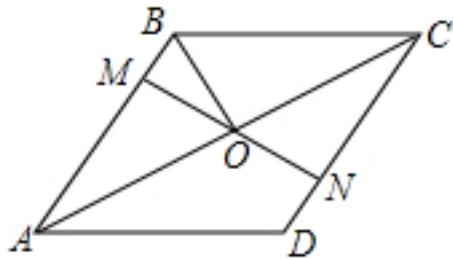
graph:

{"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 CAE}

BDC},ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△ABE, triangleB=△CBD}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠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:△AMO \cong △CNO;%(2)若∠DAC=28°,则∠OBC的度数.%

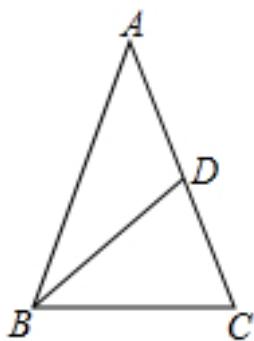


graph:

{"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{∠DAO=(7/45*Pi)},求角的大小: AngleRelation{angle=∠CBO},ProveConclusionRelation:[证明: TriangleCongRelation{triangleA=△AMO, triangleB=△CNO}],SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:]∠CBO)}

974、topic: 在等腰△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:

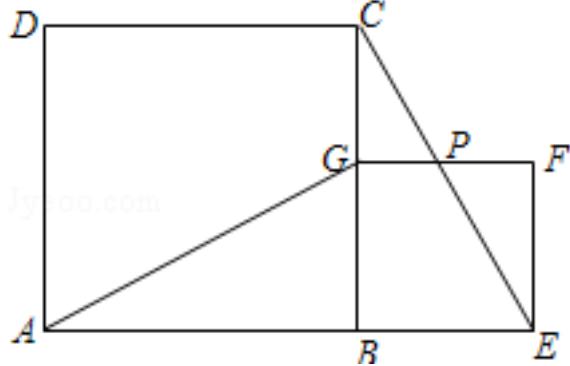
EqualityRelation{BC=v_0},IsoscelesTriangleRelation:IsoscelesTriangle:△ABC[Optional.of(A)],EqualityRelation{AB=AC}

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}\$.

证:\$\frac{PG}{CG}=\frac{PE}{AG}\$.



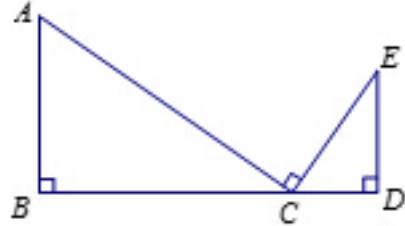
graph:

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

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}\$.

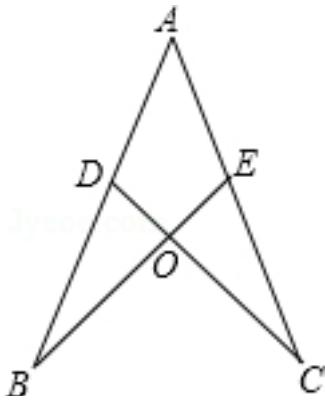


graph:

{"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"}, "collinearities": {"0": "B##C##D", "1": "D##E", "2": "E##C", "3": "A##C", "4": "A##B"}, "variable>equals": {}, "circles": []}, "appliedproblems": {}, "substems": []}}

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\$.

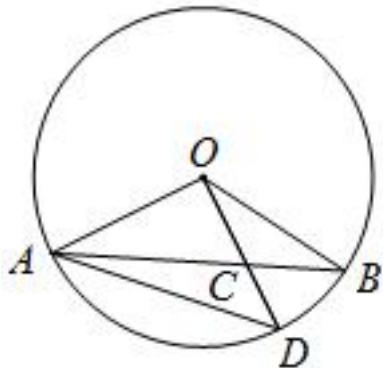


graph:

```
{"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{ $\angle DBO = \angle ECO$ }]

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: $AD^2 = AC \cdot AB$

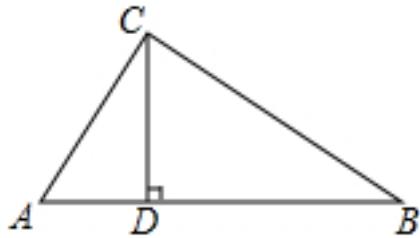


graph:

```
{"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{ $\angle AOB=(2/3\pi)$ }, 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.



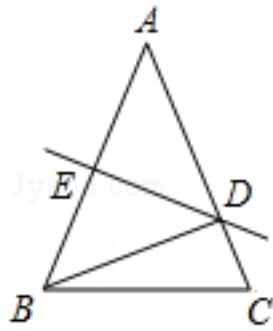
graph:

```
{"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:△ABC[Optional.of(C)], EqualityRelation{∠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△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∠ABC=∠C,∠A=50°,求∠DBC的度数. #%(2)若AB=AC,且△BCD的周长为18cm,△ABC的周长为30cm,求BE的长. #%#

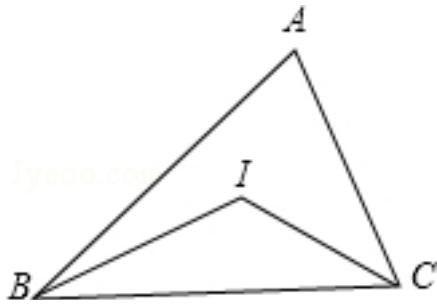


graph:

```
{"stem": {"pictures": [], "appliedproblems": {}, "substems": [{"substemid": "1", "questionrelies": "", "pictures": [{"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:△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{∠CBE=∠BCD}, EqualityRelation{∠DAE=(5/18*Pi)}, 求角的大小: AngleRelation{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:]∠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.#%#

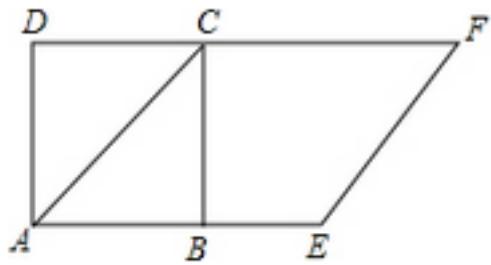


graph:

```
{"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: $\triangle ABC$, 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:

```
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```

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:]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,△ABC不动,将△EDC绕点C旋转到∠BCE=45°时,试判断四边形ACDM的形状,并证明你的结论.

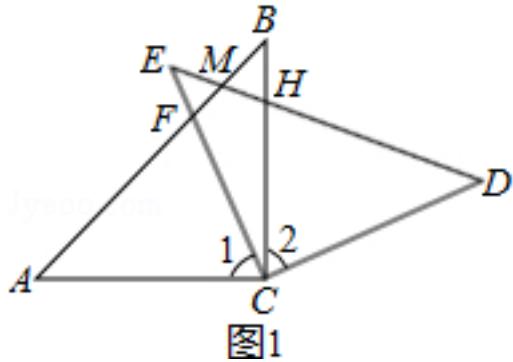


图1

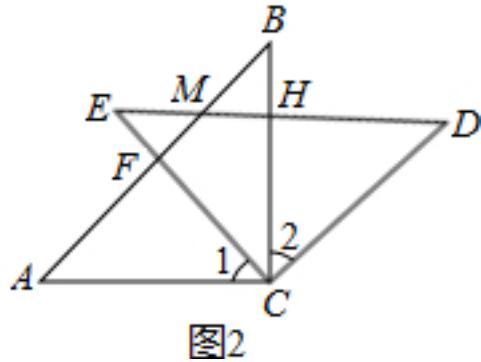
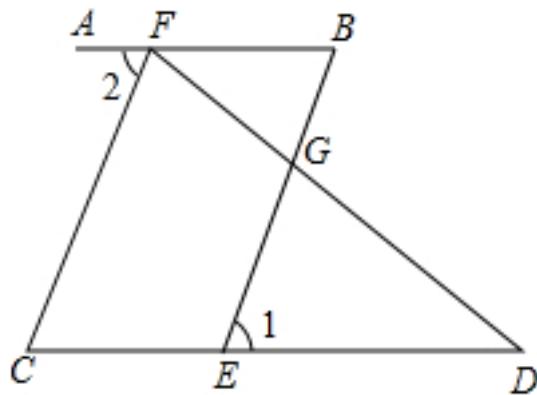


图2

graph:
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NLP: TriangleRelation:△ABC, TriangleRelation:△EDC, MultiEqualityRelation
 [multiExpressCompare=AC=CE=BC=CD, originExpressRelationList=[], keyWord=null, result=null], MultiEqualityRelation [multiExpressCompare= $\angle ACH = \angle DCF = (1/2 * \pi)$, 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,∠C=∠1,∠2和∠D互余,BE⊥FD于点G.求证:AB//CD.

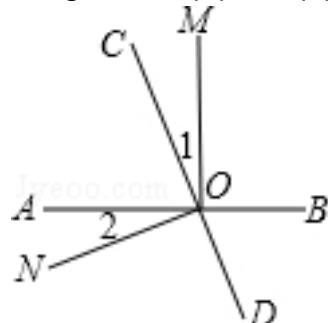


graph:
 {"stem": {"pictures": [{"picturename": "1000032962_Q_1.jpg", "coordinates": {"A": "0.63,2.36", "B": "3.67,2.36", "C": "0.00,0.00", "D": "5.00,0.00", "E": "2.00,0.00", "F": "1.67,2.36", "G": "3.00,1.41"}, "collineations": {"0": "B###A###F", "1": "B###G###E", "2": "G###F###D", "3": "C###E###D", "4": "C###F"}, "variable>equals": {"0": " $\angle C = \angle 1$ ", "1": " $\angle 2 + \angle D = 90^\circ$ "}}], "appliedproblems": {}}

$\angle 1 = \angle BED$, "1": " $\angle 2 = \angle AFC$ ", "circles": []}], "appliedproblems": {}}, "subsystems": []}

NLP: EqualityRelation{ $\angle ECF = \angle DEG$ }, AngleComplementRelation: $\angle AFC / \angle EDG$, 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 \perp AB,垂足为O. #%(1)若 $\angle 1 = \angle 2$,求 $\angle NOD$;#%(2)若 $\angle 1 = \frac{1}{4}\angle BOC$,求 $\angle AOC$ 与 $\angle MOD$.#%#

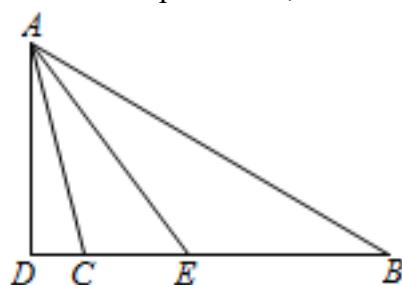


graph:

{"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": " $\angle 1 = \angle COM$ ", "1": " $\angle 2 = \angle AON$ "}, "circles": []}], "appliedproblems": {}}, "subsystems": []}

NLP: LineCrossRelation [crossPoint=Optional.of(O), iLine1=AB, iLine2=CD], LinePerpRelation{line1=OM, line2=AB, crossPoint=O}, EqualityRelation{ $\angle COM = \angle AON$ }, 求角的大小: AngleRelation{angle= $\angle DON$ }, EqualityRelation{ $\angle COM = (1/4) * \angle BOC$ }, 求角的大小: AngleRelation{angle= $\angle AOC$ }, 求角的大小: AngleRelation{angle= $\angle DOM$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DON$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AOC$)}, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle DOM$)}

986、topic: 如图,AD \perp BD,AE平分 $\angle BAC$, $\angle B=30^\circ$, $\angle ACD=70^\circ$,求 $\angle AED$ 的度数.#%#



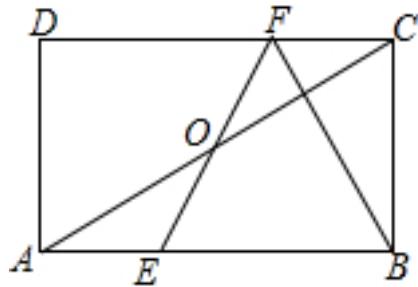
graph:

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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)}

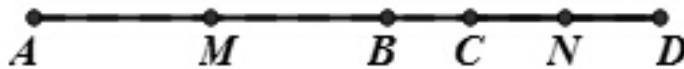
987、topic: 如图,在矩形ABCD中,E、F分别是边AB、CD上的点,AE=CF,连接EF、BF,EF与对角线AC交于点O,且BE=BF, $\angle BEF=2\angle BAC$.#%#(1)求证:OE=OF;#%#(2)求 $\angle EBF$ 的度数;#%#(3)若 $S_{BC}=2\sqrt{3}$,求矩形ABCD的面积.#%#



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"}, "collinearities": {"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": {}, "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 { $\angle BEO=2*\angle EAO$ }, 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})}

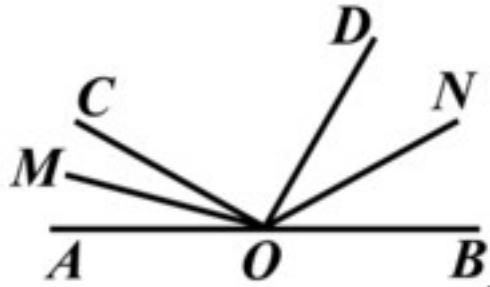
988、topic: 如图所示,点\$B\$、\$C\$在线段\$AD\$上,点\$M\$是\$AB\$的中点,点\$N\$是\$CD\$的中点,若\$MN=8, BC=2\$, 则\$AD\$的长是多少?



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"}, "collinearities": {"0": "A##M##B##C##N##D"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "subsystems": []}}

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)}

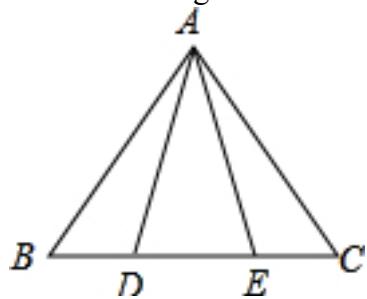
989、topic: 如图所示, $\angle AOB$ 是平角, OM, ON 分别是 $\angle AOC, \angle BOD$ 的平分线.?(1)已知 $\angle AOC=30^\circ, \angle BOD=60^\circ$,求 $\angle MON$ 的度数;?(2)如果只已知“ $\angle COD=90^\circ$ ”,你能求出 $\angle MON$ 的度数吗?如果能请求出,如果不能,请说明理由.



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: $\angle AOB/FLAT_ANGLE$, 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:] $\angle MON$)} }

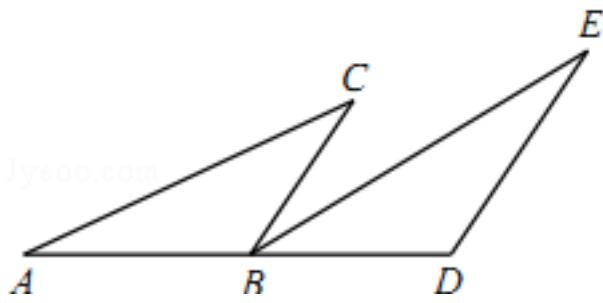
990、topic: 如图,等腰 $\triangle ABC$ 中, $AB=AC$, 点D、E在边BC上, $BD=CE$, 试说明 $\triangle AEB \cong \triangle ADC$.#%#



graph:
 {"stem": {"pictures": [{"picturename": "1000060018_Q_1.jpg", "coordinates": {"A": "1.00,3.00", "B": "-1.00,0.00", "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: $\angle A=\angle E$.#%#

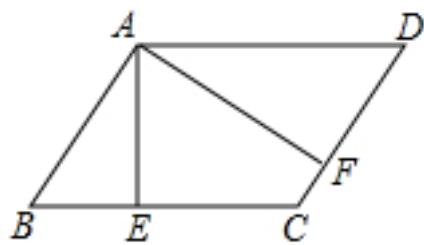


graph:

{"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 $\square ABCD$ 中, $AE \perp BC$ 于点E, $AF \perp CD$ 于点F, $\angle EAF = 60^\circ$, $EC = 2$, $CF = 1$, 求 $\square ABCD$ 的周长及 $\angle B$ 的度数. #%#



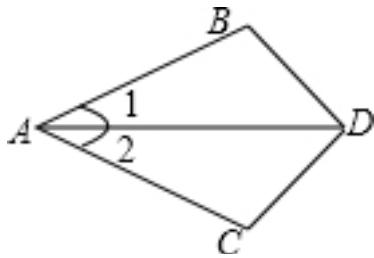
graph:

{"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###E###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: $BD = CD$. #%#

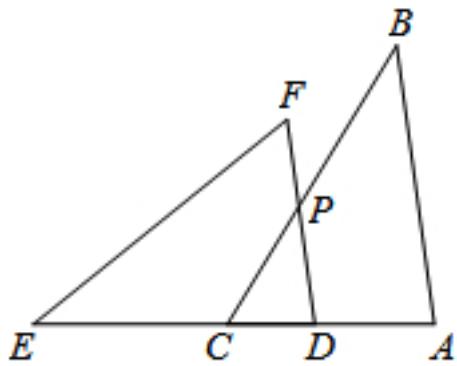


graph:

```
{"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": "\u00b21=\u00b2BAD", "1": "\u00b22=\u00b2DAC"}, "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: $\triangle ABC \cong \triangle DEF$.%#

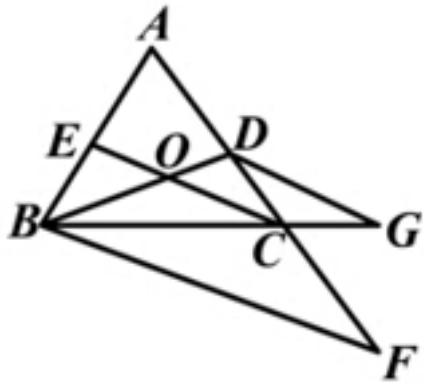


graph:

```
{"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:

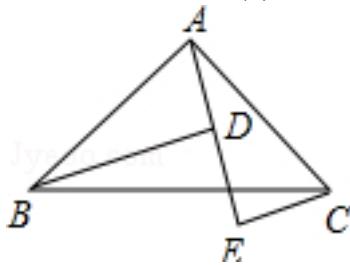
```
{"stem":{"pictures":[{"picturename":"1000021319_Q_1.jpg","coordinates":{"A":"0.57,-0.19","B":"0.17,-0.84","C":"1.07,-0.84","D":"0.87,-0.57","F":"1.42,-1.32","G":"1.52,-0.84","O":"0.64,-0.67","E":"0.35,-0.54"}, "collineations":{"0":"D###O###B","1":"E###A###B","2":"D###G","3":"E###C###O","4":"A###C###D##F","5":"F###B","6":"B###C###G"}, "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 { $\angle DOE + \angle FBO = (Pi)$ },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, $BD \parallel CE$?

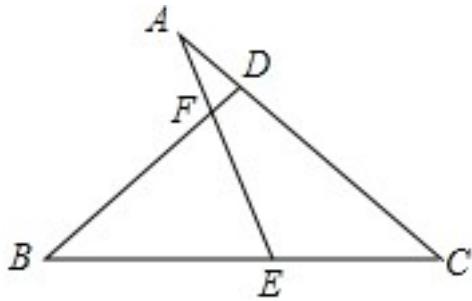
graph:

```
{"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:

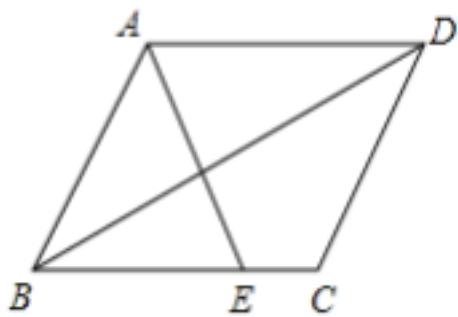
EqualityRelation{BD=DE+CE}], SolveGeoShapeConclusionRelation{iPolygon= ΔABD , iPolygonType=SOLVEENCLOSEDSHAPE}

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

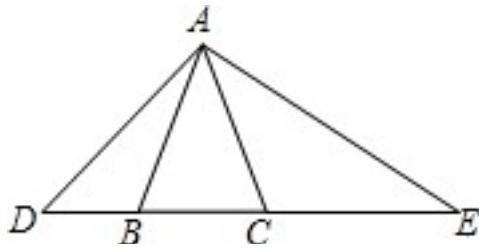
NLP: EqualityRelation{ $\angle DAF = (8/45 * \pi)$ }, EqualityRelation{ $\angle EBF = (1/4 * \pi)$ }, EqualityRelation{ $\angle DCE = (19/90 * \pi)$ }, 求角的大小: AngleRelation{angle= $\angle AFD$ }, SolutionConclusionRelation{relation=求值(大小): (ExpressRelation:[key:] $\angle AFD$)}
 998、topic: 如图,在 $\square ABCD$ 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##E##C", "4": "D##B", "5": "D##C"}, "variable>equals": {}, "circles": []}], "appliedproblems": {}, "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: $\triangle ADB \sim \triangle EAC$.

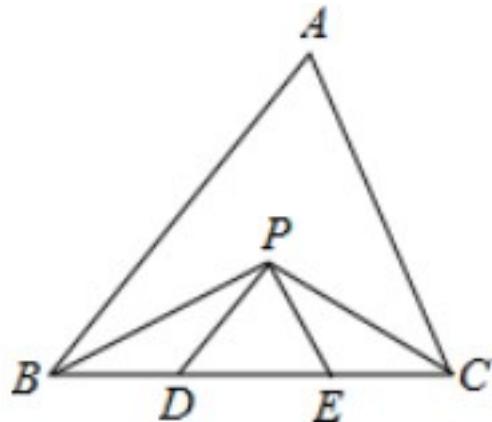


graph:

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

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*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_ΔDEP=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_ΔDEP)}