tkz-euclide examples

This lowly sand that your trample underfoot,
if you throw it in a furnace and let it melt and seethe,
will become a sparkling crystal;
and thanks to such as this
a Galileo or Newton will discover the stars.

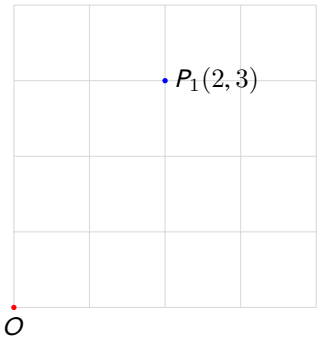
Victor Hugo, Les Misérables

Contents

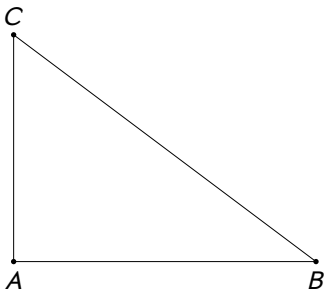
1 Points

1.1 Fixed Points

1.1.1 Cartesian Coordinates: `(x, y)`

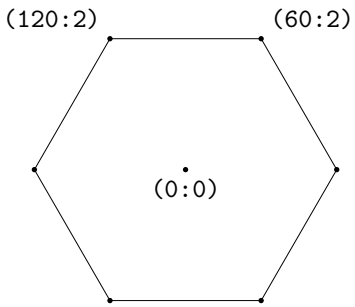



```
\begin{tikzpicture}
  \tkzInit[xmax=4,ymax=4]
  \tkzGrid[color=gray!30]
  \tkzDefPoint(0,0){O}
  \tkzDrawPoint[red](O)
  \tkzDefPoint(2,3){P1}
  \tkzDrawPoint[blue](P1)
  \tkzLabelPoint[right](P1){$P_1(2,3)$}
  \tkzLabelPoints[below](O)
\end{tikzpicture}
```



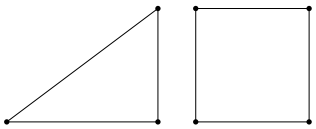

```
\begin{tikzpicture}
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(4,0){B}
  \tkzDefPoint(0,3){C}
  \tkzDrawPolygon(A,B,C)
  \tkzDrawPoints(A,B,C)
  \tkzLabelPoints[below](A,B)
  \tkzLabelPoints[above](C)
\end{tikzpicture}
```

1.1.2 Polar Coordinates: `(degree:radius)`



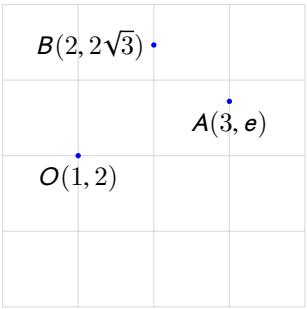

```
\begin{tikzpicture}
  \tkzDefPoint(0:0){O}
  \tkzDefPoint(60:2){A_1}  \tkzDefPoint(120:2){A_2}
  \tkzDefPoint(180:2){A_3} \tkzDefPoint(240:2){A_4}
  \tkzDefPoint(300:2){A_5} \tkzDefPoint(360:2){A_6}
  \tkzDrawPolygon(A_1,A_...,A_6)
  \tkzDrawPoints(A_1,A_...,A_6,O)
  \tkzLabelPoint[above right](A_1){\texttt{(60:2)}}
  \tkzLabelPoint[above left](A_2){\texttt{(120:2)}}
  \tkzLabelPoint[below](O){\texttt{(0:0)}}
\end{tikzpicture}
```

1.1.3 Multiple Points: `\tkzDefPoints`



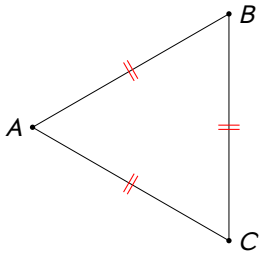
```
\begin{tikzpicture}[scale=1]
  \tkzDefPoints{0/0/A,2/0/B,2/1.5/C}
  \tkzDrawPolygon(A,B,C)
  \tkzDrawPoints(A,B,C)
  \tkzDefPoints{2.5/0/A,4/0/B,4/1.5/C,2.5/1.5/D}
  \tkzDrawPolygon(A,...,D)
  \tkzDrawPoints(A,B,C,D)
\end{tikzpicture}
```

1.2 Calculations: `xfp`



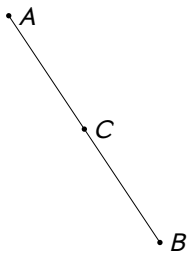

```
\begin{tikzpicture}
  \tkzInit[xmax=4,ymax=4] \tkzGrid[color=gray!30]
  \tkzDefPoint(-1+2,sqrt(4)){O}
  \tkzDefPoint({3*ln(exp(1))},{exp(1)}){A}
  \tkzDefPoint({4*sin(pi/6)},{4*cos(pi/6)}){B}
  \tkzDrawPoints[color=blue](O,B,A)
  \tkzLabelPoint[below](O){$O(1,2)$}
  \tkzLabelPoint[below](A){$A(3,e)$}
  \tkzLabelPoint[left](B){$B(2,2\sqrt{3})$}
\end{tikzpicture}
```

1.3 Point Relative to Another: `\tkzDefShiftPoint`



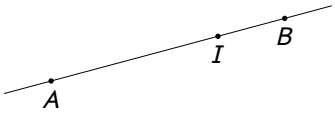

```
\begin{tikzpicture}[scale=1]
  \tkzDefPoint(2,3){A}
  \tkzDefShiftPoint[A](30:3){B}
  \tkzDefShiftPoint[A]({3/2*sqrt(3)},-1.5){C}
  \tkzDrawPolygon(A,B,C)
  \tkzDrawPoints(A,B,C)
  \tkzLabelPoints[right](B,C)
  \tkzLabelPoints[left](A)
  \tkzMarkSegments[mark=||,color=red](A,B A,C B,C)
\end{tikzpicture}
```

1.4 Midpoint: `\tkzDefMidPoint`



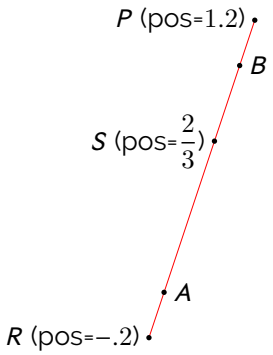

```
\begin{tikzpicture}[scale=1]
  \tkzDefPoint(2,3){A}
  \tkzDefPoint(4,0){B}
  \tkzDefMidPoint(A,B) \tkzGetPoint{C}
  \tkzDrawSegment(A,B)
  \tkzDrawPoints(A,B,C)
  \tkzLabelPoints[right](A,B,C)
\end{tikzpicture}
```

1.5 Barycenter: `\tkzDefBarycentricPoint`



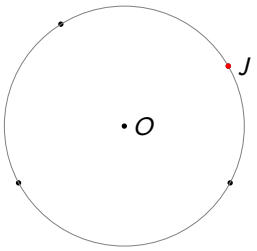

```
\begin{tikzpicture}
  \tkzDefPoint(1,1.5){A}
  \tkzDefShiftPointCoord[1,1.5](15:3.2){B}
  \tkzDefBarycentricPoint(A=2,B=5)
  \tkzGetPoint{I}
  \tkzDrawPoints(A,B,I) \tkzDrawLine(A,B)
  \tkzLabelPoints(A,B,I)
\end{tikzpicture}
```

1.6 Point on a Line: `\tkzDefPointOnLine`




```
\begin{tikzpicture}
  \tkzDefPoints{0/0/A,1/3/B}
  \tkzDrawLine[red](A,B)
  \tkzDefPointOnLine[pos=1.2](A,B)  \tkzGetPoint{P}
  \tkzDefPointOnLine[pos=-0.2](A,B) \tkzGetPoint{R}
  \tkzDefPointOnLine[pos=2/3](A,B)  \tkzGetPoint{S}
  \tkzLabelPoints[right](A,B)
  \tkzLabelPoint[left](P){$P$ (pos=$1.2$)}
  \tkzLabelPoint[left](R){$R$ (pos=$-.2$)}
  \tkzLabelPoint[left](S){$S$ (pos=$\dfrac{2}{3}$)}
  \tkzDrawPoints(A,B,P,R,S)
\end{tikzpicture}
```

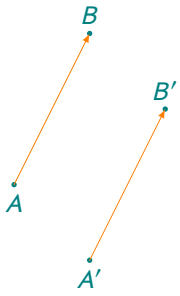
1.7 Point on a Circle: `\tkzDefPointOnCircle`




```
\begin{tikzpicture}[scale=0.7]
  \tkzDefPoints{0/0/A,4/0/B,0.8/3/C}
  \tkzDefCircle[circum](A,B,C)
  \tkzGetPoint{O} \tkzGetLength{rO}
  \tkzDefPointOnCircle[R=center O angle 30 radius \rO]
  \tkzGetPoint{J}
  \tkzDrawPoints(A,B,C)
  \tkzDrawCircle(O,J)
  \tkzDrawPoints(O,J)
  \tkzDrawPoint[red](J)
  \tkzLabelPoints[right](O,J)
\end{tikzpicture}
```

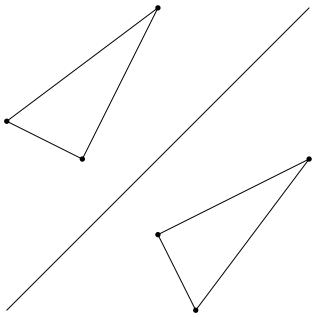
1.8 Transformations: `\tkzDefPointBy`

1.8.1 Translation



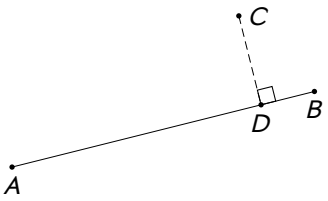

```
\begin{tikzpicture}[>=latex]
  \tkzDefPoints{0/0/A, 1/2/B, 2/1/B'}
  \tkzDefPointBy[translation= from B to A](B')
  \tkzGetPoint{A'}
  \tkzDrawPoints[teal](A,B,A',B')
  \tkzLabelPoints[above, color=teal](B,B')
  \tkzLabelPoints[below, color=teal](A,A')
  \tkzDrawSegments[orange,->](A,B A',B')
\end{tikzpicture}
```

1.8.2 Reflection



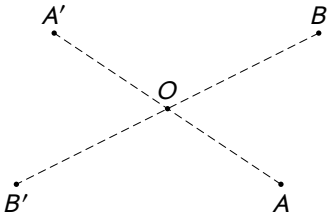
```
\begin{tikzpicture}
  \tkzDefPoints{0/0/X,4/4/Y,2/1/A,4/2/B,2.5/0/C}
  \tkzDrawSegment(X,Y)
  \tkzDefPointBy[reflection=over X--Y](A)
  \tkzGetPoint{A'}
  \tkzDefPointBy[reflection=over X--Y](B)
  \tkzGetPoint{B'}
  \tkzDefPointBy[reflection=over X--Y](C)
  \tkzGetPoint{C'}
  \tkzDrawPoints(A,B,C,A',B',C')
  \tkzDrawPolygons(A,B,C A',B',C')
\end{tikzpicture}
```

1.8.3 Projection



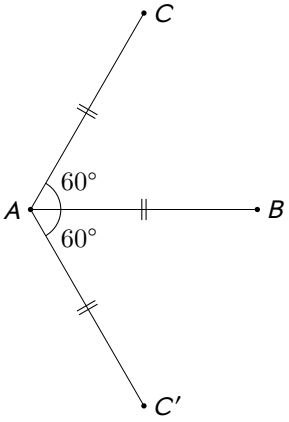

```
\begin{tikzpicture}
  \tkzDefPoints{0/0/A,4/1/B,3/2/C}
  \tkzDrawSegment(A,B)
  \tkzDefPointBy[projection=onto A--B](C)
  \tkzGetPoint{D}
  \tkzDrawPoints(A,B,C,D)
  \tkzDrawSegment[densely dashed](C,D)
  \tkzMarkRightAngle[size=.2](B,D,C)
  \tkzLabelPoints(A,B,D)
  \tkzLabelPoints[right](C)
\end{tikzpicture}
```

1.8.4 Symmetry




```
\begin{tikzpicture}[scale=1]
  \tkzDefPoint(0,0){O}
  \tkzDefPoint(1.5,-1){A}
  \tkzDefPoint(2,1){B}
  \tkzDefPointsBy[symmetry=center O](B,A){}
  \tkzDrawSegments[densely dashed](A,A' B,B')
  \tkzDrawPoints(A,B,O,A',B')
  \tkzLabelPoints[below](A,B')
  \tkzLabelPoints[above](A',O,B)
\end{tikzpicture}
```

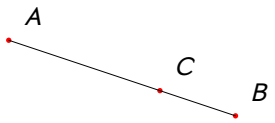
1.8.5 Rotation and Rotation in Rad




```
\begin{tikzpicture}
  \tkzDefPoint["$A$" left](0,0){A}
  \tkzDefPoint["$B$" right](3,0){B}
  \tkzDefPointBy[rotation=center A angle 60](B)
  \tkzGetPoint{C}
  \tkzDefPointBy[rotation in rad=center A angle -
pi/3](B)
  \tkzGetPoint{C'}
  \tkzLabelPoints[right](C,C')
  \tkzDrawPoints(A,B,C,C')
  \tkzDrawSegments(A,B A,C A,C')
  \tkzMarkAngles[mark=none, size=0.4cm](B,A,C C',A,B)
  \tkzLabelAngles[pos=0.75](B,A,C C',A,B){$60\degree$}
  \tkzMarkSegments[mark=||](A,B A,C A,C')
\end{tikzpicture}
```

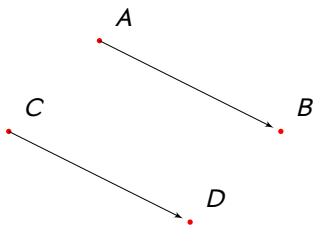
1.9 Defining Points Using a Vector: `\tkzDefPointWith`

1.9.1 Linear

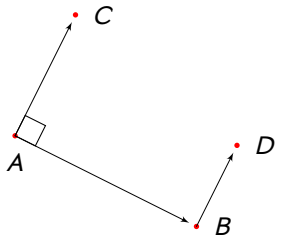



```
\begin{tikzpicture}
  \tkzDefPoint(1,3){A}
  \tkzDefPoint(4,2){B}
  \tkzDefPointWith[linear,K=2/3](A,B)
  \tkzGetPoint{C}
  \tkzDrawPoints[color=red](A,B,C)
  \tkzDrawSegment(A,B)
  \tkzLabelPoints[above right=3pt](A,B,C)
\end{tikzpicture}
```

1.9.2 Colinear



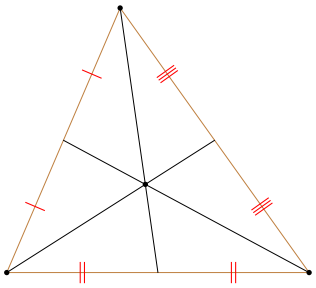

```
\begin{tikzpicture}[scale=1.2,
    vect/.style={->,shorten >=3pt,>=latex'}]
  \tkzDefPoint(2,3){A}
  \tkzDefPoint(4,2){B}
  \tkzDefPoint(1,2){C}
  \tkzDefPointWith[colinear=at C](A,B)
  \tkzGetPoint{D}
  \tkzDrawPoints[color=red](A,B,C,D)
  \tkzLabelPoints[above right=3pt](A,B,C,D)
  \tkzDrawSegments[vect](A,B C,D)
\end{tikzpicture}
```




```
\begin{tikzpicture}[scale=1.2,
    vect/.style={->,shorten >=3pt,>=latex'}]
  \tkzDefPoints{2/3/A, 4/2/B}
  \tkzDefPointWith[orthogonal,K=2/3](A,B)
  \tkzGetPoint{C}
  \tkzDefPointWith[orthogonal,normed,K=-1](B,A)
  \tkzGetPoint{D}
  \tkzDrawPoints[color=red](A,B,C,D)
  \tkzLabelPoints[right=3pt](B,C,D)
  \tkzLabelPoints[below=3pt](A)
  \tkzDrawSegments[vect](A,B A,C B,D)
  \tkzMarkRightAngle(B,A,C)
\end{tikzpicture}
```

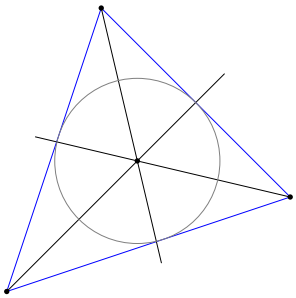
1.10 Triangle Centers: `\tkzDefTriangleCenter`

1.10.1 Centroid



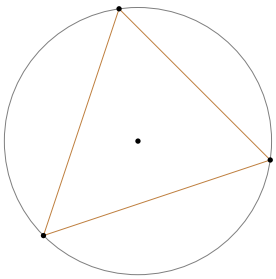
```
\begin{tikzpicture}
  \tkzDefPoints{0/0/A,4/0/B,1.5/3.5/C}
  \tkzDrawPolygon[color=brown](A,B,C)
  \tkzDefTriangleCenter[centroid](A,B,C) \tkzGetPoint{D}
  \tkzDrawPoints(A,B,C,D)
  \tkzDefMidPoint(A,B) \tkzGetPoint{E}
  \tkzDefMidPoint(B,C) \tkzGetPoint{F}
  \tkzDefMidPoint(C,A) \tkzGetPoint{G}
  \tkzDrawSegments(C,E A,F B,G)
  \tkzMarkSegments[mark=|,color=red](C,G A,G)
  \tkzMarkSegments[mark=||,color=red](A,E B,E)
  \tkzMarkSegments[mark=|||,color=red](B,F C,F)
\end{tikzpicture}
```

1.10.2 Incenter



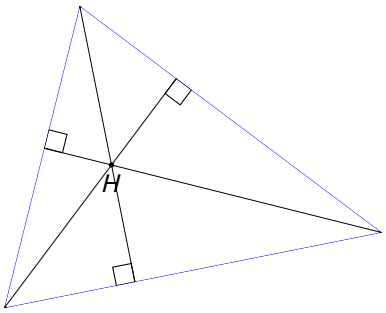
```
\begin{tikzpicture}[scale=1.25]
  \tkzDefPoints{0/1/A,3/2/B,1/4/C}
  \tkzDefTriangleCenter[in](A,B,C) \tkzGetPoint{I}
  \tkzDefPointBy[projection=onto A--C](I)
  \tkzGetPoint{Ib}
  \tkzDrawPolygon[color=blue](A,B,C)
  \tkzDrawPoints(A,B,C,I)
  \tkzDrawLines[add = 0 and 2/3](A,I B,I C,I)
  \tkzDrawCircle(I,Ib)
\end{tikzpicture}
```

1.10.3 Circumcenter



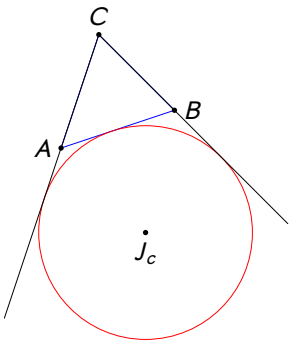
```
\begin{tikzpicture}
  \tkzDefPoints{0/1/A,3/2/B,1/4/C}
  \tkzDefTriangleCenter[circum](A,B,C) \tkzGetPoint{G}
  \tkzDrawPolygon[color=brown](A,B,C)
  \tkzDrawCircle(G,A)
  \tkzDrawPoints(A,B,C,G)
\end{tikzpicture}
```

1.10.4 Orthocenter




```
\begin{tikzpicture}
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(5,1){B}
  \tkzDefPoint(1,4){C}
  \tkzClipPolygon(A,B,C)
  \tkzDefTriangleCenter[ortho](B,C,A) \tkzGetPoint{H}
  \tkzDefSpcTriangle[orthic,name=H](A,B,C){a,b,c}
  \tkzDrawPolygon[color=blue](A,B,C)
  \tkzDrawPoints(A,B,C,H)
  \tkzDrawLines[add=0 and 1](A,Ha B,Hb C,Hc)
  \tkzLabelPoint(H){$H$}
  \tkzAutoLabelPoints[center=H](A,B,C)
  \tkzMarkRightAngles(A,Ha,B B,Hb,C C,Hc,A)
\end{tikzpicture}
```

1.10.5 Excenter

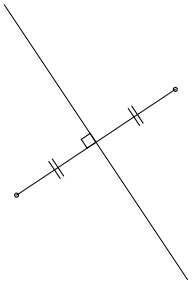



```
\begin{tikzpicture}[scale=0.5]
  \tkzDefPoints{0/1/A,3/2/B,1/4/C}
  \tkzDefTriangleCenter[ex](B,C,A) \tkzGetPoint{J_c}
  \tkzDefPointBy[projection=onto A--B](J_c)
  \tkzGetPoint{Tc}
  \tkzDrawPolygon[color=blue](A,B,C)
  \tkzDrawPoints(A,B,C,J_c)
  \tkzDrawCircle[red](J_c,Tc)
  \tkzDrawLines[add=1.5 and 0](A,C B,C)
  \tkzLabelPoints[left](A)
  \tkzLabelPoints[right](B)
  \tkzLabelPoints[above](C)
  \tkzLabelPoints(J_c)
\end{tikzpicture}
```

2 Lines

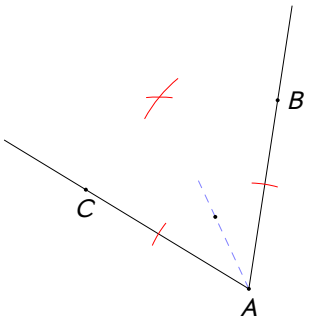
2.1 Definition: `\tkzDefLine`

2.1.1 Mediator



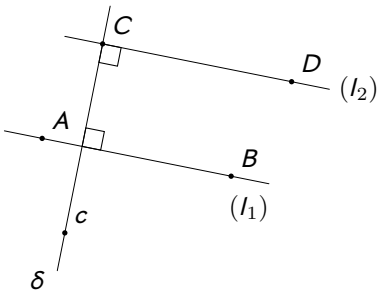
```
\begin{tikzpicture}[scale=0.7]
  \tkzSetUpPoint[size=1.5pt]
  \tkzDefPoints{-2/0/A,1/2/B}
  \tkzDefLine[mediator](A,B)
  \tkzGetPoints{C}{D}
  \tkzInterLL(C,D)(A,B)
  \tkzGetPoint{I}
  \tkzDrawPoints(A,B)
  \tkzDrawSegments(A,B C,D)
  \tkzMarkRightAngle[size=.2](A,I,C)
  \tkzMarkSegments[mark=||](A,I B,I)
\end{tikzpicture}
```

2.1.2 Bisector



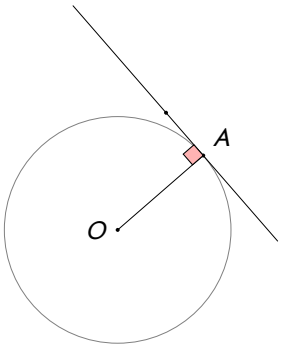

```
\begin{tikzpicture}[rotate=25,scale=.7]
  \tkzDefPoints{0/0/C, 2/-3/A, 4/0/B}
  \tkzDefLine[bisector,K=.5](B,A,C)
  \tkzGetPoint{a}
  \tkzDrawLines[add= 0 and .5](A,B A,C)
  \tkzShowLine[bisector,gap=4,size=2,color=red](B,A,C)
  \tkzDrawLines[blue!50,dashed,add= 0 and .5](A,a)
  \tkzLabelPoints[below](A,C)
  \tkzLabelPoints[right](B)
  \tkzDrawPoints[size=1.5pt](A,B,C,a)
\end{tikzpicture}
```

2.1.3 Orthogonal And Parallel



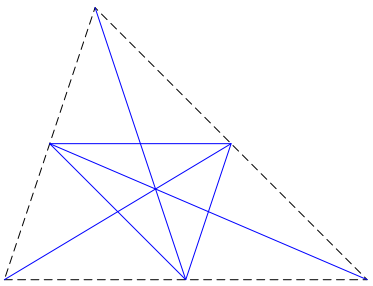

```
\begin{tikzpicture}
  \tkzDefPoints{-1.5/-0.25/A,1/-0.75/B,-0.7/1/C}
  \tkzDrawLine(A,B)
  \tkzDefLine[orthogonal=through C](B,A)
  \tkzGetPoint{c}    \tkzDrawLine(C,c)
  \tkzInterLL(A,B)(C,c)    \tkzGetPoint{I}
  \tkzDefLine[parallel=through C](A,B)
  \tkzGetPoint{D}    \tkzDrawLine(C,D)
  \tkzDrawPoints(A,B,C,c,D)
  \tkzLabelPoints[above right](A,B,C,c,D)
  \tkzLabelLine[pos=1.25,below left](A,B){$(l_1)$}
  \tkzLabelLine[pos=1.2,right](C,D){$(l_2)$}
  \tkzLabelLine[pos=1.25,left](C,c){$\delta$}
  \tkzMarkRightAngle(C,I,B)\tkzMarkRightAngle(I,C,D)
\end{tikzpicture}
```

2.2 Tangent to a Circle: `\tkzDefTangent`

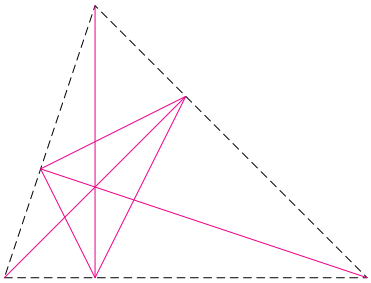



```
\begin{tikzpicture}[scale=.75]
  \tkzDefPoint(0,0){O}
  \tkzDefRandPointOn[circle=center O radius 2]
  \tkzGetPoint{A}
  \tkzDrawSegment(O,A)
  \tkzDrawCircle(O,A)
  \tkzDefTangent[at=A](O)    \tkzGetPoint{h}
  \tkzDrawPoints[size=1.5pt](A,O,h)
  \tkzDrawLine[add = 2 and 2.5](A,h)
  \tkzMarkRightAngle[fill=red!30](O,A,h)
  \tkzLabelPoints[above right](A) \tkzLabelPoints[left](O)
\end{tikzpicture}
```

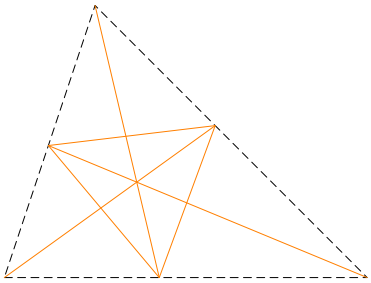
2.3 Median, Altitude, and Bisector



```
\begin{tikzpicture}[scale=1.2]
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(4,0){B}
  \tkzDefPoint(1,3){C}
  \tkzDrawPolygon[densely dashed](A,B,C)
  \tkzSetUpLine[color=blue]
  \tkzDefSpcTriangle[medial,name=M](A,B,C){_A,_B,_C}
  \tkzDrawSegments(A,M_A B,M_B C,M_C)
  \tkzDrawPolygon(M_A, M_B, M_C)
\end{tikzpicture}
```

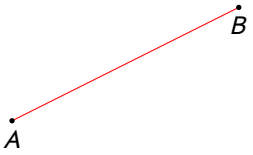


```
\begin{tikzpicture}[scale=1.2]
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(4,0){B}
  \tkzDefPoint(1,3){C}
  \tkzDrawPolygon[densely dashed](A,B,C)
  \tkzSetUpLine[color=magenta]
  \tkzDefSpcTriangle[orthic,name=H](A,B,C){_A,_B,_C}
  \tkzDrawSegments(A,H_A B,H_B C,H_C)
  \tkzDrawPolygon(H_A, H_B, H_C)
\end{tikzpicture}
```

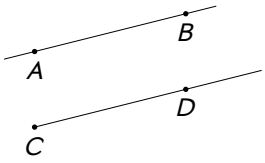


```
\begin{tikzpicture}[scale=1.2]
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(4,0){B}
  \tkzDefPoint(1,3){C}
  \tkzDrawPolygon[densely dashed](A,B,C)
  \tkzSetUpLine[color=orange]
  \tkzDefSpcTriangle[in,name=I](A,B,C){_A,_B,_C}
  \tkzDrawSegments(A,I_A B,I_B C,I_C)
  \tkzDrawPolygon(I_A, I_B, I_C)
\end{tikzpicture}
```

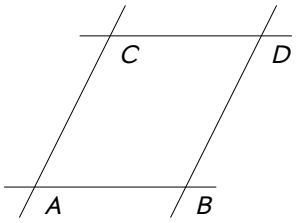
2.4 Drawing: `\tkzDrawSegment` and `\tkzDrawLine`




```
\begin{tikzpicture}[scale=1.5]
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(2,1){B}
  \tkzDrawSegment[color=red,thin](A,B)
  \tkzDrawPoints(A,B)
  \tkzLabelPoints(A,B)
\end{tikzpicture}
```

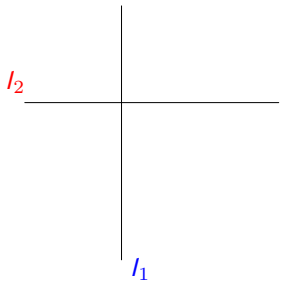



```
\begin{tikzpicture}
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(2,0.5){B}
  \tkzDefPoint(0,-1){C}\tkzDefPoint(2,-0.5){D}
  \tkzDrawLine(A,B)
  \tkzDrawLine[add = 0 and .5](C,D)
  \tkzDrawPoints(A,B,C,D) \tkzLabelPoints(A,B,C,D)
\end{tikzpicture}
```

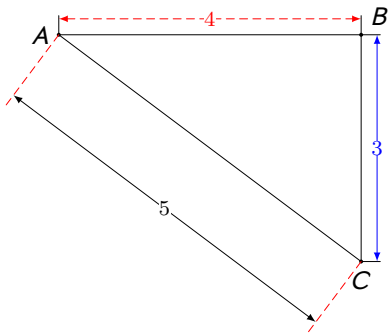



```
\begin{tikzpicture}
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(2,0){B}
  \tkzDefPoint(1,2){C}
  \tkzDefPoint(3,2){D}
  \tkzDrawLines(A,B C,D A,C B,D)
  \tkzLabelPoints[below right](A,B,C,D)
\end{tikzpicture}
```

2.4.1 Labeling: `\tkzLabelLine`

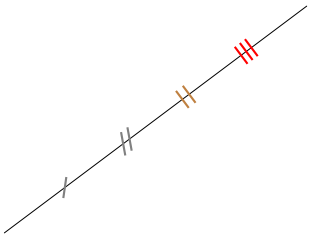



```
\begin{tikzpicture}[scale=0.8]
  \tkzDefPoints{0/0/A,3/0/B,1/1/C}
  \tkzDefLine[perpendicular=through C,K=-1](A,B)
  \tkzGetPoint{c}
  \tkzDrawLines(A,B C,c)
  \tkzLabelLine[pos=1.25,blue,right](C,c){$l_1$}
  \tkzLabelLine[pos=-0.25,red,above](A,B){$l_2$}
\end{tikzpicture}
```




```
\begin{tikzpicture}
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(4,0){B}
  \tkzDefTriangle[pythagore](A,B)  \tkzGetPoint{C}
  \tkzDrawPoints[size=1.5pt](A,B,C)
  \tkzDrawSegment[dim={$3$, 6pt, transform shape},
    dim style/.append style={blue}](B,C)
  \tkzDrawSegment[dim={$4$, 6pt, transform shape},
    dim style/.append style={densely dashed, red}](A,B)
  \tkzDrawSegment[dim={$5$, 1cm, transform shape},
    dim fence style/.style={red,densely dashed}](C,A)
  \tkzLabelPoints[left](A) \tkzLabelPoints[above right](B)
  \tkzLabelPoints[below](C)
\end{tikzpicture}
```

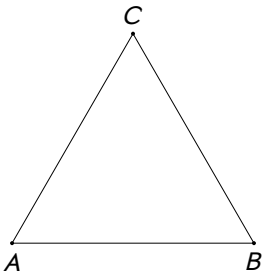
2.4.2 Marking: `\tkzMarkSegment`



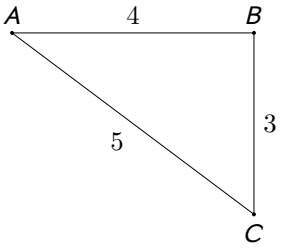
```
\begin{tikzpicture}
  \tkzDefPoint(2,1){A}
  \tkzDefPoint(6,4){B}
  \tkzDrawSegment(A,B)
  \tkzMarkSegment[thick,color=gray,pos=0.2,mark=s|](A,B)
  \tkzMarkSegment[thick,color=gray,pos=0.4,mark=s||](A,B)
  \tkzMarkSegment[thick,color=brown,pos=0.6,mark=||](A,B)
  \tkzMarkSegment[thick,color=red,pos=0.8,mark=|||](A,B)
\end{tikzpicture}
```

3 Triangles

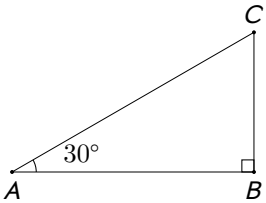
3.1 \tkzDefTriangle



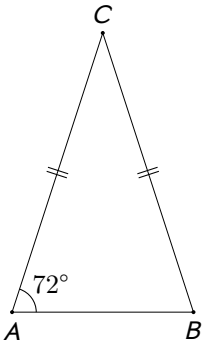

```
\begin{tikzpicture}[scale=.8]
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(4,0){B}
  \tkzDefTriangle[equilateral](A,B)
  \tkzGetPoint{C}
  \tkzDrawPolygon(A,B,C)
  \tkzDrawPoints[size=1.5pt, fill=black](A,B,C)
  \tkzLabelPoints[below](A,B) \tkzLabelPoints[above](C)
\end{tikzpicture}
```




```
\begin{tikzpicture}[scale=.8]
  \tkzInit[xmax=5,ymax=3]
  \tkzDefPoints{0/0/A,4/0/B}
  \tkzDefTriangle[pythagore](A,B) \tkzGetPoint{C}
  \tkzDrawPolygon(A,B,C)
  \tkzDrawPoints[size=1.5pt](A,B,C)
  \tkzLabelPoints[above](A,B) \tkzLabelPoints[below](C)
  \tkzLabelSegment[right](B,C){$3$}
  \tkzLabelSegment[above](A,B){$4$}
  \tkzLabelSegment[below left](A,C){$5$}
\end{tikzpicture}
```




```
\begin{tikzpicture}[scale=.8]
  \tkzInit[xmax=5,ymax=3]
  \tkzDefPoints{0/0/A,4/0/B}
  \tkzDefTriangle[school](A,B) \tkzGetPoint{C}
  \tkzDrawPolygon(A,B,C)
  \tkzDrawPoints[size=1.5pt](A,B,C)
  \tkzLabelPoints[below](A,B) \tkzLabelPoints[above](C)
  \tkzMarkRightAngle[size=.2](C,B,A)
  \tkzMarkAngles[mark=none, size=0.4cm](B,A,C)
  \tkzLabelAngles[pos=1.2](B,A,C){$30\degree$}
\end{tikzpicture}
```



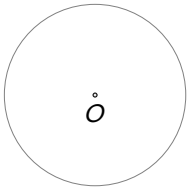

```
\begin{tikzpicture}[scale=.8]
  \tkzInit[xmax=5,ymax=3]
  \tkzDefPoints{0/0/A,3/0/B}
  \tkzDefTriangle[golden](A,B) \tkzGetPoint{C}
  \tkzDrawPolygon(A,B,C)
  \tkzDrawPoints[size=1.5pt](A,B,C)
  \tkzLabelPoints[below](A,B) \tkzLabelPoints[above](C)
  \tkzMarkSegments[mark=||](C,A C,B)
  \tkzMarkAngles[mark=none, size=0.4cm](B,A,C)
  \tkzLabelAngles[pos=.8](B,A,C){$72\degree$}
\end{tikzpicture}
```

3.2 `\tkzDefDefSpcTriangle`

See section 2.3.

4 Circles

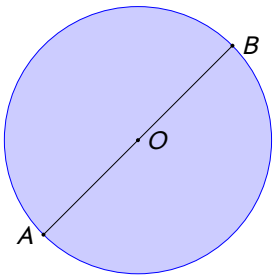
4.1 \tkzDrawCircle




```
\begin{tikzpicture}[scale=.6]
  \tkzSetUpPoint[size=1.5pt]
  \tkzDefPoint(0,0){O}
  \tkzDefCircle[R](O, 2) \tkzGetPoint{x}
  \tkzDrawCircle(O,x)
  \tkzDrawPoints[size=1.5pt](O)
  \tkzLabelPoints(O)
\end{tikzpicture}
```

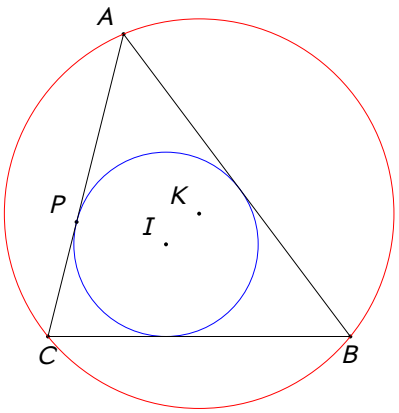
4.2 \tkzDefCircle

4.2.1 diameter



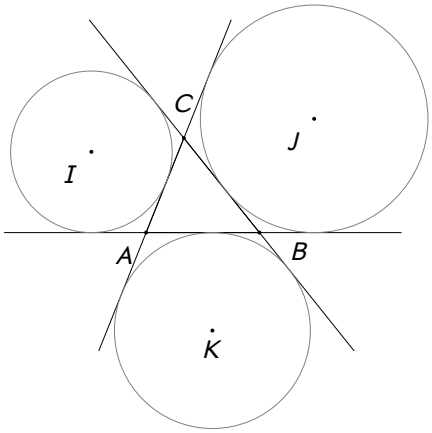

```
\begin{tikzpicture}[scale=1.25]
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(2,2){B}
  \tkzDefCircle[diameter](A,B)
  \tkzGetPoint{O}
  \tkzDrawCircle[blue,fill=blue!20](O,B)
  \tkzDrawSegment(A,B)
  \tkzDrawPoints[size=1.5pt](A,B,O)
  \tkzLabelPoints[right](B,O)
  \tkzLabelPoints[left](A)
\end{tikzpicture}
```

4.2.2 Inscribed and Circumscribed




```
\begin{tikzpicture}[scale=1]
  \tkzDefPoint(2,2){A}
  \tkzDefPoint(5,-2){B}
  \tkzDefPoint(1,-2){C}
  \tkzDefCircle[in](A,B,C)
  \tkzGetLength{rIN}
  \tkzGetFirstPoint{I}
  \tkzGetSecondPoint{P}
  \tkzDefCircle[circum](A,B,C)
  \tkzGetPoint{K}
  \tkzGetLength{rCI}
  \tkzDrawPoints[size=1.5pt](A,B,C,I,K,P)
  \tkzDefCircle[R](I,\rIN pt) \tkzGetPoint{x}
  \tkzDrawCircle[blue](I,x)
  \tkzDefCircle[R](K,\rCI pt) \tkzGetPoint{x}
  \tkzDrawCircle[red](K,x)
  \tkzLabelPoints[below](B,C)
  \tkzLabelPoints[above left](A,I,K,P)
  \tkzDrawPolygon(A,B,C)
\end{tikzpicture}
```

4.2.3 Escribed

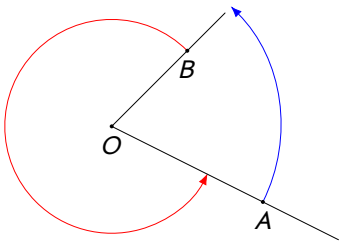



```
\begin{tikzpicture}[scale=.5]
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(3,0){B}
  \tkzDefPoint(1,2.5){C}
  \tkzDefCircle[ex](A,B,C)  \tkzGetPoint{I}
  \tkzGetLength{rI}
  \tkzDefCircle[ex](C,A,B)  \tkzGetPoint{J}
  \tkzGetLength{rJ}
  \tkzDefCircle[ex](B,C,A)  \tkzGetPoint{K}
  \tkzGetLength{rK}
  \tkzDrawLines[add=1.25 and 1.25](A,B A,C B,C)
  \tkzDrawPolygon(A,B,C)
  \tkzDefCircle[R](I,\rI) \tkzGetPoint{i}
  \tkzDefCircle[R](J,\rJ) \tkzGetPoint{j}
  \tkzDefCircle[R](K,\rK) \tkzGetPoint{k}
  \tkzDrawCircles(I,i J,j K,k)
  \tkzDrawPoints[size=1.5pt](A,B,C,I,J,K)
  \tkzLabelPoints[below left=2pt](A,I,J)
  \tkzLabelPoints[below right, xshift=8pt](B)
  \tkzLabelPoints[below](K)
  \tkzLabelPoints[above=6pt](C)
\end{tikzpicture}
```

5 Arcs and Sectors

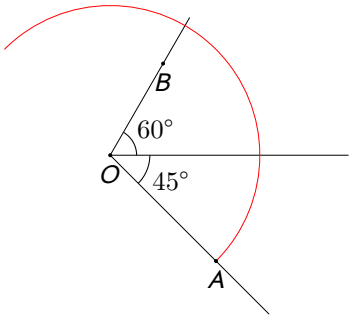
5.1 Arc: `\tkzDrawArc`

5.1.1 Default behavior `towards`



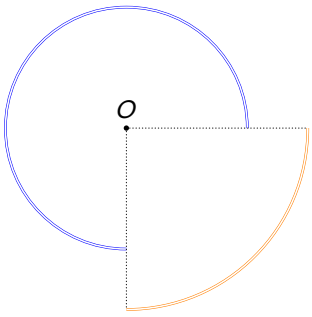

```
\begin{tikzpicture}[scale=1,>=Latex]
  \tkzDefPoints{0/0/O,2/-1/A,1/1/B}
  \tkzDrawArc[color=blue,->](O,A)(B)
  \tkzDrawArc[color=red,->](O,B)(A)
  \tkzDrawLines[add = 0 and .5](O,A O,B)
  \tkzDrawPoints[size=1.5pt](O,A,B)
  \tkzLabelPoints[below](O,A,B)
\end{tikzpicture}
```

5.1.2 Rotate



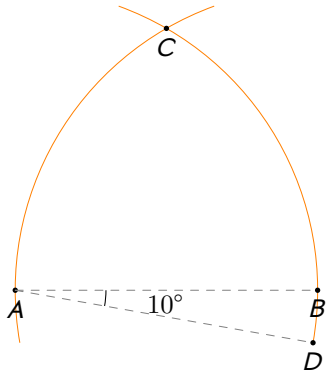

```
\begin{tikzpicture}[scale=0.7]
  \tkzDefPoints{0/0/O,2/-2/A,3/0/C}
  \tkzDefPoint(60:2){B}
  \tkzDrawLines[add = 0 and .5](O,A O,B O,C)
  \tkzDrawArc[rotate,color=red](O,A)(180)
  \tkzDrawPoints[size=1.5pt](O,A,B)
  \tkzLabelPoints[below](O,A,B)
  \tkzMarkAngle[mark=none,size=0.5cm](C,O,B)
  \tkzLabelAngle[pos=1](C,O,B){$60\degree$}
  \tkzMarkAngle[mark=none,size=0.75cm](A,O,C)
  \tkzLabelAngle[pos=1.25](A,O,C){$45\degree$}
\end{tikzpicture}
```

5.1.3 Radius



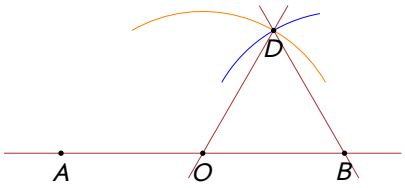

```
\begin{tikzpicture}[scale=.8]
  \tkzDefPoints{0/0/O,0/-3/x,3/0/y}
  \tkzDrawArc[R,color=orange,double](O,3cm)(270,360)
  \tkzDrawArc[R,color=blue,double](O,2cm)(0,270)
  \tkzDrawPoint(O)
  \tkzLabelPoint[above](O){$O$}
  \tkzDrawSegment[densely dotted](O,x)
  \tkzDrawSegment[densely dotted](O,y)
\end{tikzpicture}
```

5.1.4 delta



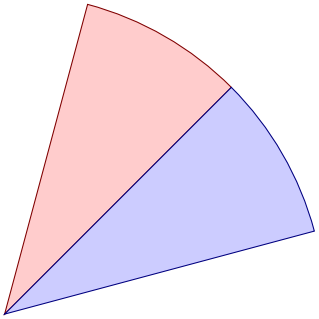

```
\begin{tikzpicture}[scale=0.8]
  \tkzDefPoints{0/0/A,5/0/B}
  \tkzDefPointBy[rotation= center A angle 60](B)
  \tkzGetPoint{C}
  \tkzDefPointBy[rotation= center A angle -10](B)
  \tkzGetPoint{D}
  \tkzDrawArc[orange,delta=10](A,B)(C)
  \tkzDrawArc[orange,delta=10](B,C)(A)
  \tkzDrawPoints(A,B,C,D)
  \tkzLabelPoints(A,B,C,D)
  \tkzDrawSegments[color=gray,dashed](A,B A,D)
  \tkzMarkAngle[mark=none,size=1.5cm](D,A,B)
  \tkzLabelAngle[pos=2.5](D,A,B){$10\degree$}
\end{tikzpicture}
```

5.1.5 angles

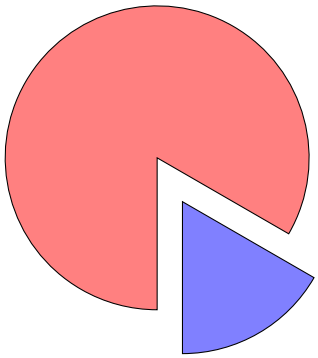



```
\begin{tikzpicture}[scale=.75]
  \tkzDefPoint(0,0){A}
  \tkzDefPoint(5,0){B}
  \tkzDefPoint(2.5,0){O}
  \tkzDefPointBy[rotation=center O angle 60](B)
  \tkzGetPoint{D}
  \tkzSetUpLine[color=Maroon]
  \tkzDrawArc[angles,color=orange](O,B)(30,120)
  \tkzDrawArc[angles,color=blue](B,O)(100,150)
  \tkzDrawLines(A,B O,D B,D)
  \tkzDrawPoints(A,B,O,D)
  \tkzLabelPoints(A,B,O,D)
\end{tikzpicture}
```

5.2 Sector: \tkzDrawSector

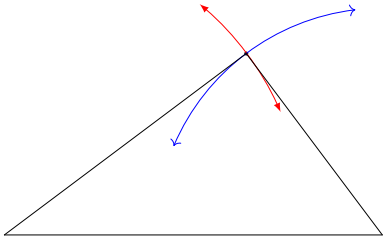


```
\begin{tikzpicture}[scale=1.5]
  \tkzDefPoint(0,0){O}
  \tkzDefPoint(2,2){A}
  \tkzDrawSector[rotate,draw=red!50!black,%
    fill=red!20](O,A)(30)
  \tkzDrawSector[rotate,draw=blue!50!black,%
    fill=blue!20](O,A)(-30)
\end{tikzpicture}
```



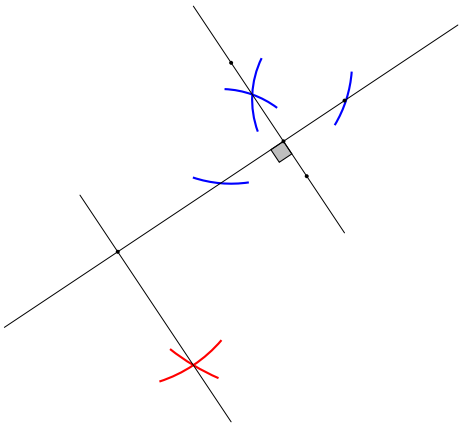
```
  \begin{tikzpicture}[scale=.67]
    \tkzDefPoint(0,0){O}
    \tkzDefPoint(-30:3){A}
    \tkzDefPointBy[rotation = center O angle -
60](A)
    \tkzDrawSector[fill=red!50](O,A)(tkzPointResult)
    \begin{scope}[shift={(-60:1)}]
      \tkzDefPoint(0,0){O}
      \tkzDefPoint(-30:3){A}
      \tkzDefPointBy[rotation = center O angle -
60](A)
      \tkzDrawSector[fill=blue!50](O,tkzPointResult)(A)
    \end{scope}
  \end{tikzpicture}
```

5.3 Compass: \tkzCompass



```
\begin{tikzpicture}
  \tkzSetUpCompass[style={<->}]
  \tkzDefPoint(1,1){A}
  \tkzDefPoint(6,1){B}
  \tkzInterCC[R](A,4)(B,3)
  \tkzGetPoints{C}{D}
  \tkzDrawPoint[size=1.5pt](C)
  \tkzCompass[color=red,>=latex,length=1.8](A,C)
  \tkzCompass[color=blue,delta=30](B,C)
  \tkzDrawSegments(A,B A,C B,C)
\end{tikzpicture}
```

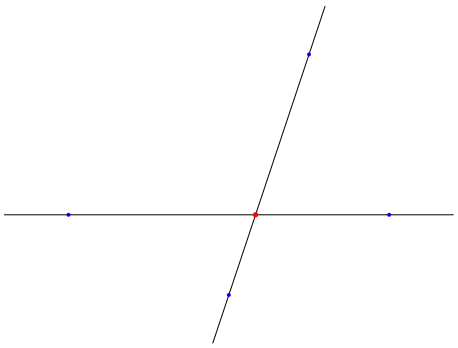
5.4 \tkzShowLine



```
\begin{tikzpicture}
  \tkzDefPoints{0/0/A, 3/2/B, 1.5/2.5/C}
  \tkzDefLine[perpendicular=through C,K=-
.5](A,B)
  \tkzGetPoint{c}
  \tkzShowLine[thick,color=blue,%
    perpendicular=through C,K=-
.5,gap=3](A,B)
  \tkzDefLine[parallel=through A](C,c)
  \tkzGetPoint{a}
  \tkzShowLine[thick,color=red,%
    parallel=through A](C,c)
  \tkzDefPointBy[projection=onto A--B](c)
  \tkzGetPoint{h}
  \tkzMarkRightAngle[fill=lightgray,size=.2](c,h,A)
  \tkzDrawLines[add=.5 and .5](A,B C,c A,a)
  \tkzDrawPoints[size=1.5pt](A,B,C,h,c)
\end{tikzpicture}
```

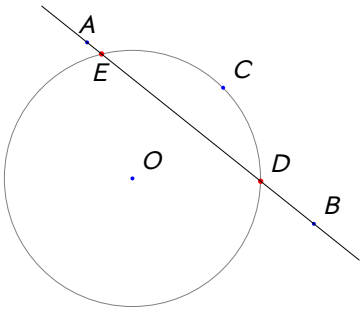
6 Intersections

6.1 \tkzInterLL



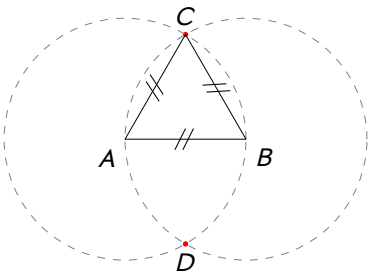
```
\begin{tikzpicture}[rotate=-45,scale=.75]
  \tkzDefPoint(2,1){A}
  \tkzDefPoint(6,5){B}
  \tkzDefPoint(3,6){C}
  \tkzDefPoint(5,2){D}
  \tkzDrawLines(A,B C,D)
  \tkzInterLL(A,B)(C,D)
  \tkzGetPoint{I}
  \tkzDrawPoints[size=1.5pt,color=blue](A,B,C,D)
  \tkzDrawPoint[color=red](I)
\end{tikzpicture}
```

6.2 \tkzInterLC



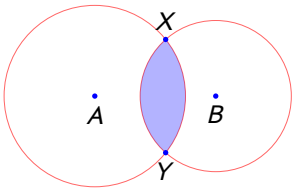

```
\begin{tikzpicture}[scale=.6]
  \tkzInit[xmax=5,ymax=4]
  \tkzDefPoints{1/1/O,0/4/A,5/0/B,3/3/C}
  \tkzInterLC(A,B)(O,C)
  \tkzGetPoints{D}{E}
  \tkzDrawCircle(O,C)
  \tkzDrawPoints[size=1.5pt,color=blue](O,A,B,C)
  \tkzDrawPoints[color=red](D,E)
  \tkzDrawLine(A,B) \tkzLabelPoints[above](A)
  \tkzLabelPoints[above right](O,B,C,D)
  \tkzLabelPoints[below](E)
\end{tikzpicture}
```

6.3 \tkzInterCC



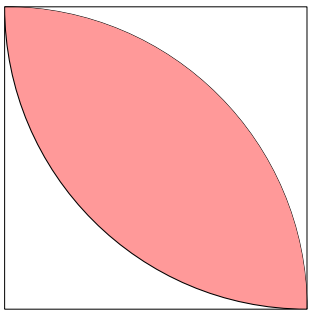

```
\begin{tikzpicture}[trim left=-1cm,
                    scale=.4, xshift=.5cm]
  \tkzDefPoint(1,1){A}
  \tkzDefPoint(5,1){B}
  \tkzInterCC(A,B)(B,A)\tkzGetPoints{C}{D}
  \tkzDrawPoints[color=red](C,D)
  \tkzDrawCircle[dashed](A,B)
  \tkzDrawCircle[dashed](B,A)
  \tkzDrawPolygon(A,B,C)
  \tkzMarkSegments[mark=s||](C,A C,B B,A)
  \tkzLabelPoints[below left](A)
  \tkzLabelPoints[below right](B)
  \tkzLabelPoint[above](C){$C$}
  \tkzLabelPoint[below](D){$D$}
\end{tikzpicture}
```

6.3.1 \tkzGetFirstPoint and \tkzGetSecondPoint

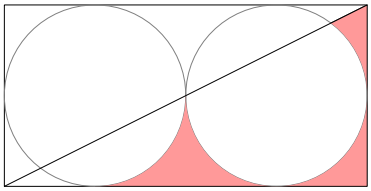



```
\begin{tikzpicture}[trim left=-1cm,
                    scale=.4, xshift=.5cm]
  \tkzDefPoints{0/0/A, 4/0/B, 3/0/C, 1.5/0/D}
  \tkzDrawCircles[red!60](A,C B,D)
  \tkzInterCC(A,C)(B,D)
  \tkzGetFirstPoint{X} \tkzGetSecondPoint{Y}
  \tkzLabelPoints[below](A,B,Y)
  \tkzLabelPoints[above](X)
  \tkzDrawPoints[color=blue](A,B,X,Y)
  \begin{scope}
    \tkzClipCircle(A,C)
    \tkzFillCircle[fill=blue,opacity=0.3](B,D)
  \end{scope}
\end{tikzpicture}
```

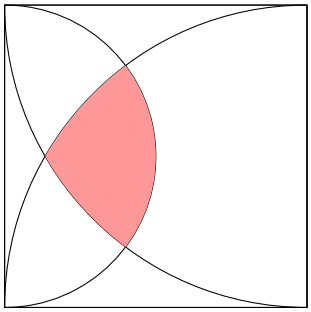
7 Clip



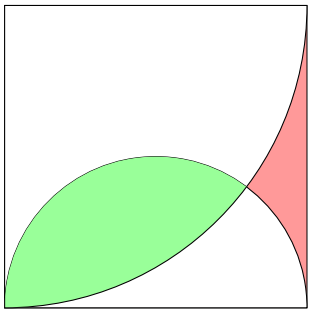
```
\begin{tikzpicture}
  \tkzDefPoints{0/0/A, 4/0/B}
  \tkzDefSquare(A,B) \tkzGetPoints{C}{D}
  \tkzDrawPolygon(A,B,C,D)
  \tkzDrawArc(A,B)(D)
  \tkzClipSector(A,B)(D)
  \tkzDrawSector[fill=red!40](C,D)(B)
\end{tikzpicture}
```



```
\begin{tikzpicture}
  \def\r{1.2}
  \tkzDefPoints{0/0/A, \r*4/0/B, \r*4/\r*2/C, 0/\r*2/D,
    \r/\r*2/E, \r/0/F, \r*3/0/G, \r/\r/O1, \r*3/\r/O2}
  \tkzDrawPolygon(A,B,C,D)
  \tkzDrawCircle(O1,E) \tkzDrawCircle(O2,G)
  \tkzDrawSegment(A,C)
  \tkzClipPolygon(B,C,E,F)
  \tkzClipCircle[out](O1,E) \tkzClipCircle[out](O2,G)
  \tkzDrawPolygon[fill=red!40](A,B,C)
\end{tikzpicture}
```



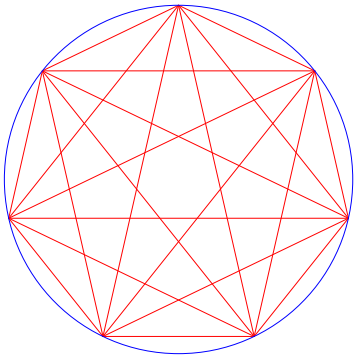
```
\begin{tikzpicture}
  \def\r{4}
  \tkzDefPoints{0/0/A, \r/0/B}
  \tkzDefSquare(A,B) \tkzGetPoints{C}{D}
  \tkzDefMidPoint(A,D) \tkzGetPoint{E}
  \tkzDrawPolygon(A,B,C,D) \tkzDrawSector(B,C)(A)
  \tkzDrawSector(C,D)(B)   \tkzDrawSector(E,A)(D)
  \tkzClipSector(B,C)(A)   \tkzClipSector(C,D)(B)
  \tkzFillSector[red!40](E,A)(D)
\end{tikzpicture}
```



```
\begin{tikzpicture}
  \def\r{4}
  \tkzDefPoints{0/0/A, \r/0/B}
  \tkzDefSquare(A,B) \tkzGetPoints{C}{D}
  \tkzDrawPolygon[fill=red!40](A,B,C,D)
  \tkzDefMidPoint(A,B) \tkzGetPoint{E}
  \tkzDrawSector[fill=white](D,A)(C)
  \tkzDrawSector[fill=white](E,B)(A)
  \tkzClipSector(E,B)(A)
  \tkzDrawSector[fill=green!40](D,A)(C)
\end{tikzpicture}
```

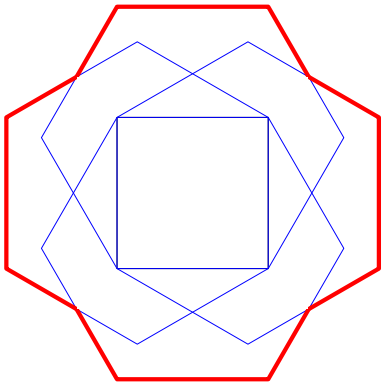
8 Miscellaneous

2022 AMC12B P24



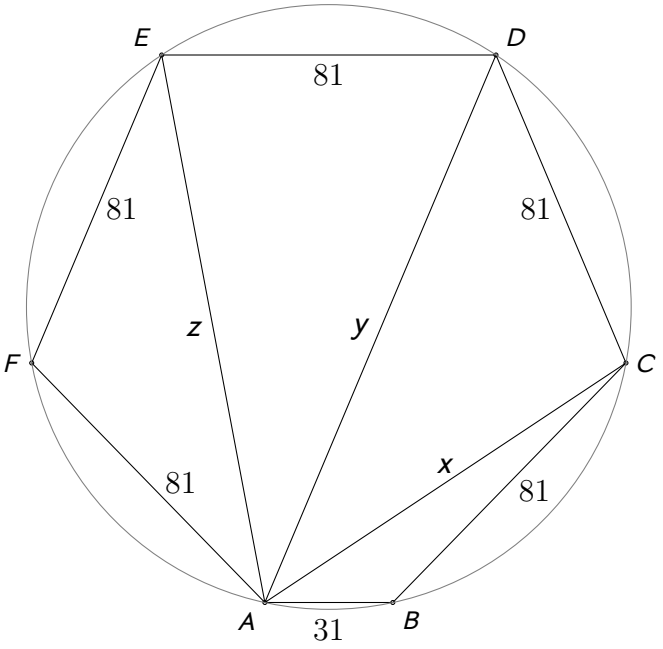
```
\begin{tikzpicture}
  \tkzDefPoints{-1/0/P_1,1/0/P_2}
  \tkzDefRegPolygon[side, sides=7, name=P_](P_1,P_2)
  \foreach \i [evaluate=\i as \next using \i + 1]
               in {1,...,6} {
    \foreach \j in {\next,...,7} {
      \tkzDrawSegment[red](P_\i, P_\j)
    }
  }
  \tkzDefCircle[circum](P_1,P_2,P_3) \tkzGetPoint{O}
  \tkzDrawCircle[blue](O,P_1)
\end{tikzpicture}
```

2022 AMC12B P25

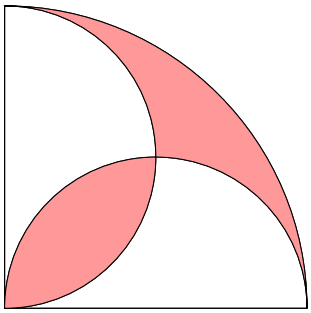


```
\begin{tikzpicture}
  \tkzDefPoints{-1/-1/P_1,1/-1/P_2,0/0/O}
  \tkzDefRegPolygon[side, sides=4, name=P_](P_1,P_2)
  \tkzDrawPolygon(P_1,P_...,P_4)
  \foreach \i [evaluate=\i as \j using { int(mod(\i,4) + 1) }]
               in {1,...,4} {
    \tkzDefRegPolygon[side, sides=6, name=Q_\i_](P_\i,P_\j)
    \tkzDrawPolygon[blue](Q_\i_1,Q_\i_...,Q_\i_6)
  }
  \begin{pgfinterruptboundingbox}
  \tkzDefPoint(5 - 2*sqrt(3), 2.1){A}
  \tkzDefPoint(4.5, -2.1){C}
  \tkzDefRectangle(A,C) \tkzGetPoints{B}{D}
  \foreach \i in {1,...,4} {
    \begin{scope}
      \tkzDefPointsBy[rotation=center O angle 90](A,B,C,D)
                     {A,B,C,D}
      \tkzClipPolygon(A,B,C,D)
      \tkzDrawPolygon[ultra thick, red](Q_\i_1,Q_\i_...,Q_\i_6)
    \end{scope}
  }
  \end{pgfinterruptboundingbox}
\end{tikzpicture}
```

1991 AIME P14

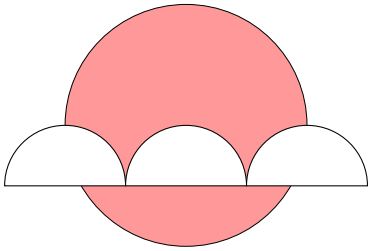



```
\begin{tikzpicture}
  \tkzSetUpPoint[size=1.5pt] \tkzDefPoint(0,0){O}
  \tkzDefPoint({-90 - 180/pi * acos(475/486)}:4){A}
  \tkzDefPoint({-90 + 180/pi * acos(475/486)}:4){B}
  \tkzDefPoint({-90 + 180/pi * acos(475/486) + 180/pi * acos(7/18)}:4){C}
  \tkzDefPoint({-90 + 180/pi * acos(475/486) + 2 * 180/pi * acos(7/18)}:4){D}
  \tkzDefPoint({-90 + 180/pi * acos(475/486) + 3 * 180/pi * acos(7/18)}:4){E}
  \tkzDefPoint({-90 - 180/pi * acos(475/486) - 180/pi * acos(7/18)}:4){F}
  \tkzDrawPoints(A,B,C,D,E,F) \tkzDrawPolygon[thin](A,B,C,D,E,F)
  \tkzDrawSegments[thin](A,E A,D A,C) \tkzDrawCircle[thin](O,A)
  \tkzLabelPoints[below left](A) \tkzLabelPoints[below right](B)
  \tkzLabelPoints[right](C) \tkzLabelPoints[above right](D)
  \tkzLabelPoints[above left](E) \tkzLabelPoints[left](F)
  \tkzLabelSegment[font=\large, below, yshift=-0.1cm](A,B){$31$}
  \tkzLabelSegment[font=\large, right, yshift=-0.1cm](B,C){$81$}
  \tkzLabelSegment[font=\large, left](C,D){$81$}
  \tkzLabelSegment[font=\large, right](E,F){$81$}
  \tkzLabelSegment[font=\large, right, xshift=0.1cm](F,A){$81$}
  \tkzLabelSegment[font=\large, below](E,D){$81$}
  \tkzLabelSegment[font=\large, above](A,C){$x$}
  \tkzLabelSegment[font=\large, left](A,D){$y$}
  \tkzLabelSegment[font=\large, left](A,E){$z$}
\end{tikzpicture}
```

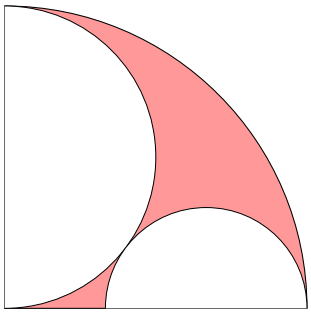


```
  \begin{tikzpicture}
    \tkzDefPoints{0/0/A,4/0/B,0/4/C,2/0/D,0/2/E}
    \tkzDrawSector(A,B)(C)
    \tkzDrawSector(D,B)(A)
    \tkzDrawSector(E,A)(C)
    \tkzInterCC(D,B)(E,C)
    \tkzGetPoints{Y}{Z}
    \filldraw[fill=red!40] (Y) arc(180:90:2cm) --
      (Z) arc(0:-90:2cm) -- cycle;
    \filldraw[fill=red!40] (Z) arc(90:0:2cm) --
      (B) arc(0:90:4cm) -- (C) arc(90:0:2cm) -- cycle;
\end{tikzpicture}
```

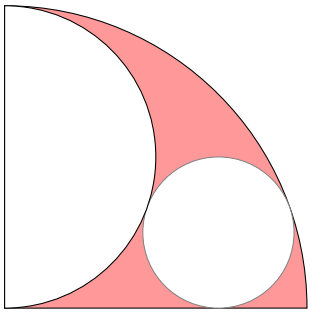
2019 AMC10B P20



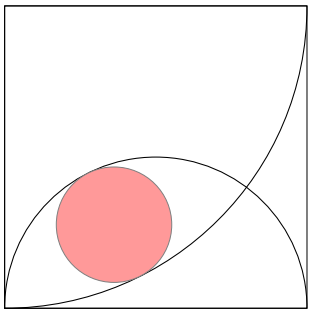
```
\begin{tikzpicture}
  \def\r{.8}
  \tkzDefPoints{-\r*2/0/O2, \r*2/0/O3, 0/\r/O4, 0/0/O1}
  \tkzDrawArc[R, fill=red!40](O4,\r*2)(0,360)
  \tkzDrawSector[R, fill=white](O2,\r)(0,180)
  \tkzDrawSector[R, fill=white](O1,\r)(0,180)
  \tkzDrawSector[R, fill=white](O3,\r)(0,180)
\end{tikzpicture}
```



```
\begin{tikzpicture}
  \def\r{4}
  \tkzDefPoints{0/0/A, \r/0/B}
  \tkzDefSquare(A,B)       \tkzGetPoints{C}{D}
  \tkzDefMidPoint(A,D)         \tkzGetPoint{E}
  \tkzInterCC(E,A)(C,D) \tkzGetSecondPoint{F}
  \tkzInterLL(E,F)(A,B)        \tkzGetPoint{G}
  \tkzDrawSector[towards,fill=red!40](A,B)(D)
  \tkzDrawSemiCircle[fill=white](E,A)
  \tkzDrawSemiCircle[fill=white](G,B)
\end{tikzpicture}
```



```
\begin{tikzpicture}
  \def\r{4}
  \tkzDefPoints{0/0/A, \r/0/B, 0/\r/C, {\r/2*sqrt(2)}/{\r/4}/D,
    {\r/2*sqrt(2)}/0/E, 0/{\r/2}/F}
  \tkzDrawSector[towards, fill=red!40](A,B)(C)
  \tkzDrawCircle[fill=white](D,E)
  \tkzDrawSector[R, fill=white](F,\r/2)(-90,90)
\end{tikzpicture}
```



```
\begin{tikzpicture}
  \def\r{4}
  \tkzDefPoints{0/0/A, \r/0/B}
  \tkzDefSquare(A,B)        \tkzGetPoints{C}{D}
  \tkzDefMidPoint(A,B)          \tkzGetPoint{E}
  \tkzInterLC(D,E)(E,B)    \tkzGetFirstPoint{F}
  \tkzInterLC(E,D)(D,A)    \tkzGetFirstPoint{G}
  \tkzDefCircle[diameter](F,G)  \tkzGetPoint{O}
  \tkzDrawSector(D,A)(C) \tkzDrawSector(E,B)(A)
  \tkzDrawPolygon(A,B,C,D)
  \tkzDrawCircle[fill=red!40](O,F)
\end{tikzpicture}
```