

Name: _____ Teacher: _____ Date: _____

Geometry and Constructions

Guided Notes: Student Edition

Define each word and draw an example:

Acute Angle	
Obtuse Angle	
Right Angle	
Parallel Lines	
Perpendicular Lines	
Line	
Ray	
Segment	
Equilateral Triangle	
Isosceles Triangle	
Scalene Triangle	
Compass	
Protractor	
Similar Figures	

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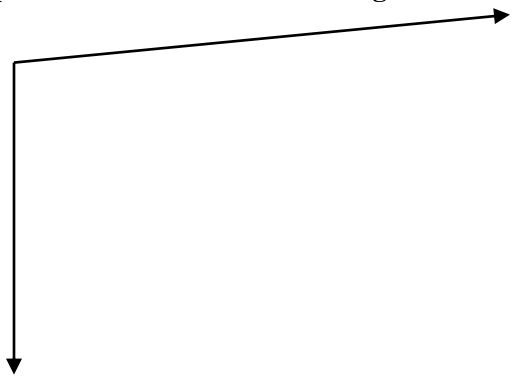
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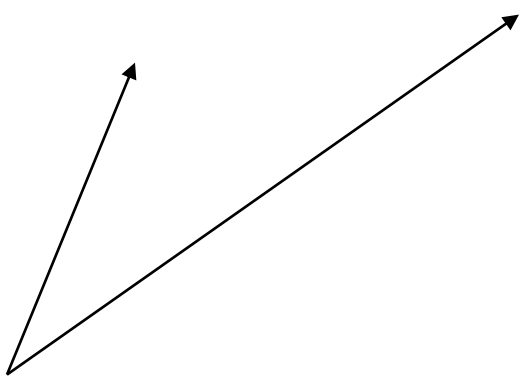
Vertex	
Intersect	
Supplementary Angles	
Complimentary Angles	
Regular Polygon	
Square	
Rectangle	
Parallelogram	
Rhombus	
Trapezoid	
Quadrilateral	
Radius	
Diameter	

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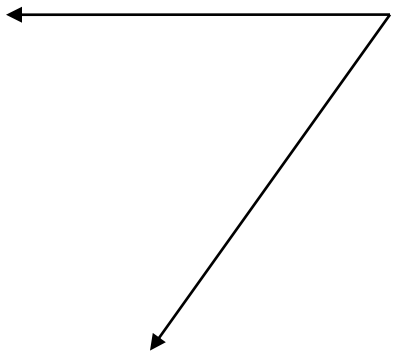
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Use a protractor to measure each angle.

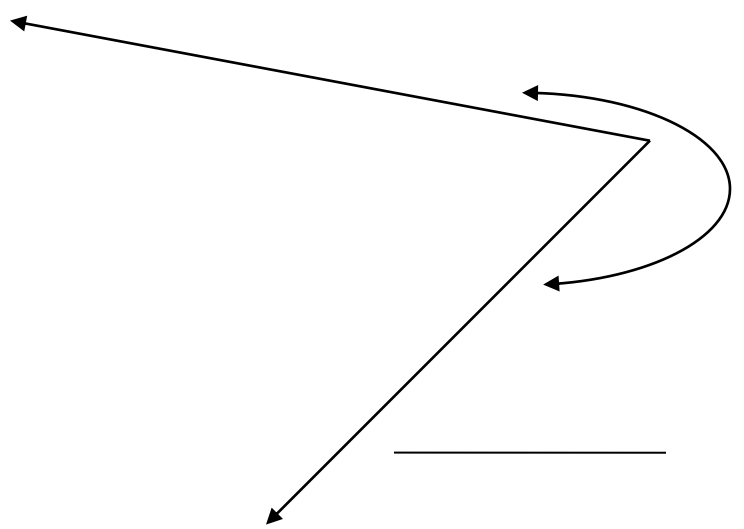












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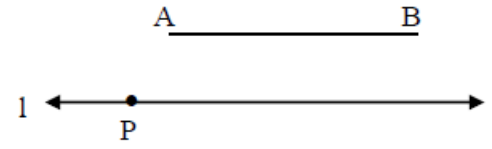
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Copy a Segment

Construction # 1: Copy a line segment.

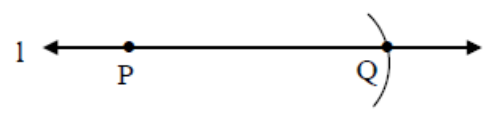
Given line segment \overline{AB} and point P on line l.

Find Q on line l so $\overline{PQ} \cong \overline{AB}$



Steps:

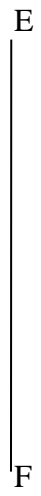
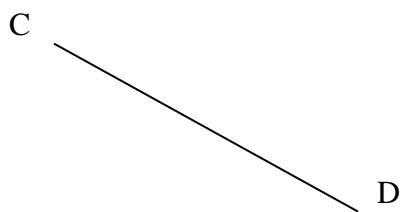
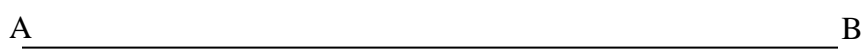
1. Open compass to length AB .
2. Holding that compass setting, put point of the compass at point P and swing an arc that intersects line l. Locate Q.



Justification:

Because the compass setting is the same, we are creating a circle centered at P with radius AB . Since Q is on the line and on the circle, $PQ = AB$.

Copy the segments below using a compass and straight edge.



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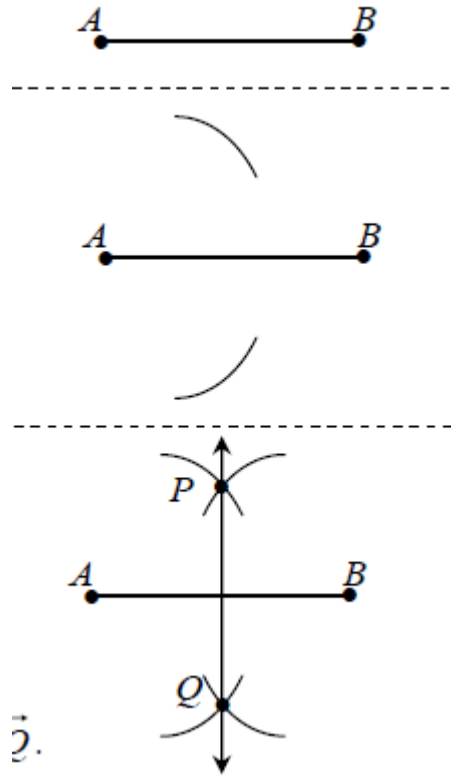
Perpendicular Bisector (and Midpoint)

Construction # 3: Construct a perpendicular bisector

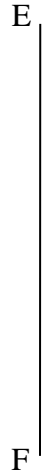
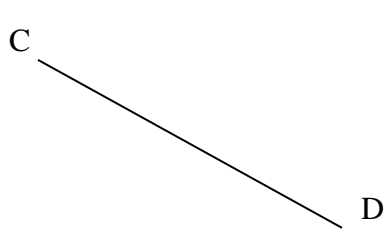
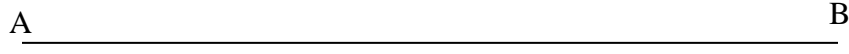
Given \overline{AB} , construct a line l so that $l \perp \overline{AB}$ and l intersects \overline{AB} at the midpoint of \overline{AB} .

Steps:

1. Place compass at A and set compass to any setting more than half of AB . Swing arcs on both sides of \overline{AB} .
2. Keeping the same compass setting, put compass point at B and swing arcs on both sides of \overline{AB} intersecting the arcs made in step 1 at P and Q .
3. Draw \overline{PQ} .



Construct the Perpendicular Bisector for each segment below.



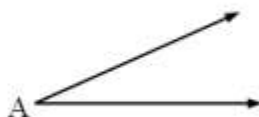
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Copying an Angle

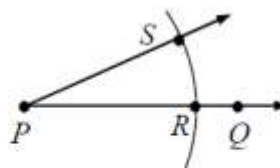
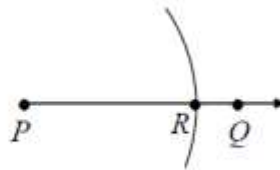
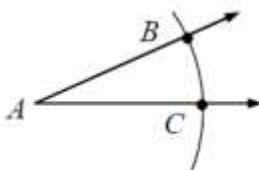
Construction # 2: Copy an angle.

Given $\angle A$ and ray \overrightarrow{PQ} locate point S so that $\angle SPQ \cong \angle A$.

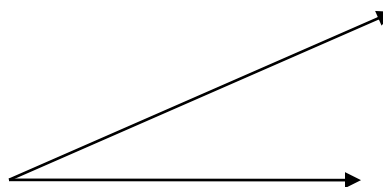
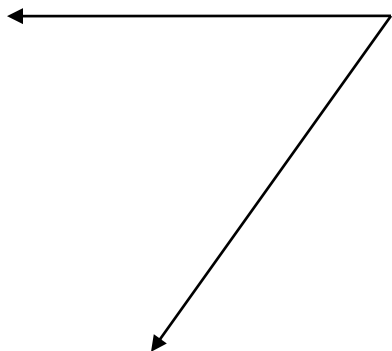


Steps:

1. Put compass point at A and using any convenient setting swing an arc that intersects both sides of $\angle A$. Locate points B and C .
2. Using the same compass setting, put point of compass at P and swing an arc that intersects the ray. Locate point R , the intersection.
3. Set compass to length BC then put compass point at R and swing an arc that intersects the arc from step # 2. Locate point S .
4. Draw ray \overrightarrow{PS} .



Copy the angles below using a compass and straight edge.



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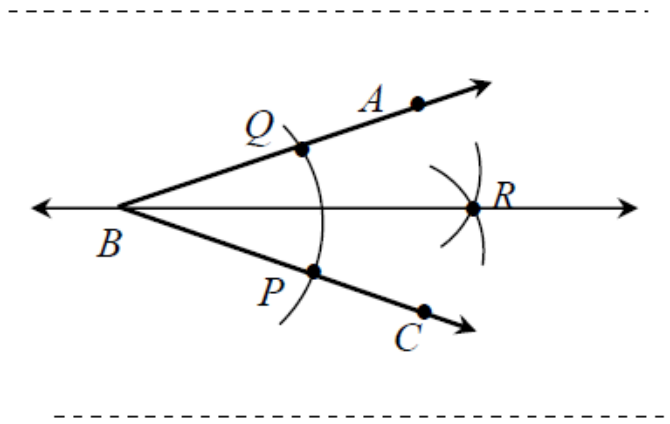
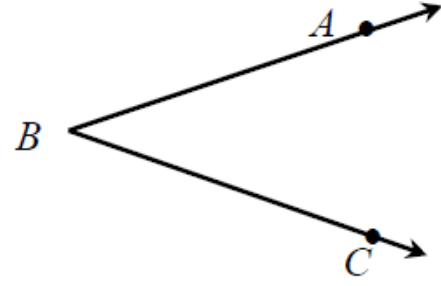
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Angle Bisector

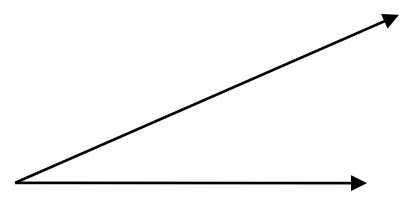
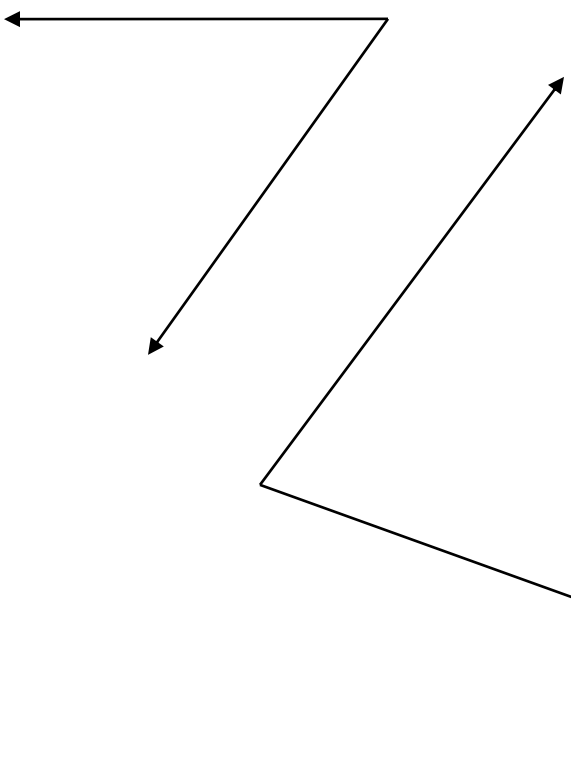
Construction # 4: Bisect an angle
 Given an angle $\angle ABC$, construct a line \overleftrightarrow{BR} so that $\angle ABR \cong \angle CBR$.

Steps:

1. Using any setting, place compass point at B and swing an arc through both sides of the angle. Locate P and Q , the intersections.
2. Using any setting, place compass point at P and swing an arc. Using same compass setting do the same from point Q . Label intersection point R .
3. Draw \overleftrightarrow{BR} .



Construct the angle bisector of each angle below.

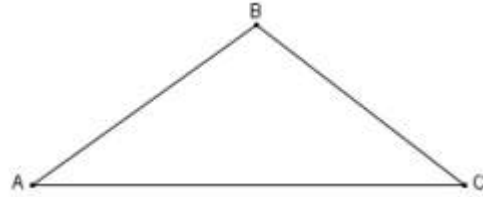


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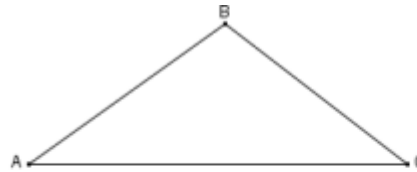
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Copy a Triangle

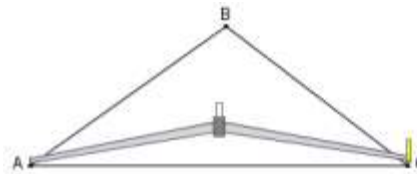
Start with the triangle ABC which we will copy.



1. Mark a point P that will be one vertex of the new triangle



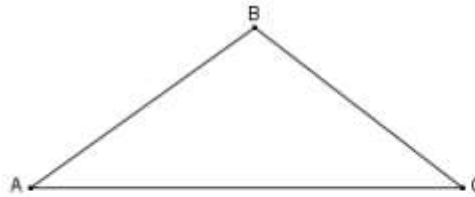
2. Set the compass width to the length of one side of the original triangle ABC. In this example we use AC.



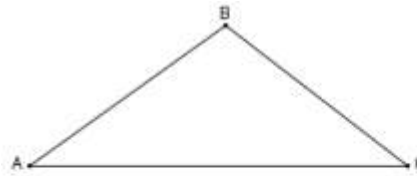
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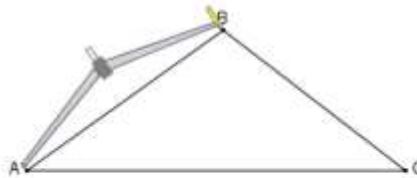
3. With the compass point on P, make an arc near where the next vertex of the triangle will be.



4. Mark a point R on the arc. This will become the next vertex of the new triangle. PR is equal in length to AC



5. Use the compass to measure the length of the side AB in the original triangle.

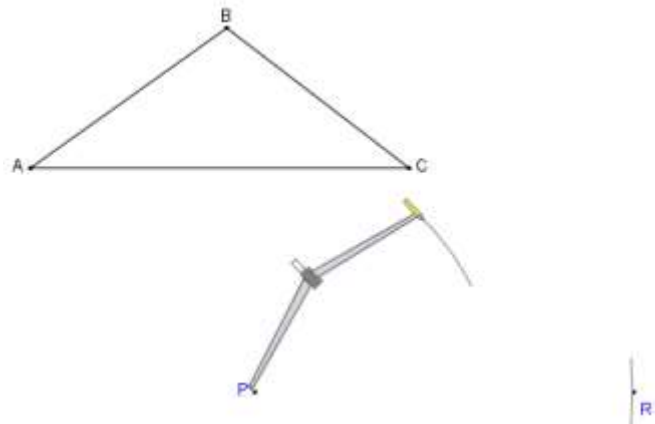


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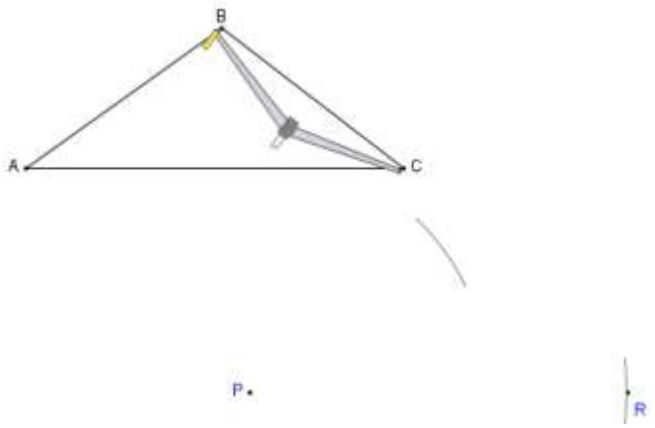
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6. Place the compass point on P and make an arc in the vicinity of where the third vertex of the triangle will be.

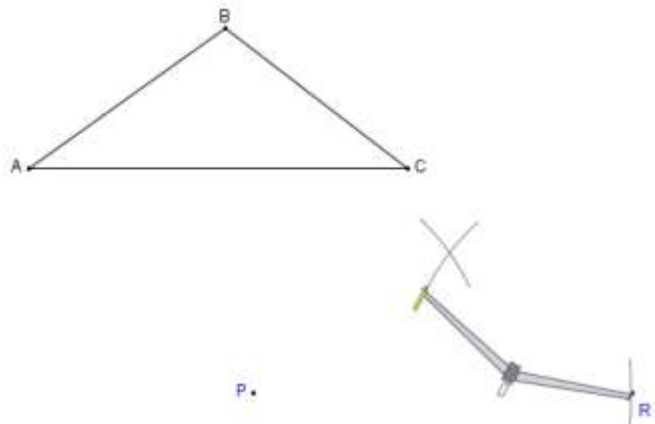
All points along this arc are the distance AB from P, but we do not yet know exactly where on this arc the the vertex is.



7. Use the compass to measure the length of the side BC in the original triangle



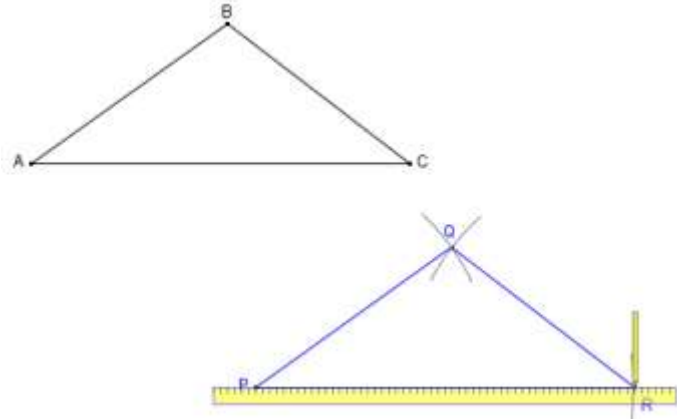
8. From point R, draw an arc crossing the first. where these intersect is the vertex Q of the triangle



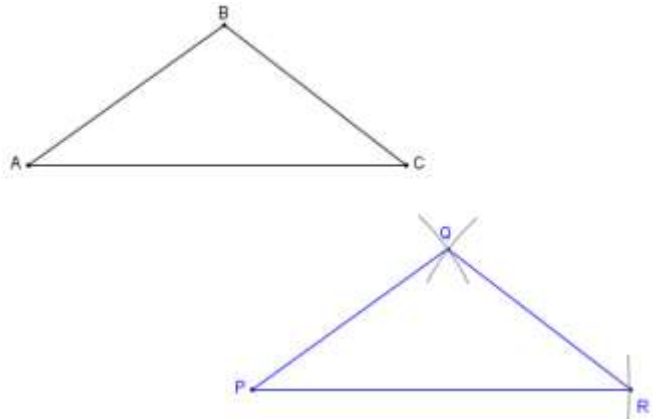
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9. Finally, draw the three sides of the new triangle PQ, PR, and QR.



10. Done. The blue triangle PQR is **congruent** to the triangle ABC.

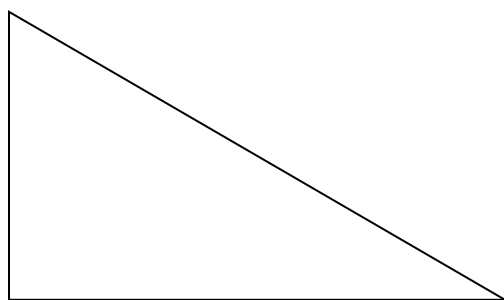
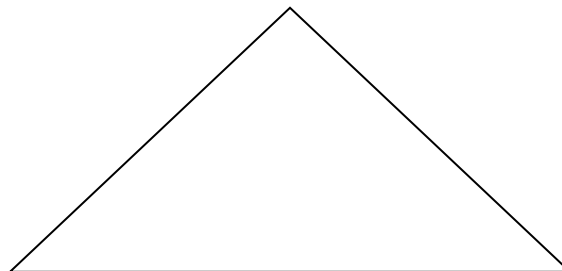


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**You
try!**



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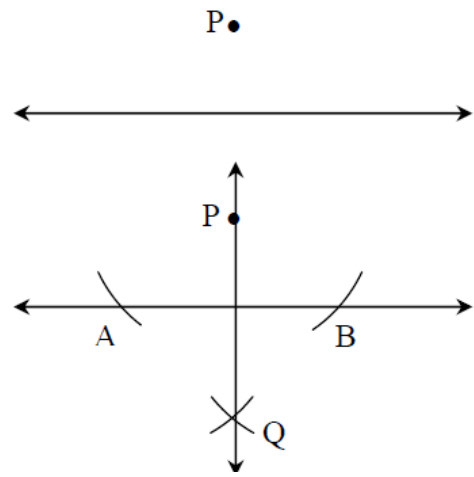
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A perpendicular through a point.

Construction # 6: Construct a line perpendicular to a given line through a point NOT on the line
 Given: line l and point P not on l

Steps:

1. Put compass point on P and swing an arc that intersects l in two points, A & B .
2. Set compass to any distance greater than $\frac{1}{2} AB$. Put compass point on A and swing an arc.
3. Using same compass setting, put compass on B and swing an arc that intersects arc from step 2. Locate point Q .
4. Draw \overline{PQ} .



Construct the perpendicular through point P for each.

·P

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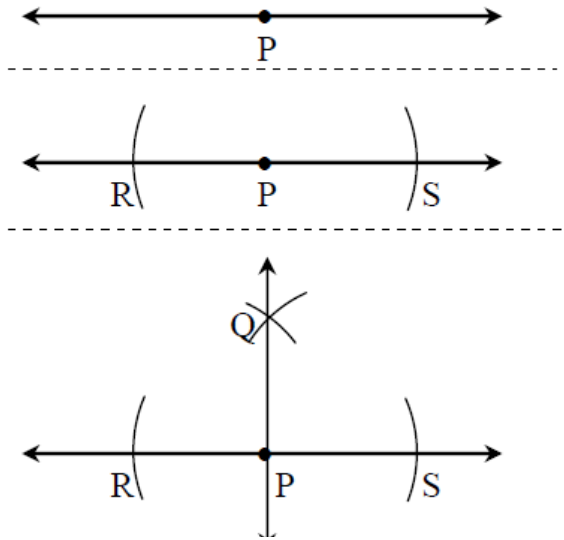
Perpendicular line through a point on the line.

Construction # 5: Construct a line perpendicular to a given line through a point on the line

Given: Point P on line l . Construct \overleftrightarrow{QP} such that $\overleftrightarrow{QP} \perp l$.

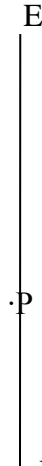
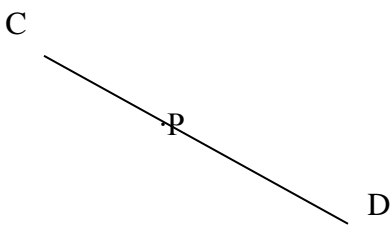
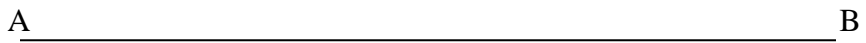
Steps:

1. Place compass point on P and construct arcs that intersect line l on both sides of P. Locate R & S.
2. Set compass to distance greater than $\frac{1}{2}$ of RS. Put point of compass on R and swing arc above l .
3. Using same compass setting, put compass on S and swing an arc intersecting arc from step 2. Locate Q.
4. Draw \overleftrightarrow{QP} .



Construct the perpendicular through point P for each.

·P



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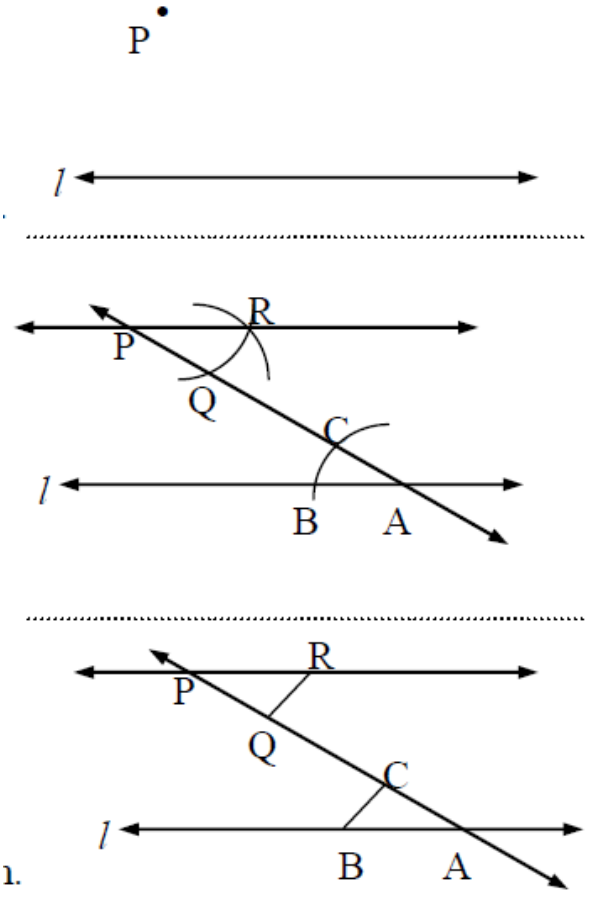
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Parallel Lines

Construction # 7: Given a line, l , and a point P not on l , construct a line through P parallel to l .

Steps:

1. Draw a line through P that intersects l at any convenient point A .
2. Set compass to any convenient setting and swing an arc through both sides of the newly created angle. Locate points B and C .
3. With compass at same setting as 2, swing a large arc from P that intersects segment \overline{PA} at Q .
4. Set compass to distance BC . Then place compass at Q and swing an arc that intersects arc from step 3. Locate R .
5. Draw line \overline{PR} . Line \overline{PR} is parallel to l .



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Construct a parallel line through the point P.

·P



·P

