CONSTRUCTION #1: Segment Copy

Objective: Given a line segment, construct a line segment congruent to the given one.

Procedure:

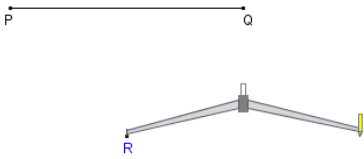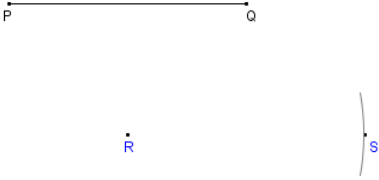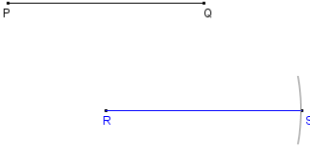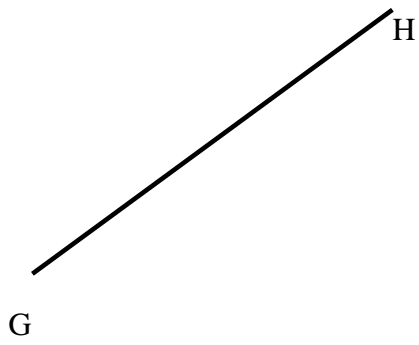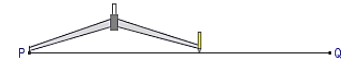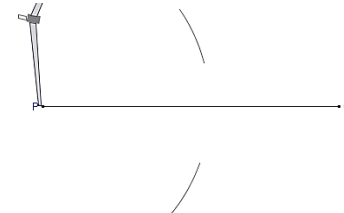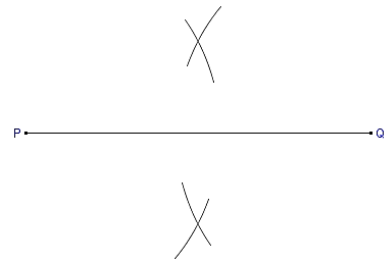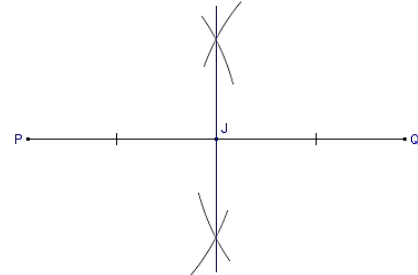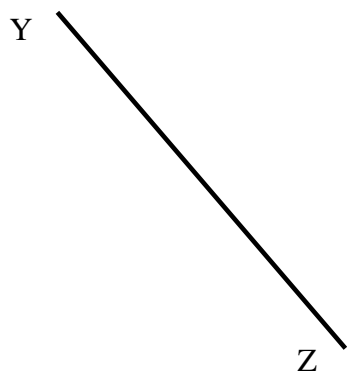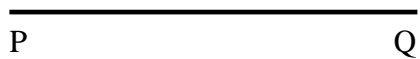|		**After doing this**	**Your work should look like this**
		Start with a line segment PQ that we will copy.	
Step 1		Mark a point R that will be one endpoint of the new line segment.	
Step 2		Set the compasses' point on the point P of the line segment to be copied.	
Step 3		Adjust the compasses' width to the point Q. The compasses' width is now equal to the length of the line segment PQ.	
Step 4		Without changing the compasses' width, place the compasses' point on the the point R on the line you drew in step 1	
Step 5		Without changing the compasses' width, Draw an arc roughly where the other endpoint will be. Pick a point S on the arc that will be the other endpoint of the new line segment.	
Step 6		Draw a line from R to S. Done. The line segment RS is equal in length (congruent to) the line segment PQ.	

Practice: Construct copies of each of these segments:

A   B

H

G

M

N

CONSTRUCTION #2: Perpendicular Bisector

Objective: Given a line segment, construct the perpendicular bisector of the segment.

Procedure:

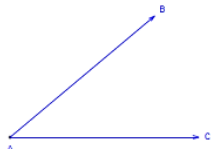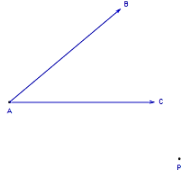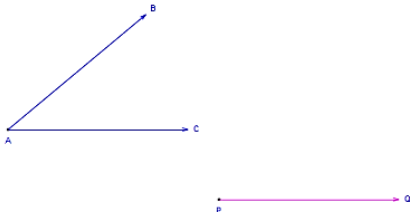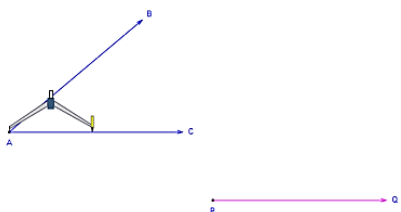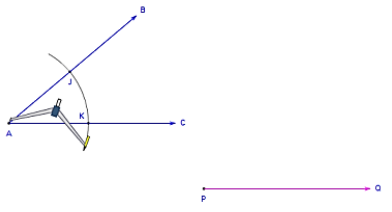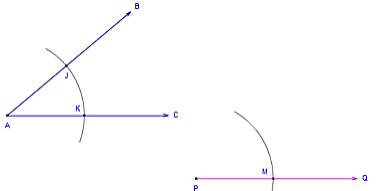|		**After doing this**	**Your work should look like this**
		Start with a line segment PQ.	
Step 1		Place the compasses on one end of the line segment.	
Step 2		Set the compasses' width to a approximately two thirds the line length. The actual width does not matter.	
Step 3		Without changing the compasses' width, draw an arc above and below the line.	
Step 4		Again without changing the compasses' width, place the compasses' point on the the other end of the line. Draw an arc above and below the line so that the arcs cross the first two.	
Step 5		Using a straightedge, draw a line between the points where the arcs intersect. Done. This line is perpendicular to the first line and bisects it (cuts it at the exact midpoint of the line).	

Practice: Construct the perpendicular bisectors of these segments:

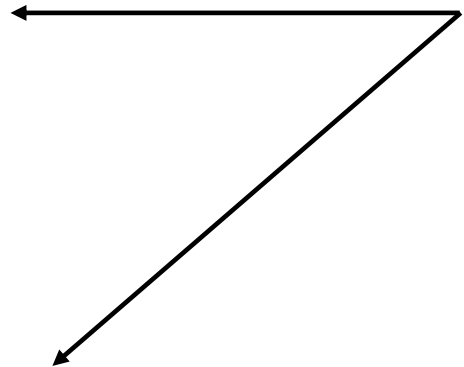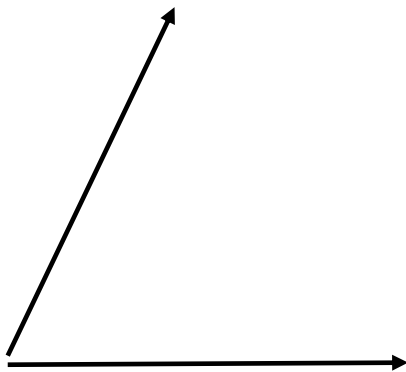P   Q

R

S

Y

Z

CONSTRUCTION #3: Angle Copy

Objective: Given an angle, construct an angle congruent to the given one.

Procedure:

	After doing this	**Your work should look like this**
	Start with an angle BAC that we will copy.	
Step 1	Make a point P that will be the vertex of the new angle.	
Step 2	From P, draw a ray PQ. This will become one side of the new angle. • This ray can go off in any direction. • It does not have to be parallel to anything else. • It does not have to be the same length as AC or AB.	
Step 3	Place the compasses on point A, set to any convenient width.	
Step 4	Draw an arc across both sides of the angle, creating the points J and K as shown.	
Step 5	Without changing the compasses' width, place the compasses' point on P and draw a similar arc there, creating point M as shown.	

	After doing this	**Your work should look like this**
Step 6	Set the compasses on K and adjust its width to point J.	
Step 7	Without changing the compasses' width, move the compasses to M and draw an arc across the first one, creating point L where they cross.	
Step 8	Draw a ray PR from P through L and onwards a little further. The exact length is not important. Done. The angle ∠RPQ is congruent to angle ∠BAC.	

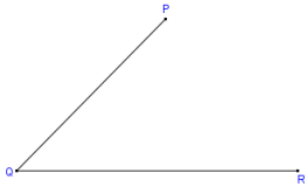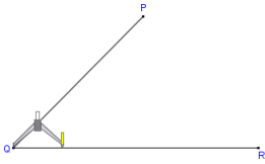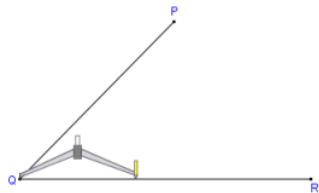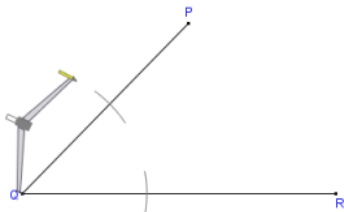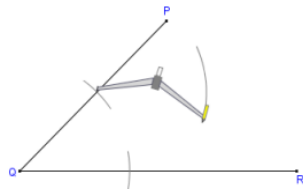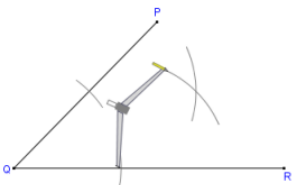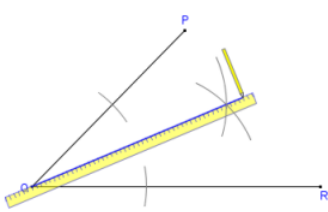Practice: Construct copies of each of these angles:

CONSTRUCTION #4: Angle Bisector

Objective: Given an angle, construct the bisector of the given angle.

Procedure:

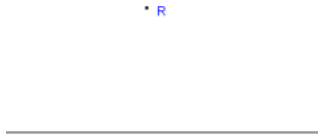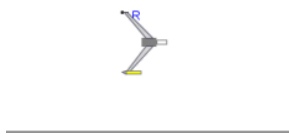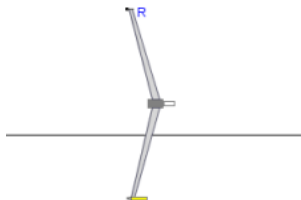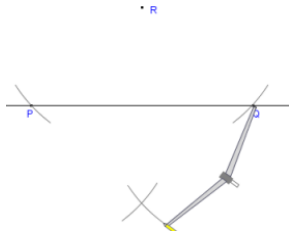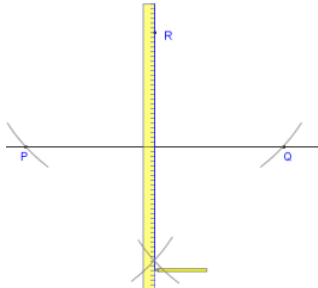|		**After doing this**	**Your work should look like this**
		Start with angle PQR that we will bisect.	
Step 1		Place the compasses' point on the angle's vertex Q.	
Step 2		Adjust the compasses to a medium wide setting. The exact width is not important.	
Step 3		Without changing the compasses' width, draw an arc across each leg of the angle.	
Step 4		The compasses' width can be changed here if desired. Recommended: leave it the same. Place the compasses on the point where one arc crosses a leg and draw an arc in the interior of the angle.	
Step 5		Without changing the compasses setting repeat for the other leg so that the two arcs cross.	
Step 6		Using a straightedge or ruler, draw a line from the vertex to the point where the arcs cross. Done. This is the bisector of the angle ∠PQR.	

Practice: Construct the bisectors of each of these angles:
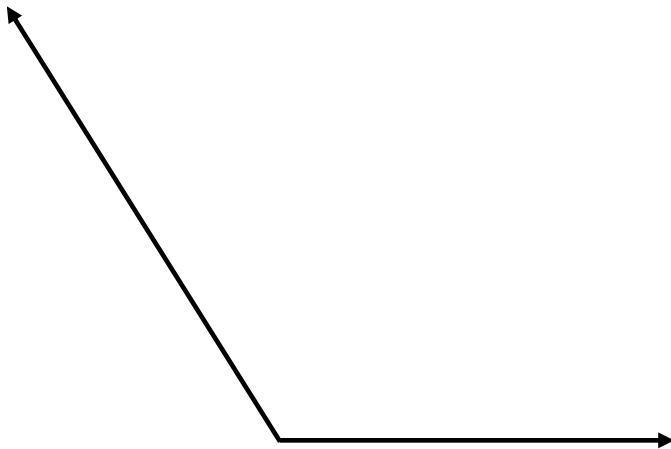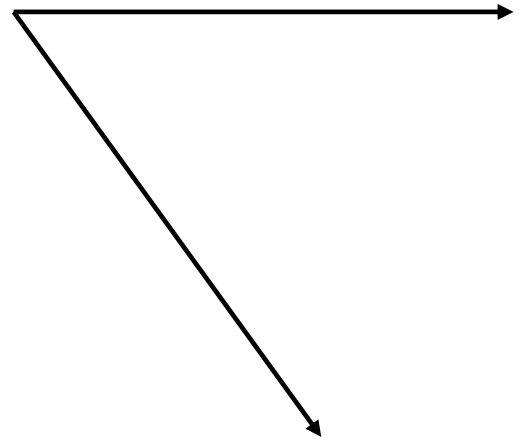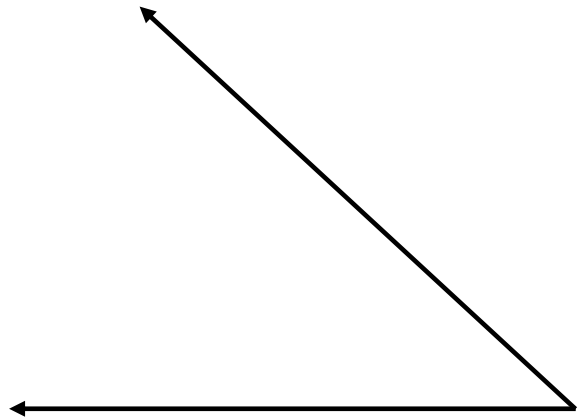
CONSTRUCTION #5: Perpendicular Through A Point Off The Line

Objective: Given a line and a point not on the line, construct the perpendicular to the line through the point.

Procedure:

	Start with a line and point R which is not on that line.	· R
Step 1	Place the compasses on the given external point R.	
Step 2	Set the compasses' width to a approximately 50% more than the distance to the line. The exact width does not matter.	
Step 3	Draw an arc across the line on each side of R, making sure not to adjust the compasses' width in between. Label these points P and Q	
Step 4	At this point, you can adjust the compasses' width. Recommended: leave it as is. From each point P,Q, draw an arc below the line so that the arcs cross.	
Step 5	Place a straightedge between R and the point where the arcs intersect. Draw the perpendicular line from R to the line, or beyond if you wish. Done. This line is perpendicular to the first line and passes through the point R. It also bisects the segment PQ (divides it into two equal parts)	

Practice: Construct the perpendiculars to each of these lines through the given points:

▪ Z

n

▪ Q

m

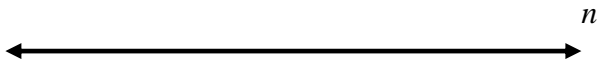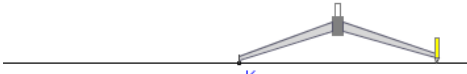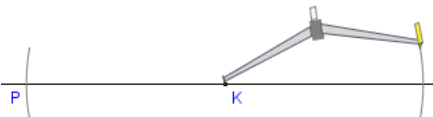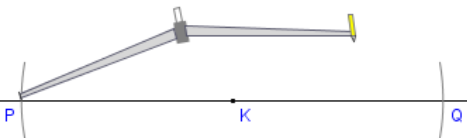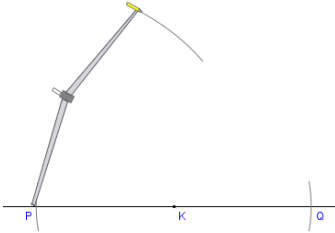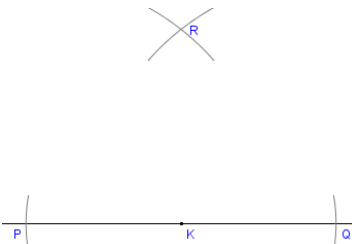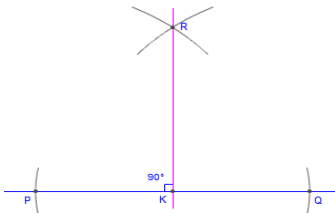▪ P

k

CONSTRUCTION #6: Perpendicular Through A Point On The Line

Objective: Given a line and a point on the line, construct the perpendicular to the line through the point.

Procedure:

	After doing this	**Your work should look like this**
	Start with a line and point K on that line.	
Step 1	Set the compasses' width to a medium setting. The actual width does not matter.	
Step 2	Without changing the compasses' width, mark a short arc on the line at each side of the point K, forming the points P,Q. These two points are thus the same distance from K.	
Step 3	Increase the compasses to almost double the width (again the exact setting is not important).	
Step 4	From P, mark off a short arc above K.	
Step 5	Without changing the compasses' width repeat from the point Q so that the the two arcs cross each other, creating the point R.	
Step 6	Using the straight edge, draw a line from K to where the arcs cross. Done. The line just drawn is a perpendicular to the line at K.	

Practice: Construct the perpendiculars to each of these lines through the given points:

m

P

h

S

g

U