Section 1.8 Constructions – Basic Geometry Constructions

# Objective 1: Make Basic Constructions Using a Straight Edge and a Compass

A **straight edge** is a ruler with no markings on it.

A **compass** is a geometric tool used to draw circles and parts of circles called arcs.

A **construction** is a figure drawn using a straight edge and a compass.

**1. Construct Congruent Segments**

**Given:** segment 

**Construct:** segment  so that 

**Step 1:** Draw a ray with endpoint *C* so that the ray is longer than segment .

**Step 2:** Open the compass to the length of .

**Step 3:** With the same compass setting, put the compass point on point *C*. Draw an arc that intersects the ray. Label the point of intersection *D*. 

**2. Construct Congruent Angles**

**Given:** angle *A*

**Construct:** angle *S* so that 

**Step 1:** Draw a ray with endpoint *S*.

**Step 2:** With the compass point on vertex *A*, draw an arc that intersects the sides of angle *A*. Label the points of intersection *B* and *C*.

**Step 3:** With the same compass setting, put the compass point on point *S*. Draw an arc and label its point of intersection with the ray as *R*.

**Step 4:** Open the compass to the length . Keeping the same compass setting, put the compass point on *R*. Draw an arc to locate point *T* on the existing arc.

**Step 5:** Draw ray . 

**Perpendicular lines** are two lines that intersect to form right angles. The symbol  means “is perpendicular to”.



**A perpendicular bisector** of a segment is a line, segment, ray, or even a plane that is perpendicular to the segment at its midpoint.



**3. Construct the Perpendicular Bisector of a Segment**

**Given:** segment 

**Construct:** line  so that line  is the perpendicular bisector of segment 

**Step 1:** Put the compass point on point *A* and draw a long arc crossing segment . Be sure the opening is greater than .

**Step 2:** With the same compass setting, put the compass point on point *B* and draw another long arc crossing  and intersecting the first arc twice. Label the points where the two arcs intersect as *X* and *Y*.

**Step 3:** Draw . Label the point of intersection of  and as *M*, the midpoint of .  at midpoint M, so is the perpendicular bisector of .

**4. Construct an Angle Bisector**

**Given:** angle *A*

**Construct:** ray , the bisector of angle *A*

**Step 1:** Put the compass point on vertex A. Draw an arc that intersects the sides of angle A. Label the points of intersection B and C.

**Step 2:** Put the compass point on point C and draw an arc further out from vertex A between the sides of angle A. With the same compass setting, draw an arc with the compass point on point B. Be sure the arcs intersect. Label the point where the two arcs intersect as D.

**Step 3:** Draw ray , the bisector of .

a. Draw a segment and label the endpoints *A* and *B*. Construct segment  so that .

b. Draw two segments of different lengths. Label the endpoints of one segment *A* and *B* and the endpoints of the other segment *C* and *D*. Construct segment  so that .

c. Draw an acute angle with vertex labeled K. Construct angle *P* so that .

d. Draw an obtuse angle with vertex labeled M and an acute angle with vertex labeled *N*. Construct angle *B* so that .

e. Draw line . Construct line  so that .