

Constructions:

1.1 Basic Constructions

When we do constructions in geometry, we will use the traditional approach that uses only TWO instruments, a compass and a straightedge. Since a compass measures the radius of a circle, and radii of a circle are congruent, then we can use it to construct congruent segments. A straightedge is used to connect to points. A ruler may not be used to measure distances in constructions.

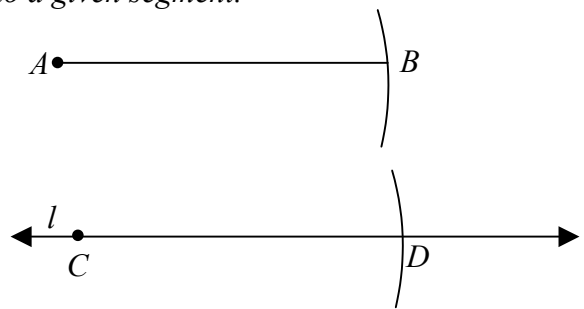
Definition: An arc is any part of a circle.

When we draw using a compass we will be drawing arcs. We rarely need to complete the entire circle. The radii will still be congruent even if a complete circle is not present.

CONSTRUCTION 1: Construct a segment congruent to a given segment.

Copy \overline{AB}

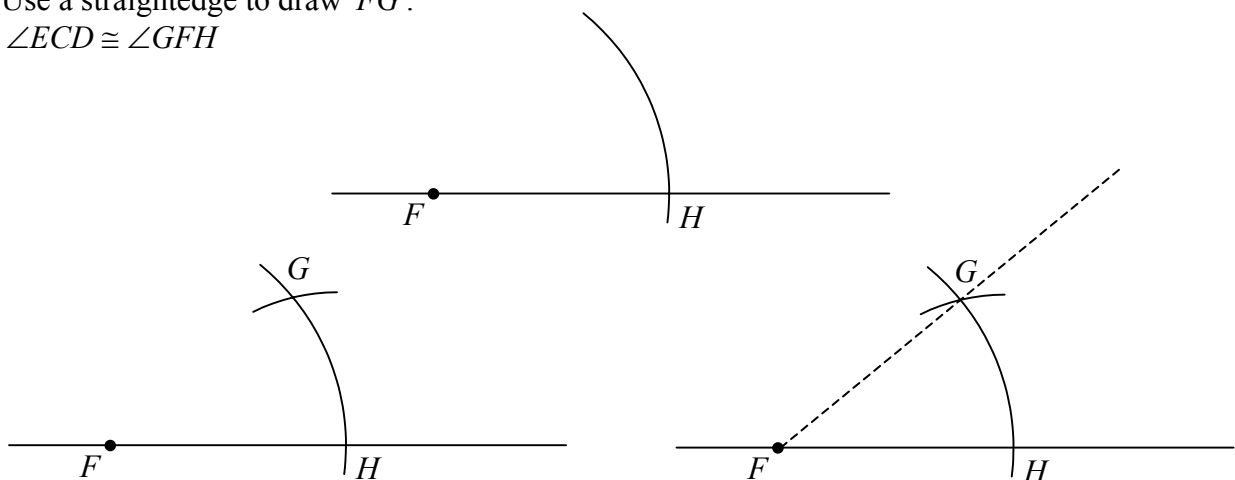
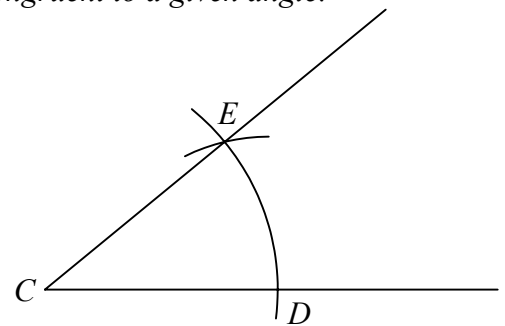
1. Use the straightedge to draw a line and label it l .
2. Choose any point on l and label it C .
3. Set the compass at A and measure the radius \overline{AB} .
4. KEEPING the SAME setting, put the compass at C and draw an arc that intersects line l . Call this point D .
5. $\overline{CD} \cong \overline{AB}$



CONSTRUCTION 2: Construct an angle at a given point congruent to a given angle.

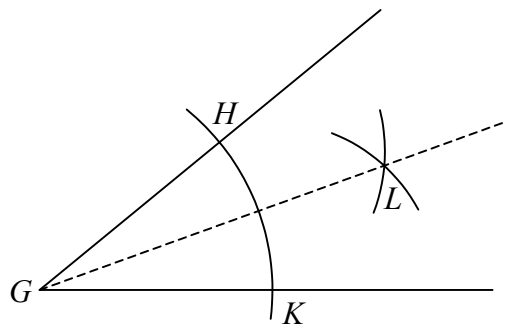
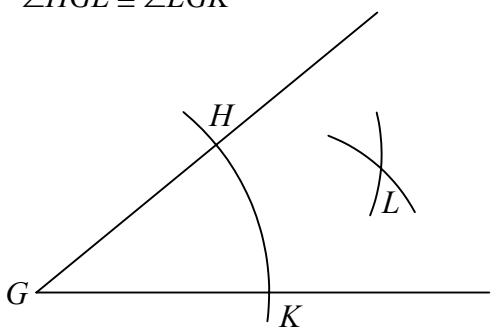
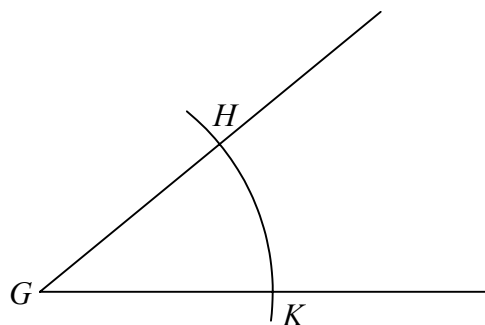
Given $\angle C$, copy $\angle C$ at F .

1. Set compass at C and draw a convenient arc that intersects both sides of $\angle C$. Label the intersections D and E .
2. Keeping the same setting, put the compass at F and draw the arc intersecting line l at H .
3. Set the compass at D and measure \overline{DE} .
4. Set the compass at H and draw an arc intersecting the previous arc. Label this point G .
5. Use a straightedge to draw \overline{FG} .
6. $\angle ECD \cong \angle GFH$



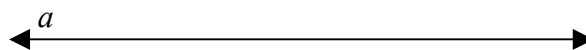
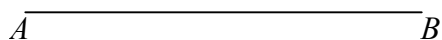
CONSTRUCTION #3: Construct the bisector of an angle.

1. Set the compass at G, draw any convenient arc that intersects the sides of $\angle G$. Label these points H and K.
2. Set the compass at H and draw an arc that is inside $\angle G$.
3. Use the same setting, put the compass at K and draw an arc that intersects the previous arc. Label this L.
4. Use a straightedge to draw \overrightarrow{GL} .
5. $\angle HGL \cong \angle LGK$

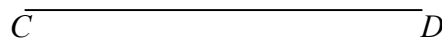


ASSIGNMENT:

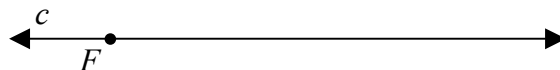
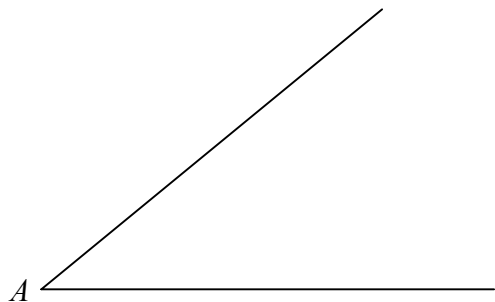
1. Draw a line segment congruent to \overline{AB} on line a .



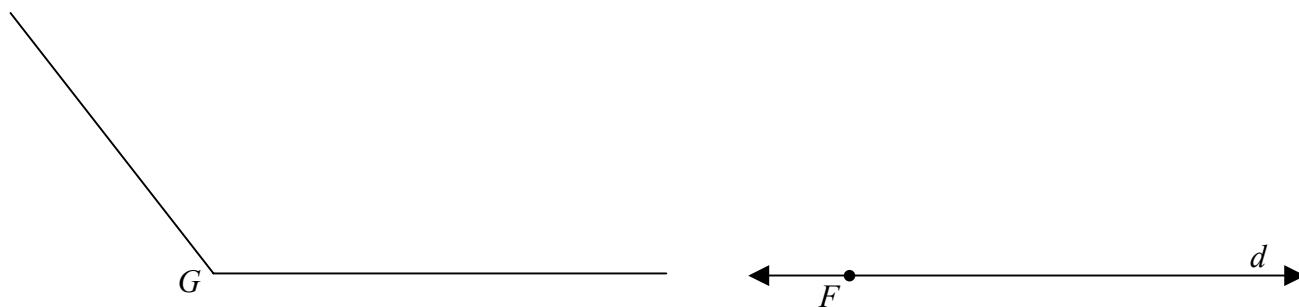
2. Draw a line segment congruent to \overline{CD} on line b .



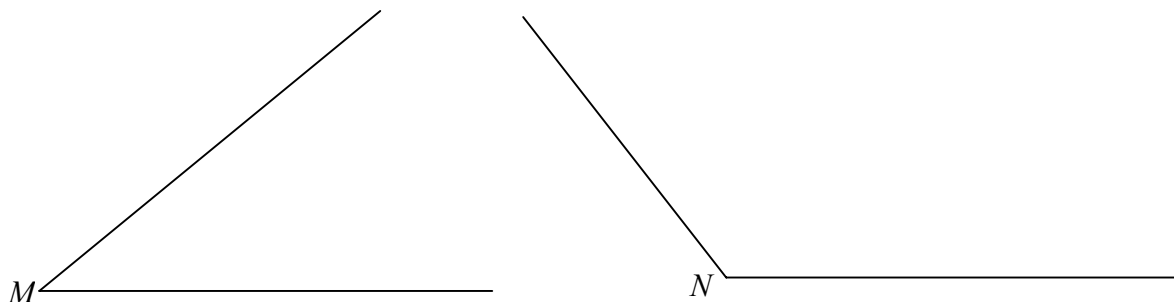
3. Draw an angle congruent to $\angle A$ at F on line c .



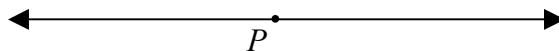
4. Construct an angle at H on line d congruent to $\angle G$.



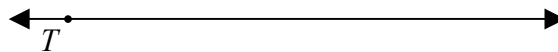
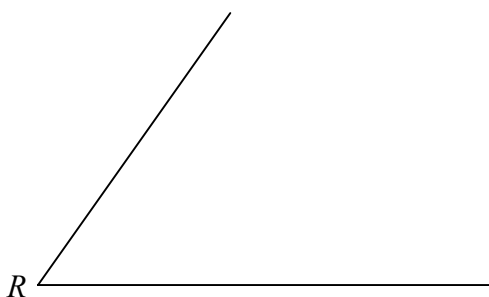
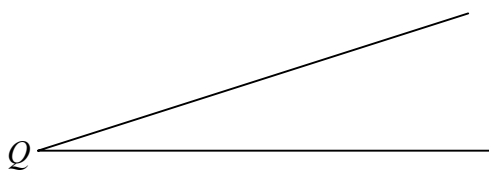
5. Construct the bisector of $\angle M$ and $\angle N$.



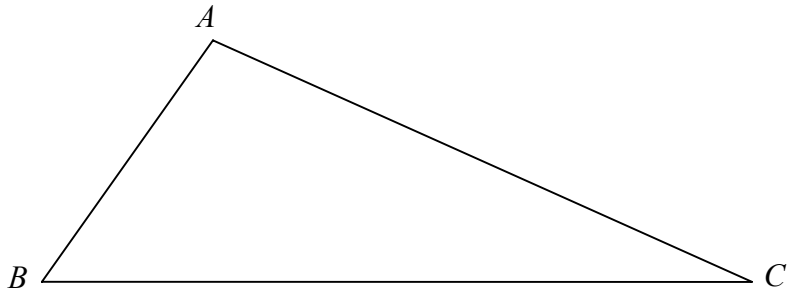
6. Construct the bisector of straight angle P .



7. Construct an angle equal to $\angle Q + \angle R$ at T .



8. Bisect $\angle B$ and extend the ray through \overline{AC} .
- a) Measure the two parts of \overline{AC} . Are they equal?
 - b) In general, if a ray bisects an angle, does it also bisect the opposite side?
 - c) When could this happen?



9. Carefully bisect each of the three angles for $\triangle ABC$ and for $\triangle DEF$. What appears to be true?

