

Measuring Angles // Constructing Angles

Lesson Objective: INBAT use the Angle Add. Post. to find measures of angles; construct $\cong$ segments, $\cong$ angles, and angle bisectors

Using Algebra with the Angle Addition Postulate

Examples:

1. Given that $m\angle LKN = 145^\circ$, find $m\angle LKM$ and $m\angle MKN$.

$$145 = 2x + 10 + 4x - 3$$

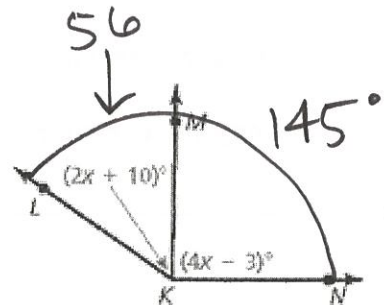
$$145 = 6x + 7$$

$$138 = 6x$$

$$23 = x$$

$$m\angle LKM = 2(23) + 10 = 56$$

$$m\angle MKN = 145 - 56 = 89^\circ$$



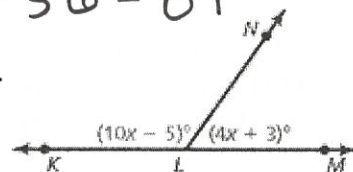
2. Given that $\angle KLM$ is a straight angle, find $m\angle KLN$ and $m\angle NLM$.

$$180 = 10x - 5 + 4x + 3$$

$$x = 13$$

$$m\angle KLN = 125$$

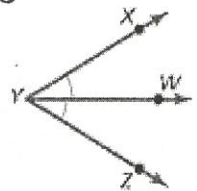
$$m\angle NLM = 55^\circ$$



Bisecting Angles

Angle Bisector: An angle bisector is a ray that divides an angle into 2 $\cong$ angles.

$\overrightarrow{YW}$ bisects $\angle XYZ$, so $\angle XYW \cong \angle WYZ$



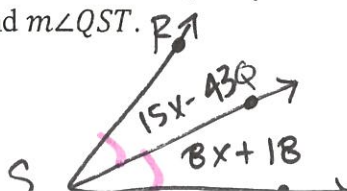
Examples:

3. $\overrightarrow{QS}$ bisects $\angle PQR$. $m\angle PQS = 24^\circ$. Draw a diagram and find $m\angle PQR$.



$$48^\circ$$

4. $\overrightarrow{SQ}$ bisects $\angle RST$. $m\angle RSQ = (15x - 43)^\circ$ and $m\angle QST = (8x + 18)^\circ$. Draw a diagram and find $m\angle RSQ$ and $m\angle QST$.



$$15x - 43 = 8x + 18$$

$$7x = 61$$

$$x \approx 8.7$$

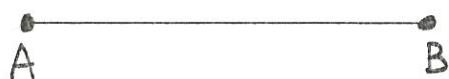
$$m\angle RSQ \approx 15(8.7) - 43 \approx 87.5$$

Constructions

Construction: A construction is a geometric drawing that uses a limited set of tools, usually a compass and a straightedge.

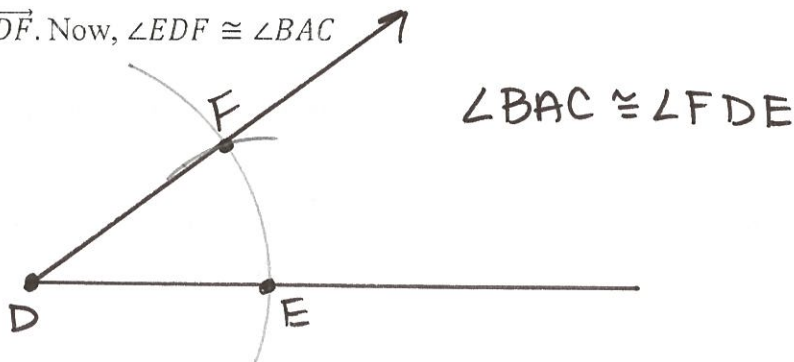
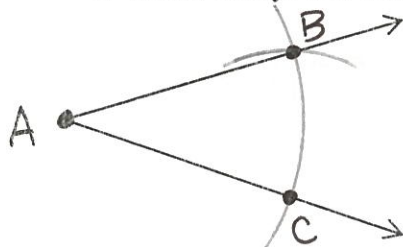
Construction #1: Copying a Segment.

1. **Draw a segment.** Use a straightedge to draw a segment longer than $\overline{AB}$. Name an endpoint C.
2. **Measure the length.** Set your compass to the length of $\overline{AB}$.
3. **Copy the length.** Place the compass at C. Mark point D on the new segment using an arc.



Construction #2: Copying an Angle.

1. **Draw a segment.** Use a straightedge to draw a segment. Label one endpoint D.
2. **Draw arcs.** With anchor on point A, draw an arc that goes through both sides of $\angle A$. Label the intersections B and C. Now, make the same arc with anchor on point D WITHOUT CHANGING THE COMPASS. Label the intersection E.
3. **Measure with width of the angle.** With anchor on B, make an arc through C. Now, make the same arc with anchor on point E WITHOUT CHANGING THE COMPASS. Label the intersection with the other arc F.
4. **Draw a ray.** Use a straightedge to draw $\overrightarrow{DF}$. Now, $\angle EDF \cong \angle BAC$



Construction #3: Bisecting an Angle

1. **Draw an arc.** With anchor on point A, draw an arc that goes through both sides of $\angle A$. Label the intersections B and C.
2. **Draw arcs.** With anchor on C, draw an arc *inside* the angle. WITHOUT CHANGING THE COMPASS, do the same with point B. The arcs should intersect. If not, repeat this step opening the compass more. Label the intersection G.
3. **Draw a ray.** Use a straightedge to draw $\overrightarrow{AG}$. Now, $\overrightarrow{AG}$ bisects $\angle CAB$, and $\angle CAG \cong \angle GAB$

