Name KEY Date _____ Period _____

Measuring Angles // Constructing Angles

Lesson Objective:

Using Algebra with the Angle Addition Postulate

Examples:

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

$m\angle LKN = m\angle LKM + m\angle MKN$

$145° = (2x+10)+(4x-3)$

$145 = 6x+7$

$138 = 6x$

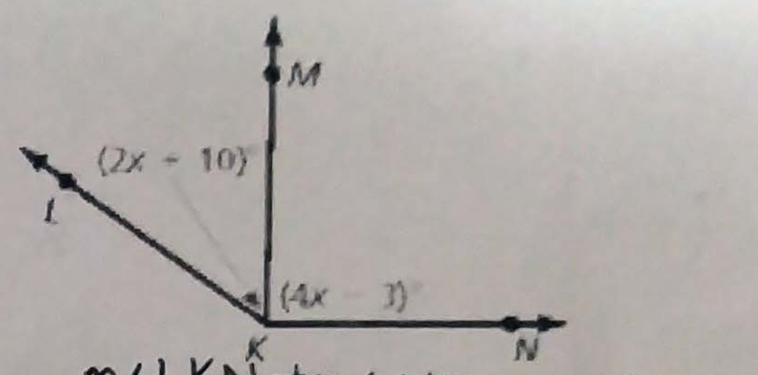
$23 = x$

$m\angle LKM = 2x+10$

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

$m\angle LKM = 46+10$

$\boxed{m\angle LKM = 56°}$



$m\angle LKN = m\angle LKM + m\angle MKN$

$145 = 56 + m\angle MKN$

$\boxed{89° = m\angle MKN}$

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

$m\angle KLM = m\angle KLN + m\angle NLM$

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

$180 = 14x-2$

$182 = 14x$

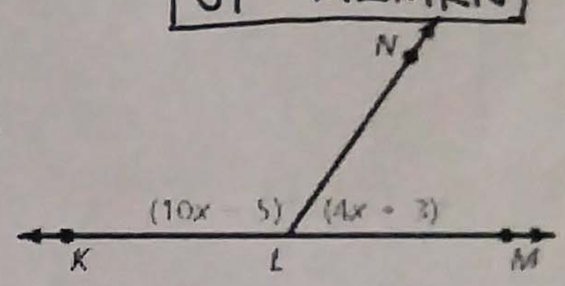
$13 = x$

$m\angle KLN = 10x-5$

$m\angle KLN = 10(13)-5$

$m\angle KLN = 130-5$

$\boxed{m\angle KLN = 125°}$



$m\angle KLM = m\angle KLN + m\angle NLM$

$180 = 125 + m\angle NLM$

$\boxed{55° = m\angle NLM}$

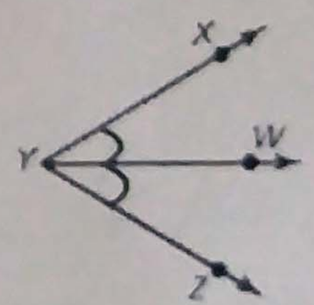
Bisecting Angles

Angle Bisector: An angle bisector is a RAY that divides an angle into TWO CONGRUENT ($\cong$) ANGLES

$\overrightarrow{YW}$ BISECTS $\angle XYZ$

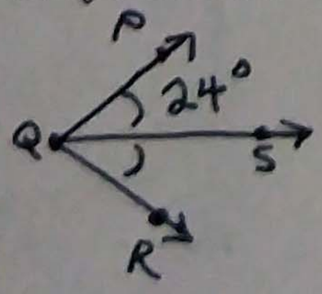
$\angle XYW \cong \angle WYZ$

$m\angle XYW = m\angle WYZ$



Examples:

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

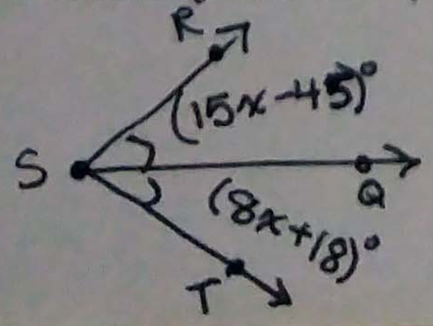


$m\angle PQR = m\angle PQS + m\angle SQR$

$m\angle PQR = 24 + 24$

$\boxed{m\angle PQR = 48°}$

* 4. $\overrightarrow{SQ}$ bisects $\angle RST$. $m\angle RSQ = (15x - 45)°$ and $m\angle QST = (8x + 18)°$. Draw a diagram and find $m\angle RSQ$ and $m\angle QST$.



$m\angle RSQ = m\angle QST$

$15x-45 = 8x+18$

$7x = 63$

$x = 9$

$m\angle RSQ = m\angle QST = 8x+18$

$= 8(9)+18$

$= 72+18$

$\boxed{= 90°}$

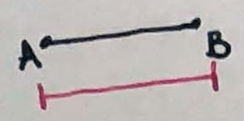
Constructions

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

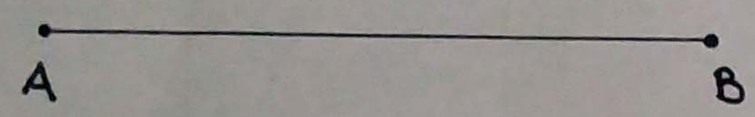
Construction #1: Copying a Segment.

1. **Draw a segment.** Use a straightedge to draw a segment longer than $\overline{AB}$.

2. **Measure the length.** Set your compass to the length of $\overline{AB}$.



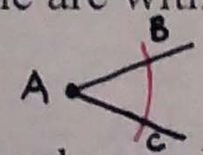
3. **Copy the length**. Place the compass at C. Mark point D on the new segment using an arc.

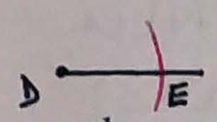


Construction #2: Copying an Angle.

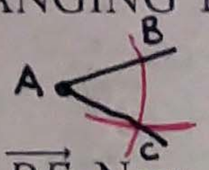
1. **Draw a segment**. Use a straightedge to draw a segment. Label one endpoint D.

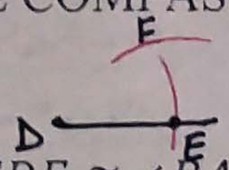
2. **Draw arcs.** With anchor on point A, draw an arc that goes through both sides of $\angle A$. Label the intersections B and C. Now, make the same arc with anchor on point D WITHOUT CHANGING THE COMPASS. Label the intersection E.



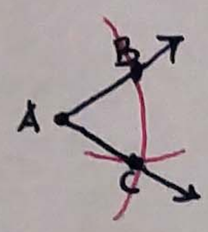


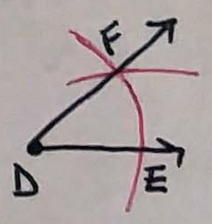
3. **Measure with width of the angle.** With anchor on B, make an arc through C. Now, make the same arc with anchor on point E WITHOUT CHANGING THE COMPASS. Label the intersection with the other arc F.

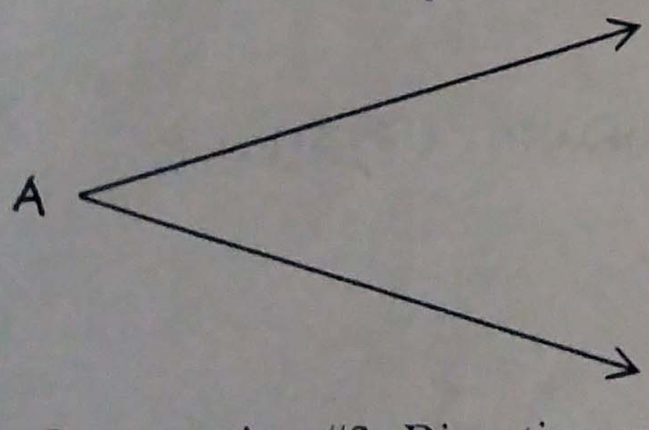




4. **Draw a ray.** Use a straightedge to draw $\overrightarrow{DF}$. Now, $\angle EDF \cong \angle BAC$

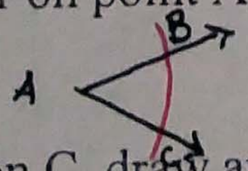




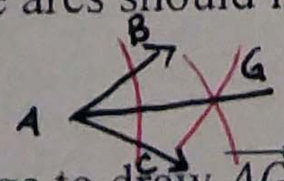


Construction #3: Bisecting an Angle

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 $\angle CAG \cong \angle GAB$