Date: 10/6/20

Lesson 1.5 Measuring and Constructing Angles

Learning Intent (Target): *Today I will* be able to measure and classify angles.

Success Criteria: *I'll know I'll have it when* I'll be able to use the angle addition postulate to determine angle measures.

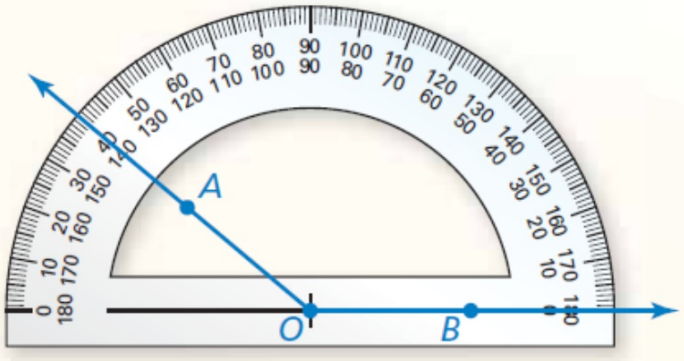
Accountable Team Task: *Therefore, I can* practice using postulates from interactive flip charts and apply it to problem solving.

Postulate

Postulate 1.3 Protractor Postulate

Consider $\overleftrightarrow{OB}$ and a point A on one side of $\overleftrightarrow{OB}$. The rays of the form $\overrightarrow{OA}$ can be matched one to one with the real numbers from 0 to 180.

The **measure** of $\angle AOB$, which can be written as $m\angle AOB$, is equal to the absolute value of the difference between the real numbers matched with $\overrightarrow{OA}$ and $\overrightarrow{OB}$ on a protractor.



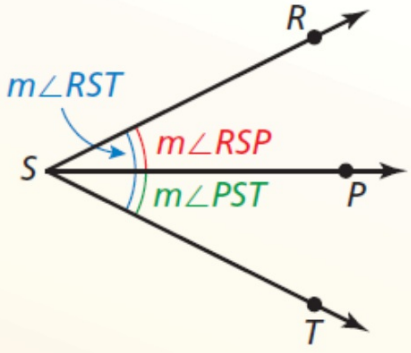
Postulate

Postulate 1.4 Angle Addition Postulate

Words If P is in the interior of $\angle RST$, then the measure of $\angle RST$ is equal to the sum of the measures of $\angle RSP$ and $\angle PST$.

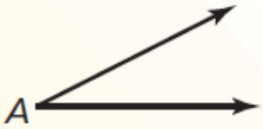
Symbols If P is in the interior of $\angle RST$, then

$$m\angle RST = m\angle RSP + m\angle PST.$$



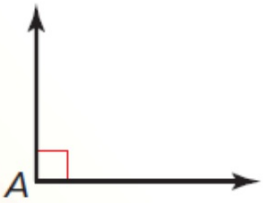
Core Concept

Types of Angles



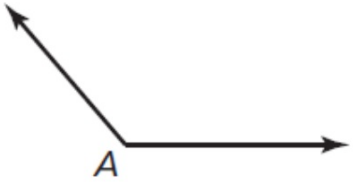
acute angle

Measures greater than 0° and less than 90°



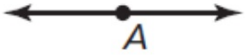
right angle

Measures 90°



obtuse angle

Measures greater than 90° and less than 180°

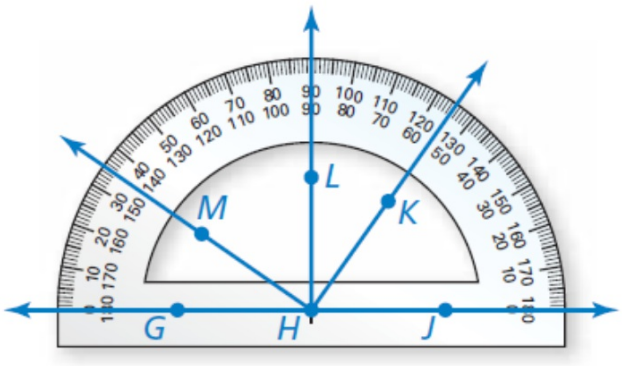


straight angle

Measures 180°

Find the measure of each angle.
Then classify each angle.

a. $\angle GHK$

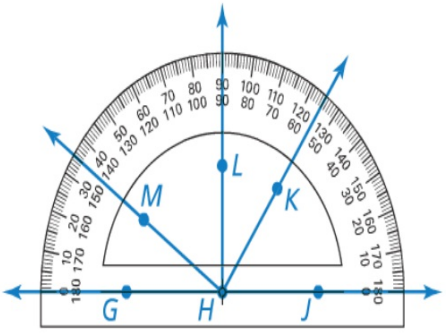


b. $\angle JHL$

c. $\angle LHK$

Find the measure of each angle.
Then classify each angle.

a. $\angle GHK$ **b.** $\angle JHL$ **c.** $\angle LHK$



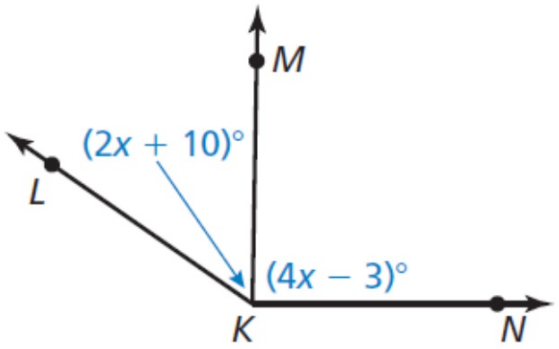
SOLUTION

a. $\overrightarrow{HG}$ lines up with 0° on the outer scale of the protractor. $\overrightarrow{HK}$ passes through 125° on the outer scale. So, $m\angle GHK = 125°$. It is an *obtuse* angle.

b. $\overrightarrow{HJ}$ lines up with 0° on the inner scale of the protractor. $\overrightarrow{HL}$ passes through 90°. So, $m\angle JHL = 90°$. It is a *right* angle.

c. $\overrightarrow{HL}$ passes through 90°. $\overrightarrow{HK}$ passes through 55° on the inner scale. So, $m\angle LHK = |90 - 55| = 35°$. It is an *acute* angle.

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



SOLUTION

Step 1 Write and solve an equation to find the value of x.

$m\angle LKN = m\angle LKM + m\angle MKN$	Angle Addition Postulate
$145° = (2x + 10)° + (4x - 3)°$	Substitute angle measures.
$145 = 6x + 7$	Combine like terms.
$138 = 6x$	Subtract 7 from each side.
$23 = x$	Divide each side by 6.

Step 2 Evaluate the given expressions when $x = 23$.

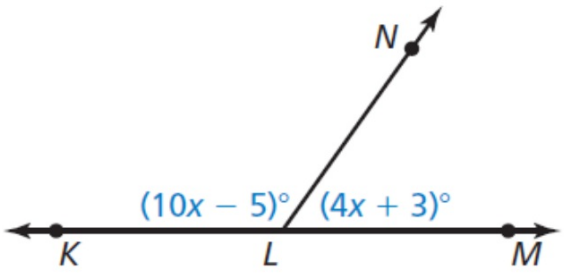
$$m\angle LKM = (2x + 10)° = (2 \cdot 23 + 10)° = 56°$$

$$m\angle MKN = (4x - 3)° = (4 \cdot 23 - 3)° = 89°$$

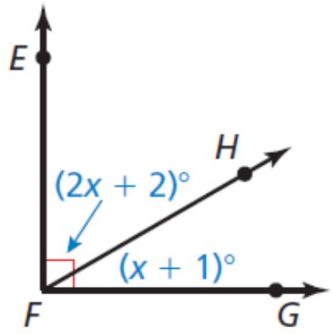
▶ So, $m\angle LKM = 56°$, and $m\angle MKN = 89°$.

Find the indicated angle measures.

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



9. Given that $\angle EFG$ is a right angle, find $m\angle EFH$ and $m\angle HFG$.



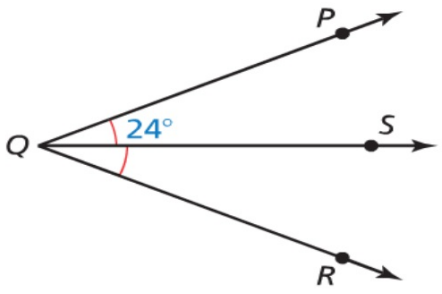
8. Given that $\angle KLM$ is a straight angle, find $m\angle KLN$ and $m\angle NLM$. 125°, 55°

9. Given that $\angle EFG$ is a right angle, find $m\angle EFH$ and $m\angle HFG$. 60°, 30°

$\overrightarrow{QS}$ bisects $\angle PQR$, and $m\angle PQS = 24°$. Find $m\angle PQR$.

SOLUTION

Step 1 Draw a diagram.

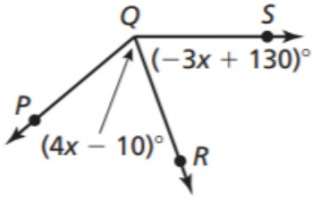


Step 2 Because $\overrightarrow{QS}$ bisects $\angle PQR$, $m\angle PQS = m\angle RQS$. So, $m\angle RQS = 24°$. Use the Angle Addition Postulate to find $m\angle PQR$.

$$m\angle PQR = m\angle PQS + m\angle RQS \quad \text{Angle Addition Postulate}$$
$$= 24° + 24° \quad \text{Substitute angle measures.}$$
$$= 48° \quad \text{Add.}$$

▶ So, $m\angle PQR = 48°$.

9. $\overline{QR}$ bisects $\angle PQS$. Find $m\angle PQR$ and $m\angle PQS$.



-3x +130 = 4x -10
+3x +3x

130 = 7x -10
+10 +10

140= 7x
7 7

20 = x

Next substitute in 20 for x for each angle

4(20)-10 = 80-10 = 70 for angle PQR

-3(20) + 130 = -60 +130 = 70 for angle SQR

the entire angle PQS = 70 + 70 = 140