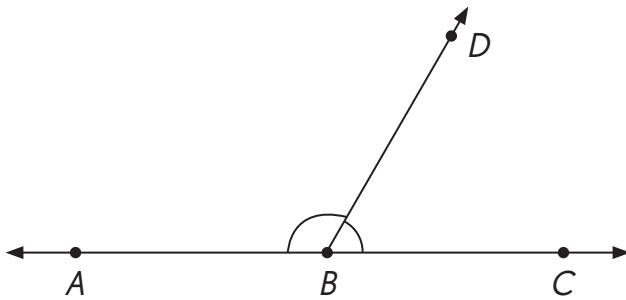


Chapter 12 Angles

Practice 1 Angles on a Line

In each figure, \overleftrightarrow{AC} is a line. Use a protractor to find the unknown angle measures.

1.



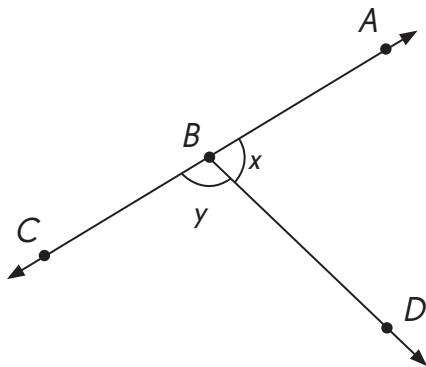
$$m\angle DBC = \underline{\hspace{2cm}}$$

$$m\angle DBA = \underline{\hspace{2cm}}$$

$$m\angle DBC + m\angle DBA = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

2.



$$m\angle x = \underline{\hspace{2cm}}$$

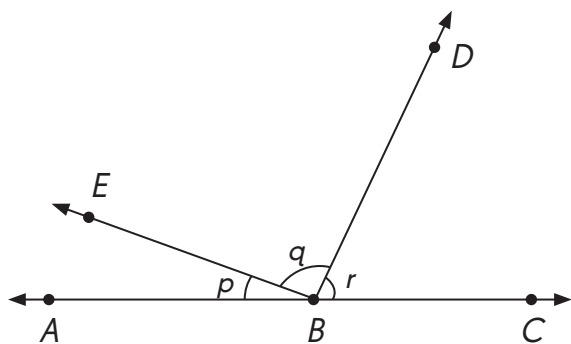
$$m\angle y = \underline{\hspace{2cm}}$$

$$m\angle x + m\angle y = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

\overleftrightarrow{AC} is a line. Use a protractor to find the unknown angle measures.

3.



$$m\angle p = \underline{\hspace{2cm}}$$

$$m\angle q = \underline{\hspace{2cm}}$$

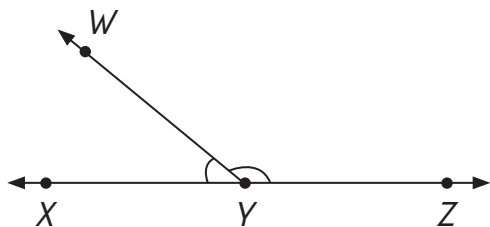
$$m\angle r = \underline{\hspace{2cm}}$$

$$m\angle p + m\angle q + m\angle r = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

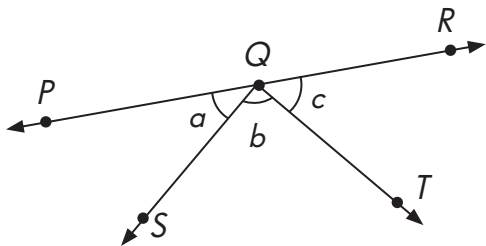
$$= \underline{\hspace{2cm}}$$

Name the angles on each line.

4. \overleftrightarrow{XZ} is a line.



5. \overleftrightarrow{PR} is a line.

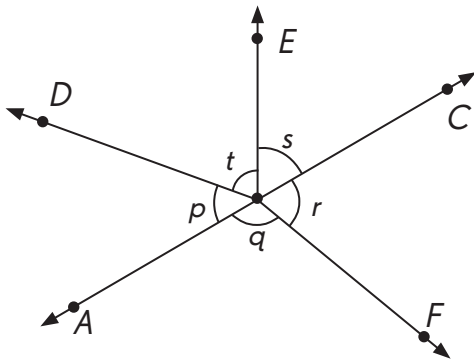


Name: _____

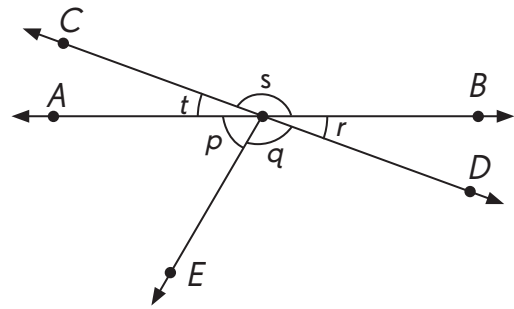
Date: _____

Name the angles on each line.

6. \overleftrightarrow{AC} is a line.

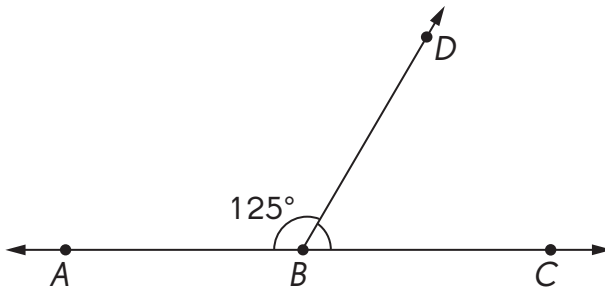


7. \overleftrightarrow{AB} and \overleftrightarrow{CD} are lines.



Find the unknown angle measures.

8. \overleftrightarrow{AC} is a line. Find the measure of $\angle DBC$.

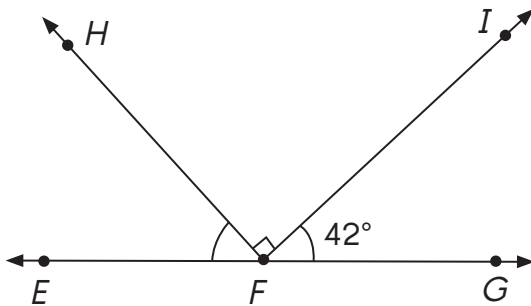


$$m\angle DBC + 125^\circ = 180^\circ$$

$$m\angle DBC = 180^\circ - \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

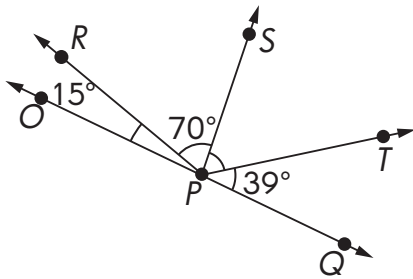
9. \overleftrightarrow{EG} is a line. Find the measure of $\angle HFE$.



$$m\angle HFE = \underline{\hspace{2cm}}$$

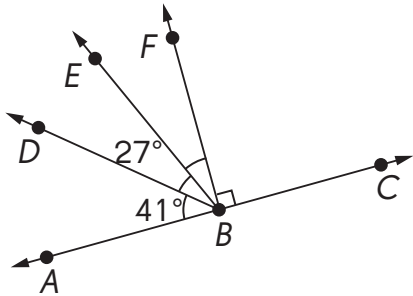
Find the unknown angle measures.

10. \overleftrightarrow{OQ} is a line. Find the measure of $\angle SPT$.



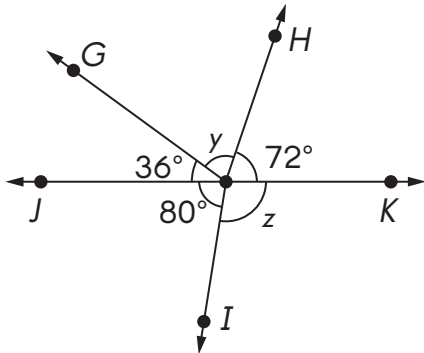
$m\angle SPT = \underline{\hspace{2cm}}$

11. \overleftrightarrow{AC} is a line. Find the measure of $\angle EBF$.



$m\angle EBF = \underline{\hspace{2cm}}$

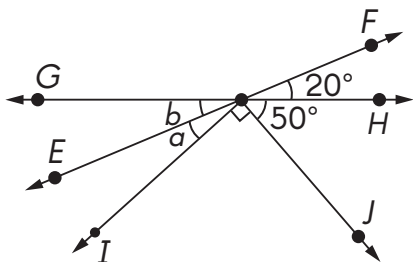
12. \overleftrightarrow{JK} is a line. Find the measures of $\angle y$ and $\angle z$.



$m\angle y = \underline{\hspace{2cm}}$

$m\angle z = \underline{\hspace{2cm}}$

13. \overleftrightarrow{EF} and \overleftrightarrow{GH} are lines. Find the measures of $\angle a$ and $\angle b$.



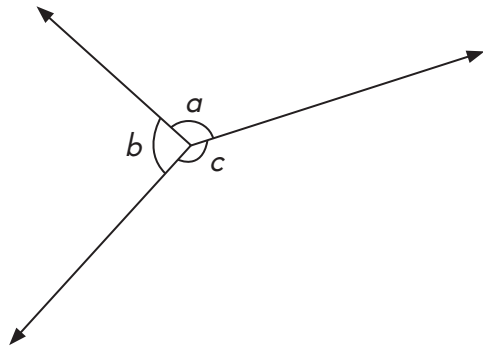
$m\angle a = \underline{\hspace{2cm}}$

$m\angle b = \underline{\hspace{2cm}}$

Practice 2 Angles at a Point

In each figure, the rays meet at a point. Use a protractor to find unknown angle measures.

1.



$$m\angle a = \underline{\hspace{2cm}}$$

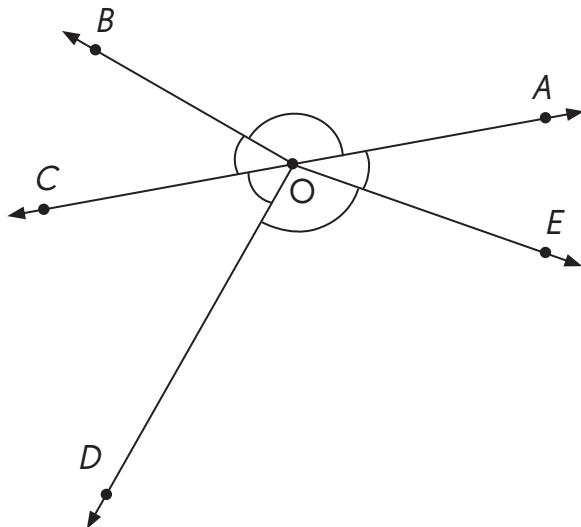
$$m\angle b = \underline{\hspace{2cm}}$$

$$m\angle c = \underline{\hspace{2cm}}$$

$$m\angle a + m\angle b + m\angle c = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

2.



$$m\angle AOB = \underline{\hspace{2cm}}$$

$$m\angle BOC = \underline{\hspace{2cm}}$$

$$m\angle COD = \underline{\hspace{2cm}}$$

$$m\angle DOE = \underline{\hspace{2cm}}$$

$$m\angle AOE = \underline{\hspace{2cm}}$$

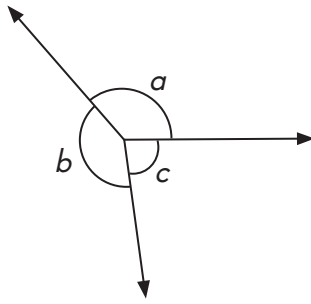
$$m\angle AOB + m\angle BOC + m\angle COD + m\angle DOE + m\angle AOE$$

$$= \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

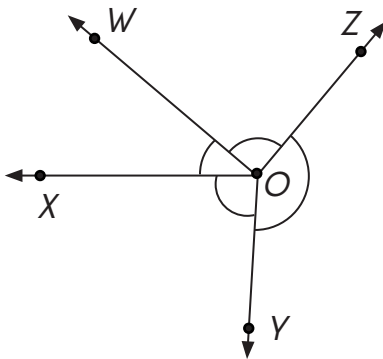
$$= \underline{\hspace{2cm}}$$

Name the angles at a point.

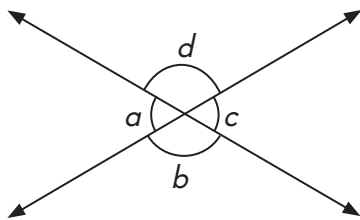
3.



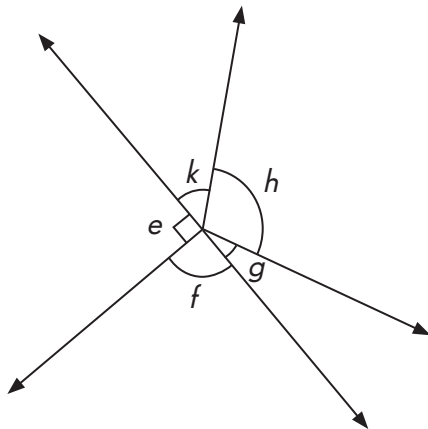
4.



5.



6.

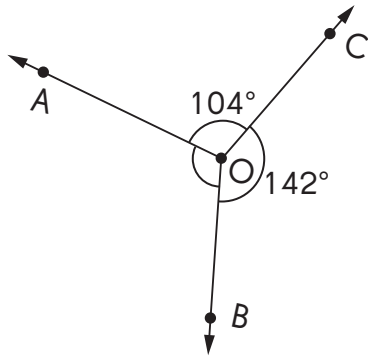


Name: _____

Date: _____

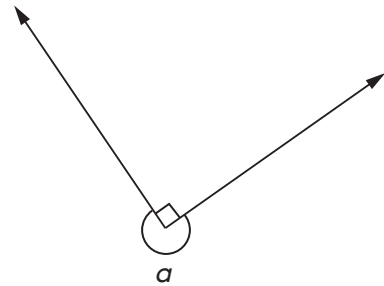
Find the unknown angle measures.

7. Find the measure of $\angle AOB$.



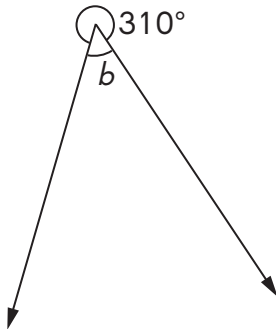
$m\angle AOB =$ _____

8. Find the measure of $\angle a$.



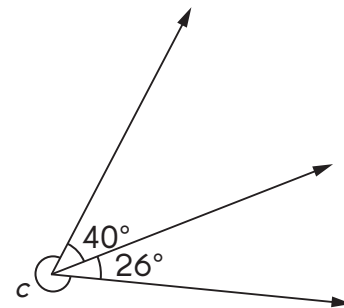
$m\angle a =$ _____

9. Find the measure of $\angle b$.



$m\angle b =$ _____

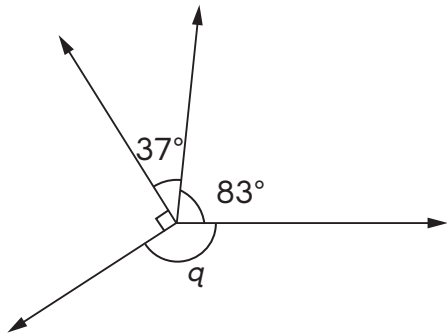
10. Find the measure of $\angle c$.



$m\angle c =$ _____

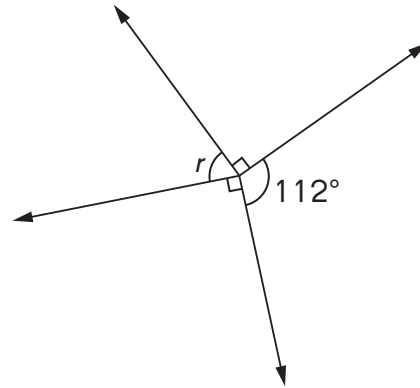
Find the unknown angle measures.

11. Find the measure of $\angle q$.



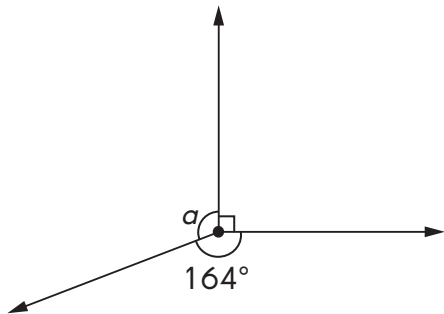
$m\angle q = \underline{\hspace{2cm}}$

12. Find the measure of $\angle r$.



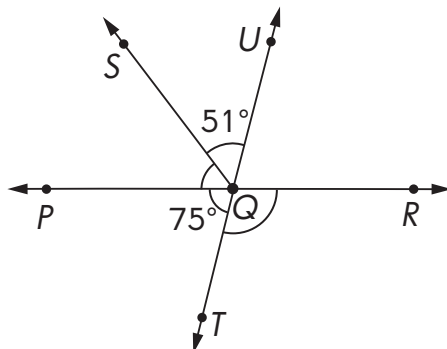
$m\angle r = \underline{\hspace{2cm}}$

13. Find the measure of $\angle a$.



$m\angle a = \underline{\hspace{2cm}}$

14. \overleftrightarrow{PR} and \overleftrightarrow{TU} meet at Q . Find the measures of $\angle PQS$ and $\angle TQR$.



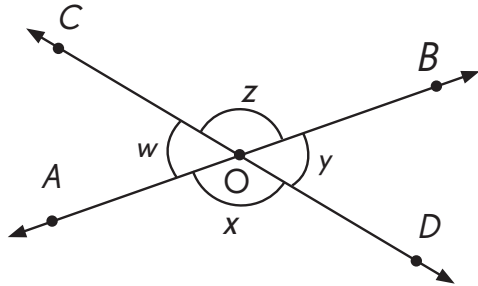
$m\angle PQS = \underline{\hspace{2cm}}$

$m\angle TQR = \underline{\hspace{2cm}}$

Practice 3 Vertical Angles

Complete.

1. \overleftrightarrow{AB} and \overleftrightarrow{CD} meet at O . Use a protractor to find unknown angle measures.



$m\angle w =$ _____

$m\angle x =$ _____

$m\angle y =$ _____

$m\angle z =$ _____

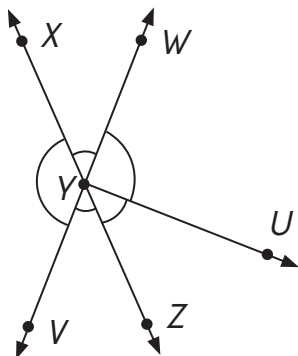
$m\angle$ _____ $= m\angle$ _____

\angle _____ and \angle _____ are vertical angles.

$m\angle$ _____ $= m\angle$ _____

\angle _____ and \angle _____ are vertical angles.

2. \overleftrightarrow{XZ} and \overleftrightarrow{VW} meet at Y . Use a protractor to find unknown angle measures.



$m\angle XYW =$ _____

$m\angle WYU =$ _____

$m\angle UYZ =$ _____

$m\angle ZYV =$ _____

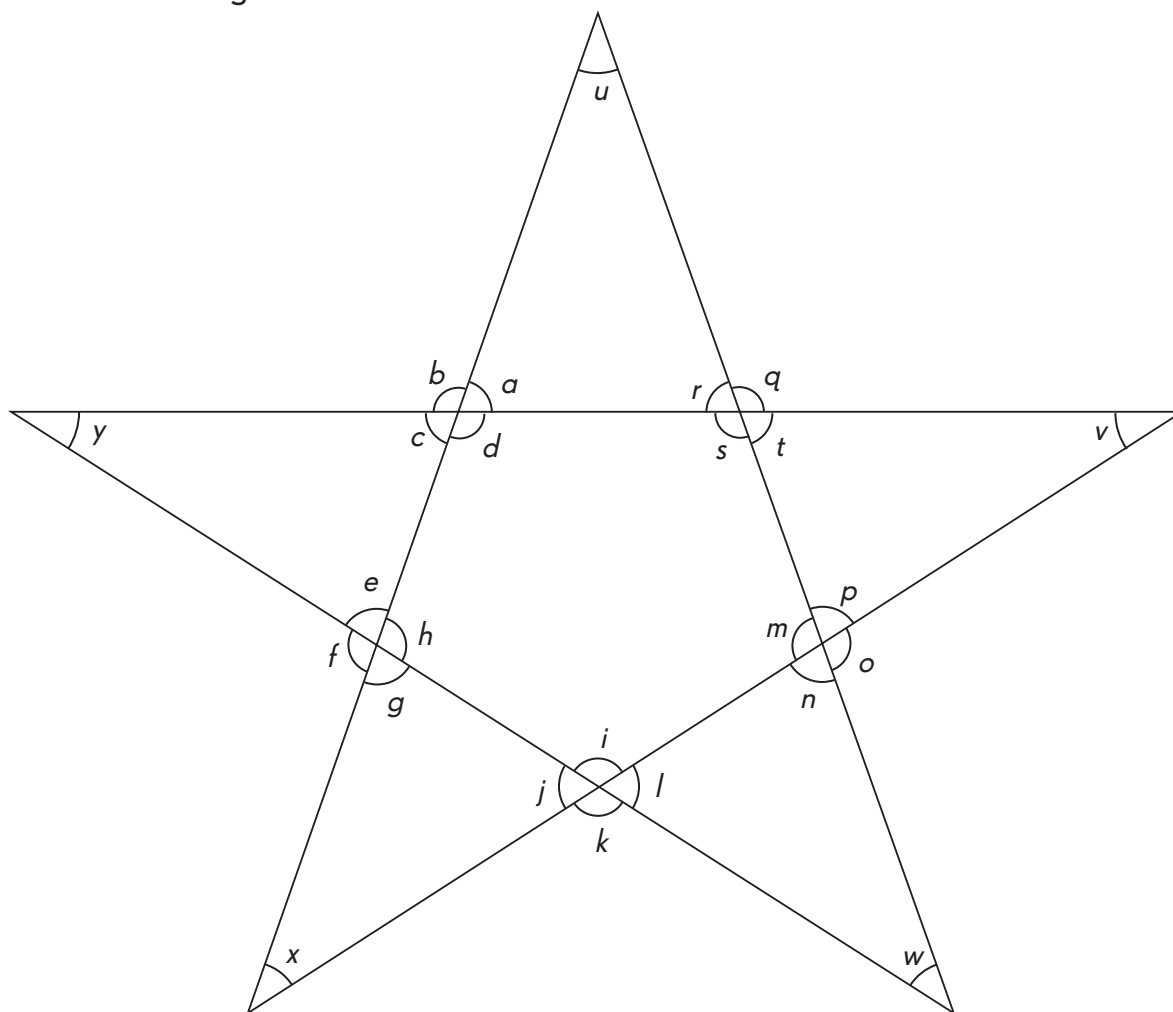
$m\angle VYX =$ _____

\angle _____ and \angle _____ are vertical angles.

\angle _____ and \angle _____ are vertical angles.

Complete.

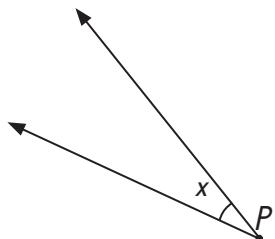
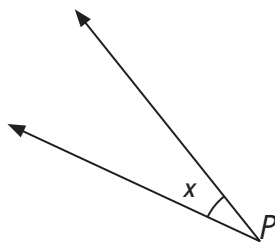
3. Look at the star and its marked angles. In the table below, write three sets of:
- a. angles on a line,
 - b. angles at a point,
 - c. vertical angles.



Angles on a Line	Angles at a Point	Vertical Angles
$\angle b$ and $\angle c$	$\angle a, \angle b, \angle c,$ and $\angle d$	$\angle a$ and $\angle c$

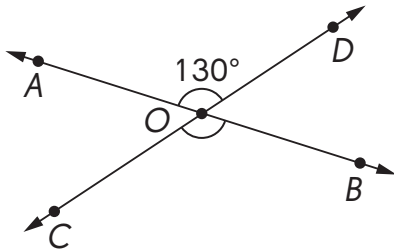
Draw.

4. Draw rays at P to form
- a. an angle whose measure forms a sum of 180° with the measure of $\angle x$,
 - b. an angle whose measure is equal to the measure of $\angle x$.
- (Do not use a protractor to draw the angles.)

a.**b.**

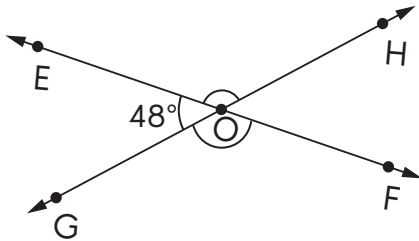
Find the unknown angle measures.

5. \overleftrightarrow{AB} and \overleftrightarrow{CD} meet at O . Find the measure of $\angle COB$.



$m\angle COB = \underline{\hspace{2cm}}$

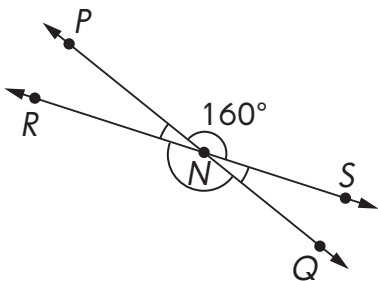
6. \overleftrightarrow{EF} and \overleftrightarrow{GH} meet at O . Find the measures of $\angle GOF$ and $\angle EOH$.



$m\angle GOF = \underline{\hspace{2cm}}$

$m\angle EOH = \underline{\hspace{2cm}}$

7. \overleftrightarrow{RS} and \overleftrightarrow{PQ} meet at N . Find the measures of $\angle PNR$, $\angle RNQ$, and $\angle QNS$.



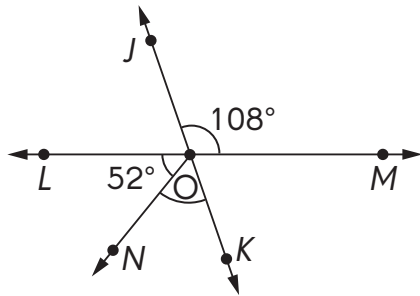
$m\angle PNR = \underline{\hspace{2cm}}$

$m\angle RNQ = \underline{\hspace{2cm}}$

$m\angle QNS = \underline{\hspace{2cm}}$

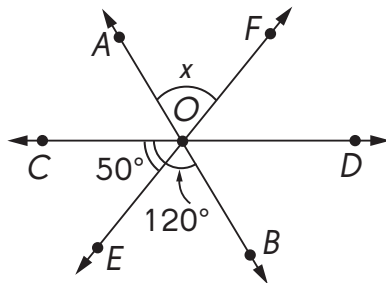
Find the unknown angle measures.

8. \overleftrightarrow{JK} and \overleftrightarrow{LM} meet at O . Find the measure of $\angle NOK$.



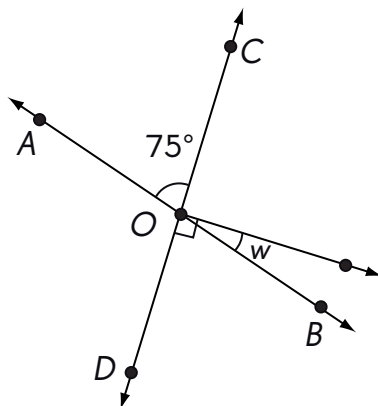
$m\angle NOK =$ _____

9. \overleftrightarrow{AB} , \overleftrightarrow{CD} , and \overleftrightarrow{EF} meet at O . Find the measure of $\angle x$.



$m\angle x =$ _____

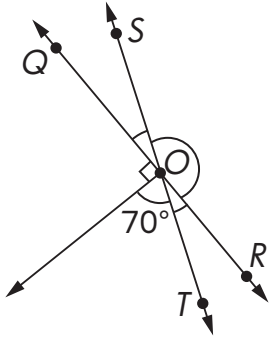
10. \overleftrightarrow{AB} and \overleftrightarrow{CD} meet at O . Find the measure of $\angle w$.



$m\angle w =$ _____

Find the unknown angle measures.

11. \overleftrightarrow{QR} and \overleftrightarrow{ST} meet at O . Find the measures of $\angle QOS$, $\angle TOR$, and $\angle SOR$.

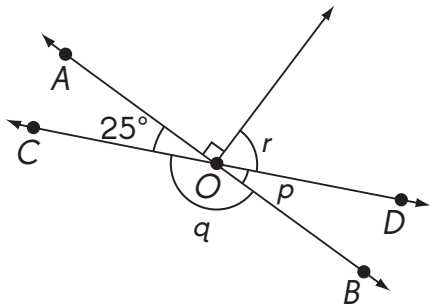


$$m\angle QOS = \underline{\hspace{2cm}}$$

$$m\angle TOR = \underline{\hspace{2cm}}$$

$$m\angle SOR = \underline{\hspace{2cm}}$$

12. \overleftrightarrow{AB} and \overleftrightarrow{CD} meet at O . Find the measures of $\angle p$, $\angle q$, and $\angle r$.

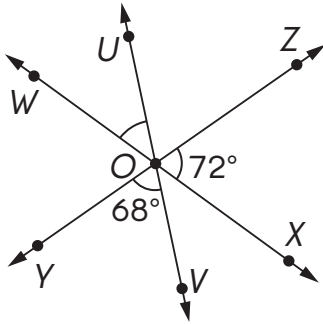


$$m\angle p = \underline{\hspace{2cm}}$$

$$m\angle q = \underline{\hspace{2cm}}$$

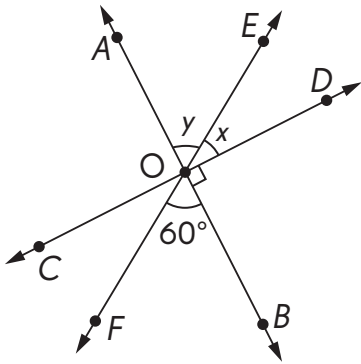
$$m\angle r = \underline{\hspace{2cm}}$$

13. \overleftrightarrow{UV} , \overleftrightarrow{WX} , and \overleftrightarrow{YZ} meet at O . Find the measure of $\angle UOW$.



$m\angle UOW =$ _____

14. \overleftrightarrow{AB} , \overleftrightarrow{CD} , and \overleftrightarrow{EF} meet at O . Find the measures of $\angle x$ and $\angle y$.

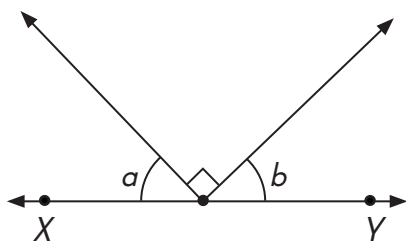


$m\angle x =$ _____

$m\angle y =$ _____

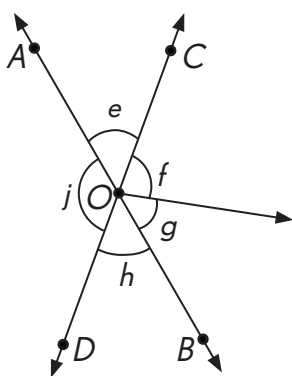
**Check the box for each correct statement.
Then explain your answer.**

1. \overleftrightarrow{XY} is a line.



- $m\angle a$ is more than 90° .
- If $m\angle a = m\angle b$,
then $m\angle a = 45^\circ$.

2. \overleftrightarrow{AB} and \overleftrightarrow{CD} meet at O .



- $m\angle e = m\angle h$
- $m\angle f + m\angle g = m\angle j$
- $m\angle e = m\angle g$

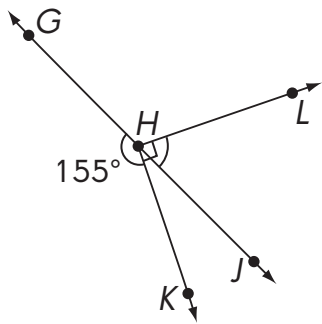


Put On Your Thinking Cap!

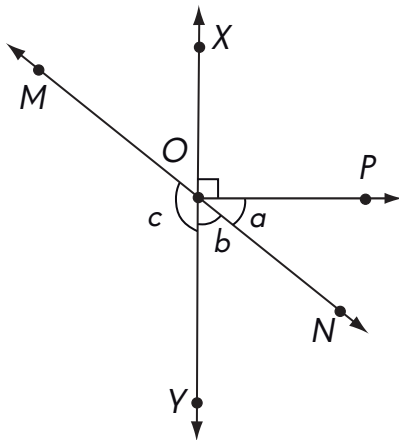
Challenging Practice

Find the unknown angle measures. Explain.

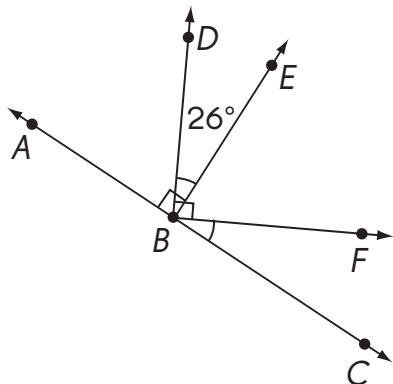
1. \overleftrightarrow{GJ} is a line. $\angle LHK$ is a right angle. Find the measure of $\angle LHJ$.



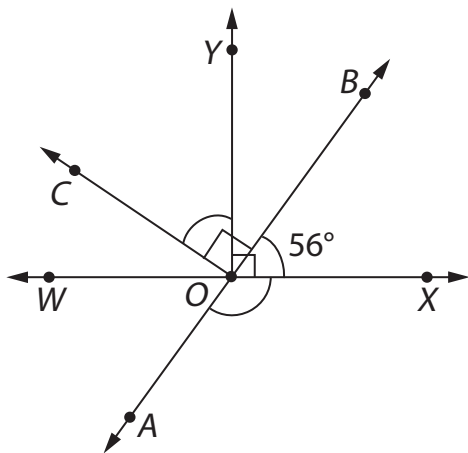
2. \overleftrightarrow{MN} and \overleftrightarrow{XY} meet at O and $m\angle a = m\angle b$. Find the measure of $\angle c$.

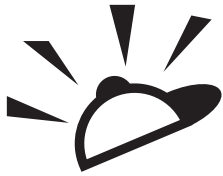


3. \overleftrightarrow{AC} is a line. $\angle ABE$ and $\angle DBF$ are right angles.
Find the measure of $\angle FBC$.



4. \overleftrightarrow{AB} and \overleftrightarrow{WX} meet at O . $\angle COB$ and $\angle YOX$ are right angles.
Find the measures of $\angle AOX$ and $\angle COY$.





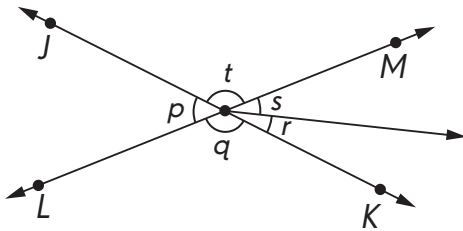
Put On Your Thinking Cap!



Problem Solving

Solve.

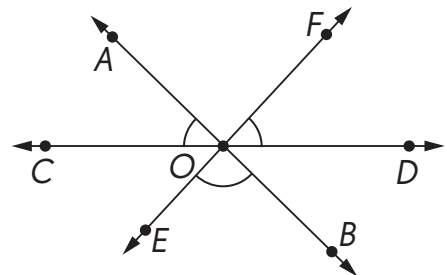
1. \overleftrightarrow{JK} and \overleftrightarrow{LM} are lines.
Check the box for each correct statement.



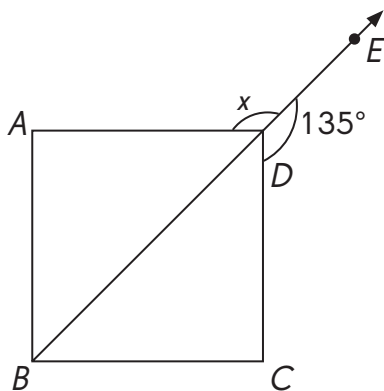
- a. $m\angle p = m\angle r + m\angle s$
- b. $m\angle s = m\angle p - m\angle r$
- c. $m\angle q = 180^\circ - m\angle p$
- d. $m\angle r + m\angle s = m\angle p + m\angle q$

2. \overleftrightarrow{AB} , \overleftrightarrow{CD} , and \overleftrightarrow{EF} meet at O . Find the sum of the measures of $\angle AOC$, $\angle FOD$, and $\angle BOE$.

$m\angle AOC + m\angle FOD + m\angle BOE =$ _____

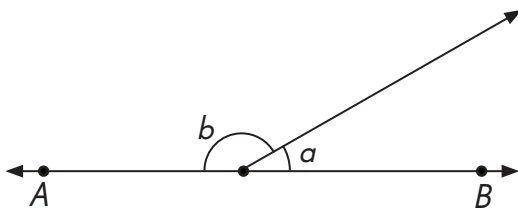


3. $ABCD$ is a square. \overrightarrow{BE} is a ray. Find the measure of $\angle x$.



4. How many degrees does the hour hand of a clock turn between 3 P.M. and 7:30 P.M.?

5. \overleftrightarrow{AB} is a line. The measures of $\angle a$ and $\angle b$ are whole numbers.



If the measure of $\angle b$ is twice that of $\angle a$, find the measures of $\angle a$ and $\angle b$.
