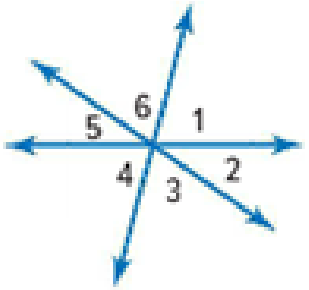
Get out your homework and have it ready to check. Warm Up on #4-9 on page 539 in the book.

Classwork - Complementary and Supplementary Angles

Independent Practice #4 - 9

MP **Identify Structure** Refer to the diagram at the right. Identify each angle pair as *adjacent*, *vertical*, or *neither*. (Example 2)



4. ∠2 and ∠5 Vertical

5 ∠4 and ∠6 Neither

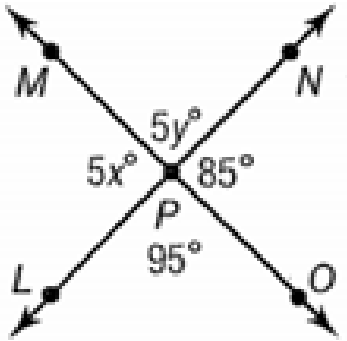
6. ∠3 and ∠4 Adjacent

7. ∠5 and ∠6 Adjacent

8. ∠1 and ∠3 Neither

9. ∠1 and ∠4 Vertical

Use the figure at the right to answer Exercises 1–4.



1. Name two angles that are vertical.

∠MPL ≅ ∠NPO
OR
∠MPN ≅ ∠LPO

2. Name two angles that are adjacent.

∠LPM ≅ ∠MPN
OR
∠NPO ≅ ∠LPO

3. Write an equation to find the value of x.

$\frac{5x}{5} = \frac{85}{5}$

$x = 17$

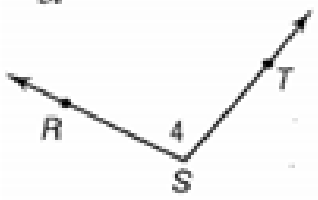
4. Write an equation to find the value of y.

$\frac{5y}{5} = \frac{95}{5}$

$y = 19$

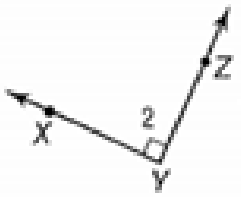
Name each angle in four ways. Then classify the angle as *acute*, *right*, *obtuse*, or *straight*.

5.



∠RST
∠TSR
∠5
∠4
obtuse

6.

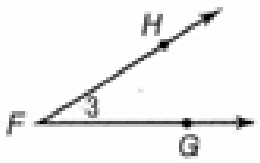


∠XYZ
∠ZYX
∠Y
∠2
Right

7.

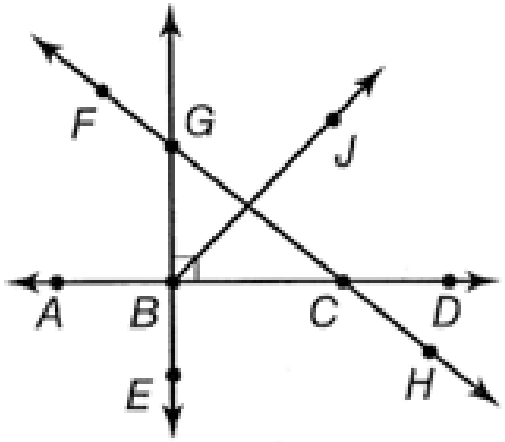
∠ABC
∠CBA
∠B
∠1
Straight

8.



∠HFG
∠GFH
∠F
∠3
Acute

Use the figure at the right to name the following.



9. two acute angles

∠BCH

∠JBD

10. two straight angles

∠ABC

∠FGH

11. two right angles

∠GBC

∠ABE

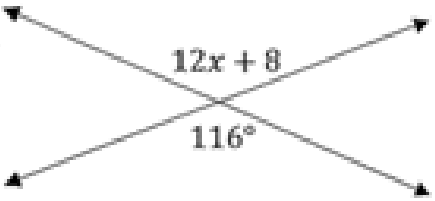
12. two obtuse angles

∠FGE

∠ACH

13) Write and solve an equation to find the value of x.

A)



Equation

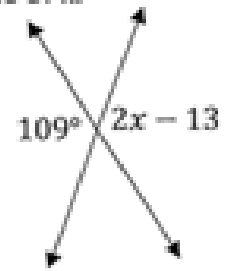
$12x + 8 = 116$

$-8 \quad -8$

$\frac{12x}{12} = \frac{108}{12}$

$x = 9$

B)



Equation

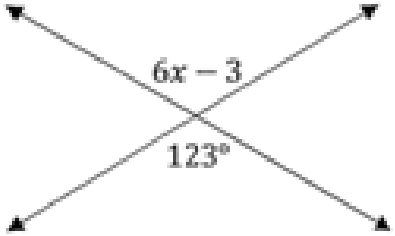
$2x - 13 = 109$

$+13 \quad +13$

$\frac{2x}{2} = \frac{122}{2}$

$x = 61$

C)



Equation

$6x - 3 = 123$

$+3 \quad +3$

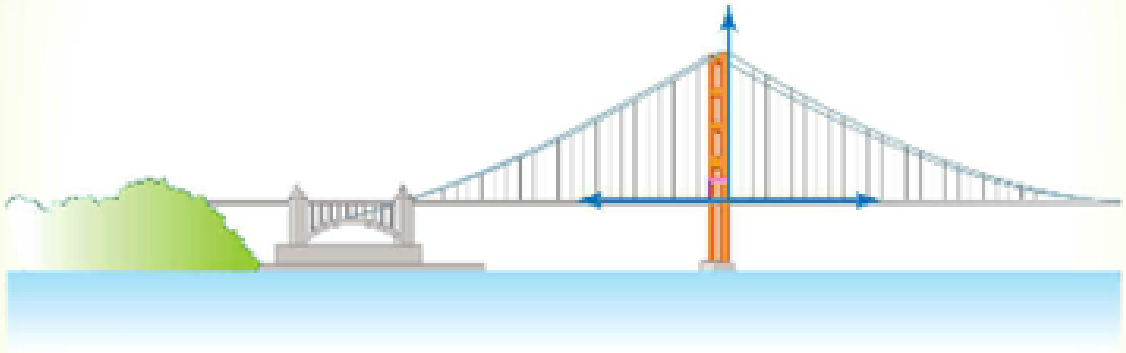
$\frac{6x}{6} = \frac{126}{6}$

$x = 21$

Real-World Link

Watch

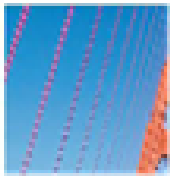
Bridges Engineers use angles to construct bridges. The Golden Gate Bridge is created by combining angles as shown.



1. What types of angles make up the two angles marked in the drawing of the bridge? _____

2. What is the sum of the two angles marked in the drawing of the bridge? _____

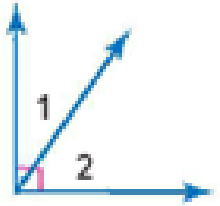
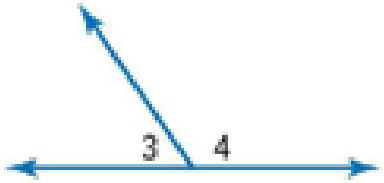
3. In the space below, draw a figure that contains two angles that have a sum of 90°.



p. 543

Pairs of Angles

P. 544

Words	Models	Symbols
Two angles are **complementary** if the sum of their measures is 90°.		$m\angle 1 + m\angle 2 = 90°$
Two angles are **supplementary** if the sum of their measures is 180°.		$m\angle 3 + m\angle 4 = 180°$

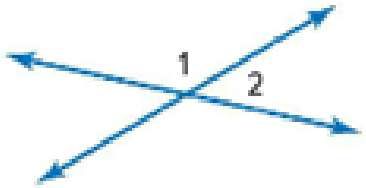
A special relationship exists between two angles with a sum of 90°. A special relationship also exists between two angles with a sum of 180°. The symbol $m\angle 1$ means *the measure of angle 1.*

Examples

Tutor

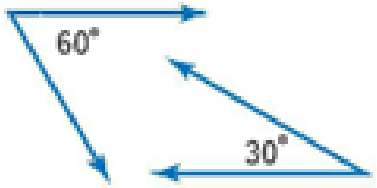
Identify each pair of angles as *complementary*, *supplementary*, or *neither*.

1.



$\angle 1$ and $\angle 2$ form a straight angle. So, the angles are supplementary.

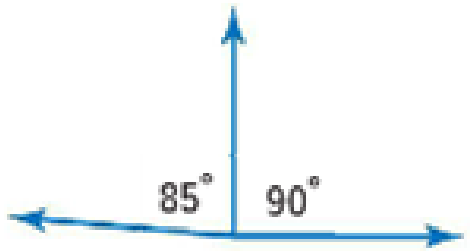
2.



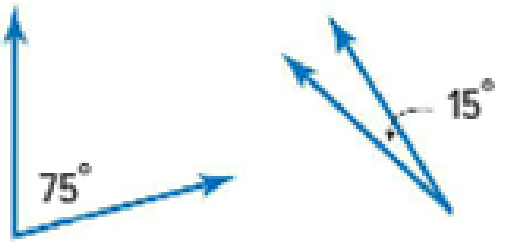
$60° + 30° = 90°$ The angles are complementary.

Got it? Do these problems to find out.

a.



b.



$85+90=175°$

Neither

$75+15=90°$

Complementary

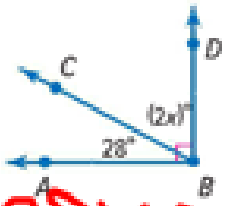
Find a Missing Measure

You can use angle relationships to find missing measures.

Examples

3. **Find the value of x.**

Since the two angles form a right angle, they are complementary.



28+62=90

∠CBD = 62°

2(31) = 62°

Words	The sum of the measures of $\angle ABC$ and $\angle CBD$	is	90°.
Variable	Let $2x$ represent the measure of $\angle CBD$.		
Equation	$28 + 2x$	$=$	90

$28 + 2x = 90$ Write the equation.

$-28 \quad = -28$ Subtract 28 from each side.

$\frac{2x}{2} = \frac{62}{2}$ Divide each side by 2.

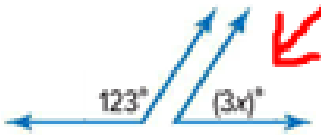
$x = 31$

So, the value of x is 31.

4. **The angles shown are supplementary. Find the value of x.**

$$\begin{aligned} 123 + 3x &= 180 && \text{Write the equation.} \\ -123 &= -123 && \text{Subtract 123 from each side.} \\ \frac{3x}{3} &= \frac{57}{3} && \text{Divide each side by 3.} \\ x &= 19 \end{aligned}$$

So, the value of x is 19.

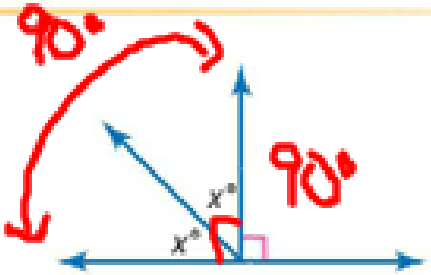


$3(19) = 57°$

Got it? **Do this problem to find out.**

Simplify before you solve!

c. Find the value of x.



$x + x = 90$

$\frac{2x}{2} = \frac{90}{2}$

$x = 45$

$x + x + 90 = 180$

$2x + 90 = 180$

$-90 \quad -90$

$\frac{2x}{2} = \frac{90}{2}$

$x = 45$

Example

5. **The picture shows a support brace for a gate. Find the value of *x*.**

The angle labeled 80° and the angle labeled 10*x* are supplementary angles.

$80 + 10x = 180$ Write the equation.

$-80 \quad = -80$ Subtract 80 from each side.

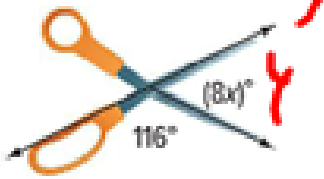
$\frac{10x}{10} = \frac{100}{10}$ Divide each side by 10.

$x = 10$

So, the value of *x* is 10.

Got it? **Do this problem to find out.**

d. A pair of scissors forms the angles shown. What is the value of *x*?



$8x + 116 = 180$

$-116 \quad -116$

$\frac{8x}{8} = \frac{64}{8}$

$x = 8$

$\angle 4 = 64°$

$8(8) = 64°$

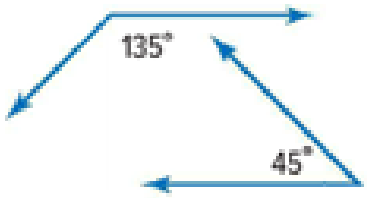
$80 - 116 = 64°$

Guided Practice

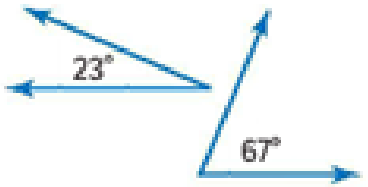
Identify each pair of angles as *complementary*, *supplementary*, or *neither*.

(Examples 1 and 2)

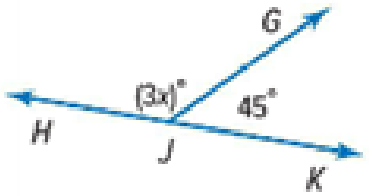
1.



2.



3. Find the value of x. (Examples 3–5)



$3x + 45 = 180$

$-45 \quad -45$

$3x = 135$

$x = 45$

$\angle HJG = 135°$

$3(45) = 135°$

$180 - 45 = 135°$