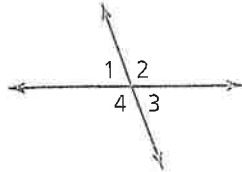


## Identifying Adjacent and Vertical Angles (Topic #2)

### Adjacent Angles

**Words** Two angles are **adjacent angles** when they share a common side and have the same vertex.

**Examples**



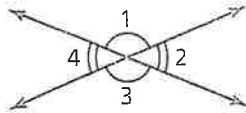
$\angle 1$  and  $\angle 2$  are adjacent.

$\angle 2$  and  $\angle 4$  are not adjacent.

### Vertical Angles

**Words** Two angles are **vertical angles** when they are opposite angles formed by the intersection of two lines. Vertical angles are **congruent angles**, meaning they have the same measure.

**Examples**



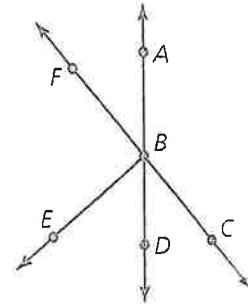
$\angle 1$  and  $\angle 3$  are vertical angles.

$\angle 2$  and  $\angle 4$  are vertical angles.

### EXAMPLE 1: Naming Angles

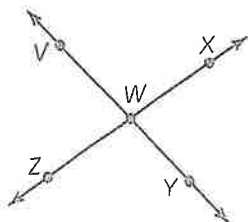
Use the figure shown.

- a) Name a pair of adjacent angles.
- b) Name a pair of vertical angles.

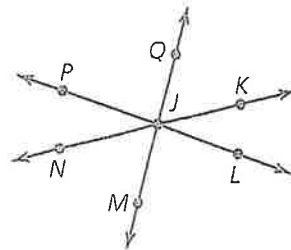


**PRACTICE:** Name two pairs of adjacent angles and two pairs of vertical angles in the figure.

1)



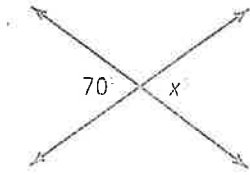
2)



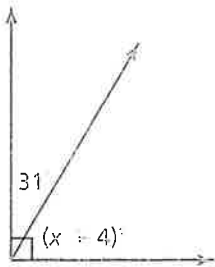
**EXAMPLE 2: Using Adjacent and Vertical Angles**

Tell whether the angles are *adjacent* or *vertical*. Then find the value of  $x$ .

a)



b)

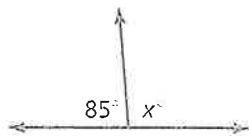


**EXAMPLE 3: Constructing Angles**

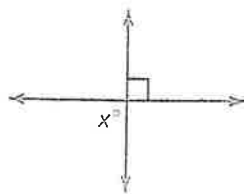
Draw a pair of vertical angles with a measure of  $40^\circ$ .

**PRACTICE:** Tell whether the angles are *adjacent* or *vertical*. Then find the value of  $x$ .

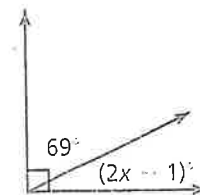
3.



4.



5.



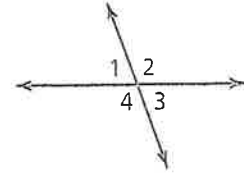
6. Draw a pair of vertical angles with a measure of  $75^\circ$ .

NAME: \_\_\_\_\_  
 ANGLES

DATE: \_\_\_\_\_  
 PERIOD: \_\_\_\_\_

## HOMEWORK #2

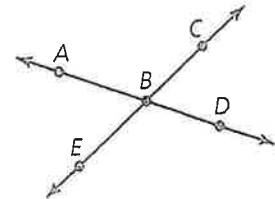
1. When two lines intersect, how many pairs of vertical angles are formed? How many pairs of adjacent angles are formed?



2. Identify the congruent angles in the figure. Explain your reasoning.

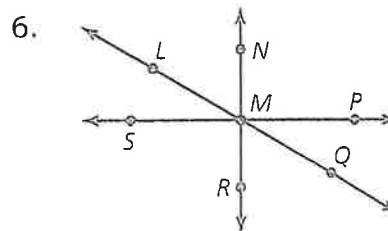
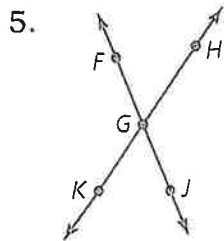
**Use the figure at the right.**

3. Measure each angle formed by the intersecting lines.

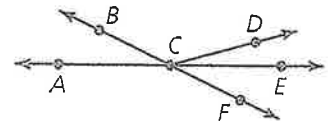


4. Name two angles that are adjacent to  $\angle ABC$ .

**Name two pairs of adjacent angles and two pairs of vertical angles in the figure.**

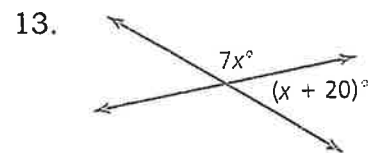
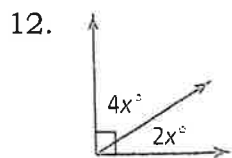
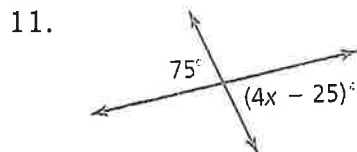
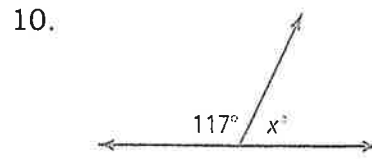
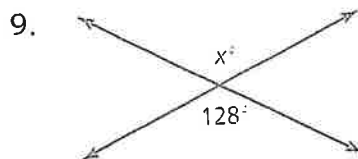
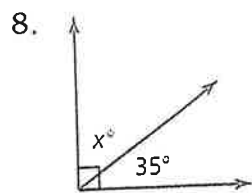


7. Describe and correct the error in naming a pair of vertical angles.



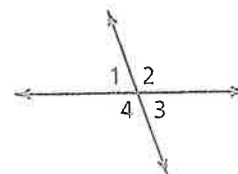
$\angle ACB$  and  $\angle BCD$   
 are vertical angles.

Tell whether the angles are *adjacent* or *vertical*. Then find the value of  $x$ .



Determine whether the statement is *always*, *sometimes*, or *never* true.

14. When the measure of  $\angle 1$  is  $70^\circ$ ,  
the measure of  $\angle 3$  is  $110^\circ$ .



15. When the measure of  $\angle 4$  is  $120^\circ$ ,  
the measure of  $\angle 1$  is  $60^\circ$ .

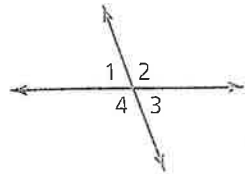
16.  $\angle 2$  and  $\angle 3$  are congruent.

## Identifying Adjacent and Vertical Angles (Topic #2)

### Adjacent Angles

**Words** Two angles are **adjacent angles** when they share a common side and have the same vertex.

**Examples**

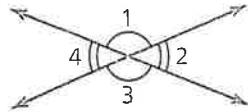


$\angle 1$  and  $\angle 2$  are adjacent.  
 $\angle 2$  and  $\angle 4$  are not adjacent.

### Vertical Angles

**Words** Two angles are **vertical angles** when they are opposite angles formed by the intersection of two lines. Vertical angles are **congruent angles**, meaning they have the same measure.

**Examples**



$\angle 1$  and  $\angle 3$  are vertical angles.  
 $\angle 2$  and  $\angle 4$  are vertical angles.

### EXAMPLE 1: Naming Angles

Use the figure shown.

a) Name a pair of adjacent angles.

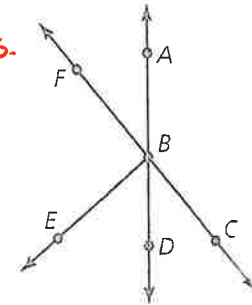
$\angle ABC$  and  $\angle ABF$  share a common side ( $\overline{AB}$ ) and have same vertex ( $B$ )

So,  $\angle ABC$  and  $\angle ABF$  are adjacent angles.

b) Name a pair of vertical angles.

$\angle ABF$  and  $\angle CBD$  are opposite angles formed by the intersection of 2 lines.

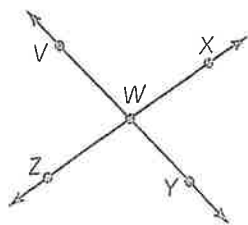
So  $\angle ABF$  and  $\angle CBD$  are vertical angles.



*There are a lot of various answers.*

**PRACTICE:** Name two pairs of adjacent angles and two pairs of vertical angles in the figure.

1)



(Answers will vary)

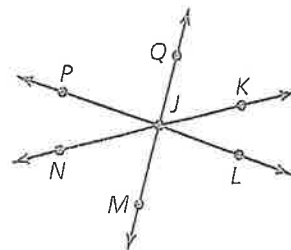
Adjacent

$\angle XWY$  and  $\angle ZWY$   
 $\angle XWY$  and  $\angle XWV$

Vertical

$\angle VWX$  and  $\angle ZWY$   
 $\angle YWX$  and  $\angle ZWV$

2)



Adjacent

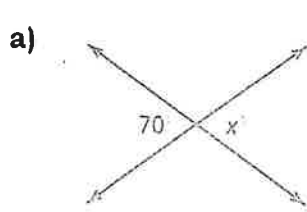
$\angle LJM$  and  $\angle LJK$   
 $\angle LJM$  and  $\angle NJM$

Vertical

$\angle KTL$  and  $\angle PJN$   
 $\angle PJQ$  and  $\angle MTL$

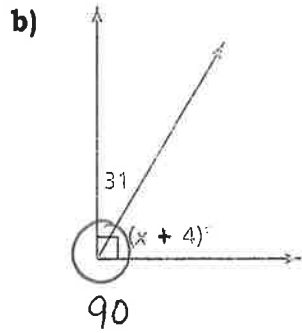
**EXAMPLE 2: Using Adjacent and Vertical Angles**

Tell whether the angles are *adjacent* or *vertical*. Then find the value of  $x$ .



Vertical (congruent  $\cong$ )

$$x = 70^\circ$$



Adjacent

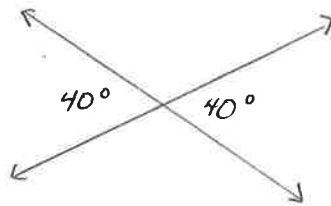
$$x + 4 + 31 = 90$$

$$x + 35 = 90$$
$$\underline{- 35 \quad - 35}$$

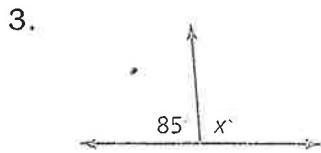
$$x = 55^\circ$$

**EXAMPLE 3: Constructing Angles**

Draw a pair of vertical angles with a measure of  $40^\circ$ . (Protractor)



**PRACTICE:** Tell whether the angles are *adjacent* or *vertical*. Then find the value of  $x$ .

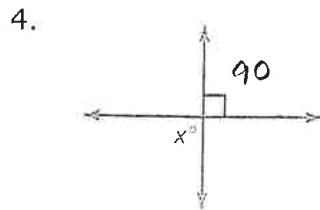


Adjacent

$$x + 85 = 180$$

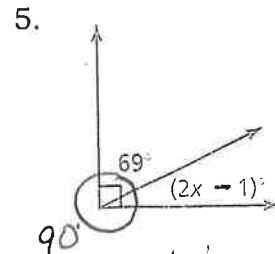
$$\underline{- 85 \quad - 85}$$

$$x = 95^\circ$$



Vertical

$$x = 90^\circ$$



Adjacent

$$2x - 1 + 69 = 90$$

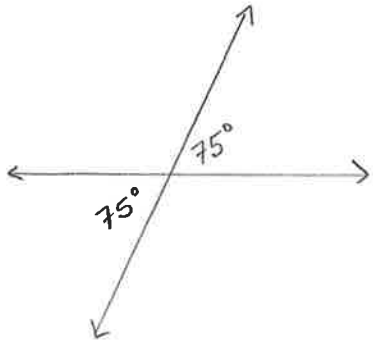
$$2x + 68 = 90$$

$$\underline{- 68 \quad - 68}$$

$$\frac{2x}{2} = \frac{22}{2}$$

$$x = 11^\circ$$

6. Draw a pair of vertical angles with a measure of  $75^\circ$ . (Protractor)





NAME: \_\_\_\_\_  
 ANGLES

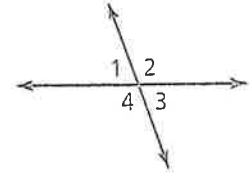
**KEY**

DATE: \_\_\_\_\_  
 PERIOD: \_\_\_\_\_

### HOMework #2

1. When two lines intersect, how many pairs of vertical angles are formed? How many pairs of adjacent angles are formed?

2 pairs ; 4 pairs

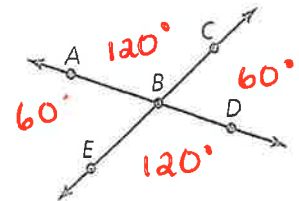


2. Identify the congruent angles in the figure. Explain your reasoning.

$\angle 1$  is congruent to  $\angle 3$ ;  
 $\angle 2$  is congruent to  $\angle 4$ ;  
 They are congruent b/c they are vertical angles.

Use the figure at the right.

3. Measure each angle formed by the intersecting lines. (Protractor)\*



4. Name two angles that are adjacent to  $\angle ABC$ .

$\angle EBA$ ,  $\angle CBD$

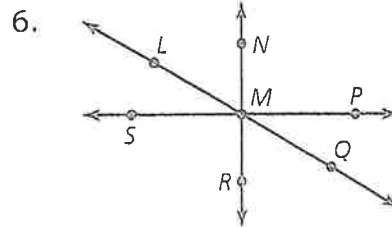
Name two pairs of adjacent angles and two pairs of vertical angles in the figure.

Answers will vary.

5. Adjacent  
 $\angle FGH$  and  $\angle HGT$   
 $\angle FGT$  and  $\angle KGT$   


---

Vertical  
 $\angle FGH$  and  $\angle JGK$   
 $\angle FGT$  and  $\angle JGH$



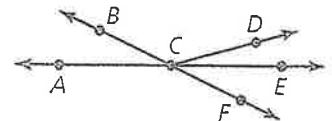
Adjacent  
 $\angle SML$  and  $\angle LMN$   
 $\angle SMR$  and  $\angle RMQ$   


---

Vertical  
 $\angle NMP$  and  $\angle SMR$   
 $\angle LMN$  and  $\angle RMQ$

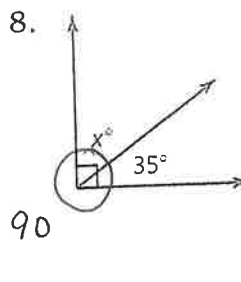
7. Describe and correct the error in naming a pair of vertical angles.

$\angle ACB$  and  $\angle BCD$  are adjacent angles, not vertical.

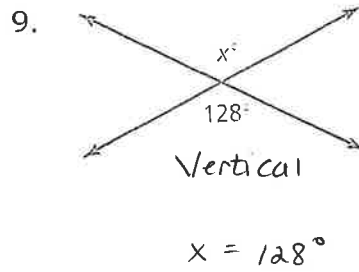


$\angle ACB$  and  $\angle BCD$  are vertical angles.

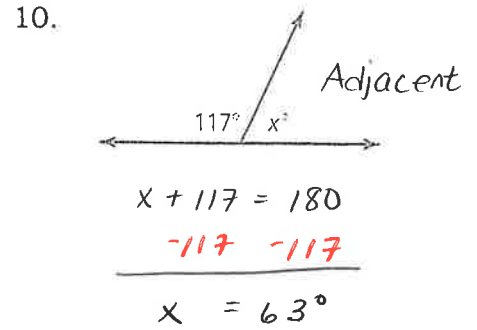
Tell whether the angles are *adjacent* or *vertical*. Then find the value of  $x$ .

8.  Adjacent

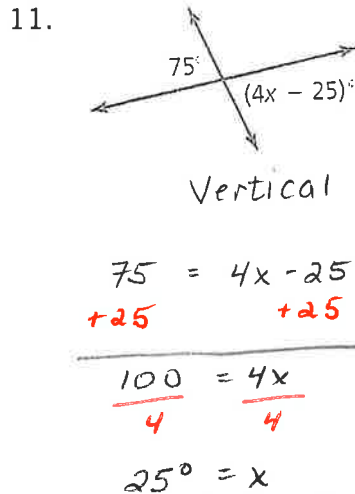
$$\begin{array}{r} x + 35 = 90 \\ -35 \quad -35 \\ \hline x = 65^\circ \end{array}$$

9.  Vertical

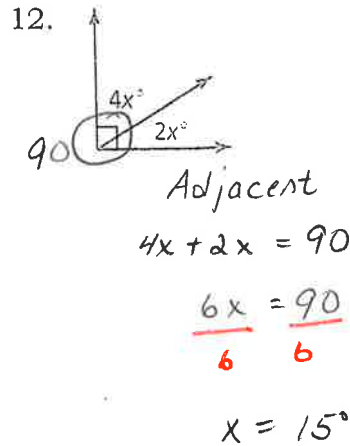
$$x = 128^\circ$$

10.  Adjacent

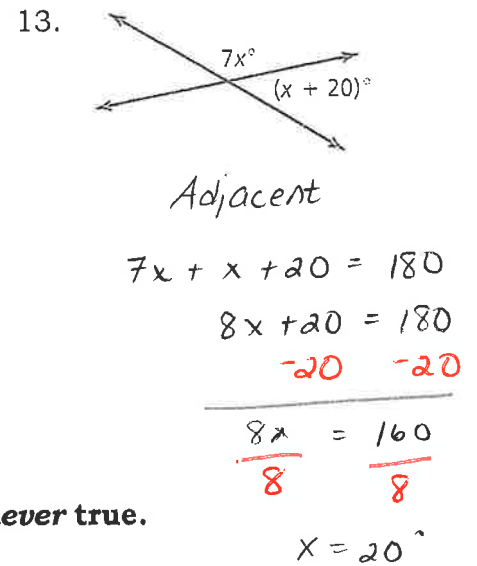
$$\begin{array}{r} x + 117 = 180 \\ -117 \quad -117 \\ \hline x = 63^\circ \end{array}$$

11.  Vertical

$$\begin{array}{r} 75 = 4x - 25 \\ +25 \quad +25 \\ \hline 100 = 4x \\ \frac{100}{4} = \frac{4x}{4} \\ 25^\circ = x \end{array}$$

12.  Adjacent

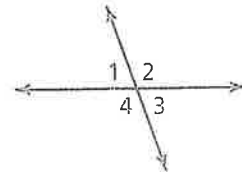
$$\begin{array}{r} 4x + 2x = 90 \\ 6x = 90 \\ \frac{6x}{6} = \frac{90}{6} \\ x = 15^\circ \end{array}$$

13.  Adjacent

$$\begin{array}{r} 7x + x + 20 = 180 \\ 8x + 20 = 180 \\ -20 \quad -20 \\ \hline 8x = 160 \\ \frac{8x}{8} = \frac{160}{8} \\ x = 20^\circ \end{array}$$

Determine whether the statement is *always*, *sometimes*, or *never* true.

14. When the measure of  $\angle 1$  is  $70^\circ$ , the measure of  $\angle 3$  is  $110^\circ$ . *Never*;  $\angle 1$  and  $\angle 3$  are vertical angles. Vertical angles are congruent.



15. When the measure of  $\angle 4$  is  $120^\circ$ , the measure of  $\angle 1$  is  $60^\circ$ . *Always*;  $\angle 4$  and  $\angle 1$  form a straight angle ( $180^\circ$ ).
- $$120^\circ + 60^\circ = 180^\circ$$

16.  $\angle 2$  and  $\angle 3$  are congruent.

*Sometimes*; when the 2 intersecting lines are perpendicular (forming 4 right angles.)