

**Skills Practice****Writing Expressions and Equations****Write an algebraic expression for each verbal expression.**

1. the sum of  $t$  and 4      2. the difference of 5 and  $r$

3. the product of 4 and  $y$       4. the quotient of  $a$  and  $b$

5. 5 more than the product of 3 and  $d$       6. 2 less than the quotient of  $m$  and  $n$

**Write a verbal expression for each algebraic expression.**

7.  $n - 7$       8.  $8 + c$

9.  $\frac{12}{y}$       10.  $9h$

11.  $7x - 10$       12.  $6a + b$

**Write an equation for each sentence.**

13. 2 more than  $y$  is 14.

14. 8 less than  $x$  is 6.

15. 5 is equal to  $m$  divided by 10.

16. 2 more than the product of 4 and  $t$  is 16.

17. 3 less than the quotient of  $w$  and 4 is 9.

**Write a sentence for each equation.**

18.  $b - 7 = 3$       19.  $4n = 24$

20.  $a + 8 = 15$       21.  $6 = x - y$

22.  $2t + 5 = 15$       23.  $\frac{8}{m} = 4$

**Skills Practice****Order of Operations***Find the value of each expression.*

1.  $5 \cdot 3 - 4$

2.  $12 - 8 \div 2$

3.  $7 - (14 \div 2)$

4.  $4(10 - 2) + 3$

5.  $\frac{5(4 + 8)}{4}$

6.  $25 - [4(5 - 3)]$

*Name the property of equality shown by each statement.*7. If  $y = 4$ , and  $4 = z$ , then  $y = z$ .8. If  $a + 5 = 14$ , then  $14 = a + 5$ .9.  $x + 4 = x + 4$ .10. If  $b = 6$ , then  $b - 4 = 6 - 4$ .*Name the property used to evaluate each expression.*

11.  $5(12 - 3 \cdot 4)$

12.  $7 + 2(16 - 3 \cdot 5)$

$5(12 - 12)$

$7 + 2(16 - 15)$

$5(0)$

$7 + 2(1)$

$0$

$7 + 2$

$9$

13.  $(10 - 5 \cdot 2) + 9$

14.  $2(9 - 4 \cdot 2)$

$(10 - 10) + 9$

$2(9 - 8)$

$0 + 9$

$2(1)$

$9$

$2$

*Evaluate each algebraic expression if  $x = 2$  and  $y = 4$ .*

15.  $4(4x - y)$

16.  $5x + 3y$

17.  $\frac{y - 2}{x}$

18.  $x + 2y - 5$

19.  $\frac{x + y}{3x}$

20.  $4(12 - xy)$

**Skills Practice****Commutative and Associative Properties****Name the property shown by each statement.**

1.  $x + 7 = 7 + x$       2.  $(2 \cdot 4) \cdot 5 = 2 \cdot (4 \cdot 5)$   
 3.  $3 + (6 + 4) = (3 + 6) + 4$       4.  $4 \cdot 8 = 8 \cdot 4$   
 5.  $3 + 4n + 5 = 3 + 5 + 4n$       6.  $(4 + 8) + 9 = 4 + (8 + 9)$   
 7.  $3(5 + 8) = (5 + 8) \cdot 3$       8.  $(3 + 9) \cdot 2 = (9 + 3) \cdot 2$

**Simplify each expression. Identify the properties used in each step.**

9. 
$$\begin{aligned} 4 \cdot x \cdot 6 \\ = 4 \cdot 6 \cdot x \\ = 24x \end{aligned}$$
      10. 
$$\begin{aligned} 4 + n + 3 \\ = n + 4 + 3 \\ = n + 7 \end{aligned}$$
11. 
$$\begin{aligned} 12 \cdot (3t) \\ = (12 \cdot 3)t \\ = 36t \end{aligned}$$
      12. 
$$\begin{aligned} 4 + 5y + 7 \\ = 4 + 7 + 5y \\ = 11 + 5y \end{aligned}$$
13. 
$$\begin{aligned} 2 + (9 + m) \\ = (2 + 9) + m \\ = 11 + m \end{aligned}$$
      14. 
$$\begin{aligned} 2 + (4 + 3x) \\ = (2 + 4) + 3x \\ = 6 + 3x \end{aligned}$$
15. 
$$\begin{aligned} 10 \cdot (3 \cdot y) \\ = (10 \cdot 3)y \\ = 30y \end{aligned}$$
      16. 
$$\begin{aligned} 8 + 2(5 \cdot t) \\ = 8 + (2 \cdot 5)t \\ = 8 + 10t \end{aligned}$$
17. 
$$\begin{aligned} (8 + 4) + 3r + 5 \\ = 12 + 3r + 5 \\ = 12 + 5 + 3r \\ = 17 + 3r \end{aligned}$$
      18. 
$$\begin{aligned} 5 \cdot d \cdot (3 + 4) \\ = 5 \cdot d \cdot 7 \\ = 5 \cdot 7 \cdot d \\ = 35d \end{aligned}$$

**Skills Practice****Distributive Property****Simplify each expression.**

1.  $5n + 6n$

2.  $14a + 27a$

3.  $4x + 3x$

4.  $8n - 5n$

5.  $7s - s$

6.  $32z - 8z$

7.  $7s + s - 4$

8.  $3a + 4b + 6a + 2b$

9.  $7 - 3 + 2ef$

10.  $8 + 2y - 3 + 9y$

11.  $6m + 8n - 5m + n$

12.  $9k + 5h - h + 3k$

13.  $(10a + 6) + (5 - 2a)$

14.  $(4s + 8t) + 6s - 3t$

15.  $3(2x + 5y)$

16.  $5(a - 6b)$

17.  $4(8 - 2b)$

18.  $(9 + 5y)3$

19.  $5(2d - 6e + 3f)$

20.  $4 + 12st + 15$

## Skills Practice

### A Plan for Problem Solving

Solve each problem. Use any strategy.

1. Michael is 3 years older than Andrew. The sum of their ages is 15. How old are they?
2. Janice and Michele take turns driving as they go to the beach. Janice drives 35 miles farther than Michele. How far did Michele drive if together they drove a total of 155 miles?
3. Marla deposits \$1200 into her savings account which has an interest rate of 3%. How much money will she have in her account after 4 years?
4. How many ways are there to make \$0.30 using pennies, nickels, and dimes?
5. Victoria sells flowers to help raise money for her class. She sells 5 more pots of impatiens than petunias. If she sold a total of 23 pots of flowers, how many petunias did she sell?
6. The volume of a box is the product of its length, width, and height. What is the volume of a box whose length is 14 inches, width is 8 inches, and height is 6 inches?
7. Daniela and Claire both have summer jobs. By the end of the summer Claire has earned 3 times the amount of money Daniela earned. If together they earned \$2400, how much money did Daniela earn?
8. Fred, Ashley, Monica, and James are the first four batters on a baseball team. The coach is still deciding the order in which to have them bat. How many different ways can the coach arrange them?
9. Zoe has the following breads, meats, and cheeses to choose from to make a sandwich. How many different sandwiches can she make if she can only use one type of bread, meat, and cheese at a time?

Breads	Meats	Cheeses
white	ham	swiss
rye	turkey	provolone
	salami	

10. Miranda is studying for two tests she has tomorrow. She studies 2 hours longer for her history test than she does for her science test. How long does she study for science if she studies for a total of 8 hours?

**Skills Practice****Collecting Data**

**Determine whether each is a good sample. Describe what caused the bias in each poor sample. Explain.**

1. Every second person exiting a book store is asked his or her favorite type of book to read.
2. 20,000 households in the northeast are surveyed to determine the most popular television show in the country.
3. Every second person who enters a baseball stadium to watch a home game is asked which team they expect to win.

**Refer to the following chart.**

Number of Televisions per Household				
3	2	3	4	2
2	1	2	1	5
4	1	3	2	2
1	2	3	1	4

Number of Televisions per Household		
Number	Tally	Frequency
One		5
Two		7
Three		4
Four		3
Five		1

4. Make a frequency table to organize the data.
5. How many households have 1 television?
6. What is more common, having two televisions or having 3 or more televisions?

**Refer to the following chart.**

Type of Vehicle Owned				
LX	M	L	M	M
M	S	M	S	LX
LX	M	S	M	S
S	M	S	LX	M

LX = Luxury L = Large M = Midsize S = Small

Type of Vehicle Owned		
Number	Tally	Frequency
Luxury		4
Large		1
Midsize		9
Small		6

7. Make a frequency table to organize the data.
8. How many people surveyed owned a luxury vehicle?
9. Which type of vehicle is owned the least?
10. In 2001, almost half of all the vehicles sold were midsize. Does this data reflect that fact? Explain.

**Skills Practice****Displaying and Interpreting Data**

Use the table below for Exercises 1-4.

Year	Median Price of Existing Homes (thousands)
1997	\$121
1998	128
1999	133
2000	139
2001	148

1. Make a line graph of the data.
2. Over which one year time interval did home prices increase the most?
3. Describe the trend in home prices.  
steadily increasing each year
4. Predict the median price of existing homes in 2002.

Use the table for Exercises 5-7.

5. Which age group has the fewest licensed drivers?
6. How many licensed drivers are ages 40-49?
7. Which age group do you think car manufacturers should market to more, 30-49 year olds or 50-69 year olds? Explain.

Licensed Drivers in 2000 (millions)	
Ages	Number
20-29	34
30-39	40
40-49	40
50-59	30
60-69	18

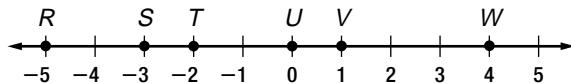
Refer to the stem-and-leaf plot at the right.

8. What is the lowest normal low temperature in July for the cities polled here?
9. In what 10-degree interval do the normal low temperatures in July occur most?
10. What temperature occurs the most as a normal low temperature in July?
11. How many cities have a normal low temperature of 63 degrees in July?

Normal Low Temperatures of Select U.S. Cities in July

Stem	Leaf
3	4
4	9
5	2 5 9
6	0 2 3 3 5 6 7 7
7	1 2 2 2 4 7
8	1

$$3/4 = 34^\circ$$

**Skills Practice****Graphing Integers on a Number Line****Name the coordinate of each point.**

1.  $S$       2.  $U$       3.  $T$   
 4.  $R$       5.  $W$       6.  $V$

**Graph each set of numbers on a number line.**

7.  $\{-2, 0, 3\}$       8.  $\{-5, -3, -1\}$

9.  $\{2, 4, -4\}$       10.  $\{-1, 3, 5\}$

11.  $\{-4, -2, 2\}$       12.  $\{-3, -1, 1, 3\}$

**Write  $<$  or  $>$  in each blank to make a true sentence.**

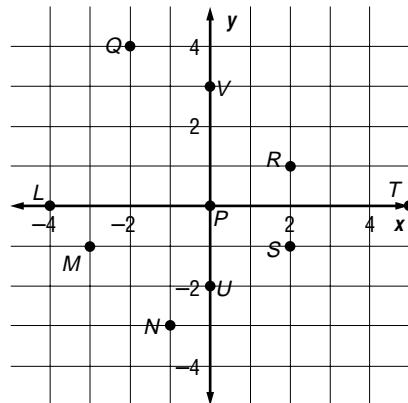
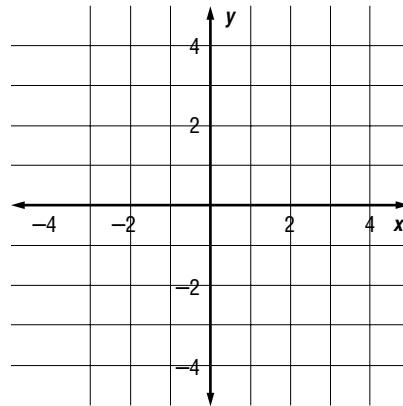
- |                                      |                                     |                                      |
|--------------------------------------|-------------------------------------|--------------------------------------|
| 13. $2 \underline{\hspace{1cm}} 7$   | 14. $4 \underline{\hspace{1cm}} -2$ | 15. $-3 \underline{\hspace{1cm}} 0$  |
| 16. $-5 \underline{\hspace{1cm}} -2$ | 17. $-1 \underline{\hspace{1cm}} 2$ | 18. $-5 \underline{\hspace{1cm}} -8$ |
| 19. $-4 \underline{\hspace{1cm}} 3$  | 20. $0 \underline{\hspace{1cm}} -9$ | 21. $-6 \underline{\hspace{1cm}} -3$ |

**Evaluate each expression.**

22.  $|4|$       23.  $|-5|$

24.  $|-8|$       25.  $|10|$

26.  $|3| + |-2|$       27.  $|-7| + |-12|$

**Skills Practice****The Coordinate Plane***Write the ordered pair that names each point.*1. *L*2. *M*3. *N*4. *P*5. *Q*6. *R*7. *S*8. *T*9. *U*10. *V**Graph each point on the coordinate plane.*11.  $A(-2, 4)$ 12.  $B(0, -4)$ 13.  $C(5, -3)$ 14.  $D(-2, -1)$ 15.  $E(1, 4)$ 16.  $F(4, 0)$ 17.  $G(-4, -1)$ 18.  $H(3, 3)$ 19.  $I(-4, 3)$ 20.  $J(-5, 0)$ *Name the quadrant in which each point is located.*21.  $(-2, -2)$ 22.  $(3, 4)$ 23.  $(-4, 3)$ 24.  $(4, -3)$ 25.  $(0, -2)$ 26.  $(-1, -1)$ 27.  $(4, -1)$ 28.  $(-3, 5)$ 29.  $(-3, 0)$ 30.  $(8, -4)$

**Skills Practice****Adding Integers****Find each sum.**

1.  $2 + 7$

2.  $-3 + (-2)$

3.  $-4 + 1$

4.  $3 + (-9)$

5.  $-2 + 12$

6.  $-1 + (-6)$

7.  $10 + (-8)$

8.  $-9 + 4$

9.  $3 + (-3)$

10.  $-5 + (-5)$

11.  $8 + (-9)$

12.  $-7 + 4$

13.  $-2 + 2$

14.  $-12 + 10$

15.  $-8 + (-5)$

16.  $-14 + 8$

17.  $15 + (-8)$

18.  $3 + (-11)$

19.  $-9 + (-7)$

20.  $6 + (-9)$

21.  $-14 + 15$

22.  $-10 + 6 + (-4)$

23.  $13 + (-14) + 1$

24.  $-4 + (-8) + 5$

**Simplify each expression.**

25.  $-4c + 8c$

26.  $-5a + (-9a)$

27.  $-8d + 3d$

28.  $7x + 3x$

29.  $6y + (-3y)$

30.  $-7t + 4t$

31.  $-12s + (-4s)$

32.  $5t + (-13t)$

33.  $15h + (-4h)$

34.  $7b + 6b + (-8b)$

35.  $-9w + 4w + (-5w)$

36.  $12t + 3t + (-6t)$

**Skills Practice*****Subtracting Integers******Find each difference.***

1.  $8 - 2$

2.  $12 - 4$

3.  $-7 - (-2)$

4.  $-9 - 4$

5.  $4 - 12$

6.  $-4 - (-10)$

7.  $-6 - 1$

8.  $-5 - 8$

9.  $-5 - (-5)$

10.  $-8 - 8$

11.  $-11 - 7$

12.  $8 - (-7)$

13.  $9 - 14$

14.  $-3 - (-15)$

15.  $-14 - 6$

16.  $-3 - 9$

17.  $-7 - 7$

18.  $13 - 14$

***Evaluate each expression if  $a = 2$ ,  $b = -3$ ,  $c = -1$ , and  $d = 1$ .***

19.  $a - b$

20.  $b - c$

21.  $a - c$

22.  $c - d$

23.  $a + b - c$

24.  $b - d - c$

25.  $d + b - a$

26.  $c - a - b$

27.  $a - d + b$

**Skills Practice****Multiplying Integers***Find each product.*

1.  $3(12)$

2.  $-4(7)$

3.  $-8(-8)$

4.  $5(-9)$

5.  $-2(-9)$

6.  $-3(-10)$

7.  $0(-5)$

8.  $-13(-4)$

9.  $4(-11)$

10.  $-5(12)$

11.  $14(0)$

12.  $-8(7)$

13.  $-15(-4)$

14.  $9(-3)$

15.  $-8(11)$

16.  $(-2)(4)(-3)$

17.  $(-4)(-5)(-1)$

18.  $(3)(5)(-5)$

*Evaluate each expression if  $x = -2$  and  $y = -4$ .*

19.  $-3xy$

20.  $-2xy$

21.  $-5x$

22.  $-7y$

23.  $8xy$

24.  $-6xy$

*Simplify each expression.*

25.  $3(2a)$

26.  $-4(-3c)$

27.  $-5(-8b)$

28.  $(5c)(-7d)$

29.  $(-8m)(-2n)$

30.  $(-9s)(7t)$

**Skills Practice*****Dividing Integers******Find each quotient.***

1.  $36 \div 3$

2.  $-15 \div 5$

3.  $24 \div (-8)$

4.  $-45 \div (-3)$

5.  $81 \div (-9)$

6.  $-28 \div 4$

7.  $-121 \div 11$

8.  $-144 \div (-12)$

9.  $32 \div (-4)$

10.  $-64 \div (-8)$

11.  $-80 \div 10$

12.  $48 \div (-6)$

13.  $100 \div (-25)$

14.  $-20 \div 5$

15.  $36 \div (-9)$

16.  $56 \div (-7)$

17.  $-63 \div (-9)$

18.  $-32 \div (-16)$

19.  $-21 \div 3$

20.  $-18 \div 2$

21.  $72 \div (-8)$

22.  $\frac{-35}{7}$

23.  $\frac{39}{-13}$

24.  $\frac{-125}{-5}$

***Evaluate each expression if  $d = -3$ ,  $f = 8$ , and  $g = -4$ .***

25.  $f \div g$

26.  $8d \div g$

27.  $4g \div f$

28.  $\frac{gf}{2}$

29.  $\frac{df}{-12}$

30.  $\frac{5f}{g}$

31.  $\frac{9g}{d}$

32.  $\frac{-2f}{g}$

33.  $\frac{4f}{g}$

**Skills Practice****Rational Numbers****Write  $<$ ,  $>$ , or  $=$  in each blank to make a true sentence.**

1.  $1.5 \underline{\hspace{1cm}} -1$

2.  $-2.4 \underline{\hspace{1cm}} 0.4$

3.  $-3.5 \underline{\hspace{1cm}} -3.2$

4.  $0 \underline{\hspace{1cm}} -4.1$

5.  $2(-12) \underline{\hspace{1cm}} -6(-4)$

6.  $-22 + 10 \underline{\hspace{1cm}} -12$

7.  $(-2)(5) -2 \underline{\hspace{1cm}} -8$

8.  $(-2)(9) \underline{\hspace{1cm}} -20 + 4$

9.  $\frac{1}{3} \underline{\hspace{1cm}} \frac{1}{6}$

10.  $\frac{2}{5} \underline{\hspace{1cm}} \frac{3}{4}$

11.  $-\frac{3}{4} \underline{\hspace{1cm}} \frac{1}{2}$

12.  $-\frac{1}{4} \underline{\hspace{1cm}} -\frac{1}{5}$

13.  $\frac{4}{6} \underline{\hspace{1cm}} \frac{2}{3}$

14.  $\frac{3}{8} \underline{\hspace{1cm}} \frac{1}{3}$

15.  $-\frac{5}{6} \underline{\hspace{1cm}} -\frac{2}{3}$

16.  $-\frac{3}{4} \underline{\hspace{1cm}} -\frac{6}{8}$

**Write the numbers in each set from least to greatest.**

17.  $\frac{1}{2}, \frac{1}{3}, \frac{2}{5}$

18.  $0.2, \frac{1}{6}, \frac{2}{5}$

19.  $-\frac{3}{5}, -\frac{3}{4}, -\frac{5}{8}$

20.  $-\frac{2}{3}, -\frac{1}{2}, -\frac{3}{4}$

21.  $\frac{7}{8}, \frac{4}{5}, \frac{5}{6}$

22.  $\frac{3}{8}, \frac{4}{9}, \frac{4}{7}$

23.  $-\frac{2}{3}, -\frac{5}{7}, -\frac{7}{9}$

24.  $-\frac{3}{5}, \frac{1}{8}, -\frac{5}{7}$

**Skills Practice****Adding and Subtracting Rational Numbers***Find each sum or difference.*

1.  $-3.2 + (-1.7)$

2.  $-5.4 + 2.3$

3.  $4.3 + (-8.5)$

4.  $6.4 - 5.3$

5.  $-7.3 + (-4.4)$

6.  $7.8 - 9.9$

7.  $-9.5 + 7.2$

8.  $-12.5 + (-3.5)$

9.  $6.4 + (-8.5)$

10.  $-8.2 + 9.4$

11.  $\frac{1}{6} - \frac{4}{6}$

12.  $\frac{1}{10} + \frac{6}{10}$

13.  $\frac{3}{8} + \left(-\frac{3}{4}\right)$

14.  $-\frac{1}{12} + \frac{5}{6}$

15.  $-\frac{2}{3} - \frac{1}{4}$

16.  $-\frac{3}{5} + \frac{3}{20}$

17.  $4\frac{7}{15} - 3\frac{4}{15}$

18.  $-8\frac{7}{16} + 10\frac{10}{16}$

19.  $-3\frac{1}{6} - 5\frac{1}{4}$

20.  $9\frac{5}{8} - 12\frac{3}{4}$

21.  $-7\frac{1}{10} - 3\frac{1}{5}$

22.  $10\frac{5}{6} - 12\frac{11}{12}$

**Skills Practice****Mean, Median, Mode, and Range***Find the mean, median, mode, and range of each set of data.*

1. 24, 16, 18, 19, 18

2. 5, 8, 4, 5, 5, 9

3. 12, 18, 28, 14, 29, 20, 23, 21, 15

4. 8, 14, 10, 14, 11, 15, 14, 18

5. 2, 3, 2, 2, 2, 7, 5, 5, 8

6. 34, 28, 25, 34, 29, 30, 32, 28

7. 5, 5, 8, 7, 10, 12, 8, 8, 9

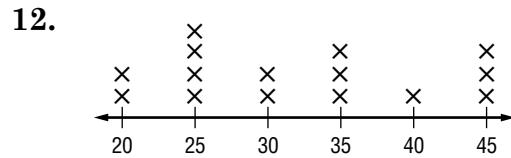
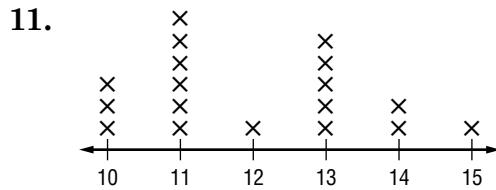
8. 45, 40, 42, 45, 41, 48, 47

9. **Stem | Leaf**

1	1 2 2 8
2	2 3 5 6 6 7
3	3 3 3 5      2   3 = 23

10. **Stem | Leaf**

5	0 0 1
6	0 2 2 3
7	1 2 3 3 7 9
8	0 2      6   2 = 62



**Skills Practice****Equations**

**Find the solution of each equation if the replacement sets are  $a = \{0, 1, 2\}$ ,  $b = \{-1, -2, -3\}$ , and  $c = \{-2, -3, -4, -5\}$ .**

1.  $b + 4 = 1$

2.  $5 - a = 4$

3.  $c - 8 = -12$

4.  $8c = -16$

5.  $5b - 2 = -12$

6.  $8 - 4a = 4$

7.  $6c + 5 = -13$

8.  $-20 = -8b - 36$

9.  $\frac{a + 3}{-2} = -2$

10.  $\frac{-10 - 5}{b} = 5$

11.  $\frac{3b}{2} - 4 = -7$

12.  $\frac{-21 - 4}{c} = 5$

**Solve each equation.**

13.  $-8 + 24 = a$

14.  $t = -5 \cdot 12$

15.  $-13 - 22 = b$

16.  $4 + 3(-4) = x$

17.  $20 \div (-5) + 8 = w$

18.  $12 \cdot 2 + 15 \div (-3) = c$

19.  $m = -2(2 \cdot 3 - 5 \cdot 4)$

20.  $d = \frac{-23 + 5}{2(-3)}$

21.  $t = \frac{5 + 7}{-6 - 6}$

22.  $p = 32 - 5 \cdot 4 - 6$

23.  $n = \frac{6 \cdot 3 - 4}{2(-7)}$

24.  $\frac{24 - 2 \cdot 4}{-4} = y$

**Skills Practice****Solving Equations by Using Models***Solve each equation. Use algebra tiles if necessary.*

1.  $d - 4 = -15$

2.  $-4 + r = -12$

3.  $t - 18 = -9$

4.  $5 + f = -7$

5.  $-4 + y = -10$

6.  $h + 5 = -14$

7.  $-8 + m = -2$

8.  $7 + x = -15$

9.  $w - 6 = -16$

10.  $10 + c = 5$

11.  $r + (-3) = -20$

12.  $5 = y - 12$

13.  $-11 + x = -5$

14.  $m + (-8) = 15$

15.  $-24 = -7 + k$

16.  $-9 + t = -19$

17.  $g + (-2) = 12$

18.  $-5 + j = -20$

19.  $-18 + f = -22$

20.  $-16 + w = 9$

21.  $v + (-4) = -22$

22.  $g + (-7) = 13$

23.  $-5 + q = -19$

24.  $-12 + m = 17$

25. What is the value of  $a$  if  $9 = -8 + a$ ?26. What is the value of  $c$  if  $c + (-8) = -20$ ?27. If  $n - 12 = -25$ , what is the value of  $n$ ?

**Skills Practice****Solving Addition and Subtraction Equations****Solve each equation. Check your solution.**

1.  $c + 4 = -14$

2.  $t - 5 = -20$

3.  $-7 + y = -18$

4.  $28 = y - 30$

5.  $c + (-9) = -14$

6.  $m - (-4) = 24$

7.  $-16 = b - 5$

8.  $-12 + d = -16$

9.  $-20 = n + (-3)$

10.  $t - (-5) = 21$

11.  $-14 + f = -4$

12.  $y - 3 = 18$

13.  $h - 9 = 15$

14.  $w - (-1) = 4$

15.  $-8 + c = 12$

16.  $h - (-3) = -15$

17.  $m - 6 = -28$

18.  $-12 = m + 2$

19.  $v - (-7) = 14$

20.  $-20 = p - (-8)$

21.  $-14 + z = -20$

22.  $b + (-9) = 13$

23.  $c - 9 = 11$

24.  $a + 10 = -22$

25.  $j - 6 = -18$

26.  $k - (-20) = 8$

27.  $t + 6 = -23$

28.  $-18 = c - 5$

29.  $v + (-9) = -30$

30.  $r - 9 = -22$

**Skills Practice****Solving Equations Involving Absolute Value***Solve each equation. Check your solution.*

1.  $|m| = 4$

2.  $|d| = 12$

3.  $|w| = -5$

4.  $|h| + 3 = 12$

5.  $8 = |x| - 7$

6.  $-9 = 4 + |k|$

7.  $-5 + |f| = -2$

8.  $-8 + |n| = 10$

9.  $|y + 1| = 4$

10.  $12 = |t - 5|$

11.  $|p - (-3)| = 15$

12.  $20 = |-4 + y|$

13.  $-7 = |x - 3|$

14.  $|f - 6| = 7$

15.  $2 + |c - 2| = 12$

16.  $|w - 5| - 3 = -3$

17.  $-9 + |m + 2| = -15$

18.  $|g + 2| + 1 = 4$

19.  $|v + 10| - 2 = 12$

20.  $-12 + |c + 1| = -8$

**Skills Practice****Multiplying Rational Numbers***Find each product.*

1.  $5 \cdot 3.2$

2.  $4.6(3)$

3.  $-8.2(2)$

4.  $(-0.2)(-1.5)$

5.  $(-5.0)(-4.5)$

6.  $-3.7 \cdot 10$

7.  $(-14.0)(0.5)$

8.  $(-1.2)(-4)$

9.  $-4.0(-2.5)$

10.  $-\frac{1}{5}\left(\frac{2}{3}\right)$

11.  $-\frac{3}{4}\left(-\frac{1}{2}\right)$

12.  $\frac{2}{3}\left(-\frac{4}{5}\right)$

13.  $-3 \cdot \left(\frac{1}{6}\right)$

14.  $-\frac{3}{7} \cdot \frac{1}{2}$

15.  $-\frac{5}{6} \cdot 6$

16.  $\frac{2}{5} \cdot (-20)$

17.  $\frac{1}{4} \cdot \left(-\frac{2}{3}\right)$

18.  $1\frac{2}{3} \cdot \left(-\frac{3}{4}\right)$

*Simplify each expression.*

19.  $4(3.1a)$

20.  $-0.2(-4y)$

21.  $(-3.4b)(2.5c)$

22.  $(-5m)(-2.2n)$

23.  $-4 \cdot \left(\frac{1}{2}r\right)$

24.  $\left(\frac{2}{3}a\right)(-15b)$

25.  $\left(\frac{1}{2}f\right)\left(\frac{2}{3}g\right)$

26.  $\left(-\frac{1}{4}x\right)\left(\frac{1}{3}y\right)$

27.  $\left(-\frac{5}{6}y\right)(-12)$

## Skills Practice

### Counting Outcomes

**Determine whether each is an outcome or a sample space for the given experiment.**

1. (1, 2, 3, 4, 5, 6); rolling a number cube once
2. (B, B, R, R, R); choosing five marbles from a jar containing 25 blue and red marbles
3. (Clubs, Spades, Hearts, Diamonds); choosing a card from a standard deck
4. (7, 4, 11, 8); rolling two number cubes simultaneously four times and finding the sum
5. (M, F, F, M, M, F, F); people randomly selected for a survey
6. (O, CC, S); choosing a cookie from a jar containing oatmeal, chocolate chip, and sugar cookies

**Find the number of possible outcomes by drawing a tree diagram.**

7. At the end of a party, the children are given two prizes. First, they may choose a stuffed rabbit, bear, or monkey, and then they may choose a box of crayons or a yo-yo.

8. On vacation, you have a choice of going to a water park or an amusement park during the day, and then a choice of an Italian, Chinese, or Mexican restaurant for dinner in the evening.

**Find the number of possible outcomes by using the Fundamental Counting Principle.**

9. Suppose you roll a number cube three times.
10. Suppose for your meal you have a choice of soup or salad for the first course, chicken, beef, or fish for your second course, and cake or ice cream for your third course.
11. Suppose you spin a game wheel that has 5 different equal-sized sections 3 times.

**Skills Practice****Dividing Rational Numbers****Find each quotient.**

1.  $-9.4 \div 2$

2.  $12 \div (-1.5)$

3.  $-16 \div (-3.2)$

4.  $-8.4 \div 2.1$

5.  $18.9 \div (-6.3)$

6.  $-22.8 \div (-5.7)$

7.  $-13.4 \div 2$

8.  $10.8 \div (-2.7)$

9.  $-35.2 \div (4.4)$

10.  $-12.1 \div -1.1$

11.  $-16.4 \div (-8.2)$

12.  $-25.6 \div 6.4$

13.  $\frac{2}{5} \div \left(-\frac{3}{5}\right)$

14.  $-\frac{7}{9} \div \frac{11}{12}$

15.  $-\frac{1}{3} \div \left(-\frac{3}{8}\right)$

16.  $-24 \div \left(-\frac{3}{4}\right)$

17.  $-\frac{7}{10} \div \frac{4}{5}$

18.  $-\frac{3}{8} \div \frac{12}{13}$

19.  $\frac{5}{12} \div \left(-\frac{5}{6}\right)$

20.  $-\frac{4}{7} \div \left(-\frac{4}{5}\right)$

21.  $\frac{3}{4} \div \left(-\frac{9}{10}\right)$

22.  $\frac{7}{9} \div \left(-\frac{7}{18}\right)$

23.  $-\frac{7}{8} \div \left(-\frac{15}{16}\right)$

24.  $\frac{8}{13} \div \left(-\frac{4}{5}\right)$

**Skills Practice****Solving Multiplication and Division Equations****Solve each equation. Check your solution.**

1.  $-6y = -42$

2.  $-4b = 36$

3.  $-9h = -81$

4.  $-56 = 8x$

5.  $-7d = -49$

6.  $6t = -48$

7.  $9n = -45$

8.  $-20 = 4k$

9.  $-32 = -4f$

10.  $-6c = 18$

11.  $-8a = 64$

12.  $-9w = 54$

13.  $\frac{x}{4} = -12$

14.  $\frac{y}{-3} = -8$

15.  $\frac{n}{5} = -12$

16.  $\frac{2}{3}x = -18$

17.  $24 = \frac{4}{5}y$

18.  $-\frac{7}{9}m = 14$

19.  $-\frac{5}{6}r = -20$

20.  $\frac{y}{4} = -14$

21.  $-\frac{1}{6}x = 5$

22.  $-49 = 7h$

23.  $6d = -30$

24.  $-\frac{3}{8}a = -6$

**Skills Practice****Solving Multi-Step Equations***Solve each equation. Check your solution.*

1.  $3n + 1 = 10$

2.  $2x - 5 = 7$

3.  $5p + 1 = 11$

4.  $2x - 4 = 12$

5.  $-3y + 4 = -11$

6.  $-4x - 5 = 19$

7.  $8 - 4t = -12$

8.  $6t - 3 = 15$

9.  $-7x - 2 = 33$

10.  $-4y + 3 = -25$

11.  $-42 = -10b + 8$

12.  $-8x + 4 = -28$

13.  $-9m - 3 = 24$

14.  $\frac{x}{3} + 4 = -11$

15.  $\frac{y}{-2} - 6 = 6$

16.  $-7 = \frac{b}{4} - 3$

17.  $\frac{m}{-2} + 5 = 16$

18.  $\frac{2y}{3} - 4 = 8$

**Skills Practice****Variables on Both Sides***Solve each equation. Check your solution.*

1.  $2n - 4 = n$

2.  $5x = 2x + 9$

3.  $8w = 6w + 12$

4.  $m + 4 = 9m - 12$

5.  $2x + 4 = 4x - 8$

6.  $3x - 5 = 2x + 4$

7.  $8y - 4 = 5 + 8y$

8.  $9d + 4 = -8 + 6d$

9.  $7y - 3 = 2y + 12$

10.  $-4n - 5 = -n + 4$

11.  $3t - 5 = -5 + 3t$

12.  $-4d + 8 = 8 + 4d$

13.  $8d - 5 = 2d + 25$

14.  $6x + 15 = -6 + 3x$

**Skills Practice****Grouping Symbols***Solve each equation. Check your solution.*

1.  $2(3x - 4) = 4$

2.  $3(y + 2) = -9$

3.  $6 = -2(2y + 5)$

4.  $5 + 2(a - 6) = 9$

5.  $4(2h + 1) - 9 = 11$

6.  $4(a + 3) = 3a$

7.  $3 - 2(2b + 1) = 13 + 2b$

8.  $3(3x + 4) = 2(4x - 5)$

9.  $c = -5(c + 6)$

10.  $8 - 3(4y + 5) = 5$

11.  $-4(2w - 1) + 3(3w + 7) = 18$

12.  $12(x - 3) = 6(2x - 6)$

13.  $5j - 7j = 4(4 - j)$

14.  $-8(a + 2) = 0$

**Skills Practice****Solving Proportions****Solve each proportion.**

1.  $\frac{5}{6} = \frac{x}{12}$

2.  $\frac{5}{14} = \frac{25}{n}$

3.  $\frac{2}{5} = \frac{t}{40}$

4.  $\frac{a}{4} = \frac{9}{36}$

5.  $\frac{4}{m} = \frac{12}{9}$

6.  $\frac{r}{3} = \frac{12}{2}$

7.  $\frac{8}{x} = \frac{3}{6}$

8.  $\frac{6}{8} = \frac{3}{b}$

9.  $\frac{c}{32} = \frac{1}{8}$

10.  $\frac{36}{a} = \frac{8}{2}$

11.  $\frac{27}{54} = \frac{1}{t}$

12.  $\frac{6}{16} = \frac{3}{h}$

13.  $\frac{x+1}{6} = \frac{6}{4}$

14.  $\frac{2}{3} = \frac{6}{x+3}$

15.  $\frac{x-6}{1} = \frac{x}{7}$

16.  $\frac{5}{x} = \frac{1}{x-4}$

17.  $\frac{4}{t+2} = \frac{3}{t-3}$

18.  $\frac{x-5}{x-3} = \frac{3}{4}$

19.  $\frac{a-2}{4} = \frac{a}{8}$

20.  $\frac{3}{5} = \frac{b-3}{b+1}$

21.  $\frac{5}{6} = \frac{y+4}{6}$

**Skills Practice****Scale Drawings and Models**

**On a map, the scale is 1 inch = 30 miles. Find the actual distance for each map distance.**

1. Cheyenne, WY to Des Moines, IA; 2 inches
2. Norfolk, VA to New York, NY; 1 inch
3. Tampa, FL to Boston, MA; 4 inches
4. San Antonio, TX to Corpus Christi, TX;  $\frac{1}{2}$  inch
5. Oklahoma City, OK to Charleston, WVA; 3 inches
6. Albuquerque, NM to Houston, TX;  $2\frac{1}{2}$  inches
7. Philadelphia, PA to Miami, FL;  $3\frac{1}{2}$  inches
8. Carson City, NV to Duluth, MN; 5 inches
9. Salem, OR to Little Rock, AK; 6 inches
10. Springfield, IL to Cleveland, OH;  $1\frac{1}{2}$  inches
11. Boise, ID to Nashville, TN;  $5\frac{1}{2}$  inches
12. Denver, CO to Pittsburgh, PA;  $4\frac{1}{2}$  inches
13. Topeka, KS to Columbia, SC; 3 inches

**Skills Practice****The Percent Proportion****Express each fraction or ratio as a percent.**

1.  $\frac{3}{5}$

2. 2 out of 8

3. 8 to 10

4.  $\frac{4}{10}$

5.  $\frac{7}{10}$

6. 6 to 25

7. 13 out of 25

8.  $\frac{29}{50}$

9.  $\frac{7}{4}$

10. On a given street, six out of 30 households have children under the age of five.

11. In a class of 25 students, four students have blue eyes.

12. Eight out of 20 students received a B on a social studies quiz.

**Use the percent proportion to find each number.**

13. What is 20% of 65?

14. 24 is what percent of 120?

15. 32 is 25% of what number?

16. 40% of 15 is what number?

17. 16 is what percent of 80%

18. Find 52% of 125.

19. 20% of what number is 64?

20. 3 is what percent of 30?

21. Find 35% of 40.

22. 60% of what number is 84?

23. What is 48% of 150?

24. 70 is what percent of 35?

**Skills Practice****The Percent Equation**

**Use the percent equation to find each number.**

1. Find 4% of 200.
2. What is 15% of 80?
3. 14 is 8% of what number?
4. 16 is what percent of 32?
5. Find 12% of 50.
6. 28 is 14% of what number?
7. What is 45% of 120?
8. 51 is 30% of what number?
9. 15 is 60% of what number?
10. Find 20% of 140.
11. What number is 40% of 50?
12. 60 is 24% of what number?
13. Find 45% of 80.
14. What is 85% of 140?
15. 70 is 10% of what number?
16. What is 400% of 16?
17. 14 is 5% of what number?
18. Find 3% of 300.
19. What number is 70% of 200?
20. 18 is 20% of what number?
21. 16 is 40% of what number?
22. What number is 125% of 80?

**Skills Practice****Percent of Change***Find the percent of increase or decrease.*

1. original: 20

new: 12

2. original: 15

new: 24

3. original: 34

new: 51

4. original: 50

new: 26

5. original: 56

new: 42

6. original: 60

new: 69

*The cost of an item and a sales tax rate are given.**Find the total price of each item.*

7. lawn mower: \$350; 6%

8. dress: \$125; 4%

9. book: \$12.50; 8%

10. graphing calculator: \$80; 5%

11. jacket: \$50; 6%

12. handbag: \$75; 8%

*The original cost of an item and a discount rate are given.**Find the sale price of each item.*

13. video: \$20; 40%

14. beach umbrella: \$30; 20%

15. necklace: \$200; 30%

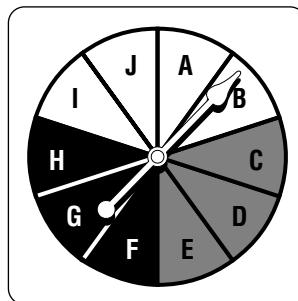
16. sweatshirt: \$44; 25%

17. swing set: \$700; 35%

18. sandals: \$45; 40%

**Skills Practice****Probability and Odds**

*Find the probability of each outcome if the spinner below is spun.*



1. white

2. C

3. a vowel

4. gray

5. black

6. a consonant

7. not gray

8. not white

*Find the odds of each outcome if the spinner above is spun.*

9. D

10. a vowel

11. gray

12. not black

13. G or B

14. white or black

15. F or gray

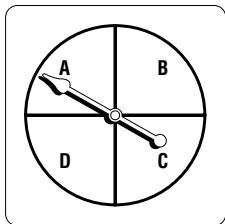
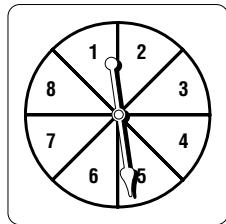
16. white

**Skills Practice****Compound Events**

**A die is rolled and a coin is tossed. Find the probability of each outcome.**

1.  $P(\text{odd number and tails})$
2.  $P(4 \text{ and heads})$
3.  $P(\text{a number greater than } 2 \text{ and heads})$
4.  $P(\text{a multiple of } 3 \text{ and tails})$
5.  $P(\text{a number less than } 6 \text{ and tails})$
6.  $P(\text{a number greater than } 6 \text{ and heads})$

**The spinners shown below are both spun. Find the probability of each outcome.**



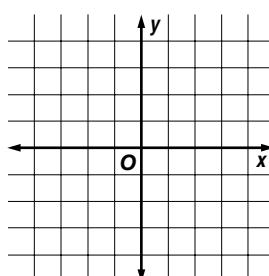
7.  $P(3 \text{ and A})$
8.  $P(1 \text{ and C})$
9.  $P(\text{an even number and D})$
10.  $P(7 \text{ and a vowel})$
11.  $P(\text{a number greater than } 3 \text{ and B})$
12.  $P(\text{an even number and a consonant})$
13.  $P(\text{a prime number and C})$
14.  $P(\text{an odd number and a vowel})$
15.  $P(\text{a number divisible by } 4 \text{ and A})$
16.  $P(\text{a number less than } 4 \text{ and a consonant})$

**Skills Practice****Relations**

**Express each relation as a table and as a graph. Then determine the domain and range.**

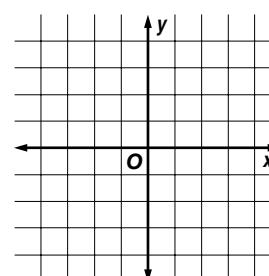
1.  $\{(-4, 2), (-3, -3), (-1, 0), (1, 1), (2, 3)\}$

$x$	$y$



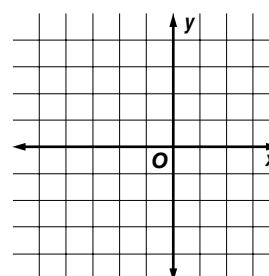
2.  $\{(-2, 4), (-1, 2), (0, 0), (1, 3), (2, 1)\}$

$x$	$y$



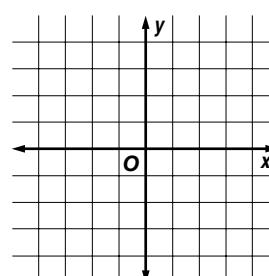
3.  $\{(-5, 4), (-4, -1), (-2, 1), (0, -4), (1, 3)\}$

$x$	$y$



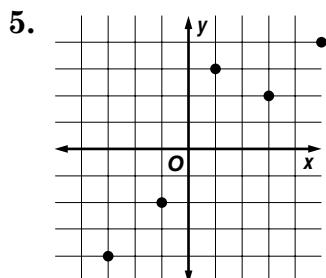
4.  $\{(-3, -5), (-2, 4), (-1, 1), (0, 1), (1, 2)\}$

$x$	$y$

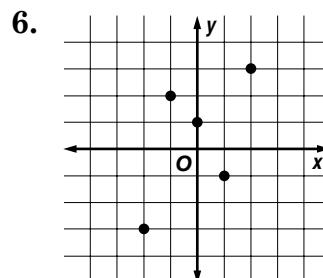


**Express each relation as a set of ordered pairs and in a table.**

**Then determine the domain and the range.**



$x$	$y$



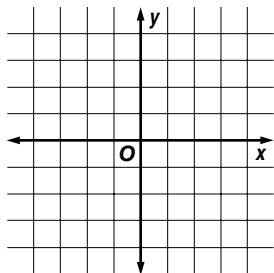
$x$	$y$

**Skills Practice*****Equations as Relations******Which ordered pairs are solutions of each equation?***

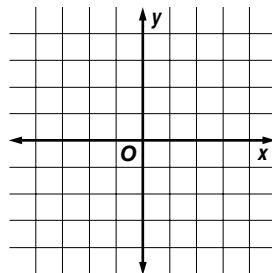
- |                   |             |            |            |            |
|-------------------|-------------|------------|------------|------------|
| 1. $2x - 4y = 14$ | a. (2, 3)   | b. (3, -2) | c. (5, -3) | d. (-1, 2) |
| 2. $3x + 5y = 7$  | a. (-5, 3)  | b. (6, -4) | c. (4, -1) | d. (0, -2) |
| 3. $x - 3y = -11$ | a. (-5, 2)  | b. (4, -1) | c. (6, -3) | d. (1, 5)  |
| 4. $4x + 6y = -2$ | a. (-8, 5)  | b. (4, -4) | c. (3, 2)  | d. (-2, 1) |
| 5. $17 = 5x - y$  | a. (-2, -1) | b. (2, 5)  | c. (4, 3)  | d. (3, -2) |
| 6. $6x + 7y = 0$  | a. (5, -5)  | b. (7, -6) | c. (-6, 4) | d. (4, -4) |

***Solve each equation if the domain is {-1, 0, 1, 2, 3}. Graph the solution set.***

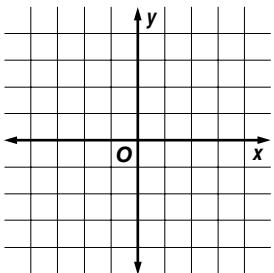
7.  $y = 2x - 3$



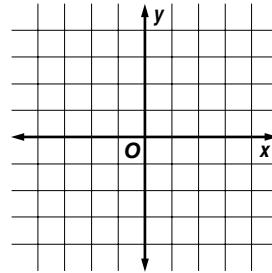
8.  $1 - x = y$



9.  $y = -2x + 2$



10.  $x - y = 0$



**Skills Practice****Graphing Linear Relations**

**Determine whether each equation is a linear equation.  
If an equation is linear, identify A, B, and C.**

1.  $4x - 3y = 5$

2.  $xy - 2 = 8$

3.  $y = -5x$

4.  $6x^2 + 3y = 4$

5.  $y = 4$

6.  $7x - 4y = 3$

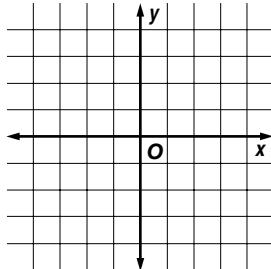
7.  $4x + 5xy = -2$

8.  $5x + 2y - 4 = 2$

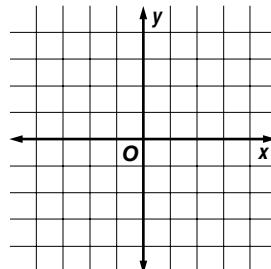
9.  $x^2 - 4 = y$

**Graph each equation.**

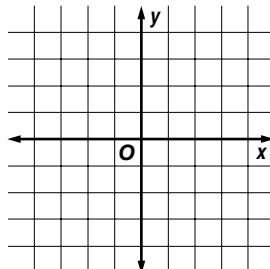
10.  $y = 3x + 1$



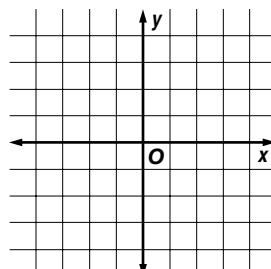
11.  $y = -x - 4$



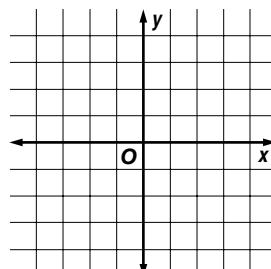
12.  $y = -2$



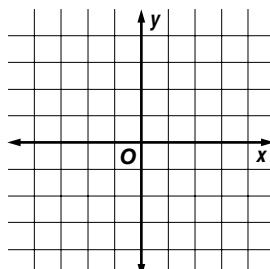
13.  $y = 2x$



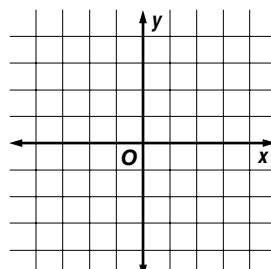
14.  $x = 3$



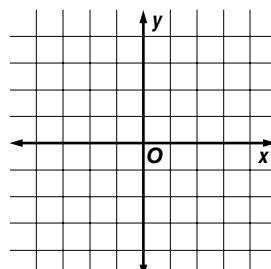
15.  $x + y = 2$



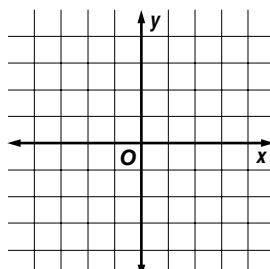
16.  $-4x = y$



17.  $2x + y = -1$



18.  $y = x - 3$



**Skills Practice****Functions****Determine whether each relation is a function.**

1.  $\{(-3, -2), (-2, 0), (-1, 4), (1, 2), (2, 4)\}$

2.  $\{(-4, -1), (-3, -1), (-2, 3), (-1, 0), (0, 2)\}$

3.  $\{(-2, 3), (0, 1), (2, -4), (3, -1), (2, 4)\}$

4.  $\{(1, -5), (2, -3), (3, -1), (4, 0), (5, 2)\}$

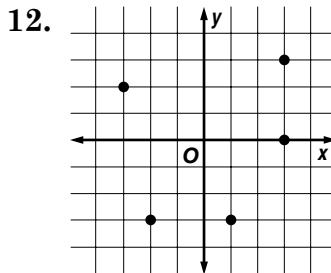
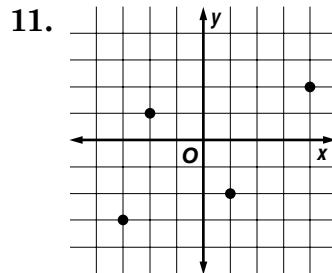
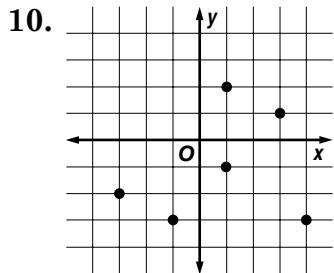
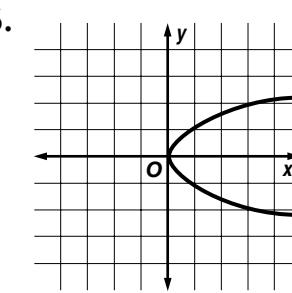
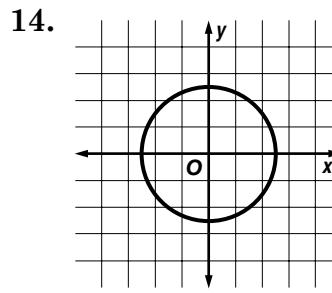
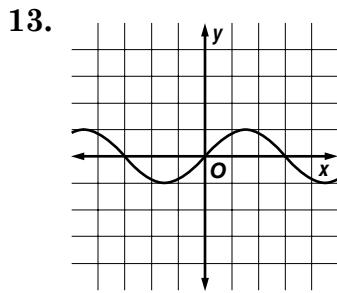
5.  $\{(-2, 6), (-1, -3), (-2, 3), (-4, -2), (0, 5)\}$

6.  $\{(5, -2), (3, -5), (2, -5), (0, -2), (3, -3)\}$

<b>x</b>	<b>y</b>
2	3
-1	0
0	1
1	1
2	2

<b>x</b>	<b>y</b>
-2	3
-1	0
0	1
1	1
2	2

<b>x</b>	<b>y</b>
-3	4
-1	2
0	1
-1	3
-2	5

**Use the vertical line test to determine whether each relation is a function.****If  $f(x) = x - 3$ , find each value.**

16.  $f(2)$

17.  $f(-1)$

18.  $f(-2)$

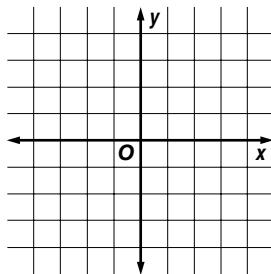
19.  $f(0)$

20.  $f(4)$

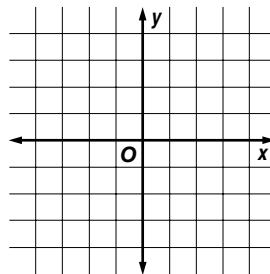
**Skills Practice****Direct Variation**

Determine whether each equation is a direct variation. Verify the answer with a graph.

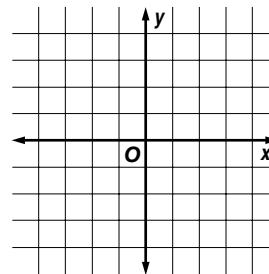
1.  $y = x - 1$



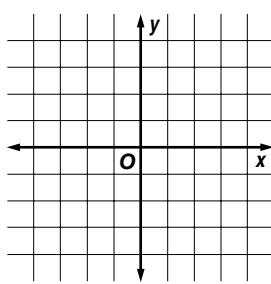
2.  $y = -2x$



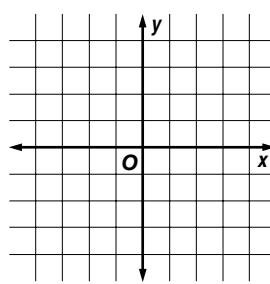
3.  $y = -3x + 2$



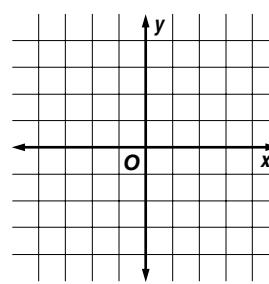
4.  $y = 2x - 4$



5.  $y = 3x$



6.  $y = 4$



**Solve.** Assume that  $y$  varies directly as  $x$ .

7. Find  $x$  when  $y = 4$  if  
 $y = 8$  when  $x = 16$ .

8. Find  $x$  when  $y = 5$  if  
 $y = -4$  when  $x = 12$ .

9. Find  $y$  when  $x = -2$  if  
 $y = 16$  when  $x = 4$ .

10. Find  $y$  when  $x = 12$  if  
 $y = 4$  when  $x = 8$ .

**Find the constant of variation for each direct variation.**

11.  $y = 4x$

12.  $y = x$

13.  $y = -3x$

14.  $y = -x$

15.  $y = -8x$

16.  $5x + y = 0$

17.  $\frac{y}{x} = -6$

18.  $4x + 2y = 0$

**Skills Practice****Inverse Variation**

Determine if each equation is an inverse or a direct variation.

Find the constant of variation.

1.  $xy = 4$

2.  $\frac{a}{b} = -2$

3.  $st + 2 = 0$

4.  $p = \frac{5}{q}$

5.  $\frac{y}{-6} = x$

6.  $-4 = cd - 5$

7.  $a - 2 = b - 2$

8.  $\frac{5}{x} = y$

9.  $y = \frac{3}{4}x$

Solve. Assume that  $y$  varies inversely as  $x$ .

10. Find  $x$  when  $y = 12$  if  $x = 3$  when  $y = 9$ .

11. If  $y = 24$  when  $x = 16$ , find  $y$  when  $x = 2$ .

12. Suppose  $x = -14$  when  $y = 4$ . Find  $x$  when  $y = 8$ .

13. If  $x = 18$  when  $y = -12$ , find  $x$  when  $y = 6$ .

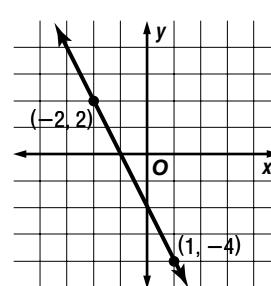
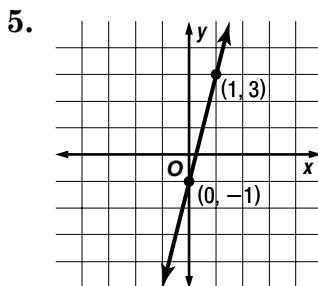
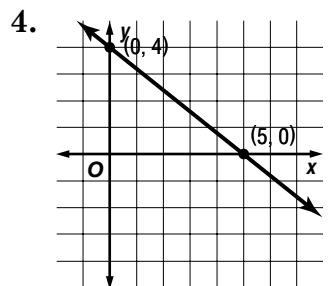
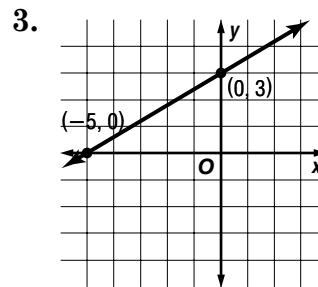
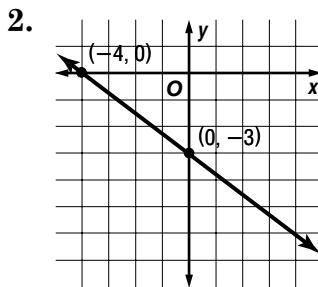
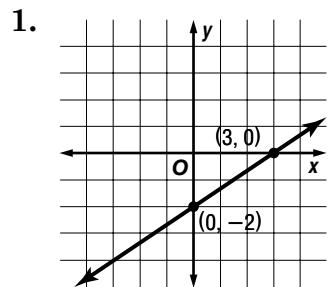
14. Find  $y$  when  $x = 8$  if  $y = 9$  when  $x = 12$ .

15. Suppose  $y = -3$  when  $x = 5$ . Find  $y$  when  $x = -10$ .

16. Find  $x$  when  $y = -6$  if  $x = 16$  when  $y = 12$ .

17. If  $y = 15$  when  $x = 9$ , find  $y$  when  $x = 3$ .

18. Suppose  $x = 4$  when  $y = 10$ . Find  $x$  when  $y = 25$ .

**Skills Practice****Slope****Determine the slope of each line.****Determine the slope of the line passing through the points whose coordinates are listed in each table.**

7. 

<i>x</i>	<i>y</i>
-2	-3
0	0
2	3
4	6

8. 

<i>x</i>	<i>y</i>
-1	2
0	1
1	0
2	-1

9. 

<i>x</i>	<i>y</i>
-5	-5
-2	-3
1	-1
4	1

**Determine the slope of each line.**

10. the line through  
(0, 2) and (3, 4)

11. the line through  
(-3, -1) and (1, 3)

12. the line through  
(-2, 5) and (2, -2)

13. the line through  
(-2, 3) and (4, 3)

14. the line through  
(-4, 8) and (6, -1)

15. the line through  
(-5, 1) and (-2, 4)

**Skills Practice*****Writing Equations in Point-Slope Form***

***Write the point-slope form of an equation for each line passing through the given point and having the given slope.***

1.  $(2, 5), m = -3$

2.  $(-1, -4), m = -2$

3.  $(-5, 2), m = 1$

4.  $(4, -3), m = -\frac{4}{3}$

5.  $(0, -4), m = \frac{1}{3}$

6.  $(-3, -3), m = 2$

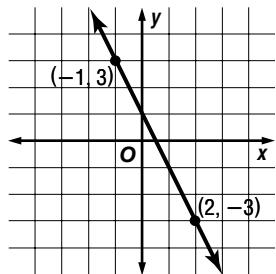
7.  $(1, -1), m = -8$

8.  $(6, 0), m = \frac{2}{3}$

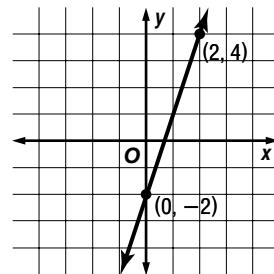
9.  $(-4, -4), m = \frac{5}{6}$

***Write the point-slope form of an equation for each line.***

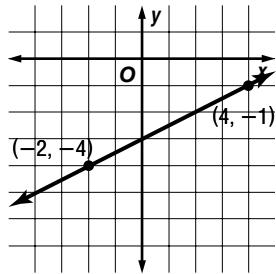
10.



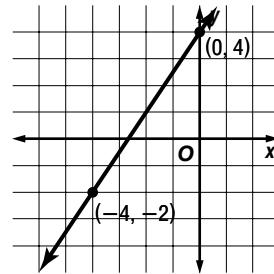
11.



12.



13.



14. the line through points  $(-1, 4)$  and  $(2, -1)$

15. the line through points  $(-2, -4)$  and  $(3, 3)$

**Skills Practice****Writing Equations in Slope-Intercept Form**

**Write an equation in point-intercept form of the line with each slope and y-intercept.**

1.  $m = 2, b = -1$

2.  $m = 3, b = 2$

3.  $m = -1, b = 1$

4.  $m = \frac{1}{2}, b = -2$

5.  $m = -\frac{2}{3}, b = 0$

6.  $m = 4, b = -3$

7.  $m = 0, b = -3$

8.  $m = \frac{1}{4}, b = 5$

9.  $m = 1, b = -2$

10.  $m = \frac{4}{3}, b = -1$

11.  $m = -\frac{3}{2}, b = 2$

12.  $m = \frac{5}{6}, b = 3$

**Write an equation in slope-intercept form of the line having the given slope and passing through the given point.**

13.  $m = 1, (3, 2)$

14.  $m = -2, (4, -3)$

15.  $m = 3, (9, -2)$

16.  $m = -5, (2, 4)$

17.  $m = -3, (2, -6)$

18.  $m = -4, (-1, -3)$

19.  $m = 2, (-6, 2)$

20.  $m = 8, (1, 1)$

21.  $m = -3, (4, -7)$

22.  $m = 0, (1, 2)$

23.  $m = -1, (0, 2)$

24.  $m = 7, (3, 0)$

**Write an equation in slope-intercept form of the line passing through each pair of points.**

25.  $(0, 5)$  and  $(1, 3)$

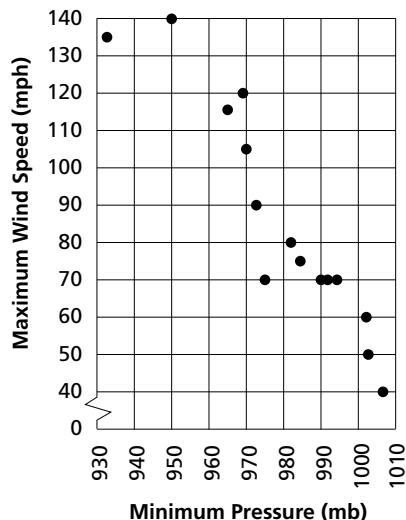
26.  $(-4, 6)$  and  $(-2, 4)$

27.  $(-2, -4)$  and  $(0, 4)$

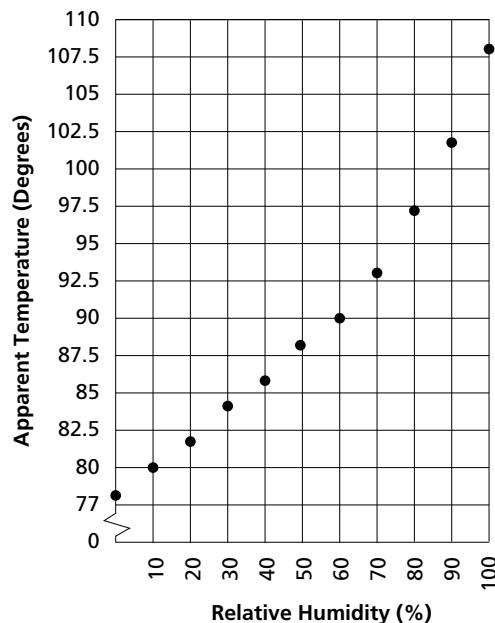
**Skills Practice****Scatter Plots**

Determine whether each scatter plot has a positive relationship, negative relationship, or no relationship. If there is a relationship, describe it.

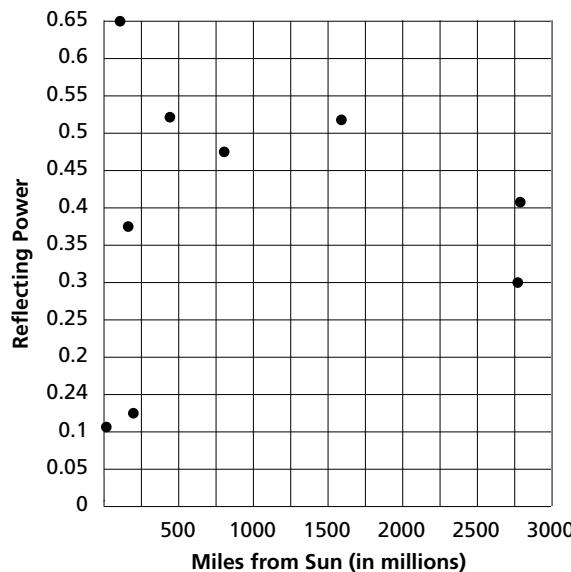
- 1. Maximum Wind Speeds During Hurricanes**



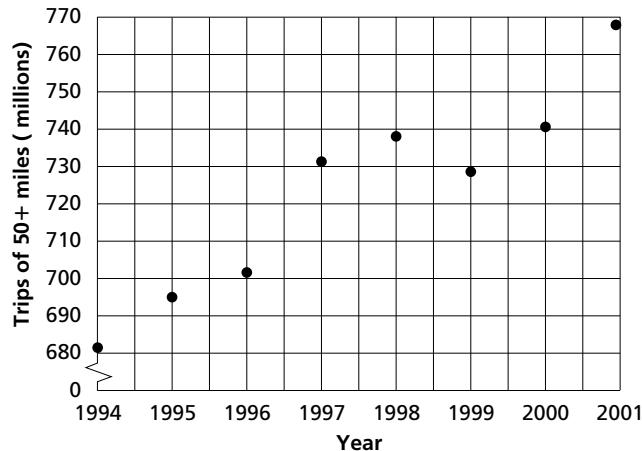
- 2. Heat Index with Air Temperature of 80 Degrees**



- 3. Planetary Characteristics**



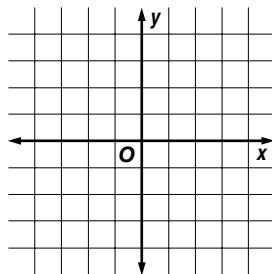
- 4. U.S. Domestic Travel Volume 1994-2001**



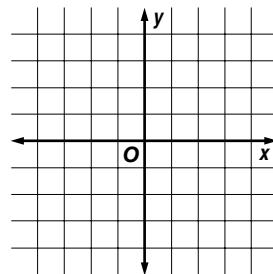
**Skills Practice****Graphing Linear Equations**

Determine the  $x$ - and  $y$ -intercept of the graph of each equation.  
Then graph the equation.

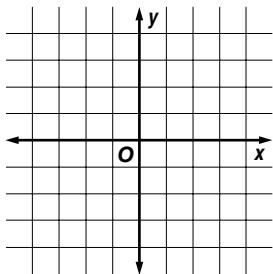
1.  $x + 2y = 4$



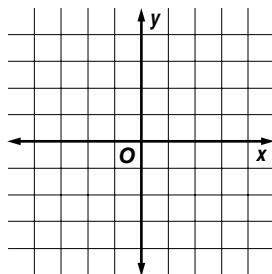
2.  $3x - 2y = -6$



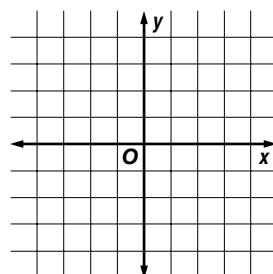
3.  $5x - y = -5$



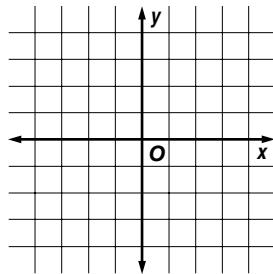
4.  $4x + 3y = 12$



5.  $2x - 4y = 8$

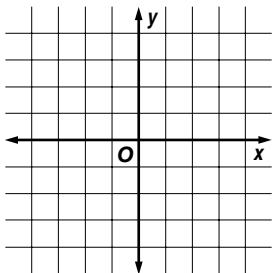


6.  $x + 3y = -3$

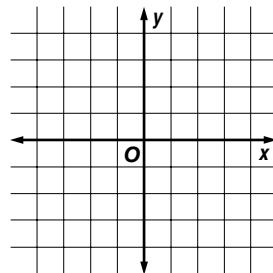


Determine the slope and  $y$ -intercept of the graph of each equation. Then graph the equation.

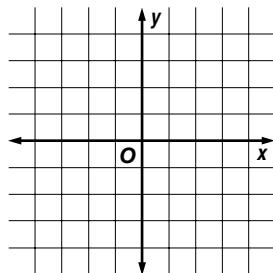
7.  $y = x - 3$



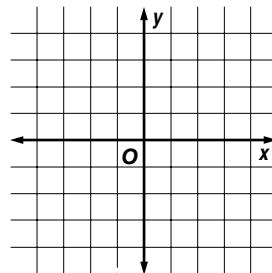
8.  $y = -2x + 4$



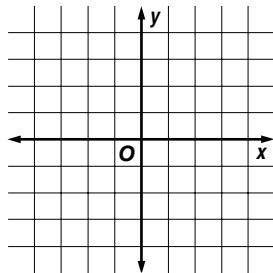
9.  $y = -x - 4$



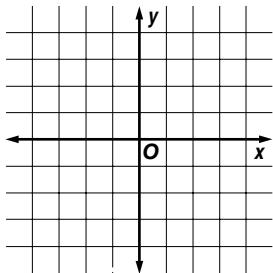
10.  $y = \frac{2}{3}x - 2$



11.  $y = -\frac{1}{4}x + 3$



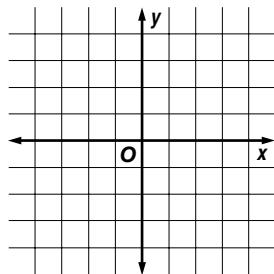
12.  $y = \frac{2}{5}x - 1$



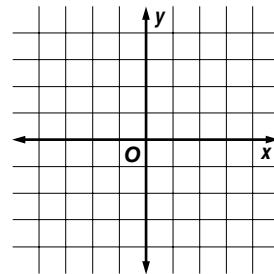
**Skills Practice****Families of Linear Graphs**

**Graph each pair of equations. Describe any similarities or differences and explain why they are a family of graphs.**

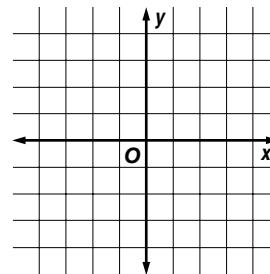
1.  $y = 3x - 2$   
 $y = -x - 2$



2.  $y = -3x - 2$   
 $y = -3x + 1$

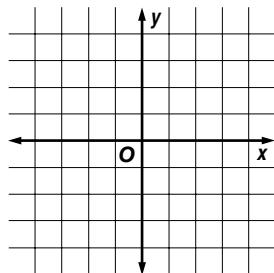


3.  $y = \frac{1}{2}x - 1$   
 $y = \frac{1}{2}x + 3$

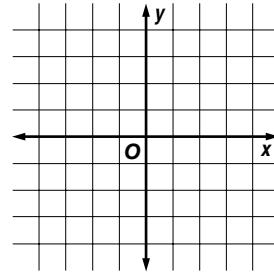


**Compare and contrast the graphs of each pair of equations. Verify by graphing the equations.**

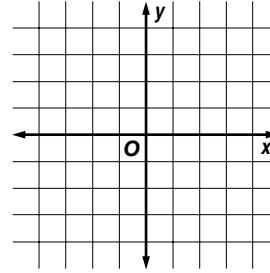
4.  $y = x + 2$   
 $y = x - 4$



5.  $y = 4x - 2$   
 $y = -2x - 2$



6.  $y = 2x - 1$   
 $y = -\frac{1}{2}x - 1$



**Change  $y = 2x - 3$  so that the graph of the new equation fits each description.**

7. same slope,
- 
- shifted up 1 unit

8. same y-intercept,
- 
- steeper slope

9. negative slope,
- 
- same y-intercept

10. same slope,
- 
- shifted down 4 units

11. same slope,
- 
- shifted up 3 units

12. same y-intercept,
- 
- less steep negative slope

**Skills Practice****Parallel and Perpendicular Lines**

**Determine whether the graphs of each pair of equations are parallel, perpendicular, or neither.**

1.  $y = 2x + 1$   
 $y = 2x - 4$

2.  $y = \frac{1}{3}x + 5$   
 $y = -3x - 2$

3.  $y = 4x + 3$   
 $y = \frac{1}{4}x - 1$

4.  $y = \frac{1}{3}x + 4$   
 $y = -3x + 1$

5.  $y = \frac{3}{4}x - 3$   
 $y = \frac{3}{4}x + 5$

6.  $y = \frac{2}{5}x - 4$   
 $y = -\frac{2}{5}x - 2$

7.  $y = x + 1$   
 $y = -x + 1$

8.  $y = 4x - 3$   
 $y = 4x + 3$

9.  $y = \frac{3}{2}x$   
 $y = -\frac{2}{3}x - 3$

**Write an equation in slope-intercept form of the line that is parallel to the graph of each equation and passes through the given point.**

10.  $y = 4x - 5$ ; (1, 3)

11.  $y = -2x + 3$ ; (-4, -1)

12.  $y = x + 1$ ; (0, -4)

13.  $y - 3x = 7$ ; (-2, 2)

14.  $x + y = 8$ ; (4, 6)

15.  $y + 4x = -1$ ; (3, 0)

**Write an equation in slope-intercept form of the line that is perpendicular to the graph of each equation and passes through the given point.**

16.  $y = \frac{1}{2}x + 3$ ; (2, 5)

17.  $y = -\frac{1}{4}x - 2$ ; (3, -1)

18.  $y = \frac{1}{5}x + 2$ ; (-2, 0)

19.  $y = -\frac{1}{3}x + 6$ ; (-2, 4)

20.  $y = 2x + 4$ ; (-6, 4)

21.  $y = -4x + 3$ ; (4, -5)

**Skills Practice****Powers and Exponents****Write each expression using exponents.**

1.  $7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$

2.  $(-4)(-4)(-4)$

3.  $10 \cdot 10 \cdot 10$

4.  $m \cdot m \cdot m \cdot m$

5.  $2 \cdot 3 \cdot 7 \cdot 2 \cdot 7 \cdot 3 \cdot 2 \cdot 2$

6.  $2 \cdot 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5$

7.  $d \cdot d \cdot d \cdot e \cdot e \cdot e$

8.  $(-3)(x)(x)(y)(y)(y)(z)(z)$

**Write each power as a multiplication expression.**

9.  $2^5$

10.  $(-7)^3$

11.  $3^2 \cdot 5^3$

12.  $p^4$

13.  $-3g^4$

14.  $a^3b^2$

15.  $8h^3k$

16.  $5w^2yz^5$

**Evaluate each expression if  $a = 3$ ,  $b = -2$ , and  $c = 4$ .**

17.  $b^5$

18.  $3c^2$

19.  $-2a^3$

20.  $-b^3$

21.  $ab^2c$

22.  $-4bc^2$

23.  $a^3 - b^3$

24.  $2(a - b)^2$

25.  $-3(c^2 - a)$

26.  $4a^2 - 3b^3$

27.  $c^2 + b^3$

29.  $2a^4 - c^3$

**Skills Practice****Multiplying and Dividing Powers***Simplify each expression.*

1.  $4^3 \cdot 4^5$

2.  $7^5 \cdot 7$

3.  $a^4 \cdot a^2$

4.  $y^8(y)$

5.  $(k^3)(k^6)(k)$

6.  $(m^2n)(mn^4)$

7.  $(3b^4)(-2b)$

8.  $(g^2h^5)(g^7h^3)$

9.  $-5x^3(-3x^4)$

10.  $(st)(sv)(tv)$

11.  $(rt^7)(r^3s)(t^2s^5)$

12.  $(8mp^5)(2m^3p^3)(mp)$

13.  $\frac{8^7}{8^3}$

14.  $\frac{3^{15}}{3^{14}}$

15.  $\frac{d^{12}}{d^7}$

16.  $\frac{k^8}{k^5}$

17.  $\frac{x^6y^4}{x^2y^3}$

18.  $\frac{18m^6n^8}{6mn}$

19.  $\frac{36a^3b^7c^4}{-9a^2b^5}$

20.  $\frac{-15p^6q^9}{-5p^3q^7}$

**Skills Practice****Negative Exponents***Simplify each expression.*

1.  $x^{-5}$

2.  $a^{-9}$

3.  $m^8(m^{-3})$

4.  $p^{-6}p^2$

5.  $d^{-4}e^9$

6.  $s^5t^{-3}$

7.  $\frac{h^4}{h^6}$

8.  $\frac{1}{g^{-9}}$

9.  $\frac{b^2c}{c^5}$

10.  $\frac{14w^4}{7w^{-2}}$

11.  $\frac{x^4y^{-3}}{x^2y^2}$

12.  $\frac{32d^5f^{-3}}{8d^{-2}f^6}$

13.  $\frac{m^{-3}n^{-6}}{m^{-5}n}$

14.  $\frac{7a^2b^{-3}c}{21a^{-1}c^5}$

15.  $\frac{1}{r^{-8}}$

16.  $\frac{18p^{-5}}{2q^3}$

17.  $\frac{36a^{-4}b^8}{12b^{-7}}$

18.  $c^6(c^{-3})(c^{-2})$

**Skills Practice****Scientific Notation****Express each number in standard form.**

1. 3.8 micrograms

2. 125 kilobytes

3. 6.84 nanoseconds

4. 9.1 billion dollars

5. 10 megahertz

6. 2.3 milliamperes

**Express each number in scientific notation.**

7. 62,000

8. 850,000

9. 0.000071

10. 0.005

11. 106,000,000

12. 888

13. 0.00031

14. 0.000000001

**Evaluate each expression. Express each result in scientific notation and standard form.**

15.  $(2 \times 10^3)(4 \times 10^2)$

16.  $(1.6 \times 10^{-4})(3 \times 10^{-1})$

17.  $\frac{9.6 \times 10^8}{3.2 \times 10^5}$

18.  $\frac{7.5 \times 10^3}{3 \times 10^{-2}}$

19.  $(2.3 \times 10^3)(3 \times 10^{-2})$

20.  $\frac{12.4 \times 10^{-4}}{4 \times 10^2}$

**Skills Practice****Square Roots****Simplify.**

1.  $\sqrt{81}$

2.  $-\sqrt{64}$

3.  $-\sqrt{256}$

4.  $\sqrt{121}$

5.  $\sqrt{36}$

6.  $-\sqrt{441}$

7.  $-\sqrt{100}$

8.  $\sqrt{225}$

9.  $\sqrt{729}$

10.  $\sqrt{961}$

11.  $\sqrt{\frac{16}{25}}$

12.  $-\sqrt{\frac{49}{81}}$

13.  $-\sqrt{\frac{144}{169}}$

14.  $\sqrt{\frac{9}{25}}$

15.  $-\sqrt{\frac{361}{400}}$

16.  $\sqrt{\frac{144}{36}}$

17.  $\sqrt{\frac{121}{324}}$

18.  $\sqrt{\frac{0.16}{0.49}}$

19.  $\sqrt{0.81}$

20.  $\sqrt{1.69}$

21.  $\sqrt{0.0064}$

22.  $-\sqrt{0.0025}$

**Skills Practice****Estimating Square Roots**

*Estimate each square root to the nearest whole number.*

1.  $\sqrt{2}$

2.  $\sqrt{11}$

3.  $\sqrt{8}$

4.  $\sqrt{23}$

5.  $\sqrt{75}$

6.  $\sqrt{42}$

7.  $\sqrt{130}$

8.  $\sqrt{300}$

9.  $\sqrt{62}$

10.  $\sqrt{250}$

11.  $\sqrt{180}$

12.  $\sqrt{564}$

13.  $\sqrt{412}$

14.  $\sqrt{70}$

15.  $\sqrt{210}$

16.  $\sqrt{1150}$

17.  $\sqrt{90}$

18.  $\sqrt{12}$

19.  $\sqrt{184}$

20.  $\sqrt{645}$

21.  $\sqrt{8.15}$

22.  $\sqrt{0.03}$

23.  $\sqrt{53.7}$

24.  $\sqrt{218.9}$

**Skills Practice****The Pythagorean Theorem**

**If  $c$  is the measure of the hypotenuse and  $a$  and  $b$  are the measures of the legs, find each missing measure. Round to the nearest tenth if necessary.**

1.  $a = 12, b = 16, c = ?$

2.  $a = 7, b = 24, c = ?$

3.  $b = 8, c = 15, a = ?$

4.  $a = 14, c = 21, b = ?$

5.  $a = 18, b = 9, c = ?$

6.  $b = 6, c = 31, a = ?$

7.  $a = 22, c = 38, b = ?$

8.  $b = 11, c = 29, b = ?$

9.  $a = 6, b = 10, c = ?$

10.  $a = 14, b = 9, c = ?$

11.  $a = 8, c = 14, b = ?$

12.  $b = 7, c = 21, a = ?$

**The lengths of three sides of a triangle are given. Determine whether each triangle is a right triangle.**

13. 5 cm, 12 cm, 13 cm

14. 3 ft, 8 ft, 11 ft

15. 15 m, 9 m, 35 m

16. 14 mi, 8 mi, 18 mi

17. 11 in., 60 in., 61 in.

18. 7 mm, 13 mm, 20 mm

19. 32 yd, 24 yd, 40 yd

20. 2 ft, 8 ft, 9 ft

**Skills Practice****Polynomials**

Determine whether each expression is a monomial. Explain why or why not.

1.  $12x$

2.  $3m - 9$

3.  $\frac{7}{a}$

4.  $19r^2st$

5.  $3p^{-5}$

State whether each expression is a polynomial. If it is a polynomial, identify it as a monomial, binomial, or trinomial.

6.  $3d - 9$

7.  $6s^2 - 5s + 2s^{-1}$

8.  $-14a^3bc^2$

9.  $8w^2 + 4w - 3$

10.  $y^2 + \frac{3}{8}y$

11.  $\frac{m}{n} + 9$

Find the degree of each polynomial.

12.  $5j - 3$

13. 7

14.  $4x^3 - 2y^5$

15.  $12a^3b^2 + 9ab - b^3$

16.  $3b^2 + 2b - 4$

17.  $3g^3$

Arrange the terms of each polynomial so that the powers of  $x$  are in descending order.

18.  $x^2 + 3x^4 - 7x + 2x^3 - 4$

19.  $5x^2y - 9x^3 + 7xy^4 + 2y^6$

**Skills Practice*****Adding and Subtracting Polynomials******Find each sum.***

1. 
$$\begin{array}{r} 3x + 6 \\ (+) \ x - 9 \\ \hline \end{array}$$

2. 
$$\begin{array}{r} -8m - 7 \\ (+) \ 3m + 5 \\ \hline \end{array}$$

3. 
$$\begin{array}{r} 7a + 3b \\ (+) \ -2a + 4b \\ \hline \end{array}$$

4. 
$$\begin{array}{r} 3d^2 + 2d + 4 \\ (+) \ d^2 - 6d + 1 \\ \hline \end{array}$$

5. 
$$\begin{array}{r} 5p^2q - 2pq \\ (+) \ -6p^2q + 3pq \\ \hline \end{array}$$

6. 
$$\begin{array}{r} 9c - 3d \\ (+) \ -3c - 5d \\ \hline \end{array}$$

7. 
$$\begin{array}{r} f^2 + f + 1 \\ (+) \ 4f^2 + 3f - 7 \\ \hline \end{array}$$

8. 
$$\begin{array}{r} -12w + 6v - 1 \\ (+) \ 7w + 3v + 2 \\ \hline \end{array}$$

9. 
$$\begin{array}{r} 3g^2 + 2gh + 5 \\ (+) \ -8g^2 - 3gh - 2 \\ \hline \end{array}$$

***Find each difference.***

10. 
$$\begin{array}{r} 5z + 7 \\ (-) \ 3x + 2 \\ \hline \end{array}$$

11. 
$$\begin{array}{r} 3a + 5 \\ (-) \ 7a - 2 \\ \hline \end{array}$$

12. 
$$\begin{array}{r} -6x + 2 \\ (-) \ -3x + 5 \\ \hline \end{array}$$

13. 
$$\begin{array}{r} 4b^2 - 2b + 1 \\ (-) \ 3b^2 + 6b + 4 \\ \hline \end{array}$$

14. 
$$\begin{array}{r} -3p^2 + 2p - 1 \\ (-) \ 5p^2 + 7p + 9 \\ \hline \end{array}$$

15. 
$$\begin{array}{r} 7w^2 - 3wy + 5y^2 \\ (-) \ -2w^2 - 4wy + 2y^2 \\ \hline \end{array}$$

16. 
$$\begin{array}{r} -7r - 5 \\ (-) \ -11r - 8 \\ \hline \end{array}$$

17. 
$$\begin{array}{r} -9n^2 + 13mn \\ (-) \ 5n^2 - 2mn \\ \hline \end{array}$$

18. 
$$\begin{array}{r} 5x^2 - 7x + 9 \\ (-) \ -2x^2 - 9x + 3 \\ \hline \end{array}$$

**Skills Practice****Multiplying a Polynomial by a Monomial****Find each product.**

1.  $4(x + 6)$

2.  $8(a - 2)$

3.  $-5(m + 3)$

4.  $-7(d - 2)$

5.  $h(h + 4)$

6.  $k(k - 9)$

7.  $6p(p - 8)$

8.  $5(x^2 - 3x + 1)$

9.  $-4g(-2g + 7)$

10.  $3c(-2c - 5)$

11.  $2(3x^2 - 5x + 4)$

12.  $-3x(6x^2 - 12x + 18)$

**Solve each equation.**

13.  $4(x + 2) = 16$

14.  $2(y - 5) = 4$

15.  $-3(a + 4) = 6$

16.  $6(m + 1) = 3m - 3$

17.  $4(c - 3) + 5 = 2c + 3$

18.  $3(n - 8) = 4(n + 2)$

19.  $x(x - 3) - x(x + 5) + 6 = -2$

20.  $-9(z + 5) = 0$

21.  $-4(2d + 3) = 3(-4d - 4)$

22.  $8(s - 2) = 5s + 11$

**Skills Practice****Multiplying Binomials**

*Find each product. Use the Distributive Property or the FOIL method.*

1.  $(x + 2)(x + 7)$

2.  $(x + 8)(x + 3)$

3.  $(b + 4)(b - 2)$

4.  $(w - 7)(w + 3)$

5.  $(h + 3)(h - 11)$

6.  $(m - 5)(m - 2)$

7.  $(y - 1)(y - 3)$

8.  $(t - 4)(t + 9)$

9.  $(2x + 3)(x + 1)$

10.  $(k + 4)(3k + 2)$

11.  $(4m + 1)(m - 2)$

12.  $(w + 6)(3w - 4)$

13.  $(-5b + 3)(b - 2)$

14.  $(-2g - 4)(7g - 2)$

15.  $(3x + 4)(2x - 3)$

16.  $(8a - 4)(4a + 5)$

17.  $(2k - 3)(6k - 1)$

18.  $(-4q - 1)(-3q + 2)$

19.  $(2m + n)(3m - n)$

20.  $(4a - 2b)(5a + 3b)$

21.  $(3d - 2c)(3d + 2c)$

22.  $(7x - 9)(-3x + 1)$

**Skills Practice****Special Products****Find each product.**

1.  $(x + 4)^2$

2.  $(w + 1)^2$

3.  $(a - 3)^2$

4.  $(c - 8)^2$

5.  $(m + 5)^2$

6.  $(y - 7)^2$

7.  $(4 + d)^2$

8.  $(9 - h)^2$

9.  $(3 + 4g)^2$

10.  $(3 - x)^2$

11.  $(x + 1)(x - 1)$

12.  $(f - 8)(f + 8)$

13.  $(3d - 5)(3d + 5)$

14.  $(2w + 1)(2w - 1)$

15.  $(2a + 9b)(2a - 9b)$

16.  $(7 + 3p)(7 - 3p)$

17.  $(5 - 10w)(5 + 10w)$

18.  $(1 - a)(1 + a)$

19.  $(x - y)^2$

20.  $(m + n)^2$

21.  $3(y + 1)^2$

22.  $h(h - 1)^2$

## **Skills Practice**

## **Factors**

**Find the factors of each number. Then classify each number as prime or composite.**

- |       |       |
|-------|-------|
| 1. 23 | 2. 18 |
| 3. 40 | 4. 37 |
| 5. 83 | 6. 72 |

**Factor each monomial.**

- 7.**  $12x^2$       **8.**  $8m^2$

**9.**  $14ab^2$       **10.**  $30m^2n^2$

**11.**  $21y^2z$       **12.**  $45bc^3$

**Find the GCF of each set of numbers or monomials.**

- |                           |                  |
|---------------------------|------------------|
| 13. 12, 32                | 14. 24, 36       |
| 15. 21, 49                | 16. 38, 95       |
| 17. $6a^2$ , $15a$        | 18. $7xy$ , $13$ |
| 19. $18s^3t^2$ , $24mn^8$ | 20. $20t^3u^5$ , |

**Skills Practice****Factoring Using the Distributive Property**

**Factor each polynomial. If the polynomial cannot be factored, write prime.**

1.  $3x + 12$

2.  $8w + 36$

3.  $6a + 9a^2$

4.  $14m + 21m^2n$

5.  $5t - 11w$

6.  $9f^2g^3 - 12f^3g^2$

7.  $18pq + 11q^4$

8.  $7d - 35$

9.  $x^2y^3 - 12xy^5$

10.  $21t^3u^5 + 14t^5u^3$

11.  $32a^3b - 24a^2b^2$

12.  $x^2 + y^2$

13.  $9m - 6n + 12p$

14.  $15g^2 - 45gh^2$

15.  $18de^2 + 45e^5$

16.  $12abc + 18ac - 24ab$

**Find each quotient.**

17.  $(21x^2 + 14xy) \div 7x$

18.  $(36mnp - 24p) \div 12p$

19.  $(48y^3z^2 - 18yz) \div 6yz$

20.  $(84d + 24) \div 12$

**Skills Practice****Factoring Trinomials:  $x^2 + bx + c$** 

**Factor each trinomial. If the trinomial cannot be factored, write prime.**

1.  $x^2 + 5x + 6$

2.  $a^2 + 11a + 30$

3.  $m^2 + 8m + 12$

4.  $w^2 + 2w + 1$

5.  $p^2 + 3p - 40$

6.  $c^2 - 2c - 15$

7.  $b^2 - 6b + 8$

8.  $s^2 - 5s - 25$

9.  $t^2 - 7t + 12$

10.  $d^2 + 9d + 18$

11.  $k^2 - 4k - 45$

12.  $h^2 - 3h - 88$

13.  $x^2 - x - 12$

14.  $j^2 + 12j + 32$

15.  $p^2 - 5p + 6$

16.  $e^2 + 3e - 10$

17.  $y^2 + 6y + 9$

18.  $t^2 - 10t + 25$

19.  $m^2 + 11m + 28$

20.  $r^2 - 14r + 40$

21.  $g^2 + 6g + 5$

22.  $w^2 - 13w - 30$

**Skills Practice****Factoring Trinomials:  $ax^2 + bx + c$** 

**Factor each trinomial. If the trinomial cannot be factored, write prime.**

1.  $2x^2 + 5x + 3$

2.  $3x^2 - 5x - 12$

3.  $4x^2 - 19x - 5$

4.  $6x^2 + 7x + 2$

5.  $6m^2 - 5m + 1$

6.  $8d^2 - 10d - 3$

7.  $3w^2 - 2w - 16$

8.  $10p^2 - p - 2$

9.  $9z^2 - 6z - 8$

10.  $4a^2 + 8a + 3$

11.  $5g^2 - 3g + 11$

12.  $6c^2 + 7c - 20$

13.  $8y^2 - 6y - 9$

14.  $5x^2 - 17x - 12$

15.  $6t^2 - 7t - 5$

16.  $7m^2 - 20m - 3$

17.  $8w^2 - 2w - 3$

18.  $3p^2 + p - 10$

19.  $16y^2 - 6y - 1$

20.  $7k^2 - 3k + 11$

21.  $6x^2 - x - 12$

22.  $10n^2 - n - 2$

**Skills Practice****Special Factors**

Determine whether each trinomial is a perfect square trinomial. If so, factor it.

1.  $x^2 + 6x + 9$

2.  $m^2 - 10m + 25$

3.  $t^2 + 8t + 16$

4.  $a^2 - 12a + 36$

5.  $w^2 - 7w + 14$

6.  $9p^2 - 12p + 4$

Determine whether each binomial is the difference of squares. If so, factor it.

7.  $h^2 - 36$

8.  $y^2 + 4$

9.  $9 - d^2$

10.  $16a^2 - 49b^2$

11.  $f^2 - 100$

12.  $3p^2 - 75$

Factor each polynomial. If the polynomial cannot be factored, write prime.

13.  $7z^2 + 14$

14.  $m^2 - 81n^2$

15.  $r^2 - 14r + 49$

16.  $w^2 + 5w - 24$

17.  $4s^2 + 4s - 8$

18.  $5e^2 - 80$

19.  $p^3 - 25p$

20.  $f^2 - 72$

21.  $k^3 + 16k^2 + 64k$

22.  $8x^2 + 10x - 3$

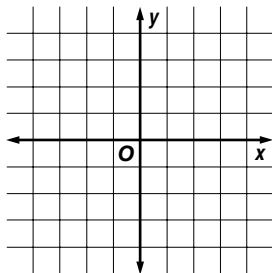
23.  $16v^2 - 81w^2$

24.  $5b^2 + 33b - 14$

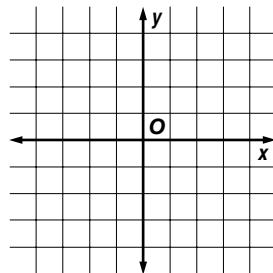
**Skills Practice****Graphing Quadratic Functions**

**Graph each quadratic function by making a table of values.**

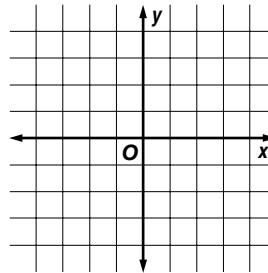
1.  $y = 3x^2$



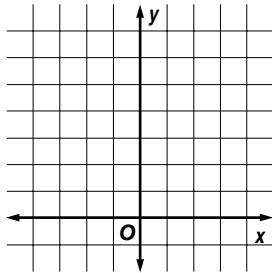
2.  $v = -2x^2$



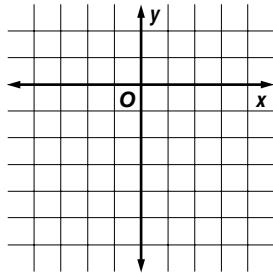
3.  $y = x^2 - 2$



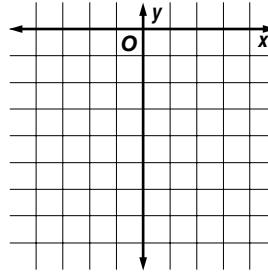
4.  $y = x^2 + 3$



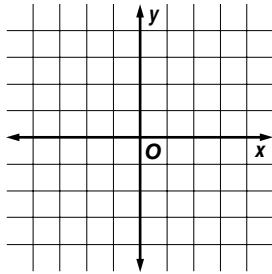
5.  $y = -3x^2 + 1$



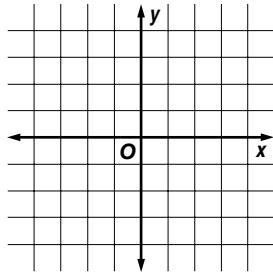
6.  $y = -x^2 - 3$



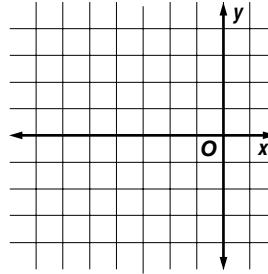
7.  $y = x^2 + 3x$



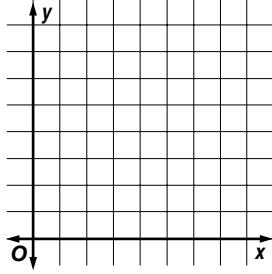
8.  $y = 2x^2 - 5x$



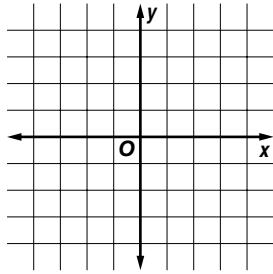
9.  $y = x^2 + 5x + 4$



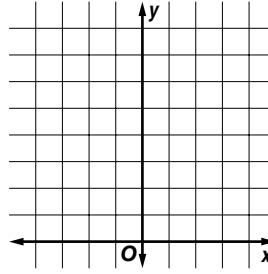
10.  $y = x^2 - 7x + 12$



11.  $y = 2x^2 + 4x - 2$



12.  $y = -2x^2 - 4x + 6$



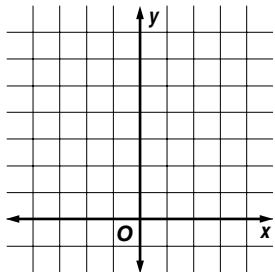
**Skills Practice****Families of Quadratic Functions**

**Graph each group of equations on the same screen. Compare and contrast the graphs.**

1.  $y = x^2$

$y = 3x^2$

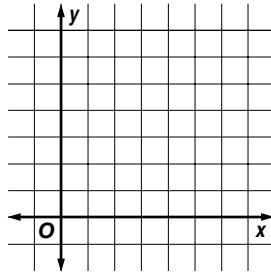
$y = 5x^2$



2.  $y = (x - 2)^2$

$y = (x - 3)^2$

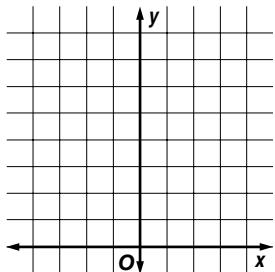
$y = (x - 5)^2$



3.  $y = x^2 + 1$

$y = x^2 + 2$

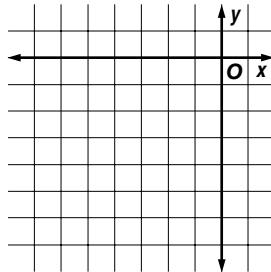
$y = x^2 + 3$



4.  $y = -(x + 1)^2$

$y = -(x + 3)^2$

$y = -(x + 5)^2$



**Describe how each graph changes from the parent graph  $y = x^2$ . Then name the vertex of each graph.**

5.  $y = 3x^2$

6.  $y = (x - 2)^2$

7.  $y = x^2 + 4$

8.  $y = -x^2$

9.  $y = -7x^2$

10.  $y = -x^2 + 3$

11.  $y = -(x + 1)^2$

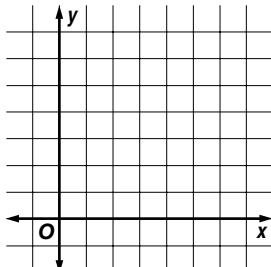
12.  $y = -x^2 - 2$

13.  $y = (x + 3)^2$

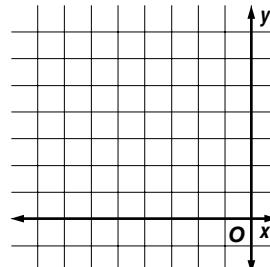
14.  $y = 0.6x^2$

**Skills Practice****Solving Quadratic Equations by Graphing***Solve each equation by graphing the related function.*

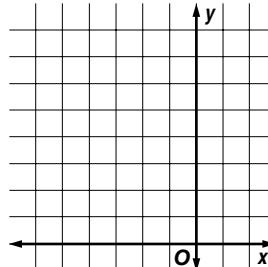
1.  $x^2 - 3x + 2 = 0$



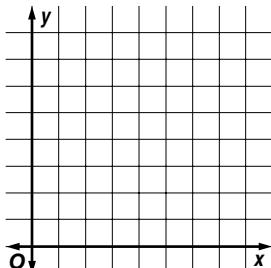
2.  $x^2 + 6x + 8 = 0$



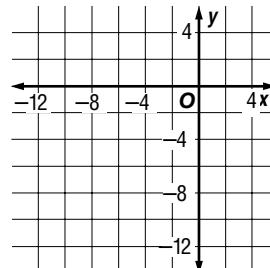
3.  $x^2 + 4x + 4 = 0$



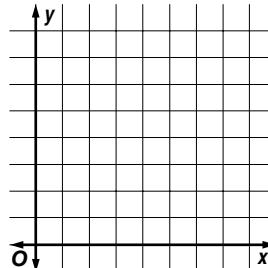
4.  $x^2 - 7x + 12 = 0$



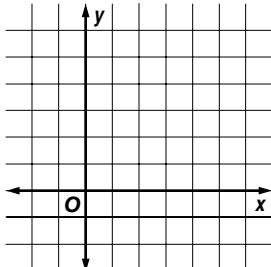
5.  $x^2 + 9x + 8 = 0$



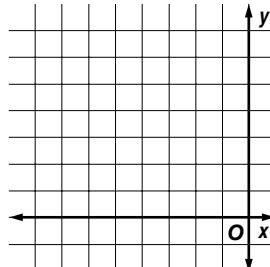
6.  $x^2 - 12x + 36 = 0$



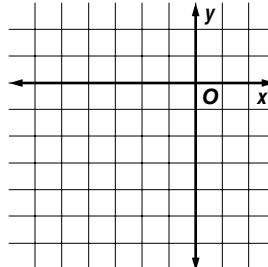
7.  $x^2 - 5x + 4 = 0$



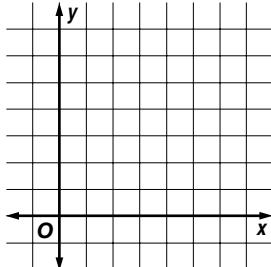
8.  $x^2 + 11x + 30 = 0$



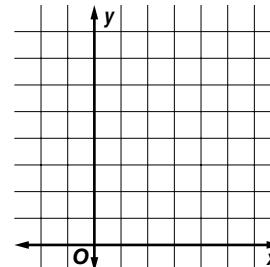
9.  $-x^2 - 3x - 2 = 0$



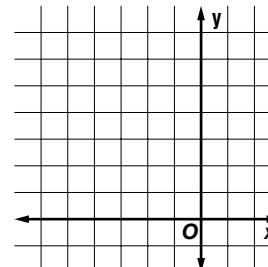
10.  $x^2 - 9x + 20 = 0$



11.  $x^2 - 4x + 5 = 0$



12.  $x^2 + 6x + 9 = 0$



**Skills Practice****Solving Quadratic Equations by Factoring**

**Solve each equation. Check your solution.**

1.  $a(a - 3) = 0$

2.  $d(d + 5) = 0$

3.  $4p(p + 9)$

4.  $8w(w - 6)$

5.  $(z + 3)(z + 8) = 0$

6.  $(b - 5)(b + 2) = 0$

7.  $(m + 2)(m - 1) = 0$

8.  $(x - 7)(x - 3) = 0$

9.  $(r - 4)^2 = 0$

10.  $(y + 3)^2 = 0$

11.  $(t - 3)(3t + 6) = 0$

12.  $(h + 4)(2h + 6) = 0$

13.  $x^2 + 7x + 12 = 0$

14.  $d^2 - 2d - 24 = 0$

15.  $n^2 + 4n + 3 = 0$

16.  $f^2 - 5f + 4 = 0$

17.  $c^2 + 13c = 0$

18.  $w^2 - 5w = 0$

**Skills Practice****Solving Quadratic Equations by Completing the Square**

**Find the value of  $c$  that makes each trinomial a perfect square.**

1.  $x^2 + 8x + c$

2.  $m^2 - 14m + c$

3.  $w^2 - 2w + c$

4.  $b^2 + 4b + c$

5.  $p^2 - 10p + c$

6.  $s^2 + 6s + c$

7.  $y^2 + 18y + c$

8.  $t^2 - 24t + c$

9.  $d^2 + 12d + c$

10.  $j^2 + 16j + c$

**Solve each equation by completing the square.**

11.  $h^2 - 4h = -3$

12.  $p^2 + 8p = -12$

13.  $x^2 - 6x + 8 = 0$

14.  $m^2 + 12m + 36 = 0$

15.  $d^2 + 2d - 24 = 0$

16.  $w^2 - 2w = 35$

17.  $y(y - 8) = -12$

18.  $g(g + 4) = 5$

**Skills Practice****The Quadratic Formula**

**Use the Quadratic Formula to solve each equation.**

1.  $b^2 + 2b - 15 = 0$

2.  $p^2 - 7p + 12 = 0$

3.  $-m^2 + 5m - 4 = 0$

4.  $-x^2 - 3x + 18 = 0$

5.  $g^2 - 4g - 5 = 0$

6.  $w^2 + 8w = -15$

7.  $r^2 = -7r - 10$

8.  $y^2 - 9 = 8y$

9.  $h^2 - 5h = 0$

10.  $v^2 + 11v = 0$

11.  $x^2 - 36 = 0$

12.  $d^2 = 100$

13.  $4s^2 + 4s - 3 = 0$

14.  $2f^2 - 3f - 5 = 0$

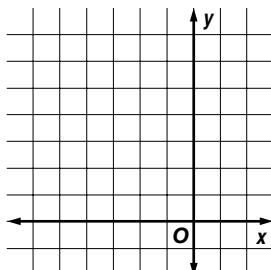
15.  $3q^2 + 5q + 1 = 0$

16.  $5w^2 + w = 1$

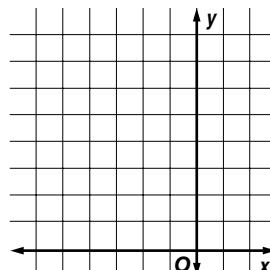
**Skills Practice****Exponential Functions**

**Graph each exponential function. Then state the  $y$ -intercept.**

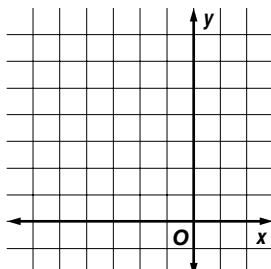
1.  $y = 2^x$



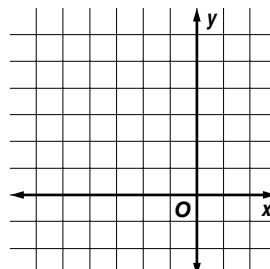
2.  $y = 3^x$



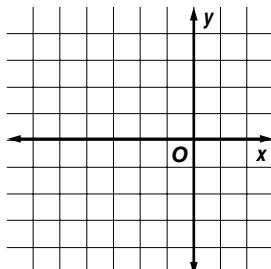
3.  $y = 2^x + 2$



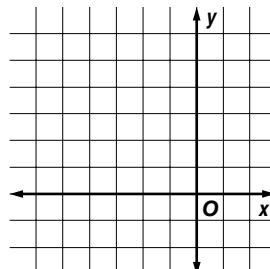
4.  $y = 3^x - 2$



5.  $y = 4^x - 3$



6.  $y = 2^x - 1$



**Find the amount of money in a bank account given the following conditions.**

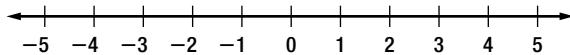
7. initial deposit = \$3000, annual rate = 2%, time = 3 years
8. initial deposit = \$7500, annual rate = 5%, time = 2 years
9. initial deposit = \$4000, annual rate = 7%, time = 5 years
10. initial deposit = \$5500, annual rate = 4%, time = 4 years
11. initial deposit = \$6000, annual rate = 3%, time = 6 years
12. initial deposit = \$4000, annual rate = 2.5%, time = 4 years

**Skills Practice****Inequalities and Their Graphs****Write an inequality to describe each number.**

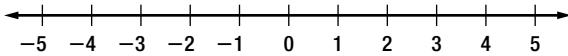
1. a number greater than 9      2. a number less than 5
3. a number less than or equal to 4      4. a number greater than or equal to  $-1$
5. a number that is at least 3      6. a number that is no more than 12

**Graph each inequality on a number line.**

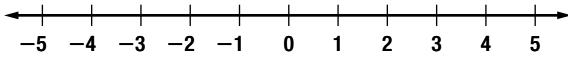
7.  $x < 3$



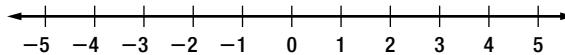
9.  $x \geq 4$



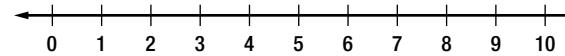
11.  $x > 2$



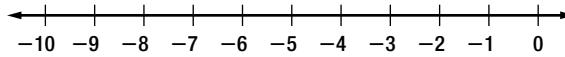
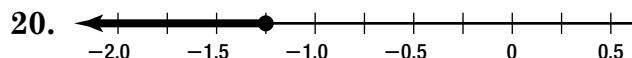
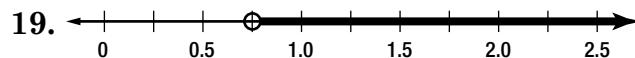
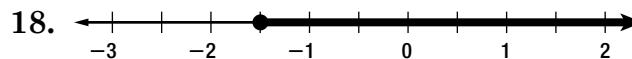
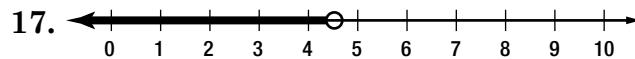
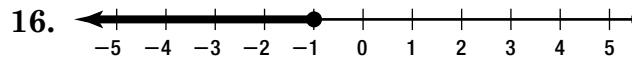
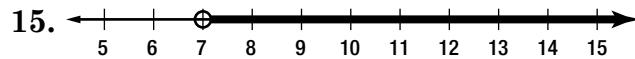
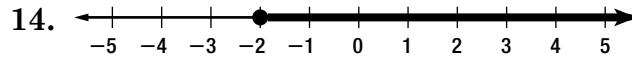
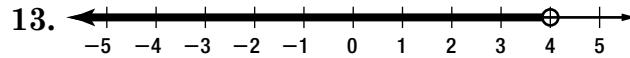
8.  $x > -1$



10.  $x \leq 6$



12.  $x \geq -5$

**Write an inequality for each graph.**

**Skills Practice****Solving Addition and Subtraction Inequalities****Solve each inequality. Check your solution.**

1.  $d - 4 > 13$

2.  $m + 6 < 3$

3.  $w + 1 \leq -4$

4.  $t - 7 \geq -2$

5.  $-6 + b < -1$

6.  $p + 11 \geq 4$

7.  $f - 9 > 3$

8.  $4 + n \leq 3$

9.  $y + 7 < 4$

10.  $-14 < a - 6$

11.  $5 + k \leq -2$

12.  $-1 \geq w - 4$

13.  $d + 9 < -5$

14.  $s - 7 > -10$

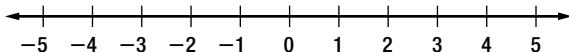
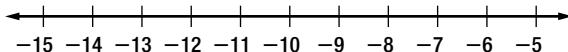
15.  $5 + a \geq -2$

16.  $t + 4 < 0$

**Solve each inequality. Graph the solution.**

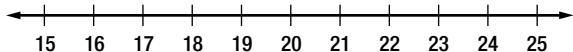
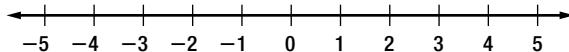
17.  $4x + 3 > 3x - 8$

18.  $7g \leq 6g + 4$



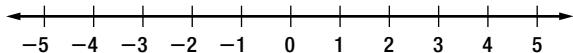
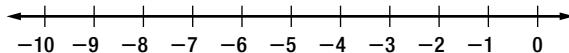
19.  $3a < 2(a - 1)$

20.  $4(p - 3) > 3(p + 2)$



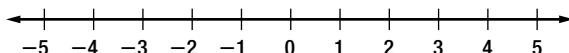
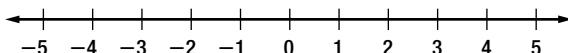
21.  $6w - 3 \geq 7w + 2$

22.  $-(-b + 4) > 0$



23.  $12 < 9m - 8m + 9$

24.  $5x - 4 < 4x - 3$



**Skills Practice****Solving Multiplication and Division Inequalities**

Solve each inequality. Check your solution.

1.  $3x > 15$

2.  $7w \leq -21$

3.  $4p < 24$

4.  $-2g > 14$

5.  $9t \geq -45$

6.  $-6d < -42$

7.  $-4s > 28$

8.  $12m \geq 60$

9.  $\frac{y}{4} < 2$

10.  $\frac{h}{-7} \leq -5$

11.  $\frac{k}{5} \geq 1$

12.  $\frac{c}{8} < -2$

13.  $3r < 7$

14.  $5a \leq -9$

15.  $-4 > 2w$

16.  $24 < -3n$

17.  $\frac{5}{8}x \leq -5$

18.  $-\frac{4}{7}b \geq -4$

**Skills Practice****Solving Multi-Step Inequalities**

**Solve each inequality. Check your solution.**

1.  $2x - 3 > 7$

2.  $4g + 5 \leq 13$

3.  $6m + 1 < 19$

4.  $8 + 9t \geq 35$

5.  $2b + 11 > 15$

6.  $14 \leq 4w - 6$

7.  $-3d + 2 < 17$

8.  $-5z - 7 \leq 3$

9.  $8 - 4p > 20$

10.  $-2y + 7 < -9$

11.  $14 \leq 20 - 3c$

12.  $-6 > 3d - 9$

13.  $14 > 2 + 4j$

14.  $16 - 7g \geq 2$

15.  $0 \leq -6s + 36$

16.  $7b + 9 > -19$

**Skills Practice****Solving Compound Inequalities**

**Write each compound inequality without using and.**

1.  $x > 3$  and  $x < 9$

2.  $g < 5$  and  $g > -2$

3.  $w \geq -1$  and  $w \leq 4$

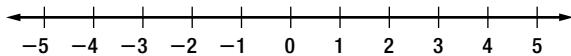
4.  $p \leq 7$  and  $p > 2$

5.  $m > -4$  and  $m < 6$

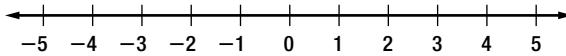
6.  $y \geq 0$  and  $y < 5$

**Graph the solution of each compound inequality.**

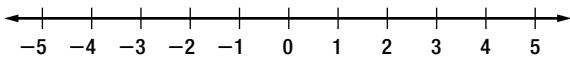
7.  $d > -1$  or  $d \leq -3$



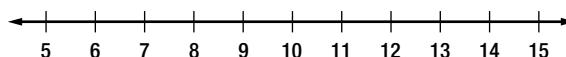
8.  $k \leq 4$  and  $k > -2$



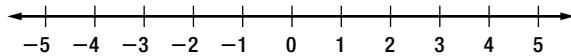
9.  $a < 5$  and  $a > 2$



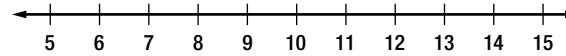
10.  $p \geq 8$  and  $p \leq 11$



11.  $t > 3$  or  $t < -2$



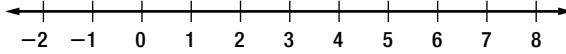
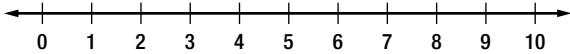
12.  $h \leq 7$  or  $h > 13$



**Solve each compound inequality. Graph the solution.**

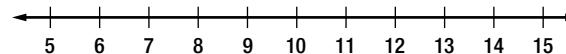
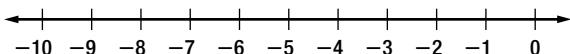
13.  $4 < x - 2 < 7$

14.  $13 \geq w + 6 \geq 5$



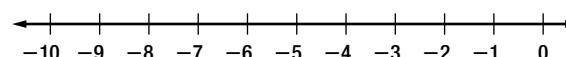
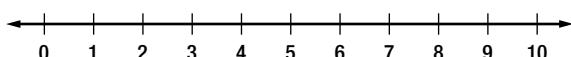
15.  $-24 < 3h < -6$

16.  $b - 3 > 9$  or  $b - 7 < 3$



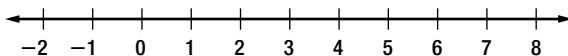
17.  $2g > 12$  or  $g + 5 < 8$

18.  $c + 4 > 2$  or  $c - 7 < -13$

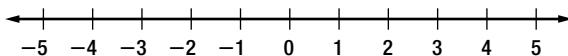


**Skills Practice****Solving Inequalities Involving Absolute Value***Solve each inequality. Graph the solution.*

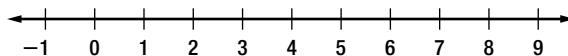
1.  $|x - 3| < 4$



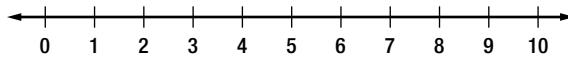
3.  $|p - 1| \leq 2$



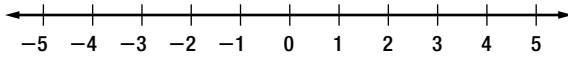
5.  $|b - 4| > 5$



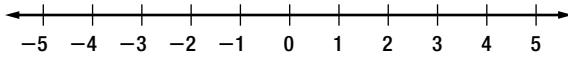
7.  $|m - 7| > 3$



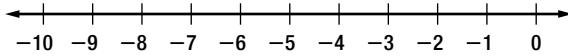
9.  $|4p| < 12$



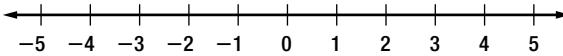
11.  $|6m| \geq 24$



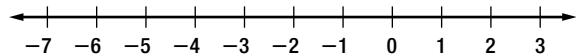
13.  $|a + 5| < 2$



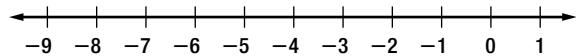
15.  $|8x| \leq 32$



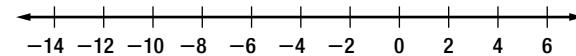
2.  $|t + 2| < 3$



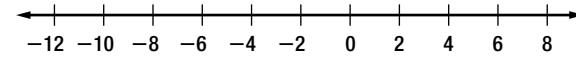
4.  $|y + 4| < 5$



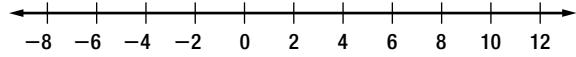
6.  $|s + 2| \geq 8$



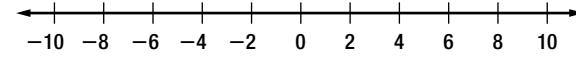
8.  $|a + 1| \geq 9$



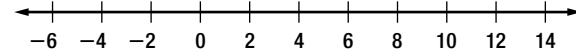
10.  $|8p| \leq 48$



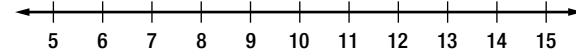
12.  $|3d| > 27$



14.  $|t - 5| > 7$

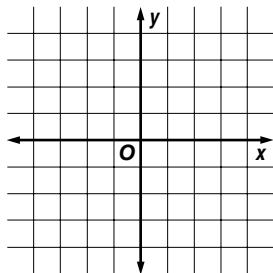


16.  $|f - 9| > 2$

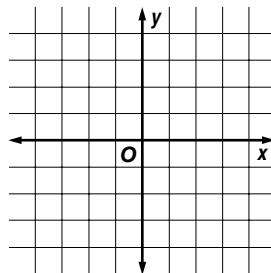


**Skills Practice****Graphing Inequalities in Two Variables****Graph each inequality.**

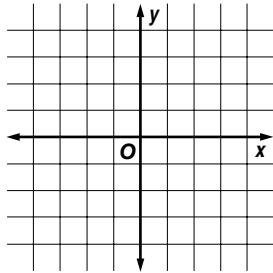
1.  $x > 2$



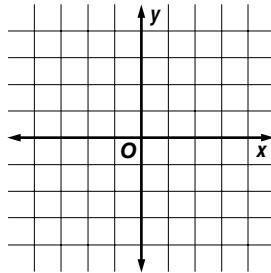
2.  $y < 1$



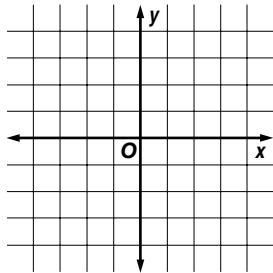
3.  $y \geq -3$



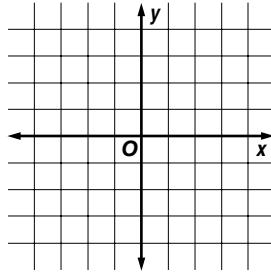
4.  $x \leq -1$



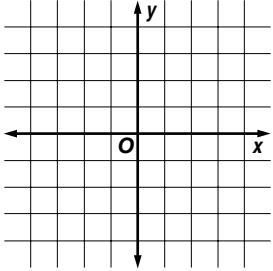
5.  $y < x + 2$



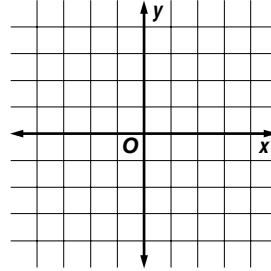
6.  $y \geq x - 1$



7.  $y > 2x$



8.  $y \leq x$

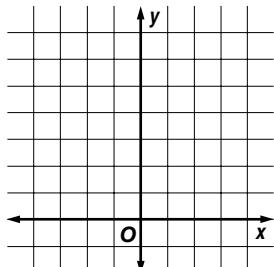


**Skills Practice****Graphing Systems of Equations**

Solve each system of equations by graphing.

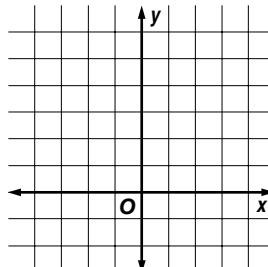
1.  $x = -2$

$y = 6$



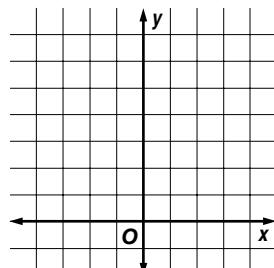
2.  $x = 3$

$y = x + 2$



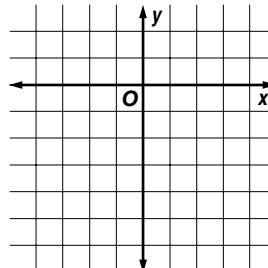
3.  $x = -4$

$y = 1 - x$



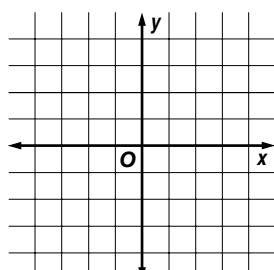
4.  $x = 2$

$y = x - 4$



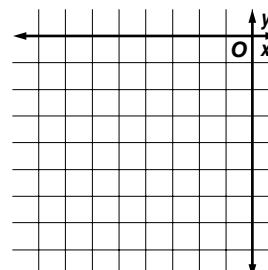
5.  $y = 1$

$x + y = 4$



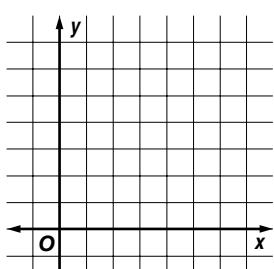
6.  $y = -7$

$x - y = 3$



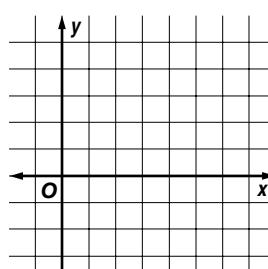
7.  $y = 3$

$x + 2y = 10$



8.  $x - y = 4$

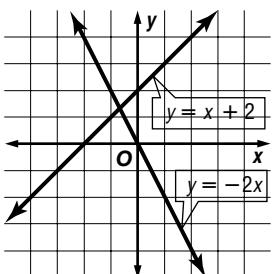
$x + y = 6$



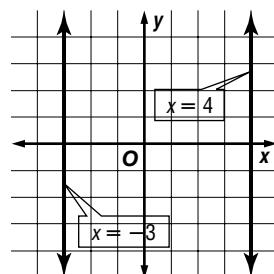
**Skills Practice****Solutions of Systems of Equations**

*State whether each system is consistent and independent, consistent and dependent, or inconsistent.*

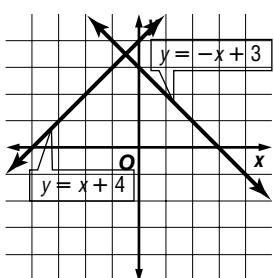
1.



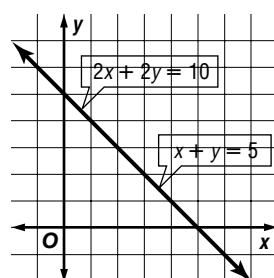
2.



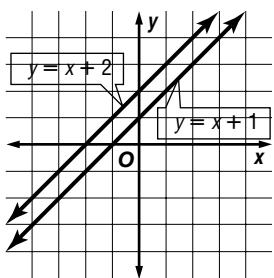
3.



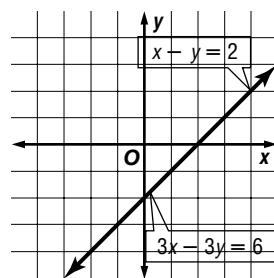
4.



5.

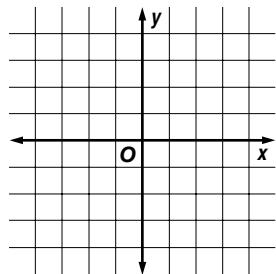


6.

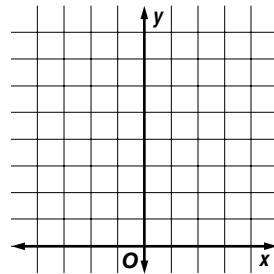


*Determine whether each system of equations has one solution, no solution, or infinitely many solutions by graphing. If the system has one solution, name it.*

7.  $2x + 8y = 12$   
 $x + 4y = 6$



8.  $y = 3$   
 $4x + 2y = 14$



**Skills Practice****Substitution**

**Use substitution to solve each system of equations.**

1.  $y = x$

$$4x + y = 15$$

2.  $y = -x$

$$3x + y = 4$$

3.  $y = 2x$

$$x + 3y = 21$$

4.  $y = 4x$

$$2x + y = -12$$

5.  $x = 3 + y$

$$2x + 3y = 1$$

6.  $x = 2 - y$

$$4x - 6y = 18$$

7.  $x = 4y$

$$x + y = -10$$

8.  $y = -3x$

$$x + y = 20$$

9.  $x = 3y - 2$

$$3x + 2y = 16$$

10.  $x = 2y$

$$3x - 4y = 10$$

11.  $x = y + 4$

$$3x + 2y = 27$$

12.  $x = y - 3$

$$4x + 3y = -5$$

**Skills Practice****Elimination Using Addition and Subtraction**

Use elimination to solve each system of equations.

$$\begin{aligned} 1. \quad & x + y = 6 \\ & x - y = 4 \end{aligned}$$

$$\begin{aligned} 2. \quad & x + y = 14 \\ & x - y = 6 \end{aligned}$$

$$\begin{aligned} 3. \quad & x + 2y = 8 \\ & x - y = 5 \end{aligned}$$

$$\begin{aligned} 4. \quad & x + 4y = 8 \\ & 3x - 4y = 8 \end{aligned}$$

$$\begin{aligned} 5. \quad & 3x + y = 2 \\ & -3x + 2y = -14 \end{aligned}$$

$$\begin{aligned} 6. \quad & 4x + 5y = 7 \\ & 2x - 5y = 11 \end{aligned}$$

$$\begin{aligned} 7. \quad & -2x + y = -11 \\ & 5x - y = 26 \end{aligned}$$

$$\begin{aligned} 8. \quad & 2x + 3y = 4 \\ & 2x + 5y = 12 \end{aligned}$$

$$\begin{aligned} 9. \quad & 3x + 2y = 11 \\ & 6x - 2y = -2 \end{aligned}$$

$$\begin{aligned} 10. \quad & 4x + 3y = -13 \\ & 6x - 3y = 3 \end{aligned}$$

$$\begin{aligned} 11. \quad & 6x - 15y = 0 \\ & 6x + 10y = 0 \end{aligned}$$

$$\begin{aligned} 12. \quad & 4x + 6y = -28 \\ & 5x - 6y = -35 \end{aligned}$$

**Skills Practice****Elimination Using Multiplication**

Use elimination to solve each system of equations.

$$\begin{aligned}1. \quad & x + 3y = 8 \\& x - y = 4\end{aligned}$$

$$\begin{aligned}2. \quad & x + 2y = 15 \\& x - y = 6\end{aligned}$$

$$\begin{aligned}3. \quad & x + 2y = 4 \\& 3x - y = 5\end{aligned}$$

$$\begin{aligned}4. \quad & x + y = 7 \\& 3x - 4y = 0\end{aligned}$$

$$\begin{aligned}5. \quad & 2x - y = 12 \\& 3x + 2y = -3\end{aligned}$$

$$\begin{aligned}6. \quad & x + y = 3 \\& -3x + 2y = -14\end{aligned}$$

$$\begin{aligned}7. \quad & 4x + y = -13 \\& 6x - 3y = 3\end{aligned}$$

$$\begin{aligned}8. \quad & 3x - 5y = 7 \\& 12x - 20y = 28\end{aligned}$$

$$\begin{aligned}9. \quad & 2x + y = 8 \\& 5x - 2y = -16\end{aligned}$$

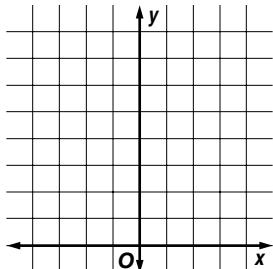
$$\begin{aligned}10. \quad & 4x + 5y = 15 \\& 2x - y = 11\end{aligned}$$

$$\begin{aligned}11. \quad & 3x - 7y = 11 \\& 3x - 7y = 2\end{aligned}$$

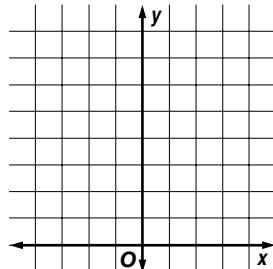
$$\begin{aligned}12. \quad & x = 6 - y \\& 4x - 4y = 24\end{aligned}$$

**Skills Practice****Solving Quadratic-Linear Systems of Equations****Solve each system of equations by graphing.**

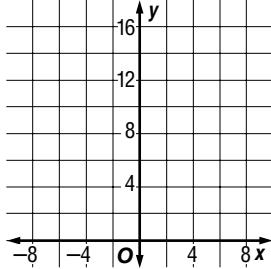
1.  $y = x^2$   
 $y = 2x + 3$



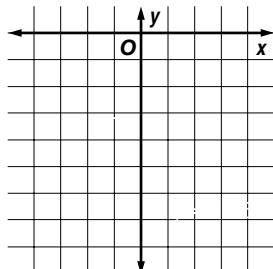
2.  $y = 4$   
 $y = x^2$



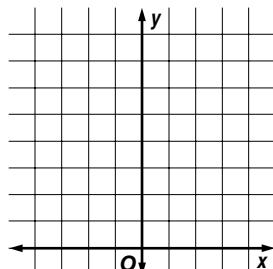
3.  $x = 3$   
 $y = x^2 + 2$



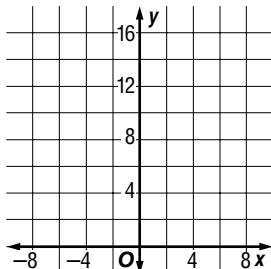
4.  $y = -x^2$   
 $y = x - 6$



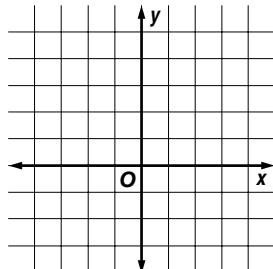
5.  $y = x^2 - 1$   
 $y = -2x + 2$



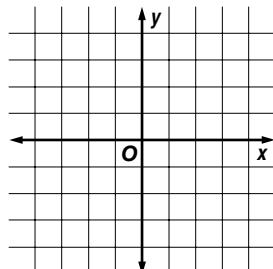
6.  $y = x^2 + 2$   
 $y = x + 14$



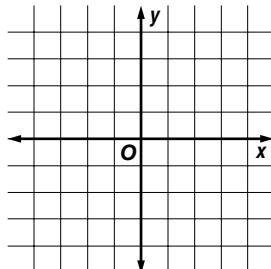
7.  $y = 5$   
 $y = -2x^2$



8.  $y = -x^2 + 3$   
 $y = x + 1$



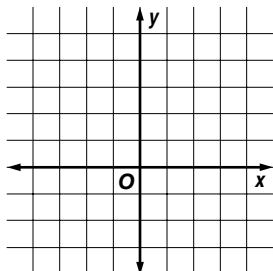
9.  $x = -3$   
 $y = x^2 - 4$



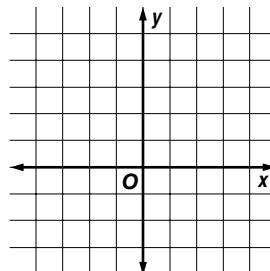
**Skills Practice****Graphing Systems of Inequalities**

Solve each system of inequalities by graphing. If the system does not have a solution, write no solution.

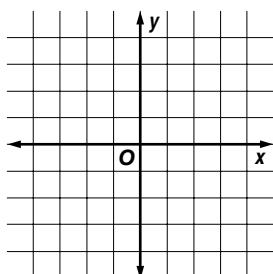
1.  $x + y > 3$   
 $x - y < 2$



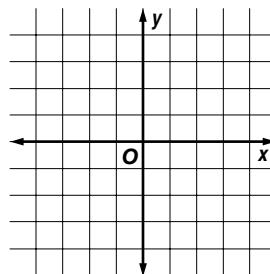
2.  $x + y \leq 5$   
 $x - y \geq 1$



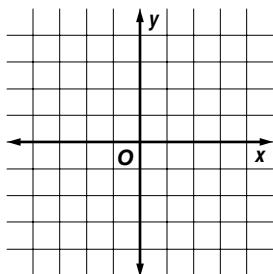
3.  $x < 3$   
 $y \geq -1$



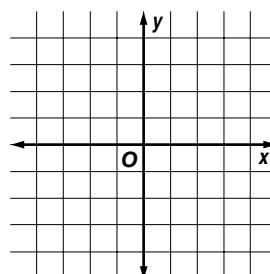
4.  $x > 1$   
 $y > 0$



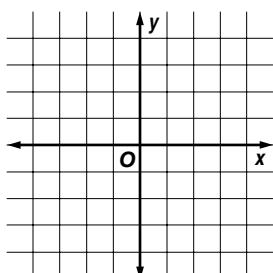
5.  $y < x$   
 $x \leq 4$



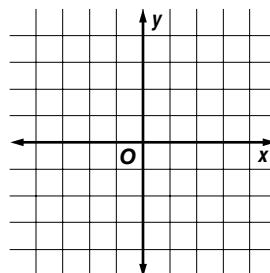
6.  $y \geq x$   
 $y < 2$



7.  $y < 2x$   
 $y \geq x + 1$



8.  $y > -3x$   
 $y < x - 2$



**Skills Practice****The Real Numbers**

**Name the set or sets of numbers to which each real number belongs. Let  $N$  = natural numbers,  $W$  = whole numbers,  $Z$  = integers,  $Q$  = rational numbers, and  $I$  = irrational numbers.**

1.  $\frac{5}{8}$

2.  $\sqrt{36}$

3.  $-13$

4.  $0.123123\dots$

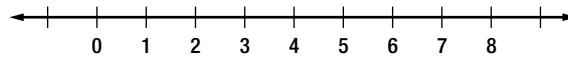
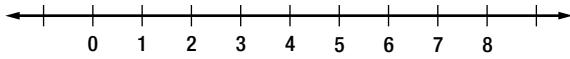
5.  $\sqrt{2}$

6.  $-\frac{21}{3}$

**Find an approximation, to the nearest tenth, for each square root. Then graph the square root on a number line.**

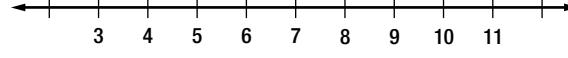
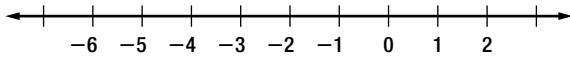
7.  $\sqrt{5}$

8.  $\sqrt{19}$



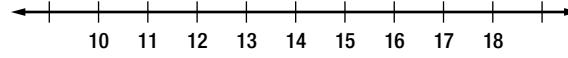
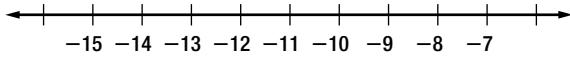
9.  $-\sqrt{22}$

10.  $\sqrt{80}$



11.  $-\sqrt{145}$

12.  $\sqrt{275}$



**Determine whether each number is rational or irrational. If it is irrational, find two consecutive integers between which its graph lies on the number line.**

13.  $\sqrt{25}$

14.  $\sqrt{11}$

15.  $-\sqrt{42}$

16.  $\sqrt{169}$

17.  $-\sqrt{35}$

18.  $\sqrt{66}$

**Skills Practice****The Distance Formula**

**Find the distance between each pair of points. Round to the nearest tenth, if necessary.**

1.  $A(0, 3), B(0, 8)$

2.  $C(-4, 1), D(3, 1)$

3.  $E(1, 4), F(3, 1)$

4.  $G(5, 2), H(1, 7)$

5.  $I(-2, 0), J(1, -5)$

6.  $K(9, 3), L(2, 6)$

7.  $M(-3, -6), N(2, 5)$

8.  $P(4, -3), Q(1, 1)$

9.  $R(-8, 3), S(0, 5)$

10.  $T(4, 4), U(8, 8)$

11.  $V(-6, 6), W(2, 4)$

12.  $X(3, 5), Y(-3, -5)$

13.  $A(4, -7), B(1, 2)$

14.  $C(-2, -3), D(5, -1)$

**Skills Practice****Simplifying Radical Expressions**

*Simplify each expression. Leave in radical form.*

1.  $\sqrt{24}$

2.  $\sqrt{48}$

3.  $\sqrt{72}$

4.  $\sqrt{27}$

5.  $\sqrt{300}$

6.  $\sqrt{63}$

7.  $\sqrt{2} \cdot \sqrt{18}$

8.  $\sqrt{5} \cdot \sqrt{20}$

9.  $\sqrt{8} \cdot \sqrt{10}$

10.  $\sqrt{12} \cdot \sqrt{6}$

11.  $2\sqrt{3} \cdot \sqrt{3}$

12.  $5\sqrt{11} \cdot 2\sqrt{11}$

13.  $\frac{\sqrt{24}}{\sqrt{6}}$

14.  $\frac{\sqrt{75}}{\sqrt{3}}$

15.  $\frac{\sqrt{96}}{\sqrt{8}}$

16.  $\frac{\sqrt{48}}{\sqrt{6}}$

17.  $\frac{\sqrt{2}}{\sqrt{5}}$

18.  $\frac{\sqrt{6}}{\sqrt{8}}$

**Skills Practice****Adding and Subtracting Radical Expressions***Simplify each expression.*

1.  $5\sqrt{2} + 3\sqrt{2}$

2.  $11\sqrt{7} + 4\sqrt{7}$

3.  $8\sqrt{2} + 4\sqrt{3}$

4.  $12\sqrt{6} + 5\sqrt{6}$

5.  $14\sqrt{10} - 9\sqrt{10}$

6.  $9\sqrt{3} - \sqrt{3}$

7.  $3\sqrt{15} - 8\sqrt{15}$

8.  $14\sqrt{17} - 8\sqrt{17}$

9.  $12\sqrt{7} - 3\sqrt{7} + 5\sqrt{7}$

10.  $8\sqrt{15} + 2\sqrt{15} - 11\sqrt{15}$

11.  $-4\sqrt{2} - 7\sqrt{2} - \sqrt{2}$

12.  $8\sqrt{5} - 12\sqrt{5} + 2\sqrt{5}$

13.  $3\sqrt{8} + 5\sqrt{2}$

14.  $3\sqrt{3} - 6\sqrt{12}$

15.  $3\sqrt{24} + 5\sqrt{6}$

16.  $\sqrt{72} - 9\sqrt{2}$

17.  $-2\sqrt{48} + 5\sqrt{3}$

18.  $7\sqrt{27} + 2\sqrt{12}$

19.  $5\sqrt{27} - 2\sqrt{48} + \sqrt{12}$

20.  $6\sqrt{20} + \sqrt{125} - 3\sqrt{80}$

**Skills Practice****Solving Radical Equations**

*Solve each equation. Check your solution.*

1.  $\sqrt{x} = 2$

2.  $\sqrt{w} = 7$

3.  $\sqrt{m} = 5$

4.  $\sqrt{f} = 4$

5.  $\sqrt{3b} = 6$

6.  $\sqrt{-5p} = 10$

7.  $4 = \sqrt{2y}$

8.  $\sqrt{8s} - 8 = 0$

9.  $0 = \sqrt{4c} - 8$

10.  $\sqrt{3d} - 9 = 0$

11.  $\sqrt{h - 3} = 4$

12.  $\sqrt{z + 3} = 5$

**Skills Practice****Simplifying Rational Expressions***Find the excluded value(s) for each rational expression.*

1.  $\frac{4x}{x - 2}$

2.  $\frac{3d}{6d + 24}$

3.  $\frac{4}{y(y - 3)}$

4.  $\frac{m - 2}{(m - 7)(m + 5)}$

5.  $\frac{3t}{t^2 + 2t}$

6.  $\frac{h^2 - 16}{h^2 - h - 6}$

*Simplify each rational expression.*

7.  $\frac{21}{35}$

8.  $\frac{6m}{9n}$

9.  $\frac{12x^3y^2}{18x^5y}$

10.  $\frac{6(z - 4)}{15(z - 4)}$

11.  $\frac{(n + 2)(n + 5)}{(n + 5)(n - 4)}$

12.  $\frac{b^2 + 5b}{4(b + 5)}$

13.  $\frac{x^2 + 2x - 8}{3x + 12}$

14.  $\frac{5x + 15}{x^2 - 9}$

**Skills Practice****Multiplying and Dividing Rational Expressions****Find each product.**

1.  $\frac{4m}{3n} \cdot \frac{n^3}{8}$

2.  $\frac{2(g - h)}{g} \cdot \frac{g^2}{g - h}$

3.  $\frac{5t}{t - 3} \cdot \frac{3t - 9}{15}$

4.  $\frac{2w - 12}{7w} \cdot \frac{14}{3w - 18}$

5.  $\frac{4y}{8y + 4} \cdot \frac{14y + 7}{6}$

6.  $\frac{m + 2}{m - 3} \cdot \frac{m}{m^2 - m - 6}$

7.  $\frac{d^2 - 16}{d + 3} \cdot \frac{4d + 12}{d^2 + d - 12}$

8.  $\frac{p^2 - 25}{p^2 + p - 20} \cdot \frac{p^2 + 7p + 12}{p^2 - 2p - 15}$

**Find each quotient.**

9.  $\frac{b^2}{c} \div \frac{b^2}{c^2}$

10.  $\frac{k^5}{5j^3} \div \frac{k^2}{25j^4}$

11.  $\frac{7h^2}{h - 5} \div \frac{h^4}{h - 5}$

12.  $\frac{8z - 16}{20} \div \frac{3z - 6}{40}$

13.  $\frac{t^2 - 25}{6t} \div (t + 5)$

14.  $\frac{9d^4}{d - 3} \div \frac{d}{d - 3}$

**Skills Practice****Dividing Polynomials****Find each quotient.**

1.  $(15m - 10) \div (3m - 2)$

2.  $(24w + 9) \div (8w + 3)$

3.  $(p^2 - 7p) \div (p - 7)$

4.  $(y^2 + 5y) \div (y + 5)$

5.  $(9d^2 + 6d) \div (3d + 2)$

6.  $(12x^2 + 20x) \div (3x + 5)$

7.  $(4c^3 - 14c^2) \div (2c - 7)$

8.  $(18a^2 + 9a^3) \div (2 + a)$

9.  $(b^2 + 4b + 3) \div (b + 3)$

10.  $(m^2 - 2m - 15) \div (m - 5)$

11.  $(h^2 + 7h + 12) \div (h + 3)$

12.  $(y^2 - 9y + 18) \div (y - 3)$

13.  $(z^2 + 11z + 10) \div (z + 1)$

14.  $(b^2 - 4b - 21) \div (b - 7)$

15.  $(f^2 - 36) \div (f + 6)$

16.  $(r^2 - 1) \div (r - 1)$

17.  $(2m^2 - 7m - 4) \div (m - 4)$

18.  $(5m^2 + 2m - 3) \div (m + 1)$

**Skills Practice****Combining Rational Expressions with Like Denominators**

*Find each sum or difference. Write in simplest form.*

1.  $\frac{5}{w} + \frac{3}{w}$

2.  $\frac{9}{b} - \frac{7}{b}$

3.  $\frac{6}{5h} - \frac{2}{5h}$

4.  $\frac{3}{11x} + \frac{9}{11x}$

5.  $\frac{t}{7} + \frac{3t}{7}$

6.  $\frac{9m}{5} - \frac{6m}{5}$

7.  $\frac{6z}{7} - \frac{5z}{7}$

8.  $\frac{8}{5d} - \frac{7}{5d}$

9.  $\frac{p}{3} + \frac{2p}{3}$

10.  $\frac{6n}{5} - \frac{n}{5}$

11.  $\frac{5y}{12} + \frac{y}{12}$

12.  $\frac{10}{27x} + \frac{8}{27x}$

13.  $\frac{3}{8a} + \frac{-1}{8a}$

14.  $\frac{9}{20t} + \frac{7}{20t}$

15.  $\frac{9}{b+4} - \frac{5}{b+4}$

16.  $\frac{m}{n+2} - \frac{m}{n+2}$

17.  $\frac{4c}{c-5} - \frac{20}{c-5}$

18.  $\frac{6p}{p+2} + \frac{12}{p+2}$

**Skills Practice****Combining Rational Expressions with Unlike Denominators****Find the LCM for each pair of expressions.**

1.  $4m^3, 8m$

2.  $2xy^2, 6x^2$

3.  $w - 4, w^2 - 16$

4.  $a^2 + 3a - 10, a^2 - 25$

**Write each pair of rational expressions with the same LCD.**

5.  $\frac{3}{x^2}, \frac{2}{x^3}$

6.  $\frac{9}{12y}, \frac{7}{4y}$

7.  $\frac{3}{mn}, \frac{5}{np}$

8.  $\frac{8c}{2c - 3}, \frac{c}{6c - 9}$

**Find each sum or difference. Write in simplest form.**

9.  $\frac{y}{8} + \frac{y}{4}$

10.  $\frac{p}{3} - \frac{p}{18}$

11.  $\frac{4}{3h} - \frac{2}{9h}$

12.  $\frac{3}{d^2} + \frac{2}{d}$

13.  $\frac{3}{2mn} + \frac{n}{8m^3}$

14.  $\frac{3}{c + 2} + \frac{2}{5c + 10}$

15.  $\frac{5}{w} - \frac{3}{w + 4}$

16.  $\frac{t}{t^2 + 3t + 2} + \frac{1}{t + 2}$

**Skills Practice****Solving Rational Equations***Solve each equation. Check your solution.*

1.  $\frac{x}{4} + \frac{x}{6} = \frac{5}{3}$

2.  $\frac{1}{2} + \frac{3d}{4} = \frac{d}{4}$

3.  $\frac{m}{6} - \frac{3m}{9} = 1$

4.  $\frac{w}{10} + \frac{3w}{5} = -\frac{7}{2}$

5.  $\frac{p+3}{4} = \frac{p-2}{3}$

6.  $\frac{2t-2}{4} = \frac{3t+4}{5}$

7.  $\frac{4}{5x} - \frac{3}{10x} = 2$

8.  $\frac{1}{2a} + \frac{1}{3a} = \frac{1}{12}$

9.  $\frac{8}{k+2} - \frac{2}{k+2} = 3$

10.  $\frac{2}{n} + \frac{3n}{n-1} = 3$

11.  $\frac{y+4}{y} = \frac{y+4}{y-2}$

12.  $\frac{5}{z+2} - \frac{1}{z} = \frac{1}{z}$

13.  $\frac{6}{a-1} + \frac{2}{a} = \frac{2}{a^2-a}$

14.  $\frac{1}{b-1} + \frac{5}{12} = \frac{-2}{3b-3}$

15.  $\frac{4}{p+2} - \frac{11}{9} = \frac{1}{3p+6}$

16.  $\frac{9}{t+3} = \frac{4}{t-2}$