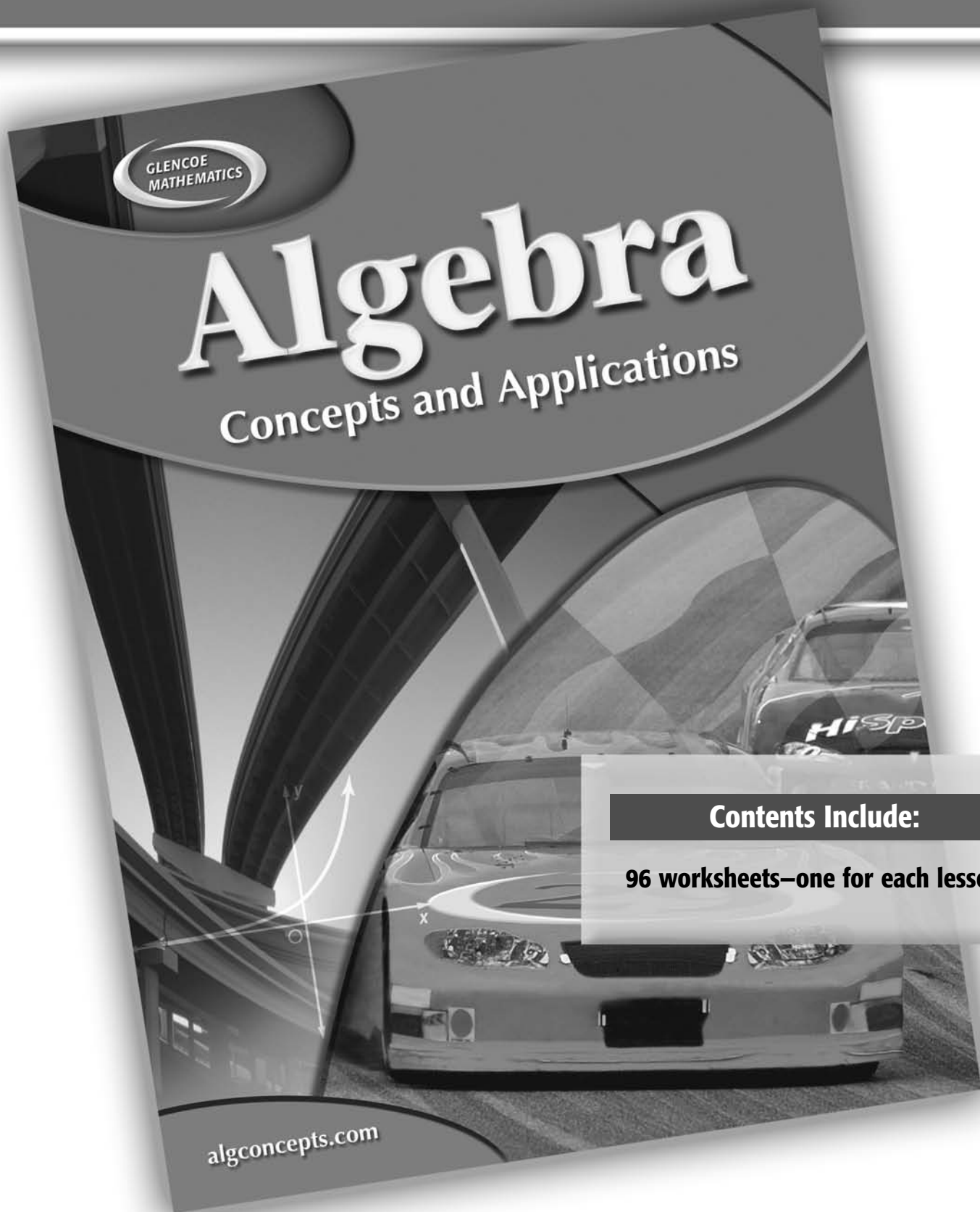


Practice Workbook



GLENCOE
MATHEMATICS

Algebra

Concepts and Applications

Contents Include:

96 worksheets—one for each lesson

algconcepts.com

To the Teacher:

Answers to each worksheet are found in Glencoe's *Algebra: Concepts and Applications Practice Masters* and also in the Teacher's Wraparound Edition of Glencoe's *Algebra: Concepts and Applications*.



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*Algebra: Concepts and Applications
Practice Workbook*

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Practice**Writing Expressions and Equations**

Write an algebraic expression for each verbal expression.

1. the product of 6 and s
2. five less than t
3. g divided by 4
4. 13 increased by y
5. two more than the product of 7 and n
6. the quotient of c and nine decreased by 3

Write a verbal expression for each algebraic expression.

7. $r + 4$
8. $8s$
9. $\frac{t}{5}$
10. $3n - 2$

Write an equation for each sentence.

11. Thirteen decreased by n is equal to 9.
12. Three times g plus five equals 11.
13. Eight is the same as the quotient of 16 and x .
14. Four less than the product of 6 and t is 20.

Write a sentence for each equation.

15. $8 - p = 1$
16. $6x + 3 = 21$
17. $18 \div c = 9$
18. $\frac{2q}{4} = 3$

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

1. $16 \div 4 - 3$

2. $6 + 9 \cdot 2$

3. $3(8 - 4) \div 2$

4. $6 \cdot 2 \div 3 + 1$

5. $21 \div [7(12 - 9)]$

6. $\frac{7 + 5}{3 \cdot 2}$

Name the property of equality shown by each statement.

7. $4 + d = 4 + d$

8. If $\frac{y}{3} = 9$ and $y = 27$, then $\frac{27}{3} = 9$.

9. If $3c + 1 = 7$, then $7 = 3c + 1$.

10. If $8 - n = 3 + 1$ and $3 + 1 = 2 \cdot 2$, then $8 - n = 2 \cdot 2$.

Find the value of each expression. Identify the property used in each step.

11. $6(9 - 27 \div 3)$

12. $4(16 \div 16) + 3$

13. $5 + (3 - 6 \div 2)$

14. $8 \div 2 \cdot 7(9 - 8)$

Evaluate each algebraic expression if $s = 5$ and $t = 3$.

15. $3(2s - t)$

16. $\frac{4s}{t - 1}$

17. $s + 3t - 8$

18. $s - \frac{t}{3} \cdot 5$

19. $(s + t) - 2 \cdot 3$

20. $3s - 4t + 2$

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

1. $43 + 28 = 28 + 43$

2. $(9 + 5) + 4 = 9 + (5 + 4)$

3. $(8 \cdot 7) \cdot 11 = 8 \cdot (7 \cdot 11)$

4. $12 \cdot 3 \cdot 6 = 3 \cdot 12 \cdot 6$

5. $(b + 22) + 3 = b + (22 + 3)$

6. $c \cdot d = d \cdot c$

7. $2n + 13 = 13 + 2n$

8. $15 \cdot (2g) = (15 \cdot 2) \cdot g$

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

9. $(m + 7) + 2$

10. $4 \cdot x \cdot 8$

11. $12 + k + 5$

12. $(y \cdot 3) \cdot 12$

13. $13 \cdot (3h)$

14. $7 + 2q + 4$

15. $6n + (9 + 4) + 5$

16. $(7 + p + 22)(9 \div 9)$

17. State whether the statement *Subtraction of whole numbers is associative* is *true* or *false*. If false, provide a counterexample.

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

1. $3t + 8t$

2. $7(w + 4)$

3. $8c + 11 - 6c$

4. $2(3n - n)$

5. $5(2r + 3)$

6. $4(6 - 2g)$

7. $15d - 9 + 2d$

8. $(7q + 2z) + (q + 5z)$

9. $24b - b$

10. $6 + 2rs - 5$

11. $9(f + g)$

12. $8x + 2y - 4x - y$

13. $(3a + 2)7$

14. $5(2m - p)$

15. $3(2 - k)$

16. $9(2n + 4)$

17. $12s - 4t + 7t - 3s$

18. $4(2a - 3b)$

19. $(5m + 5n) + (6m - 4n)$

20. $8 + 5z - 6 + z$

21. $2(4x + 3y)$

22. $(hg - 1)7$

23. $13st + 5 - 9st$

24. $8 + 2r + 9$

25. $w + 10 - 4 + 6w$

26. $3(6 + c - 4)$

27. $4(2f - g)$

28. $2 + 7q + 3r + q$

A Plan for Problem Solving

Solve each problem. Use any strategy.

1. Tara read 19 science fiction and mystery novels in 6 months. She read 3 more science fiction novels than mystery novels. How many novels of each type did she read?
2. Gasoline costs \$1.21 per gallon, tax included. Jaime paid \$10.89 for the gasoline he put in his car. How many gallons of gasoline did he buy?
3. A coin-operated telephone at a mall requires 40 cents for a local call. It takes quarters, dimes, and nickels and does not give change. How many combinations of coins could be used to make a local call?
4. Together, Jason and Tyler did 147 sit-ups for the physical fitness test in gym. Jason did 11 fewer sit-ups than Tyler. How many sit-ups did each person do?
5. The perimeter P of a square can be found by using the formula $P = 4s$, where s is the length of a side of the square. What is the perimeter of a square with sides of length 19 cm?
6. Mrs. Hernandez wants to put a picture of each of her 3 grandchildren on a shelf above her desk. In how many ways can she line up the pictures?
7. Leona is 12 years old, and her sister Vicki is 2 years old. How old will each of them be when Leona is twice as old as Vicki?
8. Gunther paid for 6 CDs at a special 2-for-1 sale. The CDs that he got at the sale brought the total number of CDs in his collection to 42. How many CDs did he have before the sale?
9. Phil, Ron, and Felix live along a straight country road. Phil lives 3 miles from Ron and 4 miles from Felix. Felix lives closer to Ron than he does to Phil. How far from Ron does Felix live?
10. Gere has 3 times as many shirts with print patterns as he does shirts in solid colors. He has a total of 16 shirts. How many shirts in print patterns does he have?

Collecting Data

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

1. Every third person leaving a music store is asked to name the type of music they prefer.
2. One hundred students at Cary High School are randomly chosen to find the percentage of people who vote in national elections.
3. Two out of 25 students chosen at random in a cafeteria lunch line are surveyed to find whether students prefer sandwiches or pizza for lunch.

Refer to the following chart.

Favorite Leisure Activity									
S	R	C	C	S	R	R	C	S	C
M	S	C	C	C	M	C	C	S	R
S	S	R	M	M	C	M	S	C	R

C = computer games, M = movies,
R = reading, S = sports

4. Make a frequency table to organize the data.
5. What is the most popular leisure activity?
6. How many more people chose sports over reading?
7. Does the information in the frequency table support the claim that most people do not get enough exercise? Explain.

Refer to the following chart.

Number of Breakfasts Eaten Per School Week									
0	5	3	2	0	2	1	3	4	2
5	1	3	2	1	3	1	3	4	1
0	2	3	5	5	2	3	4	1	3

8. Make a frequency table to organize the data.
9. How many students eat breakfast fewer than 3 times per week?
10. Should the school consider a campaign to encourage more students to eat breakfast at school? Explain.

Practice***Displaying and Interpreting Data******Use the table below for Exercises 1–4.***

Year	U.S. Population
1960	179.3 million
1970	203.3 million
1980	226.5 million
1990	248.7 million

1. Make a line graph of the data. Use the space provided at the right.
2. For which ten-year interval was population growth the greatest?
3. Describe the general trend in the population.
4. Predict the U.S. population for the year 2000.

***Use the table at the right for Exercises 5–8.
In each age group, 100 people were surveyed.***

5. Make a histogram of the data.
6. Which age group listens to country music the least?
7. How many respondents in the 40–49 age group listen to country music?
8. Suppose most listeners for a radio station are in their twenties. Should the station play a lot of country music? Explain.

Age Group	Number
10–19	10
20–29	15
30–39	35
40–49	40
50–59	25

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

9. What were the highest and lowest scores?
10. Which test score occurred most frequently?
11. In which 10-point interval did most of the students score?
12. How many students scored 75 or better?
13. How many students received a score less than 75?

Algebra Test Scores

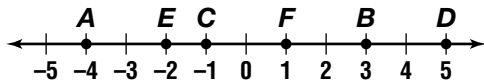
Stem	Leaf
5	6 7 7 8
6	1 4 9
7	3 3 4 5 5 7 8
8	1 3 3 3 6 9
9	0 1 2 4

$$7 \mid 5 = 75$$

Practice

Graphing Integers on a Number Line

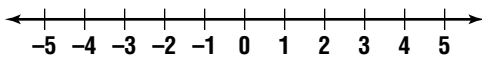
Name the coordinate of each point.



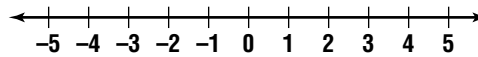
- | | | |
|------|------|------|
| 1. A | 2. B | 3. C |
| 4. D | 5. E | 6. F |

Graph each set of numbers on a number line.

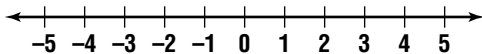
7. $\{-5, 0, 2\}$



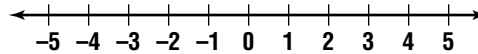
8. $\{4, -1, -2\}$



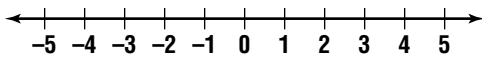
9. $\{3, -4, -3\}$



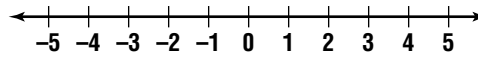
10. $\{-2, 5, 1\}$



11. $\{2, -5, 0\}$



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

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

- | | | |
|--------------------|---------------------|---------------------|
| 13. 7 _____ 9 | 14. 0 _____ -1 | 15. -2 _____ 2 |
| 16. 6 _____ -3 | 17. -4 _____ -5 | 18. -7 _____ -3 |
| 19. -8 _____ 0 | 20. -11 _____ 2 | 21. -5 _____ -6 |

Evaluate each expression.

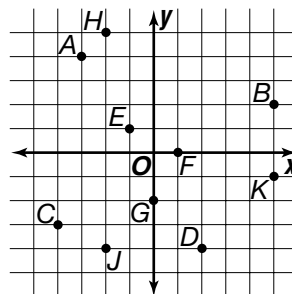
- | | |
|-------------------|-------------------|
| 22. $ -4 $ | 23. $ 6 $ |
| 24. $ -3 + 1 $ | 25. $ 9 - -8 $ |
| 26. $ -7 - -2 $ | 27. $ -8 + 11 $ |

Practice

The Coordinate Plane

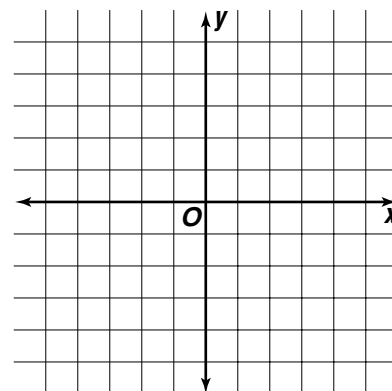
Write the ordered pair that names each point.

- | | |
|--------|---------|
| 1. A | 2. B |
| 3. C | 4. D |
| 5. E | 6. F |
| 7. G | 8. H |
| 9. J | 10. K |



Graph each point on the coordinate plane.

- | | |
|-----------------|-----------------|
| 11. $K(0, -3)$ | 12. $L(-2, 3)$ |
| 13. $M(4, 4)$ | 14. $N(-3, 0)$ |
| 15. $P(-4, -1)$ | 16. $Q(1, -2)$ |
| 17. $R(-5, 5)$ | 18. $S(3, 2)$ |
| 19. $T(2, 1)$ | 20. $W(-1, -4)$ |



Name the quadrant in which each point is located.

- | | |
|----------------|----------------|
| 21. $(1, 9)$ | 22. $(-2, -7)$ |
| 23. $(0, -1)$ | 24. $(-4, 6)$ |
| 25. $(5, -3)$ | 26. $(-3, 0)$ |
| 27. $(-1, -1)$ | 28. $(6, -5)$ |
| 29. $(-8, 4)$ | 30. $(-9, -2)$ |

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

1. $8 + 4$

2. $-3 + 5$

3. $9 + (-2)$

4. $-5 + 11$

5. $-7 + (-4)$

6. $12 + (-4)$

7. $-9 + 10$

8. $-4 + 4$

9. $2 + (-8)$

10. $17 + (-4)$

11. $-13 + 3$

12. $6 + (-7)$

13. $-8 + (-9)$

14. $-2 + 11$

15. $-9 + (-2)$

16. $-1 + 3$

17. $6 + (-5)$

18. $-11 + 7$

19. $-8 + (-8)$

20. $-6 + 3$

21. $2 + (-2)$

22. $7 + (-5) + 2$

23. $-4 + 8 + (-3)$

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

Simplify each expression.

25. $5a + (-3a)$

26. $-7y + 2y$

27. $-9m + (-4m)$

28. $-2z + (-4z)$

29. $8x + (-4x)$

30. $-10p + 5p$

31. $5b + (-2b)$

32. $-4s + 7s$

33. $2n + (-4n)$

34. $5a + (-6a) + 4a$

35. $-6x + 3x + (-5x)$

36. $7z + 2z + (-3z)$

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

1. $9 - 3$

2. $-1 - 2$

3. $4 - (-5)$

4. $6 - (-1)$

5. $-7 - (-4)$

6. $8 - 10$

7. $-2 - 5$

8. $-6 - (-7)$

9. $2 - 8$

10. $-10 - (-2)$

11. $-4 - 6$

12. $5 - 3$

13. $-8 - (-4)$

14. $7 - 9$

15. $-9 - (-11)$

16. $-3 - 4$

17. $6 - (-5)$

18. $6 - 5$

Evaluate each expression if $a = -1$, $b = 5$, $c = -2$, and $d = -4$.

19. $b - c$

20. $a - b$

21. $c - d$

22. $a + c - d$

23. $a - b + c$

24. $a - c + d$

25. $b - c + d$

26. $b - c - d$

27. $a - b - c$

Multiplying Integers***Find each product.***

1. $3(-7)$

2. $-2(8)$

3. $4(5)$

4. $-7(-7)$

5. $-9(3)$

6. $8(-6)$

7. $6(2)$

8. $-5(-7)$

9. $2(-8)$

10. $-10(-2)$

11. $9(-8)$

12. $12(0)$

13. $-4(-4)(2)$

14. $7(-9)(-1)$

15. $-3(5)(2)$

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

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

18. $-5(-3)(-2)(-1)$

Evaluate each expression if $a = -3$ and $b = -5$.

19. $-6b$

20. $8a$

21. $4ab$

22. $-3ab$

23. $-9a$

24. $-2ab$

Simplify each expression.

25. $5(-5y)$

26. $-7(-3b)$

27. $-3(6n)$

28. $(6a)(-2b)$

29. $(-4m)(-9n)$

30. $(-8x)(7y)$

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

1. $28 \div 7$

2. $-33 \div 3$

3. $42 \div (-6)$

4. $-81 \div (-9)$

5. $12 \div 4$

6. $72 \div (-9)$

7. $15 \div 15$

8. $-30 \div 5$

9. $-40 \div (-8)$

10. $56 \div (-7)$

11. $-21 \div (-3)$

12. $-64 \div 8$

13. $-8 \div 8$

14. $-22 \div (-2)$

15. $32 \div (-8)$

16. $-54 \div (-9)$

17. $60 \div (-6)$

18. $63 \div 9$

19. $-45 \div (-9)$

20. $-60 \div 5$

21. $24 \div (-3)$

22. $\frac{-12}{6}$

23. $\frac{40}{-10}$

24. $\frac{-45}{-9}$

Evaluate each expression if $a = 4$, $b = -9$, and $c = -6$.

25. $-48 \div a$

26. $b \div 3$

27. $9c \div b$

28. $\frac{ab}{c}$

29. $\frac{bc}{-6}$

30. $\frac{3c}{b}$

31. $\frac{12a}{c}$

32. $\frac{-4b}{a}$

33. $\frac{ac}{6}$

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

1. 2.5 _____ -2

2. -1 _____ 0.5

3. 0 _____ -1.9

4. -3.6 _____ -3.7

5. $-7(4)$ _____ $-15 + (-13)$

6. $-18 + 3$ _____ $5(0)(-3)$

7. $-5 + 19$ _____ $-2(7)(1)$

8. $6 - 24$ _____ $-3(2)(-4)$

9. $\frac{1}{4}$ _____ $\frac{1}{8}$

10. $-\frac{1}{2}$ _____ $\frac{3}{5}$

11. $\frac{3}{9}$ _____ $\frac{1}{3}$

12. $\frac{2}{5}$ _____ $-\frac{5}{10}$

13. $\frac{3}{8}$ _____ $\frac{2}{6}$

14. $\frac{4}{5}$ _____ $\frac{3}{4}$

15. $-\frac{2}{3}$ _____ $-\frac{4}{6}$

16. $-\frac{1}{5}$ _____ $\frac{2}{10}$

Write the numbers in each set from least to greatest.

17. $\frac{5}{6}, \frac{3}{8}, \frac{1}{3}$

18. $\frac{2}{5}, 0.\bar{3}, \frac{6}{8}$

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

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

21. $\frac{6}{10}, \frac{3}{4}, \frac{4}{6}$

22. $\frac{4}{10}, \frac{2}{8}, \frac{3}{9}$

23. $-\frac{2}{4}, -\frac{6}{9}, -\frac{7}{8}$

24. $\frac{8}{10}, -\frac{5}{6}, -\frac{6}{8}$

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

1. $6.2 + (-9.4)$

2. $-7.9 + 8.5$

3. $-2.7 - 3.4$

4. $5.6 - 7.1$

5. $-8.3 + (-4.6)$

6. $4.2 - 1.9$

7. $3.7 + (-5.8)$

8. $-1.5 - 2.93$

9. $6.8 + (-4.6) + 5.3$

10. $-4.7 - 8.2 + (-2.5)$

11. $-\frac{1}{4} - \frac{3}{8}$

12. $\frac{1}{3} + \left(-\frac{5}{9}\right)$

13. $-3\frac{3}{8} + \left(-4\frac{1}{2}\right)$

14. $-2\frac{2}{3} + 2\frac{1}{2}$

15. $-7\frac{3}{10} - 2\frac{2}{5}$

16. $5\frac{1}{3} + \left(-3\frac{1}{6}\right)$

17. $2\frac{5}{6} - 6\frac{1}{2}$

18. $-6\frac{1}{5} + 4\frac{7}{10} + \left(-\frac{3}{5}\right)$

19. $3\frac{1}{2} + \left(-5\frac{5}{8}\right) + 3\frac{3}{4}$

20. $2\frac{2}{3} - 9\frac{1}{2} - 8\frac{5}{6}$

21. Evaluate $m + 4\frac{1}{8}$ if $m = -1\frac{3}{4}$.

22. Find the value of k if $k = -7\frac{1}{3} - 1\frac{5}{6} + 4\frac{2}{3}$.

Practice

Mean, Median, Mode, and Range

Find the mean, median, mode, and range of each set of data.

1. 33, 41, 17, 25, 62

2. 18, 15, 18, 7, 11, 12

3. 12, 27, 19, 38, 14, 15, 19, 27, 19, 14

4. 7.8, 6.2, 5.4, 5.5, 7.8, 6.1, 5.3

5. 13.5, 11.3, 10.7, 15.5, 11.4, 12.6

6. 0.7, 0.4, 0.4, 0.7, 0.4, 0.7

7. 5, 4.1, 4, 3.3, 2.7, 5.2, 3

8. 6.1, 4, 5.3, 6.7, 4, 5.1, 6.7, 4, 9.8, 6.1

9.

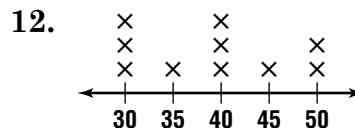
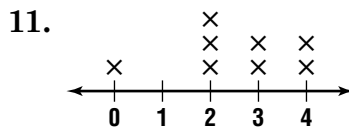
Stem	Leaf
6	2 3 5 7
7	2 7
8	0 1 1

6 | 3 = 63

10.

Stem	Leaf
3	1 1
4	2 5 6
5	3 3 7
6	2 5

5 | 3 = 53



Practice**Equations**

Find the solution of each equation if the replacement sets are $a = \{4, 5, 6\}$, $b = \{-2, -1, 0\}$, and $c = \{-1, 0, 1, 2\}$.

1. $8 = a + 3$

2. $b - 3 = -5$

3. $3c = -3$

4. $9 = -a + 13$

5. $5a + 5 = 35$

6. $2c - 4 = 0$

7. $-4b + (-3) = 1$

8. $-9c - 9 = 0$

9. $\frac{8 + 17}{5} = -5c$

10. $\frac{-9 - 23}{4} = 4b$

11. $\frac{11 + 9}{a} + 2 = 7$

12. $\frac{9c}{3} - 5 = -2$

Solve each equation.

13. $q = -9.7 - 0.6$

14. $14 - 1.4 = d$

15. $f = 7 + 6 \cdot 7$

16. $b = -5(3) + 4 - 1$

17. $10 - 8 \cdot 3 \div 3 = w$

18. $z = 6(3 - 6 \div 2)$

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

20. $g = 3(7) - 9 \div 3$

21. $\frac{6 \cdot 8 - 8}{5} = c$

22. $p = \frac{-18 \div 3 + 2}{16 \div 4}$

23. $\frac{2 \cdot 5 - 8}{9 - 4} = t$

24. $\frac{12 - 3 \cdot 2}{32 \div 4} = m$

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

1. $-5 = h + (-2)$

2. $p + 3 = -1$

3. $m - 6 = -8$

4. $7 + c = 4$

5. $6 = n - 3$

6. $-5 + x = -1$

7. $2 = -8 + w$

8. $b + (-5) = -3$

9. $z + 4 = 9$

10. $3 + y = -3$

11. $a - 4 = 7$

12. $-10 + s = -6$

13. $6 + d = -4$

14. $f + (-1) = 0$

15. $-10 = j - 10$

16. $q + 4 = -5$

17. $6 = 12 + t$

18. $e - 3 = -2$

19. $u + (-7) = 2$

20. $15 + g = 10$

21. $-9 + r = -5$

22. $-8 = l - 4$

23. $v + (-1) = -2$

24. $-3 - i = 2$

25. What is the value of q if $-7 = q + 2$?

26. What is the value of n if $n - 4 = -2$?

27. If $b + (-3) = -5$, what is the value of b ?

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

1. $b + 8 = -9$

2. $s + (-3) = -5$

3. $-4 + q = -11$

4. $23 = m - 11$

5. $k + (-6) = 2$

6. $x - (-9) = 4$

7. $-16 + z = -8$

8. $-5 + c = -5$

9. $14 = f + (-7)$

10. $x + 12 = -1$

11. $15 - w = -4$

12. $6 = 9 + d$

13. $-31 = 11 + y$

14. $n - (-7) = -1$

15. $a + (-27) = -19$

16. $0 = e - 38$

17. $4.65 + w = 5.95$

18. $g + (-1.54) = 1.07$

19. $u - 9.8 = 0.3$

20. $7.2 = p - (-6.1)$

21. $\frac{7}{8} + t = \frac{1}{4}$

22. $h - \frac{1}{3} = -\frac{5}{6}$

23. $q + \left(-\frac{2}{9}\right) = \frac{1}{3}$

24. $\frac{1}{2} + f = -\frac{1}{4}$

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

1. $|x| = 7$

2. $|c| = -11$

3. $3 + |a| = 6$

4. $|s| - 4 = 2$

5. $|q| + 5 = 1$

6. $|h - 5| = 8$

7. $|y + 7| = 9$

8. $-2 = |10 + b|$

9. $|p + (-3)| = 12$

10. $|w - 1| = 6$

11. $|4 + r| = -3$

12. $8 = |l - 3|$

13. $|n - 5| = 7$

14. $|-2 + f| = 1$

15. $9 = |e + 8|$

16. $|m - (-3)| = 12$

17. $|k + 2| + 3 = 7$

18. $|g - 5| + 8 = 14$

19. $10 = |4 + v| + 1$

20. $|-6 + p| + 5 = 19$

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

1. $3.9 \cdot (-3)$

2. $-6(-5.4)$

3. $4 \cdot (-7.3)$

4. $-2.6(1.5)$

5. $(-4.4)(-0.5)$

6. $-3.7 \cdot 2$

7. $(-8.3)(-1)$

8. $-2.5(2.8)$

9. $-3 \cdot (-6.3)$

10. $-\frac{1}{4}\left(-\frac{3}{5}\right)$

11. $-5 \cdot \frac{2}{3}$

12. $\frac{5}{6}\left(\frac{7}{9}\right)$

13. $-\frac{6}{7} \cdot \frac{1}{3}$

14. $-\frac{3}{8}(-3)$

15. $\frac{2}{5}\left(-\frac{8}{9}\right)$

16. $6\frac{3}{4}\left(\frac{1}{6}\right)$

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

18. $1\frac{4}{5}\left(-\frac{3}{7}\right)$

Simplify each expression.

19. $4(-2.3z)$

20. $-5.5x(-0.8)$

21. $-4.2r(1.5s)$

22. $6\left(\frac{1}{7}t\right)$

23. $-\frac{1}{3} \cdot \frac{4}{5}g$

24. $\frac{2}{9}k\left(-\frac{1}{2}\right)$

25. $\left(\frac{1}{4}a\right)\left(\frac{5}{8}b\right)$

26. $\frac{5}{6}m\left(-\frac{1}{3}n\right)$

27. $3x\left(\frac{4}{9}y\right)$

Counting Outcomes

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

1. (H, T, H); tossing a coin three times
2. (green, black); choosing one marble from a box of green and black marbles
3. (green, green), (green, black), (black, green), (black, black); choosing two marbles, one at a time, from a box of several green and several black marbles
4. (3, 1, 4, 5); rolling a number cube four times
5. (1, 2, 3, 4, 5, 6); rolling a number cube once
6. (red, black); choosing two cards from a standard deck
7. (dime, penny); choosing two coins from a bag of dimes, nickels, and pennies
8. (dime, nickel, penny); choosing one coin from a bag of dimes, nickels, and pennies

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

9. Suppose you can have granola or wheat flakes for cereal with a choice of strawberries, bananas, peaches, or blackberries.
10. Suppose you can travel by car, train, or bus to meet a friend. You can leave either in the morning or the afternoon.

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

11. Suppose you toss a coin five times.
12. Suppose you can make an outfit from six sweaters, four pairs of jeans, and two pairs of shoes.

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

1. $-8.5 \div 5$

2. $4.2 \div 14$

3. $2.8 \div (-0.5)$

4. $3.6 \div (-6)$

5. $-5.1 \div (-1.7)$

6. $7.8 \div (-0.3)$

7. $-4.8 \div 1.2$

8. $7.5 \div (-1.5)$

9. $-3.7 \div (-0.1)$

10. $-\frac{3}{4} \div \frac{5}{2}$

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

12. $4 \div \frac{9}{10}$

13. $\frac{5}{6} \div \left(-\frac{2}{3}\right)$

14. $-\frac{3}{8} \div 6$

15. $-\frac{2}{7} \div (-3)$

16. $-\frac{4}{5} \div 4\frac{1}{2}$

17. $-2\frac{2}{3} \div \frac{3}{4}$

18. $-1\frac{1}{8} \div \left(-\frac{5}{7}\right)$

Evaluate each expression if $m = \frac{1}{5}$ and $n = -\frac{3}{4}$.

19. $\frac{m}{4}$

20. $\frac{5}{n}$

21. $-\frac{m}{7}$

22. $\frac{6}{m}$

23. $\frac{n}{3}$

24. $\frac{n}{m}$

25. $\frac{m}{n}$

26. $-\frac{2m}{3}$

27. $-\frac{1}{3n}$

Practice***Solving Multiplication and Division Equations*****Solve each equation.**

1. $7p = -42$

2. $-3z = 27$

3. $-8q = -56$

4. $-28 = 2a$

5. $5f = 40$

6. $-9g = 18$

7. $-48 = -12r$

8. $4 = 0.8w$

9. $-2.4t = 6$

10. $0 = 5.3k$

11. $-1.6s = -8$

12. $2.5d = -11$

13. $\frac{m}{9} = 2$

14. $-8 = \frac{y}{4}$

15. $\frac{2}{5}s = 18$

16. $-2 = -\frac{8}{3}b$

17. $-\frac{c}{6} = 6$

18. $-\frac{v}{12} = -5$

19. $\frac{1}{8}d = -1$

20. $4 = \frac{4}{5}x$

21. $-\frac{7}{6}r = 28$

22. $\frac{9}{10}z = -9$

23. $-\frac{b}{18} = 2$

24. $-\frac{3}{7}n = -21$

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

1. $8z - 6 = 18$

2. $-4s + 1 = 9$

3. $12 = -3k + 3$

4. $5 - 2f = 19$

5. $-31 = -6w - 7$

6. $6 + 7r = 13$

7. $-8 = 8 - 2c$

8. $0.4u + 1 = 6.6$

9. $3b - 2.5 = 5$

10. $4.7 + 2g = 7.3$

11. $-2.1q - 1 = -1$

12. $-2 = \frac{t}{4} - 3$

13. $\frac{p}{9} + 4 = 7$

14. $7 - \frac{m}{2} = 0$

15. $8 = 5 - \frac{c}{6}$

16. $\frac{y - 5}{3} = 2$

17. $1 = \frac{c + 1}{-8}$

18. $\frac{-4a + 4}{5} = -4$

19. $-4 = \frac{x}{7} + 3$

20. $\frac{8h - 2}{9} = 6$

21. $9 - \frac{1}{4}j = 5$

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

1. $9r = 3r + 6$

2. $5s - 6 = 2s$

3. $7p - 12 = 3p$

4. $11w = -16 + 7w$

5. $-3b + 9 = 9 - 3b$

6. $8 + 2m = -2m - 16$

7. $12x + 5 = 11 + 12x$

8. $-6g + 14 = -12 - 8g$

9. $-15 + 7t = 30 - 2t$

10. $5a + 4 = -2a - 10$

11. $1.4h - 3 = 2 + h$

12. $5.3 + d = -2d + 4.7$

13. $3.6z + 6 = -2 + 2z$

14. $4f - 3.7 = 3f - 1.8$

15. $\frac{3}{5}n - 10 = \frac{2}{5}n$

16. $\frac{5}{8}j = 8 + \frac{3}{8}j$

17. $\frac{2}{3}q - 2 = \frac{1}{3}q + 7$

18. $-\frac{1}{4}p + 4 = \frac{3}{4}p + 8$

Practice**Grouping Symbols**

Solve each equation. Check your solution.

1. $15 = 3(h - 1)$

2. $3(2z + 8) = -6$

3. $7 = 4(5 - 2x) + 3$

4. $2(p + 6) - 10 = 12$

5. $4a - 7 = 4(a - 2) + 1$

6. $13 = 3g - 2(-5 + g)$

7. $6(k + 2) + 2(2k - 5) = 22$

8. $-2 = 7(q + 2) + 3(2q - 1)$

9. $5(d - 4) + 2 = 2(d + 2) - 4$

10. $2b + 6(2 - b) = -b$

11. $6(n - 1) = 4.4n - 2$

12. $2(s + 1.6) - 5(2 - s) = -1.9$

13. $4(y + 2) + 1.3 = 3(y + 2.1)$

14. $8(e + 2.5) = 2(4e - 2)$

15. $7 - \frac{1}{4}(j - 8) = 6$

16. $\frac{1}{3}(x + 9) + 5 = \frac{x}{3} + 8$

17. $\frac{3(a + 4)}{9} = 2a - 12$

18. $1 + \frac{1}{6}p = 2(p - 5)$

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

1. $\frac{1}{7} = \frac{a}{14}$

2. $\frac{8}{2} = \frac{12}{h}$

3. $\frac{5}{b} = \frac{3}{9}$

4. $\frac{9}{6} = \frac{15}{b}$

5. $\frac{3}{y} = \frac{9}{21}$

6. $\frac{21}{24} = \frac{c}{8}$

7. $\frac{8}{3} = \frac{32}{x}$

8. $\frac{4}{5} = \frac{p}{25}$

9. $\frac{24}{g} = \frac{3}{8}$

10. $\frac{5}{2} = \frac{13}{a}$

11. $\frac{1.5}{c} = \frac{15}{5}$

12. $\frac{6}{2.4} = \frac{x}{4}$

13. $\frac{4}{2} = \frac{x+2}{3}$

14. $\frac{c+5}{15} = \frac{8}{6}$

15. $\frac{7}{7} = \frac{10}{b+3}$

16. $\frac{y}{y+3} = \frac{2}{5}$

17. $\frac{z+6}{12} = \frac{z}{4}$

18. $\frac{5}{4} = \frac{a+4}{2a}$

Convert each measurement as indicated.

19. 5 pounds to ounces

20. 3000 grams to kilograms

21. 7 feet to inches

22. 4 meters to centimeters

23. 6 quarts to gallons

24. 250 centimeters to meters

Scale Drawings and Models

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

1. Los Angeles, CA, to San Bernardino, CA; 2 inches

2. Kalamazoo, MI, to Chicago, IL; 4.5 inches

3. Nashville, TN, to Union City, TN; 6 inches

4. Springfield, MO, to Joplin, MO; 2.5 inches

5. Albuquerque, NM, to Santa Fe, NM; $1\frac{3}{4}$ inches

6. Montgomery, AL, to Birmingham, AL; 3 inches

7. Columbus, OH, to Cincinnati, OH; 3.5 inches

8. Des Moines, IA, to Sioux City, IA; $6\frac{3}{4}$ inches

9. Concord, NH, to Boston, MA; $2\frac{1}{4}$ inches

10. Providence, RI, to Newport, RI; 1 inch

11. Raleigh, NC, to Wilmington, NC; 4 inches

12. St. Paul, MN, to Minneapolis, MN; $\frac{1}{4}$ inch

13. Portland, OR, to Seattle, WA; $5\frac{3}{4}$ inches

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

1. $\frac{3}{4}$

2. 4 out of 5

3. 4 to 10

4. 7 to 4

5. $\frac{13}{20}$

6. 1 out of 8

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

8. 2 out of 4

9. 6 to 5

10. Two out of 50 students scored above 98 on a geometry test.

11. At a computer convention, 19 out of 20 people accepted a free mouse pad.

12. In a recent inspection, three-eighths of the apartments at Kendall Heights had fire extinguishers.

Use the percent proportion to find each number.

13. 20 is what percent of 125?

14. Find 30% of 75.

15. 18 is 45% of what number?

16. 85% of what number is 85?

17. 15 is what percent of 50?

18. What number is 3% of 40?

19. 40% of what number is 28?

20. Find 130% of 20.

21. 78 is 65% of what number?

22. What is 10% of 73?

23. 30 is what percent of 150?

24. Find 6% of 15.

The Percent Equation***Use the percent equation to find each number.***

1. Find 60% of 150.
2. What number is 40% of 95?
3. 21 is 70% of what number?
4. Find 20% of 120.
5. Find 7% of 80.
6. 63 is 60% of what number?
7. 12 is 30% of what number?
8. 90 is 45% of what number?
9. What number is 27% of 50?
10. What number is 70% of 122?
11. What number is 12% of 85?
12. Find 14% of 150.
13. 26 is 65% of what number?
14. What number is 67% of 140?
15. 108 is 90% of what number?
16. Find 34% of 85.
17. 50 is 25% of what number?
18. What number is 95% of 90?
19. 21 is 35% of what number?
20. Find 22% of 55.
21. Find 14.5% of 500.
22. 4 is 0.8% of what number?

Percent of Change

Find the percent of increase or decrease. Round to the nearest percent.

1. original: 60
new: 54

2. original: 20
new: 25

3. original: 18
new: 36

4. original: 50
new: 32

5. original: 32
new: 20

6. original: 35
new: 98

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

7. guitar: \$120; 5%

8. shirt: \$22.95; 6%

9. shoes: \$49.99; 7%

10. jacket: \$89.95; 6%

11. ruler: \$1.49; 5%

12. weight bench: \$79; 6%

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

13. stereo: \$900; 10%

14. jeans: \$54; 25%

15. VCR: \$129.95; 20%

16. golf club: \$69.95; 15%

17. barrette: \$6.99; 15%

18. sweat pants: \$12; 25%

Practice***Probability and Odds***

Find the probability of each outcome if a pair of dice are rolled. Refer to the table below, which shows all of the possible outcomes when you roll a pair of dice.

	1	2	3	4	5	6
1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

1. an even number on the second die
2. a sum of 8
3. a sum of 7
4. an odd sum
5. a sum less than 6
6. a sum greater than 7
7. both die are the same number
8. a sum less than 2

Find the odds of each outcome if a bag contains 7 blue marbles, 3 yellow marbles, and 2 red marbles.

9. choosing a blue marble
10. choosing a red marble
11. choosing a yellow marble
12. choosing a yellow or red marble
13. choosing a yellow or blue marble
14. choosing a blue or red marble
15. not choosing a blue or red marble
16. not choosing a blue marble

Compound Events

Two dice are rolled. Find the probability of each outcome.

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

A card is drawn from a standard deck of cards. Determine whether the evens are mutually exclusive or inclusive. Then find each probability.

7. $P(\text{jack or five})$
8. $P(\text{ace or club})$
9. $P(\text{red card or four})$
10. $P(\text{face card or black card})$
11. $P(\text{spade or diamond})$
12. $P(\text{black card or odd-numbered card})$
13. $P(\text{heart or black card})$
14. $P(\text{heart or even-numbered card})$
15. $P(\text{face card or diamond})$
16. $P(\text{red card or black card})$
17. $P(\text{even-numbered card or ace})$
18. $P(\text{red card or heart})$

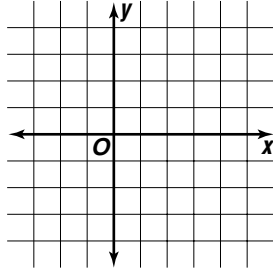
Practice

Relations

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

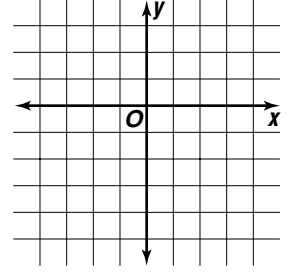
1. $\{(-3, 1), (-2, 0), (1, 2), (3, -4), (5, 3)\}$

x	y



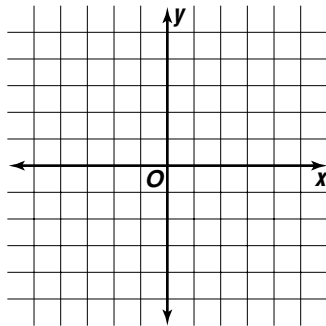
2. $\{(-4, -1), (-1, 2), (0, -5), (2, -3), (4, 3)\}$

x	y



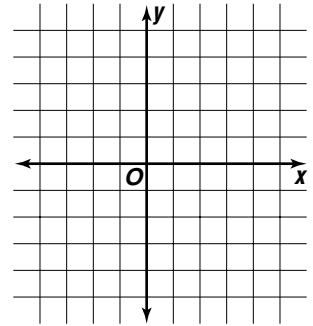
3. $\{(-5, 3.5), (-3, -4), (1.5, -5), (3, 3), (4.5, -1)\}$

x	y

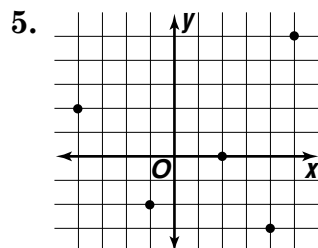


4. $\{(-3.9, -2), (0, 4.5), (2.5, -5), (4, 0.5)\}$

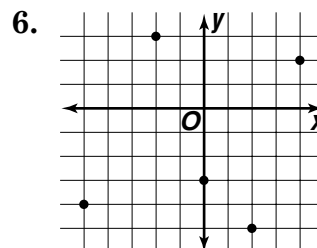
x	y



Express each relation as a set of ordered pairs and in a table. Then determine the domain and the range.



x	y



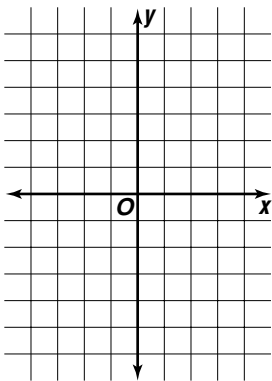
x	y

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

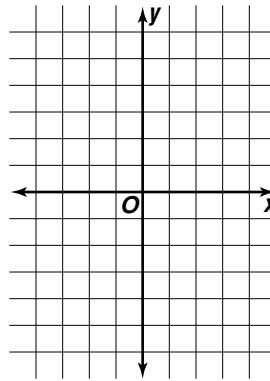
- | | | | | |
|------------------|------------|------------|-------------|-------------|
| 1. $a + 3b = 5$ | a. (2, 1) | b. (1, -2) | c. (-3, 3) | d. (8, -1) |
| 2. $2g + 4h = 4$ | a. (2, -2) | b. (4, -1) | c. (-2, 2) | d. (-4, 3) |
| 3. $-3x + y = 1$ | a. (4, 11) | b. (1, 4) | c. (-2, -5) | d. (-1, -2) |
| 4. $9 = 5c - d$ | a. (2, 1) | b. (1, -4) | c. (-2, -1) | d. (4, 11) |
| 5. $2m = n + 6$ | a. (4, -2) | b. (3, -2) | c. (3, 0) | d. (4, 2) |

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

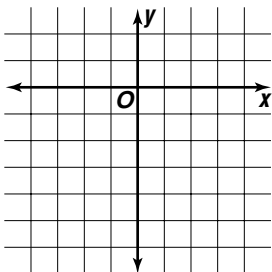
6. $-3x = y$



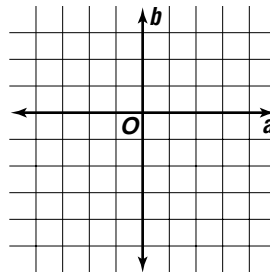
7. $y = 2x + 1$



8. $-2x - 2 = y$



9. $2 + 2b = 4a$

**Find the domain of each equation if the range is $\{-4, -2, 0, 1, 2\}$.**

10. $y = x + 5$

11. $3y = 2x$

Practice

Graphing Linear Relations

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

1. $2xy = 6$

2. $3x = y$

3. $4y - 2x = 2$

4. $x = -3$

5. $4x + 5xy = 18$

6. $x + 3y = 7$

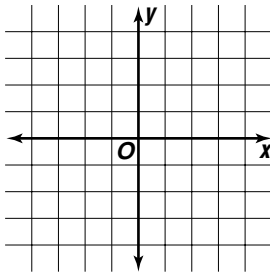
7. $\frac{2}{x} = 8$

8. $5y = x$

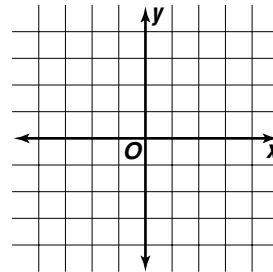
9. $3x^2 + 4y = 2$

Graph each equation.

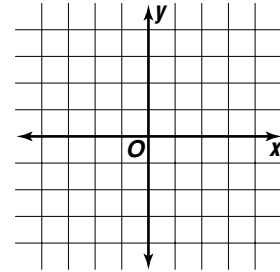
10. $y = 4x - 2$



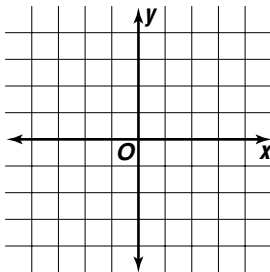
11. $y = 2x$



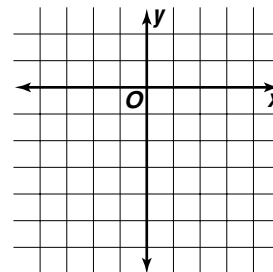
12. $x = 4$



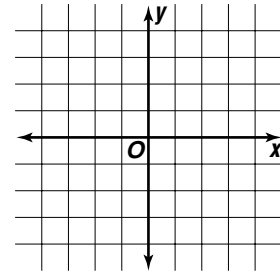
13. $y = -3x + 4$



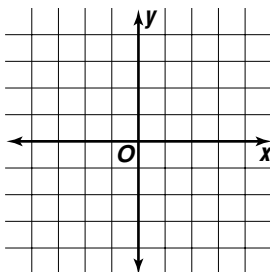
14. $y = -5$



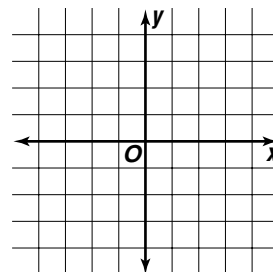
15. $2x + 3y = 4$



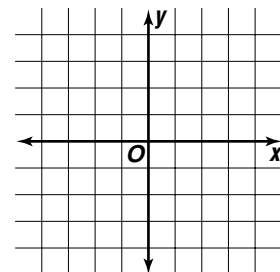
16. $-3 = x + y$



17. $6y = 2x + 4$



18. $-4x + 4y = -8$



Practice

Functions

Determine whether each relation is a function.

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

7.

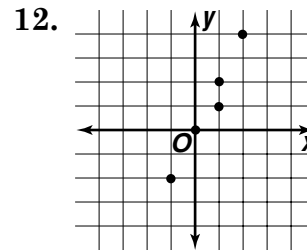
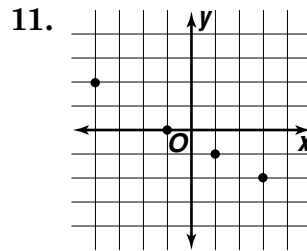
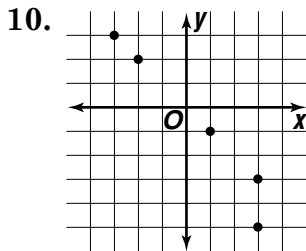
x	y
-2	3
1	3
-4	2
0	1
2	3

8.

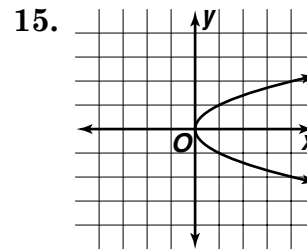
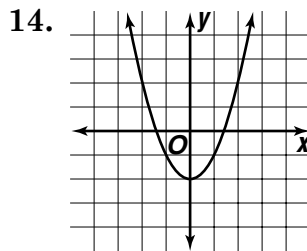
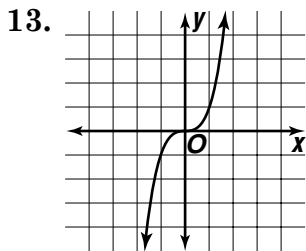
x	y
2	-3
-1	0
5	5
3	2
2	1

9.

x	y
-4	3
2	0
1	4
-3	5
3	5



Use the vertical line test to determine whether each relation is a function.

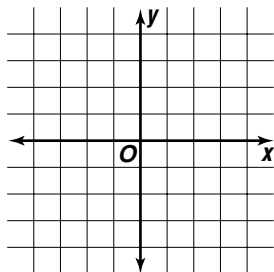
If $f(x) = 3x - 2$, find each value.

16. $f(4)$ 17. $f(-2)$ 18. $f(8)$ 19. $f(-5)$
20. $f(1.5)$ 21. $f(2.4)$ 22. $f\left(\frac{1}{3}\right)$ 23. $f\left(-\frac{2}{3}\right)$
24. $f(b)$ 25. $f(2g)$ 26. $f(-3c)$ 27. $f(2.5a)$

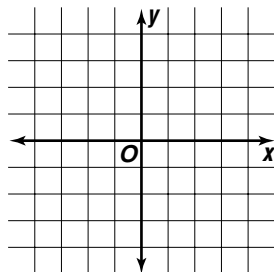
Direct Variation

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

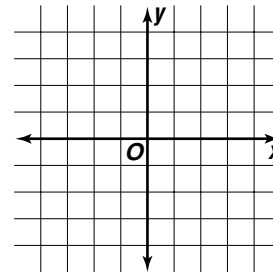
1. $y = 3x$



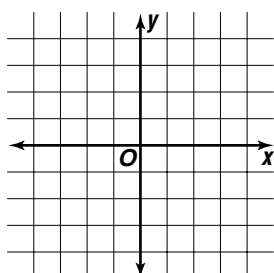
2. $y = x + 2$



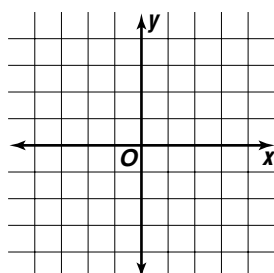
3. $y = -4x$



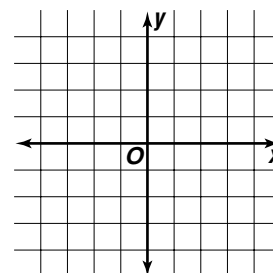
4. $y = -x - 1$



5. $y = 2$



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



Solve. Assume that y varies directly as x .

7. If $y = 14$ when $x = 5$,
find x when $y = 28$.

8. Find y when $x = 5$ if
 $y = -6$ when $x = 2$.

9. If $x = 9$ when $y = 18$,
find x when $y = 24$.

10. If $y = 36$ when $x = -6$,
find x when $y = 54$.

11. Find y when $x = 3$ if
 $y = -3$ when $x = 6$.

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

Solve by using direct variation.

13. If there are 4 quarts in a gallon, how many quarts are in 4.5 gallons?

14. How many feet are in 62.4 inches if there are 12 inches in a foot?

15. If there are 2 cups in a pint, how many cups are in 7.2 pints?

Inverse Variation

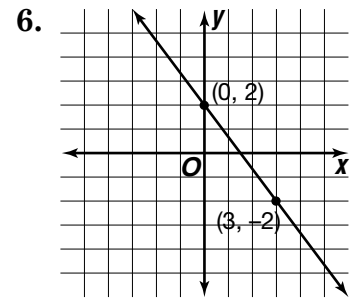
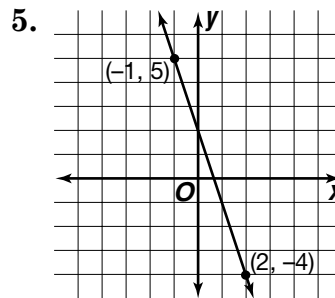
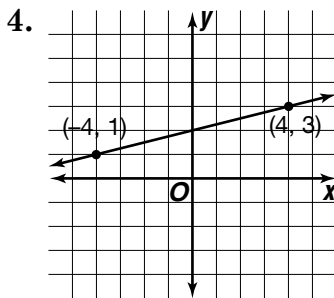
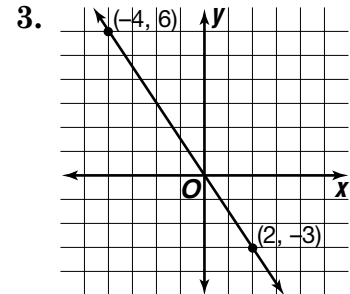
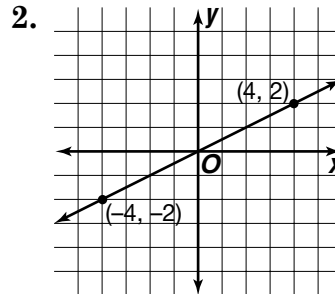
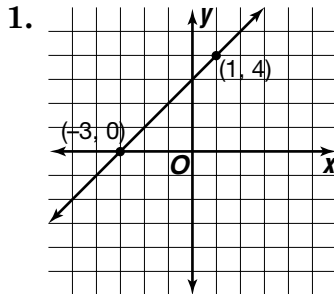
Solve. Assume that y varies inversely as x .

1. Suppose $y = 9$ when $x = 4$. Find y when $x = 12$.
2. Find x when $y = 4$ if $y = -4$ when $x = 6$.
3. Find x when $y = 7$ if $y = -2$ when $x = -14$.
4. Suppose $y = -2$ when $x = 8$. Find y when $x = 4$.
5. Suppose $y = -9$ when $x = 2$. Find y when $x = -3$.
6. Suppose $y = 22$ when $x = 3$. Find y when $x = -6$.
7. Find x when $y = 9$ if $y = -3$ when $x = -18$.
8. Suppose $y = 5$ when $x = 8$. Find y when $x = 4$.
9. Find x when $y = 15$ if $y = -6$ when $x = 2.5$.
10. If $y = 3.5$ when $x = 2$, find y when $x = 5$.
11. If $y = 2.4$ when $x = 5$, find y when $x = 6$.
12. Find x when $y = -10$ if $y = -8$ when $x = 12$.
13. Suppose $y = -3$ when $x = -0.4$. Find y when $x = -6$.
14. If $y = -3.8$ when $x = -4$, find y when $x = 2$.

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.

x	y
-1	-3
0	0
1	3
2	6

8.

x	y
-2	5
2	4
6	3
10	2

9.

x	y
-3	4
-1	5
1	6
3	7

Determine the slope of each line.

10. the line through points at (3, 4) and (4, 6)

11. the line through points at (-3, -2) and (-2, -5)

12. the line through points at (2, 3) and (-5, 1)

13. the line through points at (4, -1) and (9, 6)

14. the line through points at (-4, 4) and (-9, -8)

15. the line through points at (-6, 2) and (7, -3)

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

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

3. $(6, -1), m = -2$

4. $(-5, -2), m = 0$

5. $(-4, -6), m = \frac{2}{3}$

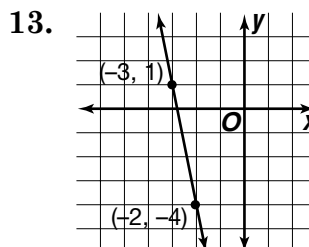
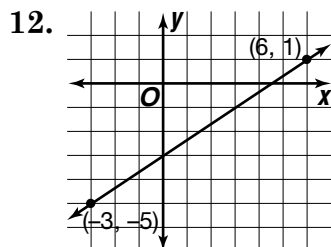
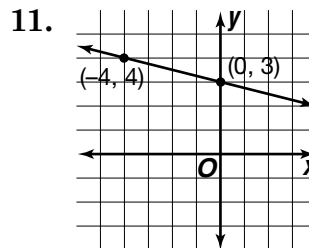
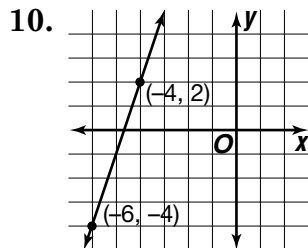
6. $(-8, 3), m = -\frac{3}{5}$

7. $(7, -9), m = 4$

8. $(-6, 3), m = -\frac{1}{2}$

9. $(-2, -5), m = 8$

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



14. the line through points
at $(-2, -2)$ and $(-1, -6)$

15. the line through points
at $(-7, -3)$ and $(5, -1)$

Writing Equations in Slope-Intercept Form

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

1. $m = -3, b = 5$

2. $m = 6, b = 2$

3. $m = 4, b = -1$

4. $m = 0, b = 4$

5. $m = \frac{2}{5}, b = -7$

6. $m = -\frac{3}{4}, b = 8$

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

8. $m = -5, b = 6$

9. $m = \frac{1}{2}, b = -9$

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

10. $m = 3, (4, 2)$

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

12. $m = 4, (0, -7)$

13. $m = -\frac{3}{5}, (-5, -3)$

14. $m = \frac{1}{4}, (-8, 6)$

15. $m = -\frac{2}{3}, (9, -4)$

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

17. $m = 0, (-8, -7)$

18. $m = -\frac{3}{2}, (-8, 9)$

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

19. $(1, 3)$ and $(-3, -5)$

20. $(0, 5)$ and $(3, -4)$

21. $(2, 1)$ and $(3, 6)$

22. $(-3, 0)$ and $(6, -6)$

23. $(4, 5)$ and $(-5, 5)$

24. $(0, 6)$ and $(-4, 3)$

25. $(-3, 2)$ and $(3, -6)$

26. $(-7, -6)$ and $(-5, -3)$

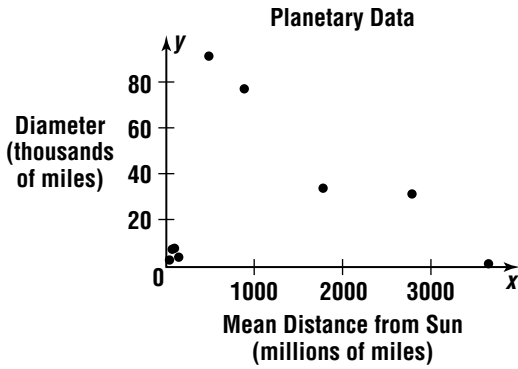
27. $(6, -4)$ and $(0, 2)$

Practice

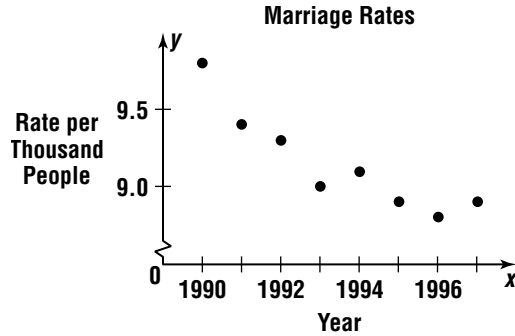
Scatter Plots

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

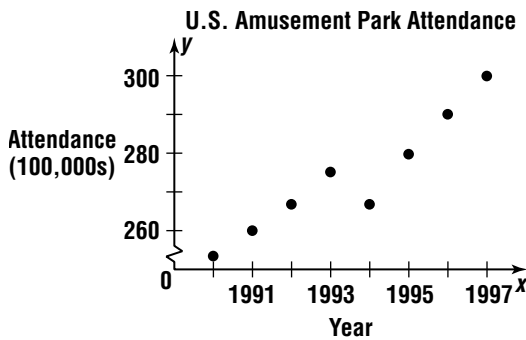
1.



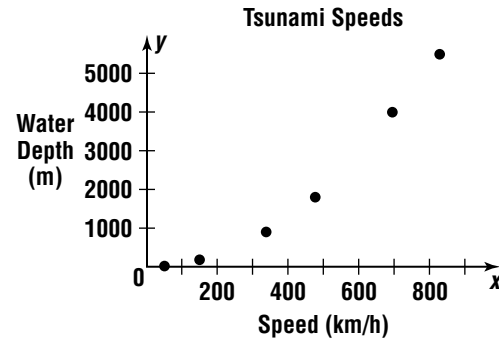
2.



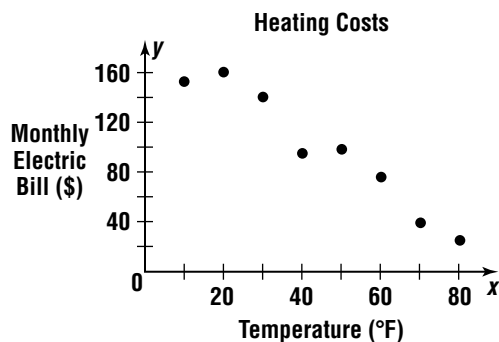
3.



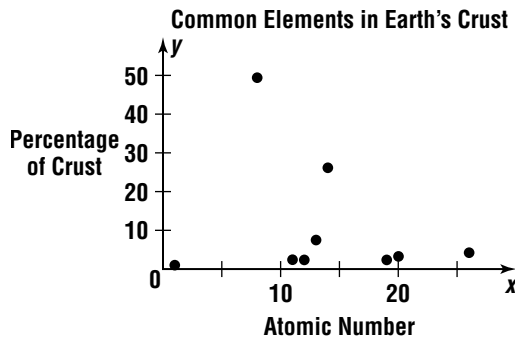
4.



5.



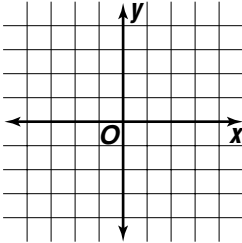
6.



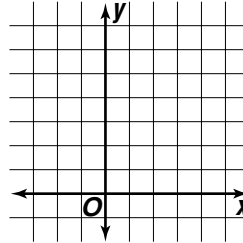
Graphing Linear Equations

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

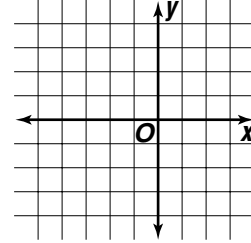
1. $x + y = -2$



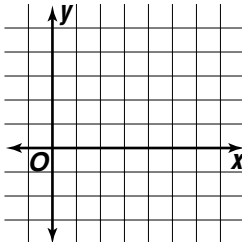
2. $2x + y = 6$



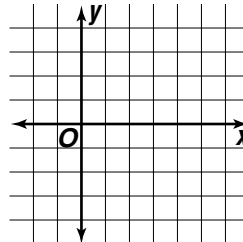
3. $x - 2y = -4$



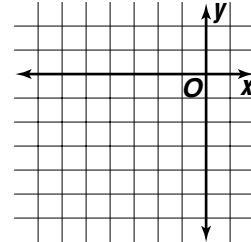
4. $2x + 3y = 12$



5. $3x - 3y = 9$

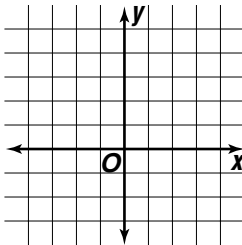


6. $5x + 6y = -30$

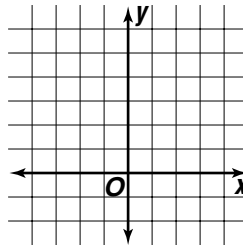


Determine the slope and y-intercept of the graph of each equation. Then graph the equation.

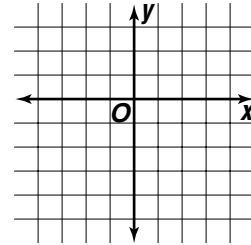
7. $y = -x + 3$



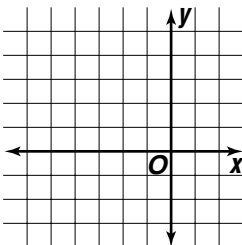
8. $y = 5$



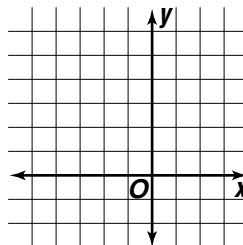
9. $y = 3x - 4$



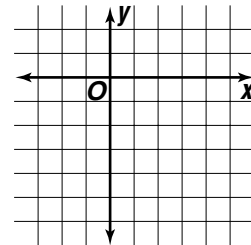
10. $y = \frac{2}{5}x + 2$



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



12. $y = \frac{2}{3}x - 6$

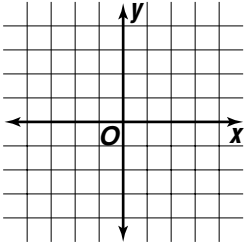


Practice

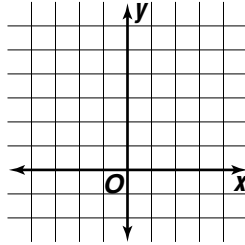
Families of Linear Graphs

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

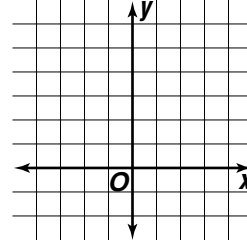
1. $y = 2x + 3$
 $y = 2x - 3$



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

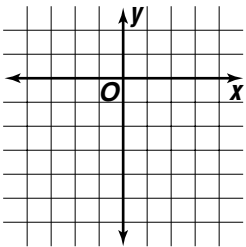


3. $y = \frac{1}{3}x + 2$
 $y = \frac{1}{3}x + 4$

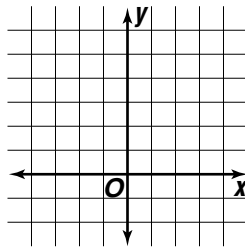


Compare and contrast the graphs of each pair of equations. Verify by graphing the equations.

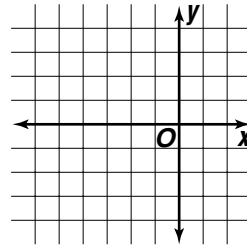
4. $y = -\frac{1}{2}x - 4$
 $y = -2x - 4$



5. $3x + 6 = y$
 $3x = y$



6. $y = \frac{5}{6}x + 3$
 $y = 5x + 3$



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

7. same slope,
 shifted down 2 units

8. same y-intercept,
 steeper negative slope

9. positive slope,
 same y-intercept

10. same y-intercept, less
 steep negative slope

11. same slope, shifted
 up 4 units

12. same slope, shifted
 down 6 units

Practice***Parallel and Perpendicular Lines***

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

1. $y = 3x + 4$
 $y = 3x + 7$

2. $y = -4x + 1$
 $4y = x + 3$

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

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

5. $y = \frac{3}{5}x - 3$
 $5y = 3x - 10$

6. $y = 4$
 $4y = 6$

7. $y = 7x + 2$
 $x + 7y = 8$

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

9. $y = -\frac{3}{8}x - 9$
 $y = \frac{8}{3}x + 3$

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. $y = 3x + 6$; (4, 7)

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

12. $y = \frac{1}{2}x + 5$; (4, -5)

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

14. $y - \frac{2}{5}x = -5$; (5, 3)

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

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. $y = -5x + 1$; (2, -1)

17. $y = 2x - 3$; (-5, 3)

18. $4x + 7y = 3$; (-4, -7)

19. $3x - 4y = 2$; (6, 0)

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

21. $6x + 5y = -3$; (-6, 2)

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

1. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6$

2. 8

3. $10 \cdot 10 \cdot 10 \cdot 10$

4. $7 \cdot 7 \cdot 7$

5. $(-4) \cdot (-4) \cdot (-4) \cdot (-4)$

6. $b \cdot b \cdot b \cdot b \cdot b \cdot b$

7. $x \cdot x$

8. $m \cdot m \cdot m \cdot m \cdot m \cdot m \cdot m$

9. $3 \cdot 3 \cdot 5 \cdot 5 \cdot 5$

10. $a \cdot a \cdot a \cdot a \cdot c \cdot c \cdot c \cdot c$

11. $7 \cdot 7 \cdot 9 \cdot 7 \cdot 9 \cdot 2 \cdot 2 \cdot 2$

12. $(6)(x)(x)(x)(y)(y)(y)(y)$

Write each power as a multiplication expression.

13. 9^3

14. 13^5

15. 7^2

16. p^4

17. n^6

18. $(-5)^5$

19. $4 \cdot 8^6$

20. $7^3 \cdot 5^2$

21. ab^2

22. m^5n^3

23. $-4c^3$

24. $3x^2y^4$

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

25. b^4

26. a^6

27. $4c^5$

28. $-3b^3$

29. a^5b^2

30. $2bc^3$

31. $-4a^4c^2$

32. $a^2 + b^2$

33. $2(b^2 - c^3)$

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

1. $6^3 \cdot 6^2$

2. $7^6 \cdot 7^4$

3. $y^4 \cdot y^8$

4. $b \cdot b^4$

5. $(g^2)(g^3)(g)$

6. $m(m^8)$

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

8. $(xy^5)(x^3y^3)$

9. $(2c^3)(2c)$

10. $(-3x^2)(6x^2)$

11. $(-7xy)(-2x)$

12. $(5m^3n^2)(4m^2n^3)$

13. $(-8ab)(a^2b^5)$

14. $\frac{9^2}{9}$

15. $\frac{12^8}{12^3}$

16. $\frac{y^4}{y^2}$

17. $\frac{k^6}{k^6}$

18. $\frac{x^4y^5}{x^3y^2}$

19. $\frac{a^9b^6}{a^2b}$

20. $\frac{mn^3}{n^2}$

21. $\frac{15a^3}{3a}$

22. $\frac{8x^5y^4}{4x^2y^2}$

23. $\frac{m^2n}{m^2}$

24. $\frac{6a^5b^7}{-2a^3b^7}$

25. $\frac{-20x^3y^2}{-5x^3y}$

26. $\frac{-16ab^4}{4b^3}$

27. $\frac{12x^2y}{2x^2y}$

Negative Exponents

Write each expression using positive exponents. Then evaluate the expression.

1. 2^{-6}

2. 5^{-1}

3. 8^{-2}

4. 10^{-3}

Simplify each expression.

5. g^{-6}

6. s^{-1}

7. q^0

8. $a^{-2}b^2$

9. m^5n^{-1}

10. $p^{-1}q^{-6}r^3$

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

12. $a^{-2}b^0c^{-1}$

13. $12m^{-6}n^4$

14. $7xy^{-8}z$

15. $x^{-3}(x^2)$

16. $b^3(b^{-5})$

17. $\frac{b^3}{b^6}$

18. $\frac{y^3}{y^{-2}}$

19. $\frac{m^5n^3}{m^6n^2}$

20. $\frac{xy^2}{xy^3}$

21. $\frac{a^7b^4}{a^9b^2}$

22. $\frac{rs^{-3}}{r^2s^4}$

23. $\frac{16c^8}{4c^{10}}$

24. $\frac{9x^{-5}y^5}{36x^4y^3}$

25. $\frac{7p^2q^6}{21p^{-3}q^7}$

26. $\frac{-6m^5n^2q^{-1}}{36m^{-2}n^4q^{-1}}$

27. $\frac{4a^3b^2c^2}{6a^5b^3c}$

28. $\frac{28x^5y^{-3}z}{-4x^4yz^3}$

Practice**Scientific Notation****Express each measure in standard form.**

1. 4 gigabytes

2. 78 kilowatts

3. 9 megahertz

4. 7.5 milliamperes

5. 2.3 nanoseconds

6. 3.7 micrograms

Express each number in scientific notation.

7. 6300

8. 4,600,000

9. 92.3

10. 51,200

11. 776,000

12. 68,200,000

13. 0.00013

14. 0.000009

15. 0.026

16. 0.04

17. 0.0055

18. 0.000031

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

19. $(4 \times 10^3)(2 \times 10^4)$

20. $(3 \times 10^2)(1.5 \times 10^{-5})$

21. $(6 \times 10^{-7})(1.5 \times 10^9)$

22. $(7 \times 10^{-3})(2.1 \times 10^{-3})$

23. $\frac{5.1 \times 10^5}{1.7 \times 10^7}$

24. $\frac{3.6 \times 10^6}{2 \times 10^2}$

25. $\frac{8.5 \times 10^{-3}}{2.5 \times 10^6}$

26. $\frac{2.7 \times 10^2}{3 \times 10^{-4}}$

27. $\frac{3.9 \times 10^4}{3 \times 10^7}$

PracticeStudent Edition
Pages 357-361**Square Roots****Simplify.**

1. $\sqrt{36}$

2. $-\sqrt{16}$

3. $\sqrt{81}$

4. $-\sqrt{144}$

5. $-\sqrt{100}$

6. $-\sqrt{121}$

7. $\sqrt{169}$

8. $-\sqrt{25}$

9. $-\sqrt{529}$

10. $\sqrt{256}$

11. $\sqrt{324}$

12. $-\sqrt{289}$

13. $\sqrt{441}$

14. $-\sqrt{225}$

15. $\sqrt{196}$

16. $\sqrt{400}$

17. $\sqrt{484}$

18. $\sqrt{729}$

19. $-\sqrt{625}$

20. $\sqrt{1225}$

21. $\sqrt{\frac{49}{81}}$

22. $-\sqrt{\frac{16}{25}}$

23. $\sqrt{\frac{4}{16}}$

24. $-\sqrt{\frac{25}{36}}$

25. $-\sqrt{\frac{100}{121}}$

26. $\sqrt{\frac{1}{64}}$

27. $\sqrt{\frac{36}{64}}$

28. $-\sqrt{\frac{144}{36}}$

29. $-\sqrt{\frac{121}{289}}$

30. $-\sqrt{\frac{225}{625}}$

31. $\sqrt{\frac{400}{100}}$

32. $\sqrt{\frac{196}{256}}$

Practice***Estimating Square Roots******Estimate each square root to the nearest whole number.***

1. $\sqrt{10}$

2. $\sqrt{14}$

3. $\sqrt{32}$

4. $\sqrt{19}$

5. $\sqrt{40}$

6. $\sqrt{6}$

7. $\sqrt{53}$

8. $\sqrt{23}$

9. $\sqrt{30}$

10. $\sqrt{21}$

11. $\sqrt{90}$

12. $\sqrt{73}$

13. $\sqrt{72}$

14. $\sqrt{56}$

15. $\sqrt{89}$

16. $\sqrt{135}$

17. $\sqrt{152}$

18. $\sqrt{110}$

19. $\sqrt{162}$

20. $\sqrt{129}$

21. $\sqrt{181}$

22. $\sqrt{174}$

23. $\sqrt{223}$

24. $\sqrt{195}$

25. $\sqrt{240}$

26. $\sqrt{271}$

27. $\sqrt{312}$

28. $\sqrt{380}$

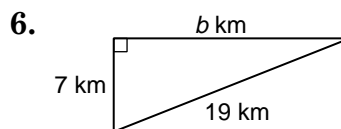
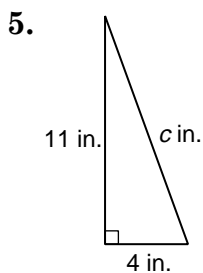
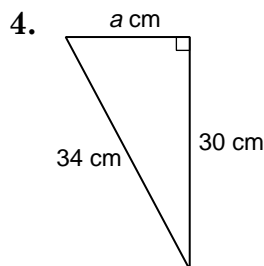
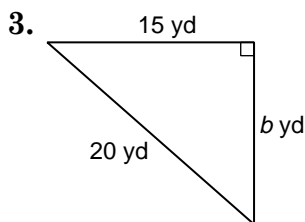
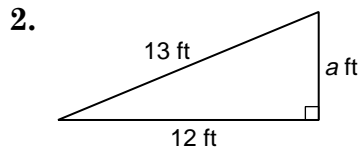
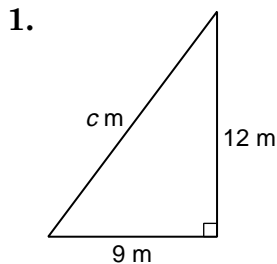
29. $\sqrt{335}$

30. $\sqrt{300}$

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.



7. $a = 8, b = 10, c = ?$

8. $b = 20, c = 22, a = ?$

9. $c = 26, a = 10, b = ?$

10. $a = 21, c = 35, b = ?$

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

11. 12 m, 16 m, 20 m

12. 8 cm, 12 cm, 14 cm

13. 6 in., 15 in., 16 in.

14. 7 ft, 24 ft, 25 ft

Practice**Polynomials**

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

1. $8y^2$

2. $3m^{-4}$

3. $\frac{6}{p}$

4. -9

5. $2x^2 + 5$

6. $-7a^3b$

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

7. $4h + 8$

8. 13

9. $3xy$

10. $\frac{2}{c} + 4$

11. $m^2 + 2 - m$

12. $5a + b^{-2}$

13. $7 - \frac{1}{2}d$

14. n^2

15. $2a^2 + 8a + 9 - 3$

16. $x^3 + 4x^3$

17. $m^2 + 2mn + n^2$

18. $6 - y$

Find the degree of each polynomial.

19. 8

20. $3a^2$

21. $5m + n^2$

22. $16cd$

23. $3g^4 + 2h^3$

24. $4a^2b + 3ab^3$

25. $c^2 + 2c - 8$

26. $2p^3 - 7p^2 - 4p$

27. $9y^3z + 15y^5z$

28. $7s^2 - 4s^2t + 2st$

29. $6x^3 + x^3y^2 - 3$

30. $2ab^3 - 5abc$

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

1.
$$\begin{array}{r} 5x - 2 \\ (+) 4x + 6 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 2y + 4 \\ (+) y - 1 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 4x - 8 \\ (+) 2x + 5 \\ \hline \end{array}$$

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

5.
$$\begin{array}{r} n^2 + 4n + 3 \\ (+) 3n^2 + 4n - 4 \\ \hline \end{array}$$

6.
$$\begin{array}{r} 2x^2 + 3xy - y^2 \\ (+) 2x^2 - 2xy - 4y^2 \\ \hline \end{array}$$

7. $(2x^2 - 2x - 4) + (x^2 - 3x + 2)$

8. $(x^2 + 2x + 1) + (3x^2 + 4x + 1)$

9. $(2a^2 + 8a + 6) + (a^2 + 3a - 4)$

10. $(x^2 + x - 12) + (x^2 - 3x)$

11. $(3x^2 + 8x + 4) + (4x^2 - 1)$

12. $(x^2 - 4x - 5) + (x^2 + 4x)$

Find each difference.

13.
$$\begin{array}{r} 7n + 2 \\ (-) n + 1 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 3x - 3 \\ (-) 2x + 2 \\ \hline \end{array}$$

15.
$$\begin{array}{r} 2y + 5 \\ (-) y - 1 \\ \hline \end{array}$$

16.
$$\begin{array}{r} 4x^2 + 7x - 2 \\ (-) 2x^2 - 6x + 4 \\ \hline \end{array}$$

17.
$$\begin{array}{r} 2x^2 - 9x - 5 \\ (-) x^2 - 5x - 6 \\ \hline \end{array}$$

18.
$$\begin{array}{r} 5m^2 - 4m - 1 \\ (-) 4m^2 + 8m + 4 \\ \hline \end{array}$$

19. $(6x - 2) - (8x + 3)$

20. $(3x^2 + 3x - 6) - (2x^2 - 2x - 4)$

21. $(6x^2 + 2x - 8) - (4x^2 + 8x + 4)$

22. $(2a^2 + 6a + 4) - (a^2 - 3)$

23. $(2x^2 - 8x + 3) - (-x^2 + 2x)$

24. $(3x^2 - 5xy - 2y^2) - (2x^2 + y^2)$

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

1. $3(y + 4)$

2. $-2(n + 3)$

3. $5(3a - 4)$

4. $7(-2c + 3)$

5. $x(x + 6)$

6. $8y(2y - 3)$

7. $y(9 + 2y)$

8. $-3b(b - 1)$

9. $6(a^2 + 5)$

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

11. $-7n(-4n + 2)$

12. $2q(3q - 1)$

13. $p(3p^2 + 7)$

14. $4x(5 - 2x^2)$

15. $5b(b^2 + 5b)$

16. $-3y(-9 + 3y^2)$

17. $2(8a^2 - 4a + 9)$

18. $6(z^2 + 2z - 6)$

19. $x(x^2 - x + 3)$

20. $-4b(1 - 7b + b^2)$

21. $5m^2(3m^2 - m - 7)$

22. $-7y(-2 + 7y + 3y^2)$

23. $-3n^2(n^2 - 2n + 3)$

24. $9c(2c^3 + c^2 - 4)$

Solve each equation.

25. $5(y + 2) = 25$

26. $7(x - 2) = -7$

27. $2(a - 5) + 4 = a + 9$

28. $3(2x + 6) - 10 = 4(x + 3)$

29. $-6(2n - 2) + 12 = 4(2n - 9)$

30. $b(b + 8) = b(b + 7) + 5$

31. $y(y + 7) + 3y = y(y + 3) - 14$

32. $m(m - 5) + 14 = m(m + 2) - 14$

Multiplying Binomials

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

1. $(y + 4)(y + 3)$

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

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

4. $(a - 6)(a - 4)$

5. $(z - 5)(z + 3)$

6. $(n - 1)(n - 8)$

7. $(x + 7)(x - 4)$

8. $(y - 3)(y + 9)$

9. $(b + 2)(b + 3)$

10. $(2c + 5)(c - 4)$

11. $(4x - 7)(x + 3)$

12. $(x - 1)(5x - 4)$

13. $(3y + 1)(3y + 2)$

14. $(2n + 4)(5n - 3)$

15. $(7h - 3)(4h - 1)$

16. $(2m - 6)(3m + 2)$

17. $(6a + 2)(2a + 3)$

18. $(4c + 5)(2c - 2)$

19. $(x + y)(2x + y)$

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

21. $(3m - 3n)(3m - 2n)$

22. $(7p - 4q)(2p + 3q)$

23. $(2r + 2s)(2r + 3s)$

24. $(3y - 5z)(3y + 3z)$

25. $(x^2 + 1)(x - 3)$

26. $(y - 4)(y^2 + 2)$

27. $(2c^2 - 5)(c - 4)$

28. $(a^3 - 3a)(a + 4)$

29. $(b^2 + 2)(b^2 + 3)$

30. $(x^3 - 3)(4x + 1)$

Special Products**Find each product.**

1. $(y + 4)^2$

2. $(x + 3)^2$

3. $(m + 6)^2$

4. $(2b + c)^2$

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

6. $(4r + s)^2$

7. $(2m + 2n)^2$

8. $(4a + 2b)^2$

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

10. $(b - 3)^2$

11. $(p - 4)^2$

12. $(s - 5)^2$

13. $(3x - 3)^2$

14. $(2y - 3)^2$

15. $(c - 6d)^2$

16. $(m - 2n)^2$

17. $(5x - y)^2$

18. $(a - 4b)^2$

19. $(3p - 5q)^2$

20. $(2j - 4k)^2$

21. $(2r - 2s)^2$

22. $(y + 3)(y - 3)$

23. $(x + 6)(x - 6)$

24. $(a + 9)(a - 9)$

25. $(3a + b)(3a - b)$

26. $(4r + s)(4r - s)$

27. $(2y + 6)(2y - 6)$

28. $(5x + 4)(5x - 4)$

29. $(2c + 4d)(2c - 4d)$

30. $(3m + 6n)(3m - 6n)$

Practice**Factors**

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

1. 36

2. 31

3. 28

4. 70

5. 43

6. 27

7. 14

8. 97

Factor each monomial.

9. $30m^2n$

10. $-12x^2y^3$

11. $-21ab^2$

12. $36r^3s$

13. $63x^3yz^2$

14. $-40pq^2r^2$

Find the GCF of each set of numbers or monomials.

15. 27, 18

16. 9, 12

17. 45, 56

18. 4, 8, 16

19. 32, 36, 38

20. 24, 36, 48

21. $6x$, $9x$

22. $5y^2$, $15y$

23. $14c^2$, $-13d$

24. $25mn^2$, $20m$

25. $12ab^2$, $18ab$

26. $-28x^2y^3$, $21xy^2$

27. $6xy$, $18y^2$

28. $18c^2d$, $27cd^2$

29. $7m$, mn

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

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

1. $4x + 16$

2. $3y^2 + 12y$

3. $10x + 5x^2y$

4. $7yz + 3x$

5. $15r + 20rs$

6. $14ab + 21a$

7. $9xy - 3xy^2$

8. $12m^2n - 18mn^2$

9. $8ab + 2a^2b^2$

10. $16a^2bc - 36ab^2$

11. $3x^2y + 25m^2$

12. $8x^2y^3 - 10xy$

13. $4xy^2 + 18xy + 14y$

14. $7m^2 + 28mn + 14n^2$

15. $2x^2y + 4xy - 2xy^2$

16. $3a^3b - 9a^2b + 15b^2$

17. $18a^2bc + 24ac^2 + 36a^3c$

18. $8x^3y^2 + 16xy + 28x^2y^3$

Find each quotient.

19. $(6m^2 + 4) \div 2$

20. $(14x^2 - 21x) \div 7x$

21. $(10x^2 + 15y^2) \div 5$

22. $(2c^2 + 4c) \div 2c$

23. $(12xy + 9y) \div 3y$

24. $(9a^2b - 27ab) \div 9ab$

25. $(25m^2n^2 + 15mn) \div 5mn$

26. $(3a^2b - 9abc^2) \div 3ab$

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

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

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

2. $y^2 + 5y + 4$

3. $m^2 + 12m + 35$

4. $p^2 + 8p + 15$

5. $a^2 + 8a + 12$

6. $n^2 + 4n + 4$

7. $x^2 + 9x + 18$

8. $x^2 + x + 3$

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

10. $c^2 - 8c + 15$

11. $m^2 - 2m + 1$

12. $b^2 - 9b + 20$

13. $x^2 - 8x + 7$

14. $n^2 - 5n + 6$

15. $y^2 - 8y + 12$

16. $c^2 - 4c + 5$

17. $x^2 - x - 12$

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

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

20. $y^2 - y - 6$

21. $b^2 - 3b - 10$

22. $x^2 + 3x - 4$

23. $c^2 + 2c - 15$

24. $2x^2 + 10x + 8$

25. $3y^2 - 15y + 18$

26. $5m^2 - 10m - 40$

27. $3b^2 + 6b - 9$

28. $4n^2 + 12n + 8$

29. $2x^2 + 8x - 24$

30. $3y^2 - 15y + 12$

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

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

1. $2y^2 + 8y + 6$

2. $2x^2 + 5x + 2$

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

4. $5m^2 - 4m - 1$

5. $2c^2 + 6c - 8$

6. $4q^2 + 2q + 3$

7. $3x^2 - 13x + 4$

8. $4y^2 - 14y + 6$

9. $2b^2 - b - 10$

10. $6a^2 + 8a + 2$

11. $3n^2 + 7n - 6$

12. $3x^2 - 3x - 6$

13. $2c^2 + 3c - 7$

14. $5y^2 - 17y + 6$

15. $2b^2 + 2b - 12$

16. $2x^2 + 10x + 8$

17. $3m^2 - 19m + 6$

18. $4a^2 + 10a - 6$

19. $7b^2 - 16b + 4$

20. $3y^2 - y - 10$

21. $6c^2 + 11c + 4$

22. $10x^2 - x - 2$

23. $12m^2 - 11m + 2$

24. $9y^2 - 3y - 6$

25. $8b^2 + 12b + 4$

26. $6x^2 + 8x - 8$

27. $4n^2 - 14n + 12$

28. $6x^2 + 18x + 12$

29. $4a^2 + 18a - 10$

30. $9y^2 - 15y + 6$

Special Factors

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

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

2. $x^2 - 4x + 4$

3. $n^2 + 6n + 3$

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

5. $y^2 - 10y + 20$

6. $4a^2 + 16a + 16$

7. $9x^2 + 6x + 1$

8. $4n^2 - 20n + 25$

9. $4y^2 + 9y + 9$

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

10. $x^2 - 49$

11. $b^2 + 16$

12. $y^2 - 81$

13. $4m^2 - 9$

14. $9a^2 - 16$

15. $25r^2 + 9$

16. $18n^2 - 18$

17. $3x^2 - 12y^2$

18. $8m^2 - 18n^2$

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

19. $4a - 24$

20. $6x + 9$

21. $x^2 + 5x - 10$

22. $2y^2 + 6y - 20$

23. $m^2 - 9n^2$

24. $a^2 - 8a + 16$

25. $5b^2 + 10b$

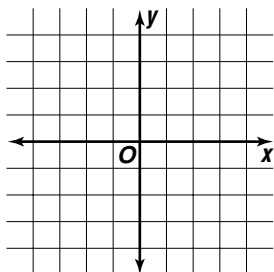
26. $9y^2 + 12y + 4$

27. $3x^2 - 3x - 18$

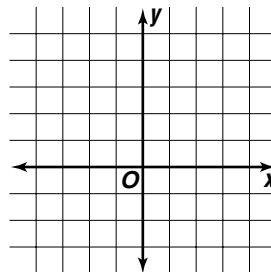
Graphing Quadratic Functions

Graph each quadratic equation by making a table of values.

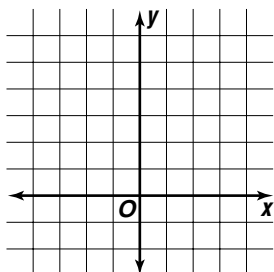
1. $y = x^2 + 2x$



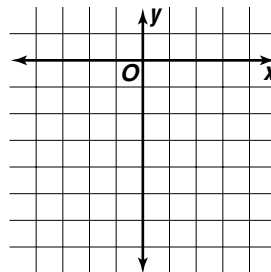
2. $y = -x^2 + 4$



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

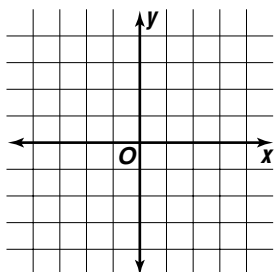


4. $y = x^2 - 2x - 6$

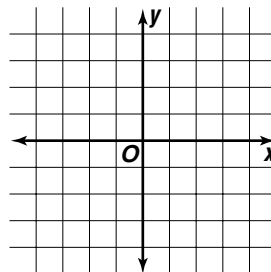


Write the equation of the axis of symmetry and the coordinates of the vertex of the graph of each quadratic function. Then graph the function.

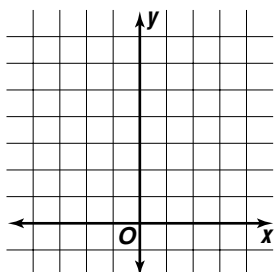
5. $y = x^2 - 1$



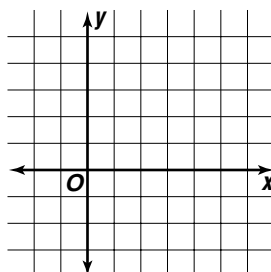
6. $y = x^2 + 4x + 2$



7. $y = -x^2 + 2x + 6$



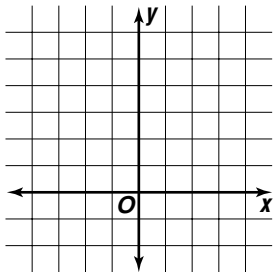
8. $y = -x^2 + 4x$



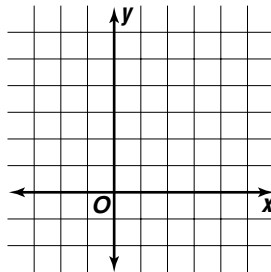
Families of Quadratic Functions

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

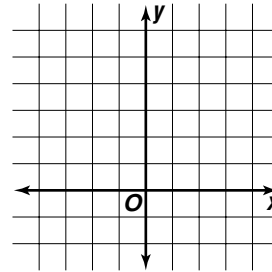
$$\begin{aligned} 1. \quad & y = -x^2 + 1 \\ & y = -x^2 + 3 \\ & y = -x^2 + 5 \end{aligned}$$



$$\begin{aligned} 2. \quad & y = (x + 1)^2 \\ & y = (x - 1)^2 \\ & y = (x - 3)^2 \end{aligned}$$



$$\begin{aligned} 3. \quad & y = 5.5x^2 \\ & y = 1.5x^2 \\ & y = 0.5x^2 \end{aligned}$$



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

4. $y = 2x^2$

5. $y = x^2 + 3$

6. $y = -x^2 + 5$

7. $y = -0.2x^2$

8. $y = (x + 1)^2$

9. $y = (x - 9)^2$

10. $y = -4x^2 - 1$

11. $y = (x - 6)^2 + 5$

12. $y = -0.5x^2 + 4$

13. $y = 5x^2 + 8$

14. $y = (x - 2)^2 - 3$

15. $y = -(x + 1)^2 + 8$

16. $y = -(x + 3)^2 - 7$

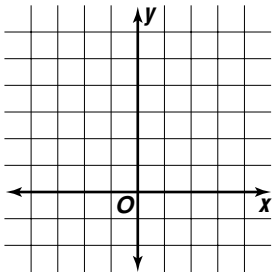
17. $y = -(x - 4)^2 + 5$

18. $y = (x + 6)^2 + 2$

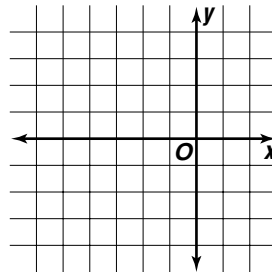
Solving Quadratic Equations by Graphing

Solve each equation by graphing the related function. If exact roots cannot be found, state the consecutive integers between which the roots are located.

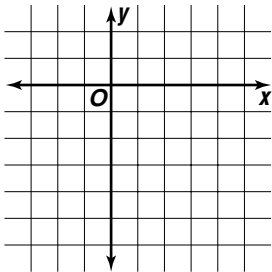
1. $x^2 - 2x + 1 = 0$



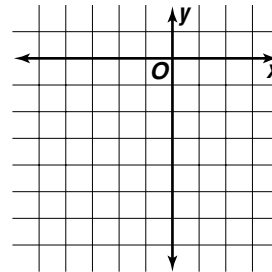
2. $x^2 + 6x + 5 = 0$



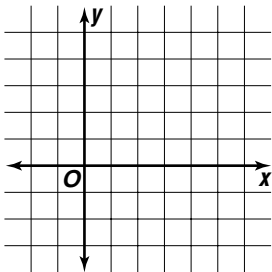
3. $x^2 - 3x - 4 = 0$



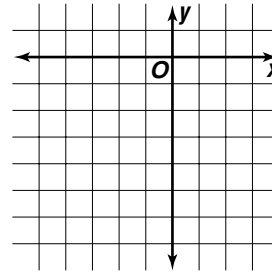
4. $x^2 + 4x - 3 = 0$



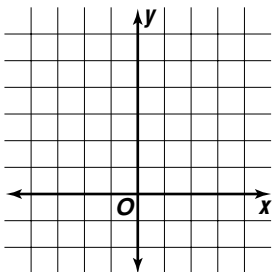
5. $x^2 - 7x + 10 = 0$



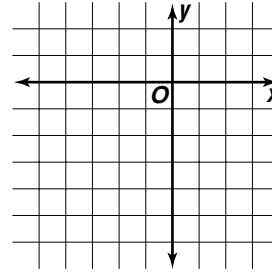
6. $2x^2 - 3x - 6 = 0$



7. $2x^2 - 6x + 3 = 0$



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



Practice***Solving Quadratic Equations by Factoring*****Solve each equation. Check your solution.**

1. $s(s + 3) = 0$

2. $4a(a - 6) = 0$

3. $3m(m + 5) = 0$

4. $6t(t - 2) = 0$

5. $(y + 4)(y - 5) = 0$

6. $(p - 2)(p + 3) = 0$

7. $(x + 5)(x - 6) = 0$

8. $(3r + 2)(r - 1) = 0$

9. $(2n - 2)(n + 1) = 0$

10. $(x - 3)(3x + 6) = 0$

11. $(y + 4)(2y - 8) = 0$

12. $(4c + 3)(c - 7) = 0$

13. $x^2 + 3x - 10 = 0$

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

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

16. $x^2 + 4x = 21$

17. $x^2 - 5x = 36$

18. $x^2 - 5x = 0$

19. $2a^2 = 6a$

20. $2x^2 - 10x + 8 = 0$

21. $3x^2 - 7x - 6 = 0$

22. $5x^2 - x = 4$

23. $3x^2 + 13x = -4$

24. $4x^2 + 7x = 2$

Practice**Solving Quadratic Equations by Completing the Square**

Find the value of c that makes each trinomial a perfect square.

1. $x^2 + 12x + c$

2. $b^2 - 4b + c$

3. $g^2 - 16g + c$

4. $n^2 + 6n + c$

5. $q^2 + 20q + c$

6. $s^2 - 8s + c$

7. $a^2 + 10a + c$

8. $m^2 - 26m + c$

9. $r^2 + 5r + c$

10. $y^2 + y + c$

11. $p^2 - 7p + c$

12. $z^2 + 11z + c$

Solve each equation by completing the square.

13. $x^2 + 10x - 11 = 0$

14. $p^2 - 8p + 12 = 0$

15. $r^2 - 2r - 15 = 0$

16. $c^2 - 4c - 12 = 0$

17. $t^2 - 4t = 0$

18. $x^2 + 6x - 7 = 0$

19. $n^2 + 6n = 16$

20. $w^2 - 14w + 24 = 0$

21. $m^2 - 2m - 5 = 0$

22. $f^2 + 10f + 15 = 0$

23. $s^2 - 6s - 4 = 0$

24. $h^2 - 4h = 2$

25. $y^2 - 12y + 7 = 0$

26. $k^2 - 8k + 13 = 0$

27. $d^2 + 8d + 9 = 0$

Practice***The Quadratic Formula******Use the Quadratic Formula to solve each equation.***

1. $y^2 - 49 = 0$

2. $x^2 + 7x + 6 = 0$

3. $k^2 - 7k + 12 = 0$

4. $n^2 + 5n - 14 = 0$

5. $b^2 - 5b - 6 = 0$

6. $z^2 + 8z + 12 = 0$

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

8. $a^2 - 9a + 22 = 0$

9. $c^2 - 4c = -3$

10. $x^2 + 9x = -14$

11. $h^2 - 2h = 8$

12. $m^2 + m = -4$

13. $-z^2 - 8z - 15 = 0$

14. $r^2 + 6r = -5$

15. $-h^2 + 6h = -7$

16. $g^2 + 12x + 20 = 0$

17. $w^2 + 10w = -9$

18. $2y^2 + 6y + 4 = 0$

19. $-2m^2 + 4m + 6 = 0$

20. $2x^2 + 8x = 10$

21. $2b^2 - 3b = -1$

22. $2p^2 + 6p + 8 = 0$

23. $3k^2 + 6k = 9$

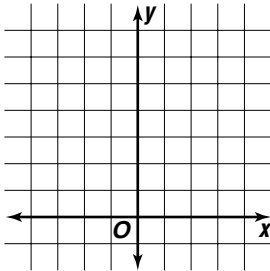
24. $-3x^2 - 4x + 4 = 0$

Practice

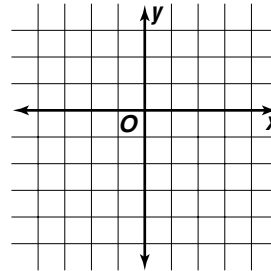
Exponential Functions

Graph each exponential function. Then state the *y*-intercept.

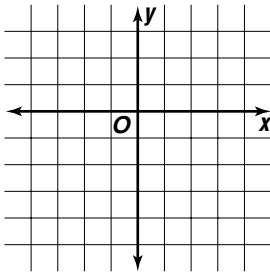
1. $y = 2^x + 3$



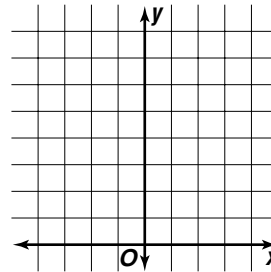
2. $y = 2^x - 2$



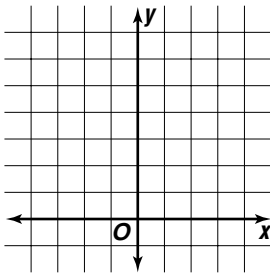
3. $y = 3^x - 4$



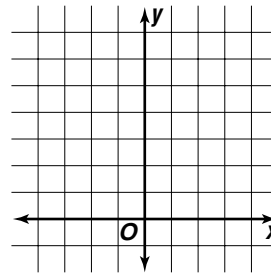
4. $y = 2^x + 4$



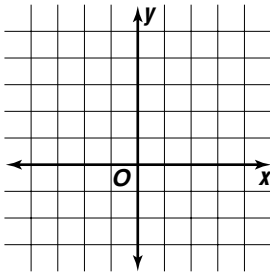
5. $y = 3^x + 1$



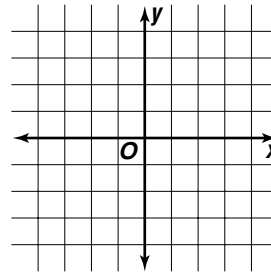
6. $y = 4^x + 2$



7. $y = 3^x - 2$



8. $y = 2^x - 1$



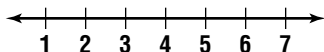
Practice

Inequalities and Their Graphs**Write an inequality to describe each number.**

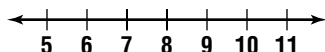
1. a number less than or equal to 11
2. a number greater than 3
3. a number that is at least 6
4. a number that is no less than -7
5. a maximum number of 9
6. a number that is less than -2

Graph each inequality on a number line.

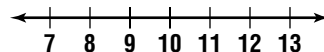
7. $x < 4$



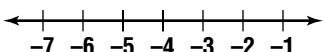
8. $x \geq 8$



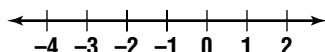
9. $y > 9$



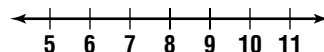
10. $-5 \leq x$



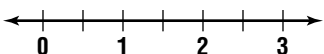
11. $p > -2$



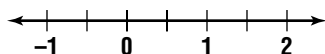
12. $7 \geq g$



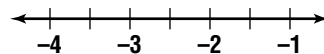
13. $y < 1.5$



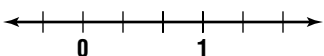
14. $x \geq 0.5$



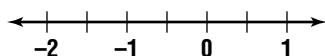
15. $-2.5 > h$



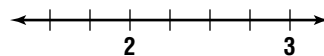
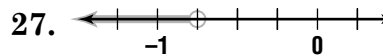
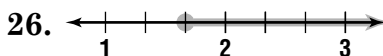
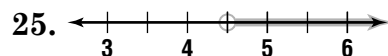
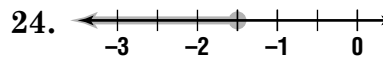
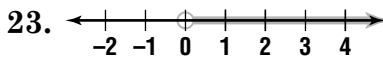
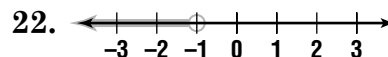
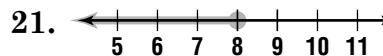
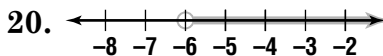
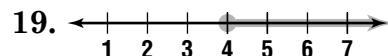
16. $x \leq \frac{1}{3}$



17. $m < -\frac{1}{2}$



18. $2\frac{1}{4} > x$

**Write an inequality for each graph.**

Solving Addition and Subtraction Inequalities**Solve each inequality. Check your solution.**

1. $x + 7 > 16$

2. $b - 4 < 3$

3. $y - 6 \geq -12$

4. $f + 9 < 24$

5. $a - 2 \leq 9$

6. $3 + w > -1$

7. $n - 1 \leq 7$

8. $10 + c \geq 13$

9. $q - 9 < 4$

10. $-5 \geq d - 7$

11. $17 \geq v + 11$

12. $14 > h - 9$

13. $x + 1.7 \leq 5.8$

14. $2.9 + s < 5.7$

15. $0.3 \leq g - 4.4$

16. $y + \frac{1}{2} \geq 2\frac{3}{4}$

17. $1\frac{1}{4} + m \leq 4\frac{5}{8}$

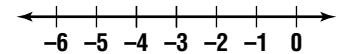
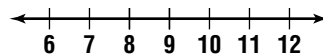
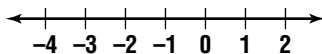
18. $2\frac{1}{6} > r - \frac{2}{3}$

Solve each inequality. Graph the solution.

19. $5x - 2 > 6x$

20. $n + 7 \leq 2n - 1$

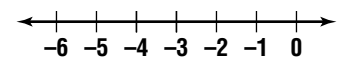
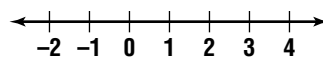
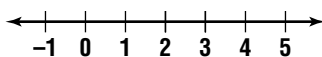
21. $2y + 6 < 3y + 9$



22. $7p \leq 3(2p + 1)$

23. $9m - 6 < 8m - 5$

24. $2h - 11 < 3h - 7$



Solving Multiplication and Division Inequalities**Solve each inequality. Check your solution.**

1. $4y < 16$

2. $-3q \leq 18$

3. $9g \leq -27$

4. $\frac{p}{5} > 5$

5. $\frac{a}{2} < -4$

6. $-\frac{m}{7} \geq 7$

7. $-6x \leq 30$

8. $-4z > -28$

9. $16 \geq 2e$

10. $-\frac{n}{3} \geq -3$

11. $4 \leq \frac{f}{6}$

12. $-\frac{w}{5} > 8$

13. $-81 < 9v$

14. $6r \leq -42$

15. $-12a \leq -60$

16. $-4 > \frac{u}{9}$

17. $-\frac{d}{6} < -8.1$

18. $\frac{l}{8} > -8$

19. $4k \leq 6$

20. $-0.9b \geq -2.7$

21. $-1.6 < 4t$

22. $\frac{2}{3}y > 6$

23. $-\frac{3}{5}c < 15$

24. $-\frac{5}{8}j \geq -10$

Practice**Solving Multi-Step Inequalities****Solve each inequality. Check your solution.**

1. $3x + 5 < 14$

2. $3t - 6 > 15$

3. $-5y + 2 \geq 32$

4. $-2n - 3 \geq -11$

5. $6 \leq 4a + 10$

6. $-28 < 7 + 7w$

7. $5 - 1.3z \leq 31$

8. $1.7b - 1.1 < 2.3$

9. $6.4 \geq 8 + 2g$

10. $-6 < \frac{k}{2} - 1$

11. $-\frac{c}{6} + 9 \leq 3$

12. $\frac{5m - 5}{3} \geq -15$

13. $\frac{-2n + 6}{4} > 8$

14. $\frac{6 - 3n}{6} \leq -5$

15. $9 - 5j < j - 3$

16. $7p - 4 \geq 3p + 12$

17. $2f - 5 \leq 4f + 13$

18. $5(7 - 2a) \geq -15$

19. $2(q + 2) > 3(q - 6)$

20. $3(h + 5) < -6(h - 4)$

21. $-2(b - 3) \leq 4(b - 9)$

Solving Compound Inequalities**Write each compound inequality without using and.**

1. $a > 2$ and $a < 7$

2. $b \leq 9$ and $b \geq 6$

3. $w \leq 4$ and $w > -3$

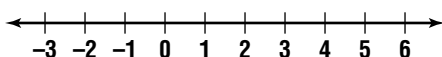
4. $k \geq -4$ and $k < 1$

5. $z < 0$ and $z > -6$

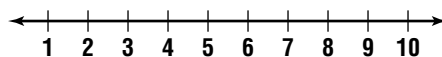
6. $p \geq -8$ and $p < 5$

Graph the solution of each compound inequality.

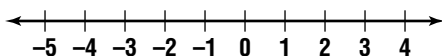
7. $f > -1$ and $f < 5$



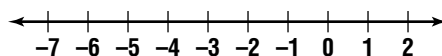
8. $x < 7$ and $x \geq 4$



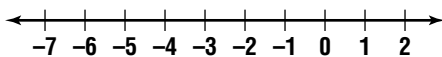
9. $y \leq -3$ or $y \geq 1$



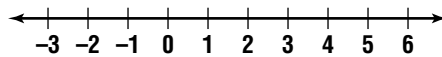
10. $h < -3$ or $h \geq -2$

**Solve each compound inequality. Graph the solution.**

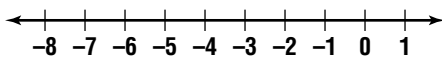
11. $4 > c + 6 \geq 2$



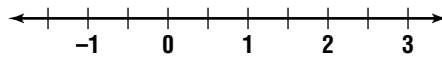
12. $-6 < u - 5 < 0$



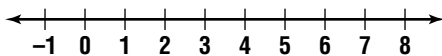
13. $6 < -2m < 10$



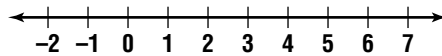
14. $10 > 4n > -2$



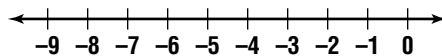
15. $0 \leq \frac{t}{3} \leq 2$



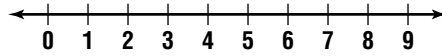
16. $r - 2 < -3$ or $5r > 25$



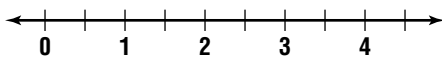
17. $v + 2 \leq -4$ or $v + 7 > 2$



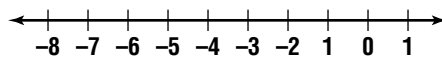
18. $a - 5 < -3$ or $-5a \geq -30$



19. $-4y > -6$ or $2.5y > 5$

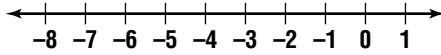


20. $\frac{w}{2} < -1$ or $\frac{w}{3} \leq -2$

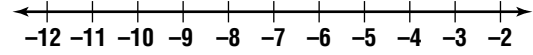


Solving Inequalities Involving Absolute Value**Solve each inequality. Graph the solution.**

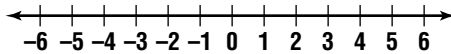
1. $|k + 2| < 1$



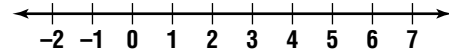
2. $|m + 7| \leq 4$



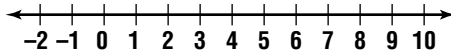
3. $|4p| < 16$



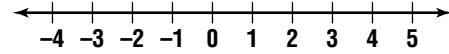
4. $|w - 3| < 3$



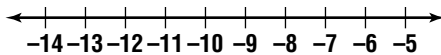
5. $|a - 5| \leq 4$



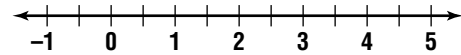
6. $|6t| < 12$



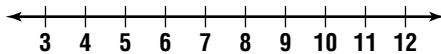
7. $|v + 9| \leq 3$



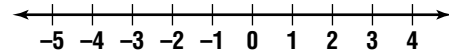
8. $|q - 2| < 2.5$



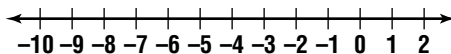
9. $|b - 8| > 2$



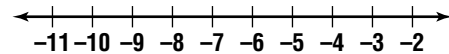
10. $|y + 1| \geq 3$



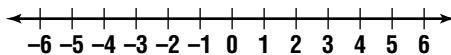
11. $|x + 4| \geq 4$



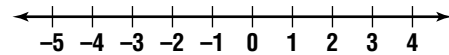
12. $|z + 7| > 2$



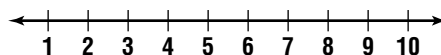
13. $|5c| > 25$



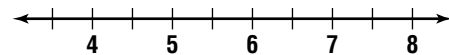
14. $|2g| \geq 2$



15. $|f - 5| \geq 2$



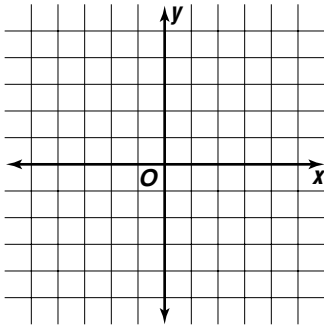
16. $|s - 6| > 1.5$



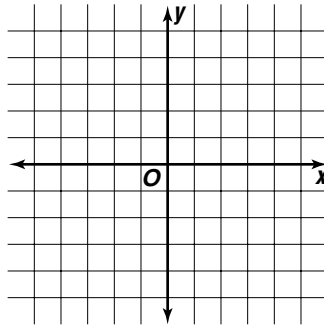
Graphing Inequalities in Two Variables

Graph each inequality.

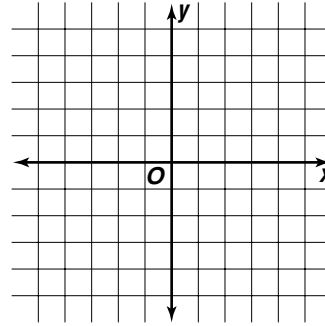
1. $y > -2$



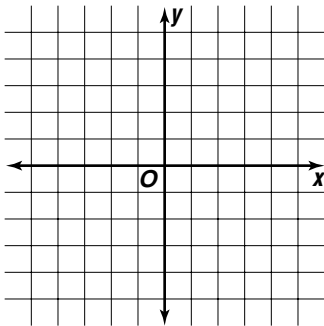
2. $y \leq x + 3$



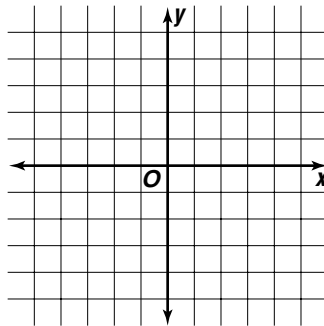
3. $y \geq -x + 1$



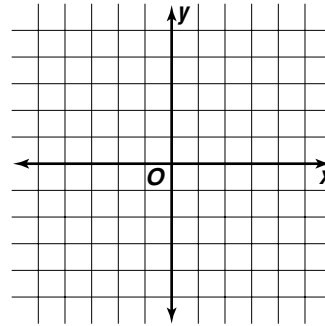
4. $y < 3x + 3$



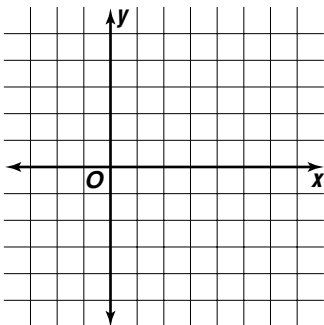
5. $x + y \leq -4$



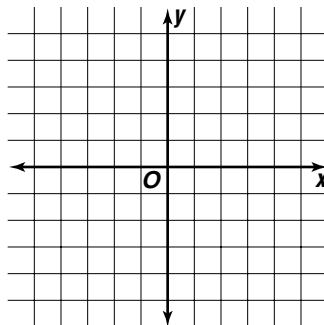
6. $2x + y > 2$



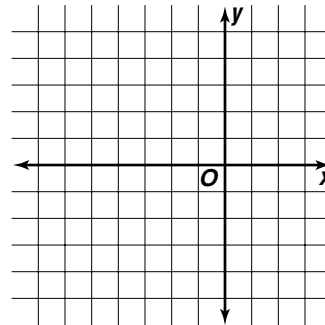
7. $2x - y \geq 10$



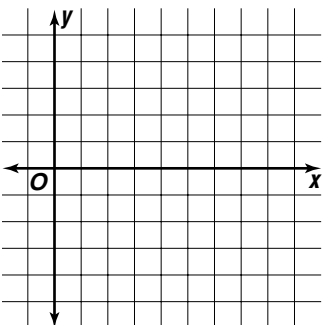
8. $-3x + y > 9$



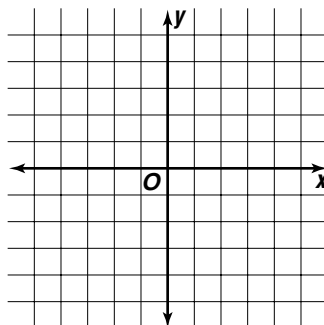
9. $x + 2y \leq -6$



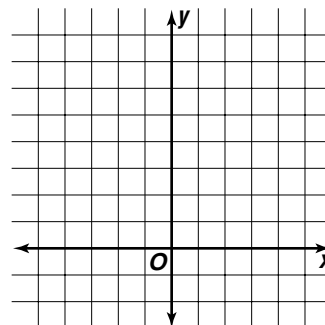
10. $x - 4y < 8$



11. $2x + 2y \geq 6$



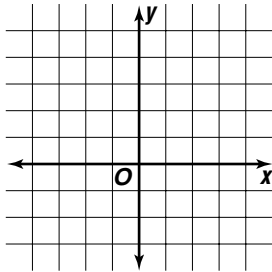
12. $-4x + 2y \leq 12$



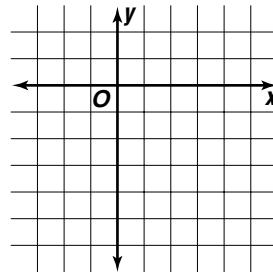
Graphing Systems of Equations

Solve each system of equations by graphing.

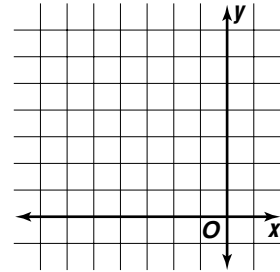
1. $y = 3x$
 $y = -x + 4$



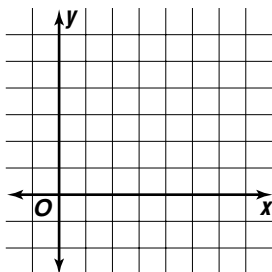
2. $y = x - 4$
 $y = 2x - 3$



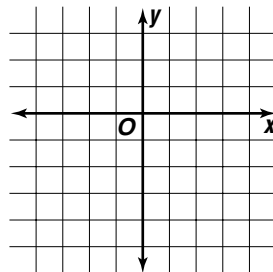
3. $x = -3$
 $y = x + 6$



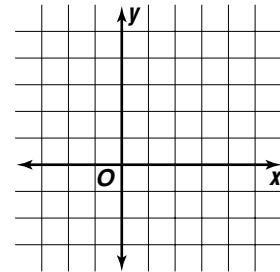
4. $x - y = 1$
 $y = 5$



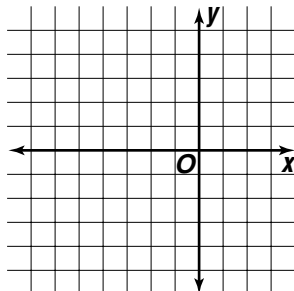
5. $x + y = -1$
 $x - y = 3$



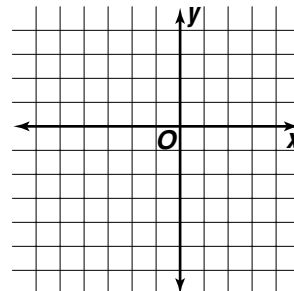
6. $x + y = 2$
 $y = -2x + 4$



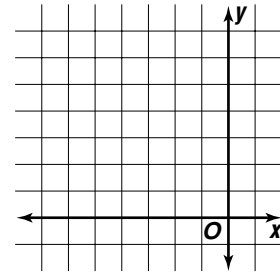
7. $y = x + 3$
 $y = -x - 5$



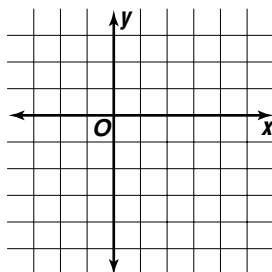
8. $-x + y = 2$
 $-2x + y = 7$



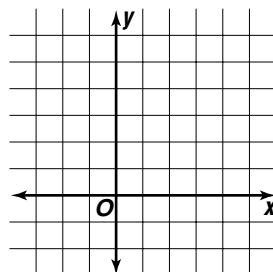
9. $y = x + 6$
 $y = 2$



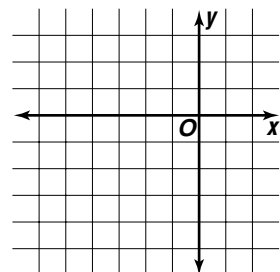
10. $x - y = 4$
 $y = -2x + 2$



11. $y = x + 2$
 $3x + y = 10$

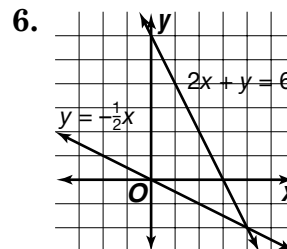
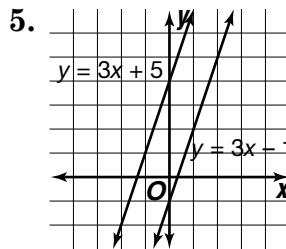
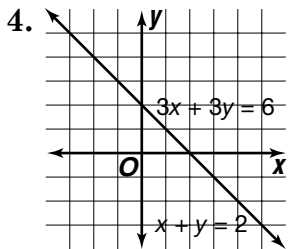
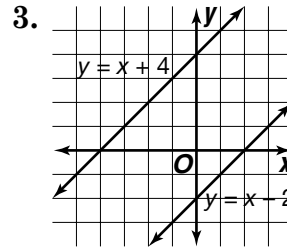
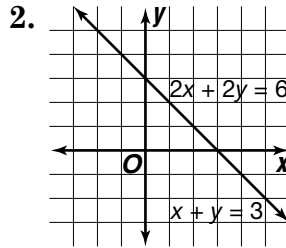
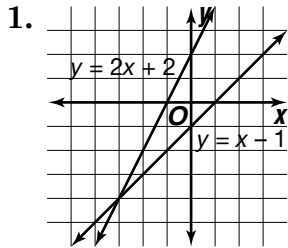


12. $y = x + 2$
 $2x + y = -1$



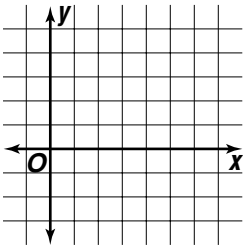
Solutions of Systems of Equations

State whether each system is consistent and independent, consistent and dependent, or inconsistent.

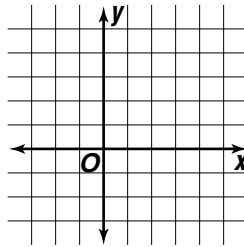


Determine whether each system of equations has one solution, no solution, or infinitely many solutions by graphing. If the system has one solution, name it.

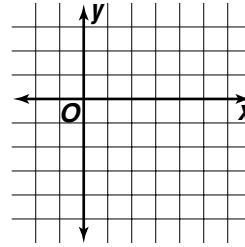
7. $2x + y = 4$
 $4x + 2y = 8$



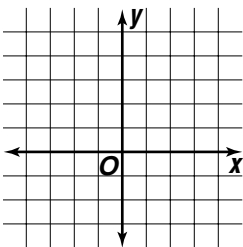
8. $y = x - 1$
 $x + y = 3$



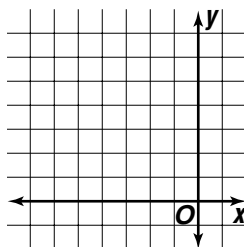
9. $y = x - 2$
 $y = x - 5$



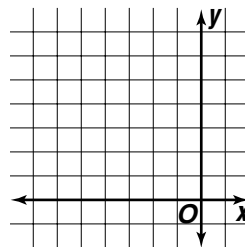
10. $y = 2x$
 $y = 2x + 3$



11. $y = x + 5$
 $-x + y = 5$



12. $x - y = -5$
 $y = 2x + 6$



Practice***Substitution***

Use substitution to solve each system of equations.

1. $y = x + 8$
 $x + y = 2$

2. $y = 2x$
 $5x - y = 9$

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

4. $x = 3y$
 $2x + 4y = 10$

5. $x = y + 9$
 $x + y = -7$

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

7. $x = 3y$
 $2x + 3y = 15$

8. $x - 2y = 4$
 $3x = 6y + 12$

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

10. $4y + 2x = 24$
 $x = 3y + 2$

11. $y = 3x + 8$
 $4x + 2y = 6$

12. $x = 3y + 10$
 $2x + 2y = -12$

13. $x + 2y = -4$
 $-2x - 3y = 9$

14. $5x + 2y = 7$
 $4x + y = 8$

15. $x = 2y + 11$
 $3x + 2y = 9$

16. $x - 2y = -7$
 $5x - 7y = -8$

17. $6x - 4y = -5$
 $2x + y = 3$

18. $x + 3y = 10$
 $4x - 5y = 6$

Elimination Using Addition and Subtraction***Use elimination to solve each system of equations.***

1. $x + y = 4$
 $x - y = -6$

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

3. $3x + y = 12$
 $x + y = 8$

4. $x + 5y = -12$
 $x + 2y = -9$

5. $x + 2y = 9$
 $3x - 2y = 3$

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

7. $4x - 3y = 10$
 $2x - 3y = 2$

8. $2x + 5y = 1$
 $2x + 10y = 10$

9. $3y = x + 4$
 $2x + 3y = 19$

10. $2x = y - 4$
 $2x + 6y = 3$

11. $4y = 2x + 8$
 $5x - 4y = 22$

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

13. $-3x - y = 24$
 $3x - 2y = 3$

14. $2x + 3y = 8$
 $y = 2x + 8$

15. $-7x = y - 4$
 $5x - y = 8$

16. $3x + 5y = 7$
 $4x + 5y = 1$

17. $6x - 3y = 3$
 $6x - 5y = -3$

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

Elimination Using Multiplication***Use elimination to solve each system of equations.***

1.
$$\begin{aligned}x + 3y &= 6 \\2x - 7y &= -1\end{aligned}$$

2.
$$\begin{aligned}9x + 3y &= 12 \\2x + y &= 5\end{aligned}$$

3.
$$\begin{aligned}3x - y &= 14 \\5x + 4y &= 12\end{aligned}$$

4.
$$\begin{aligned}3x - 3y &= -3 \\2x - y &= -5\end{aligned}$$

5.
$$\begin{aligned}3x + y &= 2 \\6x + 2y &= 4\end{aligned}$$

6.
$$\begin{aligned}5x - y &= 16 \\-4x - 3y &= 10\end{aligned}$$

7.
$$\begin{aligned}5x + 2y &= 24 \\10x - 5y &= -15\end{aligned}$$

8.
$$\begin{aligned}3x + 4y &= 6 \\7x + 8y &= 10\end{aligned}$$

9.
$$\begin{aligned}2x - 3y &= 5 \\3x + 9y &= 21\end{aligned}$$

10.
$$\begin{aligned}3x + 2y &= 11 \\6x + 3y &= 13\end{aligned}$$

11.
$$\begin{aligned}6x - 2y &= 4 \\2x - 5y &= -3\end{aligned}$$

12.
$$\begin{aligned}-7x - 3y &= -5 \\5x + 6y &= 19\end{aligned}$$

13.
$$\begin{aligned}5x - 10y &= -3 \\-3x - 5y &= 15\end{aligned}$$

14.
$$\begin{aligned}2x + 3y &= 2 \\6x + 6y &= 5\end{aligned}$$

15.
$$\begin{aligned}2x + 4y &= 6 \\3x + 6y &= 12\end{aligned}$$

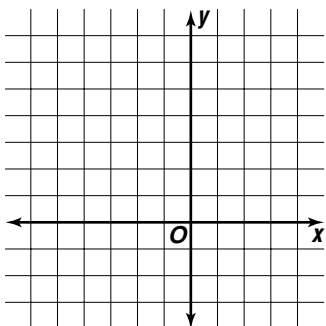
16.
$$\begin{aligned}3x + 3y &= 9 \\5x + 4y &= 10\end{aligned}$$

17.
$$\begin{aligned}2x - 7y &= 5 \\3x - 6y &= 12\end{aligned}$$

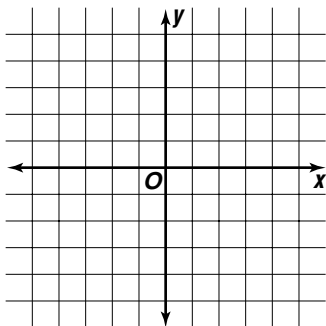
18.
$$\begin{aligned}2x - 4y &= 18 \\-5x - 6y &= 3\end{aligned}$$

Solving Quadratic-Linear Systems of Equations**Solve each system of equations by graphing.**

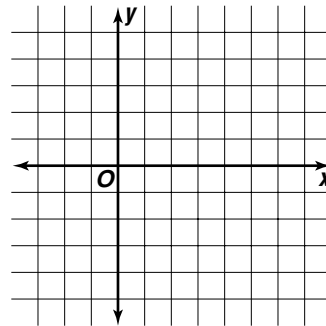
$$1. \begin{aligned} y &= x^2 + 2 \\ y &= x + 4 \end{aligned}$$



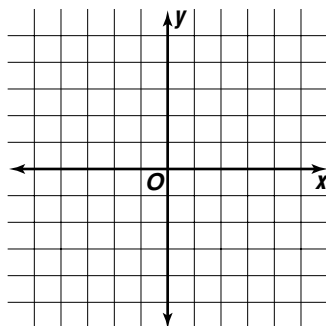
$$2. \begin{aligned} y &= x^2 - 1 \\ y &= x - 2 \end{aligned}$$



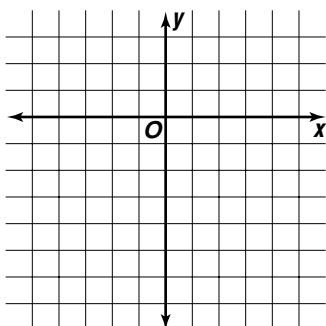
$$3. \begin{aligned} y &= -x^2 + 3 \\ y &= 3 \end{aligned}$$



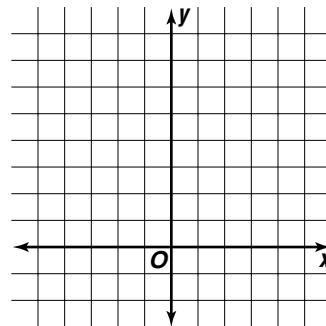
$$4. \begin{aligned} y &= x^2 + 1 \\ y &= -x - 1 \end{aligned}$$



$$5. \begin{aligned} y &= -x^2 \\ y &= -2x + 1 \end{aligned}$$



$$6. \begin{aligned} y &= x^2 - 2 \\ y &= x + 4 \end{aligned}$$

**Use substitution to solve each system of equations.**

$$7. \begin{aligned} y &= -x^2 + 1 \\ y &= x - 1 \end{aligned}$$

$$8. \begin{aligned} y &= x^2 + 2 \\ y &= -4 \end{aligned}$$

$$9. \begin{aligned} y &= x^2 - 5 \\ x &= -3 \end{aligned}$$

$$10. \begin{aligned} y &= -6x^2 + 1 \\ y &= x + 1 \end{aligned}$$

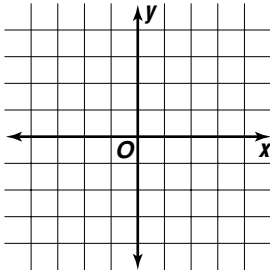
$$11. \begin{aligned} y &= 2x^2 + 3 \\ y &= x + 2 \end{aligned}$$

$$12. \begin{aligned} y &= x^2 + x - 4 \\ y &= x - 3 \end{aligned}$$

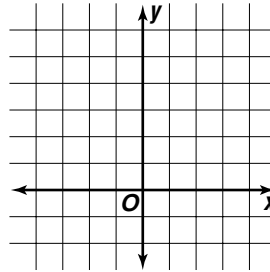
Graphing Systems of Inequalities

Solve each system of inequalities by graphing. If the system does not have a solution, write no solution.

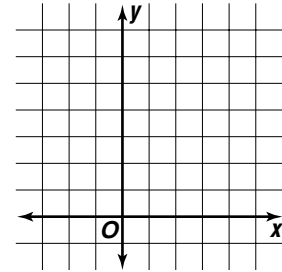
1. $x \leq 2$
 $y \geq -1$



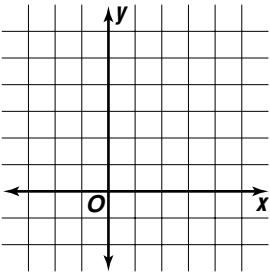
2. $x > 2$
 $y > x + 1$



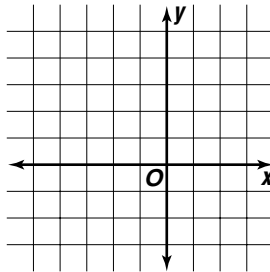
3. $x \geq 3$
 $y > x + 2$



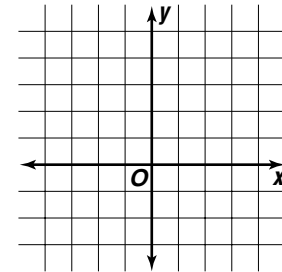
4. $x + y < 1$
 $y > x + 3$



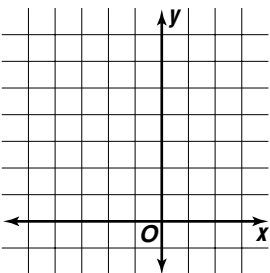
5. $2y \geq x + 4$
 $x - 2y \geq 1$



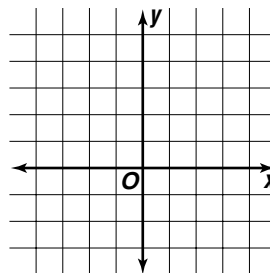
6. $y \leq x + 4$
 $x - y \leq 3$



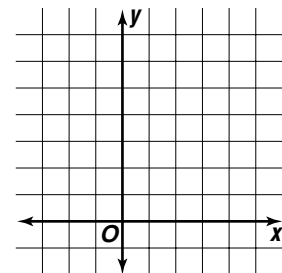
7. $x + y < 2$
 $y > x + 4$



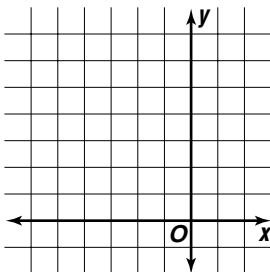
8. $x - y < -4$
 $y \leq x - 3$



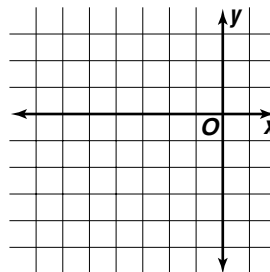
9. $y \geq x + 2$
 $y \leq 2x + 2$



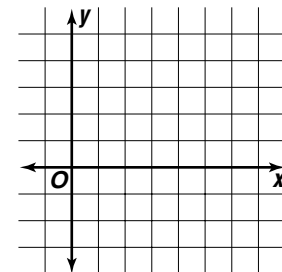
10. $x - y < -5$
 $y < -x + 1$



11. $y < x + 2$
 $x + y \geq -4$



12. $x + 2y > 5$
 $x - y > 1$



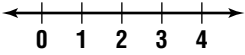
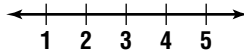
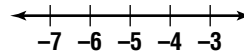
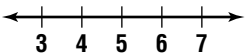
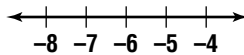
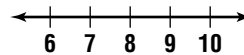
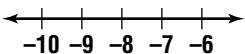
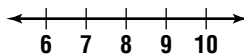
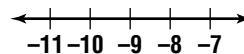
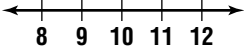
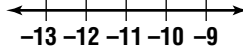
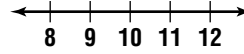
Practice

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. $\sqrt{19}$ | 2. -8 | 3. $1.737337\dots$ | 4. $0.\bar{4}$ |
| 5. $-\frac{5}{6}$ | 6. $\sqrt{64}$ | 7. $-\frac{28}{7}$ | 8. $-\sqrt{144}$ |
| 9. $0.414114111\dots$ | 10. $\frac{1}{3}$ | 11. 13 | 12. 0.75 |

Find an approximation, to the nearest tenth, for each square root. Then graph the square root on a number line.

- | | | |
|---|---|---|
| 13. $\sqrt{6}$ | 14. $\sqrt{11}$ | 15. $-\sqrt{24}$ |
|  |  |  |
| 16. $\sqrt{30}$ | 17. $-\sqrt{38}$ | 18. $\sqrt{51}$ |
|  |  |  |
| 19. $-\sqrt{65}$ | 20. $\sqrt{72}$ | 21. $-\sqrt{89}$ |
|  |  |  |
| 22. $\sqrt{118}$ | 23. $-\sqrt{131}$ | 24. $\sqrt{104}$ |
|  |  |  |

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.

- | | | |
|-------------------|------------------|------------------|
| 25. $\sqrt{28}$ | 26. $-\sqrt{9}$ | 27. $\sqrt{56}$ |
| 28. $-\sqrt{14}$ | 29. $\sqrt{36}$ | 30. $\sqrt{99}$ |
| 31. $-\sqrt{73}$ | 32. $\sqrt{196}$ | 33. $\sqrt{77}$ |
| 34. $-\sqrt{100}$ | 35. $\sqrt{88}$ | 36. $-\sqrt{46}$ |

Practice***The Distance Formula***

Find the distance between each pair of points. Round to the nearest tenth, if necessary.

1. $X(4, 2), Y(8, 6)$

2. $Q(-3, 8), R(2, -4)$

3. $A(0, -3), B(-6, 5)$

4. $M(-9, -5), N(-4, 1)$

5. $J(6, 2), K(-7, 5)$

6. $S(-2, 4), T(-3, 8)$

7. $V(-1, -2), W(-9, -7)$

8. $O(5, 2), P(7, -4)$

9. $G(3, 4), H(-2, 1)$

Find the value of a if the points are the indicated distance apart.

10. $C(1, 1), D(a, 7); d = 10$

11. $Y(a, 3), Z(5, -1); d = 5$

12. $F(3, -2), G(-9, a); d = 13$

13. $W(-2, a), X(7, -4); d = \sqrt{85}$

14. $B(a, -6), C(8, -3); d = \sqrt{34}$

15. $T(2, 2), U(a, -4); d = \sqrt{72}$

Practice**Simplifying Radical Expressions****Simplify each expression. Leave in radical form.**

1. $\sqrt{28}$

2. $\sqrt{48}$

3. $\sqrt{72}$

4. $\sqrt{90}$

5. $\sqrt{175}$

6. $\sqrt{245}$

7. $\sqrt{7} \cdot \sqrt{14}$

8. $\sqrt{2} \cdot \sqrt{10}$

9. $\sqrt{10} \cdot \sqrt{60}$

10. $\frac{\sqrt{48}}{\sqrt{2}}$

11. $\frac{\sqrt{54}}{\sqrt{3}}$

12. $\frac{\sqrt{96}}{\sqrt{8}}$

13. $\frac{\sqrt{20}}{\sqrt{3}}$

14. $\frac{\sqrt{2}}{\sqrt{10}}$

15. $\frac{\sqrt{8}}{\sqrt{6}}$

16. $\frac{5}{4 - \sqrt{7}}$

17. $\frac{4}{3 + \sqrt{2}}$

18. $\frac{3}{3 - \sqrt{3}}$

Simplify each expression. Use absolute value symbols if necessary.

19. $\sqrt{50x^2}$

20. $\sqrt{27ab^3}$

21. $\sqrt{49c^6d^4}$

22. $\sqrt{63x^2y^5z^2}$

23. $\sqrt{56m^2n^4p^3}$

24. $\sqrt{108r^2s^3t^6}$

Practice***Adding and Subtracting Radical Expressions******Simplify each expression.***

1. $3\sqrt{7} + 4\sqrt{7}$

2. $9\sqrt{2} - 4\sqrt{2}$

3. $-5\sqrt{17} + 12\sqrt{17}$

4. $7\sqrt{3} - 3\sqrt{3}$

5. $-8\sqrt{5} + 2\sqrt{5}$

6. $-7\sqrt{11} - 2\sqrt{11}$

7. $13\sqrt{10} - 5\sqrt{10}$

8. $-6\sqrt{7} + 4\sqrt{7}$

9. $3\sqrt{7} + \sqrt{3}$

10. $2\sqrt{6} + 4\sqrt{6} + 5\sqrt{6}$

11. $5\sqrt{3} + 4\sqrt{3} - 7\sqrt{3}$

12. $3\sqrt{2} - 2\sqrt{2} + 5\sqrt{2}$

13. $11\sqrt{5} - 3\sqrt{5} - 2\sqrt{5}$

14. $6\sqrt{13} + 3\sqrt{13} - 12\sqrt{13}$

15. $4\sqrt{10} - 3\sqrt{10} - 5\sqrt{10}$

16. $4\sqrt{6} - 2\sqrt{6} + 3\sqrt{6}$

17. $7\sqrt{7} + 4\sqrt{3} - 5\sqrt{7}$

18. $-9\sqrt{2} + 4\sqrt{6} + 2\sqrt{2}$

19. $\sqrt{12} + 2\sqrt{27}$

20. $5\sqrt{63} - \sqrt{28}$

21. $-4\sqrt{96} + 6\sqrt{24}$

22. $-3\sqrt{45} + 3\sqrt{180}$

23. $-4\sqrt{56} + 3\sqrt{126}$

24. $2\sqrt{72} - 3\sqrt{50}$

25. $7\sqrt{32} + 3\sqrt{75}$

26. $\sqrt{32} + \sqrt{8} + \sqrt{18}$

27. $2\sqrt{20} - \sqrt{80} + \sqrt{45}$

Solving Radical Equations**Solve each equation. Check your solution.**

1. $\sqrt{x} - 6 = 3$

2. $\sqrt{k} + 7 = 20$

3. $\sqrt{p + 3} = 3$

4. $\sqrt{n + 11} = 5$

5. $\sqrt{w - 2} - 1 = 6$

6. $\sqrt{y - 5} + 9 = 14$

7. $\sqrt{2r + 1} - 10 = -1$

8. $\sqrt{3h - 11} + 2 = 9$

9. $\sqrt{a + 4} = a - 8$

10. $\sqrt{z - 3} + 5 = z$

11. $\sqrt{3b + 9} + 3 = b$

12. $\sqrt{5f - 5} + 1 = f$

13. $\sqrt{8 + 2c} = c - 8$

14. $\sqrt{3s - 6} = s - 2$

15. $\sqrt{4h + 4} + h = 7$

16. $\sqrt{5m + 4} = m + 2$

17. $\sqrt{2y - 7} - y = -5$

18. $\sqrt{3k + 4} + k = 8$

Practice***Simplifying Rational Expressions******Find the excluded value(s) for each rational expression.***

1. $\frac{2n}{n-4}$

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

3. $\frac{3b}{b(b+9)}$

4. $\frac{y+2}{y^2-4}$

5. $\frac{4x+6}{(x+6)(x-5)}$

6. $\frac{2a-2}{a^2-3a-28}$

Simplify each rational expression.

7. $\frac{6}{15}$

8. $\frac{12m}{18m^3}$

9. $\frac{16x^2y}{36xy^3}$

10. $\frac{25ab}{30b^2}$

11. $\frac{-8y^4z}{20y^6z^2}$

12. $\frac{5(x-1)}{8(x-1)}$

13. $\frac{y(y+7)}{9(y+7)}$

14. $\frac{x^2-4x}{3(x-4)}$

15. $\frac{x^2+2x}{5x+10}$

16. $\frac{x^2+5x}{(x+5)(x-7)}$

17. $\frac{x^2-6x}{x^2-4x-12}$

18. $\frac{(x+4)(x+4)}{(x+4)(x-2)}$

19. $\frac{b^2+6b+9}{b^2-2b-15}$

20. $\frac{y^2-36}{y^2+9y+18}$

21. $\frac{x^2-16}{x^2+x-12}$

22. $\frac{y^2+4y+4}{y^2-4}$

23. $\frac{a^2+3a}{a^2-3a-18}$

24. $\frac{y^2+7y+10}{y^2+5y}$

25. $\frac{x^2+4x+3}{x^2+3x+2}$

26. $\frac{x^2-6x+8}{x^2+x-6}$

27. $\frac{9-x^2}{x^2+6x-27}$

Multiplying and Dividing Rational Expressions**Find each product.**

1. $\frac{3x^2}{2y} \cdot \frac{y^2}{9}$

2. $\frac{4a^2b}{6b^2c} \cdot \frac{3ab}{2c}$

3. $\frac{7n}{n-2} \cdot \frac{3(n-2)}{28}$

4. $\frac{2}{m(m+3)} \cdot \frac{3m+9}{6}$

5. $\frac{4y+8}{y^2-2y} \cdot \frac{y-2}{y+2}$

6. $\frac{x^2-49}{x^2+5x} \cdot \frac{x+5}{x+7}$

7. $\frac{5x+25}{x^2-5x+6} \cdot \frac{x-3}{x+5}$

8. $\frac{a+5}{3a+6} \cdot \frac{3a^2+6a}{a^2+2a-15}$

9. $\frac{x^2+8x+12}{4x-12} \cdot \frac{2x-6}{x^2+4x-12}$

10. $\frac{2n^2-10n}{n^2-9n+20} \cdot \frac{n^2-8n+16}{4n^2}$

Find each quotient.

11. $\frac{4a^3}{b^2c} \div \frac{2a}{bc}$

12. $\frac{15x^2y^2}{3} \div 3xy$

13. $\frac{3y+9}{y+2} \div (y+3)$

14. $\frac{8n^3}{n-4} \div \frac{4n}{n-4}$

15. $\frac{6x^2y}{3y} \div 2xy$

16. $\frac{b^2-81}{b} \div (b+9)$

17. $\frac{6x^2+36x}{4x} \div \frac{4x+24}{2x^2}$

18. $\frac{y^2+5y-14}{9y} \div \frac{y^2-8y+12}{3y^2}$

19. $\frac{x^2-2x-15}{x-2} \div \frac{x^2-10x+25}{2-x}$

20. $\frac{y^2-8y+7}{5y^2} \div \frac{7-y}{10y}$

Dividing Polynomials***Find each quotient.***

1. $(4x - 2) \div (2x - 1)$

2. $(y^2 + 5y) \div (y + 5)$

3. $(9a^2 + 6a) \div (3a + 2)$

4. $(8n^3 - 4n^2) \div (4n - 2)$

5. $(x^2 - 9x + 18) \div (x - 6)$

6. $(b^2 - b - 20) \div (b - 5)$

7. $(y^2 + 4y + 4) \div (y + 2)$

8. $(m^2 - 5m - 6) \div (m + 1)$

9. $(b^2 + 11b + 30) \div (b + 4)$

10. $(x^2 - 6x + 9) \div (x - 2)$

11. $(r^2 - 4) \div (r + 3)$

12. $(4x^2 + 6x + 5) \div (2x - 2)$

13. $(3n^2 - 11n + 8) \div (n - 3)$

14. $(6y^2 + 5y - 3) \div (3y + 1)$

15. $(s^3 - 1) \div (s - 1)$

16. $(a^3 + 4a + 16) \div (a + 2)$

17. $(m^3 - 9) \div (m - 2)$

18. $(x^3 - 7x - 8) \div (x + 1)$

Combining Rational Expressions with Like Denominators*Find each sum or difference. Write in simplest form.*

1. $\frac{8}{n} + \frac{4}{n}$

2. $\frac{3x}{9} + \frac{4x}{9}$

3. $\frac{7}{2k} - \frac{5}{2k}$

4. $\frac{6n}{n} - \frac{3n}{n}$

5. $\frac{-5a}{2} + \frac{4a}{2}$

6. $\frac{2y}{3} + \frac{y}{3}$

7. $\frac{9x}{11} - \frac{8x}{11}$

8. $\frac{6p}{5} - \frac{p}{5}$

9. $\frac{9}{16q} + \frac{3}{16q}$

10. $\frac{4t}{9} - \frac{t}{9}$

11. $\frac{1}{4m} - \frac{3}{4m}$

12. $\frac{-2}{10x} + \frac{6}{10x}$

13. $\frac{6s}{7} + \frac{8s}{7}$

14. $\frac{8}{3y} - \frac{2}{3y}$

15. $\frac{4}{x-7} - \frac{2}{x-7}$

16. $\frac{-2}{x+3} + \frac{3}{x+3}$

17. $\frac{5}{y-4} - \frac{8}{y-4}$

18. $\frac{3m}{m+2} - \frac{m}{m+2}$

19. $\frac{3n}{n-1} + \frac{2}{n-1}$

20. $\frac{5a}{a+4} - \frac{7}{a+4}$

21. $\frac{4g}{g+3} + \frac{12}{g+3}$

22. $\frac{2r+2}{r-5} - \frac{r-4}{r-5}$

23. $\frac{s-3}{s+1} + \frac{4s+8}{s+1}$

24. $\frac{-11b}{5b+3} + \frac{12b-2}{5b+3}$

25. $\frac{15y}{4y-2} - \frac{3y+6}{4y-2}$

26. $\frac{5c+3}{2c+1} + \frac{9c+4}{2c+1}$

27. $\frac{2x+3}{3x+4} - \frac{8x+11}{3x+4}$

Combining Rational Expressions with Unlike Denominators**Find the LCM for each pair of expressions.**

1. $4ab, 18b$

2. $6x^2y, 9xy$

3. $10a^2, 12ab^2$

4. $y + 2, y^2 - 4$

5. $x^2 - 9, x^2 + 5x + 6$

6. $x^2 - 3x - 4, 2x^2 - 2x - 4$

Write each pair of expressions with the same LCD.

7. $\frac{4}{b}, \frac{5}{ab}$

8. $\frac{5}{6c^2}, \frac{3}{8c}$

9. $\frac{6}{7x^2y}, \frac{4}{5xy}$

10. $\frac{3}{r+4}, \frac{7}{2r+8}$

11. $\frac{x}{x-2}, \frac{x+1}{x-5}$

12. $\frac{3}{y-4}, \frac{2y}{y^2-16}$

Find each sum or difference. Write in simplest form.

13. $\frac{2k}{8} + \frac{3k}{16}$

14. $\frac{n}{2} - \frac{n}{7}$

15. $\frac{7}{3b} - \frac{3}{b}$

16. $\frac{5}{x} + \frac{3}{y}$

17. $\frac{2}{m^2n} - \frac{6}{mn}$

18. $\frac{c}{4c} + \frac{8}{c}$

19. $\frac{1}{6a} - \frac{2}{9a^2}$

20. $\frac{2}{3ab} + \frac{3b}{4ab}$

21. $\frac{p}{4p^2q} + \frac{3}{5pq}$

22. $\frac{2x}{3xy^2} - \frac{2}{5xy}$

23. $\frac{2s}{s^2-4} + \frac{4}{s+2}$

24. $\frac{b}{b^2-9} - \frac{5}{b-3}$

25. $\frac{-5}{2r+3} + \frac{7}{6r+9}$

26. $\frac{6}{y+2} + \frac{3}{y}$

27. $\frac{x}{x-3} - \frac{2}{x-4}$

Solving Rational Equations**Solve each equation. Check your solution.**

1. $\frac{c}{2} + \frac{c}{2} = \frac{1}{2}$

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

3. $\frac{8}{a} = \frac{12}{a} + 5$

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

5. $\frac{7}{9t} - \frac{5}{6t} = \frac{1}{3}$

6. $\frac{4}{5x} + \frac{1}{4x} = \frac{3}{4}$

7. $\frac{3x}{4} - \frac{2x}{3} = \frac{1}{4}$

8. $\frac{s+7}{6} - 2 = \frac{s}{4}$

9. $\frac{n-3}{2} = \frac{n}{5} + 3$

10. $\frac{y+6}{3} - \frac{y+12}{7} = 2$

11. $\frac{11}{p-2} - \frac{2}{p-2} = -8$

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

13. $\frac{2}{n} - \frac{3}{n+1} = \frac{3}{n+1}$

14. $\frac{6}{y-3} - \frac{5}{y} = \frac{3}{y}$

15. $\frac{6}{s} + \frac{3s}{s-2} - 2 = 1$

16. $\frac{5}{k} + \frac{k-2}{k+1} = 1$

17. $\frac{r+2}{r} - \frac{r+2}{r-5} = -\frac{3}{r-5}$

18. $\frac{2c}{c+3} - \frac{4}{2c+6} = 4$

19. $\frac{3b}{b+2} + \frac{3}{3b+6} = 2$

20. $\frac{2m}{m+3} - \frac{4}{m-3} = 2$

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



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