

Directions: Read each question carefully. Give exact answers unless the question requests otherwise. Include correct units when appropriate.

1. (1.8) Use the order-of-operations to simplify the following expressions:

a. $|-4| + 20 \div (7 - 2)(3 - 1)$

b. $-1^2 - 15 \div (2 - 7)$

c. $(-3)^2 - (-4 + 7) \div (2^2 - 3)$

d. $\frac{4 - |10 - 12|}{2^3 - (2 - 8)}$

2. (2.3) Solve the following equations:

a. $5(x - 4) + 5x = 10(2 - x)$

b. $5(x - 3) - 6x = 10(3 - x)$

c. $\frac{1}{2}x + \frac{1}{4} = \frac{3}{4}x - \frac{1}{6}$

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

3. (2.5) Translate the following problems into an algebraic equation and solve:

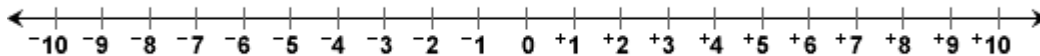
a. Twice the difference of a number and three is equal to eight.

b. Eight less than the product of three and a number is twenty-two.

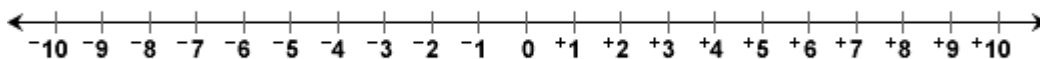
c. Four times a number added to eight is equivalent to the opposite of four.

4. (2.7) Solve the following inequalities and graph on a number line:

a. $2(x-5)+5 \leq -21$



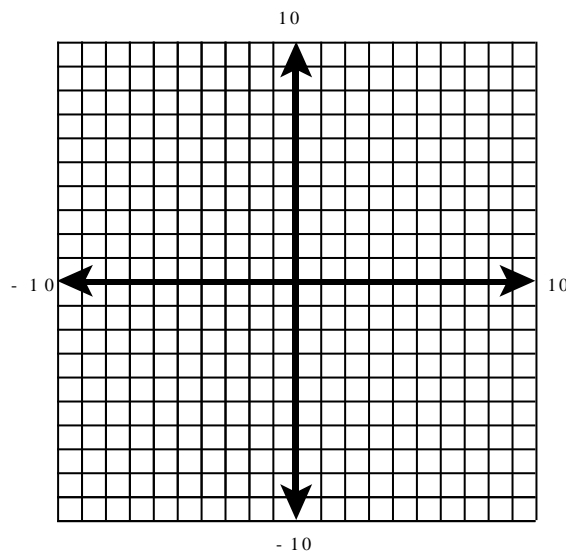
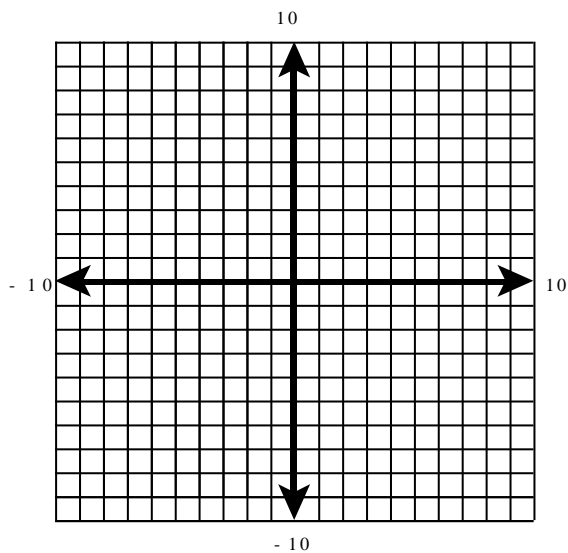
b. $-3(4x-6) > -10x$



5. (3.1, 3.2) Graph the following linear equations. Label at least two points on the graph.

a. $4x - 2y = 8$

b. $2x + 4y = 8$



6. (3.3) Find the slope of the line through the given points, then state whether the line is increasing, decreasing, vertical, or horizontal. Justify your answer.

a. $(0, -1), (3, 2)$

b. $(-2, 7), (-1, 2)$

c. $(9, -3), (5, -3)$

7. (3.4) Given the linear equation $3x + 5y = 8$, answer the following.

- Rewrite the equation in slope – intercept form.
- State the slope.
- State the y – intercept in point form.

8. (3.4) Given the linear equation $2x - 4y = 12$, answer the following.

- Rewrite the equation in slope – intercept form.
- State the slope.
- State the y – intercept in point form.

9. (3.4) Write the equation of the line in slope-intercept form given the slope and the y -intercept:

a. $m = -2; (0,3)$

b. $m = 3; (0,-2)$

10. (3.5) Write the equation of the line slope-intercept form given the slope and a point that lies on the line:

a. $m = 4; (5,3)$

b. $m = -6; (-1,2)$

11. (4.2, 4.3) Solve the following systems of equations using substitution or elimination.

a.
$$\begin{cases} 7x - 4y = 4 \\ 5x + y = 26 \end{cases}$$

b.
$$\begin{cases} 3x - 5y = -17 \\ y = -15 - 4x \end{cases}$$

12. (4.4) Translate the following word problems into a system of equations and solve algebraically. Include correct units in your answer.

a. A restaurant manager buys 50 lb of sausage and 80 lb of hamburger for a total cost of \$300. A second purchase, at the same price, includes 100 lb of sausage and 120 lb of hamburger for a cost of \$480. Find the cost of the sausage and the hamburger.

b. If David has 39 bills in his wallet worth \$330, all fives and tens, how many of each bill does he have?

13. (5.1) Simplify:

a. $(9n^3 + 5nm^2 + nm - 11) - (-2n^3 - nm + 15)$

b. $(-9u^3 - 5uv^2 + vu - 11) + (u^3 - 13vu + 15)$

14. (5.2) Multiply and Simplify:

a. $(11y - 9)(15y + 3)$

b. $(6m - 2)^2$

c. $(3x - 7y)(3x + 7y)$

d. $(5x + 4)^2$

15. (5.1, 5.5, 5.7) Simplify:

a. $\left(-\frac{3}{7}xy^2z^4\right)^3$

b. $2\left(-\frac{6}{11}a^3bc^4\right)^2$

c. $\frac{4x^7yz^3}{-6x^2z^5}$

d. $\frac{-10x^5yz^2}{25x^2z^8}$

16. (1.1, 5.4) The polynomial $S = 2LW + 2LH + 2WH$ describes the surface area of a box. Find the surface area of a box with a length of 8 inches, width of 6.5 inches and height of 4 inches, by evaluating the polynomial. Include correct units.

17. (1.8, 5.4) The height h (in feet) of a baseball after t seconds can be modeled by the equation $h = -16t^2 + 100t + 4$. Find the height of the baseball in four seconds. Include correct units.

18. (6.1 – 6.5) Factor Completely:

a. $2x^2 + 3x + 4xy + 6y$

c. $4x^2 - 49y^2$

b. $5ab^2 - 20ab - 105a$

d. $2x^3 - 14x^2 + 24x$

19. (6.6) Use factoring to solve the following equations:

a. $m^2 - m = 6$

b. $2x^2 - 9x + 4 = 0$

c. $5x^2 - 14x - 3 = 0$

20. (6.6) Translate the following word problems into an equation and solve algebraically. Include correct units in your answer.

- a. The length of a building is twice its width. If the floor area is 288 square feet, what are the length and width?
- b. The length of a rectangular area is 7 meters more than its width. If the area is 78 square meters, find the length and width of the rectangle.

21. (7.1) Factor and simplify each expression:

a. $\frac{x^2 - 5x}{x^2 - 7x + 10}$

b. $\frac{x^2 - 9}{x^2 + 5x + 6}$

22. (7.2) Perform the indicated operations and simplify each expression:

a. $\frac{y^2 - 6y + 5}{y^2 - 1} \cdot \frac{y - 1}{y^2 - 10y + 25}$

b. $\frac{x^2 - 2x - 24}{x^2 - 16} \div \frac{x^2 - x - 30}{x^2 + 10x + 25}$

23. (7.3) Perform the indicated operations and simplify each expression:

a. $\frac{x^2 + 2}{x + 1} + \frac{4 - x^2}{x + 1}$

b. $\frac{y^2}{y^2 + 3y} - \frac{9}{y^2 + 3y}$

24. (7.6) Solve.

a. $\frac{3}{x} = \frac{5}{x - 8}$

b. $\frac{2}{3(x - 2)} = \frac{-1}{-2(3 - x)}$

25. (8.2) Simplify. Assume all variables are non-negative:

a. $\sqrt{5x^3} \cdot \sqrt{20x}$

b. $\sqrt{2x^4} \cdot \sqrt{32x^8}$

c. $\frac{\sqrt{48a^7}}{\sqrt{3a}}$

d. $\frac{\sqrt{72x^3}}{\sqrt{2x}}$

26. (8.5) Solve the radical equations:

a. $\sqrt{2x-1} = 6$

b. $\sqrt{x-3} + 5 = 11$

c. $\sqrt{x+1} - 4 = 3$

d. $\sqrt{x+3} + 2 = 1$

27. (9.3) Use the quadratic formula to solve:

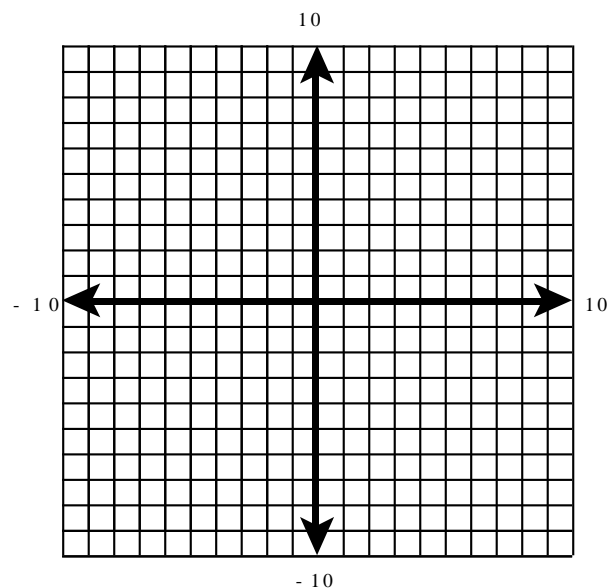
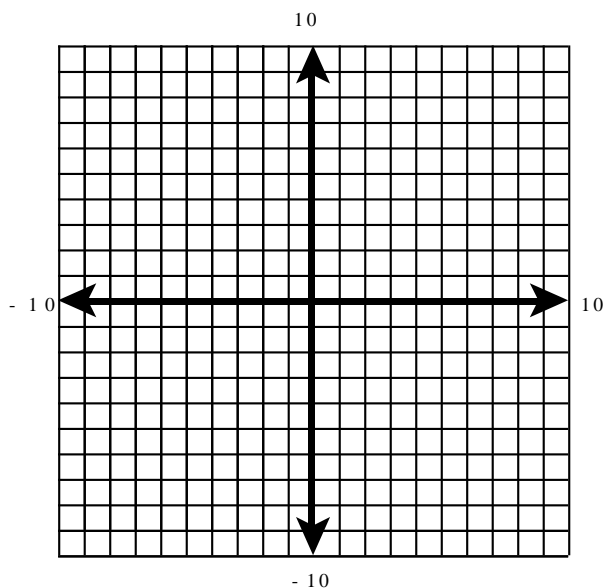
a. $6x^2 - 3x - 4 = 0$

b. $4x^2 - 4x - 1 = 0$

28. (9.5) For the quadratic equation below, find the vertex, y-intercept, and x-intercept(s). Then graph the equation, labeling all points found.

a. $y = x^2 - 4x + 3$

b. $y = x^2 + 2x - 8$



Solutions

1. a. 12 b. 2 c. 6 d. $\frac{1}{7}$
2. a. $x=2$ b. $x=5$ c. $x=\frac{5}{3}$ d. $x=4$
3. a. $2(n-3) = 8; n = 7$ b. $3n - 8 = 22; n = 10$
c. $4n + 8 = -4; n = -3$
4. a. $x \leq -8$, graph on number line – closed circle at -8 , arrow pointing to the left.
b. $x < 9$, graph on number line – open circle at 9 , arrow pointing to the left.
5. a. graph is an increasing line passing through $(0,-4)$ and $(2,0)$
b. graph is a decreasing line passing through $(0,2)$ and $(4,0)$
6. a. $m=1$; increasing line due to positive slope
b. $m=-5$; decreasing line due to negative slope
c. $m=0$; horizontal line due to zero slope
7. a. $y = \frac{-3}{5}x + \frac{8}{5}$ b. $m = -\frac{3}{5}$ c. $\left(0, \frac{8}{5}\right)$
8. a. $y = \frac{1}{2}x - 3$ b. $\frac{1}{2}$ c. $(0,-3)$
9. a. $y = -2x + 3$ b. $y = 3x - 2$
10. a. $y = 4x - 17$ b. $y = -6x - 4$
11. a. $(4,6)$ b. $(-4,1)$

12. a. Equations:
$$\begin{cases} 50x + 80y = 300 \\ 100x + 120y = 480 \end{cases}$$

Solution: The cost of hamburger is \$3.00 per pound. The cost of sausage is \$1.20 per pound.

b. Equations:
$$\begin{cases} x + y = 39 \\ 5x + 10y = 330 \end{cases}$$

Solution: David has 12 five dollar bills and 27 ten dollar bills.

13. a. $11n^3 + 5nm^2 + 2nm - 26$

b. $-8u^3 - 5uv^2 - 12uv + 4$

14. a. $165y^2 - 102y - 27$

b. $36m^2 - 24m + 4$

c. $9x^2 - 49y^2$

d. $25x^2 + 40x + 16$

15. a. $\frac{-27}{343}x^3y^6z^{12}$

b. $\frac{72}{121}a^6b^2c^8$

c. $\frac{-2x^5y}{3z^2}$

d. $\frac{-2x^3y}{5z^6}$

16. $S = 220$ squareinches

17. $h = 148$ feet

18. a. $(2x + 3)(x + 2y)$

c. $(2x - 7y)(2x + 7y)$

b. $5a(b - 7)(b + 3)$

d. $2x(x - 3)(x - 4)$

19. a. $m = -2, m = 3$

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

c. $x = 3, x = \frac{-1}{5}$

20. a. Equation: $2w(w) = 288$

Dimensions: width: 12 feet, length: 24 feet

b. Equation: $w(w + 7) = 78$

Dimensions: width: 6 meters, length: 13 meters

21. a. $\frac{x}{x-2}$

b. $\frac{x-3}{x+2}$

22. a. $\frac{y-1}{(y+1)(y-5)}$

b. $\frac{x+5}{x-4}$

23. a. $\frac{6}{x+1}$

b. $\frac{y-3}{y}$

24. a. $x = -12$

b. $x = \frac{18}{7}$

25. a. $10x^2$

b. $8x^6$

c. $4a^3$

d. $6x$

26. a. $x = \frac{37}{2}$

b. $x = 39$

c. $x = 48$

d. no solution { $x = -2$ is extraneous }

27. a. $x = \frac{3 \pm \sqrt{105}}{12}$

b. $x = \frac{1 \pm \sqrt{2}}{2}$

28. a. vertex: $(2, -1)$

y-intercept: $(0, 3)$

x-intercepts: $(1, 0), (3, 0)$

Graph: parabolic shape opening up, containing points above.

b. vertex: $(-1, -9)$

y-intercept: $(0, -8)$

x-intercepts: $(-4, 0), (2, 0)$

Graph: parabolic shape opening up, containing points above.