2.4 Worksheet

1. Write an equation of the line that passes through the given point and has the given slope.
   a) \((-3, 8), \ m = 10\)
      \[ y - 8 = 10(x + 3) \]
      \[ y = 10(x + 38) \]
   b) \((-10, 4), \ m = \frac{1}{2}\)
      \[ y - 4 = \frac{1}{2}(x + 10) \]
      \[ y = \frac{1}{2}x + b \]
      \[ y = 6 \]

2. Write an equation of the line that passes through the given points.
   a) \((3, 4), \ (0, 3)\)
      \[ \frac{3 - 4}{0 - 3} = \frac{-1}{-3} = \frac{1}{3} \]
      \[ y = \frac{1}{3}x + 3 \]
   b) \((-5, -4), \ (0, 11)\)
      \[ \frac{11 - (-4)}{0 - (-5)} = \frac{15}{5} = 3 \]
      \[ y = 3x + 11 \]
   c) \((4, -1), \ (6, -7)\)
      \[ \frac{-7 - (-1)}{6 - 4} = \frac{-6}{2} = -3 \]
      \[ y + 1 = -3(x - 4) \]
      \[ y = -3x + 11 \]
   d) \((-1, 2), \ (3, -4)\)
      \[ \frac{-4 - 2}{3 - (-1)} = \frac{-6}{4} = -\frac{3}{2} \]
      \[ 2 = -\frac{3}{2}(x - 1) + b \]
      \[ b = \frac{3}{2} \]
      \[ y = -\frac{3}{2}x + \frac{3}{2} \]

3. Write an equation of the line that passes through the given point and satisfies the given condition.
   a) \((-3, -5); \ parallel \ to \ y = -4x + 1\)
      \[ m = -4 \]
      \[ -5 = -4(-3) + b \]
      \[ -12 + b \]
      \[ b = -17 \]
      \[ y = -4x - 17 \]
   b) \((3, -1); \ perpendicular \ to \ y = 4x + 1\)
      \[ m = -\frac{1}{4} \]
      \[ -1 = -\frac{1}{4}(3 - 3) + b \]
      \[ b = \frac{3}{4} \]
      \[ y = -\frac{1}{4}x - \frac{3}{4} \]

4. Write an equation of the line.
   a) \[
      \begin{align*}
      \text{Graph} & \quad y = -\frac{2}{3}x - 1 \\
      \text{Slope} & \quad m = -\frac{2}{3} \\
      \text{Y-intercept} & \quad b = -1
      \end{align*}
   \]
   b) \[
      \begin{align*}
      \text{Graph} & \quad y = -3x + 1 \\
      \text{Slope} & \quad m = -3 \\
      \text{Y-intercept} & \quad b = -3
      \end{align*}
   \]
5. An art club spends $260 to buy tickets for two different art exhibits. The tickets for one of the exhibits are $5 a piece and the tickets for the other exhibit are $8 a piece.

a) Write an equation to model the different numbers of tickets for the two exhibits you could buy.

\[5x + 8y = 260\]

b) Use your equation to find the number of tickets you purchased for the 5 dollar exhibit, if you bought 15 tickets to the 8 dollar exhibit.

\[5x = 140\]
\[x = 28\]

6. A cable company charges $45 for an initial set-up fee. The package you chose from the cable company charges you a monthly cost of $79.

a) Write an equation that models this situation.

\[y = 79x + 45\]

b) Use your equation to find the total cost of your cable bill after 2 years.

\[2 \text{ years} = 24 \text{ months}\]
\[y = 79(24) + 45\]
\[= 1941\]

7. The caterer for your class picnic charges $1.50 for each hot dog and $2 for each hamburger. Your bill for these two items comes to $187.

a) Write a model that shows the different numbers of hot dogs \(x\) and hamburgers \(y\) that you could purchase.

\[1.50x + 2y = 187\]

b) Use your equation to find the number of hot dogs you purchased, if you bought 47 hamburgers.

\[1.5x + 2(47) = 187\]
\[1.5x + 94 = 187\]
\[1.5x = 93\]
\[x = 62 \text{ hot dogs}\]
Practice B

Find the slope and y-intercept of the line.
1. \( y = 7x + 8 \)
2. \( y = -13x \)
3. \( 2x + y - 2 = 0 \)
4. \( 4x + 2y - 5 = 0 \)
5. \( 5x - y + 2 = 0 \)
6. \( -3x + 2y - 4 = 0 \)

Find the \( x \) and \( y \)-intercepts of the line with the given equation.
7. \( y = 4x - 1 \)
8. \( y = -x - 4 \)
9. \( y = -\frac{1}{2}x + 2 \)
10. \( y = \frac{3}{2}x + 1 \)
11. \( x - \frac{1}{2}y = 0 \)
12. \( y = \frac{1}{2}x - 3 \)
13. \( x - y - 3 = 0 \)
14. \( 2x - 3y + 6 = 0 \)
15. \( -7x - 14y - 5 = 0 \)
16. \( 4x - 2y = 1 \)
17. \( 6x + 4y = -5 \)
18. \( -3x + y = -8 \)

Graph the equation.
19. \( y = 3x + 3 \)
20. \( y = -2x - 6 \)
21. \( x - 2y + 2 = 0 \)
22. \( 5x + 2y + 6 = 0 \)
23. \( -6x + 3y - 18 = 0 \)
24. \( 12x - 8y = -24 \)

Algebra 2
Chapter 2 Resource Book
LESSON 2.3 Practice B

25. \( \frac{2x + y}{-2x} = \frac{-3}{-2x} \)

26. \( 3x + y = 0 \)

27. \( -5x + 3y - 15 = 0 \)

28. \( 2y = -5x - 4 \)

29. \( -3y = 6x \)

30. \( 6y - 18 = 0 \)

31. Hot Dogs and Hamburgers
The caterer for your class picnic charges \$1 for each hot dog and \$2 for each hamburger. You have \$48 to spend. Write a model that shows the different numbers of hot dogs and hamburgers that you could purchase.

32. Commission
A car salesperson earns 2% on used car sales and 6% on new car sales. The salesperson wants to earn a \$7000 commission this month. Write a model that shows the different sales amounts of used and new cars that can be sold to reach the target commission.

In Exercises 33–35, use the following information.

Airplane Landing
An airplane's altitude is 100 feet as it is descending for a landing on a runway whose touchdown point is 5000 feet away. Let the x-axis represent the distance on the ground and the y-axis represent the airplane's altitude.

33. What is the slope of the airplane's descent?
34. What is the y-intercept of the airplane's descent?
35. Write an equation of the line that follows the path of the airplane's descent.
Write an equation of the line that has the given slope and \(y\)-intercept.

1. \(m = 3, b = -4\)
   \[
   y = 3x - 4
   \]

2. \(m = -4, b = 0\)
   \[
   y = -4x
   \]

3. \(m = 0, b = -5\)
   \[
   y = -5
   \]

Write an equation of the line that passes through the given point and has the given slope.

4. \((4, 3), m = 1\)
   \[
   y - 3 = 1(x - 4) \Rightarrow y = x - 1
   \]

5. \((-1, 1), m = 2\)
   \[
   y - 1 = 2(x + 1) \Rightarrow y = 2x + 3
   \]

6. \((-2, 1), m = 3\)
   \[
   y - 1 = 3(x + 2) \Rightarrow y = 3x + 7
   \]

7. \((2, 4), m = -3\)
   \[
   y - 4 = -3(x - 2) \Rightarrow y = -3x + 10
   \]

Write an equation of the line that passes through the given point and satisfies the given condition.

8. \((-2, 3); \) parallel to \(y = 4x - 3\)
   \[
   y - 3 = 4(x + 2) \Rightarrow y = 4x + 11
   \]

9. \((1, 4); \) perpendicular to \(y = 2x + 5\)
   \[
   y - 4 = - \frac{1}{2}(x - 1) \Rightarrow y = - \frac{1}{2}x + \frac{9}{2}
   \]

10. \((-2, 3); \) parallel to \(y = -3x + 6\)
    \[
    y - 3 = -3(x + 2) \Rightarrow y = -3x - 3
    \]

11. \((3, 7); \) perpendicular to \(y = 2x - 5\)
    \[
    y - 7 = \frac{1}{2}(x - 3) \Rightarrow y = \frac{1}{2}x + \frac{5}{2}
    \]

Write an equation of the line that passes through the given points.

12. \((-1, -4),(0, 11)\)
    \[
    y = 3x + 11
    \]

13. \((6, -2),(0, 11)\)
    \[
    y = \frac{1}{5}x - \frac{16}{5}
    \]

14. \((3, 4),(0, 3)\)
    \[
    y = 3x + 11
    \]

15. \((-3, -3),(2, 1)\)
    \[
    y = \frac{1}{5}x - \frac{16}{5}
    \]

16. \((-5, 4),(0, -11)\)
    \[
    y = 3x + 11
    \]

17. \((1, -4),(-2, 6)\)
    \[
    y = \frac{1}{5}x - \frac{16}{5}
    \]

18. \((2, 8),(5, 2)\)
    \[
    y = \frac{1}{5}x - \frac{16}{5}
    \]

19. \((-8, -3),(7, 0)\)
    \[
    y = \frac{1}{5}x - \frac{16}{5}
    \]

20. \((-1/2, 0), (1, -2)\)
    \[
    y = -2x
    \]

21. \((-2, 4), (1, -2)\)
    \[
    y = -2x
    \]

22. \((-2, -2), (4, 1)\)
    \[
    y = 1
    \]

23. **Video Store**
    The membership to your local video store is $10 per year and the DVD rental rate is $3.95 per DVD. Write an equation that models the total amount of money you will spend on DVD rentals this year.
    \[
    y = 3.95x + 10
    \]

In Exercises 24 and 25, use the following information.

**Postal Rates**
The price for U.S. postage stamps has increased over the years. Since 1975, the price has increased from $.13 to $.37 in 2005 at a rate that is approximately linear.

24. Write a linear model for the price of stamps during this time period. Let \(p\) represent the price and \(t\) represent the number of years since 1975.

25. What would you expect the price of a stamp to be in 2015?