

**Warm Up**

Write an equation parallel to the line and through the given point.


$$y = 4x + 2, \quad (3, 2)$$

$x \quad y$

$$m = 4$$

$$\begin{aligned} y &= mx + b \\ 2 &= 4(3) + b \\ 2 &= 12 + b \\ -12 & \quad -12 \\ \hline -10 &= b \end{aligned}$$

$$y = 4x - 10$$

 **CELLULAR RATES** In Exercises 46 and 47, use the following information. You are moving to Houston, Texas, and are switching your cellular phone company. Your new peak air time rate in Houston is \$.23 per minute. Your bill also includes a monthly access charge. For 110 minutes of peak air time your bill is \$51.30.


46. Write an equation that models the cost  $C$  of your monthly bill in terms of the number of minutes  $m$  used. (All of your minutes are during peak air time.)

47. How much is your monthly bill for 60 minutes of peak air time?

$$\begin{array}{r} 110 \\ \times .23 \\ \hline 25.30 \end{array}$$

$$\begin{array}{r} \$51.30 \\ - 25.30 \\ \hline \$26.00 \end{array}$$

$$y = .23x + 26$$

 **TAXI RIDE** In Exercises 48 and 49, the cost of a taxi ride is an initial fee plus \$1.50 for each mile. Your fare for 9 miles is \$15.50.

48. Write an equation that models the total cost  $y$  of a taxi ride in terms of the number of miles  $x$ .

49. How much is the initial fee?

$$\begin{array}{r} 9 \\ \times 1.50 \\ \hline 13.5 \end{array}$$

$$\begin{array}{r} 15.50 \\ 13.50 \\ \hline 2.00 \end{array}$$

$$y = 1.50x + 2$$

### 5.3 Writing Linear Equations Given Two Points

- Goal:
- Write an equation of a line given two points on the line.
  - Use a linear model to model a real-life problem

EQ: *How do you write an eqn when given 2 pts?*

#### WRITING AN EQUATION OF A LINE GIVEN TWO POINTS

**Step 1:** Find the slope. Substitute the coordinates of the two given points into the formula for slope,  $m = \frac{y_2 - y_1}{x_2 - x_1}$ .

**Step 2:** Substitute in  $m$  and  $(x, y)$  into slope-intercept form,  $y = mx + b$ .

**Step 3:** Find the  $b$  ( $y - mx$ )

**Step 4:** Write the equation. Substitute the slope  $m$  and the  $y$ -intercept  $b$  into the slope-intercept form,  $y = mx + b$ .

#### Example 1: Writing an Equation Given Two Points

Write an equation of the line that passes through the points  $(2, 8)$  and  $(-5, 1)$ .

**Step 1:**  $m = \frac{y_2 - y_1}{x_2 - x_1}$

$$\begin{array}{l} (2, 8) \\ (-5, 1) \end{array} \quad m = \frac{8 - 1}{2 - (-5)} = \frac{7}{7}$$

$m = 1$

**Step 2:**  $y = mx + b$

$$\begin{array}{l} (2, 8) \\ x \quad y \end{array} \quad m = 1$$

$$y = mx + b$$

$$8 = 1(2) + b$$

$$8 = 2 + b$$

$$-2 \quad -2$$

$$6 = b$$

**Step 3:**  $b = 6$

**Step 4:**  $y = mx + b$

$$y = 1x + 6$$

**Try It**  
Write an equation in slope-intercept form of the line that passes through the points.

- (-7, 3), (-4, 1)
- (5, -6), (-2, 1)
- (-2, -9), (6, -3)

$(-4, 1)$   
 $m = \frac{3-1}{-7-(-4)} = \frac{2}{-3}$   
 $m = -\frac{2}{3}$   
 $y = mx + b$   
 $1 = -\frac{2}{3}(-4) + b$   
 $1 = \frac{8}{3} + b$   
 $-\frac{5}{3} = b$   
 $y = -\frac{2}{3}x - \frac{5}{3}$

**Example 2: Writing Equations of Perpendicular Lines**  
**Geometry Connection:** Two different nonvertical lines are perpendicular if and only if their slopes are negative reciprocals of each other.

a) Show that  $\overline{AB}$  and  $\overline{BC}$  are perpendicular sides of ABCD.

b) Write equations for the lines containing  $\overline{AB}$  and  $\overline{BC}$ .

**Try It**  
4. Write an equation of a line through (5, 4) that is perpendicular to  $y = 3x - 4$ .

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2. (5, -6), (-2, 1)  
 $(5, -6)$   
 $m = \frac{1+6}{-2-5} = -\frac{7}{7}$   
 $m = -1$   
 $(-2, 1)$   
 $y = mx + b$   
 $1 = -1(-2) + b$   
 $-\frac{1}{2} = 2 + b$   
 $b = -1$   
 $y = -1x - 1$

3. (-2, -9), (6, -3)  
 $(-2, -9)$   
 $m = \frac{-3+9}{6+2} = \frac{6}{8}$   
 $m = \frac{3}{4}$   
 $(6, -3)$   
 $-3 = \frac{3}{4}(6) + b$   
 $-3 = \frac{18}{4} + b$   
 $-\frac{3}{2} = \frac{9}{2} + b$   
 $-\frac{3}{2} - \frac{9}{2} = b$   
 $-\frac{12}{2} = b$   
 $b = -6$   
 $y = \frac{3}{4}x - 6$

# 5.3 Homework DAY 1

p.288 #18-34even (No graphing)