

Skill Check:

Write a linear function f with the given values;

$$f(0) = 2, f(2) = 4$$

4-2

Writing Equations in Point-Slope Form

Vocabulary:

1.) Point Slope Form:

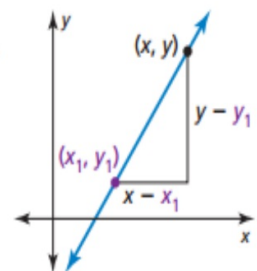
Need to memorize
formula...

Point-Slope Form

Words A linear equation written in the form $y - y_1 = m(x - x_1)$ is in **point-slope form**. The line passes through the point (x_1, y_1) , and the slope of the line is m .

Algebra $y - y_1 = m(x - x_1)$

↑ ↑
passes through (x_1, y_1)



Example 1 Using Slope & point to write equations

Steps:

1.) put x and y in formula

2.) put m in for slope

Write an equation in point-slope form of the line that passes through the point $(-8,3)$ & slope of $1/4$.

$$y - y_1 = m(x - x_1)$$

Write the point-slope form.

$$y - 3 = \frac{1}{4}[x - (-8)]$$

Substitute $\frac{1}{4}$ for m , -8 for x_1 , and 3 for y_1 .

$$y - 3 = \frac{1}{4}(x + 8)$$

Simplify.

► The equation is $y - 3 = \frac{1}{4}(x + 8)$.

Practice

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

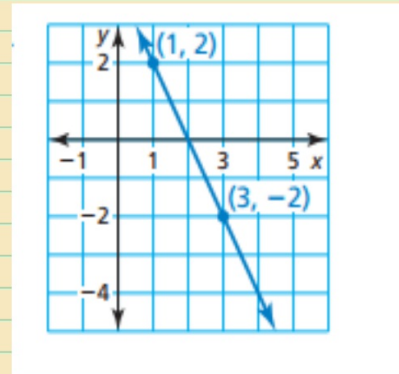
2.) $(4,0)$; $m = -2/3$

Example 2

Using 2 points to Write an equation:

Steps:

- 1.) Find the slope of the line
- 2.) Use the slope (m) and the point to write the equation



Step 2 Use the slope $m = -2$ and the point $(1, 2)$ to write an equation of the line.

$$y - y_1 = m(x - x_1)$$

Write the point-slope form.

$$y - 2 = -2(x - 1)$$

Substitute -2 for m , 1 for x_1 , and 2 for y_1 .

$$y - 2 = -2x + 2$$

Distributive Property

$$y = -2x + 4$$

Write in slope-intercept form.

► The equation is $y = -2x + 4$.

Example 3

Writing a linear Function

Steps:

- 1) find the order pair
- 2.) Find the slope
- 3.) Use the slope and point to write equation

Write a linear function f with the values $f(4) = -2$ and $f(8) = 4$

Work for example 3

SOLUTION

Note that you can rewrite $f(4) = -2$ as $(4, -2)$ and $f(8) = 4$ as $(8, 4)$.

Step 1 Find the slope of the line that passes through $(4, -2)$ and $(8, 4)$.

$$m = \frac{4 - (-2)}{8 - 4} = \frac{6}{4}, \text{ or } 1.5$$

Step 2 Use the slope $m = 1.5$ and the point $(8, 4)$ to write an equation of the line.

$$y - y_1 = m(x - x_1)$$

Write the point-slope form.

$$y - 4 = 1.5(x - 8)$$

Substitute 1.5 for m , 8 for x_1 , and 4 for y_1 .

$$y - 4 = 1.5x - 12$$

Distributive Property

$$y = 1.5x - 8$$

Write in slope-intercept form.

► A function is $f(x) = 1.5x - 8$.

practice:

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

3. $(1, 4), (3, 10)$

4. $(-4, -1), (8, -4)$

5. Write a linear function g with the values $g(2) = 3$ and $g(6) = 5$.

Example 4: Model with Mathematics

Steps:

1.) understand
the problems

2.) Make a plan

3.) Solve

4.) check

The student council is ordering customized foam hands to promote school spirit. The table shows the cost of ordering different numbers of foam hands. Can the situation be modeled by a linear equation? Explain. If possible, write a linear model that represents the cost as a function of the number of foam hands.

Number of foam hands	4	6	8	10	12
Cost (dollars)	34	46	58	70	82

Answer to example 4

- 1. Understand the Problem** You know five data pairs from the table. You are asked whether the data are linear. If so, write a linear model that represents the cost.
- 2. Make a Plan** Find the rate of change for consecutive data pairs in the table. If the rate of change is constant, use the point-slope form to write an equation. Rewrite the equation in slope-intercept form so that the cost is a function of the number of foam hands.
- 3. Solve the Problem**
 - Step 1** Find the rate of change for consecutive data pairs in the table.
$$\frac{46 - 34}{6 - 4} = 6, \frac{58 - 46}{8 - 6} = 6, \frac{70 - 58}{10 - 8} = 6, \frac{82 - 70}{12 - 10} = 6$$
Because the rate of change is constant, the data are linear. So, use the point-slope form to write an equation that represents the data.
 - Step 2** Use the constant rate of change (slope) $m = 6$ and the data pair $(4, 34)$ to write an equation. Let C be the cost (in dollars) and n be the number of foam hands.
$$C - C_1 = m(n - n_1) \quad \text{Write the point-slope form.}$$
$$C - 34 = 6(n - 4) \quad \text{Substitute 6 for } m, 4 \text{ for } n_1, \text{ and } 34 \text{ for } C_1.$$
$$C - 34 = 6n - 24 \quad \text{Distributive Property}$$
$$C = 6n + 10 \quad \text{Write in slope-intercept form.}$$
- 4. Look Back** To check that your model is correct, verify that the other data pairs are solutions of the equation.
$$46 = 6(6) + 10 \quad \checkmark \quad 58 = 6(8) + 10 \quad \checkmark$$
$$70 = 6(10) + 10 \quad \checkmark \quad 82 = 6(12) + 10 \quad \checkmark$$