

Algebra 1: 4.2 Writing Equations in Point-Slope Form

Learning Outcomes:

- I can write an equation of a line when I know the slope and a point on the line.
- I can write the equation of a line when I know two points on the line.
- I can use linear equations to solve real-life problems.

Oct 31-10:20 AM

Point Slope Form of a Linear Equation:

Remember: slope $m = \frac{y_2 - y_1}{x_2 - x_1}$ $\frac{\text{rise}}{\text{run}}$

What happens if we multiply both sides by the denominator?

$$(x_2 - x_1) m = \frac{y_2 - y_1}{x_2 - x_1} (x_2 - x_1)$$

$$y = mx + b \quad (x_2 - x_1) m = y_2 - y_1$$

Point-slope form: $y - y_1 = m(x - x_1)$

m is the slope, and (x_1, y_1) is a point on the line.

Oct 31-10:26 AM

Example 1: Write an equation in point slope form of the line that passes through the point $(1, 6)$ and has a slope of $-1/2$.

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

$$y - 6 = -\frac{1}{2}(x - 1)$$

Your turn:

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

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

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

$$y - (-1) = -2(x - 3)$$

$$y + 1 = -2(x - 3)$$

2. $(4, 0); m = -\frac{2}{3}$

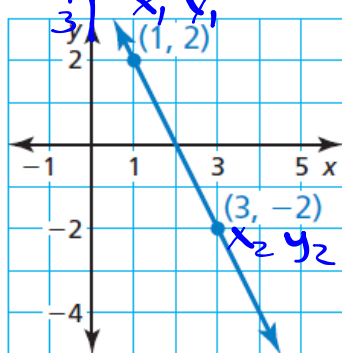
$$y - 0 = -\frac{2}{3}(x - 4)$$

$$y = -\frac{2}{3}(x - 4)$$

Oct 31-10:25 AM

Example 2:

Write an equation in slope-intercept form of the line shown.



$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 2}{3 - 1} = \frac{-4}{2} = -\frac{2}{1}$$

$$(0, 4) \quad y = -2x + 4$$

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

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

$$y = -2x + 4$$

Oct 31-10:38 AM

Example 3:

Write a linear equation with the values $f(8) = -1$ and $f(6) = 0$.

$y = mx + b$
 $y - y_1 = m(x - x_1)$

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - (-1)}{6 - 8} = \frac{1}{-2} = -\frac{1}{2}$$

$$y + 1 = -\frac{1}{2}(x - 8)$$

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

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

$f(x) = -1$
 $f(8) = -1$ $x = 8$ $y = -1$ $(8, -1)$

$f(6) = 0$
 $x = 6$ $y = 0$ $(6, 0)$

Oct 31-10:40 AM

Example 4:

You pay an installation fee and a monthly fee for Internet service. The table shows the total cost for different numbers of months. Can the situation be modeled by a linear equation? Explain. If possible, write a linear model that represents the total cost as a function of the number of months.

Yes, constant rate of change (slope) of $\frac{126}{3}$

Number of months	x	3	6	9	12
Total cost (dollars)	y	176	302	428	554

$(3, 176)$
 $(6, 302)$
 $(9, 428)$
 $(12, 554)$

$302 - 176 = 126$
 $428 - 302 = 126$
 $554 - 428 = 126$

$$m = \frac{126}{3} \quad (x_1, y_1) = (3, 176)$$

$$y - 176 = \frac{126}{3}(x - 3)$$

Oct 31-10:42 AM

HW: 4.2 pg. 185

A: 8, 10, 12, 18, 24, 26, 28, 30, 34, 36, 38 - 44 (e)

B: 1, 2, 4 - 32 (M4), 40 - 44

C: 6, 8, 12, 14, 16, 22, 28, 30, 32, 42, 44