

Algebra RH

Essential Question: What is point-slope form of a linear equation?

Do Now:

(a) Graph using a table of values.

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

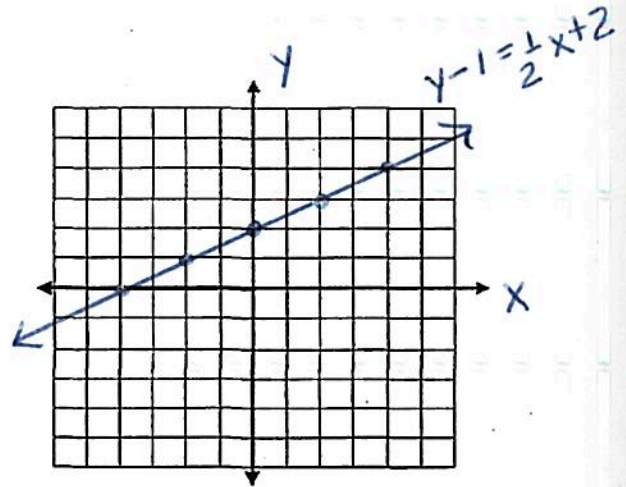
$$y = \frac{1}{2}(x + 2) + 1$$

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

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

→ point-slope form

→ slope intercept form



(b) State the slope of the line.

$$\frac{1}{2}$$

POINT - SLOPE FORM

The point-slope form of an equation derives directly from the equation of the slope of a line.

Key Concepts:

(x, y) x and y represent all of the points on the line

(x_1, y_1) represents one point on the line

m represents the slope of the line

Deriving the Formula:

$$\frac{m}{1} = \frac{y - y_1}{x - x_1}$$

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

↑
 (x_1, y_1)

↑
slope

↑
from
 (x_1, y_1)

Writing the equation of a line in point-slope form.

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

- Given slope and a point.

Practice:

	m	(x_1, y_1)
(a)	$m = 2$	$(2, 5)$
(b)	$m = \frac{1}{2}$	$(-8, -10)$
(c)	$m = -1$	$(3, 0)$
(d)	$m = -\frac{3}{4}$	$(0, -7)$

$$\begin{aligned} y - 5 &= 2(x - 2) \\ y + 10 &= \frac{1}{2}(x + 8) \\ y &= -1(x - 3) \\ y + 7 &= -\frac{3}{4}(x) \end{aligned}$$

- Given two points.

Practice:

	(x_1, y_1)	(x_2, y_2)
(a)	$(-3, 4)$	$(-6, 10)$

$$\frac{\Delta y}{\Delta x} = \frac{10 - (4)}{-6 - (-3)} = \frac{6}{-3} = -2$$

$$\begin{aligned} y - 4 &= -2(x + 3) \\ y - 10 &= -2(x + 6) \end{aligned}$$

	(x_1, y_1)	(x_2, y_2)
(b)	$(5, -3)$	$(-4, 3)$

$$\frac{\Delta y}{\Delta x} = \frac{3 - (-3)}{-4 - (5)} = \frac{6}{-9} = -\frac{2}{3}$$

$$\begin{aligned} y + 3 &= -\frac{2}{3}(x - 5) \\ y - 3 &= -\frac{2}{3}(x + 4) \end{aligned}$$

	(x_1, y_1)	(x_2, y_2)
(c)	$(-1, 2)$	$(7, 8)$

$$\frac{\Delta y}{\Delta x} = \frac{8 - (2)}{-1 - (7)} = \frac{6}{-8} = -\frac{3}{4}$$

$$\begin{aligned} y - 2 &= \frac{3}{4}(x + 1) \\ y - 8 &= \frac{3}{4}(x - 7) \end{aligned}$$

	(x_1, y_1)	(x_2, y_2)
(d)	$(7, 0)$	$(6, -2)$

$$\frac{\Delta y}{\Delta x} = \frac{-2 - (0)}{6 - (7)} = \frac{-2}{-1} = 2$$

$$\begin{aligned} y &= 2(x - 7) \\ y + 2 &= 2(x - 6) \end{aligned}$$

$$\frac{\Delta y}{\Delta x} = \frac{-2 - (0)}{6 - (7)} = \frac{-2}{-1} = 2$$

- Remember:
- A. $y = mx + b$ ← slope-intercept form
 - B. $y - y_1 = m(x - x_1)$ ← point-slope form
 - C. $6x - 5y = 10$ ← standard form
 - D. $y = \#$ ← horizontal line
 - E. $x = \#$ ← vertical line