Algebra 1A

Lesson 5.3
Writing Linear Equations in
Point - Slope Form

Warm Up
Write an equation in slope-intercept form for the line for each set of information.

(a) passes through (0, 6) with slope of -3.

$m = -3$
$b = 6$
$y = -3x + 6$

(b) passes through (0, -3) and (2, 7).

$m = \frac{7-(-3)}{2-0} = 5$
$y = 5x - 3$

(c) passes through (3, 4) with slope of 3.

$y = mx + b$
$4 = 3(3) + b$
$-9 \quad -9$
$b = -5$
$y = 3x - 5$

(d) passes through (-2,2) and (1,8).

$m = \frac{8-2}{1-(-2)} = 2$
$y = 2x + 6$

$y = mx + b$
$8 = 2(1) + b$
$-2 \quad -2$
$b = 6$

Point-Slope Form of a Linear Equation

The Point-Slope Form of the equation of a line through a given point (x_1, y_1) with a slope of m is:

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

STARTS as a SUBTRACTION - SO BECOMES ADDITION WHEN COORDINATE IS NEGATIVE

COMES FROM SLOPE FORMULA

$(x - x_1)(m) = \frac{y - y_1}{x - x_1} \cdot (x - x_1)$

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

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

Example 1. Write an Equation in Point-Slope Form

(a) Write an equation in point-slope form of the line that passes through the point (-3, 1) and has a slope of 3.

$y - y_1 = m(x - x_1)$
$y - 1 = 3(x + 3)$

(b) Write an equation in point-slope form of the line that passes through the point (2, -5) and has a slope of -2.

$y - y_1 = m(x - x_1)$
$y + 5 = -2(x - 2)$

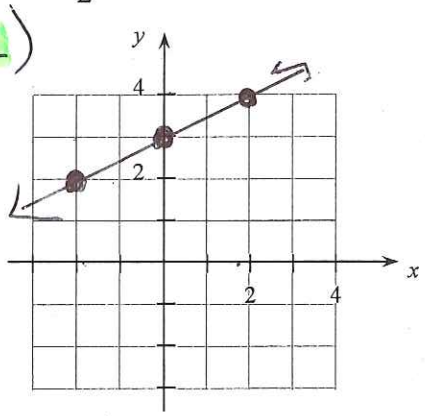
Example 2. Graph an Equation in Point-Slope Form

Graph the equation $y - 2 = \frac{1}{2}(x + 2)$.

Method 1

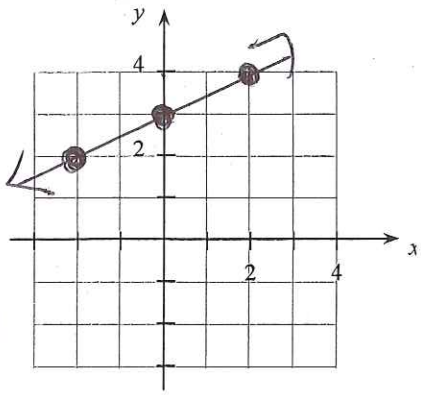
(-2, 2)

① PLOT POINT
② USE SLOPE TO PLOT OTHER POINTS



Method 2

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



Try It!

(a) Write an equation in point slope form of the line that passes through the point (-2, 5) and has a slope of 5.

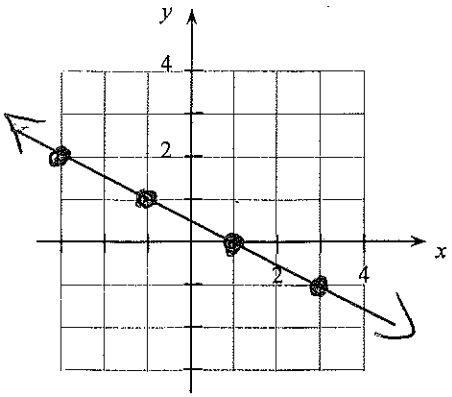
$y - y_1 = m(x - x_1)$

$y - 5 = 5(x + 2)$

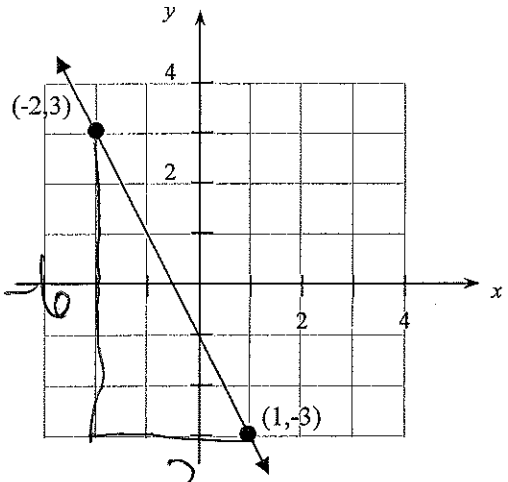
(b) Graph the equation $y + 1 = -\frac{1}{2}(x - 3)$.

① Plot point $(3, -1)$

② Use slope $m = -\frac{1}{2}$



Example 3. Use Point-Slope Form to Write an Equation
Consider the graph at the right.



(a) Find the slope of the line.

$\frac{\text{rise}}{\text{run}} = \frac{-6}{3} = -2$

(b) Use the slope from part (a) and one of the ordered pairs to write an equation in Point-Slope Form.

Picked $(1, -3)$

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

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

(c) Turn your point-slope equation from part (b) into a Slope-Intercept equation.

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

$y + 3 = -2x + 2$

$-3 \quad -3$

$y = -2x - 1$

Try It!
Write an equation in Point-Slope Form that passes through the points (2, 3) and (4, 4). Then turn it into Slope-Intercept Form.

① $m = \frac{4-3}{4-2} = \frac{1}{2}$

② $y - 4 = \frac{1}{2}(x - 4)$ or $y - 3 = \frac{1}{2}(x - 2)$

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

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

$+4 \quad +4$

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

Homework:
New: Pg. 305 #8-32 (evens), 39

Review:
Write an equation of the line in ***slope-intercept form*** ($y = mx + b$) given the following information.

1. slope = 2 y – int. = 4

3. slope = 0 y – int = 5

5. slope = 2 (2, 4)

7. slope = -5 (2, -4)