Name Key
8A; Algebra 1

slope-intercept: $y = mx + b$ (m = slope, b = intercept)

Date:_____
Period_____

Point-Slope Form Classwork

The **point-slope form** of an equation of a line with slope m passing through (x_1, y_1) is $y - y_1 = m(x - x_1)$.

Point on the line (x_1, y_1) — **Point-slope form** $y - y_1 = m(x - x_1)$ — **Slope** m

I. Using Point-Slope Form to Identify Information About a Line

Use the point-slope form of each equation to identify a point the line passes through and the slope of the line.

A $y - 9 = -\frac{2}{3}(x - 21)$

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

$y - 9 = -\frac{2}{3}(x - 21)$ *The equation is in point-slope form.*

$m = -\frac{2}{3}$ *Read the value of m from the equation.*

$(x_1, y_1) = (21, 9)$ *Read the point from the equation.* (opposite sign)

The line defined by $y - 9 = -\frac{2}{3}(x - 21)$ has slope $-\frac{2}{3}$, and passes through the point $(21, 9)$.

B $y - 2 = 3(x + 8)$

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

$y - 2 = 3(x + 8)$

$y - 2 = 3[x - (-8)]$ *Rewrite using subtraction instead of addition.*

$m = 3$

$(x_1, y_1) = (-8, 2)$ → opposite sign

The line defined by $y - 2 = 3(x + 8)$ has slope 3, and passes through the point $(-8, 2)$.

$(x_2 - x_1)m = y_2 - y_1$

$y_2 - y_1 = m(x_2 - x_1)$

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

Use the point-slope form of each equation to identify a point the line passes through and the slope of the line.

1) $y - 2 = -3(x + 6)$

slope: -3

point: $(-6, 2)$

2) $y - 8 = 7(x - 14)$

slope: 7

point: $(14, 8)$

3) $y + 3.7 = 3.2(x - 1.7)$

slope: 3.2

point: $(1.7, -3.7)$

4) $y + 1 = 11(x - 1)$

slope: 11

point: $(1, -1)$

5) $y + 6 = -4(x - 8)$

slope: -4

point: $(8, -6)$

6) $y - 7 = 4(x + 3)$

slope: 4

point: $(-3, 7)$

II. Writing the Point-Slope Form of an Equation

Write the point-slope form of the equation with the given slope that passes through the indicated point.

A **the line with slope -2 passing through $(4, 1)$**

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

$y - 1 = -2(x - 4)$ *Substitute 4 for x_1, 1 for y_1, and -2 for m.*

The equation of the line with slope -2 that passes through $(4, 1)$ in point-slope form is $y - 1 = -2(x - 4)$.

B **the line with slope 5 passing through $(-2, 4)$**

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

$y - 4 = 5[x - (-2)]$ *Substitute -2 for x_1, 4 for y_1, and 5 for m.*

$y - 4 = 5(x + 2)$

The equation of the line with slope 5 that passes through $(-2, 4)$ in point-slope form is $y - 4 = 5(x + 2)$.

Write the point-slope form of the equation with the given slope that passes through the indicated point.

7) A line with slope 5 passing through (-2, 6)

$y - y_1 = m(x - x_1)$ (same / opposites)

$y - 6 = 5(x + 2)$ or $y - 6 = 5x + 10$

8) A line with the slope -8 passing through (7,5)

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

$y - 5 = -8(x - 7)$ or $y - 5 = -8x + 56$

Write the point-slope form of the equation with the given slope that passes through the indicated point. Then take your equation and turn it into slope - intercept form. ($y = mx + b$)

9) A line with slope 7 passing through (3, 4)

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

$y - 4 = 7(x - 3)$ → point slope form

$y - 4 = 7x - 21$

$+4 \quad +4$

$y = 7x - 17$ → slope-intercept

10) A line with the slope $\frac{1}{2}$ passing through (-6,-8)

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

$y + 8 = \frac{1}{2}(x + 6)$ → point slope

$y + 8 = \frac{1}{2}x + 3$

$-8 \quad -8$

$y = \frac{1}{2}x - 5$ → slope - intercept

Given the following points, write the point-slope form of the equation Then, take your equation and turn it into slope - intercept form and identify the state the coordinates of the y - intercept.

11) (-2, 7) and (0,3)

(x_1, y_1) (x_2, y_2)

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{3-7}{0-(-2)}$ $m = \frac{-4}{2}$ $m = -2$

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

$y - 7 = -2(x + 2)$ point slope ← it doesn't matter which point you use here!

$y - 7 = -2x - 4$

$+7 \quad +7$

$y = -2x + 3$ slope - intercept

(0,3) y-intercept

12) (2,3) and (1,4)

(x_1, y_1) (x_2, y_2)

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

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

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

$y - 3 = -x + 2$

$+3 \quad +3$

$y = -x + 5$

(0,5) = the y-intercept

Write the point-slope form of the equation with the given conditions.

13) A line containing the point (2, -1) and parallel to the line $\frac{3y}{3} = \frac{2x}{3} - \frac{9}{3}$

$x, y,$ ↓ same slope

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

$m = \frac{2}{3}$

parallel slope $= \frac{2}{3}$

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

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

$y + 1 = \frac{2}{3}x - \frac{4}{3}$

14) A line containing the point (3,5) and perpendicular to the line $\frac{4y}{4} = \frac{9x}{4} - \frac{18}{4}$

↓ Negative reciprocal

$y = \frac{9}{4}x - \frac{9}{2}$

$m = \frac{9}{4}$

perpendicular slope $= -\frac{4}{9}$

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

$y - 5 = -\frac{4}{9}(x - 3)$ or

$y - 5 = -\frac{4}{9}x + \frac{4}{3}$

15) What is the equation of a line that passes through the points (2,7) and (−1,3)?

$x_1 y_1$ $x_2 y_2$

a) $y - 2 = \frac{3}{4}(x - 7)$

b) $y - 2 = \frac{4}{3}(x - 7)$

c) $y - 7 = \frac{3}{4}(x - 2)$

d) $y - 7 = \frac{4}{3}(x - 2)$

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

$y - 7 = \frac{4}{3}(x - 2)$

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

$m = \frac{3 - 7}{-1 - 2}$ $m = \frac{-4}{-3}$ $m = \frac{4}{3}$

16) What is the equation of a line that passes through the point (4, -6) and has a slope of -3?

$x_1 y_2$ m

a) $y = -3x + 6$

b) $y = -3x - 6$

c) $y = -3x + 10$

d) $y = -3x + 14$

slope-intercept form

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

$y + 6 = -3(x - 4)$

$y + 6 = -3x + 12$

$-6 \quad -6$

$y = -3x + 6$

17) Which equation represents a line that has a slope of $\frac{3}{4}$ and passes through the point (2, 1)?

m $x_1 y_1$

a) $\frac{3y}{3} = \frac{4x}{3} - \frac{5}{3}$ $y = \frac{4}{3}x - \frac{5}{3}$

b) $\frac{3y}{3} = \frac{4x}{3} + \frac{2}{3}$ $y = \frac{4}{3}x + \frac{2}{3}$

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

d) $\frac{4y}{4} = \frac{3x}{4} + \frac{5}{4}$ $y = \frac{3}{4}x + \frac{5}{4}$

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

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

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

$+1 \quad +1$

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