


Look at **rise** as **run** as

the change in the y's
the change in the x's

$$= \frac{3 - (-1)}{4 - (-2)} = \frac{4}{6} = \frac{2}{3}$$

Unit 5: Linear Equations



5.8 Slope-Point Form

Investigation #1 Slope-Point Form

The graph of $y + 3 = 2(x - 1)$ is shown on the grid.

a) Determine the slope of the graph of $y + 3 = 2(x - 1)$. $m = \frac{2}{1} = 2$

b) List the coordinates of point A on the line. $(1, -3)$

c) Compare your answers in a) and b) with the numbers in the equation.
Slope: in front of bracket
point: x → with x in bracket
y → with y on left

The graph of $y - 1 = -\frac{2}{3}(x + 4)$ is shown on the grid.

d) Determine the slope of the graph of $y - 1 = -\frac{2}{3}(x + 4)$. $m = -\frac{2}{3}$

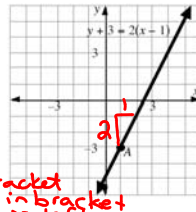
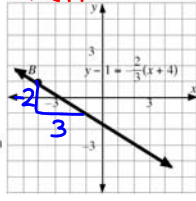
e) List the coordinates of point B on the line. $(-4, 1)$

f) Compare your answers in e) and f) with the numbers in the equation.

g) Consider the graph of the linear equation $y - y_1 = m(x - x_1)$. Based on your observations in c) and g), state the slope of the line, and write the coordinates of one point on the line.

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

$(x_1, y_1) = \text{random point}$

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Slope-Point Equation of a Line $\rightarrow y - y_1 = m(x - x_1)$

- The point-slope form of the equation of a line is $y - y_1 = m(x - x_1)$ where m is the slope of the line, and (x_1, y_1) represents a point on the line.
- To determine the equation of a line in higher grade math courses, the point-slope equation, $y - y_1 = m(x - x_1)$, is used more frequently than the slope-y-intercept equation, $y = mx + b$.

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

Class Ex. #1 State the equation, in slope-point form, of the line through the given point and with the given slope.

a) x_1, y_1 (6, 5), 3 b) (1, -1), -4 c) x_1, y_1 (-9, -8), $\frac{1}{2}$

$$y - 5 = 3(x - 6) \quad y + 1 = -4(x - 1) \quad y + 8 = \frac{1}{2}(x + 9)$$

Class Ex. #2 In each case the slope of a line and a point on the line are given. Determine the equation of the line in slope y-intercept form, $y = mx + b$.

a) $m = 5$, point (-5, 2) b) $m = -7$, point (-3, 4)

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

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

$$y - 2 = 5x + 25$$

$$+ 2 \qquad + 2$$

$$y = 5x + 27$$


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

$$y - 4 = -7x - 21$$

$$+ 4 \qquad + 4$$

$$y = -7x - 17$$

Look at $\frac{\text{rise}}{\text{run}}$ as $\frac{\text{the change in the } y\text{'s}}{\text{the change in the } x\text{'s}}$

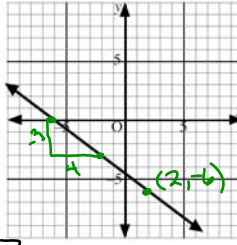
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Class Ex. #4 The line on the grid passes through at least two points with integer coordinates. Determine the equation of the line in general form.

$m = -\frac{3}{4}$ $y - y_1 = m(x - x_1)$
 $y + 6 = -\frac{3}{4}(x - 2)$

$y + 6 = -\frac{3}{4}x + \frac{3}{2}$
 $y = -\frac{3}{4}x - \frac{9}{2}$

$0 = 3x + 4y + 18$ $-4 \left[0 = -\frac{3}{4}x - 4y - \frac{9}{2} \right]$



Class Ex. #5 In each case state the slope of the line, and write the coordinates of a point on the line.

a) $y + 11 = \frac{1}{7}(x - 4)$ $m = \frac{1}{7}$ $(4, -11)$

b) $y - 9 = -\frac{5}{3}(x - 7)$ $m = -\frac{5}{3}$ $(7, 9)$

c) $y = -3(x - 6)$ $y + 0 = -3(x - 6)$ $m = -3$ $(6, 0)$

d) $y = -3x - 6$ $y = mx + b$ $m = -3$ $(0, -6)$