

Sec 2.3.1

*Determining Slope

*Writing linear equations in point-slope and slope-intercepts forms

Slope- $\frac{\text{change in } y}{\text{change in } x}$ $\frac{\text{rise}}{\text{run}}$

Formula- $\frac{y_2 - y_1}{x_2 - x_1}$ $\frac{\Delta y}{\Delta x}$

Find the slope of the line passing through (-3,-1) and (-2,4).

$$m = \frac{4 + 1}{-2 + 3} \\ = \frac{5}{1} = 5$$

Find the slope of the line passing through (2, 4) and (2, -8)

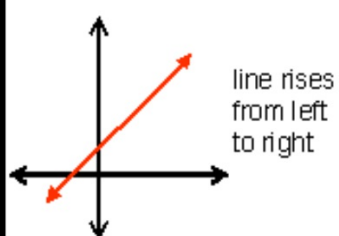
$$m = \frac{4 + 8}{2 - 2} = \frac{12}{0} \rightarrow \text{undefined vertical}$$

Find the slope of the line passing through (6,7) and (-2,7)

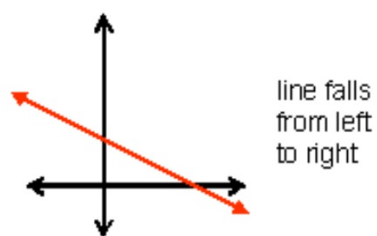
$$m = \frac{7 - 7}{6 + 2} = \frac{0}{8} = 0$$

horizontal

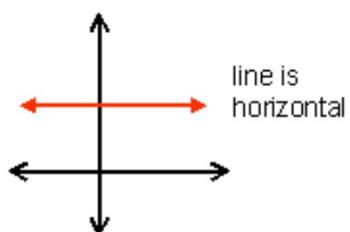
Positive Slope



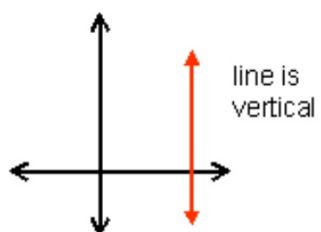
Negative Slope



Slope of 0



Undefined Slope



Deriving point-slope form...

(so you don't need to memorize)

Consider the formula for slope-

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

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

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

The diagram shows the point-slope formula $y - y_1 = m(x - x_1)$ with four colored arrows pointing to its components: a red arrow from 'any point' to y , a green arrow from 'slope' to m , a blue arrow from 'known point' to x_1 , and another red arrow from 'any point' to x_1 .

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

any point

slope

known point

What is the result if you divide through by the $(x-x_1)$?

So, please don't memorize this. Use what you know to derive it.

Write the equation, in point-slope form, for the line with a slope of 4 that passes through $(-1,3)$. Solve the equation for y .

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

$$y - 3 = 4(x + 1)$$

$$y - 3 = 4x + 4$$

$$y = 4x + 7$$

Write the equation, in point-slope form for the line passing through the points $(4, -3)$ and $(-2, 6)$. Solve the resulting equation for y .

$$m = \frac{-3 - 6}{4 - (-2)} = \frac{-9}{6} = -\frac{3}{2}$$

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

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

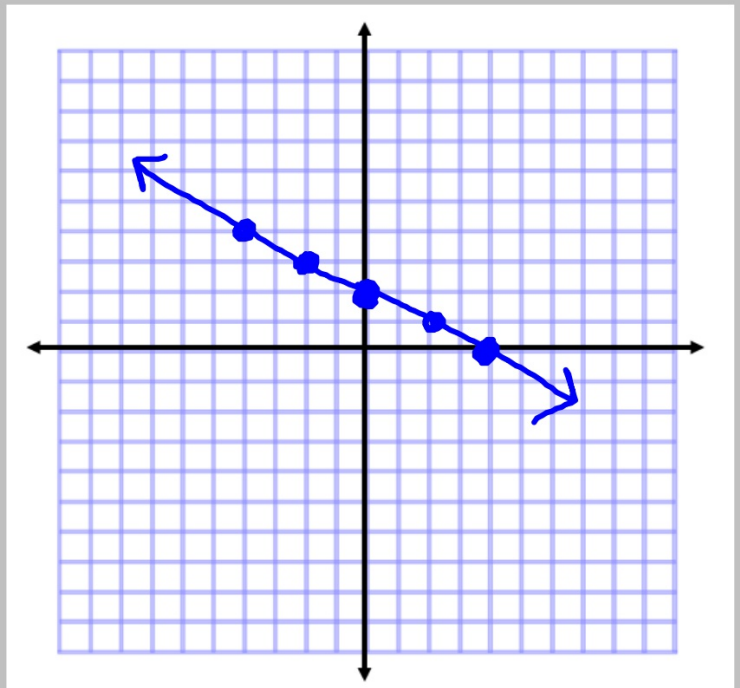
Given $y = -\frac{1}{2}x + 2$ determine the slope and y-intercept, then graph.

*include at least three points...-x, y-intercept and +x

$$y = mx + b$$

↑ ↑
slope y-int

slope $\rightarrow -\frac{1}{2}$ ↓
y-int $\rightarrow 2$ →



Suggested Practice

Sec 2.3

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5, 10, 15, 17, 20,

21, 25, 30,

35, 37, 40, 45

5. 0, horizontal

10. undefined, vertical

$$15. y+3 = -3(x+2)$$

$$y = -3x - 9$$

$$17. y-0 = -4(x+4)$$

$$y = -4x - 16$$

$$20. y + \frac{1}{4} = -1(x+4)$$

$$y = -x - \frac{17}{4}$$

$$21. y-0 = \frac{1}{2}(x-0)$$

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

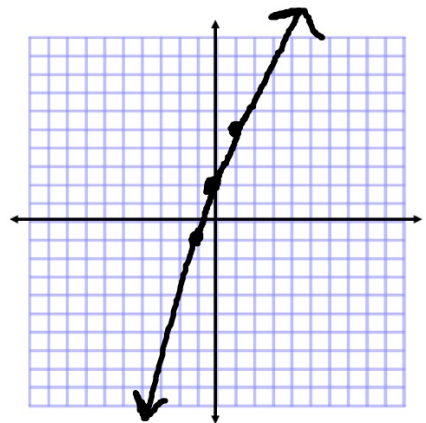
$$25. y = 2x$$

$$37. y = 8x + 4$$

$$30. y = x - 2$$

$$40. \\ m = 3 \\ b = 2$$

$$35. y = x + 2$$



$$45. m = -\frac{3}{5}$$

$$b = 7$$

$$y = -\frac{3}{5}x + 7$$

