4.3 notes

Friday, September 25, 2020   1:19 PM

Foundations and Precalculus 10

4.3 Slope-Intercept Form of the Equation for a Linear Function

coefficient on x

Slope-Intercept Form of the Equation of a Linear Function

The equation of a linear function can be written in the form $y = mx + b$

where m = _slope_ ← $\frac{rise}{run}$
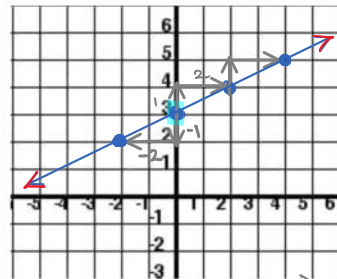
and b = _y-intercept_ ← point of graph on y-axis $(0, b)$

constant term (no variable)

Ex. 1: Graph the linear function with the equation: $y = \frac{1}{2}x + 3$

Steps:

i) Determine slope, $m = \frac{1}{2}$

ii) Determine y-intercept, $b = 3$

iii) Plot known point (b) ← on y-axis

iv) From this <u>known point</u>, use the slope to plot the other points on the line.

$m = \frac{1}{2}$ ← $\frac{rise}{run}$ or $\frac{-1}{-2}$

v) Draw a line through the points.

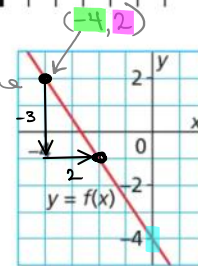**Ex. 2**: Write an equation to describe this function. Verify the equation.

$b = -4$

$m = \frac{rise}{run}$

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

$y = \boxed{m}x + \boxed{b}$

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

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

→ sub point on line into equation:

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

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

$2 = \frac{12}{2} - 4$

$2 = 6 - 4$

$2 = 2$ ✓

(-4, 2)

pick whole number coordinates to find slope.

$y = f(x)$

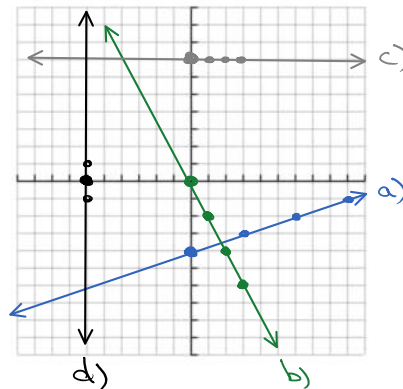**Ex. 3**: Graph the lines represented by each equation. State the slope and y-intercept of each.

a) $y = \frac{1}{3}x - 4$ $m = \frac{1}{3}$ $b = -4$

b) $y = -2x + 0$ $m = -\frac{2}{1}$ $b = 0$

c) $y = 7$ $m = \frac{0}{1}$ $b = 7$
$y = 0x + 7$

✱ horizontal (flat) line

d) $x = -6$ ✱ not in $y = mx + b$ form.

✱ vertical line

always $x = -6$ no matter what y value is:

x	y
-6	-1
-6	0
-6	1

Ex. 4: The equation of a line is $y = 3x + b$.
Determine "b" when the line passes through
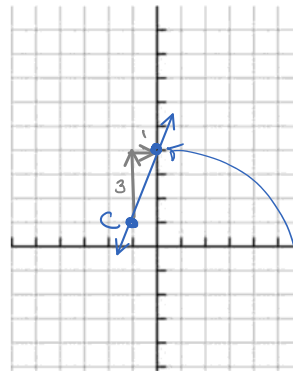the point C($-1, 1$)

Method 1: algebra
→ sub coordinates in for x & y
→ simplify
→ solve.
→ if asks for equation then write $y = mx + b$ with m and b values.

$$y = 3x + b$$
$$(1) = 3(-1) + b$$
$$1 = -3 + b$$
$$\underline{+3 \quad +3}$$
$$\boxed{4 = b}$$

Method 2: using a graph
→ plot given point
→ use slope directions to see where graph crosses y-axis.

$$m = \frac{3}{1} \begin{array}{l}-\text{rise}\\ -\text{run}\end{array}$$

$$\boxed{b = 4}$$

Same methods as Ex.4

Ex. 5: The equation of a line is $y = mx + 2$.
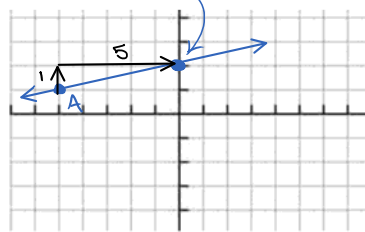Determine the slope (m) when the line passes
through the point A($-5, 1$)

$$y = mx + 2$$
$$(1) = m(-5) + 2 \quad \leftarrow \text{sub}$$
$$1 = -5m + 2 \quad \leftarrow \text{simplify}$$
$$\underline{-2 \qquad\qquad -2}$$
$$\frac{-1}{-5} = \frac{-5m}{-5} \quad \Big\} \text{ solve.}$$
$$\boxed{\frac{1}{5} = m}$$

Plot 2 known points on grid:
$$A(-5, 1)$$
$$b = 2 \rightarrow (0, 2)$$
$$m = \frac{\text{rise}}{\text{run}}$$
$$\boxed{m = \frac{1}{5}}$$

HW p362 #4-6(a,b only), 7a-d,8,12,13,23,24