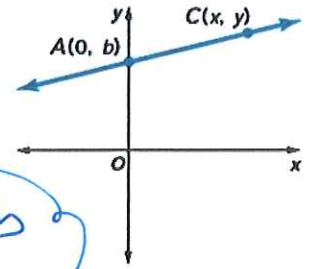


Slope-Intercept form: $y = mx + b$
 ↑ slope ↙ y intercept



Where does this equation come from? Given the points A and C in the graph, write an expression for the slope of the line.

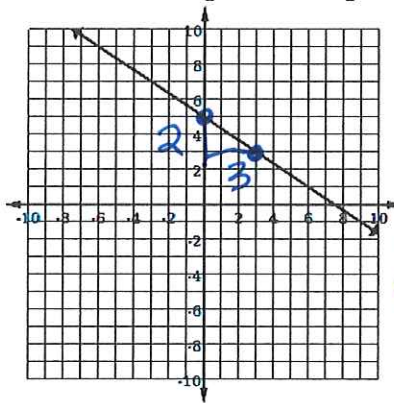
$$m = \frac{y-b}{x-0} \quad x \cdot m = \frac{y-b}{x} \cdot x \quad \frac{mx = y-b}{+b} \quad \boxed{y = mx + b}$$

Point-Slope form: $y - y_1 = m(x - x_1)$

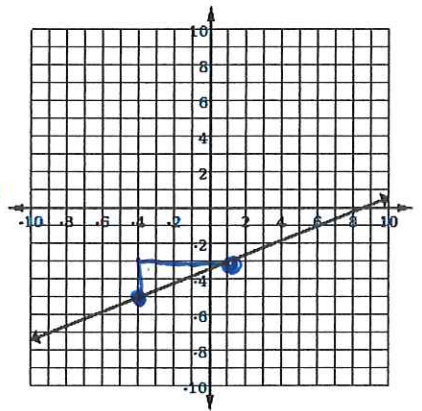
Where does this equation come from? Begin by finding the slope of the line between the points (x, y) and (x_1, y_1) using the slope formula.

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

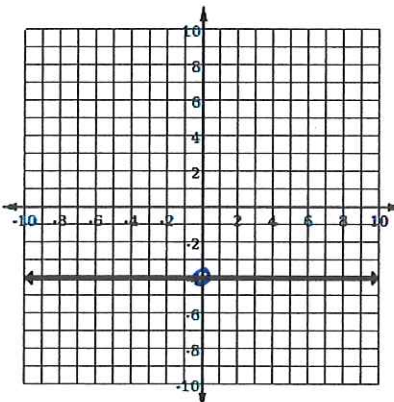
Write the slope-intercept equation of each line:



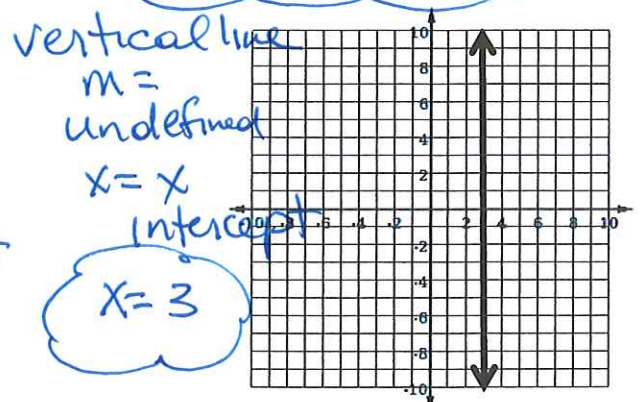
$m = -2/3$
 $b = 5$
 $y = -2/3x + 5$



$m = 2/5$
 $(1, -3)$
 $(-4, -5)$
 $y - (-3) = 2/5(x - 1)$
 $y + 3 = 2/5(x - 1)$



$m = 0$
 horizontal line
 $y = y \text{ intercept}$
 $y = -4$



vertical line
 $m = \text{undefined}$
 $x = x \text{ intercept}$
 $x = 3$

We now have 3 forms for a linear equation.

Standard Form: $Ax + By = C$
 Slope-Intercept form: $y = mx + b$
 Point-Slope form: $y - y_1 = m(x - x_1)$

To write the equation of any line, we only need 2 pieces of information:

slope and a point on the line.

Write the equation of the line that passes through (0,6) and has a slope of $\frac{2}{3}$.

$$y - y_1 = m(x - x_1) \quad \text{or} \quad y - b = \frac{2}{3}(x - 0) \Rightarrow y = \frac{2}{3}x + 6$$

Write the point-slope equation of the line that passes through (11, 16) and has a slope of $\frac{5}{3}$.

$$y - y_1 = m(x - x_1) \\ y - 16 = \frac{5}{3}(x - 11)$$

Given that $f(-6) = -3$ and $f(-2) = 1$, write the rule for the linear function $f(x)$.

$$\begin{aligned} &(-6, -3) \quad (-2, 1) \\ &m = \frac{1 - (-3)}{-2 - (-6)} = \frac{4}{4} = 1 \\ &y - 1 = 1(x - (-2)) \\ &y - 1 = x + 2 \\ &\quad \quad \quad +1 \quad \quad +1 \quad \text{or} \quad f(x) = x + 3 \end{aligned}$$

Write the equation of a line that has undefined slope and that passes through the point (5, -4).

$$x = 5 \quad \text{vertical line means } x = x \text{ intercept}$$

Write the equation of a line that has a slope of zero and that passes through the point (-3, 7).

$$y = 7 \quad \text{horizontal line } y = y \text{ intercept}$$

Write the slope-intercept equation of a line that has the same slope as $6y + 10 = 3x$ and the same y-intercept as $4x - 3y = 9$.

$$\begin{aligned} &\frac{-4x}{-3} = \frac{-4x + 9}{-3} \\ &y = \frac{4}{3}x - 3 \quad \text{y intercept} \\ &y = mx + b \\ &y = \frac{1}{2}x - 3 \\ &\frac{6y}{6} = \frac{3x - 10}{6} \\ &y = \frac{3}{6}x - \frac{10}{6} \\ &\quad \quad \quad \uparrow m \end{aligned}$$