

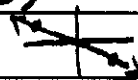
Algebra 3.3 Lines

Slope

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

EX Find the slope between $(-6, 2)$ & $(5, -3)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 2}{5 - (-6)} = \frac{-5}{11} \leftarrow \begin{array}{l} \text{down 5} \\ \text{right 11} \end{array}$$



Slope Inter

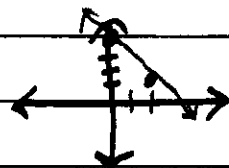
$$y = mx + b$$

$m = \text{slope}$

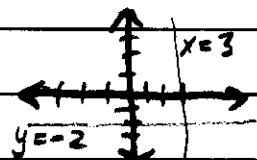
$b = y \text{ int}$

EX Let's graph the equation $y = -\frac{3}{2}x + 4$

$$m = -\frac{3}{2} \quad b = 4$$



EX Graph the equations $x = 3$ & $y = -2$ on the same axis



Point Slope

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

What is the slope of $x = 3$? Undefined

$$(3, 4), (3, 0) = m = \frac{4 - 0}{3 - 3} = \frac{4}{0} \text{ so undefined}$$

What is the slope of $y = -2$? $m = 0$

$$(-3, -2), (0, -2) = m = \frac{-2 - (-2)}{0 - (-3)} = \frac{0}{3} = 0$$

Standard Form

$$Ax + By = C$$

(Apos, no frac)

EX Write an equation for a line with a slope $m = -2$ through $(0, -5)$

$$m = -2 \quad b = -5 \quad y = mx + b \quad y = -2x - 5$$

EX Write an equation for a line w/ slope $\frac{1}{2}$, through $(6, -1)$

$$m = \frac{1}{2} \quad y = \frac{1}{2}x + b \quad -1 = \frac{1}{2}(6) + b \quad -1 = 3 + b \quad b = -4 \quad \text{y} = \frac{1}{2}x - 4$$

another way: $y - y_1 = m(x - x_1) \quad y + 1 = m(x - 6) \quad y = \frac{1}{2}x - 4$

EX Write an equation for the line between $(-7, -2)$ & $(4, -1)$

$$m = \frac{-1 + 2}{4 + 7} = \frac{1}{11}$$

$$y = \frac{1}{11}x + b \quad -1 = \frac{1}{11}(4) + b \quad b = -1 - \frac{4}{11} = \frac{-15}{11} \quad \text{y} = \frac{1}{11}x - \frac{15}{11}$$

Write an equation for a horizontal line through $(8, -6)$ $y = -6$

Write an equation for a vertical line through $(8, -6)$ $x = 8$

Algebra 3.3

EX Find the equation for a line parallel (\parallel) to the y-axis thru $(3, 5)$

$x=3$

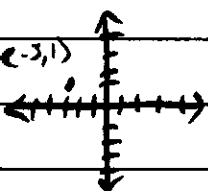
EX Find the line perpendicular (\perp) to $x=4$ thru $(5, 2)$

$y=2$

EX Find a general/standard form of an equation that's parallel to $y = \frac{2}{3}x + 7$ thru $(-3, 1)$ (parallel lines have same slope) $m = \frac{2}{3}$

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

$2x - 3y = -9$ standard/general form



EX Find the general form of the equation perpendicular to $y = 3x - 1$ thru $(5, -1)$ (perpendicular lines have opposite/reciprocal slopes)

$y = 3x - 1$ // slope = 3 \perp slope = $-\frac{1}{3}$

$y = -\frac{1}{3}x + b$ $-1 = -\frac{1}{3}(5) + b$ $-1 = \frac{5}{3} + b$ $b = -\frac{8}{3}$

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

EX Find the equation for the perpendicular bisector of the segment AB,

$A(4, 2)$ $B(-2, 10)$

$M = (\frac{4+(-2)}{2}, \frac{2+10}{2}) = (1, 6)$

$m = \frac{10-2}{-2-4} = \frac{8}{-6} = -\frac{4}{3}$ $\perp m = \frac{3}{4}$

$y = \frac{3}{4}x + b$ $6 = \frac{3}{4}(1) + b$ $b = \frac{21}{4}$

$y = \frac{3}{4}x + \frac{21}{4}$

