From HW (Solving Equations)

1 d) $4x + 3.5 = 7.5$ (−3.5 −3.5)

$4x = 4$

$x = 1$

h) $-4 - 5x = 15$ (+4 +4)

$\frac{-5x}{-5} = \frac{19}{-5}$

$x = -\frac{19}{5}$ or $-\frac{19}{5}$ or $\frac{19}{-5}$

i) $-9 = 20 - 5n$ (−20 −20)

$\frac{-29}{-5} = \frac{-5n}{-5}$

$\frac{29}{5} = n$

2 d) $5(m+2) - 3(m+3) = 5(m-1)$

$5m + 10 - 3m - 9 = 5m - 5$

$2m + 1 = 5m - 5$ (-5m, -5m)

$-3m + 1 = -5$ (-1, -1)

$\frac{-3m}{-3} = \frac{-6}{-3}$

$m = 2$

5 b) $12\left(\frac{b-3}{4} + \frac{5b-2}{3} = 1\right)$

$3(b-3) + 4(5b-2) = 12$

$3b - 9 + 20b - 8 = 12$

$23b - 17 = 12$ (+17, +17)

$\frac{23b}{23} = \frac{29}{23}$

$b = \frac{29}{23}$

Review of Linear Equations

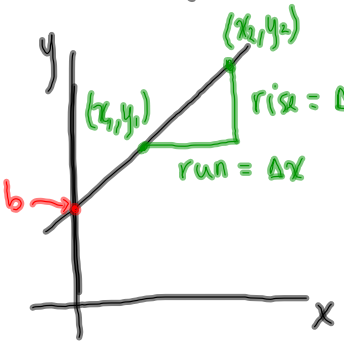
$y = 2x + 5$
$y = -5x + 1$
$y = \frac{2}{3}x + 2$

These are all linear equations in the form of

$y = mx + b$

m: slope
b: y-intercept.

$3x + 4y = 7$ ← also linear but not in $y = mx + b$ form



slope = $\frac{\text{rise}}{\text{run}}$

slope = $\frac{\Delta y}{\Delta x}$

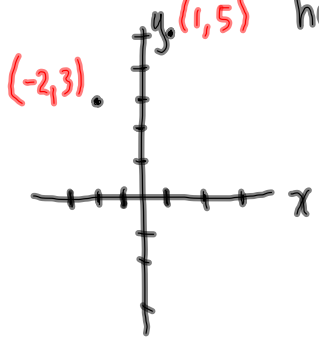
slope = $\frac{y_2 - y_1}{x_2 - x_1}$

Example slope of $\frac{2}{3}$ (Δy / Δx) ⇒ when x increases by 3, y increases by 2.

slope of $-\frac{1}{2}$ ⇒ when x increases by 2, y decreases by 1

slope of $\frac{5}{1}$ ⇒ when x increases by 1, y increases by 5.

Example A line passing through $(-2, 3)$ (x, y) and has a slope of $\frac{2}{3}$ ($\frac{\Delta y}{\Delta x}$)



$(-2, 3)$
$+3, +2$
$(1, 5)$

Nov 4-12:14 PM

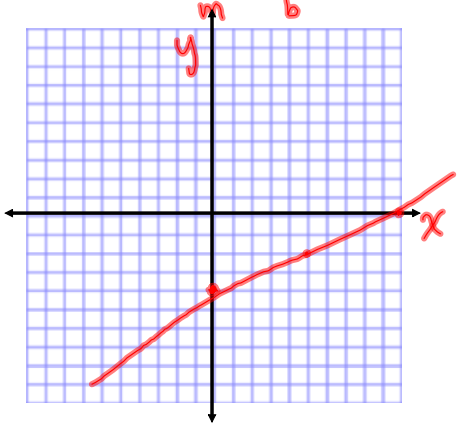
Sketching the Graph of a Linear Equation

Example: graph $2x - 5y = 20$

① Rearrange into $y = mx + b$ form:

$$2x - 5y = 20$$
$$-2x \qquad -2x$$
$$-5y = 20 - 2x$$
$$\frac{-5y}{-5} = \frac{20 - 2x}{-5}$$
$$y = -4 + \frac{2}{5}x$$
$$y = \frac{2}{5}x - 4$$

m b



② Intercepts (use the x and y- intercepts)

$2x - 5y = 20$

To find the x-intercept, $y = 0$

$2x - 5(0) = 20$

$2x = 20$

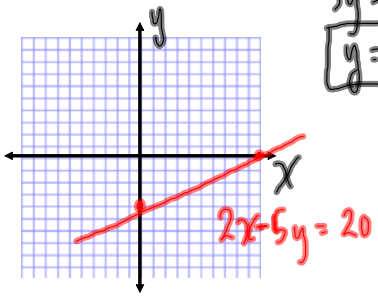
$x = 10$

To find the y-intercept, $x = 0$

$2(0) - 5y = 20$

$-5y = 20$

$y = -4$



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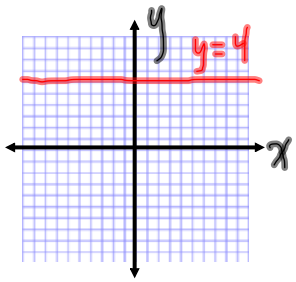
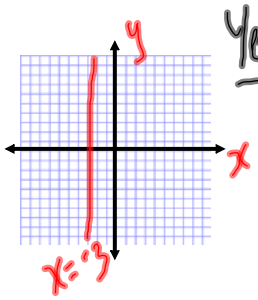
Is $y=4$ a linear equation?



Yes, ... the equation represents a line

Is $x=-3$ a linear equation?

Yes!



Example Find the equation of a line that passes through $(2,5)$ (x,y) and has a slope of 3.

$y = mx + b$

$5 = 3(2) + b$

$5 = 6 + b$ (-6)

$\boxed{b=-1}$ $\boxed{m=3}$ $\Rightarrow y = mx+b$

$\boxed{y=3x-1}$

Example

Find the equation of a line passing through $(2,6)$ and $(-1,8)$

① Find the slope:

$m = \frac{\Delta y}{\Delta x}$

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

$m = \frac{8-6}{-1-2}$

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

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

② Find b:

$y = mx + b$

$6 = -\frac{2}{3}(2) + b$

$6 = -\frac{4}{3} + b$

$6 + \frac{4}{3} = b$

$\frac{18}{3} + \frac{4}{3} = b$

$\frac{22}{3} = b$

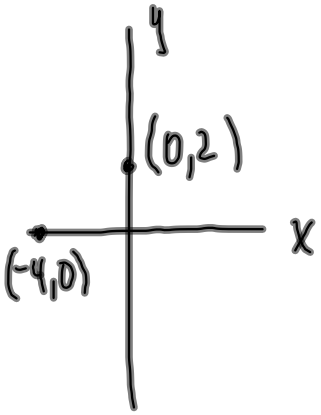
$y = mx + b$

$\boxed{y = -\frac{2}{3}x + \frac{22}{3}}$

Example

Find the equation of a line with an x-intercept of -4 and a y-intercept of 2.

$(b = 2)$



$$m = \frac{\Delta y}{\Delta x}$$

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

$$m = \frac{2 - 0}{0 - (-4)}$$

$$m = \frac{2}{4}$$

$$m = \frac{1}{2}$$

$b = 2$

$$y = mx + b$$

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