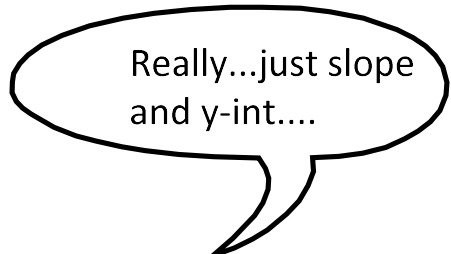
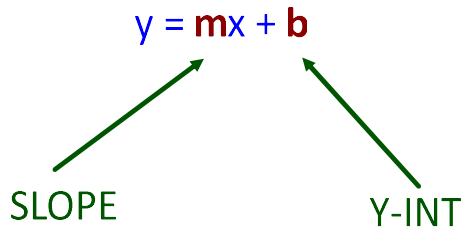


4.6 Equation of a Line Given the Slope and a Point

What information do you need to find the equation of a line?

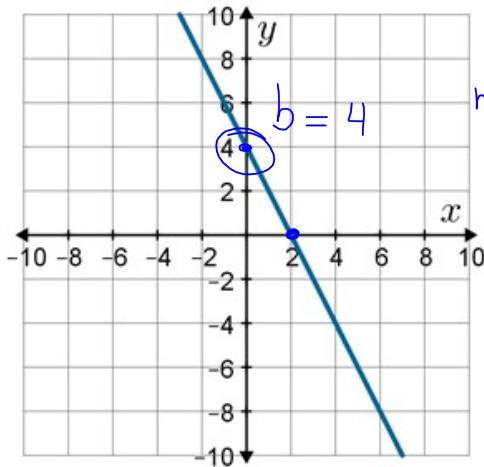


RECALL....

Ex.1 Find the equation of the line given the following information:

$y = mx + b$

a) Given a graph



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

$\therefore y = -2x + 4$

b) Given a table

x	y
2	22
4	25
6	28
8	31

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

$\therefore y = \frac{3}{2}x + 19$

Now Algebraically



Ex.2 Find the equation of the line if:

a) its slope is 2 and its y-intercept is 6.

$$m = 2$$

$$b = 6$$

$$\therefore y = 2x + 6$$

b) its slope is $-\frac{3}{5}$ and it crosses the y-axis at 4.

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

$$b = 4$$

$$\therefore y = -\frac{3}{5}x + 4$$

c) its a horizontal line having y-intercept of -5.

$$\longleftrightarrow m = 0$$

$$b = -5$$

$$y = 0x - 5$$

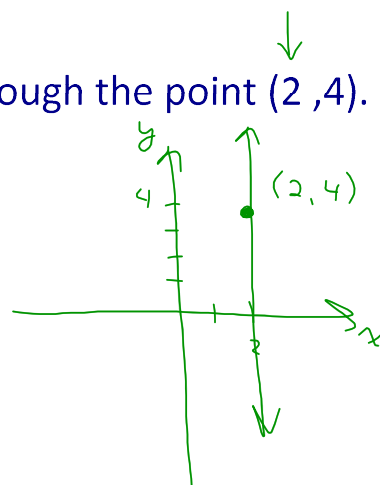
$$y = -5$$

d) the slope is undefined and it passes through the point (2, 4).



$$x = ?$$

$$x = 2$$



Ex. 3 Find the equation of a line:

a) having a slope of 1 and passing through the point (1,4).

$m=1$ Which b do we need? Solve for it!

$$y = 1x + b$$

Sub in $x=1$ & $y=4$ (1,4)

$$4 = 1(1) + b$$

$$4 = 1 + b$$

$$4 - 1 = b$$

$$\boxed{3 = b}$$

$$\therefore y = x + 3$$

b) having a slope of $\frac{-2}{3}$ and passing through the point (6, -1).

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

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

Sub in $(6, -1)$

$$-1 = -\frac{2}{3}(6) + b$$

$$-1 = -\frac{12}{3} + b$$

$$-1 = -4 + b$$

$$-1 + 4 = b$$

$$\boxed{3 = b}$$

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

c) parallel to $y = 3x - 5$ and passing through the point (2,4).

Parallel means
SAME SLOPE!

So $m=3$

$$y = 3x + b$$

Sub in $(2, 4)$

$$4 = 3(2) + b$$

$$4 = 6 + b$$

$$4 - 6 = b$$

$$\boxed{-2 = b}$$

$$\therefore y = 3x - 2$$

Recall

d) perpendicular to the line $y = \frac{1}{3}x + 2$ with the same y-intercept

$$\text{as } y = -2x + 4.$$

$$b = 4$$

$$m = \frac{1}{3}$$

$$m_{\perp} = -\frac{3}{1}$$

$$= -3$$

Recall

Perpendicular lines have negative reciprocal slopes.

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

e) perpendicular to $y - 2x = 1$ and passes through the origin.

$$m = 2$$

$$y = 2x + 1$$

$(0, 0)$

$$m_{\perp} = -\frac{1}{2}$$

$$\therefore y = -\frac{1}{2}x + 0$$

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

