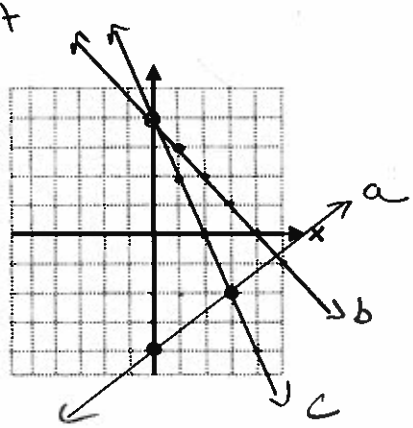
Slope and Lines

Ex/ Graph the following lines.

a) $y = \frac{2}{3}x - 4$ y-int = -4 ← start at
slope = $\frac{2}{3}$ $\frac{\text{up } 2}{\text{right } 3}$

b) $y = -x + 4$ start at 4
$-1 = \frac{\text{down } 1}{\text{right } 1}$

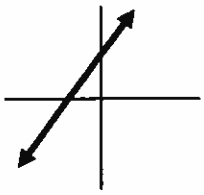
c) $y = 4 - 2x$ start at 4
$-2 = \frac{\text{down } 2}{\text{right } 1}$



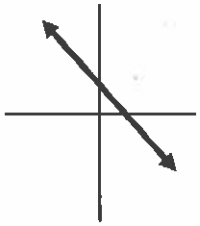
- Slope measures the steepness and direction of a line, it is another way of measuring rate of change.

- On a graph, slope is read from left to right - the same as how you read words.

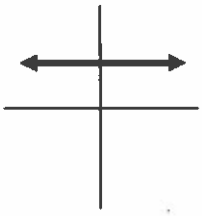
Positive slope
- Up to the right



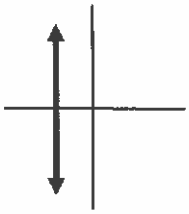
Negative slope
- Down to the right



Zero slope
- Horizontal



No slope (undefined)
- Vertical

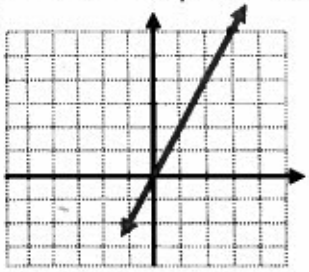


- Slope has the symbol 'm' and is defined by $m = \frac{Rise}{Run}$

- From a graph, working left to right, count the rise and run between two known points.
  Rise: up/down (if it is down - a negative rise)
  Run: distance from left to right

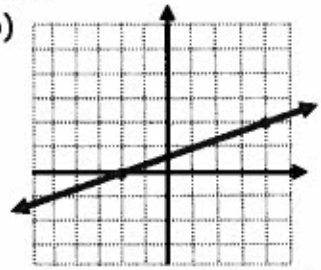
Ex/ Calculate the slope of the lines below.

a)



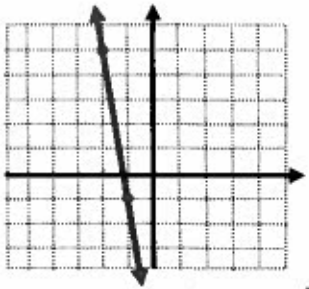
$m = \frac{\text{up } 2}{\text{right } 1} = \frac{2}{1} = 2$

b)



$m = \frac{\text{up } 2}{\text{right } 6} = \frac{2}{6} = \frac{1}{3}$

c)



$m = \frac{\text{down } 6}{\text{right } 1} = \frac{-6}{1} = -6$

Writing the Equation of a Line

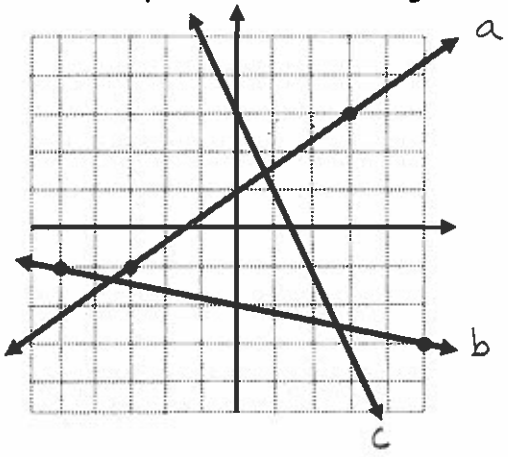
- Always start by filling in the parts you know into Slope Intercept Form $(y = mx + b)$.

Ex/ Find the equation of a line with slope of $\frac{-3}{2}$ and a y-intercept of 1.

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

* Don't forget the x!

Ex/ Find the equation of the lines given below.



a) $m = \frac{\text{up } 2}{\text{right } 3}$ $b = 1$ $\therefore y = \frac{2}{3}x + 1$

b) $m = \frac{\text{down } 1}{\text{right } 5}$ $b = -2$ $\therefore y = -\frac{1}{5}x - 2$

c) $m = \frac{\text{down } 4}{\text{right } 1}$ $b = 3$ $\therefore y = -4x + 3$

- Not everything will always fit nicely on a graph, so we need to be able to extend these ideas!

- Without using a graph, we can use two known points to find the slope.

- Here, $m = \frac{y_2 - y_1}{x_2 - x_1}$ where (x_1, y_1) and (x_2, y_2) are the coordinates of the known points.

Ex/ Calculate the slope between the following pairs of points.

a) A(5,1) and B(0,3)

x y x y

$m = \frac{3-1}{0-5}$

$= \frac{2}{-5}$ mean the same

$= -\frac{2}{5}$

b) F(2,1) and G(1,-1)

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

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

$= 2$

c) I(-7,3) and J(-6,3)

$m = \frac{3-3}{-6-(-7)}$

$= \frac{0}{1}$

$= 0$

d) M(-4,-5) and N(-2,9)

$m = \frac{9-(-5)}{-2-(-4)}$

$= \frac{14}{2}$

$= 7$