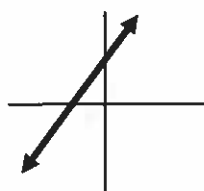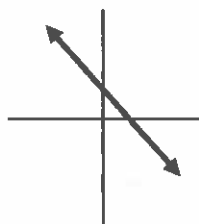# Slope

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

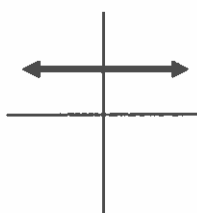- On a graph, slope is read from left to right - the same as how you read words.
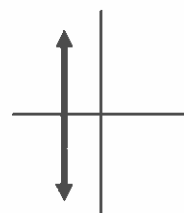
Positive slope	Negative slope	Zero slope	No slope (undefined)
- Up to the right	- Down to the right	- Horizontal	- Vertical

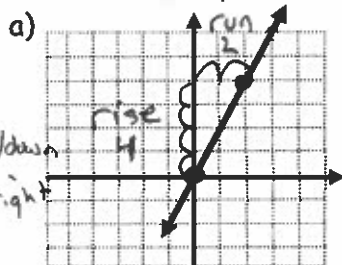- Slope has the symbol 'm' and is defined by $m = \dfrac{Rise}{Run}$

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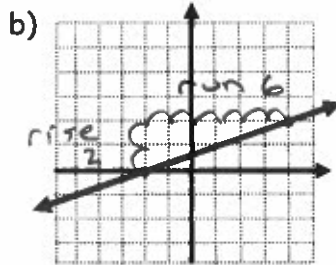   Rise: up/down (if it is down – a negative rise)
    Run: distance from left to right
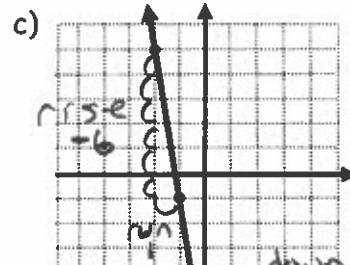
Ex/ Calculate the slope of the lines below.
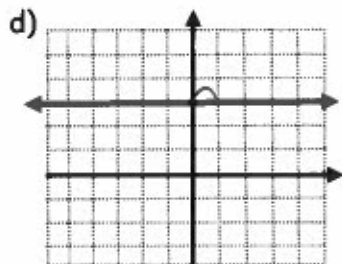
a)

rise = up/down
run = to right

$m = \dfrac{rise\ 4}{run\ 2} = \dfrac{4}{2}$ ⟩ reduce (divide)
$= 2$

b)

$m = \dfrac{rise}{run} = \dfrac{2}{6}$ ⟩ reduce
$= \dfrac{1}{3}$

c)

$m = \dfrac{rise\ -6}{run\ 1} = \dfrac{-6}{1}$
$= -6$

d)

$m = \dfrac{rise\ zero}{run} = \dfrac{0}{1}$
$= 0$

e)

$m = \dfrac{rise\ -1}{run\ 2} = \dfrac{-1}{2}$

f)
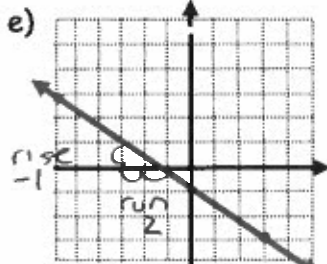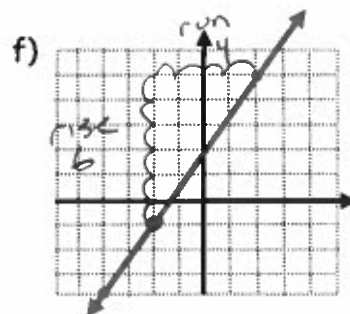
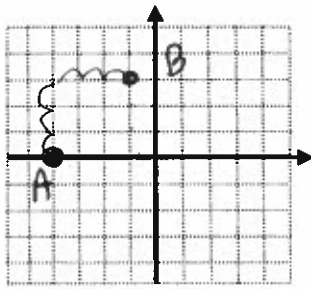$m = \dfrac{rise\ 6}{run\ 4} = \dfrac{6}{4}$
$= \dfrac{3}{2}$

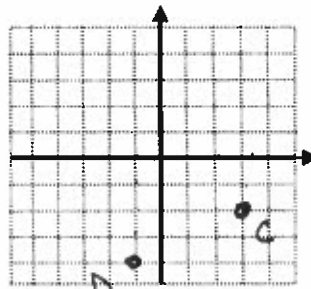Ex/ What is the slope between the points:

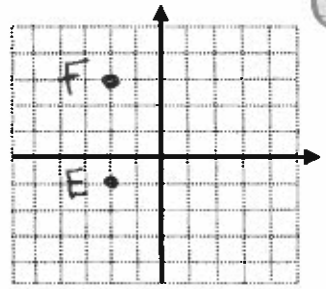a) A(-4,0) and B(-1,3) b) C(3,-2) and D(-1,-4) c) E(-2,-1) and F(-2,4)

Plot
points
then
cant
to
left
right

$m = \dfrac{rise}{run} \dfrac{3}{3} = \dfrac{3}{3}$

$= 1$

$m = \dfrac{rise}{run} \dfrac{2}{4} = \dfrac{2}{4}$

$= \dfrac{1}{2}$

$m = \dfrac{rise}{run} \dfrac{4}{0} = \dfrac{4}{0}$

$=$ undefined

- 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 the difference between two known points to calculate the slope.

- Here, $m = \dfrac{y_2 - y_1}{x_2 - x_1}$ 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. The describe the line geometrically.

a) A(15,1) and B(0,4) b) F(8,1) and G(1,-3) c) I(-7,3) and J(-6,3)

$x_1 \ y_1 \qquad x_2 \ y_2$
$\quad \quad \searrow$ 2nd point
minus 1st
point

$m = \dfrac{4 - 1}{0 - 15}$

$= \dfrac{3}{-15}$) Reduce

$= -1/5$

$x \ y \qquad x \ y$

$m = \dfrac{-3 - 1}{1 - 8}$

$= \dfrac{-4}{-7}$) 2 Negatives
= positive
but con't
reduce

$= \dfrac{4}{7}$

$x \ y \qquad x \ y$

$m = \dfrac{3 - 3}{-6 - (-1)}$

$= \dfrac{0}{1}$

$= 0$

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

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

$= \dfrac{14}{2}$

$= 7$

★ Careful
with
signs

Practice: Handout - Slope