

a) What is the domain and range ?

b) Is the graph a function?

c) What is the rate of change?

## L6: Slopes

Slope describes the steepness of a line or the rate of change of a line in a graph.

SLOPE:  $m = \frac{\Delta y \text{ change in vertical}}{\Delta x \text{ change in horizontal}} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$

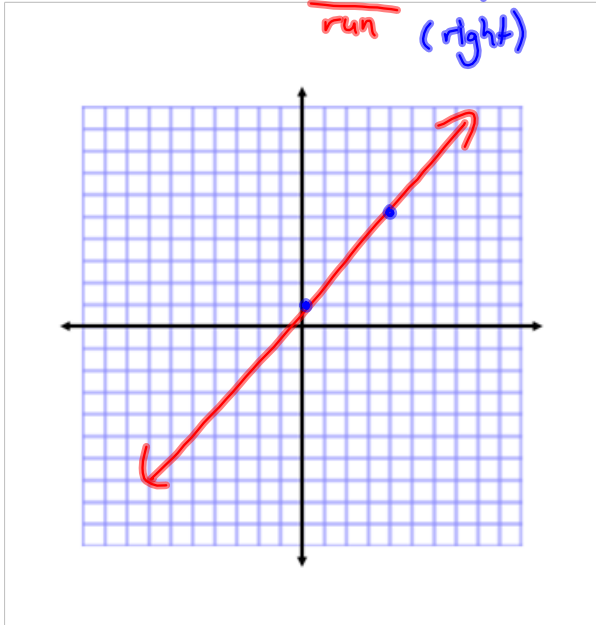
↑  
Slope



In general there are four types of slopes

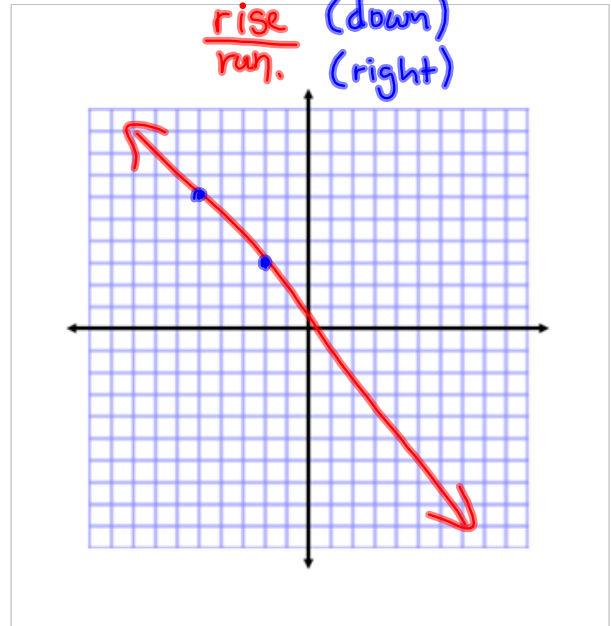
Positive Slope

rise (up)  
run (right)



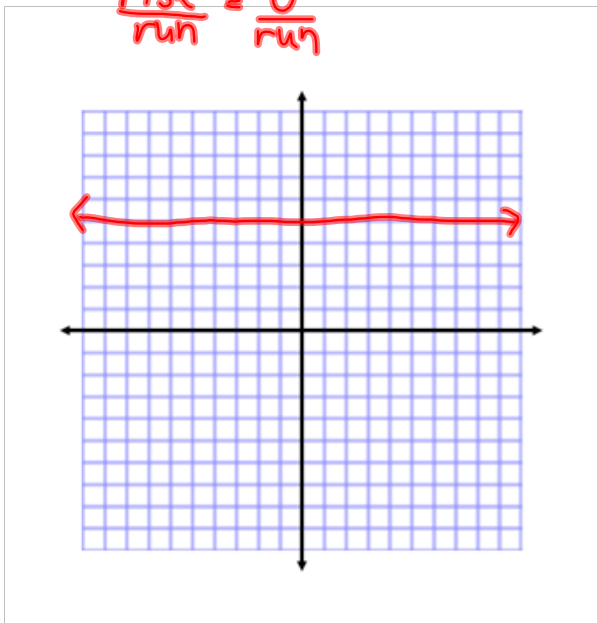
Negative Slope

rise (down)  
run (right)



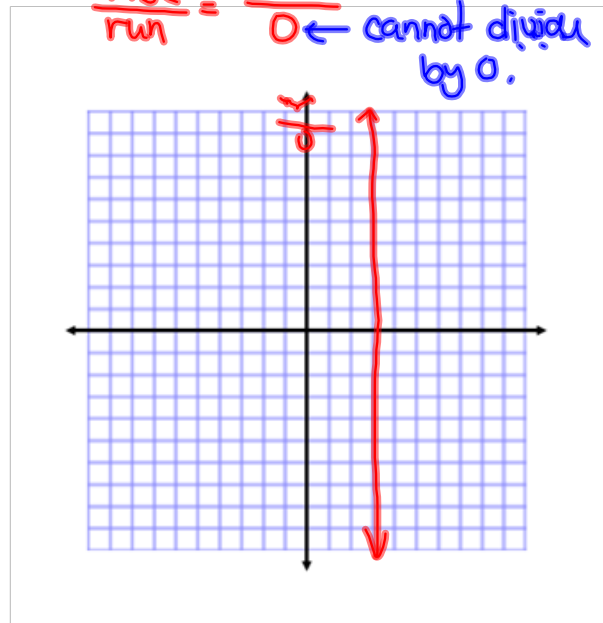
Zero Slope

rise = 0  
run

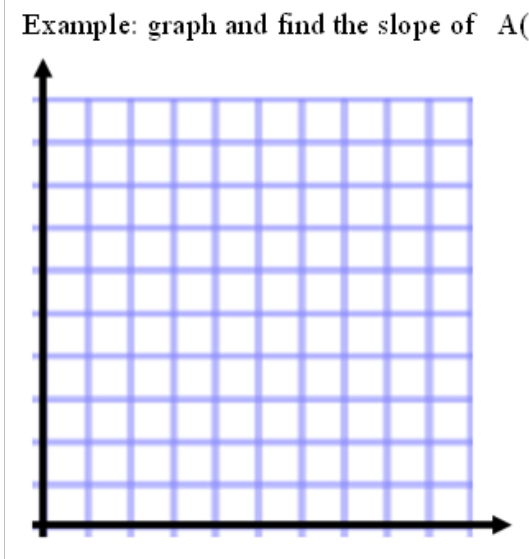


Undefined Slope

rise  
run = 0 ← cannot divide by 0.



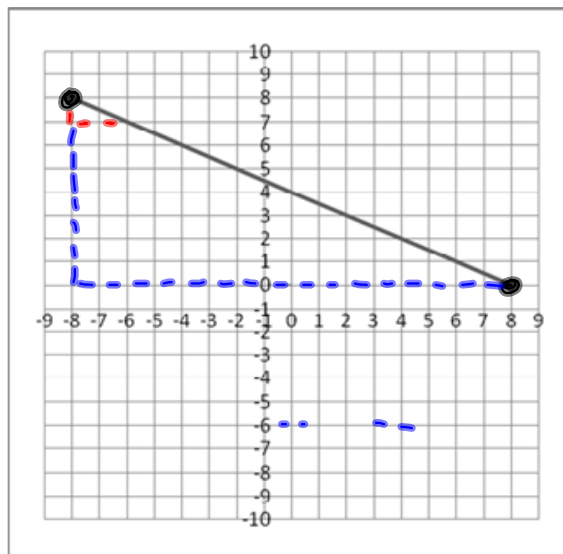
Example: graph and find the slope of A(1, 9) B(4, 2)



Example 2:

Find the slope of each line:

a)



Point 1:

$(-8, 8)$   
 $x_1 \quad y_1$

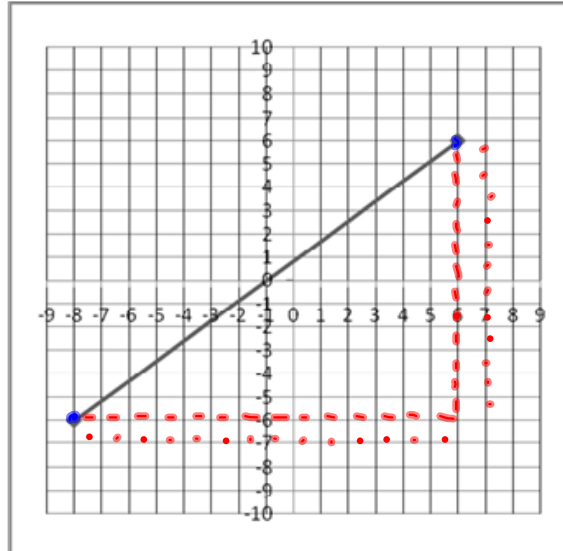
Point 2:

$(8, 0)$   
 $x_2 \quad y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 8}{8 - (-8)} = \frac{-8}{16} = -\frac{1}{2} \quad \text{rise over run}$$

$$= -0.5$$

b)



$$\frac{\text{rise}}{\text{run}} = \frac{12}{14}$$

$$= \frac{6}{7}$$

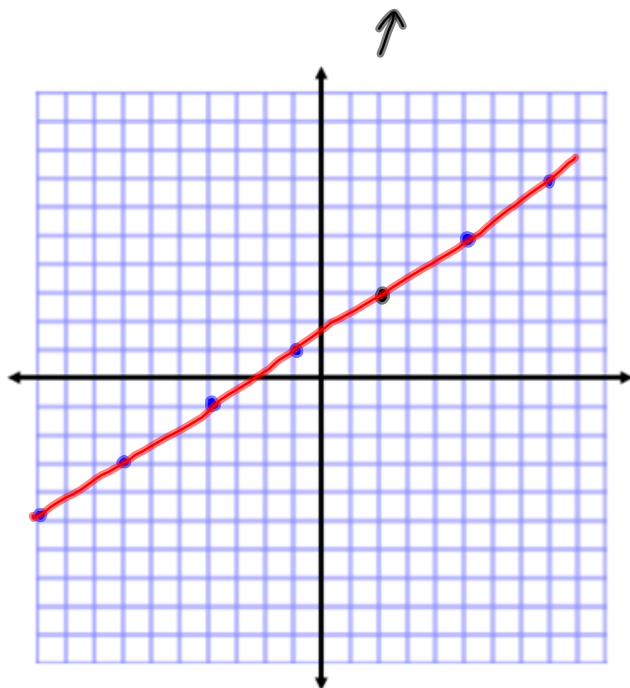
Point 1      Point 2  
 c) (6, 2)    (-1, -3)  
 $x_1, y_1$      $x_2, y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 2}{-1 - 6} = \frac{-5}{-7} = \frac{5}{7}$$

Point 1      Point 2  
 d) (8, 6)    (8, -2)  
 $x_1, y_1$      $x_2, y_2$

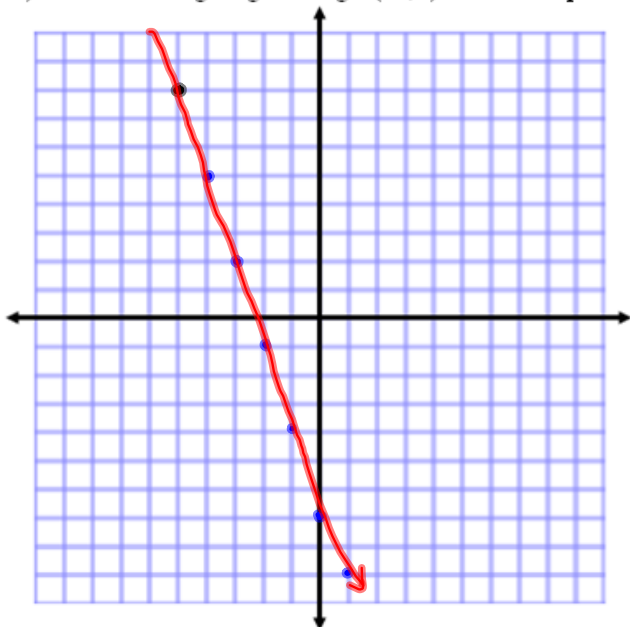
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 6}{8 - 8} = \frac{-8}{0} \text{ undefined}$$

e) Draw a line going through (2,3) with a slope of  $\frac{2}{3}$



$$\frac{\text{Rise}}{\text{Run}} = \frac{2}{3}$$

e) Draw a line going through (-5,8) with a slope of -3



$$\frac{\text{Rise}}{\text{Run}} = \frac{-3}{1} \quad \begin{array}{l} \text{down } 3 \\ \text{over } 1 \end{array}$$

Find the missing point

a) the slope is  $\frac{1}{3}$  one point is  $(3, -2)$  the other is  $(6, n)$ . Find  $n$ ?

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

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

$$\frac{1}{3} = \frac{n+2}{3}$$

$$3 = 3(n+2)$$

$$3 = 3n + 6$$

$$3 - 6 = 3n + 6 - 6$$

\* When you have a fraction = a fraction, cross x.

$$\frac{-3}{3} = \frac{3n}{3}$$

$$\boxed{-1 = n}$$

b) the slope is -2 one point is  $(-4, 9)$  the other is  $(m, -3)$ . Find  $m$ ?

$$\boxed{m = 2}$$

Figure it out!