

## Rate of Change

In the previous example the 5 transformed the  $x$  (or we could say is the relationship between the  $x$  and  $y$ )

We call this number the **rate of change** (ROC)

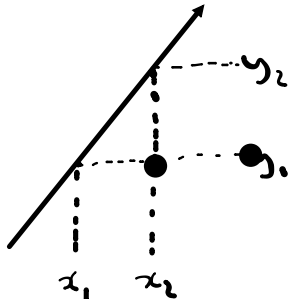
The symbol for the ROC is  $a$

The ROC is the rate at which  $a$  changes  $x$

You can calculate ROC using any two points on a line and the formula:

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$$

$(x_1, y_1)$      $(x_2, y_2)$



## Finding the Rate of Change

Step 1: Write down the coordinates of two points and label them.

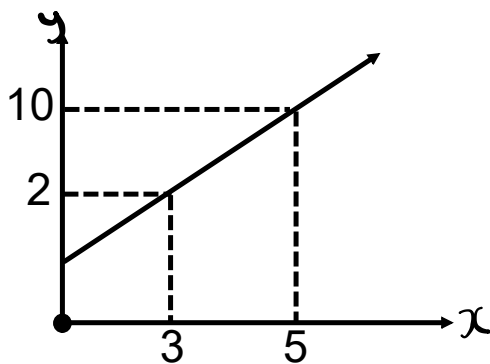
$$(\overset{x_1}{1}, \overset{y_1}{4}) \quad (\overset{x_2}{2}, \overset{y_2}{7})$$

Step 2: Write down the formula and plug in the numbers.

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 4}{2 - 1} = \frac{3}{1} = 3$$

Step 3: Calculate the ROC

Ex.



$$(\overset{x_1}{3}, \overset{y_1}{2}) \quad (\overset{x_2}{5}, \overset{y_2}{10})$$

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 2}{5 - 3} = \frac{8}{2} = 4$$

Ex. Find the R.O.C. given  $(-3, 4)$  and  $(3, 7)$

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 4}{3 - (-3)} = \frac{7 - 4}{3 + 3} = \frac{3}{6} = \frac{1}{2} = 0.5$$

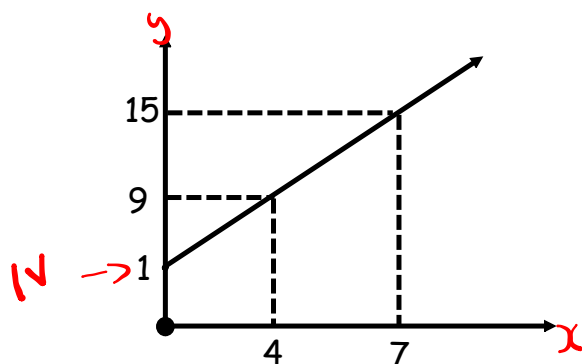
## Rule for Linear Relations

Every linear relation can be written using the rule:

$$y = ax + b$$

Rate of Change  
(Slope)
Initial value  
(y-intercept)

Ex. Find the rule for the following graph.



$$(x_1, y_1) \quad (x_2, y_2)$$

$$(4, 9) \quad (7, 15)$$

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{15 - 9}{7 - 4} = \frac{6}{3} = 2$$

$$y = 2x + 1$$