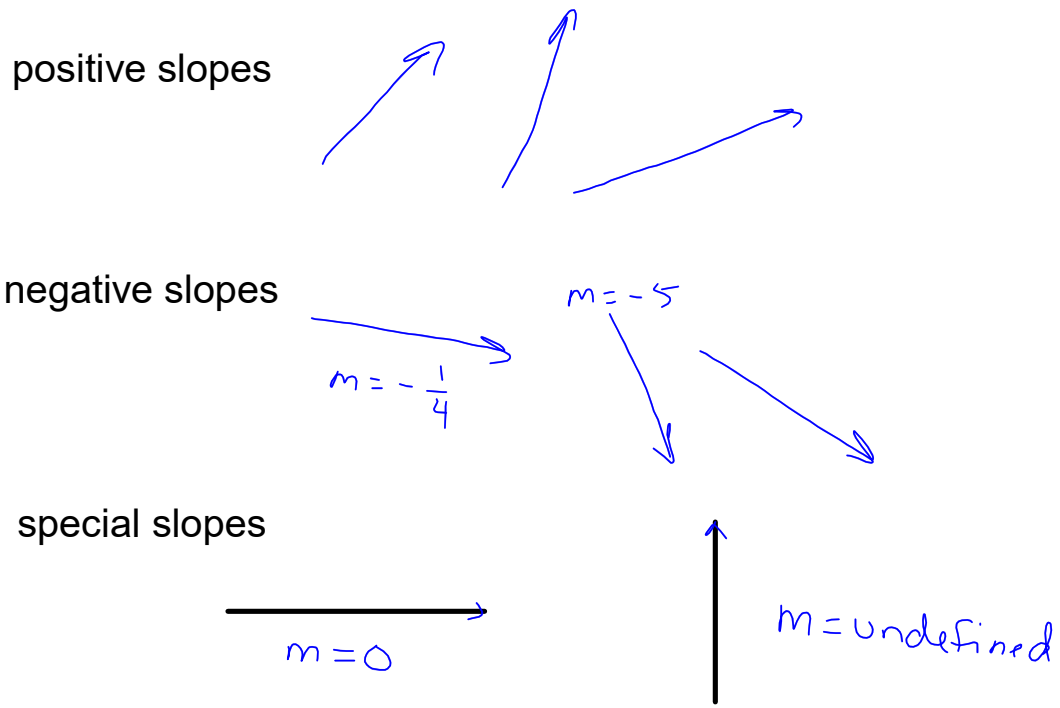
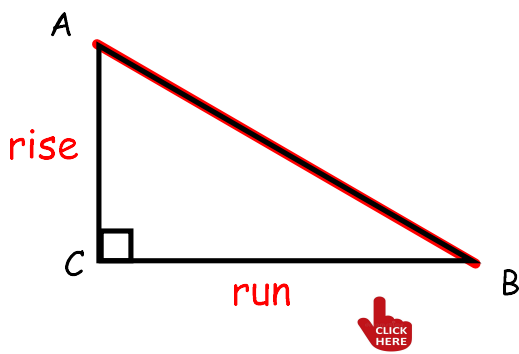


4.3 SLOPE

Slope is used to describe how steep a line is. The letter “m” (lowercase) is commonly used for slope.



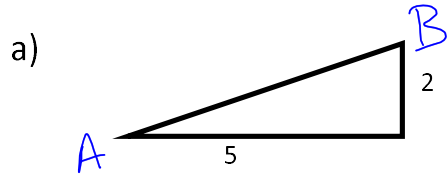
Let's examine a line segment, AB. To find the slope of AB, create a right angle triangle with a third point, C.



The slope of AB, often written as m_{AB} is defined as the ratio of the rise (AC) to the run (BC).

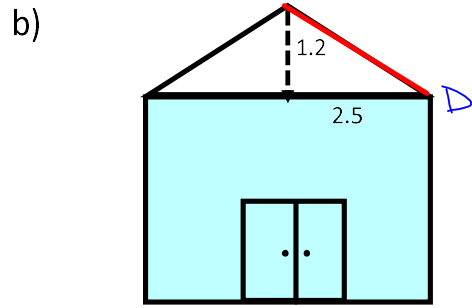
$$m = \frac{\text{rise}}{\text{run}}$$

Example 1: Find the slopes of the following.



$$m_{AB} = \frac{\text{rise}}{\text{run}}$$

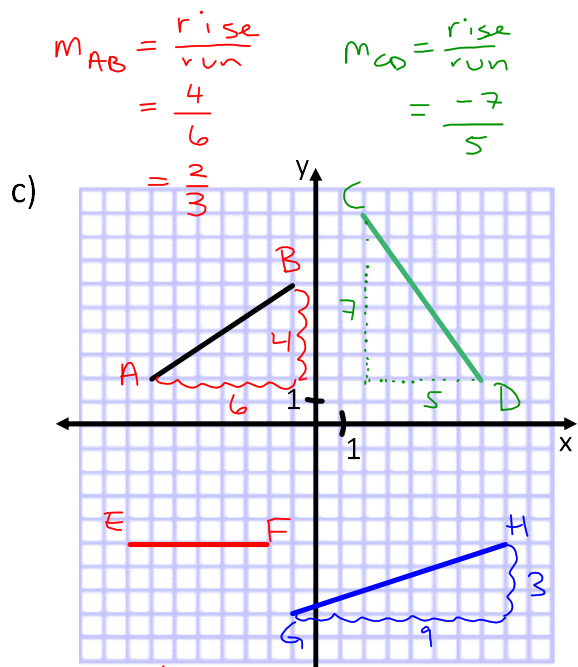
$$= \frac{2}{5}$$



$$m_{CD} = \frac{\text{rise}}{\text{run}}$$

$$= \frac{-1.2}{2.5} \quad \leftarrow \text{down (rise)}$$

$$= -0.48$$

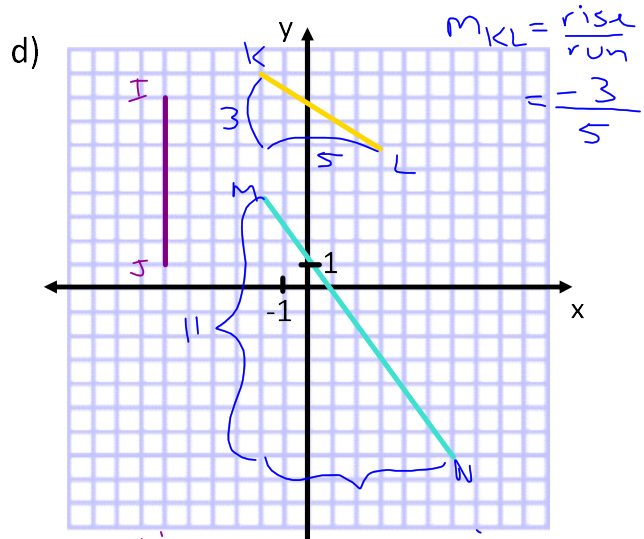


$$m_{AB} = \frac{\text{rise}}{\text{run}} = \frac{4}{6} = \frac{2}{3}$$

$$m_{CD} = \frac{\text{rise}}{\text{run}} = \frac{7}{5}$$

$$m_{GH} = \frac{\text{rise}}{\text{run}} = \frac{3}{9} = \frac{1}{3}$$

$$m_{EF} = \frac{0}{6} = 0$$



$$m_{IJ} = \frac{\text{rise}}{\text{run}} = \frac{7}{0} = \text{undefined}$$

$$m_{KL} = \frac{\text{rise}}{\text{run}} = \frac{-3}{5}$$

$$m_{MN} = \frac{\text{rise}}{\text{run}} = \frac{-11}{8}$$

The slope of a line is constant, therefore we can use any two points on the line for the calculation.

Rate of Change: The change in one variable relative to the change in another.

First Differences: The difference between two consecutive y-values in a table in which the differences between the x-values is constant.

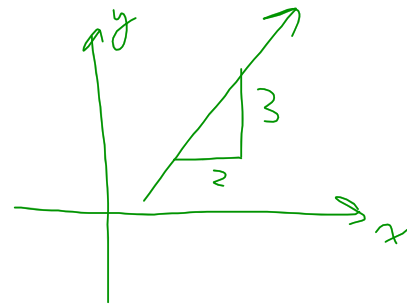
When first differences are constant (the same) with a constant change in x then the relation is **LINEAR**
 The slope can be found by $\frac{\text{change in } y}{\text{change in } x}$ $\frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$

Ex. 2 Find the slope from the table below

SLOPE!

Δx	x	y	Δy
	3	-5	
+2	5	-2	+3
+2	7	1	+3
	9	4	+3
	11	7	

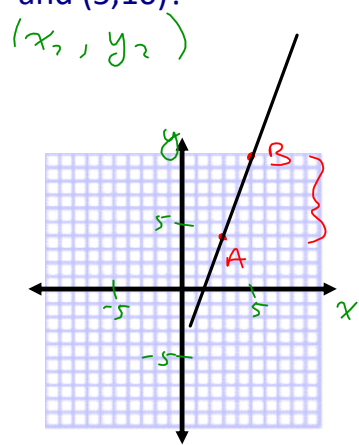
$$m = \frac{\Delta y}{\Delta x} = \frac{3}{2}$$



The slope between points (x_1, y_1) and (x_2, y_2) is

$$m = \frac{y_2 - y_1}{x_2 - x_1} \text{ or } m = \frac{\Delta y}{\Delta x}$$

Ex.3 How many ways can you find the slope between these two points (3,4) and (5,10)?



$$m_{AB} = \frac{\text{rise}}{\text{run}}$$

$$= \frac{6}{2}$$

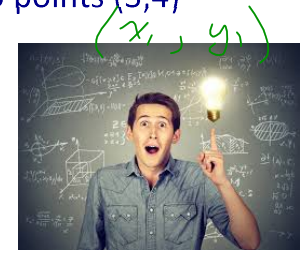
$$= 3$$

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

$$= \frac{10 - 4}{5 - 3}$$

$$= \frac{6}{2}$$

$$= 3$$



x	y
3	4
5	10

+2 (under x) and +6 (under y) are indicated with arrows.

$$m = \frac{6}{2}$$

$$= 3$$

Ex 4: Determine the slope between the pairs of points

(-2, -5) & (3, -7)

x	y
-2	-5
3	-7

+5 (under x) and -2 (under y) are indicated with arrows.

$$m = \frac{\Delta y}{\Delta x}$$

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

Ex. 5:

Point A (2,3) is plotted on the grid. Draw line segment AB with a slope of $-\frac{1}{2}$. What are possible coordinates of B?

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

	x	y	
+2 ↙	2	3	↘ -1
	4	2	↘ -1
+2 ↙	6	1	↘ -1
			etc

∴ (4, 2)
or
(6, 1)
or
(8, 0)
etc

