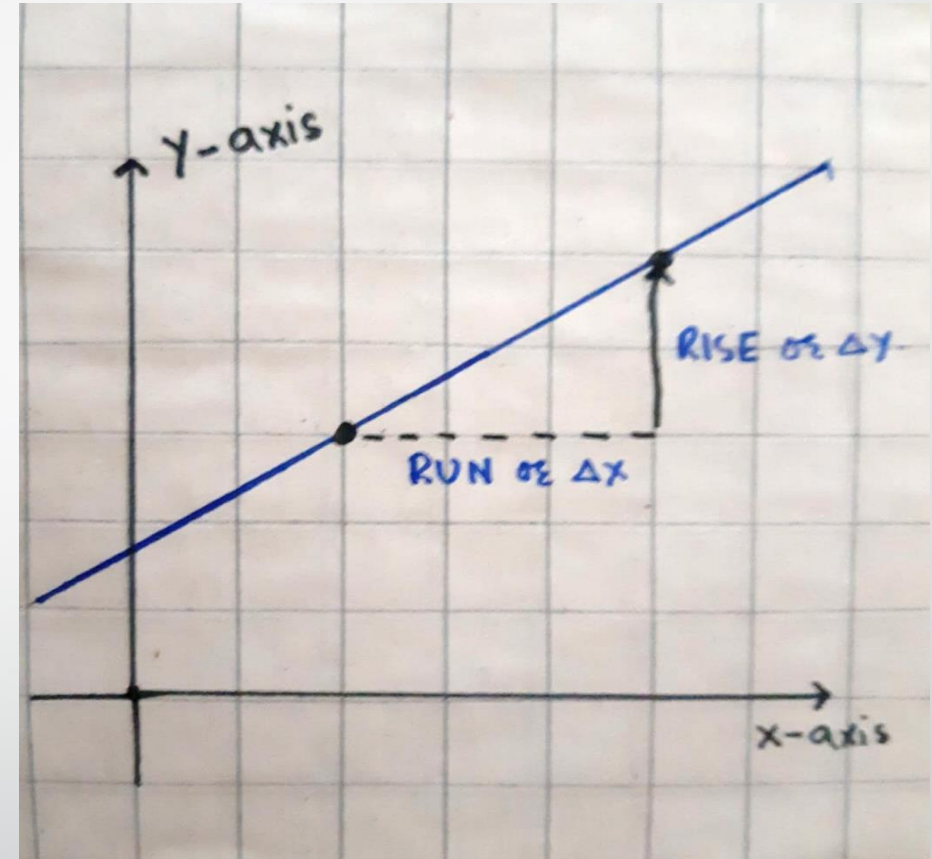


Slope & Calculations. Secant & tangent Lines

Definition of Slope

- The slope of a line is the ratio of the rise in y as x grows by a certain amount.
- The slope of a line indicates how steep it is, or how much y rises as x runs.
- Anywhere along the line, the slope remains constant (the same).

$$\text{slope} = \frac{\text{change in } y(\text{dependent variable})}{\text{change in } x(\text{independent variable})} = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$$



Slope Calculation

Taking data of above Linear Equation $F(x)=4x+3$

Values of x	1	2	3	4	5	6
Values of y	7	11	15	19	23	27

Using the 1st point $x=1$ and $y = 7$ and the 2nd point $x=2$ and $y=11$

Then the slope is:

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{11 - 7}{2 - 1} = \frac{4}{1} = 4$$

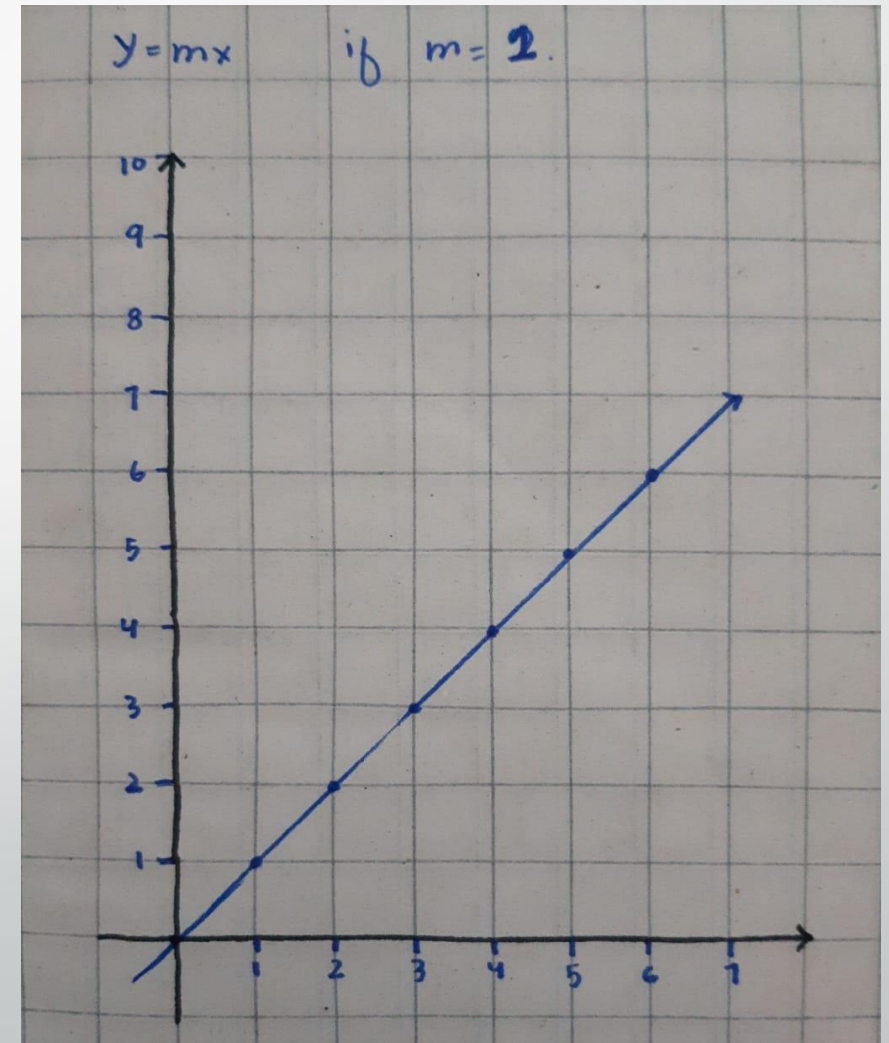
The slope of this function will always be 4 regardless of what points we choose.

slope of Linear Functions Passing through the Origin

The equation of a straight line with slope m passing through the origin is $y = mx$

For positive values of m , the graph of $y=mx$ will be:

Values of x	1	2	3	4	5	6
Values of y	1	2	3	4	5	6



Slope Interpretation

Taking an equation: $C = 200 \cdot B$

- B represents number of Books, while C represents cost.
- Solving the equation for the slope we get: $\frac{C}{B} = 200$
- So the slope is \$200/Book. i.e. Cost per Book
- The values of slope are a ratio of two : the units of the dependent variable and the units of the independent variable.

Lines That Don't Pass through the Origin

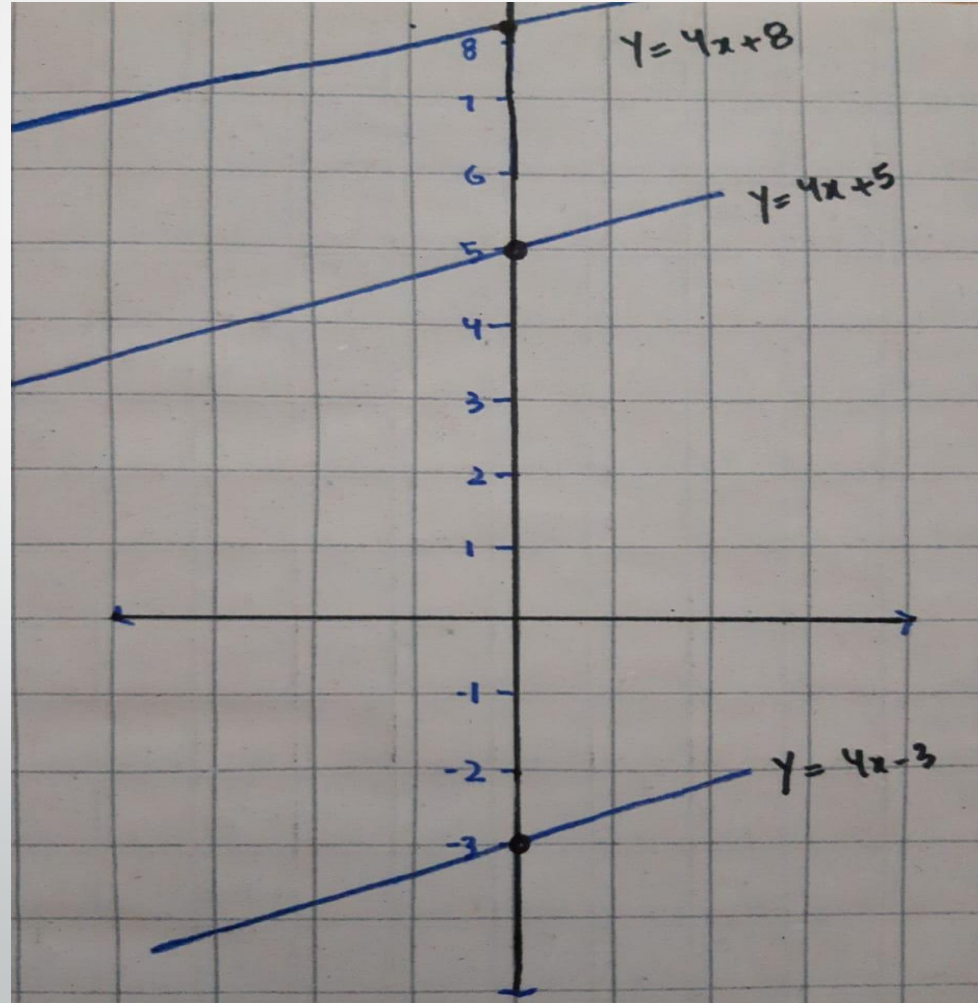
Let the equation $y = mx + b$, where m indicates the slope and b is the constant or y-intercept.

Now the graph:

$$y = f(x) = 4x - 3$$

$$Y = g(x) = 4x + 5$$

$$Y = z(x) = 4x + 8$$



Point-Slope Form of the Equation of a Line

The equation of a straight line with gradient m , passing through the point (x_1, y_1) , is

$$y - y_1 = m(x - x_1)$$

Example:

Find the equation of the line through the point $(2, 4)$ having a slope of 7.

Solution:

$$(x_1, y_1) = (2, 4) \text{ and } m = 7 \text{ so}$$

$$y - y_1 = 7(x - x_1) =$$

$$y - 4 = 7(x - 2)$$

Secant and Tangent Lines:

