CLASS 10 ACADEMIC PROGRAM-2020

HIGHER MATH

Lecture : HM-35

Chapter 11 : Coordinate Geometry

SLOPE OF A LINE CONNECTING TWO POINTS

$$\text{Slope, } m = \frac{\textit{change of Ordinate}}{\textit{change of Abscissa}} = \frac{\Delta y}{\Delta x}$$

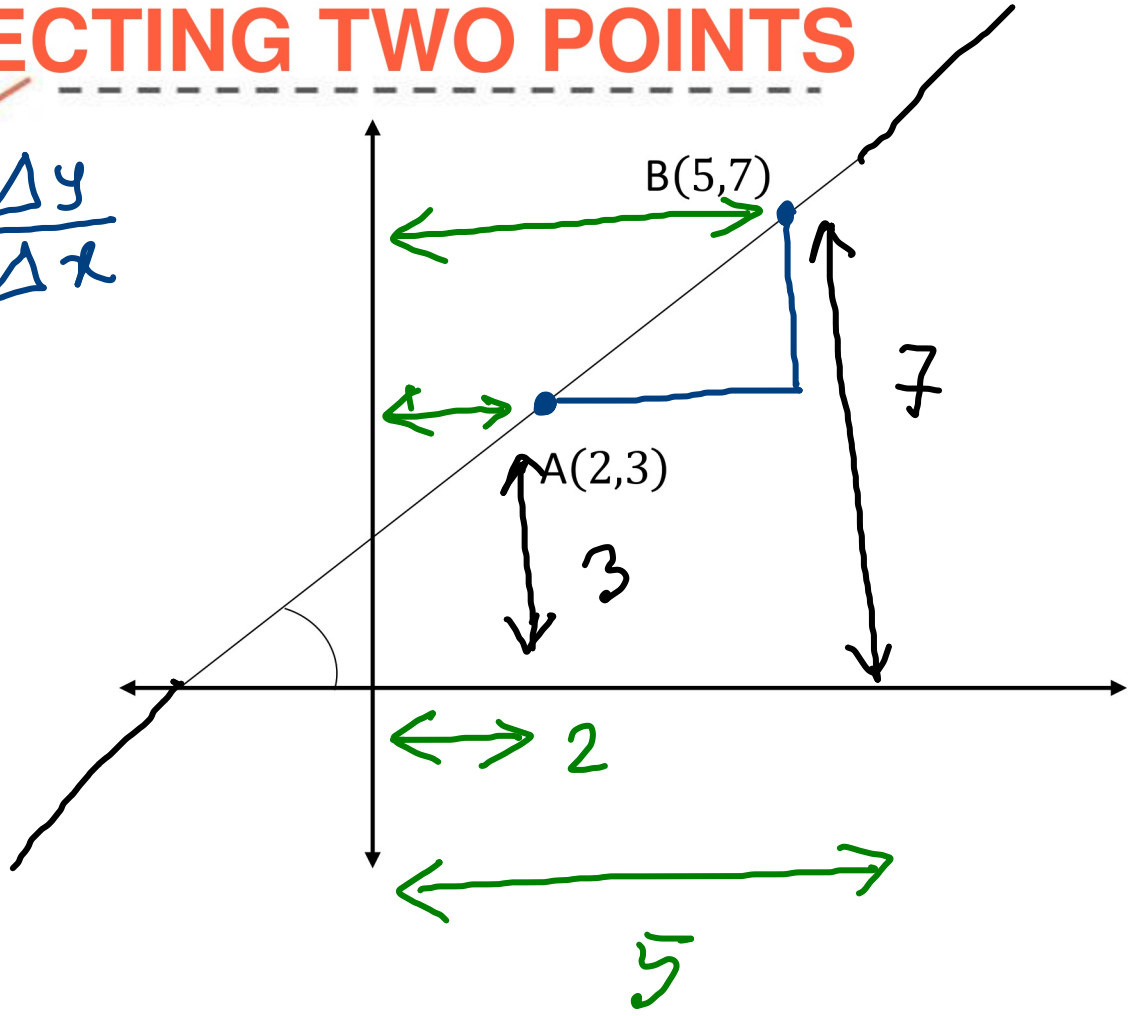
$$m_{AB} = \frac{7-3}{5-2} = \frac{4}{3}$$

$$m_{AB} = \frac{3-7}{2-5} = \frac{-4}{-3} = 4/3$$

$$\text{Slope, } m = \frac{\textit{rise}}{\textit{run}}$$

$$= \frac{7-3}{5-2}$$

$$= 4/3$$



- Find the slope of the line passing through the points $A(6,-1)$ and $B(3,4)$. (Similar to Example: 17)

Figure needed → No

$$m_{AB} = \frac{-1-4}{6-3}$$

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

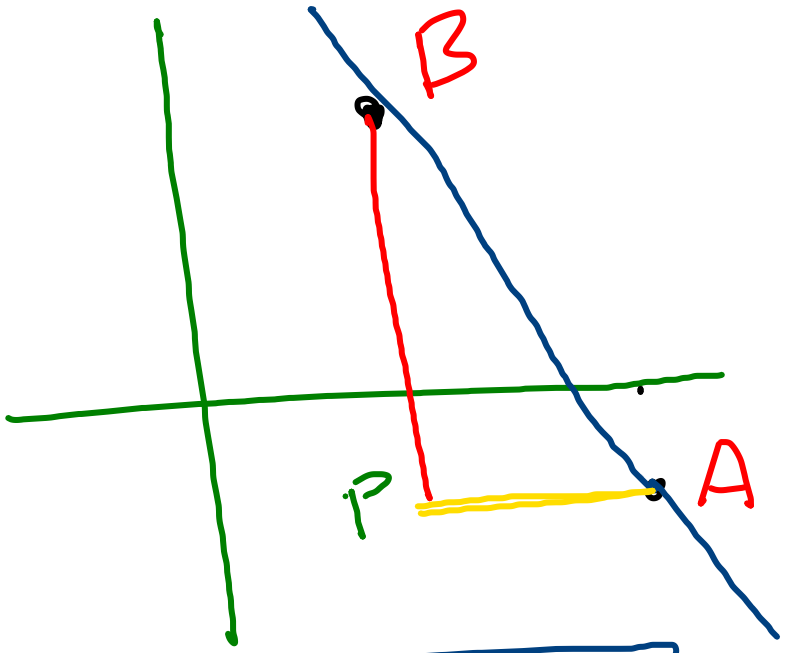
$$= -\frac{5}{3}$$

(Ans)

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

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

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



$$\boxed{\begin{aligned} BP &= \text{rise} \\ AP &= \text{run} \end{aligned}}$$

POLL QUESTION-01

What is the slope of the line passing through the points $A(2, 7)$ এবং $B(-1, 13)$?

A	-6
B	-2
C	2
D	6

$x_1 \quad y_1$

$x_2 \quad y_2$

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

$$m_{AB} = \frac{7-13}{2-(-1)}$$

$$= \frac{-6}{3}$$

$$= -2$$

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

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

SLOPE OF A STRAIGHT LINE

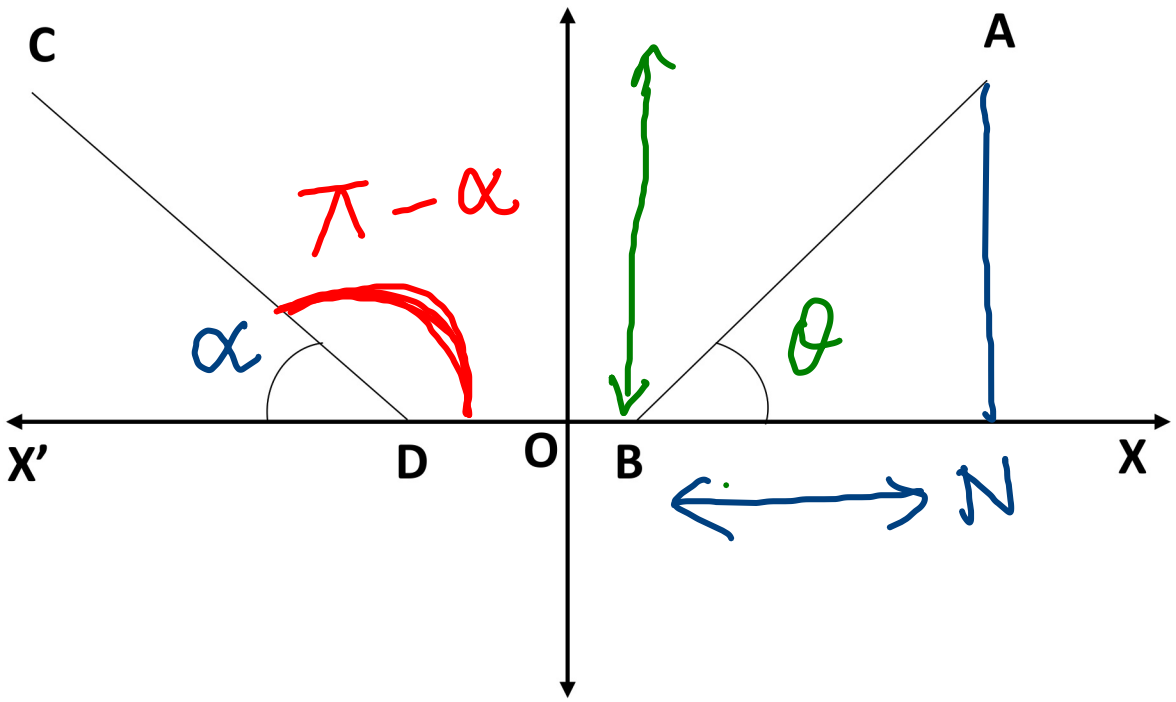
- The tangent (tan) of the inclination angle of a line with positive x axis is called the slope or gradient of a line (m).

$m_{AB} = \tan(\angle ABX)$

$= \tan\theta$

$m_{CD} = \tan(\angle CDX)$

$= \tan(\pi - \alpha)$



$\tan\theta = \frac{AN}{BN} = \frac{\text{rise}}{\text{run}} = m$

POLL QUESTION-02

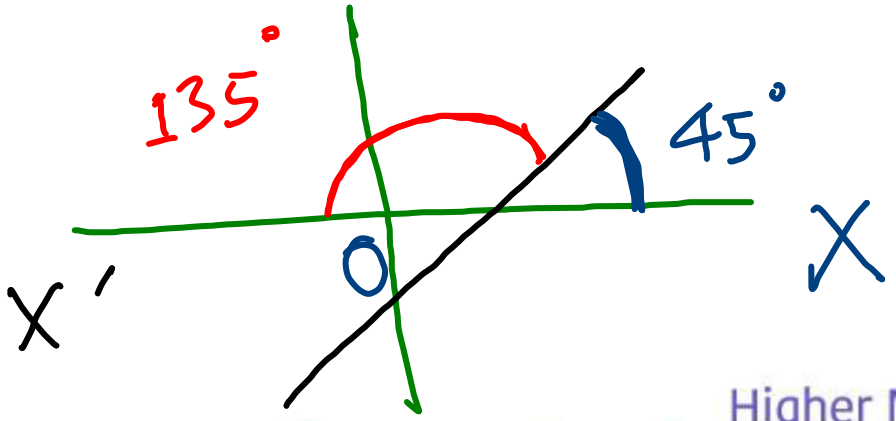
The angle of inclination of a line is $135°$ to the negative x axis, what will be its slope?

$m = \tan\theta$

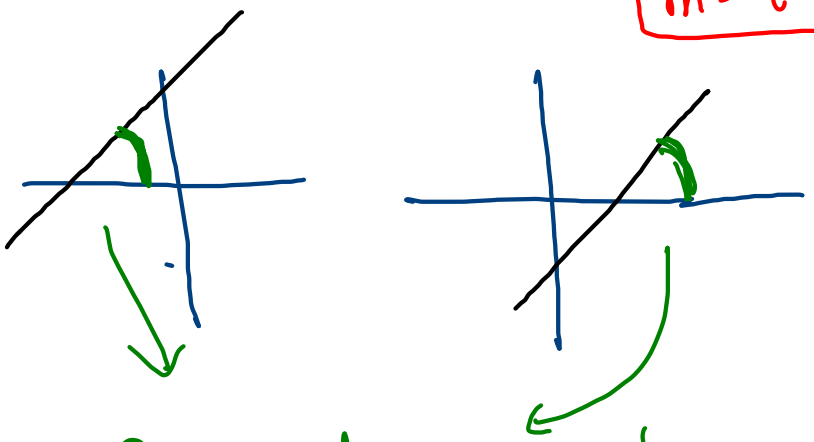
θ = inclination angle to positive x axis

$m = \tan 45°$

A	tan 45
B	tan 135
C	Both A and B
D	Not possible



$\boxed{m = \tan\theta}$

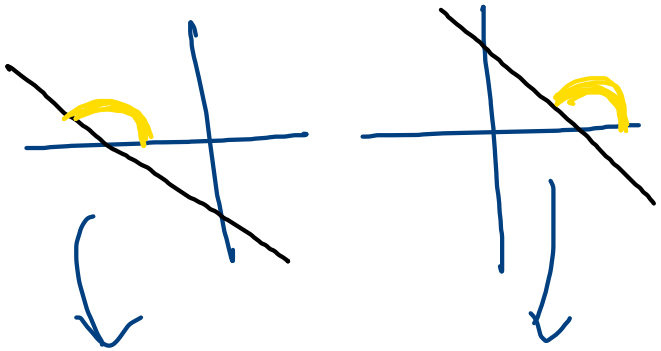


θ acute angle

$0 < \theta < 90^\circ$

$m = \tan\theta$

$m > 0$ '+'ve



θ obtuse angle

$90^\circ < \theta < 180^\circ$

$m = \tan\theta$

$m < 0$ '−'ve

- The coordinates of the three points A, B and C are respectively (2, 2), (5, 2) and (2, 7). Draw the lines AB and AC on the Cartesian plane. If possible, find the slopes of the lines AB and AC. (Example: 16)

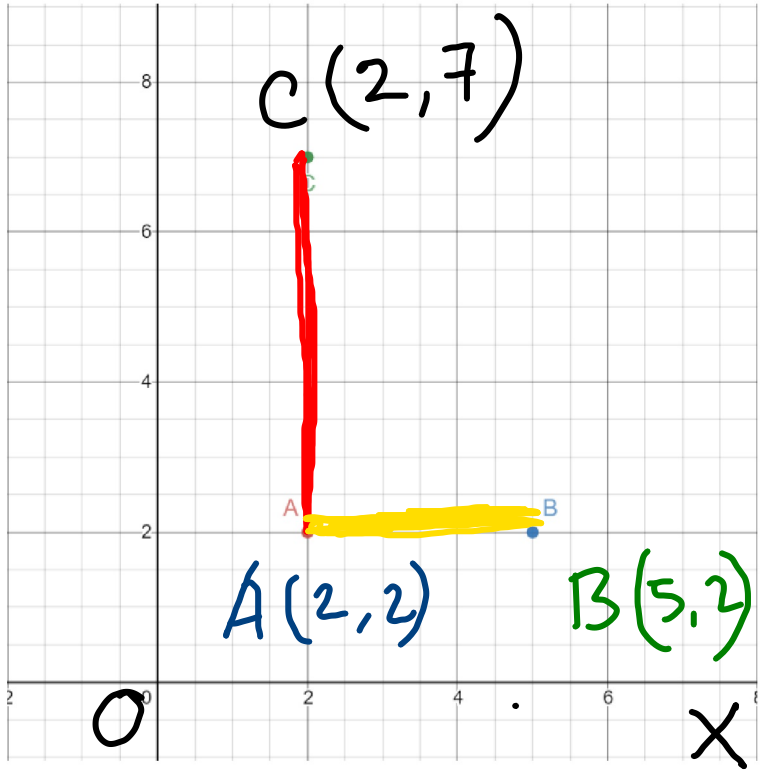
$$m_{AB} = \frac{2-2}{5-2} = 0$$

$$\boxed{m_{AB} = \tan(0) = 0}$$

$$m_{AC} = \frac{7-2}{2-2} = \text{undefined}$$

$$\boxed{m_{AC} = \tan(90) = \infty}$$

(Ans)



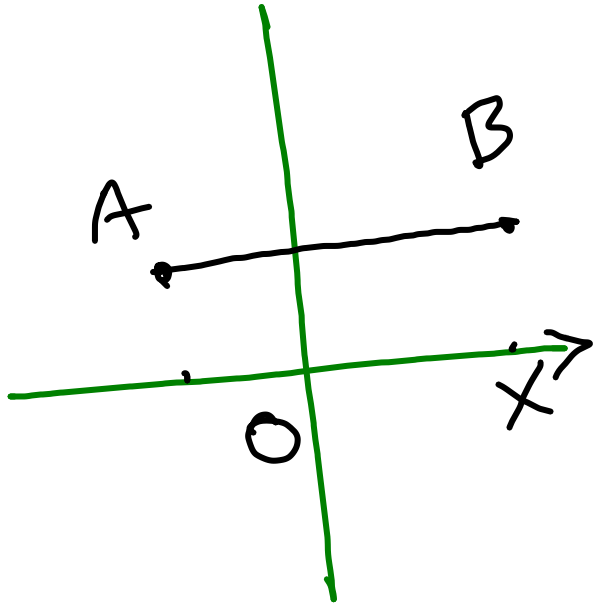
POLL QUESTION-03

$$A(-2,2), B(3,2) \rightarrow m_{AB} = ?$$

$$m = \frac{2-2}{3-(-2)}$$

$$= 0$$

A	1
B	-1
C	2
~~D~~	0



$$m = \tan(0)$$

$$= 0$$

- Find the value of p if the line joining the points $A(3, 3p)$ and $B(4, p^2 + 1)$ has slope -1. (Exercise: 5)

$$m_{AB} = \frac{p^2+1-3p}{4-3}$$

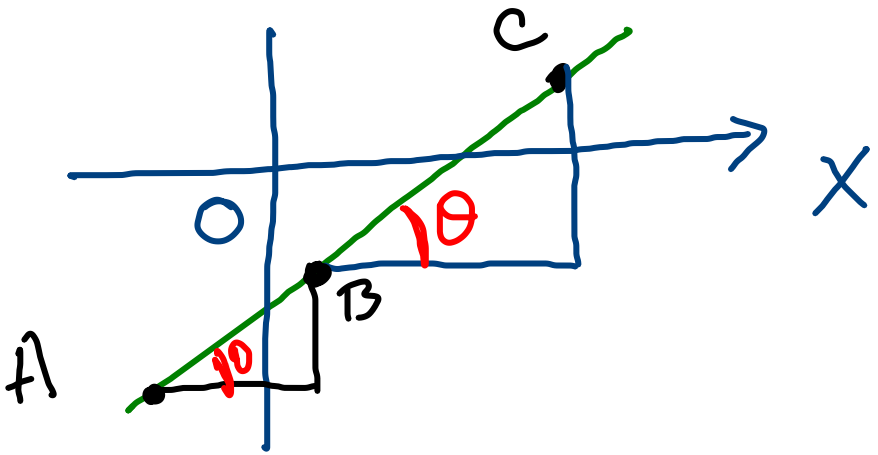
$$= \frac{p^2-3p+1}{1}$$

A.T.Q. $p^2-3p+1=-1$

$\therefore$

$p = 1, 2$

SLOPE OF COLLINEAR POINTS / PARALLEL LINES

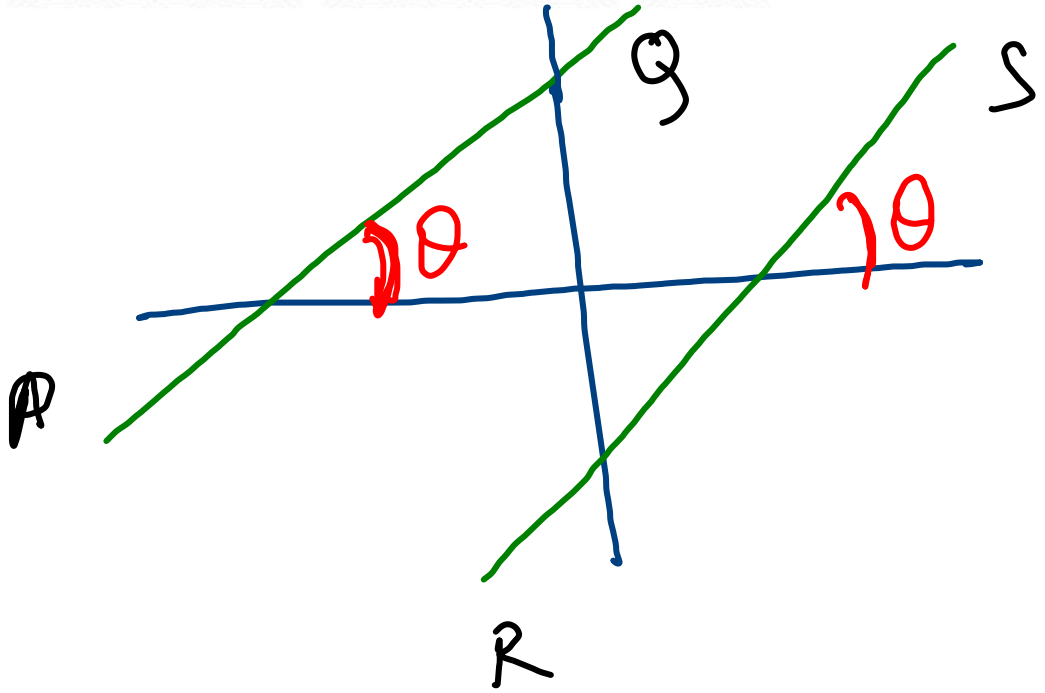


slope equal

$m_{AB} = \tan\theta$

$m_{BC} = \tan\theta$

$m_{AC} = \tan\theta$



$PQ \parallel RS$

$m_{PQ} = m_{RS}$

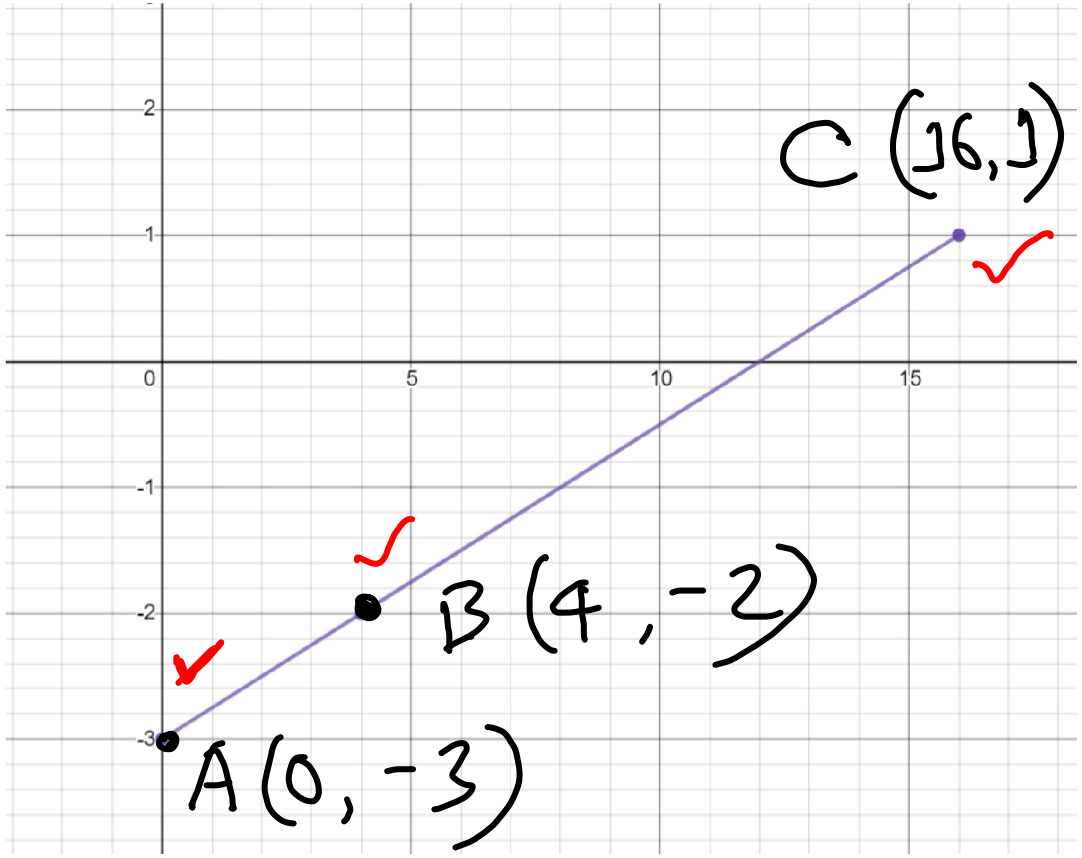
❑ Show that the points $A(0,-3), B(4,-2)$ *and* $C(16,1)$ are collinear. (Exercise: 3)

$$m_{AB} = \frac{-2-(-3)}{4-0} = \frac{1}{4}$$

$$m_{BC} = \frac{1-(-2)}{16-4}$$

$$= \frac{3}{12} = \frac{1}{4}$$

$$(m_{AB} = m_{BC}) = m_{AC}$$



$\therefore$ A, B, C are collinear.

- If the points $A(1,-1), B(t,2)$ *and* $C(t^2, t+3)$ are collinear, find the admissible value of t. (Exercise: 4)

$$m_{AC} = m_{AB}$$

$$\frac{t+3-(-1)}{t^2-1} = \frac{2-(-1)}{t-1}$$

or, $$\frac{t+4}{t^2-1} = \frac{3}{t-1}$$

$$t = 1/2, 1$$

$$\boxed{t-1=0}$$

POLL QUESTION-04

The slope of line PQ is 2 and RS is a line parallel to PQ. What is the slope of line RS?

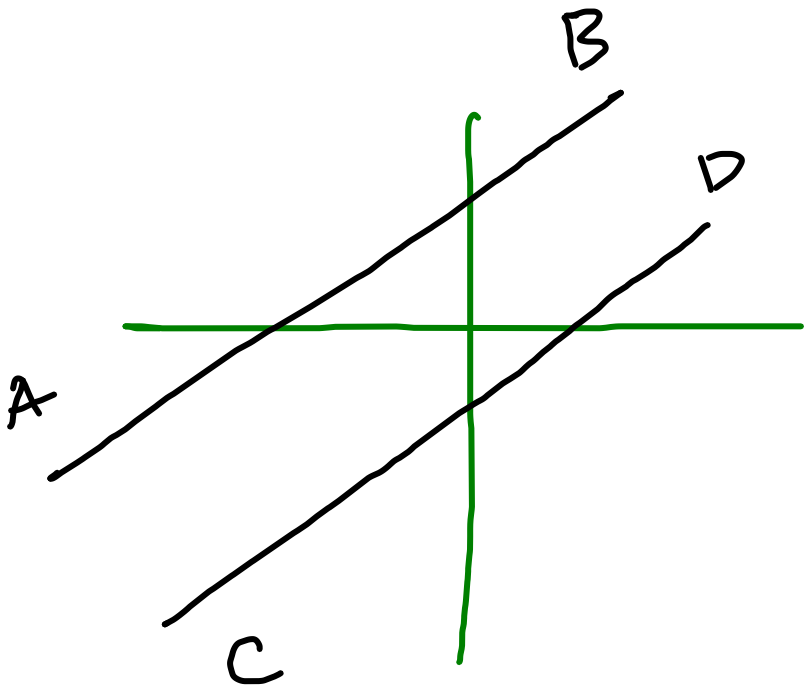
RS || PQ

$m_{RS} = m_{PQ}$

$= 2$

A	$\frac{1}{2}$
B	$-\frac{1}{2}$
C	2
D	Not defined

- $A(t, 3t), B(t^2, 2t), C(t-2, t)$ *and* $D(1, 1)$ are the four different points. If the lines AB and CD are parallel, find the admissible value of t. (Example: 19)



$$m_{AB} = m_{CD}$$

$$\frac{2t-3t}{t^2-t} = \frac{t-1}{t-2-1}$$

$$\frac{-\cancel{t}}{\cancel{t}(t-1)} = \frac{t-1}{t-3}$$

$$t = -1, 2$$

$$\boxed{t \neq 0}$$ How?

❑ Prove that the points $A(a,0), B(0,b)$ *and* $C(1,1)$ are collinear if $\frac{1}{a}+\frac{1}{b}=1$. (Exercise: 6)

Let, A, B, C be collinear points

$$m_{AC} = m_{BC}$$

$$\text{or, } \frac{0-1}{a-1} = \frac{b-1}{0-1}$$

$$\text{or, } \frac{-1}{a-1} = \frac{b-1}{-1}$$

$$\text{or, } (-1)(-1) = (b-1)(a-1)$$

$$\text{or, } \cancel{1} = ab - b - a + \cancel{1}$$

$$\text{or, } b + a = ab$$

$$\text{or, } \frac{b+a}{ab} = \frac{ab}{ab}$$

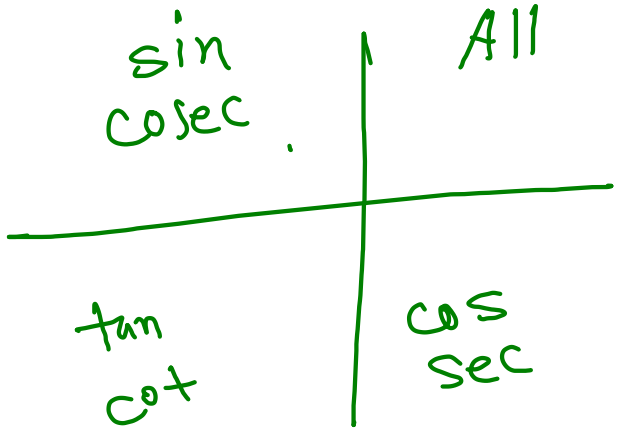
$$\text{or, } \frac{b}{ab} + \frac{a}{ab} = 1$$

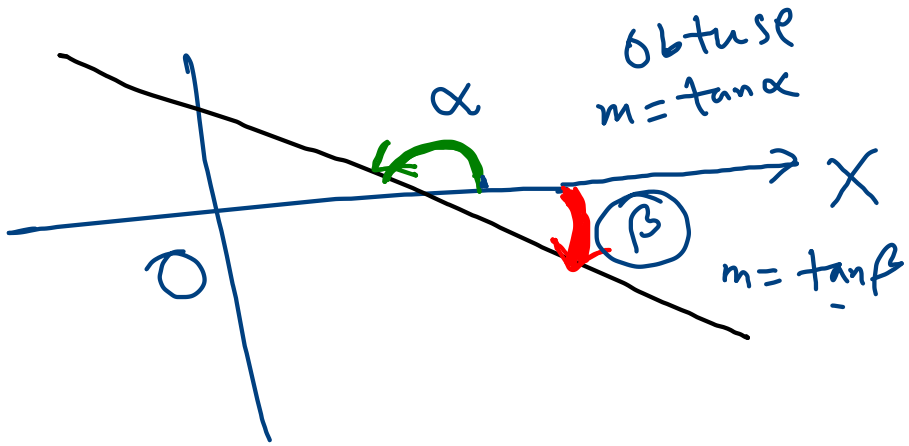
$$\therefore \frac{1}{a} + \frac{1}{b} = 1$$

Hand raise

Onnorokom pathshala

Khan Academy





না বুঝে
মুখস্থ করার
অভ্যাস প্রতিভাকে
ধ্বংস করে