



Orienting Yourself : The Use of Coordinates

Lecture - 03

CLASS-9TH

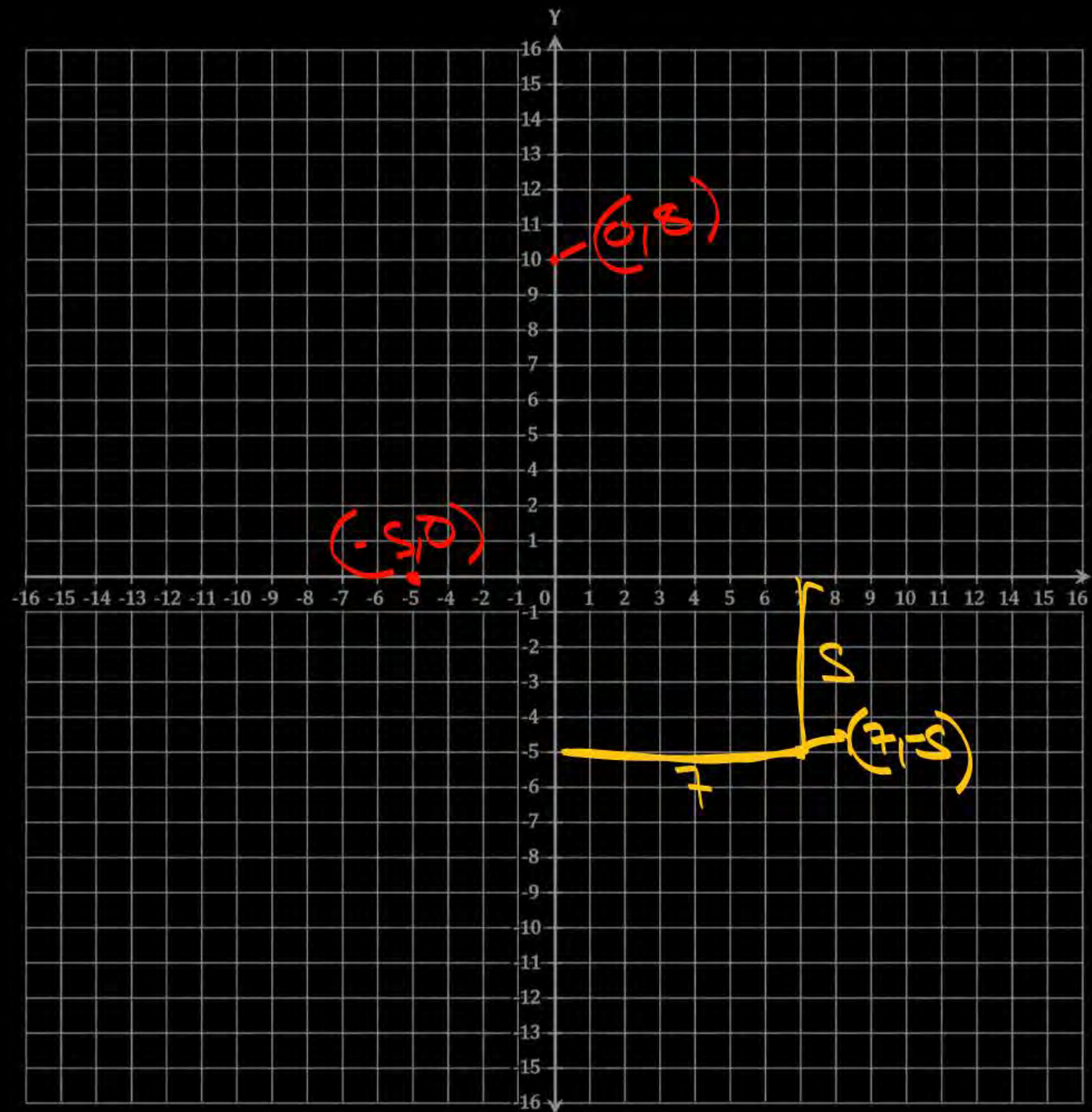
MATH

Ritik Sir



Topics To Be Covered

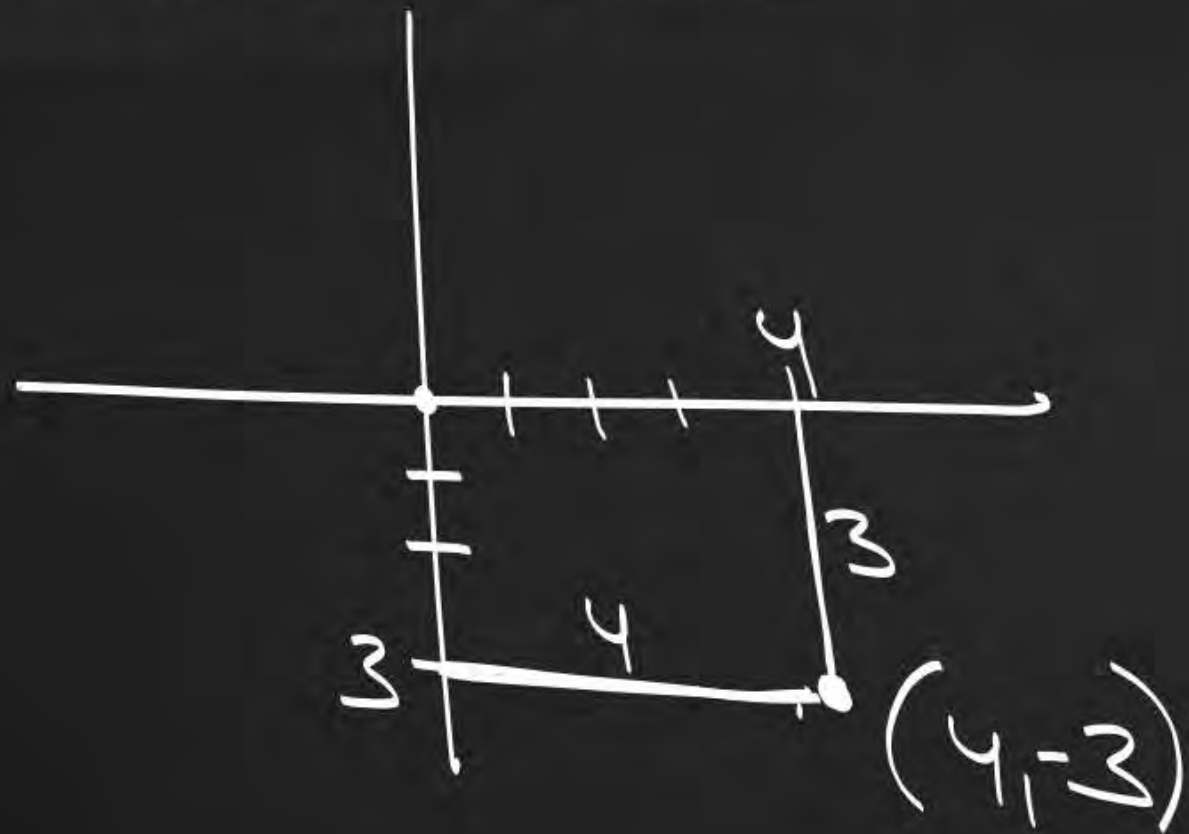
class 9th →
1 Distance formula
[class 10th]



QUESTIONS

Write coordinates of a point:

- 4 units right of origin
- 3 units below x-axis



QUESTIONS

A point is:

• 2 units from y-axis

• 5 units below x-axis

Find its coordinates.



QUESTIONS

or

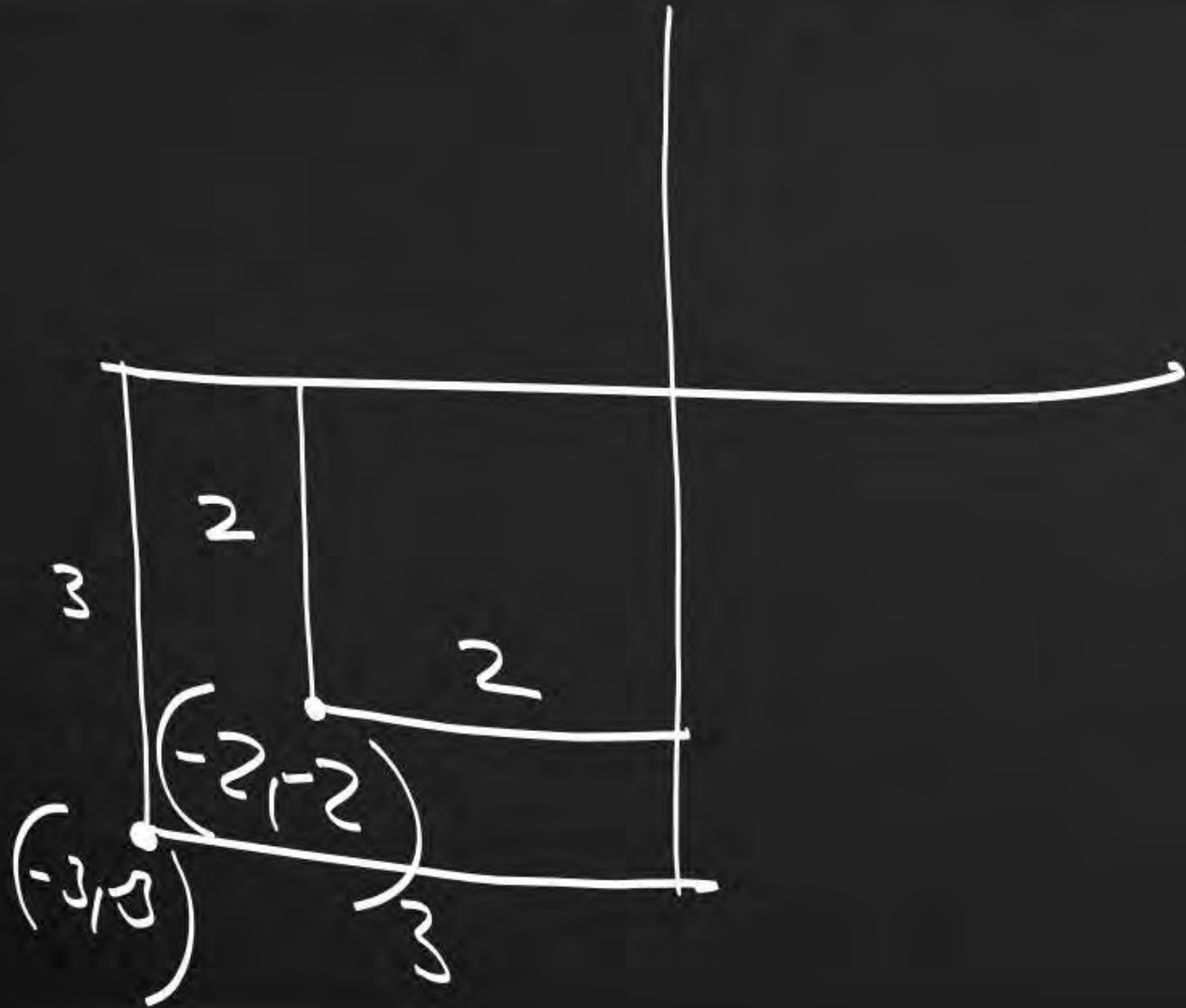
Find a point:

point key coordinates.

- In III quadrant.
- Equal distance from both the axes

$(-1, -1), (-2, -2), (-3, -3) \dots$

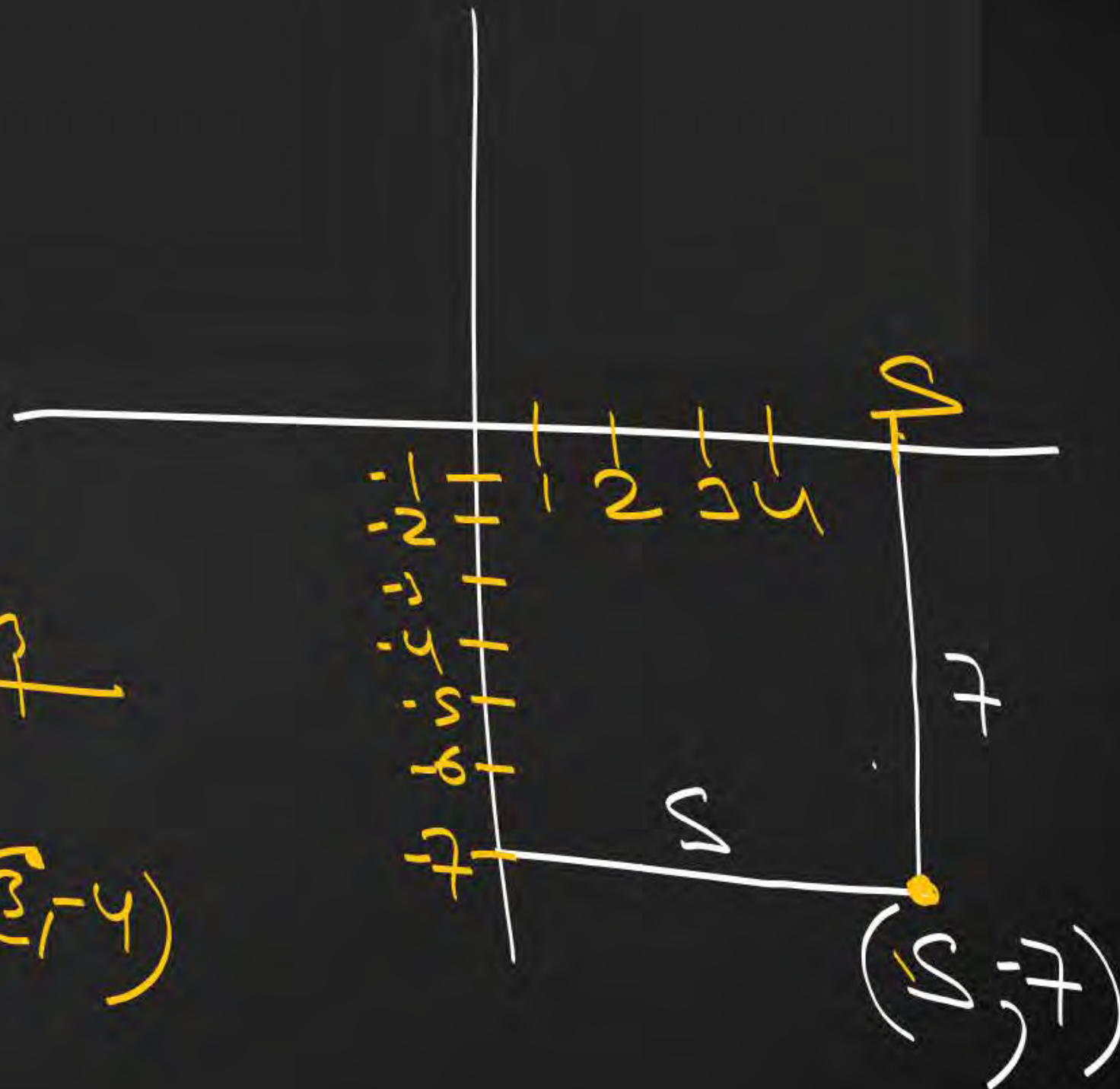
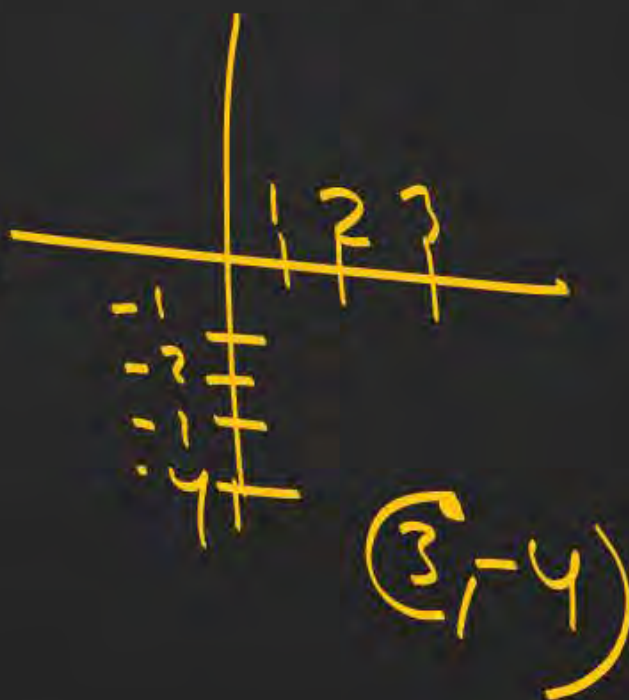
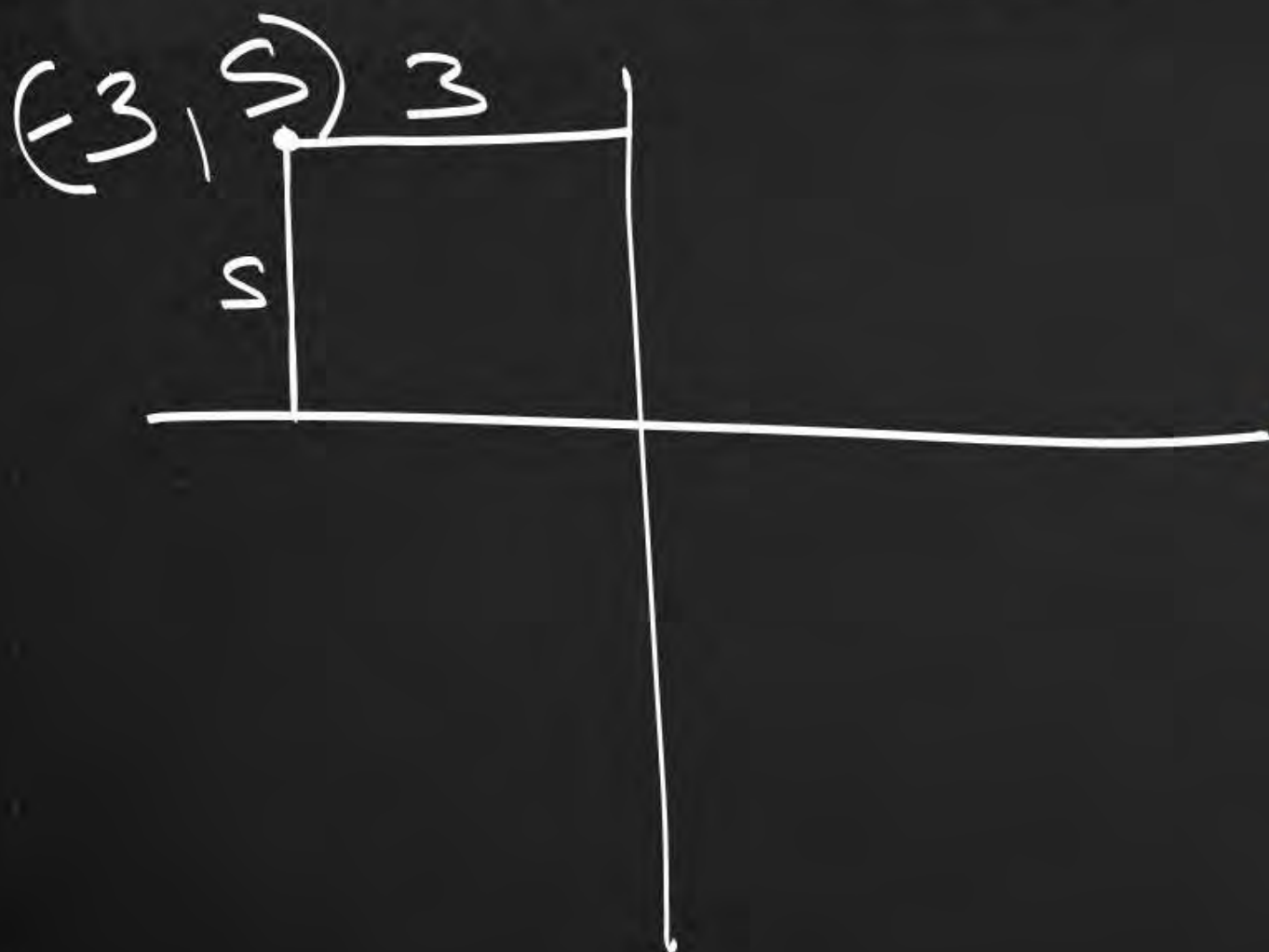
$(-4.5, -4.5)$



QUESTIONS

A point lies in the second quadrant and is:

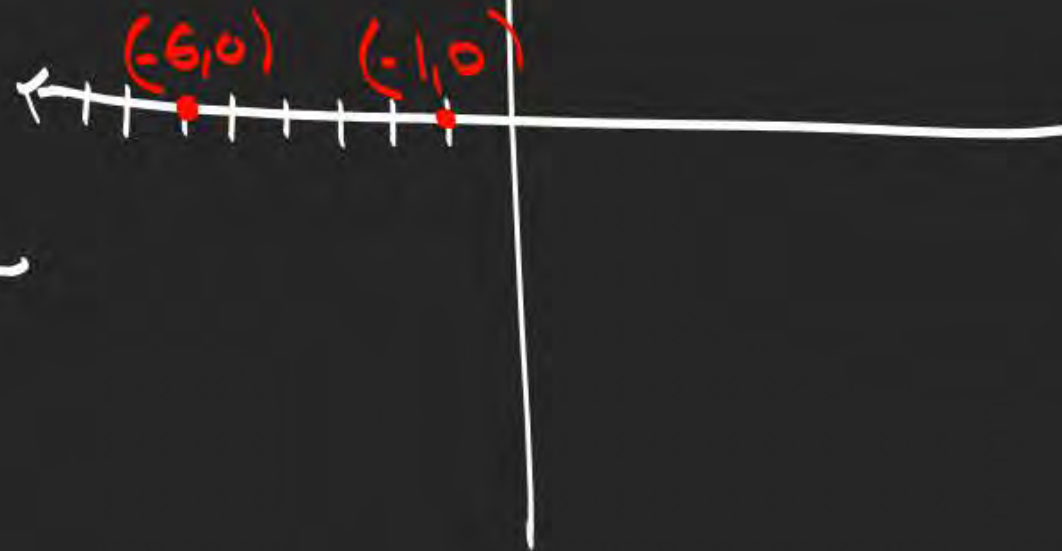
- 3 units away from the y-axis
- 5 units above the x-axis



DISTANCE BETWEEN TWO POINTS IN THE 2-D PLANE



★ Distance cannot be negative.





$$AP = \sqrt{(3-5)^2 + (2-7)^2}$$

$$= \sqrt{(-2)^2 + (-5)^2}$$

$$= \sqrt{4+25}$$

$$= \boxed{\sqrt{29} \text{ units}}$$



$$AB = \sqrt{(-8-(-7))^2 + (-6-(-5))^2}$$

$$= \sqrt{(-8+7)^2 + (-6+5)^2}$$

$$= \sqrt{(-1)^2 + (-1)^2}$$

$$= \sqrt{1+1}$$

$$= \boxed{\sqrt{2} \text{ units}}$$

Distance Formula



$$AB = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

QUESTIONS



Find the distance between the points $P(-6, 7)$ and $Q(-1, -5)$.

$$PQ = \sqrt{(-5 - 7)^2 + (-1 - -6)^2}$$

$$= \sqrt{(-12)^2 + (5)^2}$$

$$= \sqrt{144 + 25}$$

$$= \sqrt{169}$$

$$= \sqrt{13 \times 13} = \boxed{13 \text{ units}}$$

QUESTIONS

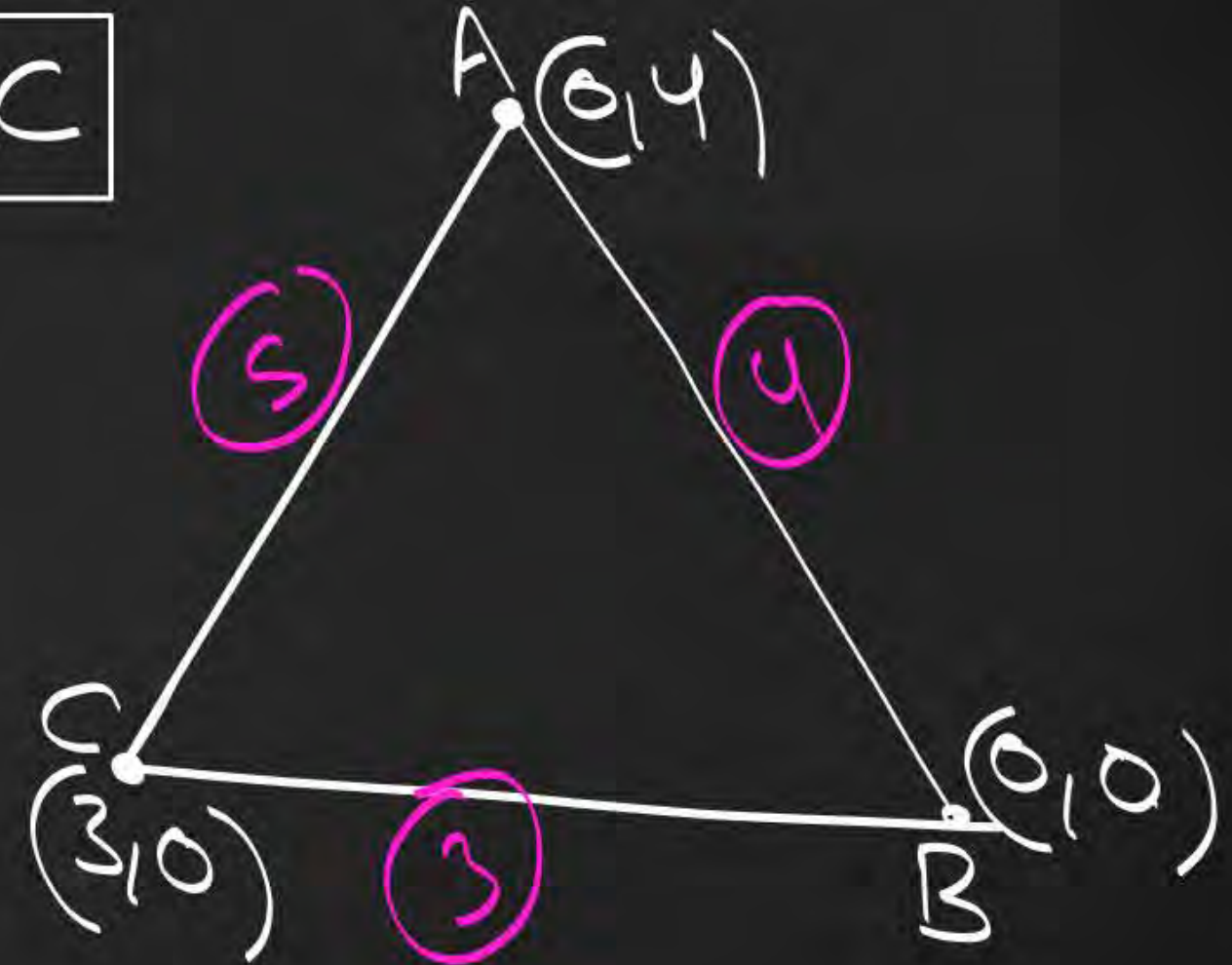
The perimeter of the triangle with vertices $(0,4)$, $(0,0)$ and $(3,0)$ is

$$\text{Perimeter} = AB + BC + AC$$

$$\begin{aligned} AB &= \sqrt{(0-4)^2 + (0-0)^2} \\ &= \sqrt{16+0} \\ &= \sqrt{16} = 4 \end{aligned}$$

$$\begin{aligned} BC &= \sqrt{(0-0)^2 + (3-0)^2} \\ &= \sqrt{0+9} = \sqrt{9} = 3 \end{aligned}$$

$$AC = \sqrt{(4-0)^2 + (0-3)^2} = \sqrt{16+9} = \sqrt{25} = 5$$



1 $(7+\sqrt{5})$

2 5

3 10

4 12

#CTR

$$AB = \sqrt{10}$$

Squaring both sides

$$(AB)^2 = (\sqrt{10})^2$$

$$AB^2 = 10$$

$$(\sqrt{10})^2 = (10^{1/2})^2 = 10^{\frac{1}{2} \times 2} = 10$$

- $PQ = 5$

$$\underline{S \cdot R \cdot S}$$

$$PQ^2 = 2S$$

- $AC = \sqrt{7}$

$$AC^2 = 7$$

QUESTIONS



Find the values of y for which the distance between the points $A(3, -1)$ and $B(11, y)$ is 10 units.

$$AB = 10$$

Squaring both sides

$$AB^2 = 100$$

$$(y - (-1))^2 + (11 - 3)^2 = 100$$

$$(y+1)^2 + (8)^2 = 100$$

$$(y+1)^2 = 100 - 64$$

$$(y+1)^2 = 36$$

$$y+1 = \pm\sqrt{36}$$

$$y+1 = \pm 6$$

$$y+1 = 6$$

$$y = 5$$

$$y+1 = -6$$

$$y = -7$$

#CTR

$$x^2 = 25$$

$$x = 5, -5$$

$$x^2 = 25$$

$$x = \pm \sqrt{25}$$

$$x = \pm 5$$

$$x = 5, -5$$

$$Q. y^2 = 49$$

$$y = \pm \sqrt{49}$$

$$y = \pm 7$$

$$y = 7, -7$$

$$Q. (x+1)^2 = 81$$

$$x+1 = \pm \sqrt{81}$$

$$x+1 = \pm 9$$

$$x+1 = 9$$

$$x = 8$$

$$x+1 = -9$$

$$x = -10$$

QUESTIONS



check if

~~show that~~ the points ^A(1, 1), ^B(5, 2) and ^C(9, 5) are collinear.

$$AB = \sqrt{(2-1)^2 + (5-1)^2} \\ = \sqrt{1+16} = \sqrt{17}$$

$$BC = \sqrt{(5-2)^2 + (9-5)^2} \\ = \sqrt{9+16} = \sqrt{25} = 5$$

$$AC = \sqrt{(5-1)^2 + (9-1)^2} = \sqrt{16+64} = \sqrt{80} = \sqrt{2 \times 2 \times 2 \times 2 \times 5} \\ = 2 \times 2 \sqrt{5} = 4\sqrt{5}$$

$\therefore AB + BC \neq AC$
 $\therefore A, B \text{ and } C \text{ are not collinear.}$

Collinear points
 $\Downarrow$

3, 3 seyyada
points

$$\begin{array}{r|l} 2 & 80 \\ \hline 2 & 40 \\ 2 & 20 \\ 2 & 10 \\ 2 & 5 \end{array}$$

$A, B, C \rightarrow \text{collinear.}$



$$\Rightarrow AB + BC = AC$$

QUESTIONS



Are the points M $(-3, -4)$, A $(0, 0)$ and G $(6, 8)$ on the same straight line? Suggest a method to check this without plotting and joining the points.

$$\begin{aligned} MA &= \sqrt{(0 - (-4))^2 + (0 - (-3))^2} \\ &= \sqrt{16 + 9} = \sqrt{25} = 5 \end{aligned}$$

$$\begin{aligned} AG &= \sqrt{(8 - 0)^2 + (6 - 0)^2} \\ &= \sqrt{64 + 36} = \sqrt{100} = 10 \end{aligned}$$

$$\begin{aligned} MG &= \sqrt{(8 - (-4))^2 + (6 - (-3))^2} \\ &= \sqrt{144 + 81} \\ &= \sqrt{225} = 15 \end{aligned}$$

$$\therefore MA + AG = MG$$

$\therefore$ M, A, and G are in the a straight line

QUESTIONS



Use your method (from Problem 6) to check if the points $R(-5, -1)$, $B(-2, -5)$ and $C(4, -12)$ are on the same straight line. Now plot both sets of points and check your answers.

#CTR

Equilateral Δ .



All sides equal.

Isosceles Δ



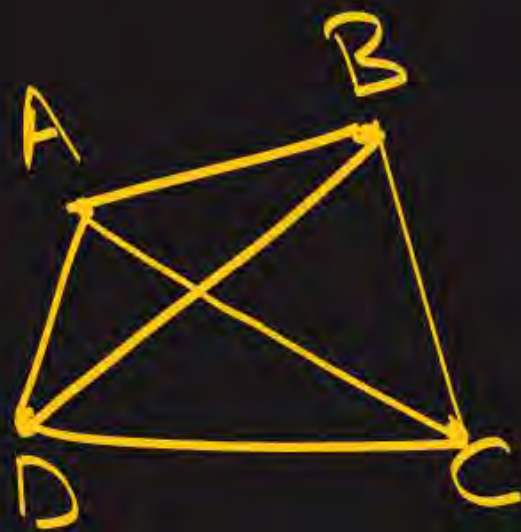
any two sides
equal

Scalene Δ .



All three
unequal.

Quadrilateral



all sides equal
+ diagonals equal

Square

opp. sides equal
+ diagonals equal

Rectangle

opp. sides
equal

+ diagonals unequal

Parallelogram

All sides
equal

+ diagonals unequal

Rhombus

QUESTIONS



$$AC = \sqrt{(-1-1)^2 + (-2-2)^2} \\ = \sqrt{4+16} = \sqrt{20} \text{ units.}$$



Plot the points A (2, 1), B (-1, 2), C (-2, -1), and D (1, -2) in the coordinate plane. Is ABCD a square? Can you explain why? What is the area of this square?

$$AB = \sqrt{(2-1)^2 + (-1-2)^2} \\ = \sqrt{1+9} = \sqrt{10} \text{ units}$$

$$CD = \sqrt{(-2--1)^2 + (1--2)^2} \\ = \sqrt{1+9} = \sqrt{10} \text{ units.}$$

$$BC = \sqrt{(-1-2)^2 + (-2--1)^2} \\ = \sqrt{9+1} = \sqrt{10} \text{ units.}$$

$$AD = \sqrt{(-2-1)^2 + (1-2)^2} \\ = \sqrt{9+1} = \sqrt{10} \text{ units.}$$

$$BD = \sqrt{(-2-2)^2 + (1--1)^2} \\ = \sqrt{16+4} \\ = \sqrt{20} \text{ units.}$$

$\therefore AB = BC = CD = AD$
and $BD = AC$, $\therefore$ ABCD is a square

$$\begin{aligned}\text{Area of square} &= (\text{Side})^2 \\ &= (510)^2\end{aligned}$$

$$= 10 \text{ sq. units.}$$

✓

QUESTIONS

Show that four points $(0, 1)$, $(6, 7)$, $(-2, 3)$ and $(8, 3)$ are the vertices of a rectangle. Also, find its area.

$$A = l \times b$$

#GIPU

Thank You !

- *Work Hard.*
- *Dream big.*
- *Never give up.*