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Class - 10

MATHS

Chapter - 7

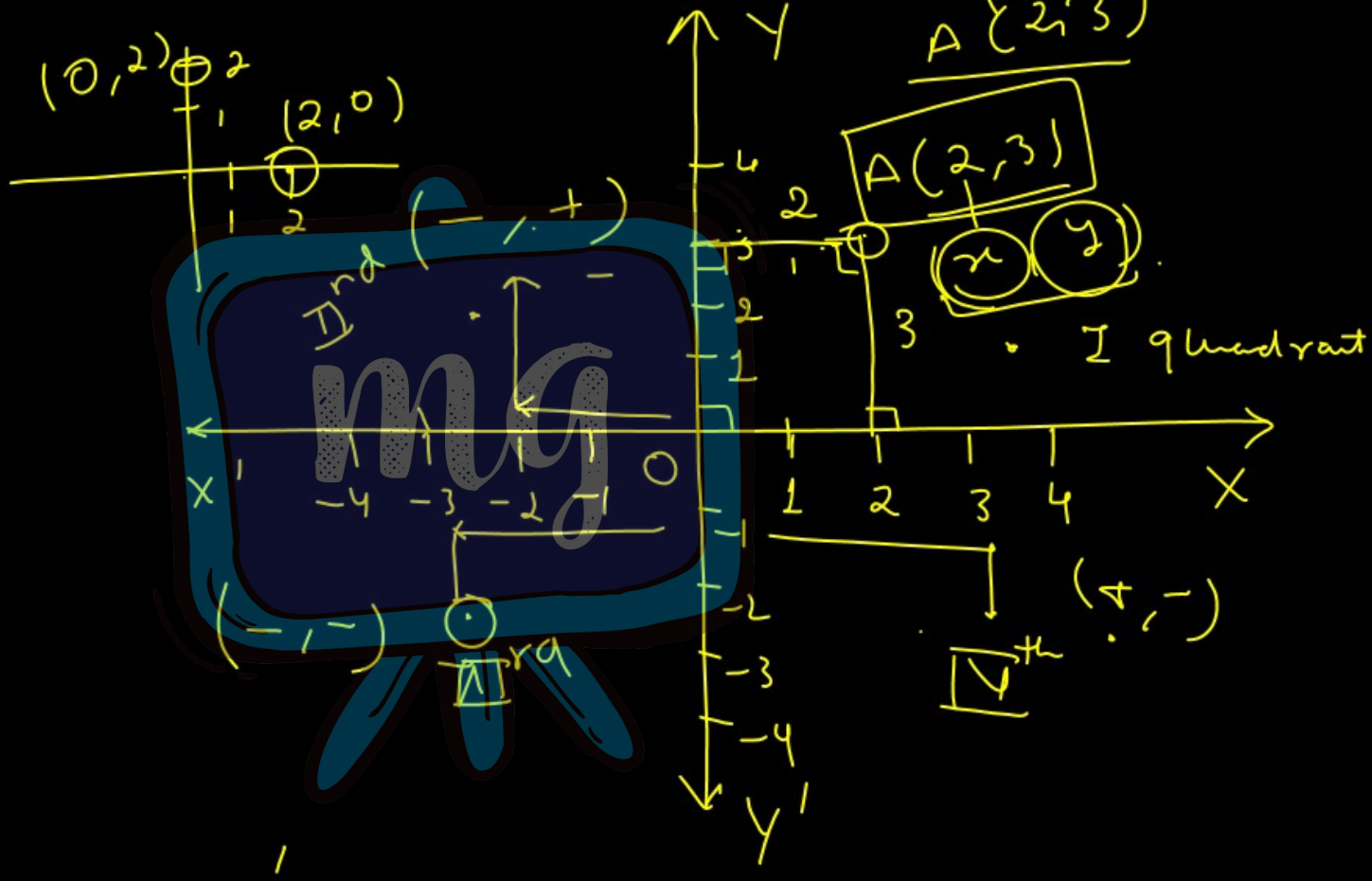
COORDINATE GEOMETRY

Part - 1

SHUBHAM TIWARI

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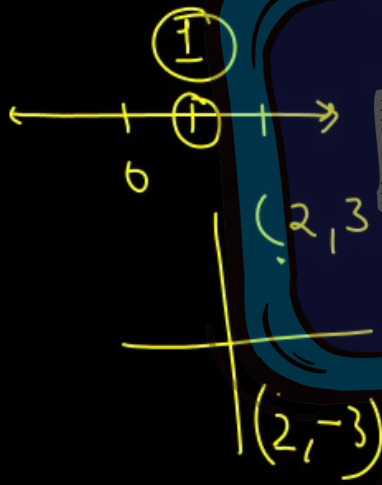


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COORDINATE GEOMETRY

KEY CONCEPTS



- Each point on a number line is associated with a number called its **coordinate.**
- Each point on a plane is associated with an ordered pair (x, y) of numbers called its **coordinates.**

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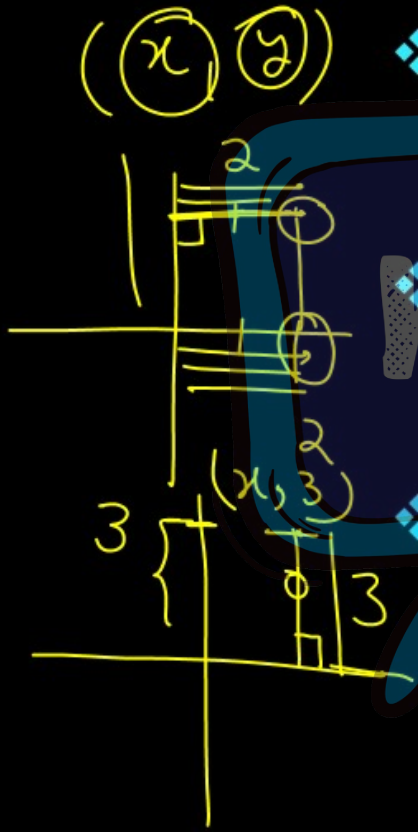


- The axes intersect at a point called the origin.
- The plane along with x–axis and y–axis is known as Cartesian plane.
- The axes divide the plane into four regions called quadrants.

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- x-coordinate is called **abscissa** and y-coordinate is called **ordinate.**
- Abscissa of a point = Perpendicular distance of a point from the y-axis
- Ordinate of a point = Perpendicular distance of a point from the x-axis

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- The coordinates of a point on the x-axis are of the form (x, 0).
- The coordinates of a point on the y-axis are of the form (0, y).

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DISTANCE FORMULA

❖ Distance between two points (x_1, y_1) and (x_2, y_2) is :

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

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By Applying Pythagoras

In $\triangle ABC$

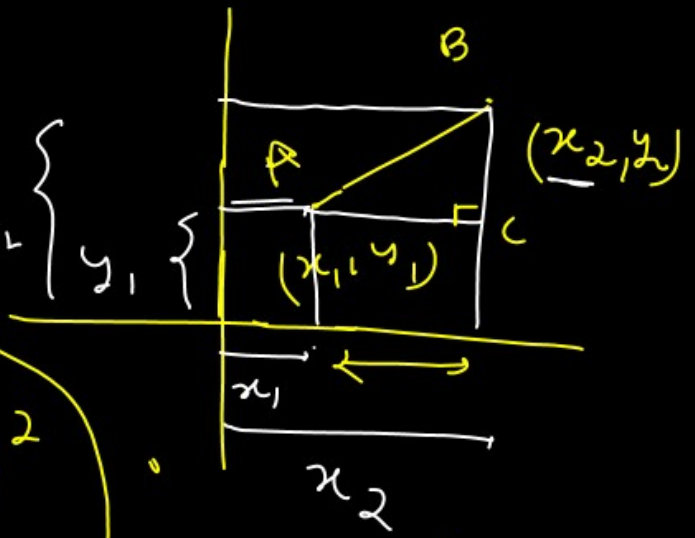
$AB^2 = AC^2 + BC^2$

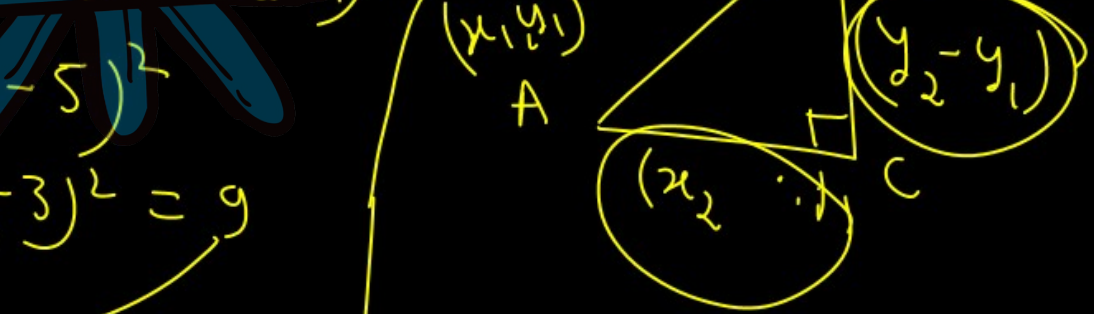
$AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$

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

$(5-2)^2 \quad (2-5)^2$

$(3)^2 = (-3)^2 = 9$

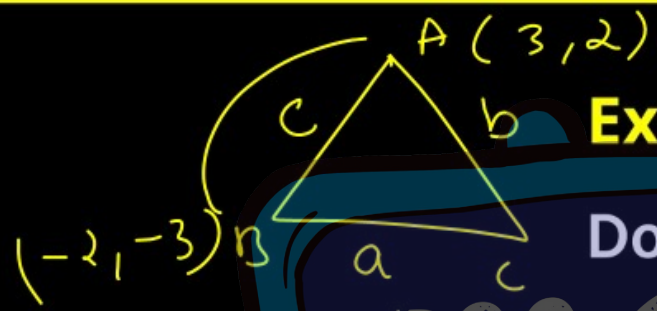




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Example : 1

Do the points (3, 2), (–2,–3) and (2, 3) form a triangle? If so, name the type of triangle formed.

Solu: in $\triangle ABC$ to verify let's calculate the lengths of the sides:

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

$$= \sqrt{(3+2)^2 + (2+3)^2}$$

$$= \sqrt{5^2 + 5^2}$$

$$= \sqrt{2 \times 5^2}$$

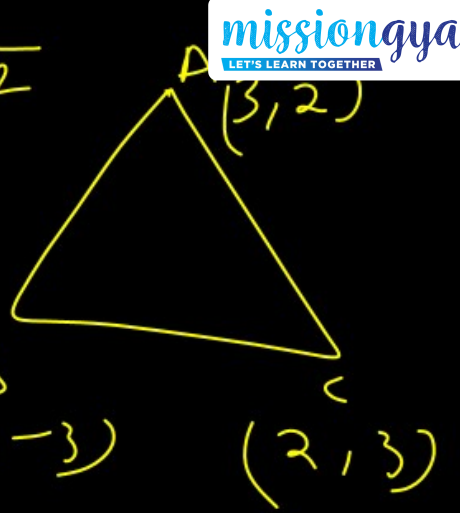
$$= \sqrt{2} \times \sqrt{5^2}$$

$$AB = \sqrt{50}$$

$$CA = \sqrt{(3-2)^2 + (2-3)^2}$$

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

$$CA = \sqrt{2}$$ ✓



$$BC = \sqrt{(2+2)^2 + (3+3)^2}$$

$$= \sqrt{4^2 + 6^2}$$

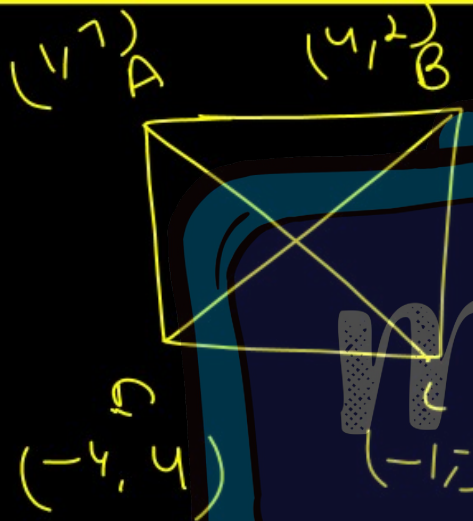
$$= \sqrt{16 + 36}$$

$$BC = \sqrt{52}$$

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Example : 2

Show that the points (1, 7), (4, 2), (–1, –1) and (–4, 4) are the vertices of a square.

Solu.

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

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

$$= \sqrt{9+25}$$

$$AB = \sqrt{34}$$

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(1, 7)
(−1, −1)

$AC = \sqrt{(1+1)^2 + (7+1)^2}$

$= \sqrt{(2)^2 + (8)^2}$

$= \sqrt{4 + 64}$

$AC = \sqrt{68}$

$BD = \sqrt{8^2 + (-2)^2}$

$= \sqrt{64 + 4}$

$BD = \sqrt{68}$

(4, 2)
(−4, +4)

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A(1, 7)
B(4, 2)
C(-1, -1)
D(-4, 4)

$$BC = \sqrt{(4+1)^2 + (2+1)^2}$$

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

$$= \sqrt{25 + 9}$$

$$= \sqrt{34}$$

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

$$= \sqrt{25 + 9}$$

$$AD = \sqrt{34}$$

$$CD = \sqrt{(-4+1)^2 + (+4+1)^2}$$

$$= \sqrt{9 + 25}$$

$$\sqrt{34}$$

Hence the co-ordinates form a square.

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Example : 5

Find a point on the y-axis which is equidistant from the points A(6, 5) and B(– 4, 3).

$AC = BC$

$AC^2 = BC^2$ { taking Square both Side }

$(0-6)^2 + (b-5)^2 = (-4-0)^2 + (b-3)^2$

$36 + (b-5)^2 = 16 + (b-3)^2$

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$$36 + (b-5)^2 = 16 + (b-3)^2$$

$$36 - 16 = (b-3)^2 - (b-5)^2$$

$$20 = [(b-3) + (b-5)][(b-3) - (b-5)]$$

$$= (b-3+b-5)(b-3-b+5)$$

$$20 = (2b-8)(2)$$

$$10 = 2b - 8$$

$$18 = 2b$$

$$\boxed{b = 9}$$

Hence the coordinate is $(0, 9)$.

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Exercise : 7.1

1. Find the distance between the following pairs of points :

(i) $(2, 3), (4, 1)$

Let's Apply distance formula.

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

$$= \sqrt{(4-2)^2 + (1-3)^2}$$

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

$$\sqrt{4+4}$$

$$\sqrt{8}$$

$$= 2\sqrt{2}$$