

CLASS - IX
MATHEMATICS

Co-ordinate Geometry : Distance Formula

1. Find out the value of y if the distance of the point (-4, y) from origin is 5 units.

Ans. The distance between origin O (0,0) & (-4, y) is $= \sqrt{(-4-0)^2 + (y-0)^2}$ units $= \sqrt{16+y^2}$ units

$$\begin{aligned} \therefore \text{By the questions, } \sqrt{16+y^2} &= 5 \\ \text{or, } 16+y^2 &= 25 \text{ (squaring both sides)} \\ \text{or, } y^2 &= 25-16 \\ \text{or, } y^2 &= 9 \\ \text{or, } y &= \pm 3 \end{aligned}$$

Ans. \therefore The required values of y are ± 3

2. What type of the triangle will be made by joining the three points (3, 0), (-3, 0), (0, 3).

Ans. Let, A (3, 0), B (-3, 0), C(0, 3)

$$\begin{aligned} \therefore AB &= \sqrt{(-3-3)^2 + (0-0)^2} \text{ units} = \sqrt{36} \text{ units} = 6 \text{ units} \\ AC &= \sqrt{(0-3)^2 + (3-0)^2} \text{ units} = \sqrt{9+9} \text{ units} = \sqrt{18} \text{ units} \\ &= \sqrt{3 \times 3 \times 2} \text{ units} = 3\sqrt{2} \text{ units} \\ BC &= \sqrt{(0+3)^2 + (3-0)^2} \text{ units} = \sqrt{9+9} \text{ units} = \sqrt{18} \text{ units} \\ &= 3\sqrt{2} \text{ units} \\ \therefore AC^2 + BC^2 &= (3\sqrt{2})^2 + (3\sqrt{2})^2 \\ \text{or, } AC^2 + BC^2 &= 18+18 = 36 = (6)^2 \\ \text{or, } AC^2 + BC^2 &= AB^2 \end{aligned}$$

\therefore By converse theorem of Pythagoras Δ ABC is right-angled triangle in which $AC = BC$

Ans. \therefore The triangle formed by the given three points is an isosceles right-angled triangle.

3. Show that the points (2, 5), (5, 9), (9, 12) and (6, 8) form a rhombus when they are joined orderly.

Ans. Let, A (2, 5), B (5, 9), C (9, 12), D (6, 8)

$$\begin{aligned} \therefore AB &= \sqrt{(5-2)^2 + (9-5)^2} \text{ units} = \sqrt{9+16} \text{ units} = \sqrt{25} \text{ units} = 5 \text{ units} \\ BC &= \sqrt{(9-5)^2 + (12-9)^2} \text{ units} = \sqrt{16+9} \text{ units} = \sqrt{25} \text{ units} = 5 \text{ units} \\ CD &= \sqrt{(6-9)^2 + (8-12)^2} \text{ units} = \sqrt{9+16} \text{ units} = \sqrt{25} \text{ units} = 5 \text{ units} \\ DA &= \sqrt{(2-6)^2 + (5-8)^2} \text{ units} = \sqrt{16+9} \text{ units} = \sqrt{25} \text{ units} = 5 \text{ units} \end{aligned}$$

$$\therefore AB = BC = CD = DA$$

Ans. \therefore The quadrilateral formed by the given four points is a rhombus.

4. Check whether the three points O (0, 0), A(4, 3) and B(8, 6) are collinear and give reason.

Ans.

$$\therefore OA = \sqrt{(4-0)^2 + (3-0)^2} \text{ units} = \sqrt{16+9} \text{ units} = 5 \text{ units}$$

$$AB = \sqrt{(8-4)^2 + (6-3)^2} \text{ units} = \sqrt{16+9} \text{ units} = 5 \text{ units}$$

$$OB = \sqrt{(8-0)^2 + (6-0)^2} \text{ units} = \sqrt{64+36} \text{ units} = 10 \text{ units}$$

$$\therefore OA + AB = 5 + 5 = 10 = OB$$

\therefore The given three points O, A, B are collinear.