

Co-Ordinate Geometry Ex 14.3 Q16

Answer:

Let A (4, 3); B (6, 4); C (5, 6) and D (3, 5) be the vertices of a quadrilateral. We have to prove that the quadrilateral ABCD is a square.

So we should find the lengths of sides of quadrilateral ABCD.

$$AB = \sqrt{(6-4)^2 + (4-3)^2}$$

$$= \sqrt{4+1}$$

$$= \sqrt{5}$$

$$BC = \sqrt{(6-5)^2 + (4-6)^2}$$

$$= \sqrt{1+4}$$

$$= \sqrt{5}$$

$$CD = \sqrt{(3-5)^2 + (5-6)^2}$$

$$= \sqrt{4+1}$$

$$= \sqrt{5}$$

$$AD = \sqrt{(3-4)^2 + (5-3)^2}$$

$$= \sqrt{1+4}$$

$$= \sqrt{5}$$

All the sides of quadrilateral are equal.

So now we will check the lengths of the diagonals.

$$AC = \sqrt{(5-4)^2 + (6-3)^2}$$

$$= \sqrt{1+9}$$

$$= \sqrt{10}$$

$$BD = \sqrt{(6-3)^2 + (4-5)^2}$$

$$= \sqrt{9+1}$$

$$= \sqrt{10}$$

All the sides as well as the diagonals are equal. Hence ABCD is a square.

Co-Ordinate Geometry Ex 14.3 Q17

Answer:

Let A (-4,-1); B (-2,-4); C (4,0) and D (2,3) be the vertices of a quadrilateral. We have to prove that the quadrilateral ABCD is a rectangle.

So we should find the lengths of opposite sides of quadrilateral ABCD.

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

= $\sqrt{4+9}$
= $\sqrt{13}$
CD = $\sqrt{(4-2)^2 + (0-3)^2}$
= $\sqrt{4+9}$
= $\sqrt{13}$

Opposite sides are equal. So now we will check the lengths of the diagonals.

$$AC = \sqrt{(4+4)^2 + (0+1)^2}$$

$$= \sqrt{64+1}$$

$$= \sqrt{65}$$

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

$$= \sqrt{16+49}$$

$$= \sqrt{65}$$

Opposite sides are equal as well as the diagonals are equal. Hence ABCD is a rectangle.

Co-Ordinate Geometry Ex 14.3 Q18

Answer:

We have to find the lengths of the medians of a triangle whose co-ordinates of the vertices are A (-1, 3); B (1,-1) and C (5, 1).

So we should find the mid-points of the sides of the triangle.

In general to find the mid-point P(x,y) of two points $A(x_1,y_1)$ and $B(x_2,y_2)$ we use section formula as

$$P(x,y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Therefore mid-point P of side AB can be written as,

$$P(x,y) = \left(\frac{-1+1}{2}, \frac{3-1}{2}\right)$$

Now equate the individual terms to get,

x = 0

y = 1

So co-ordinates of P is (0, 1)

Similarly mid-point Q of side BC can be written as,

$$Q(x,y) = \left(\frac{5+1}{2}, \frac{1-1}{2}\right)$$

Now equate the individual terms to get,

x = 3

y = 0

So co-ordinates of Q is (3, 0)

Similarly mid-point R of side AC can be written as,

$$R(x,y) = \left(\frac{5-1}{2}, \frac{1+3}{2}\right)$$

Now equate the individual terms to get,

$$x = 2$$

$$v = 2$$

So co-ordinates of Q is (2, 2)

Therefore length of median from A to the side BC is,

$$AQ = \sqrt{(-1-3)^2 + (3-0)^2}$$

$$= \sqrt{16+9}$$

$$= \boxed{5}$$

Similarly length of median from B to the side AC is,

$$BR = \sqrt{(1-2)^2 + (-1-2)^2}$$
$$= \sqrt{1+9}$$
$$= \sqrt{10}$$

Similarly length of median from C to the side AB is

$$CP = \sqrt{(5-0)^2 + (1-1)^2}$$
$$= \sqrt{25}$$
$$= \boxed{5}$$

********* END *******