Co-Ordinate Geometry Ex 14.2 Q11

Answer :

The distance *d* between two points (x_1, y_1) and (x_2, y_2) is given by the formula

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

In an equilateral triangle all the sides have equal length.

Here the three points are $A(2a, 4a)$, $B(2a, 6a)$ and $C(2a + a\sqrt{3}, 5a)$.

Let us now find out the lengths of all the three sides of the given triangle.

$$\begin{aligned} AB &= \sqrt{(2a-2a)^2 + (4a-6a)^2} \\ &= \sqrt{(0)^2 + (-2a)^2} \\ &= \sqrt{0 + 4a^2} \\ AB &= 2a \end{aligned}$$

$$\begin{aligned} BC &= \sqrt{(2a-2a-a\sqrt{3})^2 + (6a-5a)^2} \\ &= \sqrt{(-a\sqrt{3})^2 + (a)^2} \\ &= \sqrt{3a^2 + a^2} \\ &= \sqrt{4a^2} \\ BC &= 2a \end{aligned}$$

$$\begin{aligned} AC &= \sqrt{(2a-2a-a\sqrt{3})^2 + (4a-5a)^2} \\ &= \sqrt{(-a\sqrt{3})^2 + (-a)^2} \\ &= \sqrt{3a^2 + a^2} \\ &= \sqrt{4a^2} \\ AC &= 2a \end{aligned}$$

Since all the three sides have equal lengths the triangle has to be an equilateral triangle.

Co-Ordinate Geometry Ex 14.2 Q12

Answer :

The distance *d* between two points (x_1, y_1) and (x_2, y_2) is given by the formula

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

In any triangle the sum of lengths of any two sides need to be greater than the third side.

Here the three points are $A(2,3)$, $B(-4,-6)$ and $C\left(1, \frac{3}{2}\right)$

Let us now find out the lengths of all the three sides of the given triangle.

$$\begin{aligned} AB &= \sqrt{(2+4)^2 + (3+6)^2} \\ &= \sqrt{(6)^2 + (9)^2} \\ &= \sqrt{36 + 81} \\ AB &= \sqrt{117} \end{aligned}$$

$$\begin{aligned} BC &= \sqrt{(-4-1)^2 + (-6-\frac{3}{2})^2} \\ &= \sqrt{(-5)^2 + (\frac{-15}{2})^2} \\ &= \sqrt{25 + \frac{225}{4}} \end{aligned}$$

$BC = \sqrt{81.25}$

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

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

$$= \sqrt{1 + \frac{9}{4}}$$

$AC = \sqrt{3.25}$

Here we see that, $BC + AC \not> AB$

This is in violation of the basic property of any triangle to exist. Therefore these points cannot give rise to a triangle.

Hence we have proved that the given three points do not form a triangle.

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