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Matric No: 19/ENG05/036 MAT 102

Assignment

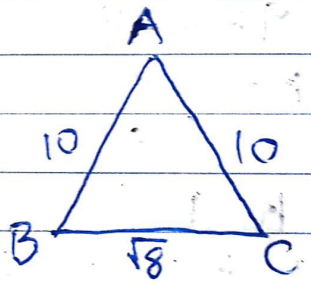
1. Show that the Points A(6,-5), B(-2,1), C(0,3) form an isosceles triangle.

Solution

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

$$\overline{AB} = \sqrt{(-2-6)^2+(1+5)^2}$$
$$= \sqrt{(-8)^2+(6)^2}$$
$$= \sqrt{64+36}$$
$$= \sqrt{100}$$
$$= 10$$

$$\overline{BC} = \sqrt{(0+2)^2+(3-1)^2}$$
$$= \sqrt{(2)^2+(2)^2}$$
$$= \sqrt{8}$$



$$\overline{AC} = \sqrt{(0-6)^2+(3+5)^2}$$
$$= \sqrt{(-6)^2+(8)^2}$$
$$= \sqrt{36+64}$$
$$= \sqrt{100}$$
$$= 10$$

∴ The Points ABC is an isosceles triangle since $\overline{AB} = \overline{AC}$

2. If P, Q and R are Points (5,-3), (-4,9) and (14,-15) respectively, find the ratio in which

a. P divides QR

b. R divides PQ

Solution

a. Let the ratio of division be K:1 by the Point P(5,-3) on QR

Coordinates of $P = \left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$

Mathias Shadrach Ojochogbo 19/ENG05/036

$m_1 : m_2 = K : 1$

$x_1 = -4 \quad , \quad x_2 = 14$

$y_1 = 9 \quad , \quad y_2 = -15$

$\therefore$ Coordinates of $A = \frac{14K - 4}{K+1} , \frac{-15K + 9}{K+1}$

$(3, -3) = \frac{14K - 4}{K+1} , \frac{-15K + 9}{K+1}$

$5 = \frac{14K - 4}{K+1}$

$5K + 5 = 14K - 4$

$5K - 14K = -4 - 5$

$-9K = -9$

$K = \frac{-9}{-9}$

$K = 1$

$\therefore K : 1 = 1 : 1$

So the ratio of division is 1:1

5. Let the ratio of division be $K:1$ by the Point $R(14, -15)$ on PQ

Coordinates of $R = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$

$\frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$

$m_1 : m_2 = K : 1$

$x_1 = 5 \quad , \quad x_2 = -4$

$y_1 = -3 \quad y_2 = 9$

Coordinates of $R = \frac{-4K + 5}{K+1} , \frac{9K - 3}{K+1}$

$(14, -15) = \frac{-4K + 5}{K+1} , \frac{9K - 3}{K+1}$

$14 = \frac{-4K + 5}{K+1}$

Mathias Shadrach Ojochegbe

19/ENG05/1036

$14K + 14 = -4K + 5$

$14K + 4K = 5 - 14$

$18K = -9$

$K = \frac{-9}{18}$

$K = \frac{-1}{2}$

$\therefore$ The ratio of division is $-1:2$