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MAT 102.

19/ENG 05/033

MECHATRONICS ENGINEERING

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

2) if P , Q and R are points $(5, 8)$, $(-4, 9)$ and $(14, -15)$ respectively. Find the ratio (a) P divides QR b) R divides PQ

Solution

1) $A(6, -5)$, $B(-2, 1)$ [$C(0, 3)$]

$$AB = \sqrt{(6 - (-2))^2 + (-5 - 1)^2}$$

$$= \sqrt{8^2 + 6^2}$$

$$= \sqrt{64 + 36}$$

$$= \sqrt{100}$$

$$= \sqrt{100} \text{ Sq Unit} = 10 \text{ Square Unit}$$

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

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

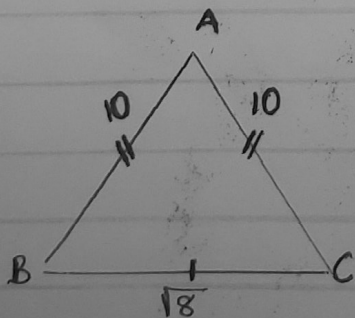
$$= \sqrt{8} \text{ Square unit}$$

$$AC = \sqrt{(0 + 6)^2 + (3 + 5)^2}$$

$$= \sqrt{6^2 + 8^2}$$

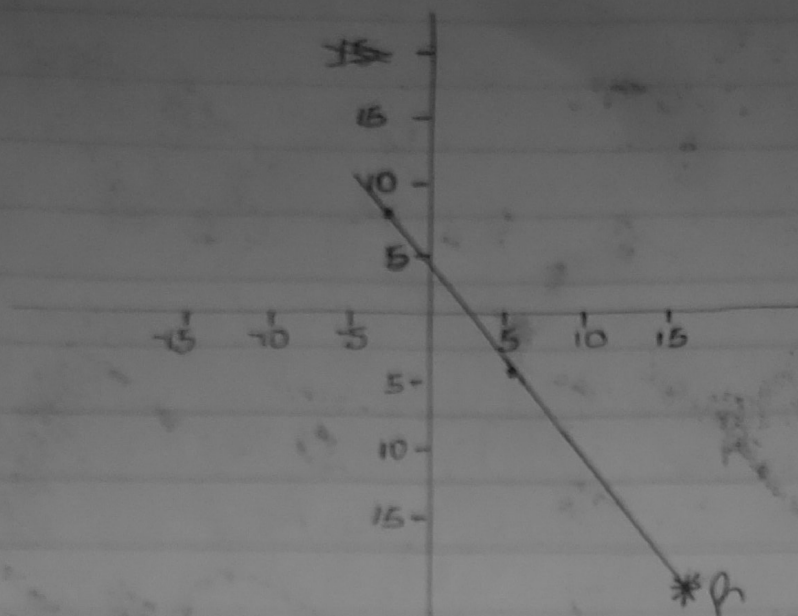
$$= \sqrt{36 + 64}$$

$$= \sqrt{100} \text{ Sq Unit} = 10 \text{ Sq Unit}$$



Isosceles triangle (A, B, C)

2.



a) Internal division $\Rightarrow (x, y) = \left(\frac{x_1 + kx_2}{L+k}, \frac{y_1 + ky_2}{L+k} \right)$

Using x

$$5 = \frac{-4L + 14k}{L+k}$$

$$5L + 5k = 14L + 14k$$

$$9L = 9k$$

The ratio which P divides QR is $1:1$.

b) External division $\Rightarrow (x, y) = \left(\frac{x_1L - x_2k}{L+k}, \frac{y_1L - y_2k}{L+k} \right)$

Using y

$$15 = \frac{9L - (-3)k}{L+k}$$

$$-15L - 15k = 9L + 3k$$

$$-15L - 9L = 3k + 15k$$

$$-24L = 18k$$

$$-4L = 3k$$

$$\frac{4}{k} = \frac{3}{L} \quad ; \quad \frac{k}{L} = \frac{4}{3}$$

The ratio that R divides $PQ = 4:3$