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MECHANICAL ENGINEERING
19/ENG06/016 SERIAL NO. 111
MAT 102 ASSIGNMENT (Mrs. Emeka)

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

Solution

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

$$x_1 = -2, \quad y_1 = 1$$

$$x_2 = 6, \quad y_2 = -5$$

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

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

$$\overline{AB} = \sqrt{100} = 10$$

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

$$x_1 = 0, \quad y_1 = 3$$

$$x_2 = 6, \quad y_2 = -5$$

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

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

$$\overline{AC} = \sqrt{100} = 10$$

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

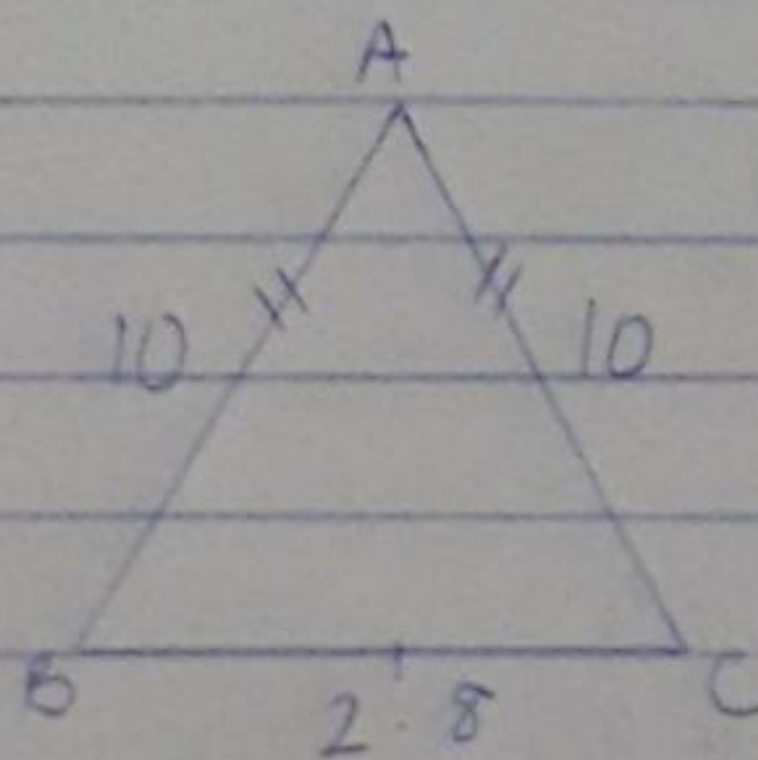
$$x_1 = -2, \quad y_1 = 1$$

$$x_2 = 0, \quad y_2 = 3$$

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

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

$$\overline{BC} = \sqrt{8} = 2.8$$



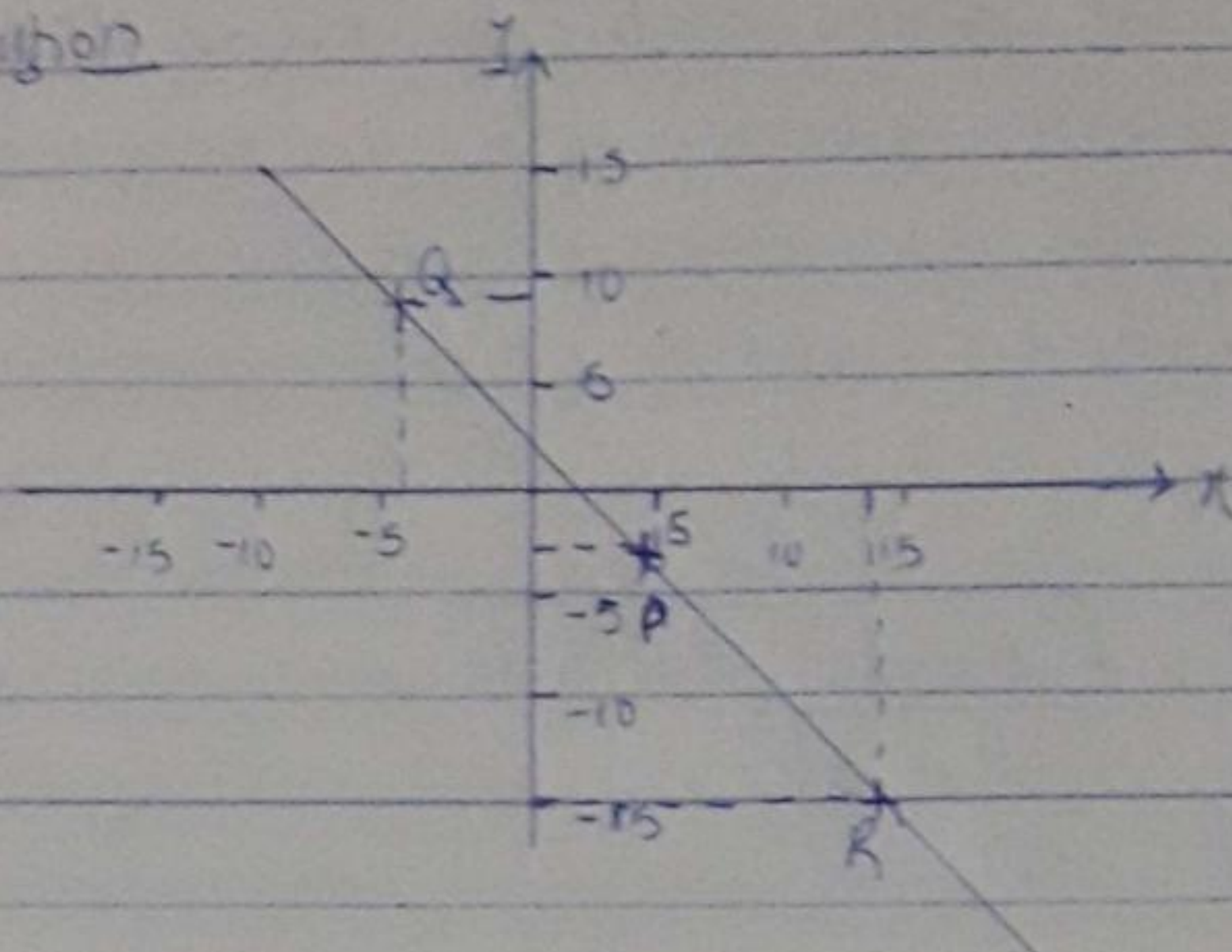
Therefore the points $A(6, -5)$; $B(-2, 1)$; $C(0, 3)$ form an isosceles triangle.

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

a. P divides \overline{QR}

b. R divides \overline{PQ}

Solution



a. P divides \overline{QR} internally,

$$(x_1, y_1) = Q = (-4, 9)$$

$$(x_2, y_2) = R = (14, -15)$$

$$(x, y) = P = (5, -3)$$

Using,

$$x = \frac{lx_1 + kx_2}{l+k}$$

$$5 = \frac{l(-4) + k(14)}{l+k}$$

$$5(l+k) = -4l + 14k$$

$$5l + 5k = -4l + 14k$$

$$5l + 4l = 14k - 5k$$

$$9l = 9k$$

$$l = k$$

$$\therefore \text{ratio } k:l = 1:1$$

b. R divides \overline{PQ} externally,

$$(x_1, y_1) = P = (5, -3)$$

$$(x_2, y_2) = Q = (-4, 9)$$

$$(x, y) = R = (14, -15)$$

Using,

$$K = \frac{Lx_1 - yx_2}{L - K}$$

$$14 = \frac{L(5) - K(-4)}{L - K}$$

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

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

$$9L = 18K$$

$$L = 2K$$

∴ Ratio; $K:L = 2:1$