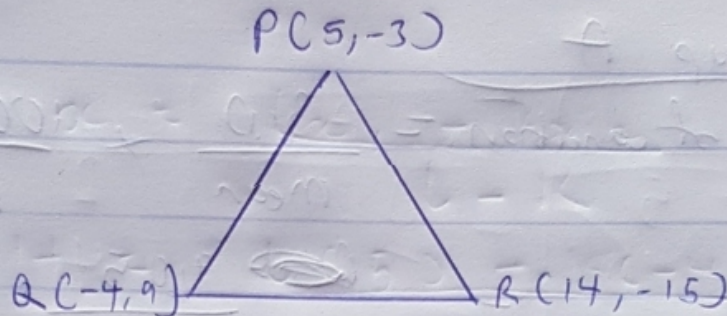


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1)



Prove these points form the Isosceles triangle above

$$\begin{aligned} \overrightarrow{PR} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(14 - 5)^2 + (-15 - (-3))^2} \\ &= \sqrt{81 + 144} \end{aligned}$$

$$\overrightarrow{PR} = 12.7$$

$$\begin{aligned} \overrightarrow{RQ} &= \sqrt{(-4 - 14)^2 + (9 - (-15))^2} \\ &= \sqrt{324 + 576} \end{aligned}$$

$$\overrightarrow{RQ} = 30$$

$$\begin{aligned} \overrightarrow{PQ} &= \sqrt{(-4 - 5)^2 + (9 - (-3))^2} \\ &= \sqrt{81 + 144} \end{aligned}$$

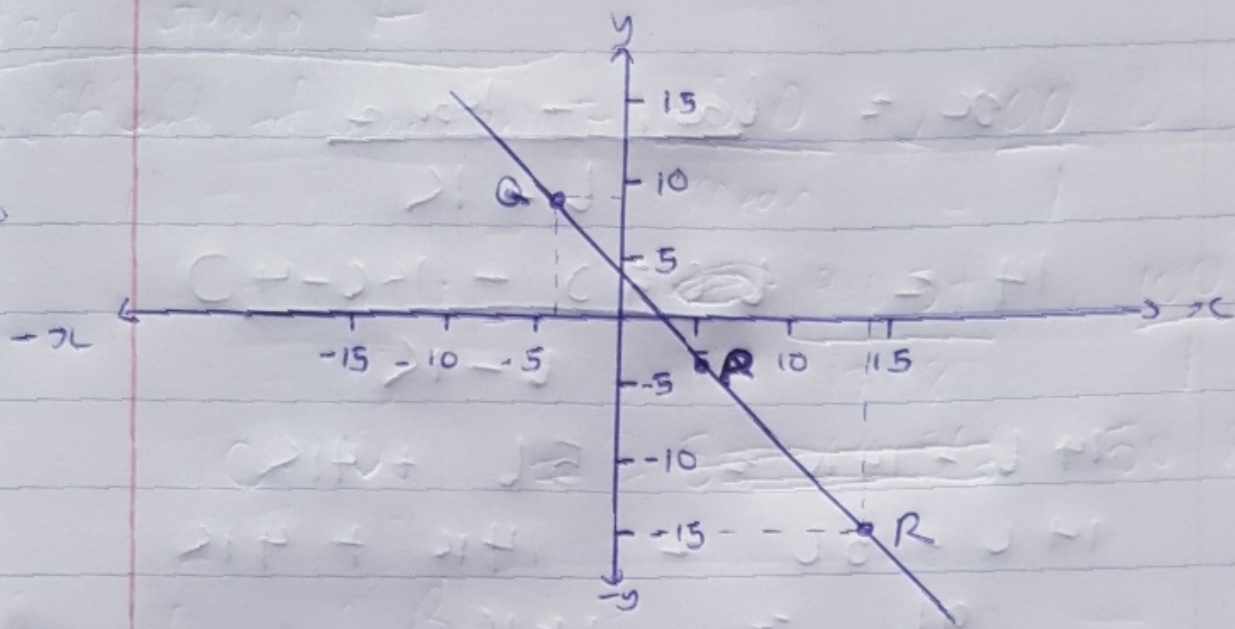
$$\overrightarrow{PQ} = 12.7$$

Since \overrightarrow{PR} and \overrightarrow{PQ} are equal therefore the triangle is an Isosceles triangle.

2.) $P(5, -3)$, $Q(-4, 9)$, $R(14, -15)$

$$x_1 = 5 \quad , \quad y_1 = -3 \quad , \quad x_2 = -4 \quad , \quad y_2 = 9$$

$$x_3 = 14 \quad y_3 = -15$$



a) P divides \overrightarrow{QR} internally

$$(x_1, y_1) = Q \quad (x_2, y_2) = R \quad (x, y) = P$$

$$x = \frac{Lx_1 + Kx_2}{L+K}$$

$$= L+K$$

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

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

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

$$9L = 9K$$

$$L = K$$

$$\text{ratio } K : L = 1 : 1 //$$

b) R divides \overrightarrow{PQ} externally

$$(x_1, y_1) = P \quad (x_2, y_2) = Q \quad (x, y) = R$$

$$x = \frac{6x_1 - 14x_2}{6 - 14}$$

$$14 = \frac{6(5) - 14(-4)}{6 - 14}$$

$$14(6 - 14) = 6(5) + 4(14)$$

$$14(6) - 14(14) = 30 + 56$$

$$84 - 196 = 86$$

$$\text{ratio } 14 : 6 = 2 : 1$$