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 Course \Rightarrow Maths 102
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(i) Show that the points $A(6, -5)$, $B(-2, 1)$ and $C(0, 3)$ form an isosceles triangle.

Solution

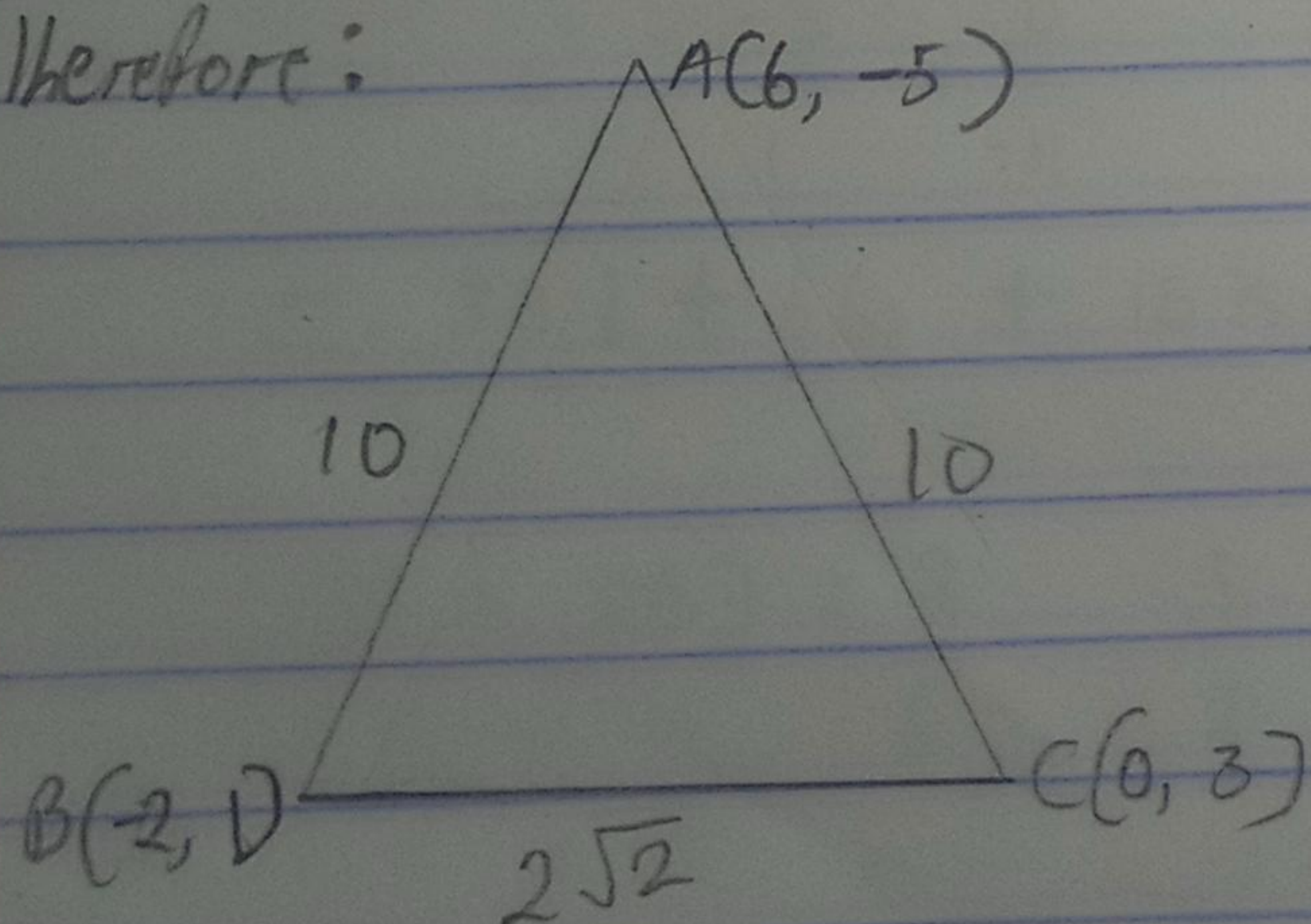
$$\begin{aligned}
 \text{Line } AB (\overline{AB}) &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
 &= \sqrt{(-2 - 6)^2 + (1 + 5)^2} \\
 &= \sqrt{64 + 36}
 \end{aligned}$$

$$= 10$$

$$\begin{aligned}
 \text{Line } BC (\overline{BC}) &= \sqrt{(6 + 2)^2 + (3 - 1)^2} \\
 &= \sqrt{4 + 4} \\
 &= \sqrt{8} \\
 &= 2\sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{Line } AC (\overline{AC}) &= \sqrt{(0 - 6)^2 + (3 + 5)^2} \\
 &= \sqrt{36 + 64} \\
 &= \sqrt{100} \\
 &= 10
 \end{aligned}$$

Therefore:



Note: Diagram not drawn to scale.

Also, since $\overline{AB} = \overline{AC} = 10$, it is an isosceles triangle since only two of its sides are equal.

(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

$$x_1 = 5$$

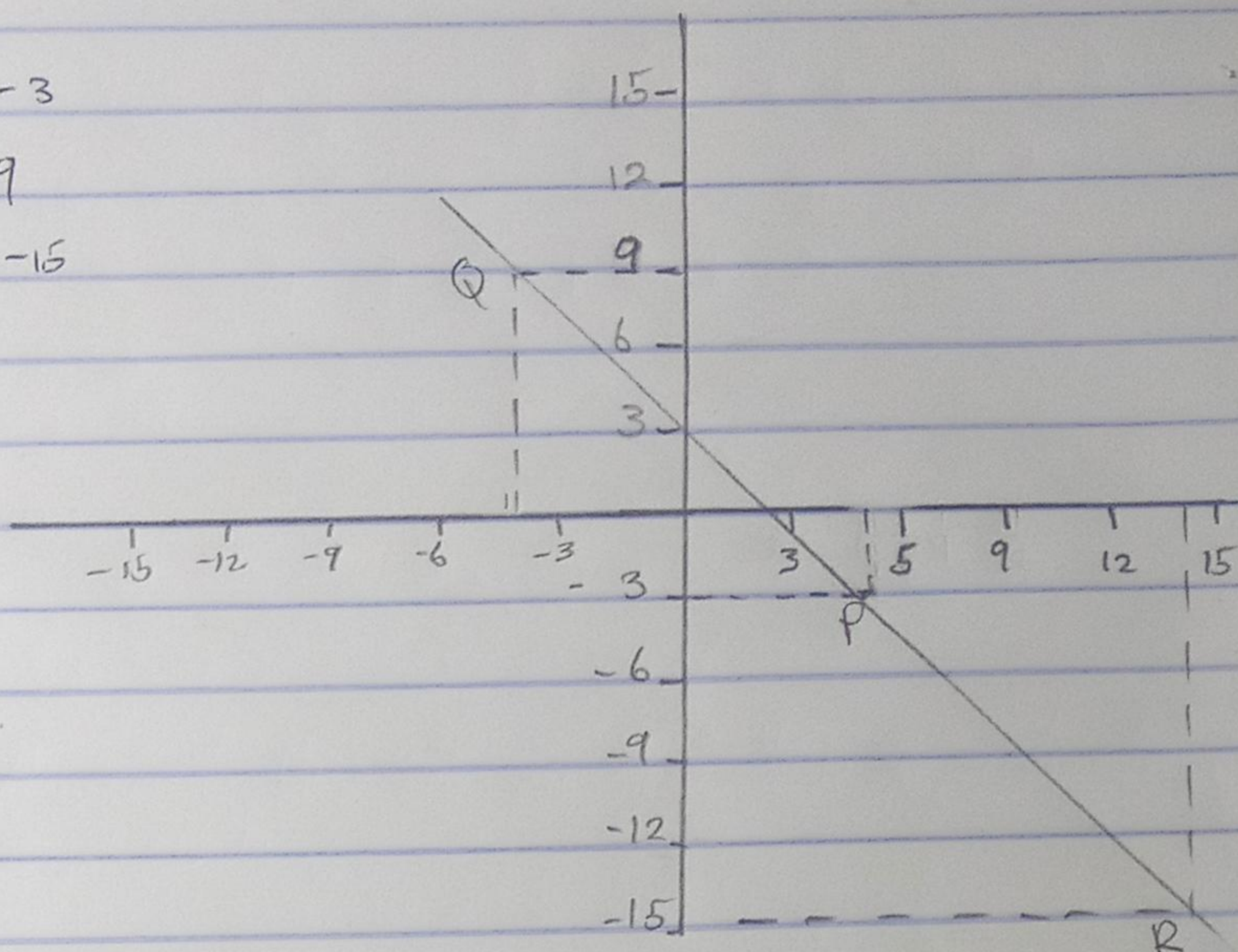
$$y_1 = -3$$

$$x_2 = -4$$

$$y_2 = 9$$

$$x_3 = 14$$

$$y_3 = -15$$



(2a) P divides \overline{QR} internally

$$x_1 = -4$$

$$x = 5$$

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

$$x_2 = 14$$

$$L + K$$

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

$$L + K$$

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

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

$$9L = 9K$$

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

(2b) R divides PQ externally

$$x_1 = -3$$

$$y_2 = 9$$

$$y = -15$$

$$y = \frac{Ly_1 - Ky_2}{L - K}$$

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

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

$$-12L = -24K$$

$$\therefore \text{ratio } K:L = 2:1$$