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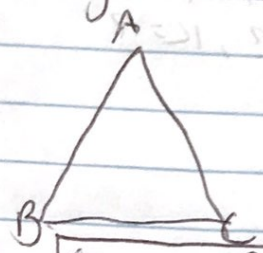
MATH 102

1 Isosceles triangle (not to scale)



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

$\therefore x_1 = 6 \quad y_1 = -5$

$x_2 = -2 \quad y_2 = 1$

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

$= \sqrt{(-8)^2 + (6)^2}$

$AB = \sqrt{64+36} = \sqrt{100}$

$= 10$

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

$= 10$

$x_1 = 6 \quad y_1 = -5$

$x_2 = 0 \quad y_2 \quad 3$

$BC = \sqrt{(0-(-2))^2 + (3-1)^2} = \sqrt{2^2 + 2^2} = \sqrt{4+4} = \sqrt{8}$

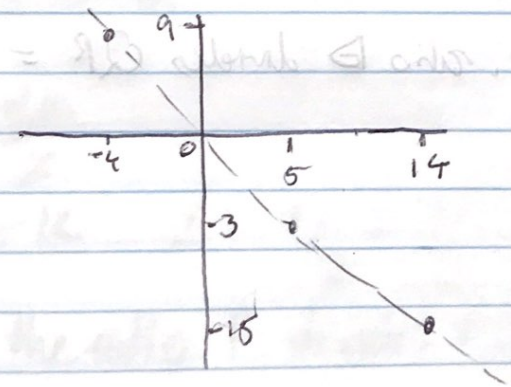
$x_1 = -2 \quad y_1 = 1$

$x_2 = 0 \quad y_2 = 3$

$\therefore AB = AC \quad \therefore$ triangle is an isoceles triangle

Not to scale

2



(ii) Ratio P divides QR

P divides QR internally

$x = \frac{Lx_1 + Kx_2}{L+K}$ $\quad x = 5, x_1 = -4, x_2 = 14$

$L = ?, K = ?$

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

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

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

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

$9L = 9K$

$L = K \therefore \frac{K}{L} = \frac{1}{1}$ ratio is $1:1$

$y = \frac{Ly_1 + Ky_2}{L+K}$ $\quad y = -3, y_1 = 9, y_2 = -15$

$L = ?, K = ?$

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

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

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

$\frac{-12L}{-12} = \frac{-12K}{-12}$

$L = K$

$\frac{L}{K} = \frac{1}{1}$ $\therefore$ ratio P divides QR $= 1:1$

iii) R divides PQ

R divides PQ externally

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

$x_1 = 5,\ x_2 = -4,\ x = 14$

$L = ?,\ K = ?$

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

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

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

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

$$\frac{L}{L} = \frac{2K}{L}$$

$$\frac{1}{2} = \frac{K}{L} \quad \therefore 2:1$$

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

$y_1 = -3,\ y_2 = 9,\ y = -15$

$L = ?,\ K = ?$

$$-15 = \frac{-3L - 9K}{L-K}$$

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

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

$$\frac{-12L}{-12} = \frac{-24K}{-12}$$

$$\frac{L}{2} = \frac{2K}{2}$$

$$\frac{L}{2} = K \quad \therefore \frac{1}{2} = \frac{K}{L}$$

$\therefore$ the ratio R divides PQ = $\underline{\underline{2:1}}$