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M/ENG108/029

Mechanical Engineering

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

$AB = \sqrt{(-8)^2 + (1+5)^2}$

$AB = \sqrt{64 + 36}$

$AB = \sqrt{100}$

$AB = 10$

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

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

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

$= \sqrt{36 + 64}$

$= \sqrt{100}$

$= 10$

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

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

$= \sqrt{4 + 4}$

$= \sqrt{8}$

$= 2.8$

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

a. P divides QR

b. R divides PQ

Solution

a. The value of P $= \left(\frac{kx_2 + x_1}{k+1}, \frac{ky_2 + y_1}{k+1}\right)$

$P(3,3) = \left(\frac{kx_2 + x_1}{k+1}, \frac{ky_2 + y_1}{k+1}\right)$

$\frac{kx_2 + x_1}{k+1} = \frac{3}{1}$ and $\frac{ky_2 + y_1}{k+1} = \frac{3}{1}$

$\frac{14k + (-4)}{k+1} = \frac{3}{1}$ and $3k = 3 - \frac{15k + 9}{k+1} = \frac{3}{1}$

$5k + 5 = 14k - 4$ $\quad -3k - 3 = -15k + 9$

$5k - 14k = -4 - 5$ $\quad -3k + 15k = 9 + 3$

$-9k = -9$ $\quad \frac{12k}{12} = \frac{12}{12}$

$\therefore k = 1$ $\quad k = 1$

$\therefore$ P divides QR in the ratio of 1:1

b) For the ratio in which R divides PQ:

the value of R $= \left(\frac{kx_2 + x_1}{k+1}, \frac{ky_2 + y_1}{k+1}\right)$

$R(14, -15) = \left(\frac{kx_2 + x_1}{k+1}, \frac{ky_2 + y_1}{k+1}\right)$

$R(14, -15)$: $\frac{kx_2 + x_1}{k+1} = \frac{14}{1}$ and $\frac{ky_2 + y_1}{k+1} = \frac{-15}{1}$

$\frac{-4k + 3}{k+1} = \frac{14}{1}$ and $\frac{9k - 3}{k+1} = -15$

$-4k + 3 = 14k + 14$ and $-15k - 15 = 9k - 3$

$-4k - 14k = 14 - 3$ and $-15k - 9k = -3 + 15$

$\frac{-18k}{-18} = \frac{9}{-18}$ and $\frac{-24k}{-24} = \frac{12}{-24}$

$k = -\frac{1}{2}$ and $k = -\frac{1}{2}$

$\therefore$ R divides PQ in the ratio of

$-\frac{1}{2} : 1$ or $1 : 2$