

1.5.26

EE25BTECH11038 - Gnanthik Lucky

Question:

Let **P** and **Q** be the points of trisection of the line segment that join the points **A** (2,-2) and **B** (-7,4) such that **P** is closer to **A**. Find the coordinates of **P** and **Q**.

Solution:

$$\text{Let } A = \begin{pmatrix} 2 \\ -2 \end{pmatrix}, \quad B = \begin{pmatrix} -7 \\ 4 \end{pmatrix}$$

Point P (Nearer to A, Ratio 1 : 2):

$$P = \frac{1}{3}B + \frac{2}{3}A = \frac{1}{3} \begin{pmatrix} -7 \\ 4 \end{pmatrix} + \frac{2}{3} \begin{pmatrix} 2 \\ -2 \end{pmatrix}$$

$$P = \begin{pmatrix} \frac{1 \times (-7) + 2 \times 2}{3} \\ \frac{1 \times 4 + 2 \times (-2)}{3} \end{pmatrix} = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$

Point Q (Further from A, Ratio 2 : 1):

$$Q = \frac{2}{3}B + \frac{1}{3}A = \frac{2}{3} \begin{pmatrix} -7 \\ 4 \end{pmatrix} + \frac{1}{3} \begin{pmatrix} 2 \\ -2 \end{pmatrix}$$

$$Q = \begin{pmatrix} \frac{2 \times (-7) + 1 \times 2}{3} \\ \frac{2 \times 4 + 1 \times (-2)}{3} \end{pmatrix} = \begin{pmatrix} -4 \\ 2 \end{pmatrix}$$

$P = (-1, 0) \quad Q = (-4, 2)$

Graph of the line segment AB with trisection points P and Q

Figs/1.jpg

Fig. 0: Figure for 1.5.26