

1.4.18

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Question

Show that **P**(5,-3) is the point of trisection of the line segment that join the points **A** (7,-2) and **B** (1,-5).

D divides BC in the ratio $k : 1$,

$$\mathbf{D} = \frac{k\mathbf{C} + \mathbf{B}}{k + 1} \quad (1)$$

Theoretical Solution

$$\text{Let } \mathbf{A} = \begin{pmatrix} 7 \\ -2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 1 \\ -5 \end{pmatrix} \quad (2)$$

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

$$\mathbf{P} = (\mathbf{A} \ \mathbf{B}) \begin{pmatrix} \frac{2}{3} \\ \frac{1}{3} \end{pmatrix} \quad (3)$$

$$\Rightarrow \mathbf{P} = \begin{pmatrix} 7 & 1 \\ -2 & -5 \end{pmatrix} \begin{pmatrix} \frac{2}{3} \\ \frac{1}{3} \end{pmatrix} \quad (4)$$

(5)

$$\mathbf{P} = \begin{pmatrix} \frac{1 \times 1 + 2 \times 7}{3} \\ \frac{1 \times -5 + 2 \times (-2)}{3} \end{pmatrix} = \begin{pmatrix} 5 \\ -3 \end{pmatrix} \quad (6)$$

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

$$\mathbf{Q} = (\mathbf{A} \quad \mathbf{B}) \begin{pmatrix} \frac{1}{3} \\ \frac{2}{3} \\ \frac{2}{3} \end{pmatrix} \quad (7)$$

$$\Rightarrow \mathbf{Q} = \begin{pmatrix} 7 & 1 \\ -2 & -5 \end{pmatrix} \begin{pmatrix} \frac{1}{3} \\ \frac{2}{3} \\ \frac{2}{3} \end{pmatrix} \quad (8)$$

(9)

$$\mathbf{Q} = \begin{pmatrix} \frac{2 \times 1 + 1 \times 7}{3} \\ \frac{2 \times (-5) + 1 \times (-2)}{3} \end{pmatrix} = \begin{pmatrix} 3 \\ -4 \end{pmatrix} \quad (10)$$

$$\mathbf{P} = \begin{pmatrix} 5 \\ -3 \end{pmatrix} \quad \mathbf{Q} = \begin{pmatrix} 3 \\ -4 \end{pmatrix} \quad (11)$$

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

figs/fig1.png