

1.1.5.14

EE24BTECH11018 - Durgi Swaraj Sharma

Question:

Points **P** and **Q** trisect the line segment joining the points **A** $(-2, 0)$ and **B** $(0, 8)$ such that **P** is nearer to **A**. Find the coordinates of points **P** and **Q**. (10, 2019)

Solution:

Point	Description	Coordinates
<i>A</i>	One end of the line segment	$A = \begin{pmatrix} -2 \\ 0 \end{pmatrix}$
<i>B</i>	Other end of line segment	$B = \begin{pmatrix} 0 \\ 8 \end{pmatrix}$
<i>P</i>	Point trisecting the line segment and closer to point A	$P = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix}$
<i>Q</i>	The other point trisecting the line segment	$Q = \begin{pmatrix} x_2 \\ y_2 \end{pmatrix}$

Using the section formula,

$$\mathbf{P} = \frac{1}{1 + \frac{1}{2}} \left(\begin{pmatrix} -2 \\ 0 \end{pmatrix} + \frac{1}{2} \begin{pmatrix} 0 \\ 8 \end{pmatrix} \right) = \begin{pmatrix} \frac{-4}{3} \\ \frac{8}{3} \end{pmatrix} \quad (0.1)$$

$$\mathbf{Q} = \frac{1}{1 + \frac{1}{2}} \left(\begin{pmatrix} -2 \\ 0 \end{pmatrix} + \frac{2}{1} \begin{pmatrix} 0 \\ 8 \end{pmatrix} \right) = \begin{pmatrix} \frac{-2}{3} \\ \frac{16}{3} \end{pmatrix} \quad (0.2)$$

which are the desired points of trisection.

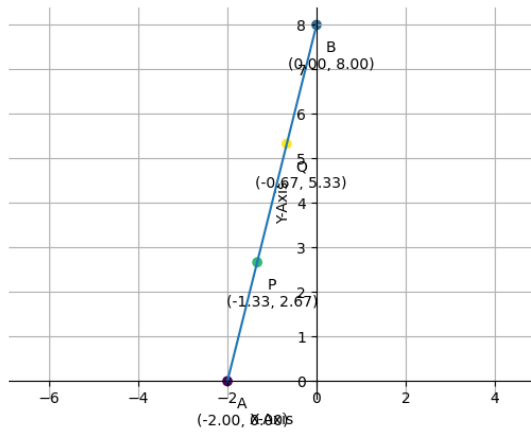


Fig. 0.1: Points of trisection of A and B.