

CHAPTER-7
COORDINATE GEOMETRY

Exercise 10.7.2.9

1. Find the coordinates of the point which divides the line segment joining $(-2, 2)$ and $(2, 8)$ into four equal parts

Solution:

Let the points **X,Y,Z** which divide the line into 4 equal parts

Point	Ratio	Value
X	Ratio of AXB	3:1
Y	Ratio of AYB	2:2
Z	Ratio of AZB	1:3

coordinates and ratio are given as:

$$\mathbf{A} = \begin{pmatrix} -2 \\ 2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 2 \\ 8 \end{pmatrix}, \quad (1)$$

1. Using section formula for n :

$$n = 3 \quad (2)$$

$$\mathbf{R}_1 = \frac{\mathbf{B} + n\mathbf{A}}{1 + n} \quad (3)$$

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

$$= \frac{1}{4} \left(\begin{pmatrix} 2 \\ 8 \end{pmatrix} + \begin{pmatrix} -6 \\ 6 \end{pmatrix} \right) \quad (5)$$

$$= \frac{1}{4} \begin{pmatrix} -4 \\ 14 \end{pmatrix} \quad (6)$$

$$= \begin{pmatrix} -1 \\ \frac{7}{2} \end{pmatrix} \quad (7)$$

2. Using section formula for n :

$$n = 1 \tag{8}$$

$$\mathbf{R}_2 = \frac{\mathbf{B} + n\mathbf{A}}{1 + n} \tag{9}$$

$$= \frac{1}{1 + 1} \left(\binom{2}{8} + 1 \binom{-2}{2} \right) \tag{10}$$

$$= \frac{1}{2} \left(\binom{2}{8} + 1 \binom{-2}{2} \right) \tag{11}$$

$$= \frac{1}{2} \binom{0}{10} \tag{12}$$

$$= \binom{0}{5} \tag{13}$$

3. Using section formula for n :

$$n = \frac{1}{3} \tag{14}$$

$$\mathbf{R}_3 = \frac{\mathbf{B} + n\mathbf{A}}{1 + n} \tag{15}$$

$$= \frac{1}{1 + \frac{1}{3}} \left(\binom{2}{8} + \frac{1}{3} \binom{-2}{2} \right) \tag{16}$$

$$= \frac{1}{\frac{4}{3}} \left(\binom{2}{8} + \binom{\frac{-2}{3}}{\frac{2}{3}} \right) \tag{17}$$

$$= \frac{3}{4} \binom{\frac{4}{3}}{\frac{26}{3}} \tag{18}$$

$$= \binom{1}{\frac{13}{2}} \tag{19}$$

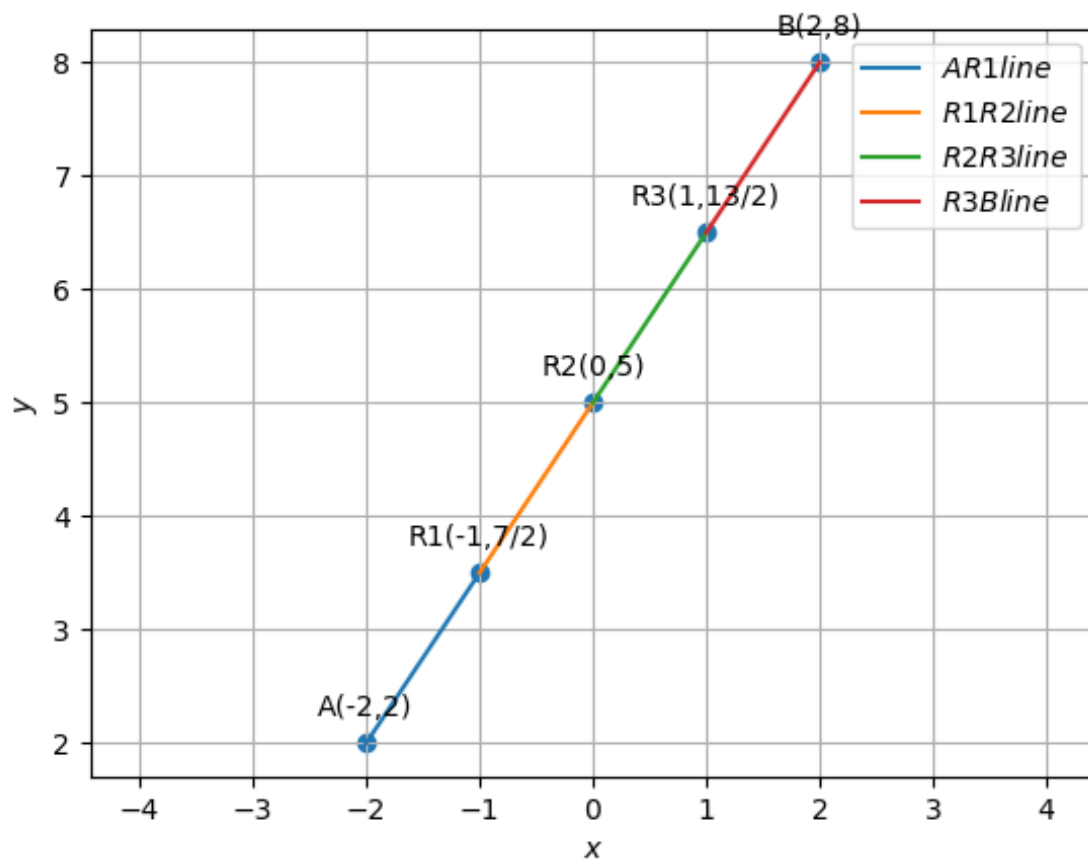


Figure 1: