

# 1.4.9k

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## Question:

Find the position vector of a point **R** which divides the line joining two points **P** and **Q** whose position vectors are  $\hat{i} + 2\hat{j} - \hat{k}$  and  $-\hat{i} + \hat{j} + \hat{k}$  respectively, in the ratio 2 : 1

- 1) internally
- 2) externally

## Solution:

- 1) Using section formula (??), the desired point is

$$\mathbf{R} = \frac{\mathbf{Q} + \frac{1}{2}\mathbf{P}}{1 + \frac{1}{2}} = \frac{1}{1 + \frac{1}{2}} \left( \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix} + \frac{1}{2} \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} \right) = \begin{pmatrix} -\frac{1}{3} \\ \frac{4}{3} \\ \frac{1}{3} \end{pmatrix} \quad (1.1)$$

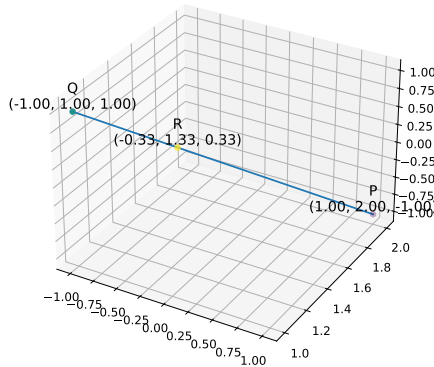


Fig. 1.1: R divides PQ internally in the ratio 2:1

- 2) Using section formula (??), the desired point is

$$\mathbf{R} = \frac{\mathbf{Q} - \frac{1}{2}\mathbf{P}}{1 - \frac{1}{2}} = \frac{1}{1 - \frac{1}{2}} \left( \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix} - \frac{1}{2} \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} \right) = \begin{pmatrix} -3 \\ 0 \\ 3 \end{pmatrix} \quad (2.1)$$

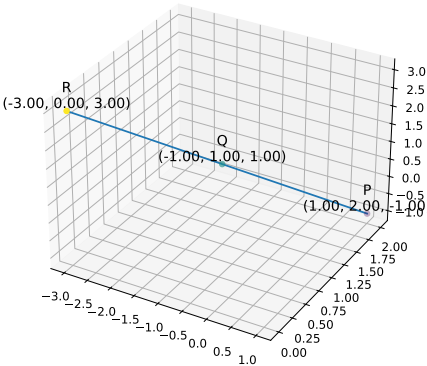


Fig. 2.1: R divides PQ externally in the ratio 2:1