

# 1.6.10

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## Question:

Show that the points  $A(1, -2, -8)$ ,  $B(5, 0, -2)$  and  $C(11, 3, 7)$  are collinear, and find the ratio in which  $B$  divides  $AC$ .

## Solution:

| Term | Description                           |
|------|---------------------------------------|
| $X$  | Equation of line passing through $AB$ |

TABLE 1: Terms used

The equation of line passing through  $A$  and  $B$  is:

$$X = \begin{pmatrix} 1 \\ -2 \\ -8 \end{pmatrix} + k \begin{pmatrix} 4 \\ 2 \\ 6 \end{pmatrix} \quad (0.1)$$

If  $k = 2.5$  then,  $x = C$

So,  $C$  also lies on the line passing through  $A$  and  $B$ , hence  $A$ ,  $B$  and  $C$  are collinear.

Let  $B$  divides  $AC$  in the ratio  $n:1$  then,

$$B = \frac{nC + A}{n + 1} \quad (0.2)$$

so,

$$\begin{pmatrix} 5 \\ 0 \\ -2 \end{pmatrix} = \frac{1}{n + 1} \begin{pmatrix} 11n + 1 \\ 3n - 2 \\ 7n - 8 \end{pmatrix} \quad (0.3)$$

Therefore,  $n = \frac{2}{3}$

Hence,  $B$  divides  $AC$  in the ratio  $2:3$

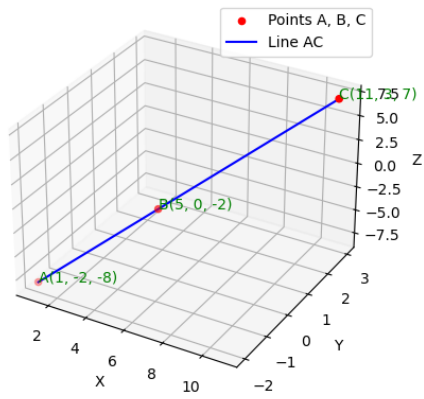


Fig. 0.1: Plot showing the velocity vectors