A particle travels first half of the total time with speed v_1 and second half time with speed v_2. Find the average speed during the complete journey.

Solution

$t : v_1$ $t : _{12}$

A ———————————————— B
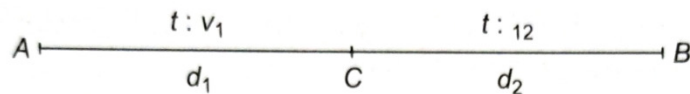
d_1 C d_2

Fig. 6.8

$$d_1 = v_1 t \quad \text{and} \quad d_2 = v_2 t$$

$$\text{Average speed} = \frac{\text{total distance}}{\text{total time}} = \frac{d_1 + d_2}{t + t} = \frac{v_1 t + v_2 t}{2t} = \frac{v_1 + v_2}{2} \qquad \textbf{Ans.}$$