

Raman covers one-fourth of his total journey with a speed of  $v_1$  m/s and the remaining journey with a speed of  $v_2$  m/s find his average speed

**Solution:**

Average velocity is determined by dividing the distance travelled by the time it takes to travel that far:

$$v_{\text{average}} = \frac{\text{distance}}{\text{time}} = \frac{S}{t} = \frac{S}{t_{AB} + t_{BC}} \quad (1)$$

$$\text{distance AB: } t_{AB} = \frac{S_{AB}}{v_1} = \frac{\frac{S}{4}}{v_1} = \frac{S}{4v_1} \quad (2)$$

$$\text{distance BC: } t_{BC} = \frac{S_{BC}}{v_2} = \frac{S - \frac{S}{4}}{v_2} = \frac{3S}{4v_2} \quad (3)$$

(3) and (2) in (1):

$$v_{\text{average}} = \frac{S}{\frac{S}{4v_1} + \frac{3S}{4v_2}} = \frac{S}{\frac{S(v_2 + 3v_1)}{4v_1v_2}} = \frac{4v_1v_2}{v_2 + 3v_1}$$

**Answer:** average speed is  $\frac{4v_1v_2}{v_2 + 3v_1}$

