A particle travels half of the distance of a straight journey with speed 6m/s .the remaining part of distance is covered with speed 2m/s for half of the time of remaining journey and with speed 4m/s for the other half of time .the average speed of the particle is

Solution

Let the total distance be d.

In the first part of journey particle travels distance $\frac{d}{2}$ with speed 6m/s, so corresponding time:

$$t_1 = \frac{\frac{d}{2}}{6} = \frac{d}{12} s.$$

The times of second and third parts of journey are equal $t_2 = t_3$. The sum of distances of these parts are $\frac{d}{2}$. Let the distance of second part of journey be x. Then

$$t_2 = t_3 \rightarrow \frac{x}{2} = \frac{\frac{d}{2} - x}{4} \rightarrow x = \frac{d}{6} m,$$

$$t_2 = \frac{\frac{d}{6}}{2} = \frac{d}{12} = t_3.$$

Total time of journey:

$$T = t_1 + t_2 + t_3 = 3\frac{d}{12} = \frac{d}{4} s$$

Average Speed:

$$V = \frac{d}{T} = 4\frac{m}{s}.$$

Answer: $4\frac{m}{s}$.