

Solve.

1) A train travels at a speed of 60km/h for 0.52hours at 30km/h for the next 0.24 and then at 70km/h for the next 0.71hours.Calculate average speed for the entire train journey?

2) A train travels a distance of 15km at a uniform speed of 30km/h, the next 75km at a uniform speed of 50km/h and the last 10km at a uniform speed of 20km/h. Calculate average speed for the entire train journey?

Both questions require that the DEFINITION of average speed be followed:

AVG speed = total distance traveled / total time to travel this distance

1) Solution.

$$v_1 = 60 \frac{\text{km}}{\text{h}}$$

$$t_1 = 0.52 \text{ h}$$

$$v_2 = 30 \frac{\text{km}}{\text{h}}$$

$$t_2 = 0.24 \text{ h}$$

$$v_3 = 70 \frac{\text{km}}{\text{h}}$$

$$t_3 = 0.71 \text{ h}$$

$$V_{\text{avg}} - ?$$

The definition of average speed is:

$$V_{\text{avg}} = \frac{S_1 + S_2 + S_3}{t_1 + t_2 + t_3}$$

Find the distance of the first part of journey:

$$S_1 = v_1 \cdot t_1 = 60 \cdot 0.52 = 31.2 \text{ km}$$

Find the distance of the second part of journey:

$$S_2 = v_2 \cdot t_2 = 30 \cdot 0.24 = 7.2 \text{ km}$$

Find the distance of the third part of journey:

$$S_3 = v_3 \cdot t_3 = 70 \cdot 0.71 = 49.7 \text{ km}$$

The AVG speed is:

$$V_{\text{avg}} = \frac{S_1 + S_2 + S_3}{t_1 + t_2 + t_3} = \frac{31.2 + 7.2 + 49.7}{0.52 + 0.24 + 0.71} = 59.9 \approx 60 \frac{\text{km}}{\text{h}}$$

Answer: $60 \frac{\text{km}}{\text{h}}$

2) **Solution.**

$$v_1 = 30 \frac{\text{km}}{\text{h}}$$

$$S_1 = 15 \text{ km}$$

$$v_2 = 50 \frac{\text{km}}{\text{h}}$$

$$S_2 = 75 \text{ km}$$

$$v_3 = 20 \frac{\text{km}}{\text{h}}$$

$$S_3 = 10 \text{ km}$$

$$V_{\text{avg}} - ?$$

The definition of average speed is:

$$V_{\text{avg}} = \frac{S_1 + S_2 + S_3}{t_1 + t_2 + t_3}$$

Calculate the separate time increments for each part of the journey:

$$t_1 = \frac{S_1}{v_1} = \frac{15}{30} = 0.5 \text{ h}$$

$$t_2 = \frac{S_2}{v_2} = \frac{75}{50} = 1.5 \text{ h}$$

$$t_3 = \frac{S_3}{v_3} = \frac{10}{20} = 0.5 \text{ h}$$

The AVG speed is:

$$V_{\text{avg}} = \frac{S_1 + S_2 + S_3}{t_1 + t_2 + t_3} = \frac{15 + 75 + 10}{0.5 + 1.5 + 0.5} = \frac{100}{2.5} = 40 \frac{\text{km}}{\text{h}}$$

Answer: $40 \frac{\text{km}}{\text{h}}$