

Answer on Question #50328 – Physics – Other

1. Sally travels by car from one city to another. She drives for 20.0 min at 84.0 km/h, 55.0 min at 40.0 km/h, and 23.0 min at 77.0 km/h, and she spends 11.0 min eating lunch and buying gas. Determine the average speed for the trip.

$$\begin{aligned}
 t_1 &= \frac{1}{3} h \\
 v_1 &= 84 \frac{\text{km}}{\text{h}} \\
 t_2 &= \frac{11}{12} h \\
 v_2 &= 40 \frac{\text{km}}{\text{h}} \\
 t_3 &= \frac{23}{60} h \\
 v_3 &= 77 \frac{\text{km}}{\text{h}} \\
 t_4 &= \frac{11}{60} h \\
 \hline
 \bar{v} &= ?
 \end{aligned}$$

Solution.

The average speed can be found if we the total distance divide by the elapsed time:

$$\bar{v} = \frac{l_1 + l_2 + l_3}{t_1 + t_2 + t_3 + t_4} = \frac{v_1 t_1 + v_2 t_2 + v_3 t_3}{t_1 + t_2 + t_3 + t_4}.$$

$$\text{Let check the dimension: } [\bar{v}] = \frac{\frac{\text{km}}{\text{h}} \cdot \text{h}}{\text{h}} = \frac{\text{km}}{\text{h}}.$$

$$\text{Let evaluate the quantity: } \bar{v} = \frac{84 \cdot \frac{1}{3} + 40 \cdot \frac{11}{12} + 77 \cdot \frac{23}{60}}{\frac{1}{3} + \frac{11}{12} + \frac{23}{60} + \frac{11}{60}} = 51.84 \left(\frac{\text{km}}{\text{h}} \right).$$

Answer: $51.84 \frac{\text{km}}{\text{h}}$.