

Answer on Question #45619, Physics, Mechanics | Kinematics | Dynamics

Sally travels by car from one city to another. She drives for 21.0 min at 76.0 km/h, 53.0 min at 40.0 km/h, and 49.0 min at 49.0 km/h, and she spends 6.0 min eating lunch and buying gas. Determine the average speed for the trip.

Solution:

The average speed during the course of a motion is often computed using the following formula:

$$\text{Average Speed} = \frac{\text{Distance Traveled}}{\text{Time of Travel}}$$
$$v_{av} = \frac{d_1 + d_2 + d_3 + d_4}{t_1 + t_2 + t_3 + t_4}$$

$$v_1 = 76.0 \text{ km/h,}$$

$$v_2 = 40.0 \text{ km/h,}$$

$$v_3 = 49.0 \text{ km/h,}$$

$$v_4 = 0,$$

$$t_1 = 21 \text{ min} = \frac{21}{60} = 0.35 \text{ hour,}$$

$$t_2 = 53 \text{ min} = \frac{53}{60} = 0.883 \text{ hour,}$$

$$t_3 = 49 \text{ min} = \frac{49}{60} = 0.817 \text{ hour,}$$

$$t_4 = 6 \text{ min} = \frac{6}{60} = 0.1 \text{ hour,}$$

$$d_1 = v_1 t_1 = 76 \cdot 0.35 = 26.6 \text{ km}$$

$$d_2 = v_2 t_2 = 40 \cdot 0.883 = 35.32 \text{ km}$$

$$d_3 = v_3 t_3 = 49 \cdot 0.817 = 40.033 \text{ km}$$

$$d_4 = v_4 t_4 = 0 \text{ km}$$

The average speed

$$v_{av} = \frac{26.6 + 35.32 + 40.033 + 0}{0.35 + 0.883 + 0.817 + 0.1} = 47.42 \text{ km/h}$$

Answer: $v_{av} = 47.4 \text{ km/h}$