

Answer on Question #45172, Physics, Mechanics | Kinematics | Dynamics

Sally travels by car from one city to another. She drives for 29.0 min at 79.0 km/h, 31.0 min at 33.0 km/h, and 15.0 min at 26.0 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:

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

$$v_1 = 79 \text{ km/h,}$$

$$v_2 = 33 \text{ km/h,}$$

$$v_3 = 26 \text{ km/h,}$$

$$v_4 = 0 \text{ km/h,}$$

$$t_1 = 29 \text{ min} = \frac{29}{60} \text{ hour} = 0.483 \text{ hour,}$$

$$t_2 = 31 \text{ min} = \frac{31}{60} \text{ hour} = 0.517 \text{ hour,}$$

$$t_3 = 15 \text{ min} = \frac{15}{60} \text{ hour} = 0.25 \text{ hour,}$$

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

The distance is

$$d = vt$$

Thus,

$$d_1 = 79 \cdot 0.483 = 38.157 \text{ km}$$

$$d_2 = 33 \cdot 0.517 = 17.061 \text{ km}$$

$$d_3 = 26 \cdot 0.25 = 6.5 \text{ km}$$

$$d_4 = 0$$

The average speed

$$v_{av} = \frac{38.157 + 17.061 + 6.5 + 0}{0.483 + 0.517 + 0.25 + 0.1} = 45.7 \text{ km/h}$$

Answer: $v_{av} = 45.7 \text{ km/h.}$