Answer on Question #47214 – Physics - Mechanics | Kinematics | Dynamics

Sally travels by car from one city to another. She drives for 30.0 min at 76.0 km/h, 39.0 min at 32.0 km/h, and 11.0 min at 33.0 km/h, and she spends 14.0 min eating lunch and buying gas.
(a) Determine the average speed for the trip?

Solution:

$Time\ t_1 = 0.5\ hour\ at\ velocity\ V_1 = 76\dfrac{km}{h};$

$Time\ t_2 = 0.65\ hour\ at\ velocity\ V_2 = 32\dfrac{km}{h};$

$Time\ t_3 = 0.183\ hour\ at\ velocity\ V_3 = 33\dfrac{km}{h};$

$Time\ t_4 = 0.23\ hour\ at\ velocity\ V_4 = 0;$

The average speed is the total distance divided by the total travel time.
$$V_a = \frac{S}{t} \quad (1)$$

The total distance is
$$S = S_1 + S_2 + S_3 + S_4 = V_1 t_1 + V_2 t_2 + V_3 t_3 + V_4 t_4 \quad (2)$$
The total time is
$$t = t_1 + t_2 + t_3 + t_4 \quad (3)$$
$$(3) and (2) in (1):$$
$$V_a = \frac{V_1 t_1 + V_2 t_2 + V_3 t_3 + V_4 t_4}{t_1 + t_2 + t_3 + t_4} =$$
$$= \frac{0.5\,\text{h} \cdot 76\dfrac{km}{h} + 0.65\,\text{h} \cdot 32\dfrac{km}{h} + 0.183\,\text{h} \cdot 33\dfrac{km}{h} + 0.23\,\text{h} \cdot 0}{0.5\,\text{h} + 0.65\,\text{h} + 0.183\,\text{h} + 0.23\,\text{h}} = 41.5\dfrac{km}{h}$$

Answer: average speed for the trip is $41.5\dfrac{km}{h}$