Quiz #2A

Clearly indicate (with a box) your answers to the following questions. SHOW ALL WORK.

1. A car drives along a straight road for 35 minutes with an average velocity of 57 miles/hour. The driver stops for a rest break for 11 minutes and finishes the trip with another 41 minute drive. The average velocity for the total trip is 53 miles/hour. What was the average velocity of the driver (in miles/hour) for the last part of the drive?

A: $\Delta t_A = 35\ min = 0.583\ hr$

$\bar{V}_A = 57\ mi/hr$

$\Delta x_A = (57)(.583) = 33.25\ mi$

B: $\Delta t_B = 11\ min = 0.183\ hr$

$\bar{V}_B = 0$

$\Delta x_B = 0$

C: $\Delta t_C = 41\ min = 0.683$

$\bar{V}_C = ?$

$\Delta x_C = ?$

$$\bar{V}_{tot} = 53\ \frac{mi}{hr} = \frac{\Delta x_A + \Delta x_B + \Delta x_C}{t_A + t_B + t_C}$$

$$53 = \frac{33.25 + 0 + \Delta x_C}{0.583 + .183 + .683} = \frac{33.25 + \Delta x_C}{1.45}$$

$$53(1.45) = 33.25 + \Delta x_C$$

$$\Delta x_C = 43.6$$

$$\bar{V}_C = \frac{43.6}{0.683} = 63.8$$

$$\boxed{\bar{V}_C = 64\ \frac{mi}{hr}}$$

2. A car sees a traffic light turn red and tries to come to stop without entering the intersection, 55 meters away. The initial speed of the car is 47 miles/hour, and the car's acceleration is -3.5 meters/sec^2. Does the car stop before reaching the intersection?

$\Delta x = ?$

$V_0 = 47 \frac{mi}{hr} = 21 \frac{m}{s}$

$V = 0$

$a = -3.5 \frac{m}{s^2}$

$t = ?$

$V^2 = V_0^2 + 2a\Delta x$

$0^2 = (21)^2 - 7\Delta x$

$\Delta x = \frac{-21^2}{-7} = \boxed{63 m}$

Car doesn't stop in time

3. A hot air balloon is descending at a rate of 7.0 meters/sec. A small ball is dropped from the balloon, hitting the ground 3.2 seconds later. How far above the ground is the balloon at the moment the ball is dropped?

$\Delta x =$

$v_0 = -7.0\ m/s$

$v = ?$

$a = -9.8\ m/s^2$

$t = 3.2\ s$

$$\Delta x = v_0 t + \frac{1}{2} a t^2$$

$$= -7.0(3.2) - 4.9(3.2)^2$$

$$= -72.58$$

73 m above ground