Name_____

Physics 120 Quiz #1, April 6, 2007

$x_f = x_i + v_{i,x}t + \frac{1}{2}a_x t^2$

$v_f = v_i + a_x t$

$v_f^2 = v_f^2 + 2a_x \Delta x$

$\vec{F} = m\vec{a}$

$g = 9.8 \frac{m}{s^2}$

$1hr = 3600s$

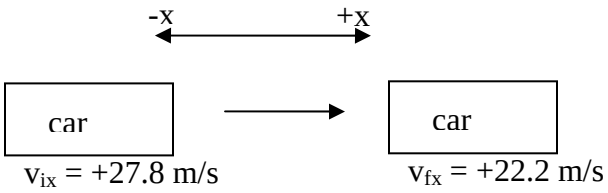
$1mi = 1600m$

Solutions to $Ax^2 + Bx + C$ are given as $x = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$

Please show all work in order to receive partial credit. The quiz is worth 10 points total.

1. Spotting a police car, you apply the breaks in your Porsche to slow down from a speed of 27.8 m/s (~100 km/hr ~ 61mph) to a speed of 22.2 m/s (~80 km/hr ~ 54 mph) during a distance of 88m.

   a. Draw the problem below, making sure you label all relevant quantities for the car. (Here it does not matter how far away the police car is from your car.)



   b. What is the acceleration (in m/s^2) of your car? (Don't forget that accelerations are vectors.)

$$v_{fx}^2 = v_{ix}^2 + 2a\Delta x \rightarrow a = \frac{v_{fx}^2 - v_{ix}^2}{2\Delta x}$$

$$a = \frac{\left[\left(22.2 \frac{m}{s}\right)^2 - \left(27.8 \frac{m}{s}\right)^2\right]}{2 \times 88m} = -1.58 \frac{m}{s^2}$$ or -1.58 $\frac{m}{s^2}$ in the negative x-direction.

   c. How much time is required for this decrease in speed?

$$v_{fx} = v_{ix} + a_x t \rightarrow t = \frac{v_{fx} - v_{ix}}{a_x} = \frac{22.2 \frac{m}{s} - 27.8 \frac{m}{s}}{-1.58 \frac{m}{s^2}} = 3.54s$$

2. The following equations give the velocity *v(t)* of a particle in four situations. In which is the acceleration of the particle constant?

   (a.) $v = 3$ b. $v = 4t^2 - 6$ c. $v = 3t^2 - 5t + 4$ (d.) $v = -4t + 5$