Use the following equations to answer the problems below:

$$v_1 = v_2 - (a x t)$$

$$a = 10 \, m/s^2$$

$$v_2 = (a x t) + v_1$$

$$t = \frac{v_2 - v_1}{a}$$

- 1. If a penny dropped from the top of the Sears Tower takes 120 seconds to reach the ground, how fast would the penny be traveling when it hit the ground?
- 2. If you dropped a penny and a bowling ball off the top of the tower at the same time, which one would hit the ground first? Why?
- 3. If a base jumper stands at the edge of a cliff and then jumps off, how fast will she be traveling after 4.5 seconds?
- 4. Imagine you throw a ball straight down out of a helicopter:
  - a. If the ball is traveling at a velocity of 180 m/s after it has been falling for 15 seconds, how fast did you throw the ball?
  - b. Using the velocity you calculated in part a, how fast would the ball be traveling after 20 seconds?

**Directions:** The following d vs. t graphs were made of a car's motion. To the right of each graph choose the logical distances covered by the car as shown by the graph for the time periods indicated. For the first five second choices you will have to decide whether the car was moving or not. For the last five seconds you will have to decide whether the car maintained it's motion or if it increased or decreased the rate at which it was covering distance. Then choose what a driver would have to do to make such a graph.

d vs. t graphs	d first 5 s	d last 5 s	driver's actions
0 5 10 15	a) 0 m b) 20 m	a) 0 m b) 10 m c) 20 m d) 30 m	a) car in park b) drive - cruise control c) drive - step on the gas d) drive - step on the brake e) reverse - cruise control f) reverse - step on the gas
0 5 10 15	a) 0 m b) 20 m	a) 0 m b) 10 m c) 20 m d) 30 m	a) car in park b) drive - cruise control c) drive - step on the gas d) drive - step on the brake e) reverse - cruise control f) reverse - step on the gas
0 5 10 15	a) 0 m b) 20 m	a) 0 m b) 10 m c) 20 m d) 30 m	a) car in park b) drive - cruise control c) drive - step on the gas d) drive - step on the brake e) reverse - cruise control f) reverse - step on the gas
0 5 10 15	a) 0 m b) 20 m	a) 0 m b) 10 m c) 20 m d) 30 m	a) car in park b) drive - cruise control c) drive - step on the gas d) drive - step on the brake e) reverse - cruise control f) reverse - step on the gas
0 5 10 15	a) 0 m b) 20 m	a) 0 m b) 10 m c) 20 m d) 30 m	a) car in park b) drive - cruise control c) drive - step on the gas d) drive - step on the brake e) reverse - cruise control f) reverse