1) What is the objective of this experiment?

2) Lisa the Cannoneer wheels her cannon to the edge of a sheer cliff, so that when she fires her cannonball, it becomes a projectile exactly 100 m above the long, flat plains that stretch into the distance below. Assume that the origin of our xy-coordinate system is at the base of the cliff, 100 m directly below the muzzle of the cannon. Lisa fires her cannon horizontally. Fill in the columns below as you answer parts a and b.

<u>x-dimension</u>

$$v_x = v_{ox} + a_x t$$

$$x = x_o + v_{ox}t + \frac{1}{2}a_x t^2$$

$$v_x^2 = v_{ox}^2 + 2a_x(x - x_o)$$

$$x_o =$$

$$x =$$

$$v_{ox} =$$

$$v_x =$$

$$a_x =$$

$$t =$$

<u>y-dimension</u>

$$v_y = v_{oy} + a_y t$$

$$y = y_o + v_{oy}t + \frac{1}{2}a_y t^2$$

$$v_y^2 = v_{oy}^2 + 2a_y(y - y_o)$$

$$y_o =$$

$$y =$$

$$v_{oy} =$$

$$v_y =$$

$$a_y =$$

$$t =$$

a) How long does it take for her cannonball to strike the ground below?

b) If Lisa measures that her cannonball landed 900 m from the base of the cliff, what was the initial velocity of the cannonball as it left the muzzle of her cannon?

c) Lisa raises the angle of her cannon so that it fires with the same initial speed, but at 30° above the horizontal. How far from the base of the cliff will the cannonball land? Make *new* dimensional columns below for these new initial conditions.