Particle Motion in Two Dimensions Model Worksheet 4:  
Projectile Motion Problems

1. A metal sphere is launched with an initial velocity of 1.5 m/s as it leaves the ramp. The end of the ramp is 1.20 m above the floor. Calculate the range of the sphere.  
(Range is the horizontal displacement of the projectile.)

2. Now the ramp is tilted downwards and the sphere leaves the ramp at 1.5 m/s as shown below. The bottom of the ramp is 0.90 m above the floor. Calculate the range of the sphere.
3. A water balloon is launched at a building 24 m away with an initial velocity of 18 m/s at an angle of 50° above the horizontal.
   a. At what height will the balloon strike the building?

   ![Diagram of a building with a water balloon launch point](image)

   b. If the balloon misses or shoots over the building, how far will the balloon land from its launch location?

   c. The balloon can be launched from less than 24 m away from the building at the same speed and angle and still hit exactly the same height you calculated in part a. Determine this second launch location.