Name: SPH 4U Date:

1.3 Projectile Motion

A special case of motion in 2 dimensions.

When does an object experience projectile motion?

Example 1: A golf ball is shot from ground level at 80 m/s [15˚ to the horizontal].

1. Sketch the path of the ball:

2. Recall, we can analyze projectile motion problems by separating the x and y components of the motion. Sketch the motion graphs for the components of motion of the ball. If you're stuck, think about the forces acting in each direction and how they would affect the motion.

x-component	***y-component***
Position-time	*Position-time*
Velocity-time	*Velocity-time*
Acceleration-time	*Acceleration-time*

3. Break down the initial velocity vector into its components and list all other given values for the x and y motions.

4. Calculate how long it takes the ball to reach its maximum height.

5. Calculate the maximum height of the ball.

6. What is the range (horizontal distance) of the ball when it hits the ground, assuming the ground is flat?

Practice: Pg 43 #1-3, 5

Challenge Problem: Try it! (Modified from a Chris Mayer problem)
A snowboarder wants to jump over a rock using a ramp. He launched from a ramp with a speed of 18.0 m/s at an angle of 28^{o} above the horizontal. The edge of the ramp was 1.5 m above the ground level. The tallest point of the rock was located 13.8 m horizontally from the edge of the ramp and was 5.0 m above the ground. The ground in this area is quite level as shown below:

Will he make it over the rock? Show all calculations.