Scientist:_____ Date:_____ Period:_____

Food Flinger Activity

Unit 4: Vectors and Projectile Motion

Purpose: To study projectile motion using a potato launcher
Materials: Potato launcher, food projectiles
Data: All data has been collected ahead of time
Disclaimer: Potato launchers shoot projectiles over long distances with high velocities. Improper use can result in serious injury. It is very important to have adult supervision during use.

Equations:

$$v_x = \frac{x}{t} \qquad v_y = g \cdot \left(\frac{t}{2}\right) \qquad y = \frac{1}{2} g \cdot \left(\frac{t}{2}\right)^2$$

Figure 1 – Sketch the motion of the potato

Angle	Range (m)	Average Range (m)	Time (s)	Average Time (s)	Launch Velocity v_x (m/s)	Launch Velocity v_y (m/s)	Height y (m)
30º	1) 116 2) 112 3) 117		1) 4.5 2) 4.8 3) 4.7				
45º	1) 145 2) 156 3) 153		1) 5.6 2) 5.1 3) 5.4				
60º	1) 114 2) 113 3) 108		1) 4.6 2) 4.9 3) 4.4				

Table 1 – Potato launch data

In the figure below, sketch the horizontal (X) and vertical (Y) components of the potato velocity at different points in the motion. The first one is done for you.

Discussion:

1. Describe the motion of the object.

2. Is the **horizontal** component of the projectile's **velocity** constant? Why or why not?

3. Is the **vertical** component of the projectile's **acceleration** constant? Why or why not?

4. How would a **horizontal** wind blowing at 8.4 m/s affect the projectile's **horizontal velocity**?

Extra Credit: Sports equipment engineers devote much of their time to product design. In building a football for instance, many factors are considered including shape, weight, materials, durability, performance, cost, and even manufacturing. On a separate sheet of paper, design a projectile for the potato launcher that would give maximum range. Make sure to include labeled diagrams. In your report, discuss the design factors you considered for your projectile.

This worksheet created by LEAPS Graduates Logan McLeod and Chuck Schelle, and LEAPS Undergraduates Kok Cheng and Shera Wu.