

Challenge Activity: Spring Launcher

Overview

This activity will reinforce concepts about horizontal projectile motion through the use of a spring-launcher and a guided worksheet

Time allotted: 1 class period

Grade level: 9-12

PA State Standards

- 3.2.P.B1. Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration. Use force and mass to explain translational motion or simple harmonic motion of objects.
- 3.2.P.B2. Explain the translation and simple harmonic motion of objects using conservation of energy and conservation of momentum.

Objectives/Learning Goals:

- Use a fundamental understanding of forces to solve for horizontal projectile motion

Materials needed (per student group):

- Spring launcher
- Plastic ball
- Meter stick

Name: _____

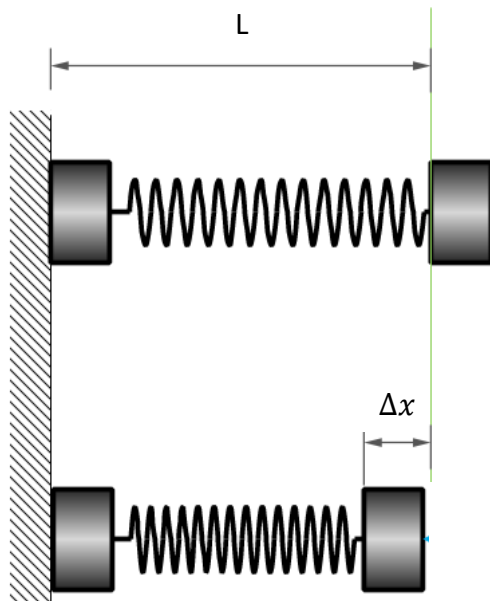
Date: _____

Partner(s): _____

CHALLENGE PROBLEM: SPRING LAUNCHER

Objective: Using a fundamental understanding of forces to solve for horizontal projectile motion

Materials: Spring launcher, plastic ball, meter stick



It is known that the initial velocity (V_i) the spring launcher gives the ball is directly proportional to the amount the spring is compressed (Δx) and can be written as

$$V_i = C\Delta x$$

where C is a proportionality constant. In your groups, you will determine the value of this constant by using horizontal projectile motion.

Challenge Questions:

1. Place a meter stick on the floor below where the ball will be launched. Use a ruler to measure the length starting from black tick mark on the launcher to the end of the spring (L). Use a meter stick to measure the height of the table (y)

$$L = \underline{\hspace{2cm}}$$

$$y = \underline{\hspace{2cm}}$$

Place the spring launcher at the edge of the table. Have one person pull the spring back and use a ruler to measure the new length (L_2). Release the spring and mark where the ball landed (d).

$$L_2 = \underline{\hspace{2cm}}$$

$$d = \underline{\hspace{2cm}}$$

2. Calculate the initial velocity of the horizontally fired ball.

