Investigating Energy Conservation

Brief Introduction

You have been using energy qualitatively through the use of energy pie charts. In this investigation you will develop the quantitative aspects of energy. You will have all of the tools you have used to this point in the semester available to you to conduct this investigation. In order to provide similar contexts for each group, you will be dropping the rubber playground balls ($m_{ball} = 0.39$ kg) and attempting to quantitatively model their motion with energy.

Pre-Lab
Nearly all scientific experiments are undertaken as the result of some underlying theoretical grounding. Theoretical grounding for an experiment develops from the construction of a model. In order to provide the theoretical grounding you should develop a model including what you already know with respect to energy. Energy pie charts are the modeling tools that you currently have. To develop the theoretical grounding you will be conducting a thought experiment based on your energy pie charts.

In constructing energy pie charts you have seen three methods of storing energy, E_k Kinetic Energy, E_g Gravitational Interaction Energy, and E_{int} Internal Energy. Today, you are only going to try to model the E_k and E_g. Create energy pie charts to model the following three situations.

A 5 kg physics book is dropped from a height of 0.1 m	A 15 kg physics book is dropped from a height of 0.1 m	A 5 kg physics book is dropped from a height of 0.5 m

How are the energy pie charts different in each of these three situations?

How are the initial pie charts different in each situation? Why are the pie charts different?

What do the differences in the initial pie charts indicate about the variables that effect E_g?

How are the final pie charts different in each situation? Why are the pie charts different?

What do the differences in the final pie charts indicate about the variables that effect E_k?

If you were to guess at what the equation for E_g is, what would you guess? Explain.

If you were to guess at what the equation for E_k is, what would you guess? Explain.

Likely, you have guessed that the height of the book, and the mass of the book influence E_g. There is actually a third variable that influences E_g, it is 'g' the gravitational strength. The equation that governs E_g is **$E_g = mgh$**. Using this and the models you have ceated earlier your job is to propose an experiment or experiments that will determine the equation for E_k. You will then carry out the experiment and analyze the resulting data to determine experimentally the equation for E_k.

Prior to conducting the actual experiment, you have to propose an experiment to achieve your objectives. In your brief proposal, you have to explain your set-up, what you will measure, and how you will analyze your data to achieve your objectives (what will you do to determine the equation for E_k?) Once your proposal has been checked by the instructor, conduct the experiment.

Set-up:

Data To Be Collected:

How Data Will Be Analyzed: