Ball Bounce Lab - Investigating Kinetic and Potential Energy

Name:____________________ Date:__________ Period:_____

Background Information
Energy cannot be created or destroyed. Stored energy is called potential energy, and the energy of motion is called kinetic energy. Due to gravity, potential energy changes as the height of an object changes, this is called gravitational potential energy.

Objectives
- Determine the relationship between height and gravitational potential energy.
- Determine how the drop height (gravitational potential energy) of a ball affects the bounce height (kinetic energy) of the ball

Materials
- 2 different ball types
- graph paper
- meter stick
- tape
- balance

Procedure
Follow the steps below to conduct your experiment. Be sure to record all data and any observations during the experiment. Follow all safety rules.

1. Tape the meter stick to the side of the lab table with the 0-cm end at the bottom and the 100-cm end at the top. Be sure that the meter stick is resting flat on the floor and is standing straight up.
2. Choose a ball type and record the ball type above the first data table.
3. Use the triple beam balance to determine the mass of the ball and record the ball’s mass in the data table. (Don’t forget to convert to kg by dividing by 1000.)
4. Calculate the gravitational potential energy (GPE) for the ball at each drop height. Record GPE in data table.
   \[ GPE (J) = \text{ball mass (kg)} \times \text{drop height (m)} \]
5. For Trial 1, hold the ball at a height of 40 cm, drop the ball carefully and observe the bounce height. Record the bounce height in the data table.
6. Drop the ball 4 more times from 40 cm, recording the bounce height each time, for a total of 5 drops.
7. For Trials 2-7, repeat steps 5 and 6 but drop the ball from the height indicated in the data table. Record the 5 bounce heights in the data table.
8. Repeat steps 2 through 7 for a different type of ball.
9. Calculate the average bounce height of the 5 drops for each drop height. Record the average bounce height in the data table. Calculate the average bounce height for all Trials.
   a. To calculate average: Add the 5 bounce heights for a trial then divide the total by 5 drops.
Conclusions
Answer on a separate sheet of paper.

1. Plot the average bounce heights on a line graph. Place the independent variable of drop height on the x-axis and place the dependent variable of bounce height on the y-axis. Label the line with the ball type.
2. Describe the relationship between drop height and the bounce height. Was the relationship the same for both ball types that you tested?
3. Compare your gravitational potential energy to your bounce height for each trial. Describe the relationship between GPE and bounce height.
4. Look at the results of both ball types you tested.
   a. Which ball type had the most gravitational potential energy?
   b. Which ball type has the most mass?
   c. Describe the relationship between mass and GPE.
5. What are the variables that affect gravitational potential energy of an object?