Names: _____

Class_____Date _____

Lab: Potential Energy - Ball Bounce Lab

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.

Objective: to determine the relationship between height and gravitational potential energy.

Problem: How does the drop height (gravitational potential energy) of a ball affect the bounce height (kinetic energy) of the ball?

Hypothesis: If the gravitational potential energy (*drop height*) of a ball is increased, **then** the kinetic energy (*bounce height*) will (increase/decrease/remain the same) **because** _____

_____

_____

_____

_____

Variables: Independent variable (known information) is _____

Dependent variable (unknown information) is _____

Constants (variables kept the same for accuracy) are_____

Materials: List all the materials used in this experiment. _____

_____

_____

Procedure: Follow the steps below to conduct your experiment. Be sure to record all data and any observations during the experiment.
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 in the 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.
4. Calculate the gravitational potential energy (GPE) for the ball at each drop height. Record GPE in data table.
   a. *GPE = ball mass x drop height*
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 Trial 2, repeat steps 5 and 6 but drop the ball from a height of **50 cm**. Record the 5 bounce heights in the data table.
8. For Trial 3, drop the ball five times from **60 cm** and record the 5 bounce heights in the data table.
9. For Trial 4, drop the ball five times from **70 cm** and record the 5 bounce heights in the data table.
10. For Trial 5, drop the ball five times from **80 cm** and record the 5 bounce heights in the data table.
11. For Trial 6, drop the ball five times from **90 cm** and record the 5 bounce heights in the data table.
12. For Trial 7, drop the ball five times from **100 cm** and record the 5 bounce heights in the data table.
13. Repeat steps 2 through 12 for a different type of ball.
14. Repeat steps 2 through 12 for a different type of ball.
15. 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.
16. 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.
17. Answer discussion questions and write your lab summary.

Data:

Ball Type:	Ball Mass (g) =_____.	Bounce Height (cm)					
	Gravitational Potential Energy (GPE)						
Drop Height (cm)	GPE = mass x height	Drop 1	Drop 2	Drop 3	Drop 4	Drop 5	Average Bounce Height
40							
50							
60							
70							
80							
90							
100							

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	Gravitational Potential Energy (GPE)						
Drop Height (cm)	GPE = mass x height	Drop 1	Drop 2	Drop 3	Drop 4	Drop 5	Average Bounce Height
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40							
50							
60							
70							
80							
90							
100							

Discussion Questions:

1. Describe the relationship between drop height and the bounce height. _____
   _____
   _____
   Was the relationship the same for all ball types that you tested?_____
   _____

2. Compare your gravitational potential energy to your bounce height for each trial.
   Describe the relationship between GPE and bounce height. _____
   _____
   _____
   _____

3. Look at the results of all 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. _____
   _____
   _____

4. What are the variables that affect gravitational potential energy of an object? _____
   _____
   _____

Tennis Ball	☐
Ping-pong Ball	☐
Bouncy Ball	☐

Bounce Height

Drop Height
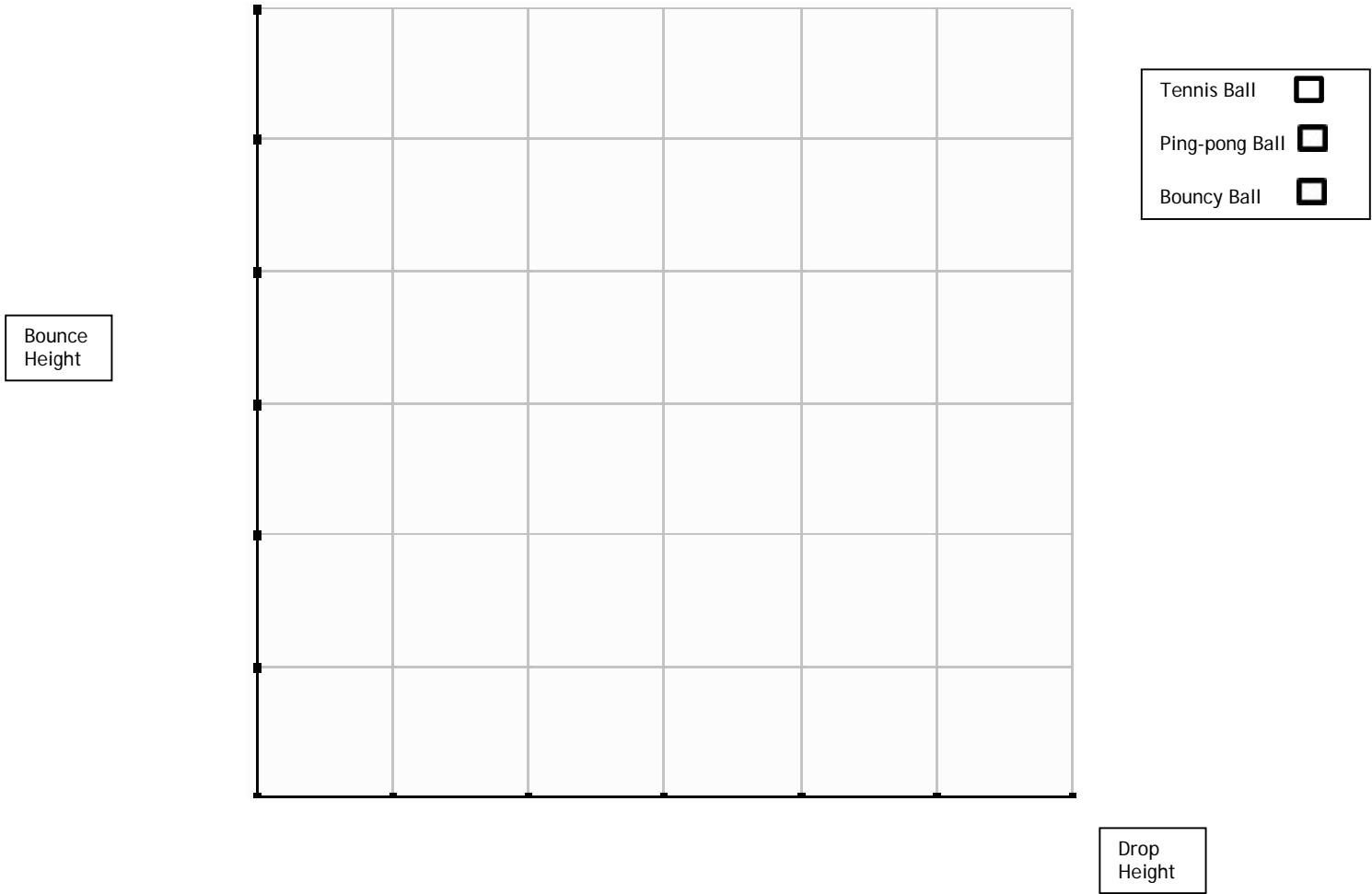
Conclusion: Write a conclusion, using complete sentences, that states the following: was your hypothesis correct? Explain.