

Lab: Energy Conversion - Ball and Ramp Lab

Background Information: Energy can not 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. Energy may be transferred from one object to another. An example of energy transfer is when a golfer swings a club to hit a golf ball - the kinetic energy of the swinging club is transferred to the golf ball resulting in the movement of the golf ball which now has the same amount of kinetic energy that the swinging club had. Energy may also be converted from one form of energy to another form. An example of energy conversion is when a battery (potential chemical energy) is connected to a light bulb resulting in electrical energy (light) and heat energy.

Objective: to determine how potential energy gets converted to kinetic energy.

Problem: How does the gravitational potential energy of a ball get converted to kinetic energy?

Hypothesis: (*Circle your choices in the "()"*).

If a ball is higher up on a ramp **then** it will have (more/less/the same) gravitational potential energy and **therefore** move a cup (more/less/the same) distance.

Re read your hypothesis and then **explain why** you think your hypothesis is true. _____

Materials: List all the materials to be 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. Follow all **SAFETY RULES**.

1. Collect and assemble all equipment needed and draw a labeled diagram of your set up below.
2. Determine the mass of the golf ball and record it in the data table.
3. Place the golf ball on the 30cm mark on the ruler and release it for trial one.
4. Observe the result and in the data table record the distance the cup moved.
5. Re-set the equipment and release the golf ball from the 30cm mark again and record the distance the cup moved. Repeat this step for one more trial.
6. Release the golf ball from the 20cm mark and record the distance the cup moved. Repeat this step for two more trials.
7. Release the golf ball from the 10cm mark and record the distance the cup moved. Repeat this step for two more trials.
8. Choose a second type of ball and repeat steps 2 through 7.
9. **Challenge:** choose a third type of ball and repeat steps 2 through 7.
10. Complete all calculations in your data table.
11. Create a line graph of all your results.
12. Answer discussion questions and write your conclusion and summary.

Data:

<u>Mass of Ball (grams)</u>	<u>Ball Type</u>	<u>Release Height (cm)</u>	<u>Trial</u>	<u>Distance Cup Moved (cm)</u>	<u>Average Distance Cup Moved (cm)</u>
	Golf ball	30cm	1		
	Golf ball	30cm	2		
	Golf ball	30cm	3		
	Golf ball	20cm	1		
	Golf ball	20cm	2		
	Golf ball	20cm	3		
	Golf ball	10cm	1		
	Golf ball	10cm	2		
	Golf ball	10cm	3		
		30cm	1		
		30cm	2		
		30cm	3		
		20cm	1		
		20cm	2		
		20cm	3		
		10cm	1		
		10cm	2		
		10cm	3		
<i>Challenge</i>	<i>Challenge</i>	<i>Challenge</i>	<i>Challenge</i>	<i>Challenge</i>	<i>Challenge</i>
		30cm	1		
		30cm	2		
		30cm	3		
		20cm	1		
		20cm	2		
		20cm	3		
		10cm	1		
		10cm	2		
		10cm	3		

Discussion Questions: Based on the data above, answer all questions using complete sentences.

- Which release height caused the cup to move the most? _____
- Did all ball types move the cup the most when released from the 30cm mark (the highest)?

- Why does the cup move more when the ball is released from a higher point? _____
- Which ball type made the cup move the most? _____ Explain why this ball makes the cup move more than the other ball types. _____
- What are the two variables of gravitational potential energy? _____ And _____
- Describe the energy transfers that occur from when the ball is placed on the ramp until the cup stops moving. _____

