

Determining the Effect of **Mass on** Kinetic **Energy**
Honors Integrated Science

Name: _____ Date: _____
Purpose: _____

Hypothesis:

Procedure:

Materials:

Safety:

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Prelab Assignment: Answer the following questions in complete sentences using the information from the lab handout to support your learning.

1. Identify the manipulated, responding, and controlled variables in this investigation.
 - a. Manipulated variable

 - b. Responding variable

 - c. Controlled variables

2. How will the mass of the rolling bottle affect its speed when it collides with the plastic cup?
(**Hint:** The bottle accelerates much like a falling body.)

3. How do you expect the mass of the bottle to affect the distance the cup moves?

4. How is work related to the distance that the cup moves?

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5. State a hypothesis about how the kinetic energy of the rolling bottle affects the amount of work done on the cup and the distance the cup moves.

Data Table: Effect of Mass on KE

	Volume of Water (ml)			
	100 ml	200 ml	300 ml	400 ml
	Mass of Bottle and Water (g)			
Distance Moved by Cup (cm)				
Trial 1				
Trial 2				
Trial 3				
Trial 4				
Trial 5				
Total Distance (cm)				
Average Distance (cm)				
Observations				

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Calculations and Graph:

- Use Google Sheets to create a graph of **Mass** of Bottle and Water on the **x-axis** and the **Distance** the cup moved on the **y-axis**.
- Determine the **equation of the line** and the slope of the line.
 - **Equation** of the line: _____
 - **Slope** of the line: _____

Post-laboratory Questions: Answer the following question in complete sentences using the data from the lab to support your answers.

1. a. What procedure was followed to make sure that the bottle would be moving at the same speed each time it collided with the cup? Explain your answer.

b. Does this method work? Explain your answer.

2. Why is it important that the bottle have approximately the same speed each time it collides with the cup in order to measure the effect of mass on energy?

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3. As the mass of the bottle increased, what happened to the distance that the bottle moved the cup?
4. Why did the cup eventually come to a complete stop? Explain.
5. How was the distance that the cup moved related to the bottle's kinetic energy?
6. Did your experimental results agree with your hypothesis about how the kinetic energy of the bottle affects the amount of work done on the cup? Explain your answer.

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7. This investigation assumes that the rolling bottle experiences only a small frictional force. How accurate is this assumption? Could this assumption affect the results of the investigation? Explain your answer.

8. In this investigation, you examined the relationship between the mass of a rolling bottle and its kinetic energy. Design a procedure to measure how the height of a ramp affects the kinetic energy of a bottle rolling down the ramp. Have your teacher approve your procedure before you carry out the investigation. Propose an explanation for what you find.