

Date _____

Conservation of Energy Lab 1 - Ramp and Marble

Introduction (Define mechanical energy. Discuss the Conservation of Mechanical Energy for a marble rolling down a ramp. Mention the equations. DO NOT use a list. Do this uses a few paragraphs. **(10 pts)**)

- Purpose**
- (a) To find the mathematical relationship between the starting height of a marble on a ramp with the launch velocity at the bottom of the ramp.
 - (b) Identify the energy changes that occur when a marble rolls down a ramp
 - (c) To generate an equation between launch height (h) and launch velocity for a marble rolling down a ramp

Materials

- Marble ramp
- 3 cm marble
- C clamp
- Loose Leaf paper
- Carbon paper

Procedure (5 pts)

1. _____
2. _____
3. _____
4. _____

Data (5 pts)

Launch Height (m)	dx (m)	Launch Velocity (m/s)	
0	0	0	

Sample Velocity Calculation Show how you found your largest velocity.

Equation

Substitution with units

Answer with Units

Energy Changes as a Marble Rolls down a Ramp

3 pts will deducted if an answer is not in a full sentences

8 pts each

1. What kind of energy did the marble have when it was released from rest from the incline?
2. What kind of energy(s) did the marble have at the bottom of the ramp?
3. A **box** at rest at a height of h slides down a frictionless ramp and achieves a velocity of v at the bottom of the ramp. Use the conservation of energy to find an equation relates the height h to the velocity v . (Solve for v not h) Full Sentence Not Needed
4. Use your linear plot and the equation for a line to express the velocity of the marble at the bottom of the ramp v with the launch height of the marble h . (Solve for v not h) Full Sentence Not Needed
5. Use the conservation of energy to explain why your equation that relates h and v derived from your marble experiment is significantly different than the equation derived for the box question (question 3).

6. Use your understanding of the conservation of energy to approximate the total energy of the marble at the bottom of the ramp in terms of the mass of the marble (m) and one or more of the variables used in this lab. Explain using the C.O.E. why your equation could be used to find the total energy of the marble at the bottom of the ramp.
7. The marble had 2 energies at the bottom of the ramp. Name those 2 energies and calculate the fraction of the total energy in terms of the variables used.

8 pts Energy Type # 1 – _____

Fraction of the total energy

8 pts Energy Type # 2 – _____

Fraction of the total energy

Plots - 8 pts each

Extra Credit – Joe releases a marble from a height of h and the marble hits the ground with a horizontal displacement of dx . At what height should he place the marble to achieve a horizontal of $2dx$? Justify your answer.