



Straw Rocket

Lab #14

Discussion: To find how things are related to each other, scientists do experiments and take measurements. Scientists like to control variable so that when they change one variable only one other variable changes. Measuring both the variable that is controlled (the independent variable) and the one that is allowed to change and gets measured (the dependent variable) allows us to find the relationship between the variables.

Purpose: To measure and determine the elastic potential energy of a rubber band by measuring the gravitational potential energy.

Hypothesis: There should be a direct relationship between the elastic potential energy and the gravitational potential energy.

Theory: The law of conservation of energy states that energy can be converted from one form to another form but the amount of energy remains constant.

Materials:

meterstick	tape	balance	plastic tube
rubber band	paper straws		

Method and Data Collection:

Caution: aim the rocket straight up, not at classmates. Do not stretch the rubber band more than the 2.0 cm as described in the method below. Horseplay will result in point penalties on your lab and your partner's lab.

1. Construct a straw rocket and a rocket launcher per directions from the instructor.
2. Determine the mass of the rocket using an electric balance. Record the mass.
Mass of the straw rocket: _____ g
3. Hold the launcher with your fingers holding the rubber band. Do not trust the tape to hold the rubber band on its own. Place the two long straws of the rocket on opposite sides of the rubber band.
4. Make a mark on the straws at the bottom edge of the tube with the short straw touching the band but not causing any stretch in the band.
5. Remove the rocket and make a second mark on the straws that is 1.0 cm closer to the top of the rocket.
6. Reload the rocket in the launcher. Pull down on the two straws until the 1.0 cm mark is at the very bottom of the launcher tube.
7. Place the top of the rocket level with the bottom of a meterstick. Release the rocket and measure the maximum height the rocket achieves. Record this height on your data table. Repeat step 7 twice more so you have three trials for the 1.0 cm mark.
8. Repeat step 7 with marks that are 2.0 cm and 3.0 cm from your zero-stretch mark on your rocket. Be sure to record three trials for each mark.



Data Table and Results					
Mark	Data			Results	
	Trial 1 (cm)	Trial 2 (cm)	Trial 3 (cm)	Average height (cm)	PE _g (mJ)
1.0					
2.0					
3.0					

Analysis:

1. Identify the independent (manipulated) and dependent (responding) variables. Explain how you were able to determine which variable was which.

2. Show a sample calculation of the gravitational potential energy from average height from Trial 1.

3. Graph your results. Show the gravitational potential energy (mJ) on the vertical axis and the amount of stretch (cm) on the horizontal axis.

Conclusions:

1. What measurement is related to the elastic potential energy in this lab?

2. Describe the shape of the graph (linear, hyperbolic, parabolic). What relationship exists between the gravitational potential energy and the elastic potential energy of the rocket?

3. How does the energy of rocket before release and the energy of the rocket at maximum height compare? Explain why you think this relationship is true.
