Name:_____ Date: _____ Bell: _____

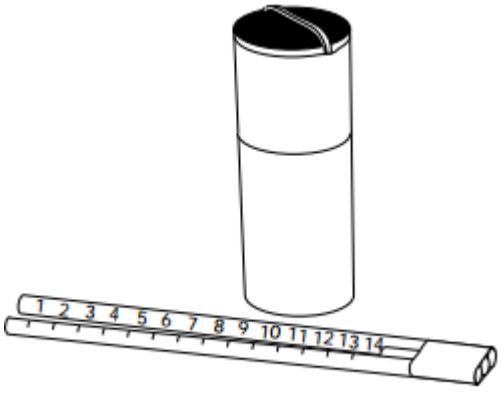
Lab: Rubber Band Rocketry

Question: What is the relationship between the gravitational potential energy of a Straw rocket and the elastic potential energy of a rubber band?

Materials:

- Scissors
- Rubber band
- 3 plastic straws
- Meter stick
- Marker
- Metric ruler
- Toilet paper tube
- Masking tape
- Balance (triple beam or digital will work)

Procedure: Part 1-Constructing the rocket



1. Cut 3 cm off the ends both of straws. Keep one piece and put the other to the side.
2. Lay the 2 straws side by side, and put the 3 cm piece in between them to separate them. Be sure to line up all 3 ends of the straws evenly. Tape the straws together.
3. Starting from the untapped end, mark off 1 cm increments on one of the long straws, using the marker and metric ruler. This will become your rocket.

Part 2: Launching practice

1. Use a balance to find the mass of the rocket in grams. Record your measurement.

   Mass of the rocket: _____

2. Wrap the rubber band around the toilet paper tube so it is taught over both ends (see picture above). Place the two long ends of your rocket through the tube (they should touch the bottom of the tube, if they are too long, trim the ends). The middle and shortest straw rests on the rubber band.
3. Practice launching your rocket by grasping the bottom straw lengths and gently pulling downward and releasing. **Caution: Be sure to aim your rocket upwards and NOT toward a classmate!** Repeat several trials until you are comfortable with the procedure.

Part 3: Calculations:

1. You will be recording **two (2)** different measurements onto your data table:

    - **The amount of your rubber band is stretched.** This can be observed by recording the centimeter marks on the rocket base from the bottom of the launch tube.
    - **The height your rocket travels.** This can be observed by having a group member hold the meter stick at the zero mark directly above the top of your launcher and another group member observe the rocket launch. It may help to place the meter stick against a wall.

2. Your group should launch your rocket using three (3) different amounts of stretch. Each stretch level should include three (3) trials from which to obtain an average height. Record your trails and calculate the average height in meters for each stretch (hint: measure the height of each trial in centimeters, find the average, then divide by 100 to get the number in meters).
3. Using the average height, mass, and acceleration due to gravity, **gravitational potential energy** for each amount of stretch.

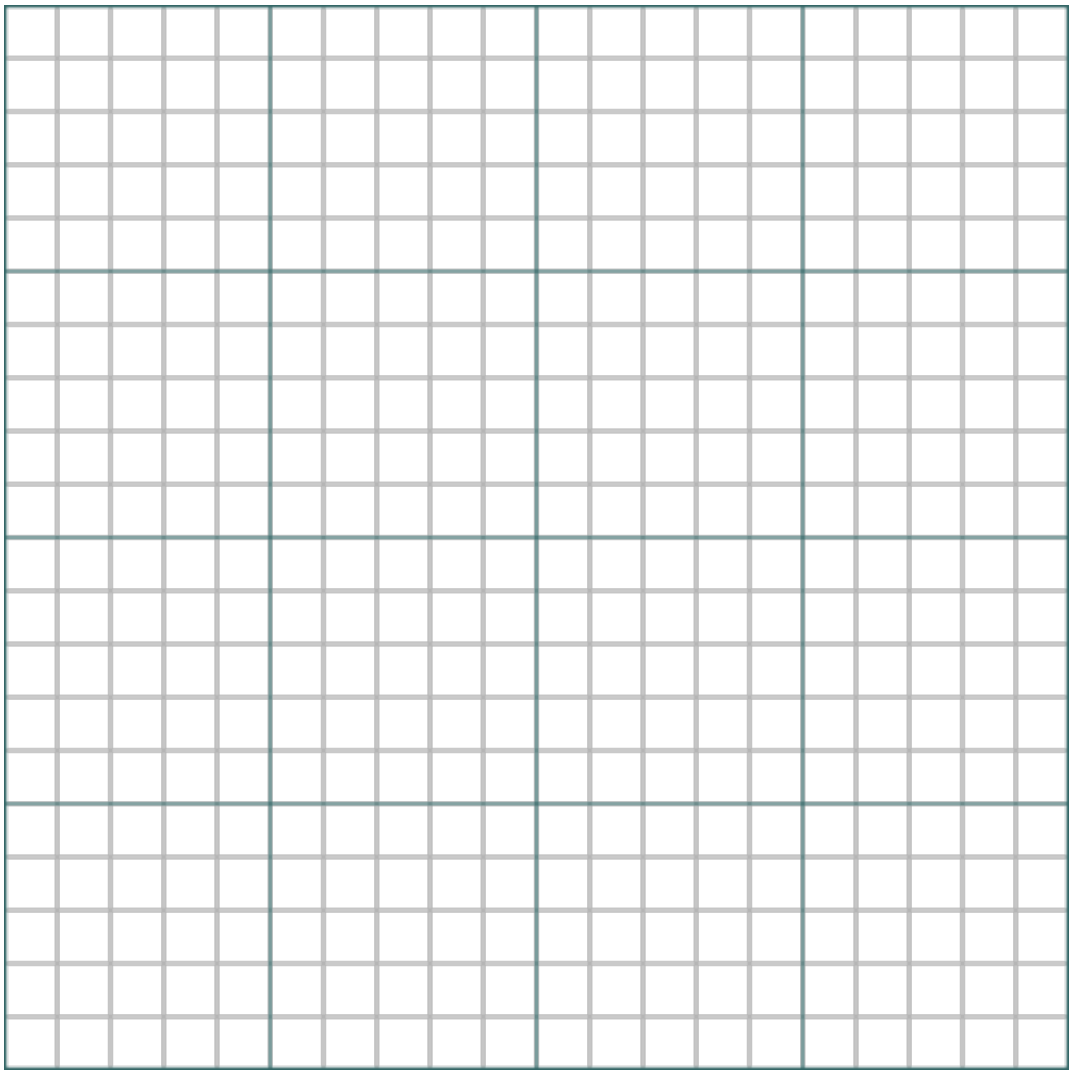
    GPE=mgh

    (m=Mass of the rocket (grams); g = 9.8 meters/second^2; h=Height the rocket soared (meters))
4. Graph your result by plotting the amount of stretch (x-axis) versus the gravitational potential energy (y-axis)

Soaring Straws Data Table

Mass of the straw rocket:_____

Amount of stretch (cm)	Height- trial 1 (m)	Height- trial 2 (m)	Height- trial 3 (m)	Average height (m)	GPE



Analysis Questions

1. Which variable in your data table is the independent variable? Which was the dependent variable? (what variable did you change for each set of trials and which variable responded to those changes?)

_____

_____

2. In this lab, what measurement is related to the elastic potential energy?

_____

_____

3. By looking at the graph, what is the relationship between gravitational potential energy and elastic potential energy?

_____

_____

4. When you release the rocket, what kind of energy does the rocket have just after takeoff? How is the energy converted from elastic potential to gravitational potential?

_____

_____

Conclusions:

Based off your data, what can you claim about the relationship between how far you pulled the rubber band back and how high your rock flew? Use your data as evidence and explain your reasoning in terms of energy (elastic potential, gravitational potential, kinetic, etc.)

Claim: _____

_____

Evidence: _____

_____

Reasoning: _____

_____

_____

_____