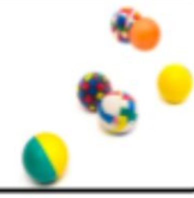
Science 10: Conservation of Energy Lab



Name:____________________________________ Block: ________
Group Members:____________________________ Date: ________/______/ 2018
Due Date:__________________________________ Drop Date:_______________________________

The report is submitted in full, **on the due date**. If you are absent on the day, the report is expected to be submitted electronically. Late reports are penalized, and will *not accepted past the drop date*.

Please show all of your calculations.

Conservation of Energy in a Bouncing Ball

1. Measure the mass of the ball. ________________grams
2. Convert the mass to kg. __________________kg

3. Place a metre stick so that it is standing upright. You will drop the bouncy ball so that it falls in front of the metre stick and the height it reaches after it bounces can be read off. You are welcome to record with your phone (recommended using slow-motion video) and obtain the measurements by looking at the video.

4. Fill in the table below.
   a. Drop the ball from a height of one meter twice and measure the bounce height (after it hits the ground, the highest point it reaches before it starts to fall) for the first, second and third bounce.
   b. For each bounce height, find the average. (Add the two bounce heights and divide by 2).

Table 1: ____

First bounce height (m)	Average first bounce height (m)	Second Bounce height (m)	Average second bounce height (m)	Third bounce height (m)	Average third bounce height (m)

5. Find the bounce/drop ratio. The first bounce/drop ratio is found by dividing the average bounce height on the first bounce by the drop height. The second bounce/drop ratio is found by dividing the average bounce height on the second bounce by the average bounce height on the first bounce. The third bounce/drop ratio is found by dividing the average bounce height on the third bounce by the average bounce height on the second bounce.

Table 2: ______________________________

First bounce/drop ratio (use ave.)	Second bounce/drop ratio (use ave.)	Third bounce/drop ratio (use ave.)

6. What do you notice about the bounce/drop ratios? Are they the same? Similar? Different?

7. What might affect the bounce/drop ratio?

8. Calculate the potential energy at the initial height, and each bounce height. $PE = mgh$
   $g = 9.8\frac{m}{s^2}$

Table 3: ________________________

Drop height potential energy	First bounce potential energy	Second bounce potential energy	Third bounce potential energy

9. Calculate the difference in potential energies.

Table 4:___________________________

$PE_{\text{drop height}} - PE_{\text{first bounce}}$	$PE_{\text{first bounce}} - PE_{\text{second bounce}}$	$PE_{\text{second bounce}} - PE_{\text{third bounce}}$

10. What accounts for the difference in potential energies?

11. Drop the ball from 1 m and measure the time it takes for it to hit the ground. What is the kinetic energy when the ball hits the ground if $KE = \frac{1}{2}mv^2$ and $v = gt$ where $g = 9.8\frac{m}{s^2}$?

12. Is the kinetic energy the same as its potential energy at 1m? Should it be? Why or why not?

13. If you throw the ball down from 1m and after the ball bounces it reaches 1m, what type of energy did you give the ball? How much energy did you give the ball?

14. Place a book on the ground and drop the ball from 1m above the book.

Table 5:___________________________________

Drop height (m)	First bounce height (m)	Average first bounce height (m)	First bounce/drop ratio
1.00			

15. Why is the bounce/drop ratio different than before? What accounts for the energy loss?

Conclusions

How do your results demonstrate the law of conservation of energy? If they don't support the law of conservation of energy, what do you think went wrong?

9 - 10	7 - 8	5 - 6 < 5 < 3 < 1
There is no missing data. The reason for the difference in potential energy is correctly identified. The energy of the ball/car is correctly found. The correct explanation is given for whether or not the kinetic and potential energy should be the same. The type of energy is correctly identified. How much energy throwing the ball gives is correctly identified.	There is some missing data. Some reasons for the difference in potential energy are given. Calculations for the energy are shown with some mistakes.	There is significant data missing or questions unanswered. Ways to improve: