Lab - Law of Conservation of Energy

Purpose - to illustrate the Law of Conservation of Energy and to explore how energy can be stored as elastic potential in springs.

Procedure -

1.) Enter windows and double click on the IP 2.5 icon.

2.) Double click on the Energy1.ip icon which simulates a mass of 1.571 kg falling from a height of 5.00 m.

3.) Prepare a table like the one below

	Potential Energy	Kinetic Energy	Total Energy
Top			
Middle			
Bottom			

4.) Record the E_p and E_k at the start of the experiment using values on the graph

5.) Run the experiment, stop once, any time before impact, and record the E_p and E_k .

6.) Continue the experiment and record the E_p and E_k at the moment of impact (frame 50).

7.) Sketch and label the graphs of E_p and E_k .

8.) Exit by pressing alt-F4, and open Energy2.ip (a mass bouncing on a frictionless spring) by double clicking on its icon.

9.) Run the experiment. Sketch the graph of E_k for the mass.

10.) Increase the spring constant k by double clicking on the spring and changing the k to $150\,\frac{N}{m}$ on the table.

11.) Run the experiment and note the changes in the graph.

12.) Change k back to $75\,\frac{N}{m}$ and then double click on the mass. Change the mass from 2.00 kg to 4.00 kg and run the experiment, again note how the graph is different from the first time.

13.) Sketch the graph of E_k for the mass.

14.) Exit by pressing alt-F4, DO NOT SAVE CHANGES!!!!

15.) Open Energy3.ip, a 2.00 kg mass falls from height of 1.00 m and compresses a spring.

16.) Record the E_p and E_k at the start of the experiment.

17.) Calculate and record the total energy at the start of the experiment.

18.) Run the experiment, stop when the spring is most compressed and calculate and record the compression (not the length).

19.) Close using alt-f4.

Discussion -

1.) Was the Law of Conservation of Energy broken during observations in Energy1.ip?

2.) Calculate the velocity of the mass in Energy1.ip at the exact moment of impact.

3.) In Energy2.ip where was the mass (top/middle/bottom of path) when E_k is greatest?

4.) In what form is the energy of the mass when at the top of its path?

5.) In what form is the energy of the mass when at the bottom of its path?

6.) How does changing the spring constant affect the E_k values on the graph?

7.) How does changing the mass affect the E_k values on the graph?

8.) In Energy3.ip what is the E_p in the spring?

Bonus - Find an equation that can be used to calculate the formula for E_p in a spring.

Conclusion - **Don't forget a meaningful conclusion to this lab.**