Physics Lab 4- Spring Scale:

In this activity you will make your own spring scale. Once you have calibrated it, you will test it to see if it actually works.

An important part of being a scientist is explaining your experiments such that other scientists can reproduce your experiment and confirm your results. Therefore, I want you to write a mini lab report. Please write clearly and in complete sentences. You don't need to give long answers, but make sure your meaning is clear. Another student should be able to read your lab and understand it well enough to repeat your experiment (I won't actually give it to another student, of course). I've provided an outline for you with hints in parenthesis. I suggest you read the whole outline before starting.

Purpose

To find the mass of an unknown object using a spring scale you built and calibrated.

Materials

Record the actual materials you used here. I listed some suggested materials below.

(A rubber band or other spring, a triple beam balance and a cup of sand that you can attach to the spring that is heavy enough to stretch the spring, but not so heavy that it damages the spring; another object to test the spring, which should have a mass greater than one weight, but less than all the weights.

Procedure

Write your procedure here. You need to tell me what you did in a manner clear enough that another student could follow your procedure. I do have a few suggestions, but you still need to write out what you did.
(You need to measure how much each additional weight stretches the spring. You may want to firmly attach the spring from the edge of a table or a door frame (it shouldn't hit the floor when stretched out) and attach a piece of cardboard next to the spring. Then you can mark the unstretched length of the spring, and take each measurement from that. Note: the spring is not massless, so gravity will pull on it a bit. Consider the length of the spring once it is hanging the "unstretched" length.

If you systematically add weight a little at a time, and measure the total amount it has stretched from the initial unstretched length, it will be easier to graph the data.

Be sure to record your data. A table is provided, but you may need more or fewer blocks than provided by the table. Use as many as you need. Don't add so much weight that it damages your spring.)

Data and Calculations

You need to record your data in a graph like the one below in the assignment section. You can either record the actual initial unstretched length of the spring, and the new length of the spring after each addition of a weight, or you can attach your ruler such that the initial unstretched length is at zero, and just measure the total stretch. Either way, you need **Δx**, which is the difference between the total stretched length and the initial unstretched length.

Amount of weight	length of spring	Δx

Graphing

Here you want to graph your data. When you make a graph, usually the independent variable (the thing you change) is on the *x*-axis, and the dependent variable (the thing that changes) is on the *y*-axis.

Which variable is independent? why?

Which variable is dependent? why?

FInd the relation between the added mass and Δx. You want to draw the "best fit" line through these points. A best fit line is a line that gets as close as possible to as many points as possible. Depending on how you did this lab, this line may or may not go through zero.

Testing

Here you want to find the mass of your test object in Newtons. You will do this by measuring Δx for this object, and compare it to your graph. Tell me both Δx and the mass according to your graph.

Conclusions

Evaluate the lab in this section. What did you learn? Was your data linear, or did it appear to curve? Did all your points lie on your best fit line? Why or why not? What weight did you find for your object? Did this seem like a reasonable number? If someone else asked you about the mass of your test object, do you think it would be a good idea to tell them the mass you found in this lab? Why do we use standard units of measurement?

Grading

- Completeness of the report. The report meets all the requirements of the assignment.
- Correctness of the purpose. You may reword the purpose, but you may not change the meaning of the given purpose.
- Appropriateness of the materials.
- Appropriateness of the procedure used and the clarity of the procedure section. There are many correct procedures.
- Quality and completeness of the data, correct calculations.
- Quality and completeness of the graph. Answers to the questions in the graphing section.
- Reasonableness of the test results and clarity of the testing section.
- Completeness and reasonableness of the conclusions. Answer all the questions, support your answers with evidence.