

Name \_\_\_\_\_  
SI Physics  
Period \_\_\_\_\_

Date \_\_\_\_\_  
Lab #26H (110 pts)  
Mrs. Nadworny

Partners:

Due Date \_\_\_\_\_

## Stretching a Spring

**Lab Write-Up Required**  
use template from website

The objective of this lab is to conduct an experimental procedure using a specific set of steps. Use this sheet ONLY as a guide, for you will be responsible for producing your own lab write-up. Remember, it is a requirement that all components of a lab write-up are typed, except for diagrams and sample calculations, and everything is placed in the correct order. (10 pts)

Everyone must complete their own write up. Submitting the same, or very similar, write ups will not earn full credit.

### Purpose

- To determine the spring constant of a spring.

### Research Question

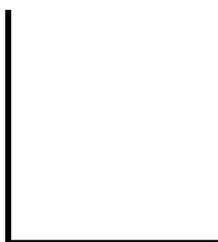
- What is the effect of weight on spring stretch?

### Variables (6 pts)

- Independent variable –
- Dependent variable –
- Constants/Control –

### Mathematical Model (2 pts)

### Expected Graph (5 pts)



Significance of Slope:

Expected y-intercept:

### Hypothesis (2 pts)

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**Procedure**

- **Materials:** (3 pts)  
*Create a bullet list of all materials that you expect to use.*
- **Diagram of setup:** (3 pts)  
*Draw and label a diagram with all equipment and measurable values.*

- **Procedure:** (10 pts)

Number each step of the procedure

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**Safety Concerns:** Do NOT put more than 500 grams on the spring or you will exceed the *elastic limit* of the spring and ruin it. Let the mass pull the spring down gently with your hand underneath it to prevent over-stretching.

**Data Table** (20 pts) Measure all lengths to the nearest hundredth of a centimeter.

± _____	± _____	± _____	± _____	± _____	± _____	± _____	± _____

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**Have your teacher check all previous work before you begin collecting data!**

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## Collect Data

### Data Analysis (10 pts)

- Show one sample of each calculation performed during the lab.

### Graph (15 pts)

- Create a graph of your data.
  1. Be sure to follow all of the steps we discussed about graphing, including labeling and drawing a best-fit line. Calculate the slope of the best-fit line for your graph. Show all calculations clearly.
  2. The graph needs to be affixed to your lab write-up after the data analysis section and before the graph analysis and spring constant. Part of your neatness grade includes having everything in the correct order.

### Graph Analysis (5 pts)

- Analyze your graph
  1. Using the slope formula, determine the associated physics formula and the physical significance of the graph. State the value of the physical significance.
  2. Write the general and specific equations for the best-fit line of the graph.

### Spring Constant (5 pts)

- The slope of your graph is NOT directly the spring constant. You will need to perform a calculation with your slope to determine the true spring constant. Show your work with the GUESS method. Do NOT calculate the spring constant using  $k = F/x$  and random values, that will not get your credit. [Hint: Think about the equation for spring constant and how it is related to what you've graphed.]

### Conclusion (20 pts)

(Use the following to help with your conclusion. It should be included in your write-up as three paragraphs using full, complete English sentences.)

- Paragraph One
  - Restate the purpose/research question of the lab.
  - Summarize the experiment using only one or two sentences. Do NOT restate the entire procedure.
  - Restate your hypothesis. Does your data support your hypothesis or not?
  - Discuss the results of your lab, including your spring constant.
- Paragraph Two
  - What was the physical significance of the slope of the graph?
  - Write about one idea that was reinforced during the lab or one new concept you learned.

Continued on next page....

- Paragraph Three
  - Describe one possible source of error in this lab. Identify what the error was. Explain how it happened. Explain how it affected your data collection (did it increase or decrease spring length). Explain how it affected your overall results (did it increase or decrease spring constant).
    - Be specific. Simply saying “human error” is not detailed enough. Blaming your graph, calculations, faulty equipment, lack of technology or imprecise tools is also not acceptable. Really think about the data collection portion of the lab and things that may have influenced it, avoid highly improbable events, such as wind gusts or dramatically shifting gravitational fields.
  - Describe a second source of error in the experiment that likely occurred during your group’s data collection (it should not be related to your first error). Identify what the error was. Explain how it happened. Explain how it affected your data collection (did it increase or decrease spring length). Explain how it affected your overall results (did it increase or decrease spring constant). Follow the same guidelines as above.