PHYSICS
EXPERIMENT 6:

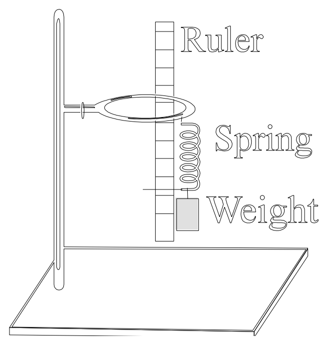
# Hooke's Law

Name:______________________________ Date:_________________

Partners: ____________________________

1. **PURPOSE:** To study the properties of springs.
2. **HYPOTHESIS: (SKIP)**
3. **PROCEDURE**:

| APPARATUS: | MATERIALS: |
|---|---|
| 1 ring stand<br>1 clamp<br>1 mm ruler<br>1 mass set | 2 different springs<br>Fisher # S41028<br># S41029 |




➲ **PART-A**: The elongation of a "light" spring.

- **Step-1:** Hang a "light" spring to a ring stand.
- **Step-2:** Align the zero reading of a (mm) ruler with the end of the spring. Tape the ruler to a graduated cylinder or a book or a box and make sure you do not move it.

  ★ **IMPORTANT**: Be sure to read the elongation of the "spring" at eye-level. Also, always read the same "spot" on the "spring" for each reading.

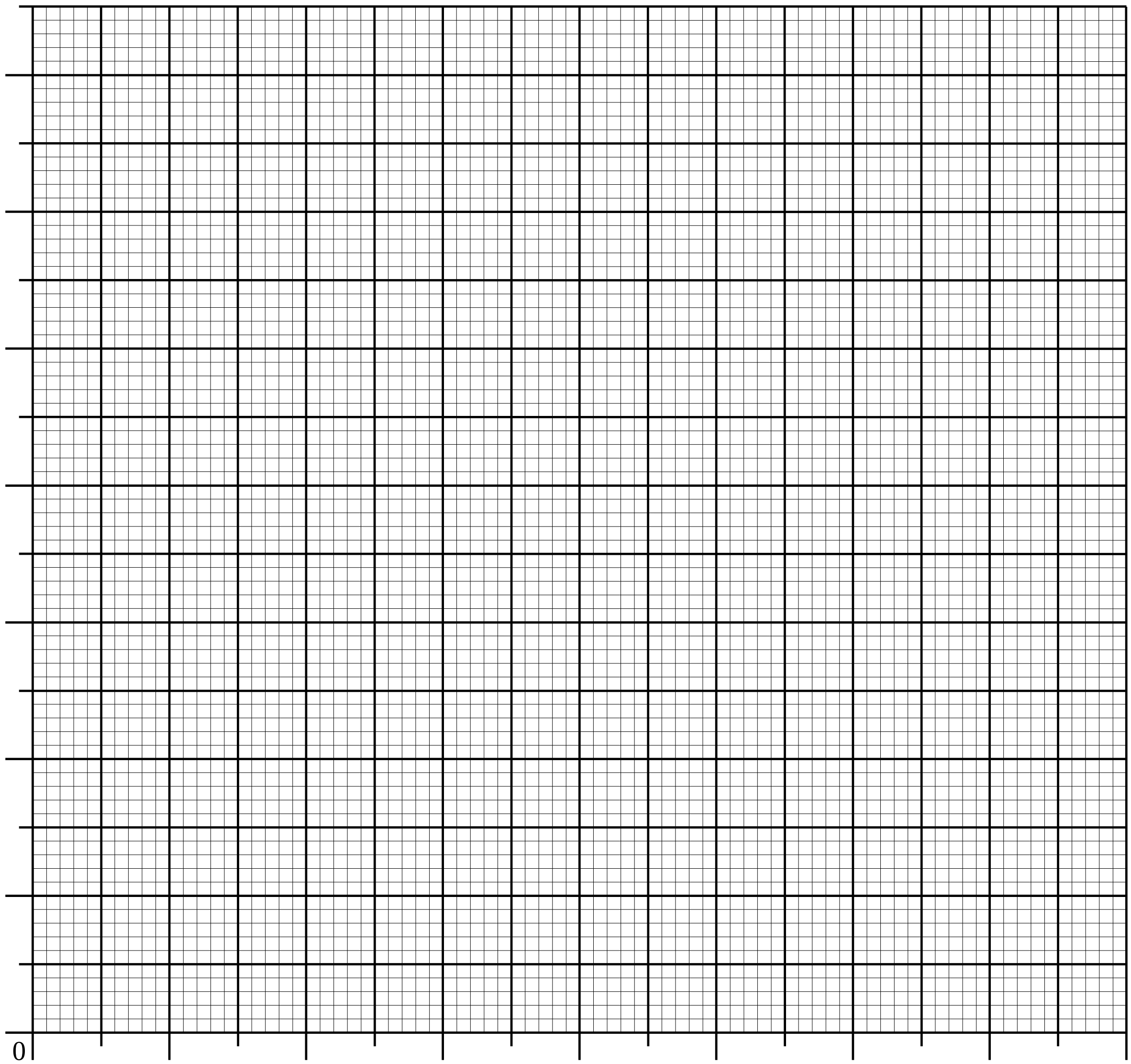
- **Step-3:** Hang the following masses to the spring and for each mass carefully record the elongation (in millimeters):

| MASS | **ELONGATION** (mm) |
|---|---|
| 0 | 0 |
| 20 g | |
| 40 g | |
| 50 g | |
| 70 g | |
| 90 g | |
| 100 g | |
| 120 g | |
| 140 g | |
| 150 g | |

1. Graph your experimental data below. Plot the distance the spring stretches (along the y-axis) versus the mass which represents the force (along the x-axis).

   Be sure to select suitable units both for the mass (g) and the distance (mm).

   After plotting your points, draw a smooth line which best fits the most plotted points.




2. What kind of relationship between the elongation of the spring and the mass (force applied) does your graph above indicate?

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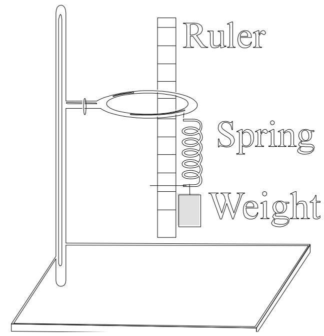
➲ **PART-B**:  The elongation of a "heavy" spring.




- Step-1:  Hang a "heavy" spring to a ring stand.
- Step-2:  Align the zero reading of a (mm) ruler with the end of the spring. Tape the ruler to a graduated cylinder or a book or a box and make sure you do not move it.

  ★ **IMPORTANT**:  Be sure to read the elongation of the "spring" at eye-level.  Also, always read the same "spot" on the "spring" for each reading.

- Step-3:  Hang the following masses to the spring and for each mass carefully record the elongation (in millimeters):

| **MASS** | **ELONGATION** (mm) |
|---|---|
| 0 | 0 |
| 400 g | |
| 500 g | |
| 600 g | |
| 700 g | |
| 800 g | |
| 900 g | |
| 1000 g | |

3. Suggest two reasons why the two springs behave differently:

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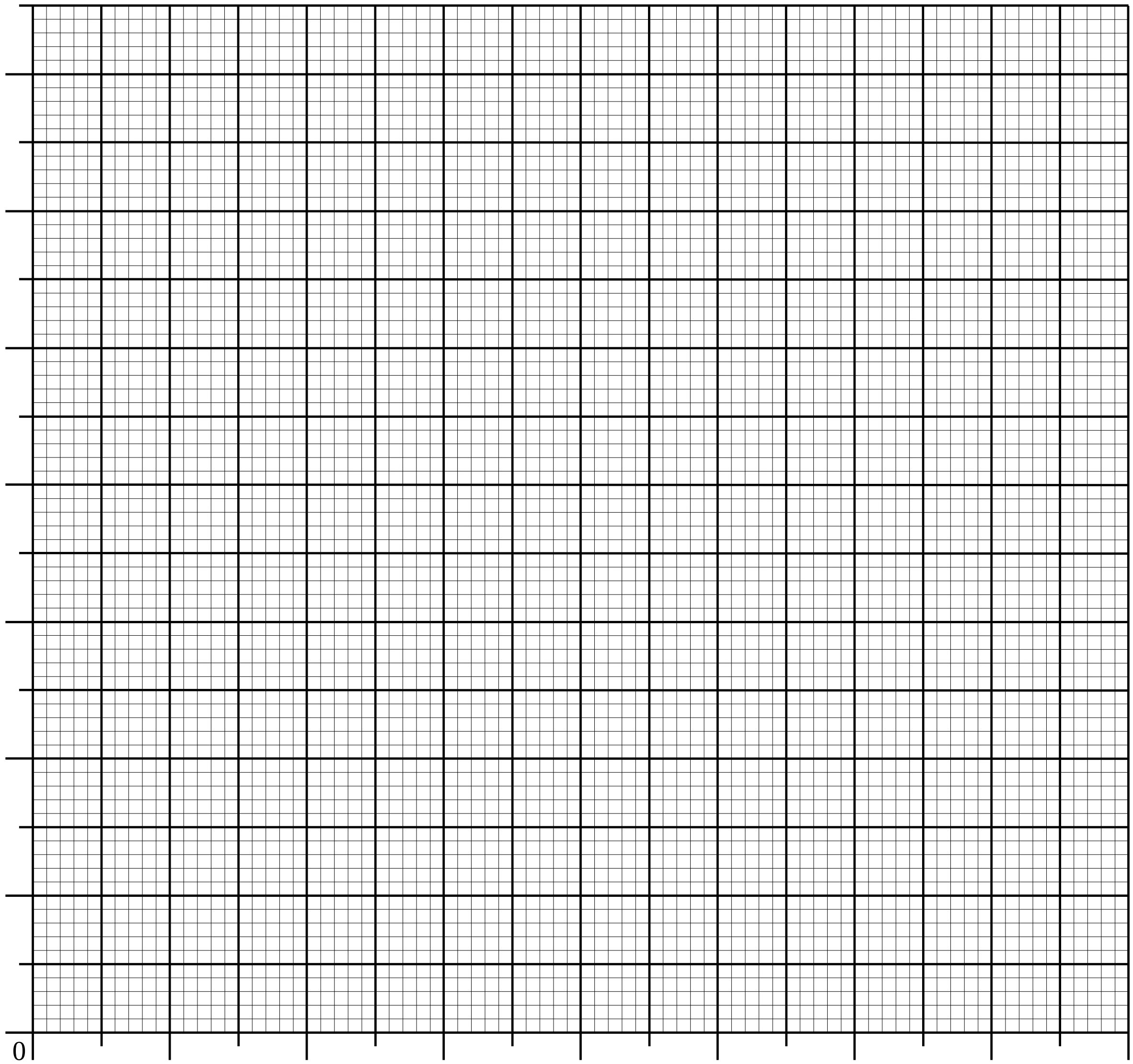
4. Graph your experimental data below. Plot the distance the spring stretches (along the y-axis) versus the mass which represents the force (along the x-axis).

   Be sure to select suitable units both for the mass (g) and the distance (mm).

   After plotting your points, draw a smooth line which best fits the most plotted points.




5. What kind of relationship between the elongation of the spring and the mass (force applied) does your graph above indicate?

   ______________________________________________________________

6. Find the slopes of the graphs you plotted:

   a) Slope of graph for the "light" spring (part-A): ____________________

   b) Slope of graph for the "heavy" spring (part-B): ____________________

7. Which spring (light or heavy) has a higher spring constant? ______________

8. What do the slopes represent? ____________________________________

9. What does the area under the curve represent? __________________________________

10. Using your first spring graph (part-A), predict the elongation of this "light" spring for any three forces which you did not attach to this spring:

| | MASS | PREDICTED ELONGATION |
|---|---|---|
| a) | | |
| b) | | |
| c) | | |

11. Using your second spring graph (part-B), predict the elongation of this "heavy" spring for any three forces which you did not attach to this spring:

| | MASS | PREDICTED ELONGATION |
|---|---|---|
| a) | | |
| b) | | |
| c) | | |

12. a) If a spring stretches 5.0 cm when a mass of 15 g is attached to it, how many centimeters will it stretch when a mass of 20 g is attached to this spring?

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    b) How much potential energy is stored in the spring when the 20g mass is hung?

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