**Names:**

# Spring Lab

Note where the end of the spring is located
Call this position "Zero" (See table below)
Place the smallest mass on the end of the spring that will actually **stretch** the spring and measure the displacement of the end of the spring.
Place enough mass combinations on the end of the spring to fill the data table and measure the displacement for each combination

| Mass (kg) | Spring Force (N) | Displacement (m) |
|---|---|---|
| 0 | 0 | 0 |
| | | |
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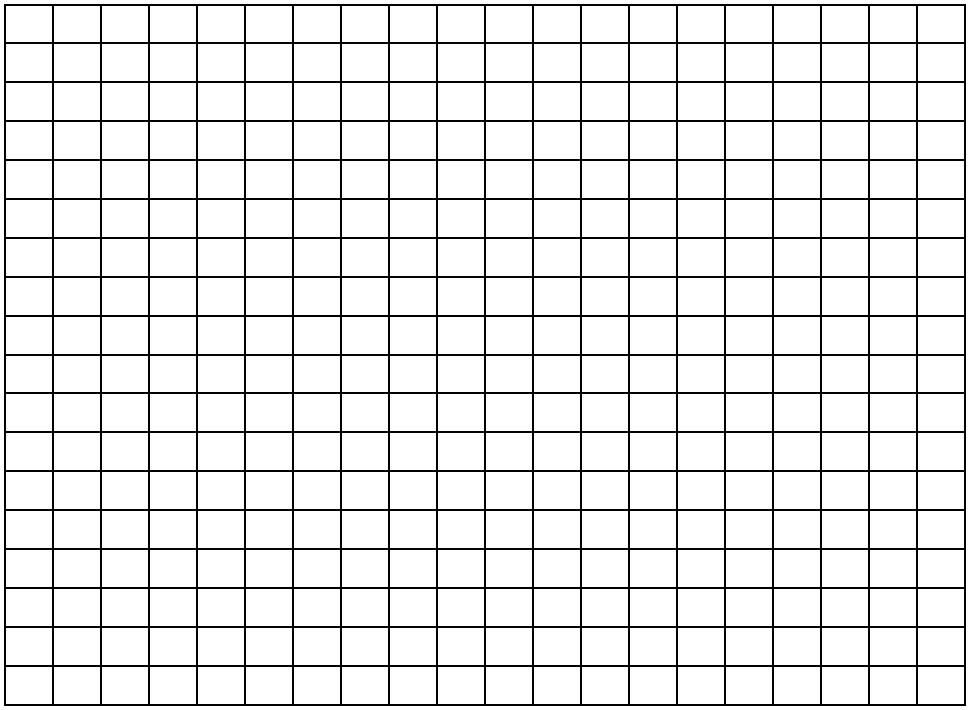
1. What forces act on the mass (think free body diagram)?

2. Draw a free body diagram of the mass as it hangs from the spring.

3. What does Newton's 2nd Law ($\Sigma F = ma$) tell you about the magnitude of the spring force? (once you figure this out, fill in the "force" column on the data table)

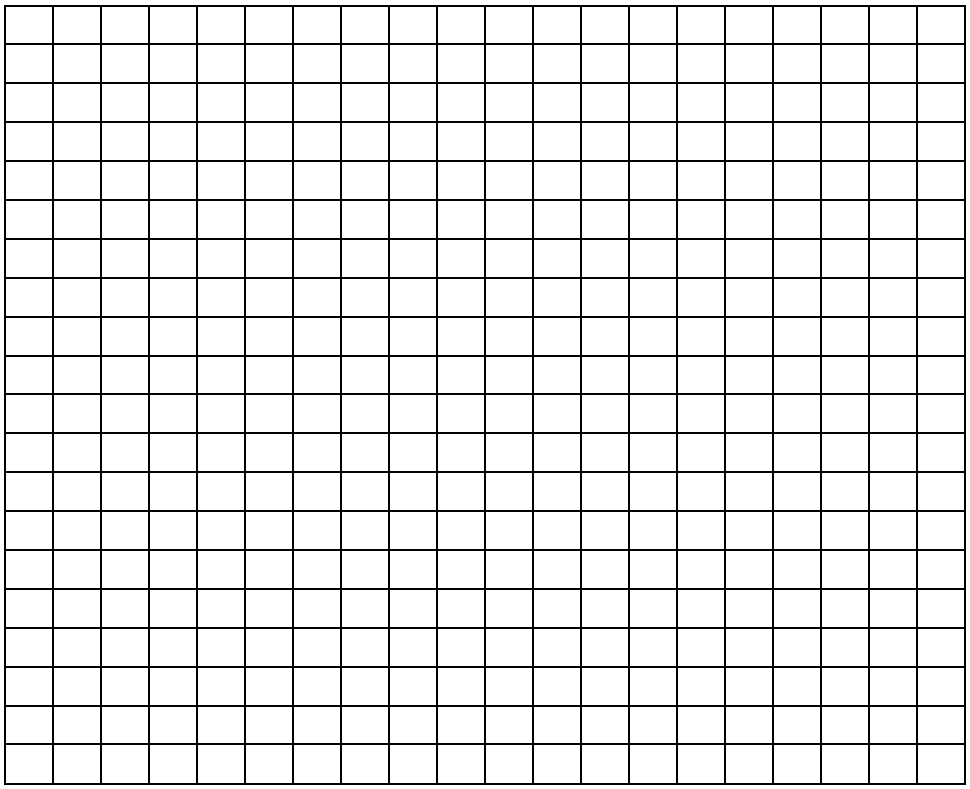
Graph the results with the force on the y-axis and displacement on the x-axis
Use a linear line of best fit and include all appropriate titles and labels.



Do the same for a second spring.

| Mass (kg) | Spring Force (N) | Displacement (m) |
|---|---|---|
| 0 | 0 | 0 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Graph the results with the force on the y-axis and displacement on the x-axis
Use a linear line of best fit



**Additional Questions**

4. Calculate the slope and its units for BOTH graphs

**Graph 1**

**Graph 2**

The quantity you just calculated is called the "spring constant" and it is represented with the variable k.

5. Write an equation (using physics variables) for the graph in the form of y=mx+b. This equation you write is called Hooke's Law.

6. If the spring has a large spring constant, what does that tell you about the spring?

7. If the spring has a small spring constant, what does that tell you about the spring?

**Some Analysis**

1. Calculate the area between the line of best fit and the horizontal axis (i.e the "area under the curve") for one of your graphs.

2. What are the units of the area?

….More on this later!