

Name _____

Lab Partners _____

Weight vs Mass

Objective:

Among Newton’s greatest achievements is his definitive work on how forces work. His three laws of motion form the foundation of many of the principals you will be studying this year. Newton’s second law of motion states:

“Acceleration of an object is directly proportional to and in the same direction as the applied force and indirectly proportional to the mass of the object.”

Mathematically, this means that the applied net force is equal to mass times acceleration ($F=ma$).

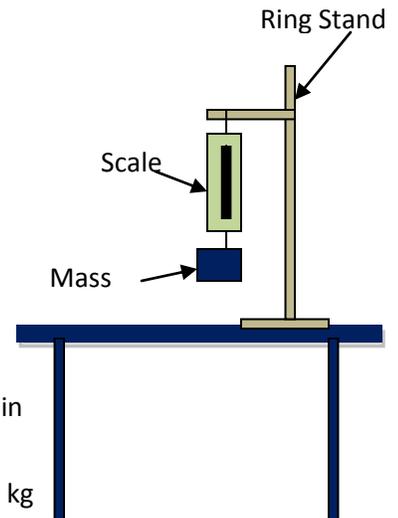
In this lab you will try to verify Newton’s second law. Remember that force has a unit of Newton’s. One Newton (N) is equal to $one\ kg \bullet m/s^2$.

Based on the reading in the interactive forces chapter, answer the following questions:

1. What is mass?
2. What is weight?
3. How is mass different than weight?
4. How is volume different from weight and mass?

Procedure:

1. Hang a spring scale from the horizontal post attached to a ring stand. Make sure the scale is at zero by adjusting the metal tab on the top of the spring scale
2. Hang a mass between 0.02 kg and 0.20 kg on the spring scale and read the force in newtons off the spring scale and record in the table below.
3. Repeat step 2 for at least 4 other masses between the values of 0.02 kg and 0.20 kg and record them in the table.
4. Using your Open Office Calc, graph the data on a scatter plot and find a best fit trend line.
5. What is the slope from the equation of your best fit trend line.
6. What does this slope represent in the Newton’s Second Law equation?



<i>Mass in Kg</i>	<i>Force in Newtons</i>

7. What constant that we have worked with in the last two unites is close to the slope on your graph?

8. Calculate the percent error between the slope of your best fit line and the answer to question 7. Use the answer to question 7 as your theoretical value. $\%error = \left| \frac{Theoretical - Measured}{Theoretical} \right| \times 100$
9. Could any differences in your answer and the theoretical value be interpreted as being within experimental error? Why or why not?
10. What does this say about the relationship between a force and the weight of an object? What about acceleration and gravity? Based on this, what is the equation for weight? What exactly is weight?