NAME_____ **Lab: Approximations, Measurements and Sig Figs**

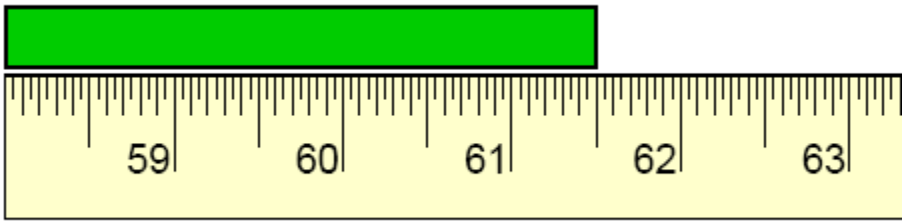
Ward Melville High School – Physics **DATE LAB PERFORMED _____**

DATE LAB DUE_____

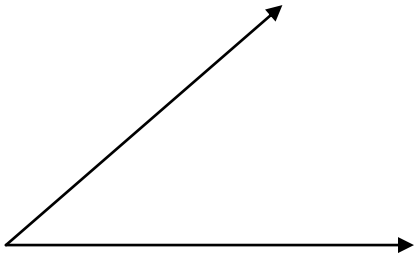
Partners:_____

Pre Lab:

Record the following measurement in cm with the correct number of significant figures:



Measure the following angle in degrees using the correct number of significant figures:



Identify the SI unit for each of the following:

Length_____

Mass_____

Time_____

PROCEDURE:

Station 1: Pull out a piece of tape that you think is one meter in length. Record its actual length below.

Estimated length: 1m TRUE LENGTH: _____

Station 2: How long is thirty seconds? Count to yourself while a partner times you and record your result below.

Estimated time: 30 seconds TRUE TIME: _____

Station 3: Choose an index card with an angle drawn on it and estimate its measure in degrees. Take a protractor and record the actual value below.

Estimated angle: _____ TRUE ANGLE: _____

Station 4: Your weight in this class is not measured in what you think it is – pounds. It is actually the force with which the Earth pulls on you (and you on the Earth, by the way) and is measured in units called **Newtons** (symbol – **N**). Your weight comes from multiplying your mass in kg by about 10. An apple has a weight of about 1 Newton. Dividing that by 10 means that an apple has a mass of about .100 kg. Take the red cup and put enough water in it so you think the cup and water together have a weight of 1 Newton or a mass of 100g (yes, that is .100 kg). Place it on the balance and record the value in the data table.

Estimated mass: 100 g or .100 kg TRUE MASS: _____

Station 5: Now that you have a small idea of what weight is all about, there is a cup with some washers and a thread attached to it. Estimate its weight in Newtons and then find the actual weight using the scale. Enter the information in the data table.

Estimate weight: _____ TRUE WEIGHT: _____

Station 6: Estimate the diameter of the paper plate and then measure it using the ruler. Record the information in the data table.

Estimated diameter: _____ TRUE DIAMETER: _____

Station 7: No estimating here! Just measure the length and width of the index card and record its value below.

Measured length: _____ Measured width: _____

Station 8: The distance from one tape in the hall to the other is 10 m. Estimate how fast a person walking from one tape to another is moving in meters per second. Then, record the time it takes someone to move those 10 meters. Divide the 10 m distance by the time and record the speed below.

Estimated time: _____ TRUE TIME: _____

Station 9: Measure the length of all three wires in the sample bag. Record the mass of only the longest and shortest pieces of wire and record your information in the table below:

	Short	Medium	Long
Length (cm)			
Mass (g)			

Calculations: BE SURE TO SHOW THE FOLLOWING FOR EACH PROBLEM!

- Write the formula you will use
- Show a substitution into the equation WITH UNITS
- Show the final answer WITH UNITS

1) Calculation of the perimeter of the index card at Station 7:

2) Calculation of the area of the card at Station 7:

4) Calculation of the speed of the person in Station 8 – you can use your Reference Tables here to find the equation:

3) Calculation of the percent error of the diameter of the plate at Station 6 – Incidentally, the formula for percent error is:

% Error = (Relative error / True value) X 100
Relative Error – difference between the true and experimental values

4) On a separate piece of graph paper, create a graph of the data you collected from Station 9:
Plot mass (y-axis) vs. length (x-axis) and label your axes with units.
Draw a best fit line or best fit curve.

5) Use the graph to predict the mass of the middle length of wire: _____

6) Calculate the slope of your graph. Be sure to include the equation, substitution and units.

7) Using a dashed line on your graph, draw in a line that shows a relationship between wires of the same length but a **greater mass.**

Questions:
1) Explain the effect on the number of significant figures in your measurements if more precise measuring devices were used:

2) You are asked to measure the thickness of one page in your textbook. There are three ways to do this: measure 1 page, 50 pages or 100 pages. Choose which one would give you the most accurate thickness of one page and explain why.