Lab: Energy Transformations: ***Chemical energy into heat energy***.   Lab report and this packet = 30 pts.

Objective: Students will burn Corn chips and capture the heat released with a known amount of water. From the change in temperature of the water and through several trials, students will estimate the energy density of these chips in units of joules/gram.

Warm up: Critical thinking. Think back to our Kinetic Energy lab (throwing baseballs) and review the amount of energy (in joules) that you put into the tennis ball.

From the Kinetic Energy Lab:

How many joules of energy did the ball have? _____

How much work did you do to throw it? _____

How much force did you apply?   _____ Newtons = _____ lbs? (divide by 4)

Considering the fact that the energy we have to throw things comes from the food that we eat, make an estimate of how many joules an average corn chip my contain (chemical energy). _____ joules

Directions for each trial

1. ***Weigh empty 250 ml beaker***

2. ***Add water (1/2 -2/3 full) then weigh it again***

3. Subtract 1 from 2 to determine mass of H_2O

4. ***Take initial temp of H_2O***

5. ***Weigh one, unburned chip (whole)***

6. Light the chip on fire.. let it burn until done.

7. ***Record the final temperature of the water.***

8. On the back of this sheet, determine the ΔQ for each trial.

Trail 1	Trial 2	Trail 3

Use the Specific Heat Equation to determine heat absorbed by water from the burning corn chip.

$$\Delta Q = m \cdot \Delta T \cdot Cp$$

1. Show your math for each calculation on the back of this sheet.
2. Turn to another group and copy their three data points (weight of chip vs heat captured). Add their data to your data and create a graph comparing mass of each chip (on the X-axis) to the Heat absorbed (on the Y-axis) for each chip burned This should be a series of "dots" on a graph. Be sure to label all axis, including units and put a meaningful title at the top of the graph as well.
3. Print your graph out and use a ruler to estimate the "best fit" straight line graph through the data.
4. Using two points on the graph which are NOT your data points, determine the slope of the line. Be sure to include units. (show your math for that calculation somewhere on the graph).

Determine the efficiency of our systems.

Based on the advertised serving size of these chips (and the advertised calories per serving) determine the efficiency of energy capture of our Thermal Energy Containment Systems.

Save these graphs and your math, you will write a report on Energy and energy transformations to hand in which will include these graphs.