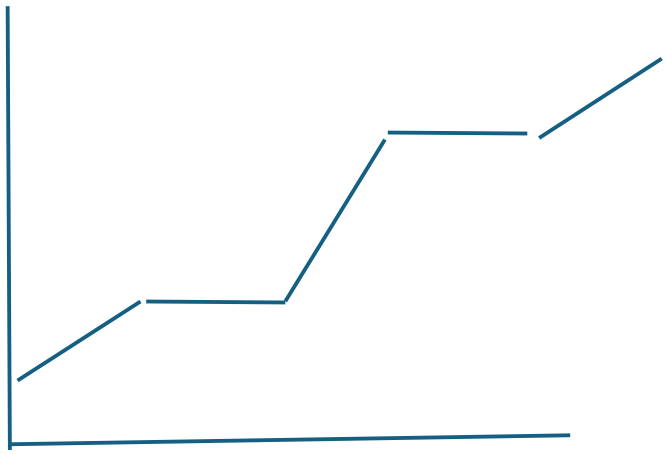
Poster Project: States of matter and phase change

For nearly as long as humans have been conscious, we have been wondering about what is and how and why it seems to change forms (think of solid ice melting and turning into liquid water.

In the modern age, we have a better sense of Heat as a form of energy which drives these changes, both forwards and backwards.

Based on our discussion in class, label the axis and annotate the graph, describing with proper terms both the phases and transitions.



In this lab; we will attempt to determine the Heat of Fusion for water ice. (the heat required to melt on gram of ice). This process is centered on the First Law of Thermodynamics. (there are four of them).

Use this space to write out the First Law of Thermodynamics.

What will this law look like in our lab?

Procedure:

1. Obtain a thermally insulated cup and weight it. _____
2. Clark will add an amount of HOT WATER! Weigh it again _____
3. Subtract the first measurement from the second measurement
    a. ..to determine the Mass of Hot water you are starting with. _____
4. Record initial temperature of the Hot water _____
5. Clark will then add a mass of solid ICE into your cup.
6. Stir the ice around until it melts and then record the Final Temperature. _____
7. Weigh the cup one more time to record the FINAL Mass of the system _____
    a. Determine how many grams of Ice must have been added. _____

Calculations.

1. Determine the Heat lost by the Hot water cooling. $= Q_1$
2. Determine the Heat gained by the ice water warming $= Q_2$
3. Using the First Law of Thermodynamics;
    a. Determine the Heat required to melt the ice $= Q_3$
4. Calculate Percent Error (given the accepted value of 333/joules).

Continued on back side..

What to hand in:

A poster that contains the following sections or ideas. (through artistry and words or labeled diagrams).

- The Four States of Matter in the 'modern sense' AND in the ancient Greek, world view.
- What are 'intermolecular forces' and what happens to 'particles' of matter when heat is added or taken away. What is happening during a phase change?
- A labeled example of a Phase Change diagram including the proper terms when heat is added or removed (i.e., ice MELTS to form a liquid when heat is added but FUSES to form a solid when heat is removed.
- The First Law of Thermodynamics in words as well as how we expressed it mathematically in this lab.
- A section which walks through your measurements and calculations. This section should include the STATED OBJECTIVE OF THE LAB. (to determine the HEAT OF FUSION OF ICE) and include your Percent Error calculation as well.

<u>Grading rubric</u>

Did you complete the assignment? All of the required steps? Did you go beyond?	5	4	3	2	1
How well did you communicate your ideas? Using words, pictures, diagrams?	5	4	3	2	1
Was your data/analysis accurate? Is the calculations/descriptions correct?	5	4	3	2	1
Were you creative in your writing? Drawings? Organization?	5	4	3	2	1
Does your final product/report/poster look clean, organized and professional?	5	4	3	2	1

Your score _____/ 23 possible