Homework #11 – Due 4/29 at the beginning of class

If you have any questions about the homework, feel free to email me: sawtelle@umd.edu

Rules:

- The less of the cylinder that is under water, the long time it will take for the temperature of the cylinder and water to equalize
- The amount of water in the cup will affect the time it takes to equalize temperature
- The space between the cylinder and the air will affect the amount of time it takes to equalize temperature
- The closer the temperature probe (measuring water temperature) is to the cylinder, the more affect the cylinder has on the temperature of the water
- The difference in initial temperatures (of the cylinder and the water) will affect the slope of the cylinder (if you decrease the difference in temperatures, you decrease the slope of the cylinder)

We also put some possible definitions of heat and temperature onto the table for discussion. Right now we have:

Heat:

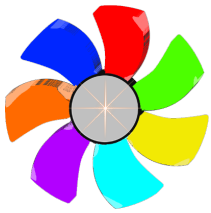
1. Speed of molecules in an object
2. Friction between molecules in an object
3. The energy that molecules in an object have (no one said this one in class that I heard, but it showed up in a *lot* of people's daily sheets)

Temperature:

1. Measurement of heat
2. The speed of molecules in an object (again, no one said this in class, but it showed up in the daily sheets)

We've also had some terrific analogies put on the table to help us talk about this stuff more easily:

In the fantastic discussion we had on Tuesday people came up with several analogies to explain what they were thinking about. One analogy was the fan blades, where Megan described thinking of heat as how fast a fan is rotating. To speed it up you have to hit the blades in the same direction as they are going, which is easy, and that corresponds to "heating up," while slowing the fan blades down by hitting them in the opposite direction (difficult) corresponds to "cooling down."



Another analogy from Mary was thinking about telling kids to come in from playing outdoors which takes a really long time (cooling) versus encouraging them to go outside and play which happens very quickly (heating).

It would be great if we could find an analogy that works well to explain many of things that we've been finding so far, because then we'd move from talking about stuff we can't see to stuff we can see. There are likely even more analogies out there, but these are two that did work for me in the heating/cooling discussion.

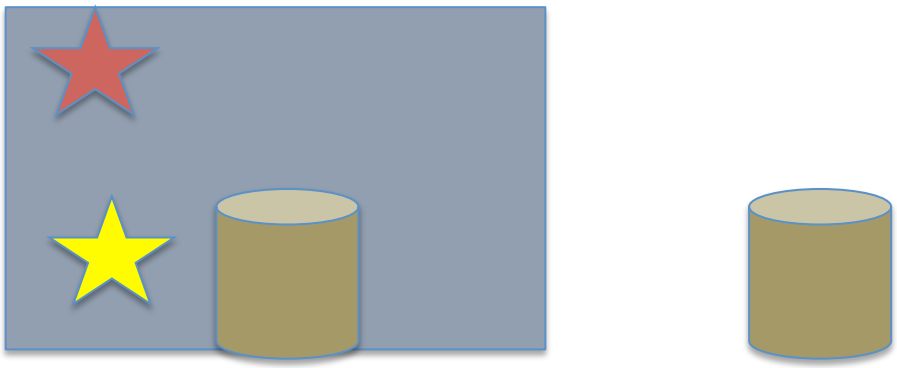
1) So many terms! - Temperature/Heat/Heating/Cooling

We have a lot of possible terms circulating in the class and I think we are often using them interchangeably. This is a relatively easy essay, but here I'd like you to choose a definition of "heat", and then work through each term and provide a definition for the other words. Be sure you're not being circular in your definition (using the word in its own definition), and that you're defining each word differently. The words to define are:

1. **Heat**
2. **Temperature**
3. **Hot**
4. **Cold**
5. **Heating**
6. **Cooling**

2) Boundaries

One conversation I heard several people having had to do with the change in heat (or temperature) *within* an object versus *between* two objects. In this essay I'd like you to say a bit about what you think is going on. In class we spent some amount of time talking about how it matters how deep you place the temperature probe. This should tell us something about how heat changes *within* water. But we also know that putting a room temperature cylinder into hot water changes the temperature of both the water and the cylinder. This tells us something about how heat changes *between* two objects. So tell me a bit about these two processes. Do you think they are the same? Different? What evidence do you have to support your idea? If you think they are different do you think the metal is different than the water? Why or why not?



That's it folks – I'm behind on grading, so I'm making this homework short in apology!