

Homework #12 – Due 5/6 at the beginning of class

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

(These are intended to serve as practice test questions – be sure you’re giving enough detail for me to evaluate the consistency and clarity of your argument.)

1) The cooling coffee cup

In class as of Tuesday 4/30, we have 4 proposed definitions of heat:

H1: The energy that results from the friction between molecules

H2: The energy that causes the friction between molecule

H4: The energy of molecules

H5: The energy that affects the speed of the molecules

In this essay I’d like you to try on two of these definitions of heat in telling a story about my coffee. Every day I bring a steaming hot cup of coffee to class. It’s in a mug with a lid on it, and I slowly drink the whole cup throughout the 2 hour class. By the time I get to the bottom third of the cup, however, my coffee is always cold. How does my coffee gets cold? Try using two different definitions of heat in your explanation. Does one of them work better for you? Is one of them impossible to use?

2) Does a cooler cool?

In class I usually use those silver coffee pots to make and keep hot water for the class. In the big orange cooler I keep iced water. Suppose that one day I needed to make a LOT of hot water, and I was looking for a place to keep it. I decide to make the water hot in the coffee pots and then pour it into the big orange cooler. What do you think will happen? Will the cooler keep my water hot? Will it cool faster than if I just poured it into a big beaker and left it sitting in the air? Will it cool just as fast as if I let it just sit in air?

3) Short circuits

In the first unit of class we played a lot with wires, batteries, and light bulbs. One of the early observations people made was that if we short circuited the battery, the wire got really hot and would burn our fingers. Explain how this happens. How is it that the wire gets hot? What’s going on?

