Reading Assignment for November 11
Sections 10.5, 11.3, 12.2, and 11.4

Please notice that this file is two pages long.

10.5 - Thermal Energy

- I'm not crazy about your book's approach here. It has too much detail in doing the calculations. It does have the basic fact right: The work done by friction is changed into thermal energy.
- I tend to ask students to solve for the work done by friction, W_f, but it's a good idea to realize that $W_f = -\Delta E_{th}$ can also be used.
- It's kind of hidden here what the actual definition of thermal energy is, so I'll probably go into more detail in class.

11.1-11.2

- I realize some of you will be disappointed that I'm skipping all this good Bio stuff in these sections. I do apologize, it is good stuff, but I need to make sure we cover certain physics topics. Read these sections for your own enrichment.

11.3 - Thermal Energy, Temperature, and Heat

- Ideal gas - object whose atoms only have translational kinetic energy.
- Temperature - measure of the average kinetic energy of a molecule in an ideal gas.
- Temperature scales - Celsius, Fahrenheit, and Kelvin.
- The Kelvin scale is defined using the physical definition of temperature.
- Before you read the subsection about heat, I would go and read Section 12.2. (See the notes below.)
- Heat, Q - energy transferred between two objects due to different temperatures.

- Thermal equilibrium - two objects at the same temperature have no net energy exchange.
- I will briefly mention the effect that heat can have on an object which is covered in Sections 12.4 and 12.5 of our textbook. I'm mostly relying on you knowing this from chemistry. If you're chemistry class did not leave you feeling confident about this, it would probably be worth your time to go over those sections in some detail.

12.2 The Atomic Model of an Ideal Gas

- I simply want you to read the first page of this section because I'll introduce equation 12.5 "early".
- In an ideal gas, the relationship between kinetic energy and temperature is exact.
- Boltzmann constant $k_B = 1.38 \times 10^{-23}\, J/K$.
- Thermal Energy for ideal gas of N particles: $E_{th} = \frac{3}{2} N k_B T$.

11.4 - The First Law of Thermodynamics

- Work or heat can cause a change in an object's thermal energy.
- Thermodynamics - Motion of heat.
- First Law of Thermodynamics - for a system in which only the thermal energy changes $\Delta E_{th} = W + Q$