LECTURE 00: Introduction/Review

Select LEARNING OBJECTIVES:

- Review work energy equation.
- Review energy transformations.

TEXTBOOK CHAPTERS:

- Giancoli (Physics Principles with Applications 7th) :: 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, 6-7, 6-8, 6-9
- Knight (College Physics : A strategic approach 3rd) :: 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7
- BoxSand :: Work & Kinetic Energy , Potential Energy , Conservation of Energy

WARM UP: Name game:

Groups of about 6-8.
Name.
Major.
Something interesting and/or why here.
1 group member introduce entire group to class.

Course website: www.fliphysics.com/ph202-s17/ (Check the calendar page regularly.)

Welcome back to your second term of algebra based physics. The first two weeks of this term will focus on thermodynamics. Some of the topics, such as the ideal gas law or calorimetry, may already be familiar to you from a chemistry course. In this class, we wish to develop a microscopic model of matter first, then focus on an energy approach to thermodynamics. Before beginning, I recommend reviewing energy by doing at least one of these things: review all of the energy notes from last term, explore the boxsand website energy content, and/or reading chapter 10 of our textbook.

PRACTICE: Discuss with your group what your remember about the work-energy equation and write it all down on a whiteboard.

PRACTICE: You drop a ball from a rooftop onto a trampoline. Define a system and describe all the energy transformations and transfers if any for one complete cycle (ball goes down, then back up to the same height).

PRACTICE: Two identical baseballs are thrown with the same speed toward home plate. Ball A is spinning rapidly as it travels. Ball B is not spinning as it travels.

(a) Which ball has more total mechanical energy? Explain.

(b) Which ball requires more work to throw? Explain.

(c) If the pitcher wants to throw two balls - one spinning and one not - that require the same amount of work to throw, which will travel faster towards home plate? Explain.

PRACTICE: Three students are discussing the concept of work in regards to a situation where a dude is standing at rest holding some books. Which statement do you agree with most?

1. "The books aren't moving so there is no way any work is being done on them."
2. "That doesn't make sense because the dudes arms would be getting tired and thus he must be losing energy, if energy is being lost then work must be done on the dude."
3. "The only forces connecting the books and that dude are the normal force, so if the books have no work being done on them but the dude does have work being done on him it can't be due to the normal force from the books."
4. All statements are correct.

Thermodynamics order of presentation this term (Read CH 11 and 12)

- Microscopic view of matter. **CH 12.1**
- State variables (P, V, T, N, …) **Everywhere in the text**.
- Kinetic theory of gases. **CH 11.3, 12.2**
- Equations of state (Ideal gas). **CH 12.2**
- Energy revisited (1st law of thermodynamics). **CH 11.1, 11.4**
- Energy Transfers. **CH 11.1, 11.2, 11.3**
- Heat, specific heat, calorimetry, phase transitions. **CH 12.5, 12.6**
- Transfer mechanisms (Conduction, convection, radiation). **CH 12.8**
- Entropy and the 2nd law of thermodynamics. **CH 11.7, 11.8**
- Heat pumps and engines. **CH 11.5, 11.6**
- Thermodynamic processes, cycles, efficiency. **CH 12.3, 12.7, 11.1**

Questions for discussion:

(1) What energy transformations occur when you walk at a constant speed across a horizontal ground?
(2) A car travels at a constant speed along a horizontal stretch of road. What energy transformations occur if any?