Q2T1 Review
Old Material:

- Metric Prefixes and unit conversions
- The motion equations:
  $$d_f = d_i + v_i t + \tfrac{1}{2} a t^2$$
  $$v_f = v_i + at$$
- ***Newton's First Law of Motion***: If the net force acting on an object is zero, the object's acceleration is also zero. In this case, the velocity (speed and direction) is constant.
- ***Newton's Second Law of Motion***: If the net force acting on an object is not zero, neither is the object's acceleration and this equation describes the relation:
  $$\Sigma \mathbf{F} = \mathbf{F}_{NET} = m\mathbf{a}$$
- Acceleration is always in the same direction as the net force.
- ***Newton's Third Law of Motion***: Unlike the first two, the Third Law describes forces that different objects exert on one another. The law states that whenever one object exerts a force on another, the second object simultaneously exerts and equal magnitude force in the opposite direction on the first.
- Momentum
  $$\mathbf{p} = m\mathbf{v}$$
- Impulse
  $$\mathbf{F}t = \Delta(m\mathbf{v})$$

New material:

- Work transfers energy from one object to another or converts energy from one form to another.
- **Work is defined as a force acting through a distance.** It is calculated by multiplying force and the distance through which it acts:
  $$W = \mathbf{F}\mathbf{d}$$
- Positive Work tends to increase the kinetic energy of an object while negative work tends to decrease the kinetic energy.
- When Force and motion are in the same direction, positive work is done. When they are in opposite directions, negative work is done. When they are perpendicular to one another, no work is done.
- Whenever positive work is done on an object, its kinetic energy tends to increase. Whenever negative work is done on an object, its kinetic energy tends to decrease.
- The energy removed from an object by negative work must be accounted for.
  - It can be transferred to another object as kinetic energy.
  - It can be transformed into potential energy either in the same object or another.
  - It can be dissipated in the form of heat.
- Kinetic Energy is the energy an object has because of its motion.
- Kinetic Energy – $E_k = \tfrac{1}{2} m v^2$
- Potential Energy is the energy an object has because of its condition or location.
- There are several kinds of potential energy. One is gravitational and another is elastic (energy stored in springs and other stretched, compressed or twisted objects.)
- Gravitational Potential energy is the energy an object has due to its mass and elevation. It is calculated by multiplying the weight of the object and its elevation.
  $$U_g = mgh$$
- When an object rises, its gravitational potential energy increases in proportion to how high it goes. Only vertical distance matters.
- When an object falls, its gravitational potential energy decreases in proportion to the distance it falls. Only vertical distance matters.
- An object's gravitational potential energy is measured relative to a chosen zero point. This means that the gravitational potential energy is considered to be zero at this point. Whenever the object is above the zero point, it has positive gravitational potential energy. Whenever the object is below the zero point, it has negative gravitational potential energy.

Make sure you can do all of the homework problems.