Physics 151 Reading Assignment for October 1 Sections 5.2-5.6

Please notice that this file is *THREE* pages long.

5.2 - Dynamics and Newton's Second Law

- The most important thing to realize when applying Newton's Second Law is that acceleration is *NOT* a force. In other words, there are no new forces acting on an object when it accelerates. The forces we identify for an accelerating object are the same that we would identify on a stationary object. The only thing that changes are the magnitudes and sometimes the direction of forces.
- It is also very important to remember to add the components of the forces: $\sum F_x = ma_x$ and $\sum F_y = ma_y$!

5.3 - Mass and Weight

- The first part of this section is review for us since we've already gone over in class that $w = mg$. Hopefully the book's discussion will cement this fact and help it make sense.
- Apparent Weight - I prefer to think of the apparent weight as the normal force instead of a spring force. The concepts, however, are the same.

- Weightlessness - People experience weightlessness when their apparent weight is zero. You can experience weightlessness on earth.

5.4 - Normal Forces

- We've discussed in lecture many times how the normal force is perpendicular to the surface.
- This section introduces the incline problem. The most convenient axes in this case are parallel and perpendicular to the surface. This causes us to use a non-standard angle. Notice how the component of weight along what they call the x-axis uses $\sin\theta$ while what they call the y-axis uses $\cos\theta$. To help students, I usually call these axes parallel ($\parallel$) and perpendicular ($\perp$).

5.5 - Friction

- Here's where we learn about the simple model for kinetic and static friction.
- Static friction is tricky - it can grow in strength.
- The static friction has a maximum magnitude that is proportional to the magnitude of the normal force.
- Also, the material types determine the maximum amount of static friction. We quantify this by using the coefficient of static friction, μ_s.
- The equation, $f_{s,max} = \mu_s n$ can only be used in problems where the static friction is guaranteed to be at its maximum value.
- Kinetic friction is much easier. Its magnitude is mostly constant and is given by the equation $f_k = \mu_k n$.

- I tend to ignore rolling friction. It's usually quite small. But do pay attention to the fact that the friction that makes wheels roll forward is static friction.

5.6 - Drag

- This is some good stuff here, especially how drag depends on the speed squared of an object, but it's a little too much for us. Covering everything else will take more than enough time already, so read this for your own education.