Unit 3 – Reading Guide

Forces and…

Read Unit 3 Prep Goals
to understand what I want you to be able to do.

Read/watch the following materials.
All videos are on the course YouTube page.
It would probably help to do these in order!

Watch this video first for an overview of the unit.

> This unit has quite a few topics in it, and thus will have readings from parts of many different chapters. However, they do all share a common theme of forces combined with some other quantity.

The ideas of torque and center of mass I want to approach differently than your textbook

Torque is the quantity that arises when you care about *where* a force is applied. As part of this discussion, you need to think about where gravity acts. This point is called the center of mass.

- Watch this video on center of mass / center of gravity
- Watch this video of Heath Hatch lecturing on torque. I think this is a better treatment than your OpenStax Textbook. **Note, this video is NOT on the course YouTube page.**
- Watch the first 11 minutes of this set of examples. We will do problems like the rest of the video in class but you are NOT required to be able to do those for prep. **Note, this video is NOT on the course YouTube page.**

OpenStax Textbook Chapter 8 sections 8.1 and 8.2 on the ideas of impulse and momentum - A video-based reading guide can be found here.

Impulse is the quantity that arises when you care about *how long of a time* a force is applied. It is connected to the idea of momentum, which is a concept that we will revisit in our unit on conservation laws.

- Read Section 8.1 – Linear momentum and Force in the OpenStax Textbook
- Read Section 8.2 – Impulse in the OpenStax Textbook

OpenStax Textbook Chapter 11 section 11.3 on the idea of pressure - A video-based reading guide can be found here.

Pressure is the quantity that arises when you care about *over what area* a force is applied and is the critical quantity when thinking about fluids. We will be considering pressure throughout the rest of the course.

- Read Section 11.3 – Pressure in the OpenStax Textbook

OpenStax Textbook Chapter 7 sections 7.1 and 7.2 on the ideas of work and kinetic energy - A video-based reading guide can be found here.

Work is the quantity that arises when you care about *how far of a distance* a force is applied. It is connected to the idea of kinetic energy, which is a concept that we will revisit in our unit on conservation laws.

- Read Section 7.1 – Work: The Scientific Definition in the OpenStax Textbook
- Read Section 7.2 – Kinetic Energy and the Work-Energy Theorem in the OpenStax Textbook
- Watch this video on the idea of work as it applies to fluids
  This involves pressure and thus will not really make sense if you have not watched the pressure material first!

Complete the MasteringPhysics homework by 9am on the day of the RAT

- *Unit 3 Forces and… Prep Homework* ← Should take you about 2 hours **IF you carefully do the reading/watching above. If you skip this, it will take longer.**
- *Unit 3 Adaptive Follow-Up* ← Will take about 30min and only become available when you have finished the previous assignment.