Today:	**10** Simple Harmonic Motion & Elasticity 2nd ½	HW1
Monday:	**16** Waves & Sound 1st 1/3	HW2
Lab:	**Lab 1** : Harmonic Motion	

Administrative

- **Office Hours**

10.2 Simple Harmonic Motion and the Reference Circle

Demo: mass on spring, let it bob

- o **Qualitative Plot of Position Vs. Time and Force Vs. Time**

- o **Mathematical description of Motion: Displacement**

Periodic Functions

- o **Amplitude**
- o **Period**
- o **Frequency**
- o **Angular Frequency**

Example 1 Say our mass bobs up and down 4 times in 6 seconds. A) What is the period? B) What is the frequency? C) What is the 'angular' frequency?

- o **Units**
- o **Connection to physical properties, m and k.**
  Demo: Mass dependence of frequency

Example 2: Say we observe that our 0.5 kg mass has a period of 1.5 sec. on our spring. What is the spring constant?

Simple Harmonic Motion Generality

Velocity & Acceleration

- **Velocity**
  - o **Qualitatively**
  - o **Quantitatively**
    - **Amplitude**

Example 3: Say I pull the mass down 0.1 m and release. It bobs up and down in 1.5 sec. What is the maximum speed?

- **Acceleration**

Other objects Displaying Simple Harmonic Motion

The Pendulum

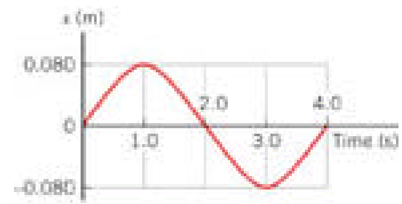
- o **Linear Approximation**
- o **Only an Approximation**
- o **Frequency dependence on g and l**

Example 4: How long must be a pendulum to have a period of 2 sec?

HW 2.

14. A loudspeaker diaphragm is producing a sound for 2.5 s by moving back and forth in simple harmionic motion. The angular frequency of the motion is 7.54×10^4 rad/s. How many times does the diaphragm move back and forth?

17. Concept Simulation 10.3 at www.wiley.com/college/cutnell (edition 6) illustrates the concepts pertinent to this problem. An 0.80 kg object is attached to one end of a spring, as in Figure 10.6, and the system is set into simple harmonic motion. The displacement x of the object as a function of time is shown in the drawing. With the aid of these data, determine(a) the amplitude A of the motion, (b) the angular frequency ω, (c) the spring constant *k*, (d) the speed of the object at t= 1.0 s, and (e) the magnitude of the object's acceleration at t = 1.0 s.



42. A pendulum clock can be approximated as a simple pendulum of length 1.99 m and keeps accurate time at a location where g = 9.83 m/s^2. In a location where g = 9.78 m/s^2, what must be the new length of the pendulum, such that the clock continues to keep accurate time (that is, its period remains the same)?