B-Day: Due Thurs., Feb 1 (Assigned: 1/30)
A-Day: Due Fri., Feb 2 (Assigned: 1/31)

Harmonic Motion 6

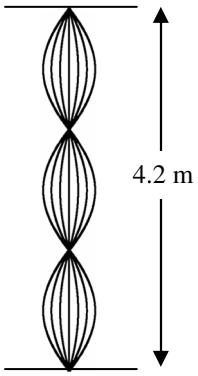
Make sure that you go back to the last few homeworks for the logic. This homework assumes that you can duplicate that work.

1) How do you increase the period of a pendulum?
2) If a pendulum is 45 cm long and has a period of 1.2 seconds, find the force of gravity on the pendulum.

3) Spring A (k = 35 N/m); Spring B (k = 20 N/m).
   A) If the same mass is put on both of them, which one will stretch farther?
   B) With the same mass, which has the faster period?
   C) If a 2 kg mass is attached to Spring A, how far will it stretch?

   D) Find the period of Spring A (with the 2 kg mass).

   E) What is the spring's frequency?



4) Use the harmonic at the right to answer the following:
   A) Which harmonic is it?
   B) How do you know?
   C) If it vibrates at 450 Hz, find the frequency of the fundamental.

   D) How many wavelengths is this harmonic?
   E) What is this harmonics wavelength?

   F) If this was a string and we plucked it, would we get this harmonic?
   G) Why or why not?
   H) How many antinodes is the fundamental for this space?
   I) Find the wavelength for the fundamental.

5) Why did the bell get quieter when I evacuated the air out of the bell jar?

6) If there is no sound in space (a vacuum), why wasn't the bell silent?

7) When we were listening the sound generator, when did I have to turn up the volume? At the extremes of our hearing or in the middle of our audible range?

8) Why when we were testing the auditory range of the students did I have them turn around and close there eyes?

9) A person is standing in a wide canyon. They yell toward the other side. 3.4 seconds later they hear the echo of their yell come back to them.
   A) What is the speed of the yell?
   B) Is the 3.4 seconds the time to the other side of the canyon or there and back?
   C) If you wanted to use this echo to find the distance to the other side, what must you do with the time?
   D) Find the width of the canyon.

10) If you wanted to increase the energy in a pendulum you would do what?

11) *Using the sound notes:* If the volume of sound changes from 15 dB to 25 dB, how big of a change do we perceive?

12) If the volume of sound changes from 50 dB to 70 dB, how big of a change do we hear?

(Note: Each 10 dB change is 10 times the air pressure. 20 dB change is 100 times the pressure on our ears.)

Using the notes: "Wave Interactions" We have already done some of this.

13) When a wave hits a hard boundary it:
14) When a wave bends around a corner it:
15) The bell's volume decreased when it was _____ by the glass bell jar.
16) Light bends in eyeglasses by:
17) How is it that you can hear someone around the corner?

18) When you stop a spring or pendulum from swinging you are _____ it.

19) What is the basic definition of period?

20) What is the basic definition of amplitude?

21) What is the basic definition of frequency?

Lab Questions: You were given time in class to figure out what affects the period of a mass-spring system. Let me ask some questions to see what you know about setting up the experiment.

22) What three quantities were you to test to see if they affect the period of a pendulum?

23) How were you to test each of the above to be sure how it affects the period?

24) You were to measure the period of the pendulum. What units was the period in?
25) You were supposed to use what device to do this?
26) Were you supposed to measure one or multiple periods?
27) Why?

28) How were you supposed to change the spring constant?
29) Write an empty data table below that you were supposed to use to experiment with amplitude. Be sure to label the columns AND circle the quantity that were to have changed.

OK—Here's the point of all of the "were supposed to's" above: When I give you time to work in class to learn something you better do it!!!!! Those of you that did the work—thank you. Those of you that wasted my time: by Newton's Third Law: I'm gonna waster yours!!!!

All of you will need to write a lab write up for me telling me what you did, what are control and experimental variables for each table, giving data, and making a definitive conclusion. This will be worth 2 homework grades. It is due on Monday or Tuesday (depending on your day). If you did NOT do anything or wasted time in the lab, you will have to find time ON YOUR TIME to do the lab. I know who did or did not do the lab.

Those that did work in the lab, one of your two homework grades will be an automatic 100%.