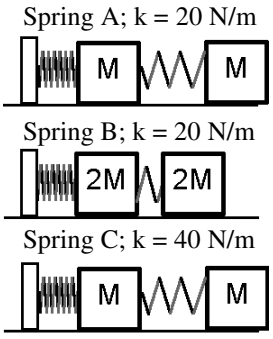
B-Day: Due Tues., Jan 30 (Assigned: 1/26)
A-Day: Due Wed., Jan 31 (Assigned: 1/29)

Harmonic Motion 5

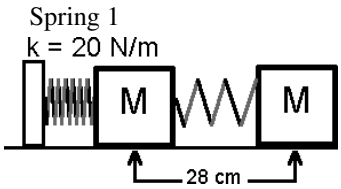
I hate to break it to you, but I think we need to do our test at the end of this week. You'll have to do some studying and I'll have to cut back on some of the sound material. Sorry, but I just realized that the end of the sixth weeks is soon and we need to take the test with enough time for you to do makeups.

You will need the notes of "Sound" and "Standing Waves" on the Internet or in my room.

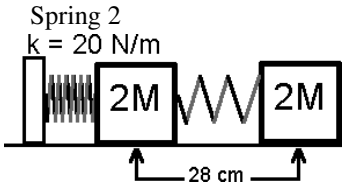
1. ___ Which spring takes the most force to stretch?
2. ___ Which force would be the easiest to stretch?
3. ___ If I put the same mass on all of the springs, which one will stretch the farthest?
4. ___ Spring A or C would provide the greatest force to the mass?
5. ___ Spring A or C would give the greatest acceleration to the mass?
6. ___ Spring A or C would take the least time for the mass to go back and forth?
7. ___ Spring A or B has the shortest period?
8. ___ Spring A or B gives the greatest force to the masses?
9. ___ Mass A or B resists the force of the spring the most?
10. ___ Spring A or B will take the most time to go back and forth?
11. ___ Spring A or B has the slowest period?
    (*You should go thru this logic several times*.)
12. ___ If Spring A travels 20 cm from side to side, what is its amplitude?



13. On Spring 1 mark where a, F, Ep, and Ek are maximums.
14. On Spring 2 mark where a, F, Ep, and Ek are minimums.
15. If M = 5 kg, find the period of spring 2. (Look carefully M = 5kg.)



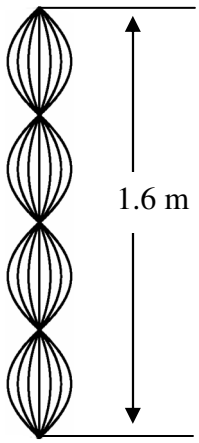
16. A pendulum has a length of 30 cm. Find it's period (use g = 9.8 m/s^2, this time).



17. Since you know the period of the 30 cm pendulum in #16 on the earth, you take it as a scientific instrument to Zorg, a newly discovered planet. If the period of the pendulum is 4.2 seconds on Zorg, find the acceleration due to gravity on Zorg.

Using the notes on Standing waves:

18. Use the graphic on the right to answer the following:
    A. Mark all nodes and antinodes. B. How many nodes does it have?
    C. How many antinodes does it have?
    D. Which harmonic is it?
    E. If it's frequency = 20 Hz, find the frequency of the fundamental (H_1).
    (Look at the sequence on the notes and figure it out.)



    F. Mark the waveform on the wave (*see notes: "Harmonics Frequencies")*
    G. Mark one wavelength on the wave (label it "λ").
    H. How many wavelengths long is this harmonic?
    I. How long is this harmonic's wavelength?

    J. Find the frequency of H_2.

19. For any space the largest standing wave has how many antinodes?

20. How many wavelengths, then, is the fundamental?

21. What is the wavelength of the fundamental frequency for a 2 m space?

From the notes on sound:

22. In sound:
    A. Increase in volume = an increase in what?
    B. A higher pitched sound = an increase in what?
    C. A lower pitched sound = an increase in what?

23. Can we hear 10 Hz? Can we hear 12,000 Hz? Can we hear 25,000 Hz?
24. Amplitude (A) or Frequency (f)?

A. ____ Pitch	C. _____Decibels	E. ____ Energy of sound
B. ____ Loudness	D. _____Different musical notes	F. ____ A longer pipe changes this.

25. High or Low Frequency?

A. ____ Bird	G. ____ Soprano (female)	M. ____ A flute
B. _____ Elephant	H. ____ Bass (male)	N. ____ Bass Guitar
C. _____Tight string	I. _____ A flute with all hopes covered	O. ____ A tall pipe
D. ____Loose string	J. _____ A flute with all holes uncovered	P. ____ A short pipe
E. _____ Wide pipe	K. ____ Blowing into a Half full bottle	
F. _____ Skinny pipe	L. ____ Blowing into a Empty bottle	

26. What is the speed of sound in air?
27. What is the speed of something I can hear in air?
28. What is the speed of music in air?
    (Get the picture?)
    Use the speed of a wave formula (on the notes: "Harmonic Basics")
29. What is the wavelength of a sound with a frequency of 550 Hz?

30. What is the wavelength of a 30 Hz sound?

31. As wavelength goes up, the frequency goes?

32. A railroad crew is repairing a rail. You hear the hammer 0.5 seconds after it is swung. How far away is the crew?

33. You hear a plane 4 seconds after you see it. Find the distance to the plane.

1. Sound	A. Faster than the speed of sound.	1. Pitch	A. Where there is no sound because of its vacuum.
2. Sonic boom	B. A wave caused by alternating high and low pressure.	2. dB	B. How we hear changes of frequency of sound.
3. Supersonic	C. The organ that detects sound waves.	3. Space	C. 340 m/s in air.
4. Ultrasonic	D. A pressure wave caused by an object going faster than sound.	4. Loudness	D. How we measure loudness.
5. Cochlea	E. A sound higher than humans can hear.	5. v_s	E. The amplitude or strength of a sound.

34. TAKS: Which is more specific: Class or Phylum?
35. Which is more general: Kingdom or Genus?
36. Which are we more alike: a clam or a tree? Why?

37. Which of the four are most alike?
    A. Ursus maritimus B. Ailuropoda melanoleuca
    C. Ursus arctos D. Melursus ursinus