2009 Harmonic Motion 3
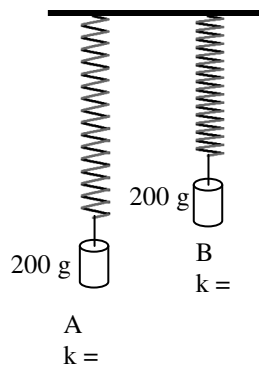
From the "Spring-Mass Systems" Notes:

1. Two springs are attached as seen in the diagram. One spring has a k = 50 N/m the other has a k = 30 N/m.
    A. _____ Which spring on the diagram is the stronger spring to stretch?
    B. Label the diagram with the correct spring constant for the correct spring.
    C. _____ Which one will move the mass easier?
    D. _____ Which one will have the faster period?

200 g

B
k =

200 g

A
k =

2. Use the positions on the graphic at the right to answer the following.
    A. _____ Where the spring is relaxed.
    B. _____ Where the spring is compressed.
    C. _____ Where the spring is stretched.
    D. _____ Where x = 0.
    E. _____ Where Ep is a maximum.
    F. _____ Where Ek is a maximum.
    G. _____ Where the force is a minimum
    H. _____ Where the acceleration is a maximum.

3

2

1
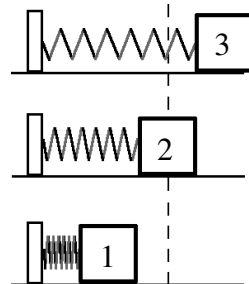
3. Remembering that 1000 g = 1 kg, what is the period of a spring that has a 400 g mass and a spring constant of 120 N/m?

From the "Waves" notes:

4. What is the medium for water waves?   For sound in a room?
5. What moves in wave motion?

6. A wave has a wavelength of 45 m and a frequency of 13 Hz, what is its speed?

15 Hz

7. Three ping pong balls are attached by springs. The first of the balls has a frequency of 15 Hz.
    A) What is the frequency of the third ball?
    B) What kind of wave is it: transverse or longitudinal?
    C) If it takes 0.6 seconds for the wave to move from ball 1 to ball 3, calculate the speed of the wave. (*Notice distance is in cm [hint, hint]*).

2 cm
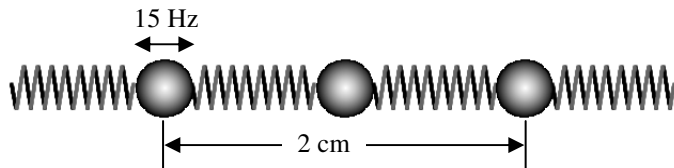
D) Calculate the wavelength of the wave.

Think of ocean waves. Surfers wait for big waves (ones with more amplitude) to ride. Yet, the big waves never catch the smaller ones. The speed of the waves never changes unless the medium changes.

8. Use the graph at the right to answer the following.
    A. Wavelength =   B. Amplitude =

    C. If the wave is vibrating at 380 Hz, what is its speed?

    D. If the amplitude doubles, how will the wave's speed change?

    E. If the frequency were to get smaller, how would λ change?

    F. On the graph mark a crest and a trough.

Displacement vs. Position

Displacement (cm)

Position (m)
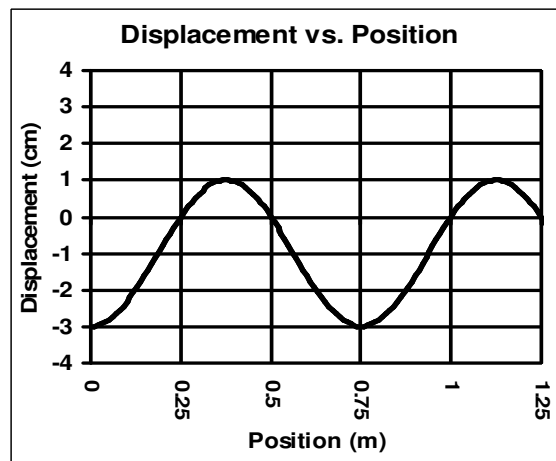
9. Which would have a faster wave: a loose slinky or a tight slinky?

Now turn to the "Standing Waves" notes:
10. Why do guitars have a body?

11. If a string is plucked it vibrates at its n_____ f_____,

    otherwise known as the f_____ f_____.

12. Use the graphic at the right to answer the following:
    A. How many antinodes does it have?
    B. Which harmonic is it?
    C. How many nodes does it have?
   D. How many wavelengths is it?

    Notice the pattern of the numbers in the table at the bottom left.
    Notice that the numbers are like a times table.
13. Put the correct frequencies underneath the harmonics at the right.

    Use the TAKS Biology Notes:
14. Respiration or Photosynthesis?
    A. _____How plants make energy.
    B. _____What animals do in their lungs.
    C. _____Glucose is used (a reactant).
    D. _____Glucose is a product (is produced).
    E. _____Uses heat.
    F. _____Produces heat.
    G. _____Makes carbon dioxide.
    H. _____Makes oxygen.
    I. _____Done by both plants and animals (read the notes carefully).
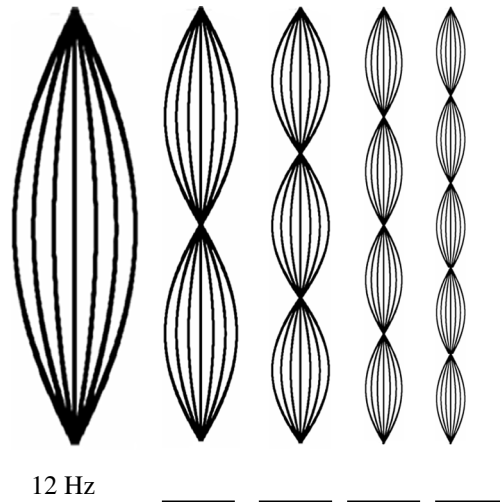
15. When can antibiotics be bad?

16. How can bacteria be helpful to humans?

17. Do antibiotics kill bacteria or viruses?

18. Why do antibiotics not help when you have a cold?

19. Are viruses alive?   Why or why not?

20. Which body system.
    A. Which two systems is the heart part of?
    B. Helps continue the species.
    C. Is the skin.
    D. Protects your brain.
    E. Moves the bones.
    F. Stomach and intestines.
    G. Causes you to feel anxious.

21. From the "How to Setup a Good Experiment" notes:
    A. What are we looking for in a good experiment?
    B. What is the experimental variable on the notes?
    C. Give two control variables in the experiment.
    D. What is a responsive variable?
    E. Why does a control setup not have the experimental variable?

    F. What is the control setup in the experiment?
    G. Why do we do double-blind tests?

12 Hz   _____   _____   _____   _____