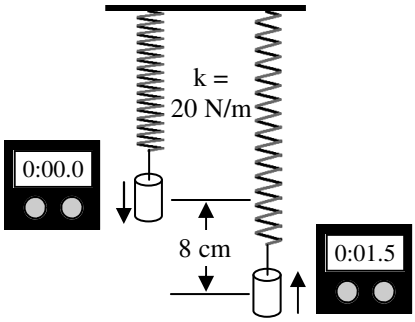
B-Day: Due Wed., Apr 7
A-Day: Due Thurs., Apr 8

2009-10 Harmonic Motion 8



1. The picture shows a mass-spring system oscillating (vibrating). The left picture shows the top of the spring's motion; the right is at the bottom.
   A. What is the amplitude of its motion?
   B. What is its period?
   C. Calculate its frequency.

   D. As its amplitude d_____, how will its frequency change?

   E. Calculate the mass hanging on the spring.

2. What is the period of a pendulum that is 65 cm long? (*Use meters.)*

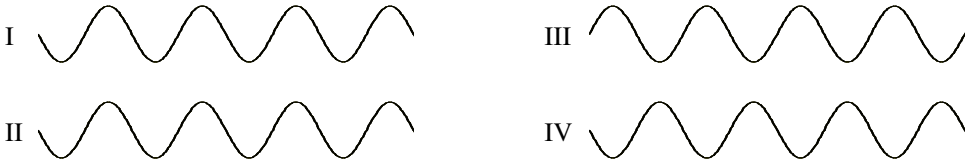
3. A person is singing with a frequency of 250 Hz.
   A. What is the speed of the sound in air?
   B. Calculate its period.

   C. Calculate its wavelength.

   The person then sings a lower note.
   D. Did the frequency go up or down?
   E. Did the wavelength get longer or shorter?
   F. Did the wave speed go up or down?

4. What is the speed of sound in space?

5. Use the four waves shown below.
   A. Which two waves are in-phase: I and II OR III or IV?
   B. Which pair of waves will produce destructive interference?
   C. Below each pair of waves, sketch the result of the interference that will result.



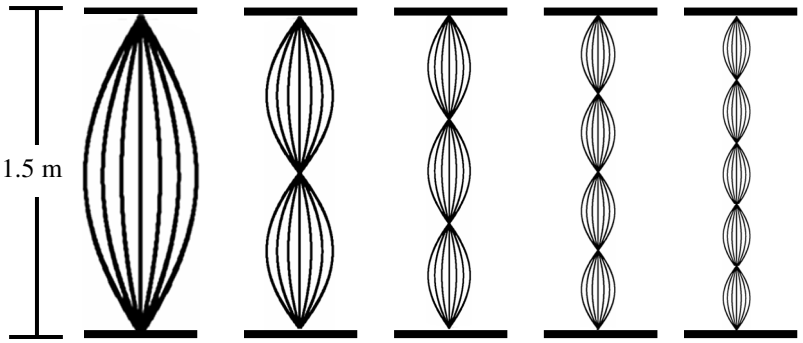
I + II:

III + IV:

6. The natural frequency of a wave is 15 Hz. A.
   A. Calculate the frequencies of the first five harmonics for this string.

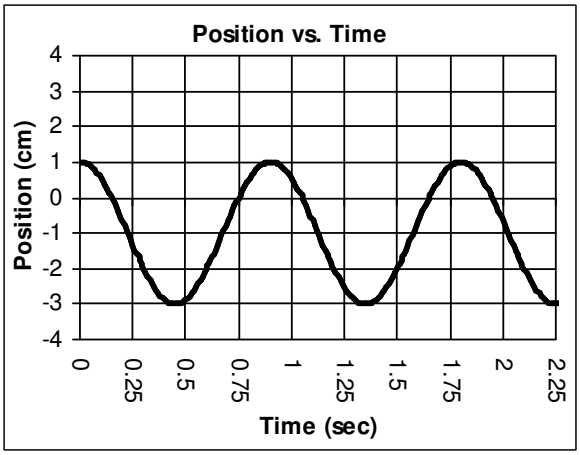
   B. Calculate the wavelength of the harmonics.

   C. Calculate the wavespeed of the string.

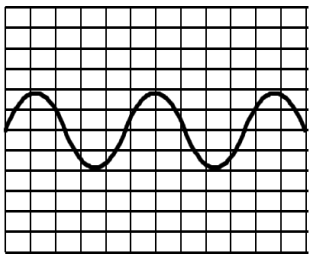


f = 15 Hz f = _____ f = _____ f = _____ f = _____
λ = _____ λ = _____ λ = _____ λ = _____ λ = _____

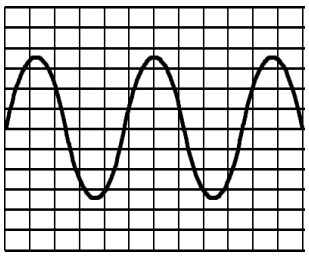
7. A longitudinal wave is moving to the left. Which way is the wave vibrating?
8. A transverse wave is moving to the right. Which way is it vibrating?
9. Two notes are played together: 440 Hz and 438 Hz.
   A. How many beats do you hear each second?
   B. Which part of the beats are the constructive interference: the loud or soft parts?
10. Which has the longer wavelength: 300 Hz or 800 Hz?
11. A person sings louder. Which of the following changed: period, frequency, wavespeed, amplitude?
12. Waves hit a gap between two obstacles.
    A. Draw what happens to the wave.
    B. What is this called?



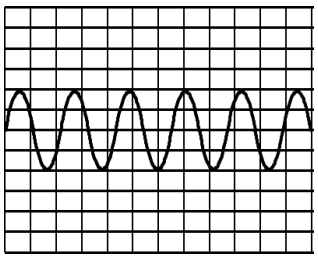
13. A. Label and crest and trough.
    B. What is its equilibrium position?
    C. What is the amplitude?
    D. How many total cycles are shown?
    E. How many seconds are shown?
    F. Since period = #sec/#cycles, what is the period of the motion on the graph?



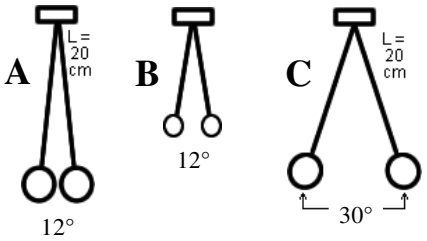
Graph 1



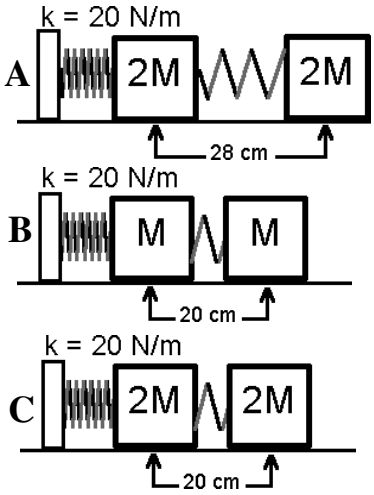
Graph 2



Graph 3



14. A. Which pendulum is graph 2?
    B. Which spring is graph 3?
    C. What is the amplitude of pendulum C?
    D. What is the amplitude of spring B?
    E. How far does spring A travel in one complete cycle?



And do TAKS.

Day 22—Heat and Heat Transfer

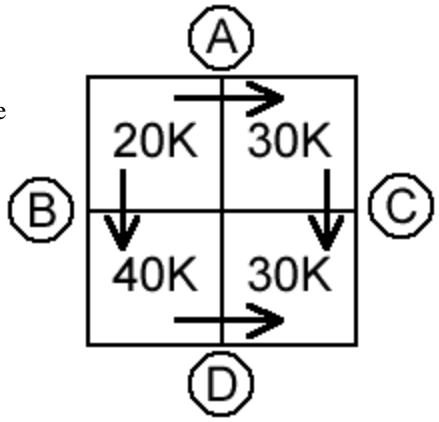
Heat is a measure of the average internal kinetic energy of atoms. Objects with greater temperature have more internal KE. Heat always transfers from hot to cold.

Types of heat transfer:
Conduction: Heat moving between solids. Must be touching.
Convection: Heat moving in fluids (gases and liquids) due to density (hot fluids rise). Always moves up.
Radiation: Heat moving due to just energy of electromagnetic waves (like the sun). Moves in all directions. Nothing has to be touching.

1. Which type of heat transfer?

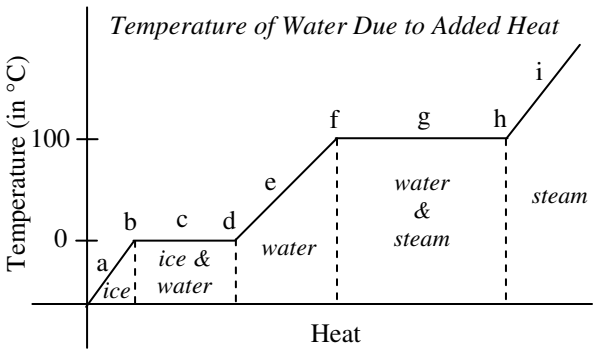
   A. From the side of a light bulb.
   B. When you touch a light bulb.
   C. From above a flame (but not in the flame).
   D. When actually in a flame.
   E. When you touch a Bunsen burner.
   F. Between a stove and a pot of water.
   G. For the water inside the pot.
   H. When you lift up the pot and put your hand close to, but not touching, the pot.

2. Which of the arrows on the diagram shows the correct direction of heat transfer?



180 K	300 K

3. Which of the two objects has the most internal kinetic energy?
4. Which way will heat flow?



5. Which parts of the graph shows the temperature not changing?

6. Which parts of the graph show an increase in internal kinetic energy of the substance?