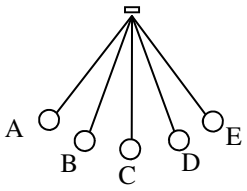
A-Day: Due Wed., Feb 6 (Assigned: 2/4)
B-Day: Due Thurs., Feb 7 (Assigned: 2/5)

2008 Harmonic Motion 2

1. Using Figure 1 at the right answer the following:
   A. If you start at A, when does 1 cycle end?
   B. If you start at E, when does 1 cycle end?
   C. If you start at B going right, when does one cycle end?
   D. If you start at C going to the left, when does one cycle end?
   E. Which letter is the equilibrium position?
   F. In one cycle, how many times does the pendulum pass thru the equilibrium position?
   G. If from A to E is 60°, what is the amplitude of the pendulum?
   H. How many amplitudes does it go thru in one full cycle?
   I. If it takes 0.3 seconds to go from A to E, how long is one period?

Figure 1



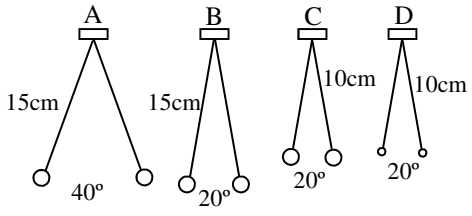
2. If the period of a pendulum is 4 seconds, find the frequency of the pendulum.

3. If the frequency of a wave is 1.35 Hz, find its period.

4. If the frequency of a wave is 0.02 Hz, find its period.

5. If the frequency gets bigger, the period gets _____.

6. Use the pendulums at the right to answer the following.
   A. Which pendulum has the smallest period B or C?
   B. Which pendulum has the most energy of all of them?
   C. What is the amplitude of A?
   D. What is the amplitude of C?
   E. Which has the smallest period: A or B?
   F. From the lab: which pendulum has the longest period C or D?
   G. Why?

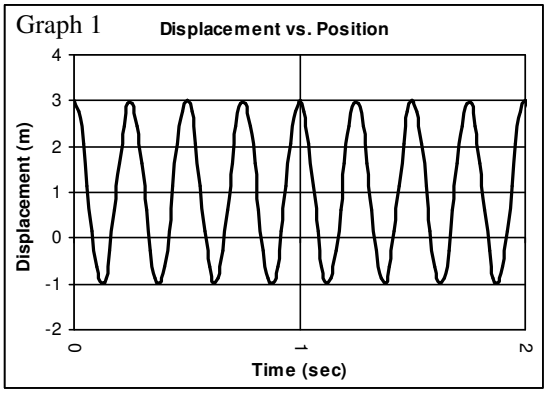


7. Use Graph 1 to answer the following:
   A. What is the amplitude of the graph?
   B. How many cycles happen in 1 second?
   C. So, find the frequency shown on Graph 1.

   D. Find the period shown on Graph 1.

   E. Over time, Graph 1 will d_____. Where will it come to rest?

Graph 1



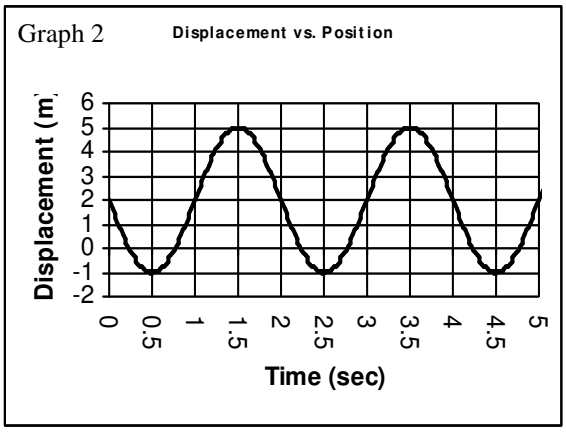
8. Use Graph 2 to answer the following:
   A. Find the amplitude.
   B. Find the period.

   C. Find the frequency.

   D. How many cycles are shown?

   E. What is the equilibrium position?
   F. Mark the crests and troughs?
   G. Mark one cycle starting at 1 second.

Graph 2



9. If a pendulum is 34 cm long, find its period.

Example: How long is a pendulum that has a period of 3.2 seconds?

$$T = 2\pi\sqrt{\frac{\ell}{g}}$$

$$3.2 = 6.28\sqrt{\frac{\ell}{10}}$$

$$\frac{3.2}{6.28} = \frac{6.28}{6.28}\sqrt{\frac{\ell}{10}}$$

$$0.5096 = \sqrt{\frac{\ell}{10}}$$

$$(0.5096)^2 = \frac{\ell}{10}$$

$$0.2957 = \frac{\ell}{10}$$

$$10(0.2957) = \ell$$

$$\ell = 2.957m = 295.7cm$$

10. A pendulum has a period of 0.85 seconds. How long is the pendulum <u>in centimeters</u>.

From the Lab:

11. Was it better to measure the period of the pendulum with only cycle or 5 cycles?

    Why?

Table 1

Mass	Length	Amplitude	Period
14g	10 cm	10°	.64 sec
14g	15 cm	10°	.79 sec
14g	25 cm	10°	1.1 sec

12. What is the experimental variable in Table 1?
13. What are the control variables in Table 1?
14. What were students trying to understand in Table 1?

15. What were students trying to understand in Table 2?

Table 2

Mass	Length	Amplitude	Period
14g	10 cm	10°	.64 sec
20g	15 cm	15°	.79 sec
5g	25 cm	25°	1.1 sec

16. How do the following affect the period of a pendulum?
    A. Amplitude.

    B. Mass

    C Length.