2009 Harmonic Motion 2
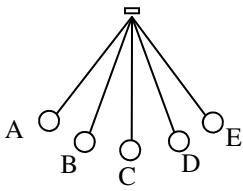
Diagram 1

1. Use diagram 1 at the right answer the following:
   A. Starting at A, 1 cycle ends at _____.   B. Starting at E, 1 cycle ends at _____
   C. Starting at B going right, 1 cycle ends at ?
   D. Equilibrium position =   E. If A to E is 60°, the amplitude =
   F. In one cycle, the pendulum passes thru the equilibrium position _____ many times.
   G. How many amplitudes does it go thru in one full cycle?
   H If it takes 0.3 seconds to go from A to E, how long is one period?

2. Period, Amplitude, or Frequency?

   A. ____ 20°   E. ____ Maximum displacement from its   H. ____ Decreases over time.
   B. ____ 1.25 seconds.   equilibrium position.   I. ____ "A"
   C. ____ 14 cm   F. ____ How many cycles per second.   J. ____ "T"
   D. ____ 280 Hz   G. ____ Time for one cycle.   K. ____ "f"

3. If the period of a pendulum is 0.5 seconds, calculate the frequency of the pendulum.

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

5. Use the pendulums at the right to answer the following.   Notice IV. has smaller masses.

   A. Which has the most energy?
   B. What is the amplitude of I?
   C. Which has the smallest period: I or II?
   D. From the lab: which pendulum has the longest period: III or IV?
   E. Why?
   F. Which pendulum has the longest period: I or III?

   I   II   III   IV

   15cm   15cm   10cm   10cm

   40°   20°   20°   20°
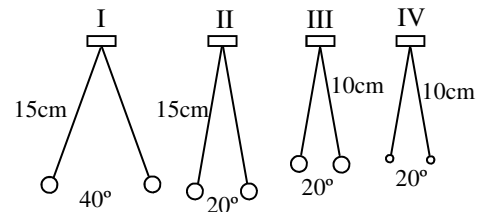
6. If you double the mass on the end of a pendulum, does T increase or decrease?

   Imagine a pendulum moving from the top of the graph to the bottom with a pen touching the graph. The graph moves to the right. The graph shows the position of the pendulum.

7. Use Graph 1 to answer the following:
   A. Amplitude =   B. # of cycle in 1 second?
   C. Calculate the frequency shown on Graph 1.

   D. Calculate the period shown on Graph 1.
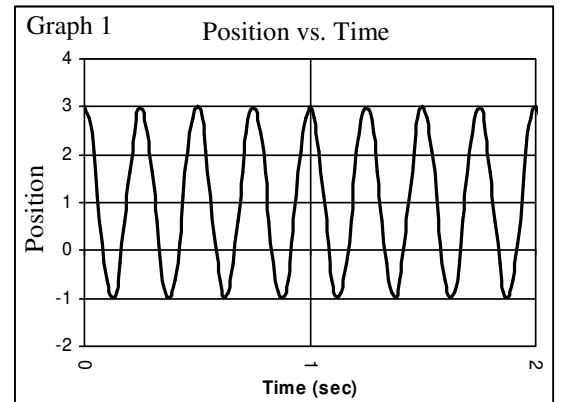
   E. Over time, the pendulum will d_____.
   F. Where will it come to rest?

8. Use Graph 2 to answer the following:
   A. Amplitude =   B. f =

   C. T =
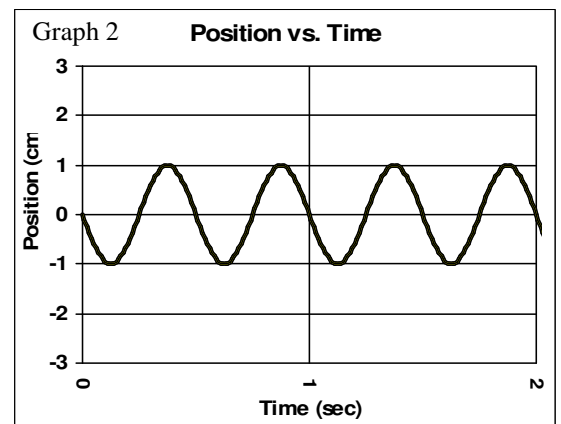
   D. How many cycles are shown?
   E. Equilibrium position =

9. Graph 1 or Graph 2
   A. ____Has the greatest amplitude.
   B. ____Has the longest period (most time).
   C. ____Has the greater frequency.
   D. ____Has the higher equilibrium position.

10. If the amplitude increases, how does the graph change?

11. If the period gets smaller, how does the graph change?

Graph 1   Position vs. Time

Position

Time (sec)

Graph 2   **Position vs. Time**

Position (cm)

Time (sec)

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

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

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

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

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

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

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

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

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

$$10(0.2957) = \ell$$

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

From the Lab:

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

   Why?

15. What is the experimental variable in Table 1?
16. What are the control variables in Table 1?
17. What were students trying to understand in Table 1?

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

18. 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

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

   B. Mass

   C Length.

DNA basics

DNA –   Found in the nucleus of all cells
       Contain the characteristics of a cell.
       Double helix (ladder structure)
       Ladder sides made up of a phosphate and deoxyri-
       bose sugar; ladder steps: nitrogen bases (A,T,C,G)
       Nitrogen bases pair up as: A with T/ C with G.

RNA –   Moves from nucleus to ribosomes.
       Only 1 side of the ladder.
       Ribose sugar instead of deoxyribose
       A with U (U not T) and C with G
DNA to mRNA—transcription—moves to ribosome.
mRNA to tRNA—translation (in ribosomes).

20. DNA, mRNA, or tRNA

   A. _____ Contains nitrogen bases.
   B. _____ Created in transcription.
   C. _____ Must stay in the nucleus.
   D. _____ Created in replication.

   E. _____ Double helix structure.
   F. _____ A goes with T
   G. _____ Carries code to ribosomes.
   H. _____ Has uricil

21. Given the following genetic codes give the paired sequence.

DNA   DNA

G	
A	
C	
C	
A	

DNA   RNA

A	
C	
G	
U	
G	