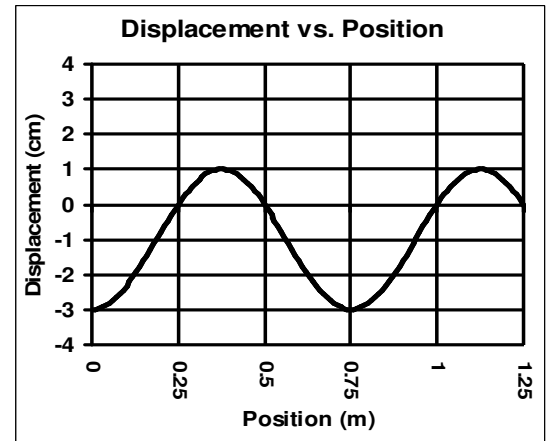


2011-12 PreAP Harmonic Motion 2

1. Harmonic Motion: Yes or No?	2. Period, Frequency, or Amplitude?		
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-right: 1px solid black; padding: 5px;"> Pendulum: _____ Ocean waves: _____ A child on a swing: _____ Jumping Jacks: _____ Bouncing spring: _____ </td> <td style="width: 50%; padding: 5px;"> A bouncing ball: _____ A ruler pulled from one side and released: _____ A person jumping up and down: _____ A spinning ball: _____ </td> </tr> </table>	Pendulum: _____ Ocean waves: _____ A child on a swing: _____ Jumping Jacks: _____ Bouncing spring: _____	A bouncing ball: _____ A ruler pulled from one side and released: _____ A person jumping up and down: _____ A spinning ball: _____	_____ Doesn't change period. _____ More of this means more energy. _____ Increases as a pendulum swings back and forth faster. _____ Measured in meters or centimeters. _____ This decreases with a smaller swing. _____ If the frequency increases, this decreases. _____ If it swings back and forth slower, this decreases. _____ As it dampens, this decreases.
Pendulum: _____ Ocean waves: _____ A child on a swing: _____ Jumping Jacks: _____ Bouncing spring: _____	A bouncing ball: _____ A ruler pulled from one side and released: _____ A person jumping up and down: _____ A spinning ball: _____		

Use your "Harmonic Motion Table" notes for the following.

3. Give the variables and units for the following quantities:
 A. Period: _____; B. Amplitude: _____; C. Frequency: _____; D. Wavelength: _____
4. If the period of a pendulum is 4 seconds, find the frequency of the pendulum.
5. What is "dampening"?
6. What is the equation for the speed of a wave?
7. What do we call this symbol: λ ?
8. A wave is moving 25 m/s and has a frequency of 80 Hz. What is the wavelength of the wave?
9. What is the *medium* that sound travels thru to your ears?
10. On the graph at the right...
 A. What is the wavelength of the wave?
 B. Mark a trough and a crest.
11. For sound, how many decibels is twice as loud?
12. If a sound is 40 dB, how many decibels is twice as loud?
13. * Find the period of a pendulum that is 80 cm long, realizing to use standard units.



14. * How long is a pendulum that has a period of 0.84 seconds? (Math help at the right.)
15. What is the period of a spring-mass system if the spring has a spring constant of 25 N/m with a 1.5 kg object on it. (Use the spring equation—not the one pendulum.)
16. * A spring-mass system has a period of 0.15 seconds and a 150 g on it (use standard units). What is the spring constant for the spring?

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

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

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

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

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

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

$$0.2597 = \frac{\ell}{10}$$

$$10(0.2597) = \ell$$

$$\ell = 2.597\text{m} = 259.7\text{cm}$$

Remember again that the period is how long for 1 cycle OR sec per cycle so, $T = \text{\#seconds}/\text{\#cycles}$. The frequency is how many cycles occur each second OR cycles/sec so, $f = \text{\#cycles}/\text{\#seconds}$. Add these 2 formulas on the table in the 1st column.

17. A pendulum swings back and forth 14 times in 8 seconds. What is the pendulum's period?

18. * A spring oscillates (moves back and forth) 35 times in 10 seconds. Calculate its frequency.

13: 1.78 sec

14. 0.179 m or 17.9 cm

16. 263 N/m

18. $f = \text{\#cycles}/\text{\#sec} = 35 \text{ cycles}/10\text{sec} = 3.5 \text{ Hz}$