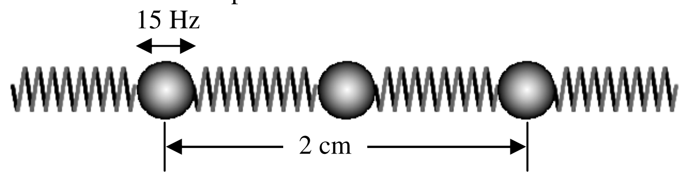
PreAP Harmonic Motion 5

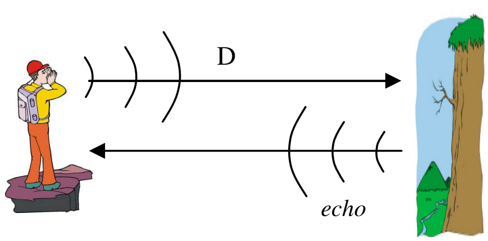
At this point I have to assume that you can find the period of a pendulum and a spring AND that you know what affects their periods. If you need to redo the lab, come in and take care of it.

1. What is the medium for water waves? For sound in a room?
2. What moves in wave motion: the actual particles in the medium or the energy?
3. * A wave has a wavelength of 45 m and a frequency of 13 Hz, what is its speed?
4. What kind of wave: longitudinal or transverse?
   A. When the slinky is moved side to side. B. When the slinky is pushed.
   C. If the slinky vibrates perpendicular to the direction it travels.
5. Will a wave move faster if the molecules are close together or far apart?



6. 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?
   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]*).

   D. Now that you have the speed, calculate its wavelength.
7. A wave has a frequency of 120Hz and a wavelength of 9 m.
   A. What is it speed?
   B. Using the units for speed, how far does the wave move in 40 seconds?

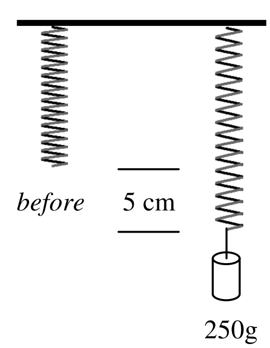


8. Imagine a boy standing in a canyon. He yells at the opposite wall of the canyon. The speed of sound is approximately 340 m/s.
   A. If the distance to the other side of the canyon is D, how far does the sound actually travel from the boy and back?

   B. * If it takes 1.6 seconds from the moment the boy yells for the echo to get back to the boy, how far wide is the canyon?
9. A person hits a metal rail with a hammer. The sound travels down the 650 m long rail and reflects back off of a post at the other end. A sensor near the person detects the reflected sound 0.25 seconds after hammer hits. What is the speed of sound in the rail?

When using T = #sec/#cycles (or f = #cycles/#sec), these words can be substituted for cycles: periods, vibrations, waves, wavelengths, crests (top of waves), back-and-forths.

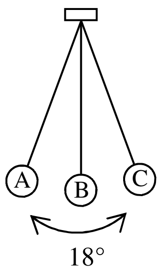
10. * A spring bounces up and down 82 times in one minute. Calculate its period.
11. 15 wavelengths pass a point in 22 seconds. If the wave is moving 105 m/s, calculate its frequency and wavelength.

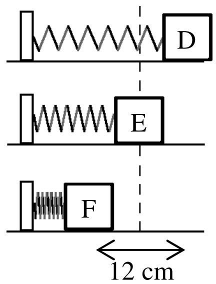


12. A 250 g mass is hung on a spring. The spring stretches 5 cm.
    A. Calculate the force pulling down on the spring?
    B. * Calculate the spring constant of the spring.

    C. * Calculate the period of the spring.

13. Fill in the following table.





	Pendulum	Spring
Equilibrium position		
Point of Maximum Displacement		
Amplitude		

(*From the "Spring Constant Lab" we did last fall.*)

14. Different mass are placed on a vertical spring, the displacements are measured, and recorded in the table below.
    A. * Because the units for the spring constant (k) are N/m, what quantity on the graph will give you the spring constant?
    B. Graph the data to determine the spring constant of the spring. (*You can work in centimeters to make the graphing easier and then convert to meters at the end OR convert to meters before graphing. Your choice*.)

Mass in g	Mass in kg	F in N	Δx (distance stretched) in cm
0	0	0	0
50			0
100			0.65
200			1.8
300			3.2
400			4.2
500			5.7

3. 585 m/s
10. 0.73 sec
12B. 50 N/m
12C. 0.444 sec
14A. Slope