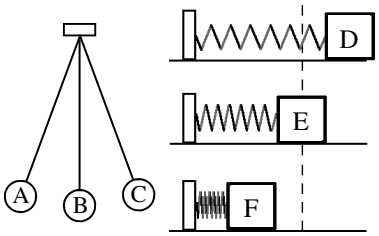
Thurs, Mar 29

2011-12 PreAP Harmonic Motion 6

1. * To double the period of a pendulum, by what factor does its length need to be changed?

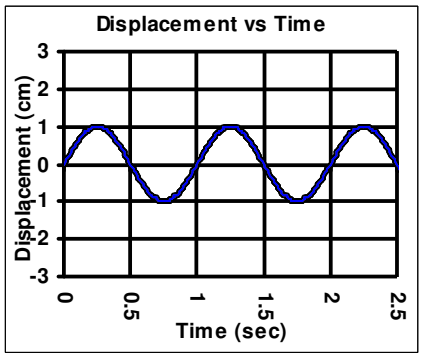
2. If a spring-mass system has its mass halved and its spring constant tripled, by how much does the spring's period change?

3. * A pendulum has a period of 0.72 seconds on the earth (use 9.8). On planet Zorg it has a period of 0.55 seconds. What is the acceleration due to gravity on Zorg?

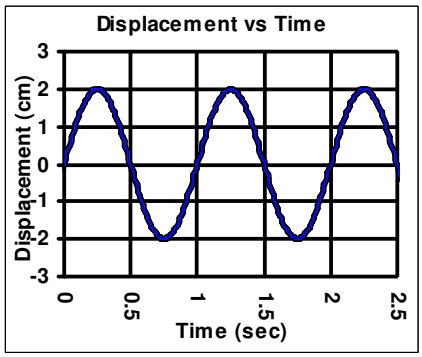


	Pendulum	Spring
PE = max	A, C	D, F
PE = min		
KE = max		
v = max		
acc = max		
F = max		
x = max		

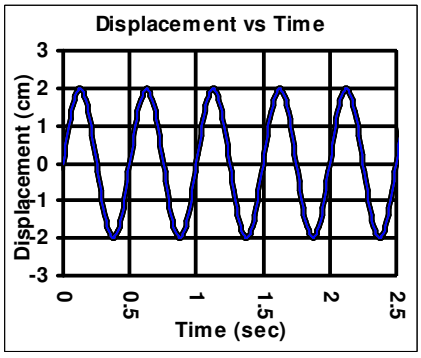
4. Use the pictures of the pendulum and spring-mass system shown at the left. Fill in the table, deciding at which position (or positions) the conditions exist. The first one is done for you. The pendulum and spring do not stop.
(*Notice that at the equilibrium position (B or E) there is no restoring force. That's why they will eventually come to rest there. So if there is no restoring force, there is no acceleration.)*



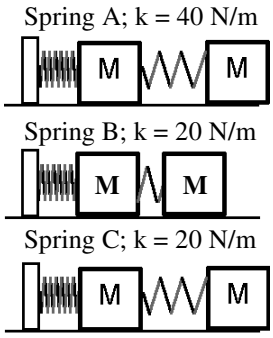
Graph A: Amplitude: _____
Period: _____
Spring ____ Pendulum ____

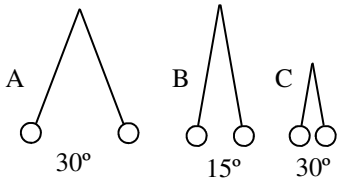


Graph B: Amplitude: _____
Period: _____
Spring ____ Pendulum ____



Graph C: Amplitude: _____
Period: _____
Spring ____ Pendulum ____





5. A. Find the amplitude and period for each of the graphs above, writing beneath the graph.
   B. * Which graph has an amplitude different than the others?
   C. * Which spring has an amplitude different than the others?
   D. Which pendulum an amplitude different than the others?
   E. Using this same logic, decide which graph belongs to which pendulum or spring.
   (*Study Help available*)

6. A pulse wave of amplitude "A" is sent down a slinky from the left. The reflected wave is shown on the right side of the slinky.
   A. Is the right side of the slinky fixed or unfixed?
   B. What will be the amplitude of the slinky when the waves cross?
   C. Is this constructive or destructive interference?

7. A pulse wave of amplitude "A" is sent down a different slinky from the left. The reflected wave is shown on the right side of the slinky.
   A. Is the right side of the slinky fixed or unfixed?
   B. What will be the amplitude of the slinky when the pulses cross?
   C. Is this constructive or destructive interference?

8. A 200g mass is on a spring with a spring constant of 15 N/m. It is stretched 20 cm from its relaxed position and released.

   A. What is its amplitude?

   B. What is its period?

   C. What is the maximum force of the spring ($F = -kx$)?

   D. What is the maximum acceleration of the mass?

   E. * Remembering that the potential energy due to a spring is $\frac{1}{2}kx^2$, calculate the maximum velocity of the mass as it passes the equilibrium position.

1. Solve for ℓ first and you see ℓ is proportional to T^2, so ℓ must be mult by 4.
3. solve for ℓ first. Then you can solve for g on Zorg.
5B. Graph A
5C. Pendulum A
8E. 1.73 m/s