**Chapter 13 Problem Set**        Advanced Physics II
Chapter 13 Part 1 SHM
1. If a spring is cut in half what is its new spring constant?


2. If a mass is hung from a spring and set in motion, why does it eventually stop?


3. Is a bouncing super ball and example of SHM?


4. A .400kg mass is attached to a spring with a spring constant of 160n/m and rests on a frictionless horizontal surface.  It is compressed 15.0 cm and released. Find force and initial acceleration.


5. A spring is hung from a ceiling, and an object attached to its lower end stretches the spring 5.00cm from its unstretched position.  If the $k_s$=47.5n/m, what is the mass of the object?


6. A spring stretches 3.9cm when a 10.0g object is hung from it.  Calculate the period when a 25.0g object is hung from it.


7. A grandfather clock is running slow.  How could you correct this problem?


8. An aluminum clock pendulum has a period of exactly 1.00s at 20.0°C.  Will it's period change at -5.00°C? How?


9. A simple 2.00m long pendulum oscillates at a location where g=9.81m/s². How many complete oscillations does it make in 5.00min?


10. What is the period of a 5.00m long pendulum on the moon?

11. A slingshot is made with two rubber hoses and a pouch tied between them. It takes a force of 15.0n to stretch each hose 1.00cm. What is the potential energy stored in the hoses when a .0500kg stone is placed in the pouch and drawn back .200m? What will the speed of the stone be as it leaves the slingshot?

12. A suction/spring pop-up toy has a mass of 100.0g and the spring is compressed 2.00cm. If it shoots 60.0cm in to the air what is the spring constant?

13. An unstretched spring ($k_s$ = 19.6n/m) is attached to a 1.50kg block on a frictionless surface and a vertical wall. A constant 20.0n force is applied to the object causing it to stretch. Determine the speed at .300m from the equilibrium point. What would be the speed if the coefficient of friction is .200?

14. A .40kg block is attached to spring in question 13. The spring is stretched 4.00cm from equilibrium and released. Determine the maximum speed, the speed when the spring is compressed 1.5cm, the speed when stretched 1.5cm. What is the displacement when the speed is half the maximum?

15. A .200kg mass is hung from the ceiling by a spring and has a period of .250s. If the total energy in the system is 2.00J, what is the amplitude?

Chapter 13 Part 2 Waves

16. If one end of a heavy rope is attached to a light rope and wave is sent down the heavy rope. What will happen to the speed, frequency and wavelength as it changes to the light rope?

17. What happens to the wavelength on a string when the frequency is doubled?

18. What happens to the speed of a wave when the frequency is doubled, assume tension is constant?

19. Draw a sine wave with amplitude of 1.0cm and a wavelength of 5.0cm.  If frequency is 25hz, what is the speed of the wave?... the period?

20. How can SHM be related to a sine wave?

21. Mr. L listens to NPR station WNIJ 89.5Mh.  Determine the period and wavelength.

22. Mr. L is kayaking on the NO pond.  He observes that the waves are traveling east at 4.0m/s with a distance between crests of 20.0m.  What frequency do they hit a stationary goose? …a goose going 1.0m/s east? …a goose going 1.0m/s west?

23.  Mr. L is going to attempt tight rope walking across the main gym from batting cage to fitness center.  He strikes the rope and the vibration takes 1.600s to go across the 20.0m wide gym and back. If one meter of his rope has a mass of .35kg, what is the tension in the rope?

24. A transverse wave travels 20.0m/s on a string with a tension of 6.00n.  What tension is needed to get a wave to go 30.0m/s?

25.  A wave of amplitude .30m interferes with a second wave of amplitude of .20m.  What are the min and max and when to they occur?