**Vibrations and Waves Applied Practice**

1. If the captain of a speed boat drives in a circle on a lake the waves he creates get increasingly larger. Use the principles of physics to explain this phenomenon.
2. Bats are amazing creatures. They use sonar to locate prey and other objects in their surroundings. Various microscopes function in a similar manor but they utilize electromagnetic waves to identify objects. A visible light microscope can zoom in on small objects but many times we need to get even smaller. X-ray microscopes can give high resolution images of smaller objects than that of the visible microscope. Why can the X-ray microscope identify smaller objects at higher resolutions?
3. NASCAR is a very popular sport in the south. One of the most exciting sports as well as one can observe cars drive around in an oval repeatedly. This repeating pattern is mesmerizing for physicists because it reminds them about waves. As you can guess, the acceleration of the cars is not constant. This begs the question, can the motion of the race cars in NASCAR be described as simple harmonic motion? Explain.
4. Before the days of digital clocks, pendulum clocks were very popular. The pendulum acted as a mechanism to move the minute and hour hands on the clock. How did this clock keep an accurate track of time?
5. Another common item back in the “old days” was a radio. Radios and even televisions used to have antennas that would have to be tweaked and moved in order to get a signal. The antenna would resonate with the radio waves coming in to generate an electrical current (we’ll get more into resonance later). In order to do this the antenna needed to have the same orientation as the radio waves coming in. So why were the antennas a straight rod? Explain and prove your answer using the principles of physics.