**Waves**

Light is an example of a wave, and there are many types of waves in nature. Examples of familiar waves are water waves, sound waves, and light waves (and don’t forget gravity waves!). Waves are characterized by three parameters: wavelength, frequency (waves per second), and speed, and these properties are related by a simple expression. (See chapter 7!)

Speed = Wavelength x Frequency

* Speed is measured as distance traveled per second.
* Wavelength is the length of a wave from peak to peak.
* Frequency is the number of waves per second that pass a given point.

**Example 1**: What is the wavelength of a typical sound wave? The frequency of, say, middle C is about 256-278 cycles per second depending on the scale, and sound travels at about 340 meters per second.

**Example 2**: A tsunami wave travels at a speed of about 0.2 meters/second, with a wavelength of about 50,000 m. What will be the time between peaks of a tsunami wave coming ashore on the beach?

**Example 3**: Electromagnetic waves travel with speed of about 300,000 km per second (3 x 108 meters per second). What is the wavelength of an electromagnetic wave with a frequency of

one billion cycles per second (109 cycles per second). What kind of light is this?

**Example 4**: Gravity waves also travel at the speed of light (3 x 108 meters per second). Two neutron stars, each with mass equal to two solar masses, orbiting each other with a separation of 0.63 light seconds and a period of 750 seconds (frequency = 0.0013 per second), will emit gravity waves. What is the wavelength of these gravity waves?