Waves Worksheet 1

(definitions, frequency, period, speed)

1. The musical note A above middle C has a frequency of 440 Hz. If the speed of sound is known to be 350 m/s, what is the wavelength of this note?

2. A dog whistle is designed to produce a sound with a frequency beyond that which can be heard by humans (between 20 000 Hz and 27 000 Hz). If a particular whistle produces a sound with a frequency of 2.5×10^4 Hz, what is the sound's wavelength? Assume the speed of sound in air is 331 m/s.

3. The lowest pitch that the average human can hear has a frequency of 20.0 Hz. If sound with this frequency travels through air with a speed of 331 m/s, what is its wavelength?

4. A buoy bobs up and down in the ocean. The waves have a wavelength of 2.5 m, and they pass the buoy at a speed of 4.0 m/s. What is the frequency of the waves? How much time does it take for one wave to pass under the buoy?

5. A drum is struck, producing a wave with a wavelength of 110 cm and a speed of 2.42×10^4 m/s. What is the frequency of the wave? What is the period?

6. One of the largest organ pipes is in the auditorium organ in the convention hall in Atlantic City, New Jersey. The pipe is 38.6 ft long and produces a sound with a wavelength of about 10.6 m. If the speed of sound in air is 346 m/s, what is the frequency of this sound?

7. Yellow light with a wavelength of 5.89×10^{-7} m travels through quartz glass with a speed of 1.94×10^8 m/s. What is the frequency of the light?

8. A ship anchored at sea is rocked by waves that have crests 14 m apart. The waves travel at 7.0 m/s. How often do the wave crests reach the ship?

9. A wave with a frequency of 60.0 Hz travels through steel with a wavelength of 85.5 m. What is the speed of this wave?

10. Earthquakes generate shock waves that travel through Earth's interior to other parts of the world.
    (a) The fastest of these waves are longitudinal waves, like sound waves, and are called primary waves, or just p-waves. A p-wave has a very low frequency, typically around 0.050 Hz. If the speed of a p-wave with this frequency is 8.0 km/s, what is its wavelength?
    (b) Earthquakes also produce transverse waves that move more slowly than the p-waves. These waves are called secondary waves, or s-waves. If the wavelength of an s-wave is 2.3×10^4 m, and its speed is 4.5 km/s, what is its frequency?