

Waves/ # 1 Homework

1. You detect waves with a frequency of 1.01×10^7 Hz. The waves travel at a speed of 3.00×10^8 m s⁻¹. What is the wavelength of these waves? What type of electromagnetic waves are these?
2. When you look at a distant star or planet, you are looking back in time. How far back in time are you looking when you observe Pluto through the telescope from a distance of 5.91×10^{12} m?
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⁻¹, what is its wavelength?
4. A 10.0 m wire is hung from a ceiling and held tightly below by a large mass. Standing waves are created by air currents that pass over the wire. If the speed of the standing wave is 335 m s⁻¹ and its frequency is 67 Hz, what is its wavelength?
5. Sonar is a device that uses reflected sound waves to measure underwater depths. If a sonar signal has a frequency of 288 Hz and the speed of sound in water is 1.45×10^3 m s⁻¹, what is the wavelength of the signal?

6. Cicadas produce a buzzing sound that has a wavelength in air of 2.69 m. If the speed of sound in air is 346 m s^{-1} , what is the frequency of the sound produced by a cicada? What is its period?

7. A drum is struck, producing a wave with a wavelength of 110 cm and a speed of $2.42 \times 10^4 \text{ m s}^{-1}$. What is the frequency of the wave? What is its period?

8. Light from a laser has a wavelength of $5.3 \times 10^{-7} \text{ m}$. What is the frequency of this light? What color would this correspond to?

9. Light with a wavelength of $5.89 \times 10^{-7} \text{ m}$ travels through quartz glass with a speed of $1.94 \times 10^8 \text{ m s}^{-1}$. What is the frequency of the light? What color would this correspond to?

10. A ship anchored at sea is rocked by waves that have crests 14 m apart. The waves travel at 7.0 m s^{-1} . How often do the wave crests reach the ship?

