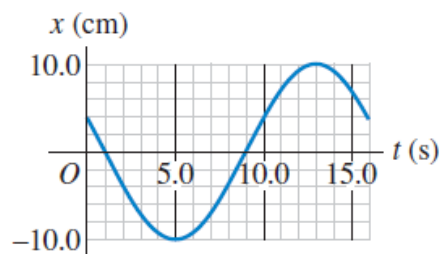


WAVES AND OSCILLATIONS

PROBLEM SET 1

January 05, 2018

1. A loud speaker puts out sound at a frequency of 6.7 MHz. (a) Calculate the time taken for each oscillation and (b) the angular frequency of the oscillations.
2. A boat anchored at a position in the sea moves up and down with the waves. The boat moves 6 cm above and 6 cm below its equilibrium position and makes one complete up and down cycle every 5 sec. What are amplitude, period, frequency, and angular frequency of motion?
3. The tip of a tuning fork goes through 440 complete vibrations in 0.5 sec. Calculate the angular frequency and the period of motion.
4. When a person sings, his or her vocal cords vibrate in a repetitive pattern that has the same frequency as the note that is sung. If the frequency of someone singing is 466 Hz, how much time does it take the person's vocal cords to vibrate through one complete cycle, and what is the angular frequency of the cords?
5. When sound waves strike the eardrum, this membrane vibrates with the same frequency as the sound. The highest pitch that typical humans can hear has a period of 50.0 μsec . What are the frequency and angular frequency of the vibrating eardrum for this sound?
6. If an object on a horizontal, frictionless surface is attached to a spring, displaced, and then released, it will oscillate. If it is displaced 0.120 m from its equilibrium position and released with zero initial speed, then after 0.800 s its displacement is found to be 0.120 m on the opposite side, and it has passed the equilibrium position once during this interval. Find (a) the amplitude; (b) the period; (c) the frequency.
7. The displacement of an oscillating object as a function of time is shown in figure below. What are (a) the frequency; (b) the amplitude; (c) the period; (d) the angular frequency of this motion?



8. Sound waves are longitudinal waves in air. The speed of sound depends on temperature; at 20 °C it is 344 m/s. What is the wavelength of a sound wave in air at 20 °C if the frequency is 262 Hz?