1. The Sears Building in Chicago sways back and forth in the wind with a frequency of about 0.11-Hz. What is its period of vibration? (**9.09-s**)

2. An ocean wave has a length of 10.50-m. A wave passes a fixed location every 2.10-s. What is the speed of the wave? (**5.00-m/s**)

3. Water waves in a shallow dish are 6.00-cm long. At one point, the water oscillates up and down at a rate of 4.50 oscillations per second.
   (a) What is the speed of the water waves? (**2.70-m/s**)
   (b) What is the period of the water waves? (**2.22 x 10^{-1}-s**)

4. Water waves in a lake travel 4.20-m in 1.60-s. The period of oscillation is 1.20-s.
   (a) What is the speed of the water waves? (**2.62-m/s**)
   (b) What is their wavelength? (**3.15-m**)

5. A sound wave of wavelength 0.75-m and velocity 334.00-m/s is produced for 0.50-s.
   (a) What is the frequency of the wave? (**445-Hz**)
   (b) How many complete waves are emitted in this time interval? (**222**)
   (c) After 0.50-s, how far is the front of the wave from the source of the sound? (**167-m**)

6. The time needed for a water wave to change from the equilibrium level to the crest is 0.18-s.
   (a) What fraction of a wavelength is this? (**1/4**)
   (b) What is the period of the wave? (**7.20 x 10^{-1}-s**)
   (c) What is the frequency of the wave? (**1.39-Hz**)

7. An ambulances siren produces a frequency of 950.00-Hz. After passing by, you hear the frequency of the siren to be 897.00-Hz. What is the speed of the ambulance? (**20.27-m/s**)

8. If you drop a stone into a mine shaft 119.0-m deep, how soon after you drop the stone do you hear it hit the bottom of the shaft? (**5.27-s**)

9. For a diffraction horn loudspeaker, the sound emerges through a rectangular opening. The width of a diffraction horn is 0.18-m. At what frequency is the diffraction angle 35.00°? (**3322.23-Hz**)

10. Light from a He-Ne laser (λ = 632.8-nm) falls on a slit of unknown width. A pattern is formed on a screen 0.95-m away on which the first dark band is 8.00-mm from the center of the central bright band. How wide is the slit? (**7.51 x 10^{-5}-m**)

11. A guitar string produces 4 beats when sounded with a 250.00-Hz tuning fork and 9 beats when sounded with a 255.00-Hz tuning fork. What is the vibrational frequency of the string? (**246-Hz**)

12. Two timpani (tunable drums) are played at the same time. One is correctly tuned so that when it is struck, sound is produced that has a wavelength of 2.20-m. The second produces sound with a wavelength of 2.08-m. What beat frequency is heard? (**9-b/s**)

13. Determine the shortest length of pipe, open at both ends, which will resonate at 256.00-Hz. (**6.70 x 10^{-1}-m**)

14. Pipe **A** is 0.50-m long and open at both ends. Pipe **B** is open at one end and closed at the other end. Determine the length of pipe **B** so that it has the same fundamental (n=1) frequency as **A**. (**2.50 x 10^{-1}-m**)