1. Explain why a simple megaphone made of a piece of conical pipe, with a small opening near your mouth, and a larger opening at the other end, allows you to transmit your voice father away than by simple shouting with no megaphone.

2. To warn ships of a coastline, a foghorn should radiate sound in a wide horizontal sheet over the ocean’s surface. Suppose that the opening of a foghorn is a rectangle, with one short and one long side. How should the foghorn be oriented with respect to the ocean’s surface (long side horizontal, short side horizontal, etc.)? Explain your answer.

3. A plane sinusoidal sound wave with frequency f=6600 Hz is entering a rectangular room through a narrow window, normal incidence. The window is 20 cm wide, and very tall. You are detecting the sound at the wall located 10 m away from the window. What is the distance from the central maximum to the first minimum along the wall? Assume that the speed of sound is 330 m/s.

4. A double slit contains the slits of the width 10 µm each, separated by the distance 100 µm. A plane wave, wavelength 600 nm, normal incidence, illuminates the slit and produces a diffraction pattern on a screen. Approximately how many diffraction fringes will you see in the central part of the diffraction pattern, before the fringes fade because of the single-slit diffraction effects?