PHYS 201 Longitudinal Standing Waves

1. Show the fundamental and higher modes of vibrations for,
(a) a tube open at both ends (b) a tube closed at one end



2. (P 41, Ch 17) Sound enters the ear, travels through the auditory canal, and reaches the eardrum. The auditory canal is approximately a tube open at only one end. The other end is closed by the eardrum. A typical length for the auditory canal in an adult is about 2.9 cm. The speed of sound is . What is the fundamental frequency of the canal? (Interestingly, the fundamental frequency is in the frequency range where human hearing is most sensitive.)

3. (P 43, Ch 17) An organ pipe is open at both ends. It is producing sound at its third harmonic, the frequency of which is 262 Hz. The speed of sound is . What is the length of the pipe?

4. (P 46) A piccolo and a flute can be approximated as cylindrical tubes with both ends open. The lowest fundamental frequency produced by one kind of piccolo is 587.3 Hz, and that produced by one kind of flute is 261.6 Hz. What is the ratio of the piccolo's length to the flute's length?