Tutorial Quiz-10 **PHYS 101 : Week of November 19, 2007**

This week we have only one hour for the tutorials. Please ask the students to do two problems on the blackboard form the following list.

To be handed in problem is attached at the end of this document.

For the problems to be marked each problem is worth 10 points
A student may discuss the problems with other students but may not copy from others.

Problem 21.48

A narrow column of air is found to have standing waves at frequencies of 390 Hz, 520 Hz, and 650 Hz and at no frequencies in between these. The behavior of the tube at frequencies less than 390 Hz or greater than 650 Hz is not known.

a. Is this an open-open tube or an open-closed tube? Explain.

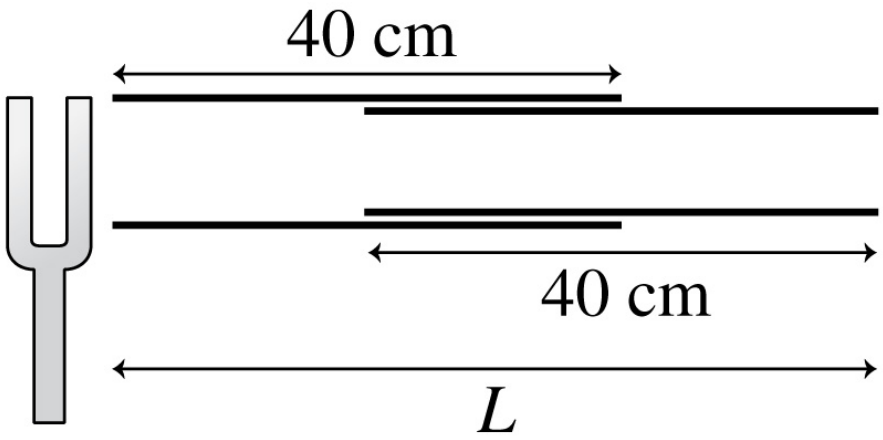
b. How long is the tube?

c. Draw a displacement graph of the 520 Hz standing wave in the tube.

d. The air in the tube is replaced with carbon dioxide, which has a sound speed of 280 m/s. What are the new frequencies of these three modes?

Problem 21.50

A 40-cm-long tube has a 40-cm-long insert that can be pulled in and out. A vibrating tuning fork is held next to the tube. As the insert is slowly pulled out, the sound from the tuning fork creates standing waves in the tube when the total length L is 42.5 cm, 56.7 cm, and 70.8 cm. What is the frequency of the tuning fork?



Problem 21.60

Two loudspeakers emit sound waves along the *x*-axis. Speaker 2 is 2.0 m behind speaker 1. Both loudspeakers are connected to the same signal generator, which is oscillating at 340 Hz, but the wire to speaker 1 passes through a box that delays the signal by 1.47 ms. Is the interference along the *x*-axis maximum constructive interference, perfect destructive interference, or something in between? Assume v_{sound} = 340 m/s

Problem 21.61

Two loudspeakers emit sound waves along the *x*-axis. A listener in front of both speakers hears a maximum sound intensity when speaker 2 is at the origin and speaker 1 is at x = 0.50 m. If speaker 1 is slowly moved forward, the sound intensity decreases and then increases, reaching another maximum when speaker 1 is at x = 0.90 m.

a. What is the frequency of the sound? Assume v_{sound} = 340 m/s

b. What is the phase difference between the speakers?