

NAME: _____, Sect. # _____

Physics 109

Homework # 4

due **Wednesday** October 10, 2001

formulae:

open pipe:

$$= \frac{v}{f}$$

$$f_1 = \frac{v}{2L}$$

speed of sound in air: 340 m/s.

1. A 2 meter long piano string has a fundamental frequency of 50 Hz.

a) find the period of the oscillation: $T =$ _____ sec.

b) what is the round trip travel time of the wave on this string? (this relates to the slinky experiment in the lab):

round trip time = _____ sec

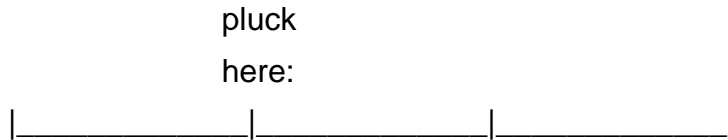
c) what is the speed of propagation of the wave on the string? (speed = distance / time!)

speed = _____ m / sec.

2. The string of a string bass is 1 meter long. When the string is plucked 1/4 meter from the end of the string, what modes will be missing in the resulting oscillation?

missing modes: _____, _____, _____,

3. A guitar string is plucked at a point one-third of the string length away from one end.



a) what modes will NOT be present in the ensuing oscillation?

NOT present: _____, _____, _____

b) The string is now touched lightly at the midpoint. What modes will be present afterwards?

modes still present: _____, _____, _____,

4. An open pipe oscillates in the fundamental mode. Make a graph of the pressure at the various places inside the pipe. Since the pressure keeps changing, show the pressure distribution at three instances one-quarter cycle apart.

pipe: _____

pressure graph: _____

5. how long an organ pipe would you need to play a 40 Hz tone?

length = _____ m