

**This exercise is to be handed in at the beginning of lab; no lab quiz!!!**

**STEP 1:** It is a **very** hot day in Dallas, and the speed of sound is 400 m/s. Given the formula  $c=331\pm 0.6C$ , determine the present temperature. (We will use  $c=400\text{m/s}$  for the pre-lab exercise ONLY to make the numbers come out nicely.)

**STEP 2:** OPEN PIPE: Draw the resonant standing wave patterns corresponding to the lowest 3 frequencies of an OPEN pipe. (You may draw pressure or displacement--your choice.)

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$$L = \frac{\square}{2} \lambda$$

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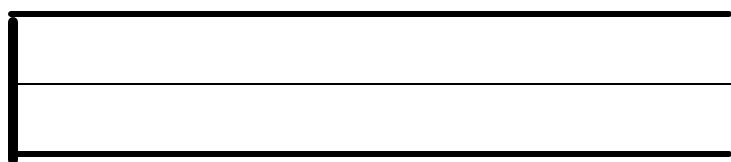
$$L = \frac{\square}{2} \lambda$$

You should observe a pattern. We will now calculate the frequency. If  $L = (N/2)\lambda$  where  $N=1,2,3,\dots$ , then  $1/\lambda = 2L/N$ . Using  $c = \lambda f$ , we have:

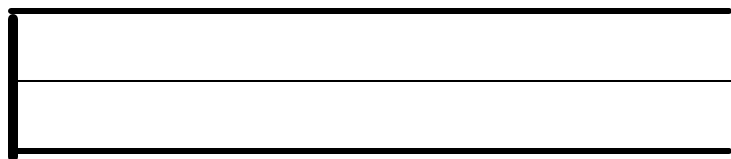
$f = \frac{c}{\lambda} = \frac{c}{2L} N$ . Use this formula, with  $c=400\text{m/s}$  to compute the first 3 resonant frequencies.

For the length of the pipe, assume  $L=1\text{m}$ .

**STEP 3:** CLOSED PIPE: Draw the resonant standing wave patterns corresponding to the lowest 3 frequencies of an CLOSED pipe. (You may draw pressure or displacement--your choice.)



$$L = \frac{\square}{4} \lambda$$



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$$L = \frac{\square}{4} \lambda$$

You should observe a pattern. We will now calculate the frequency.

If  $L = (N/4)\lambda$  where  $N=1,2,3,\dots$ , then  $1/\lambda = 4L/N$ . Using  $c = \lambda f$ , we have:

$$f = \frac{c}{\lambda} = \frac{c}{4L} N.$$

Use this formula, with  $c=400\text{m/s}$  to compute the first 3 resonant frequencies.

For the length of the pipe, assume  $L=1\text{m}$ .

**STEP 4:** COMPARISON:

Fill in the following tables. (Yeah, we only calculated the first 3 resonances, but you're smart and can figure out the pattern--we make use of this in the lab.)

OPEN PIPE	
Resonance	Frequency
1	
2	
3	
4	
5	

CLOSED PIPE	
Resonance	Frequency
1	
2	
3	
4	
5	

**STEP 5:** REMARKS:

Comments and Conclusions.