Name: _____ Period: _____

PHYSICS LAB—Measuring the Speed of Sound Using Resonance

BACKGROUND: The patterns seen below occur when a standing wave is created in a tube with one end open and the other end closed.

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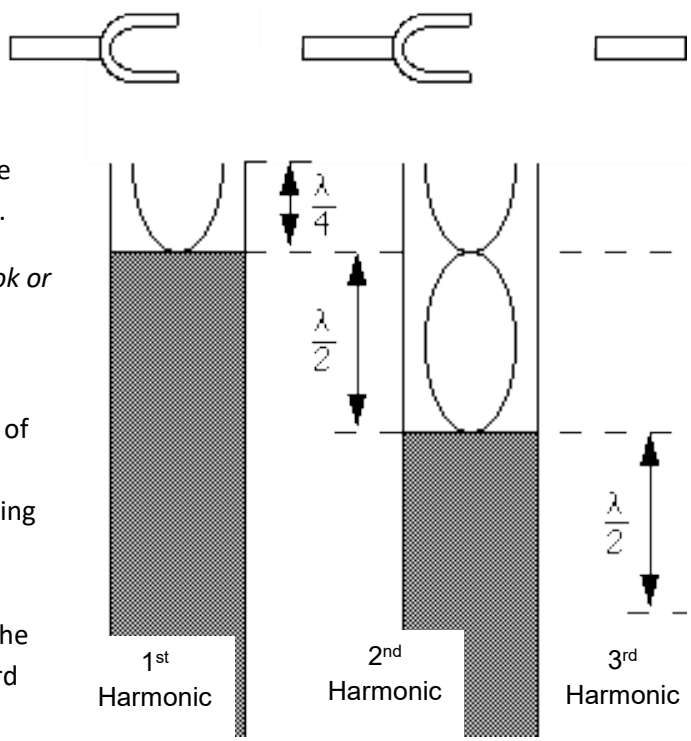

By adjusting tube length, you will create the first pattern in your lab activity. Be careful to create the first pattern and not the second and third patterns.

PROCEDURE: Note—*Strike the tuning fork on a book or other soft surface!*

1. Lower the tube all the way into the water.
2. Hold the vibrating tuning fork over the top of the tube.
3. Slowly pull the tube out of the water listening for the position of loudest resonance.
4. Hold the tube at the resonant length while your partner measures the distance from the top of the tube to the water surface. Record that as length L.
5. Use the relationship between pipe length and wavelength to find the wavelength of the sound.
6. Use the relationship between frequency and wavelength to find the speed of the sound.
7. Repeat with a second and third tuning fork.

DATA:

Trial	**Frequency of Fork (Hz)**	**Period of Fork (s)**	**Length L (m)**	**Wavelength (m)**	**Speed of sound (m)**
1					
2					
3					

RECORD ROOM TEMPERATURE: _____ °C Teacher Initials _____

ANALYSIS: The speed of sound in air depends on temperature. Other studies have shown that the speed of sound varies with temperature according to this equation:

$$v = (331\ m/s) + (0.6\ m/s°C)(\text{Temperature in } °C)$$

Name: _____ Period: _____

1. Calculate the predicted speed of sound in this room using the temperature formula.

2. Find % error for your two trials. Show all work.

$$\% \text{ error} = (v_{experimental} - v_{predicted})/(v_{predicted}) \times 100$$

3. What are sources of error for this lab? Remember that "human error" is a non-descriptive term!

CONCLUSION: How well did this method work for you and your team? How would you improve your results? Could the speed of sound be measured in another way? Describe another method that could work in our lab. You may use the internet if your imagination fails you!