**Data:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Frequency of Tuning Fork (Hz) | Tube Length (cm) | Tube Length (m) | Wavelength (m) | Speed of Sound (m/s) | Average Speed of Sound (m/s) |
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**Analysis:**

1. Convert the tube length from cm to meters and enter into the table.
2. Calculate the wavelength using the equation λ = 4(L + 0.3d), where λ is wavelength, L is the measured tube length, and d is the diameter of the open end of the PVC pipe. Please show one sample calculation below.
3. Calculate the speed of sound using the formula v = λf, or speed is equal to wavelength times the frequency. Please show one sample calculation below.
4. Calculate the average speed of sound. This is your experimental value for the speed of sound in air at today’s temperature.
5. Using the equation vs = 331 + 0.6TC (TC is the temperature of the room in Celsius), calculate the actual value for the speed of sound in air today. Show your work below.
6. Using your answers to questions 4 and 5, calculate the percent error for the speed of sound in air. Show your work below.

**Use your group’s diameter for problems 7 – 9.**

1. If a student doing this lab were to record a length of 0.25 m, and the speed calculated was 364 m/s, what is the frequency of the tuning fork the student used?
2. Another student measures a tube length of 19 cm and uses a tuning fork with a frequency of 440 Hz. What speed would the student get?
3. What is the temperature of the room in the experiment in problem 8?

**Analysis and Conclusion:**

1. What is resonance? How can you tell that you have reached resonance?
2. Give and explain two examples of resonance other than that seen in the lab today. What did resonance cause in each of your examples? (Online research is encouraged, but don’t plagiarize!)
3. What is the relationship between frequency and wavelength for a sound wave in the air? How do you know?
4. List and explain 3 sources of error and how you would fix them in a future experiment.