

6. Since the first resonance occurs at $\ell_{\text{corr}} = \lambda/4$, the wavelength can be calculated by rearranging this formula.

$$\lambda = 4 \ell_{\text{corr}} = 15.7 \quad (\text{Substitute})$$

$$= 15.7 \text{ cm} \quad (\text{Final answer})$$

7. Transfer the measured and calculated data from steps 4, 5, and 6 to the data table for reading 1.
8. Strike the tuning fork on the activator again and hold it above the resonance tube. Lower the water level until a second resonant condition is reached. Record this level on the data table as ℓ for reading 2. Lower the water level further until a third resonant condition is reached. Record this level on the data table as ℓ for reading 3.
9. Correct these two additional values of ℓ in the same way you did in step 5. Then calculate the wavelengths. For reading 2: $\lambda = 4 \ell_{\text{corr}}/3$. For reading 3: $\lambda = 4 \ell_{\text{corr}}/5$. Make these calculations on scratch paper and record your results on the data table.
10. Calculate the average wavelength below. Then, convert this wavelength to meters by moving the decimal point two places to the left.

$$\text{average } \lambda = \frac{\text{Sum of 3 values}}{3} = \frac{15.7 + 36.4 + 32.24}{3} \quad (\text{Substitute})$$

$$= 28.11 \text{ cm} = 0.2811 \text{ m} \quad (\text{Final answer})$$

11. Calculate the velocity of sound from your measurements. Use the average value of λ from step 10.

$$v_{\text{meas}} = f \lambda = 512 \times 0.2811 \quad (\text{Substitute})$$

$$= 143.92 \text{ m/s} \quad (\text{Final answer})$$

12. Find the accepted speed of sound at your room temperature.

$$v_{\text{accept}} = 331.3 \sqrt{\frac{273.2 + t_r}{273.2}} = 331.3 \sqrt{\frac{273.2 + 23}{273.2}} \quad (\text{Substitute})$$

$$= 344.96 \text{ m/s} \quad (\text{Final answer})$$

13. Calculate the percent error in your measured value of the speed of sound.

$$\% \text{ Error} = \frac{v_{\text{meas}} - v_{\text{accept}}}{v_{\text{accept}}} \times 100$$

$$= \frac{143.92 - 344.96}{344.96} \times 100 \quad (\text{Substitute})$$

$$= -58.28 \% \quad (\text{Final answer})$$

14. Transfer the results of your calculations in steps 10 through 13 to the data table.