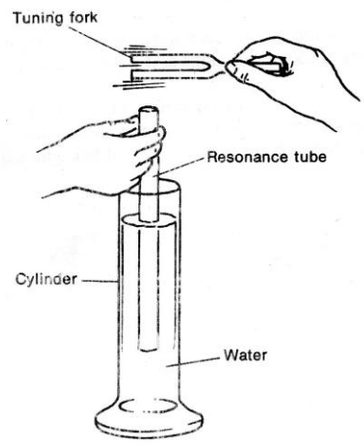
**Resonance Lab**

Resonance describes a dramatic increase in amplitude of a wave due to forced vibration of a medium at its natural frequency. With sound waves resonance causes an increase in loudness, or volume. In this lab you will use a tuning fork to cause a column of air in a tube to vibrate. When you adjust the air column to match the frequency of the tuning fork, the air column will resonate and sound louder. You will adjust the air column by raising or lowering the tube in water. This will be what is known as a closed pipe, with the water sealing off the bottom of the tube. For a closed pipe, resonance occurs when the length of the tube is about one-fourth of the wavelength of the sound waves.

**Do this:** (1)Determine the wavelength of sound waves of known resonance frequency
(2) Calculate the speed of sound waves in the classroom
(3) Predict the length of resonance tube for a given frequency and test your prediction




**Materials for demo:** glass tube, 26+ cm tall graduated cylinder, water, two tuning forks, rubber stopper or anvil, ruler

## (1) Data Table

| Fork | Frequency (Hz) | Resonance length (cm) | Wavelength (cm) |
|---|---|---|---|
| #1 | | | |
| #2 | | | |
| #3 | | | |

**(2) K-U-E-S for speed of sound**

**Approval** _____

**(3) Prediction:**

1. Construct a wavelength v. frequency graph from your data. Use a 100 Hz range that includes the two frequencies and a 20 cm range that includes the two wavelengths. *This is one of the few times you do not need to start at zero.* **Have your graph approved at this point**
2. **Use the graph to predict the approximate wavelength of the sound produced by the third tuning fork in your assigned set.
3. Use the wavelength to determine the tube length that would resonate with the third tuning fork in your assigned set.
4. Test your prediction. If your predicted length does not result in resonance, adjust the tube's position until it resonates and measure that length. How close was your prediction?
   **Have your teacher verify your test**