Tuning Fork in Water

Demonstration

Visualize sound waves with a tuning fork and water.

Number of Participants: Unlimited

Audience: Elementary (ages 5-10) and up

Duration: 5 -10 mins

Difficulty: Level 1

Materials Required:

- Tuning fork
- Cup of water
- Food dye (optional)
- Rubber tuning fork mallet

Setup:

1. Introduce the tuning fork to participants and illustrate how to use one if needed (strike the end of the tuning fork against rubber mallet).
2. Stick the tip of the vibrating tuning fork prongs into the cup of water.

Presenter Brief:

Understand sound waves, tuning fork motion, and vibrations.

Vocabulary:

- Longitudinal waves – waves that propagate parallel to their direction of motion.
- Oscillation – moving in a regular motion back and forth from a resting position.

Physics & Explanation:

Middle (ages 11-13) and general public:

Tuning forks make noise by rapidly vibrating their tongs (back and forth) and their bottom (up and down), as in Figure 1. The rate at which tuning forks vibrate is too fast for the human eye to detect (remember, 384 Hz tuning fork means the tuning fork arms are vibrating out and back to its original position 384 times every second). Sticking the tuning fork in water is a way to visualize this rapid motion.

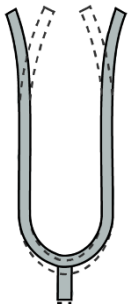

Figure 1 the principle mode of vibration for a tuning fork.

Sounds are another form of waves – longitudinal waves. Like all waves, sound waves carry energy. By sticking the vibrating tuning fork in a denser medium like water, the tuning fork's energy is transferred into the act of splashing water, rather than hearing sound.

🔑 Waves are energy carriers. Water is a better medium to visualize sound waves and detect the rapid motion of a vibrating tuning fork.

> If time allows, have participants examine the bottom/base of the tuning to observe small vibrations.
>
> Additionally, different size tuning forks produce different effects. Have participants experiment with differently tuned/sized forks to experiment with how large a splash they can make.

Additional Resources:

- Rossing Moore & Wheeler *The Science of Sound* 2002. p. 33-34
- Resnick, Halliday, Walker *Fundamentals of Physics,* 2001. (p 403-405)