NAME _____ DATE _____

Scenario

A soda bottle is partially filled with water in a room where the speed of sound is v.

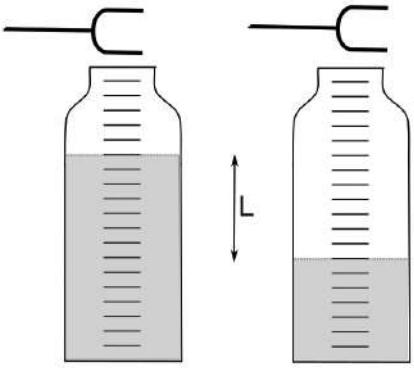
Using Representations

PART A: Sketch a diagram of the displacement wave for the first harmonic in the bottle.

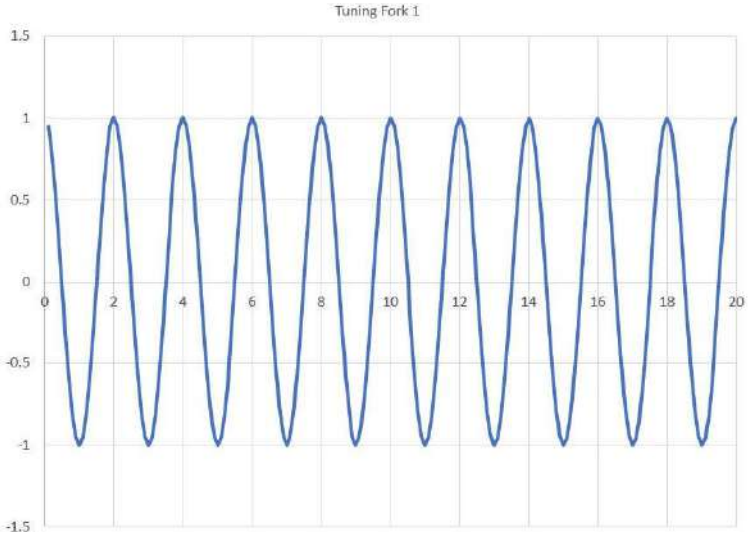
PART B: What happens to the resonant frequency as the water level in the bottle decreases? Explain.

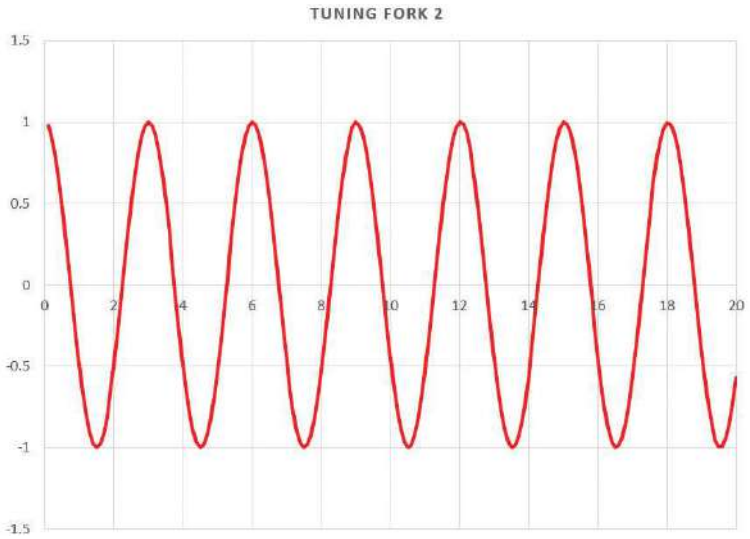
Quantitative Analysis

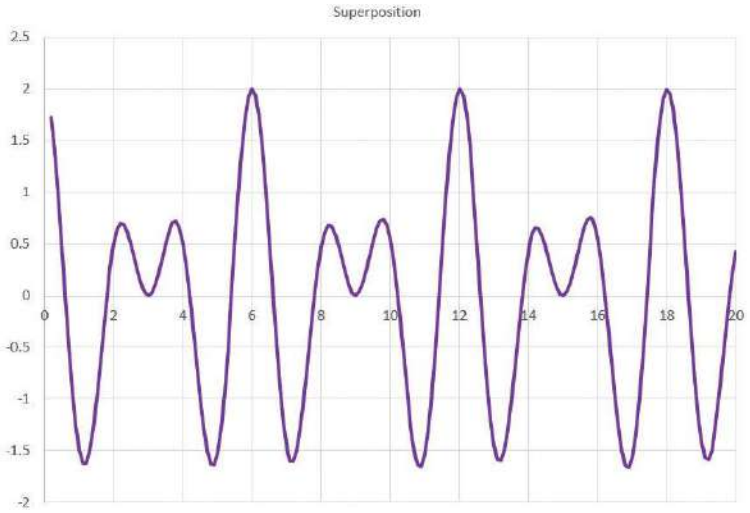
PART C: The bottle is filled again, and with the water at a certain height, a vibrating tuning fork causes resonance within the bottle. The water level is then lowered until another resonance is observed. This second resonance occurs when the water level is lowered a distance L. Derive an expression for the frequency of the vibrating tuning fork in terms of L, v, and physical constants.



The sound waves produced from two tuning forks broadcast at the same time are shown below, in addition to their superposition. Amplitude of the wave vs. time in seconds is being graphed.







Data Analysis

PART D: Determine the frequency of each tuning fork.

Tuning Fork 1: ___f = _____

Tuning Fork 2: ___f = _____

PART E: Determine the beat frequency. Beat frequency: __f = _____ Hz

PART F: Explain the phenomenon of beats. What must happen in order to cause beats to occur?