Good Vibrations

Crickets and Cicadas

What you need!

- Crystal wineglass (thin-walled glass works best)
- Separate glass of water
- Fingers

Insects can be really, really loud. If humans had the same calling ability as crickets we probably wouldn't need phones. It is really amazing that such small animals like crickets and cicadas can make such big noises. This doesn't occur by accident - it is by design. Sounds are made up of vibrations and if an object is vibrating near one of its natural frequencies, this motion can produce a very loud noise known as resonance.

What you do:

1. On a solid surface, hold an empty wineglass by the base with one hand.
2. Wet the index or middle finger of your other hand with some water.
3. Lightly rub your wet finger around the rim of the glass.
4. As you rub the glass, you may hear the "singing" sound of the glass. You will have to re-wet your finger and/or adjust the pressure of your finger on the rim of the glass if the sound doesn't start or it stops.

5. Try it again adding water to the glass.
6. Next, try it with a set of wineglasses with different levels of water.

Ask yourself

- Why does the wineglass only 'sing' when you rub your finger a certain way?
- How else can you make the wineglass resonate?
- What happens to the sound when you add water to the glass?
- Compare the sounds made with more or less water in the glasses?
- List examples of small creatures that can make a really loud noise.

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What did you find out?

The small effort that you apply to the wineglass creates a large vibration, but not always a sound. The timing has to be just right for your movements to build on to one another rather than to subtract from one another. The process of using a series of small inputs to create a large output is known as resonance. When the vibration of the wineglass, matches the vibration made by your finger, this is said to be the glass's natural frequency, and a sound is produced.

There are many everyday examples of resonance in your very own home. Certain objects in your home might rattle when the stereo hits a particular note. Rattling noises in your car may only appear at certain speeds. The wineglass will not only resonate by rubbing it; it can also resonate if you hum to it at just the right tone. Try that!

Specific Learner Expectations (SLE)

Grade 3 Topic D: Hearing and Sound.

SLE 1 Identify examples of vibrations.

SLE 2: Recognize that sound is the result of vibration; and demonstrate that the larger the vibration, the louder the sound.

SLE 5: Demonstrate a variety of ways of producing sound: e.g., by striking an empty glass, blowing air into a bottle.