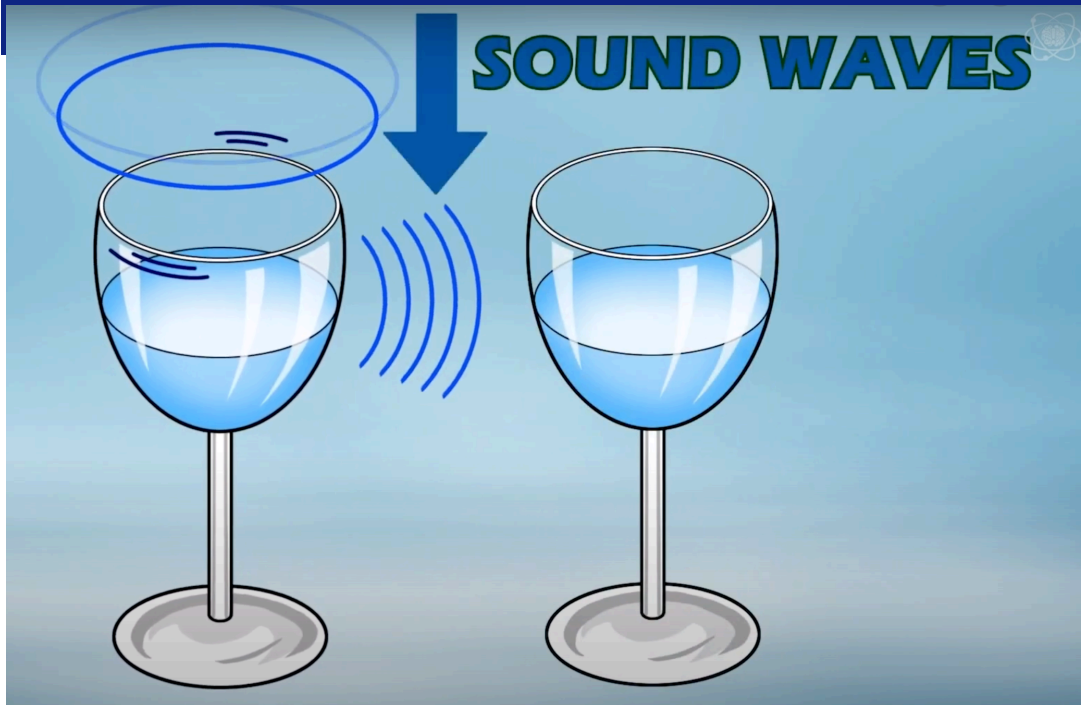


The Power of Resonance

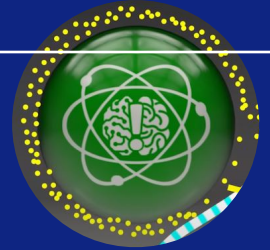
Goal: Students will be aware of how the power of resonance can be used to move objects.

NGSS: MS PS4-1



Procedure:

1. Ask: How could you realistically move an object without touching it? Have students turn and talk, then share.
2. Have students touch their throats and hum loudly. Ask: What do you notice? Explain that.
3. Review terms above, beginning with connecting the vibration in their throats to resonance. They can demonstrate pitch by raising and lower their voices and experience friction by rubbing their hands together.
4. Hand out glasses and straws to pairs of students.
5. Show: [The Power of Resonance](#), pausing to have students jot down notes and follow the steps in the experiment.



Objective:

Students will recreate the straw experiment to move an object using resonance.



Materials:

- a lightweight straw
- two thin glasses such as wine glasses (thinner glass will be easier to work with)
- water
- a bowl
- plastic wrap
- a spoonful of rice
- a metal baking dish (cookie sheet, cake pan)
- a metal spoon

6. Ask: How long did you have to rub one glass to get the straw to fall off the other? How did the pitch change? What else could you try to move? Besides what you saw in the video, have you seen anything else moved by resonance and, if so, what?

Vocabulary

Resonance: a sound or vibration produced in one object that is caused by the sound or vibration produced in another; a clear, loud, and deep quality of sound.

Friction: the rubbing of one thing against another

Pitch: the property of a sound and especially a musical tone that is determined by the frequency of the waves producing it; highness or lowness of sound.

Natural Frequency: the rate at which an object vibrates when disturbed.

Extension:

1. Have students very tightly cover a bowl with plastic wrap.
2. Place a spoonful of uncooked rice on the bowl.
3. Hold the metal sheet pan very near the bowl (but not touching) and hit it a few times with varied force.
4. Observe how and when the rice moves.
5. With partners, write an explanation of why the rice moves.

Assessment:

Students should work in pairs to design and perform an experiment using the power of resonance to move an object or objects. Students should correctly incorporate the vocabulary into their experiment and explanation.

