

STEM Bites

TODAY'S EXPLORATION: Sound Waves in Water

Grade 1 – 4

Overview: Explore how different amounts of water in a jar affect the sound made when the jar is tapped.

NGSS:

1-PS4 Waves and their Applications in Technologies for Information Transfer

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

4-PS4 Waves and Their Application in Technologies for Information Transfer

4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

Materials:

- 8 jars or glasses of the same size (or fewer if 8 are not available)
- Water
- Measuring cups
- Plastic or wooden spoon
- Masking tape
- Marker
- Food coloring (optional)



Investigation:

1. Label the jars 1-8
2. Fill jars with different amounts of water. Tap on the jars to explore the sound and the pitch of the sound made when the amount of water is higher or lower.
3. Tune the jars of water by adding a specific amount of water to each jar.
 - a. To the first glass add $1 \frac{3}{4}$ cups of water
 - b. Second glass add $1 \frac{1}{2}$ cups of water
 - c. Third glass add $1 \frac{1}{4}$ cups of water
 - d. Continue to decrease the amount of water by $\frac{1}{4}$ cup each time.
 - e. If you use 8 glasses the last glass will be empty.
4. Add food coloring to the jars if desired.
5. Predict which will have the higher **pitch** when tapped on the side with a spoon.

6. Place the glasses in a straight line, tap each glass and listen to the sound it makes. Which has a higher sound? A lower sound?
7. Try using different tools to tap the glasses, such as wooden or metal spoons.
8. Tap the glasses in the following order to play Happy Birthday
1-1-2-1-4-3
1-1-2-1-5-4
1-1-8-6-4-3-2
7-7-6-4-5-4

See this link for an example: [Water Xylophone link](#)

More Investigations:

- Add different amounts of water to the jars.
- Use different liquids in the jars.

Guiding Questions:

1. What happened when the different jars were tapped?
2. If the glass with the most water slows down the sound wave vibrations the most, what is occurring in the glass with the least amount of water?
3. How might changing the kind of liquid in the glass affect the sound created when the glass is tapped?
4. Sound energy can be seen as well as heard. Describe a time when you have seen or felt sound waves.

Product or Artifact Possibilities:

- Draw what the exploration setup looked like.
- Play a song on the water jars and record it.

What Are We Discovering?

Vibrating materials can make sound, and sound can make materials vibrate. When a mallet taps the glass, the water inside the glass vibrates. The pitch of the sound depends on the speed of the vibrations. Since the glass with the most water slows down the vibrations the most, it produces a lower pitched sound.

Reading Connections:

How Sound Moves: By Sharon Coan
Epic Books for Kids

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