Sound

Physical Science | Lesson Guide

1st Grade

Photo Description

People are playing brass instruments like trumpets and trombones. The instruments are shiny and made of metal. When people blow into them, they make sounds.

Scientific Phenomena

The anchoring phenomenon is sound production through vibrating air columns in musical instruments. When musicians blow air into brass instruments, they create vibrations with their lips that cause the air inside the instrument to vibrate in specific patterns. The length and shape of the instrument determines the pitch (how high or low the sound is), while the force of the air and lip vibrations affects the volume (how loud or soft the sound is).

Core Science Concepts

1. Sound is produced by vibrations - The musicians' lips vibrate against the mouthpiece, creating sound waves
2. Sound travels through air - The vibrations move through the air inside the instruments and then to our ears
3. Different materials make different sounds - The metal instruments create bright, bold sounds compared to other materials
4. Sound has properties - We can observe that sounds can be loud/soft (volume) and high/low (pitch)

Pedagogical Tip:

Have students place their hands on their throats while humming to feel vibrations, then connect this to how instruments make sound through vibrations.

UDL Suggestions:

Provide multiple ways for students to experience sound concepts: visual representations with sound wave drawings, tactile experiences feeling vibrations on instruments or speakers, and auditory examples with various instruments.

Zoom In / Zoom Out

1. Zoom In: Inside the instruments, air molecules are bumping into each other in waves, creating invisible sound waves that travel at about 343 meters per second through the air to reach our ears.

2. Zoom Out: This musical performance is part of how humans use science and engineering to create art and communicate emotions across cultures, connecting communities through the universal language of music.

Discussion Questions

1. What do you think happens inside the trumpet when someone blows into it? (Bloom's: Analyze | DOK: 2)
2. How could we test if different materials make different sounds? (Bloom's: Create | DOK: 3)
3. Why do you think some instruments sound higher and others sound lower? (Bloom's: Evaluate | DOK: 2)
4. What would happen if there was no air inside the instruments? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: "The instrument makes the sound by itself"
   Clarification: The person must blow air and vibrate their lips to create the sound - the instrument shapes and amplifies it
2. Misconception: "Bigger instruments are always louder"
   Clarification: Size affects pitch (how high or low), but how hard you blow affects volume (how loud)
3. Misconception: "Sound stays inside the instrument"
   Clarification: Sound waves travel out of the instrument and through the air to reach our ears

Cross-Curricular Ideas

1. Math - Patterns and Counting: Students can create repeating patterns with instrument pictures (trumpet, trombone, trumpet, trombone) or count how many musicians are playing in the photo. They can also explore long and short sounds, connecting to measurement concepts.

2. ELA - Descriptive Writing: Students can listen to brass instrument sounds and write or draw words that describe what they hear (loud, bright, happy, bouncy). Create a class chart of "sound words" and use them in simple sentences about the instruments.

3. Art - Color and Design: Students can paint or color pictures of shiny brass instruments, exploring how light reflects off metal surfaces. They can also create their own simple instruments from paper towel tubes and experiment with decorating them.

4. Social Studies - Community Helpers and Culture: Discuss how musicians are part of our community and how music brings people together. Learn about different cultures that have their own brass instruments and celebrate diversity through music from around the world.

STEM Career Connection

1. Musician/Band Director: A musician plays instruments and makes music that makes people happy. Some musicians teach other people how to play instruments in schools and bands. They use science to understand how their instruments work and create beautiful sounds. Average Annual Salary: $35,000 - $50,000

2. Instrument Maker/Luthier: This person builds and fixes musical instruments like trumpets and trombones. They know all about how air moves through instruments and use tools and materials to create instruments that sound wonderful. Average Annual Salary: $38,000 - $55,000

3. Acoustical Engineer: This scientist studies how sound works and helps design better instruments, concert halls, and speakers. They use math and physics to understand vibrations and sound waves, making sure music sounds its best in different spaces. Average Annual Salary: $62,000 - $85,000

NGSS Connections

- Performance Expectation: 1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate
- Disciplinary Core Ideas: 1-PS4.A - Sound can make matter vibrate, and vibrating matter can make sound
- Crosscutting Concepts: Cause and Effect - Simple tests can be designed to gather evidence to support or refute student ideas about causes

Science Vocabulary

* Vibration: When something moves back and forth very quickly
* Sound wave: The invisible moving air that carries sound to our ears
* Pitch: How high or low a sound is
* Volume: How loud or soft a sound is
* Brass: A type of metal that is shiny and good for making instruments

External Resources

Children's Books:
- The Magic School Bus Explores the Senses by Joanna Cole
- Sounds All Around by Wendy Pfeffer
- The Listening Walk by Paul Showers