Sound

Physical Science | Lesson Guide

2nd Grade

Photo Description

Students are playing brass instruments like trumpets and trombones together in a band. The instruments are shiny and made of metal. When they blow air into the instruments, sound comes out.

Scientific Phenomena

The anchoring phenomenon is sound production through vibration. When students blow air into brass instruments, their lips vibrate against the mouthpiece, creating sound waves that travel through the metal tubes. The length and shape of each instrument determines the pitch (how high or low the sound is). The vibrations move through the air as sound waves, allowing everyone in the room to hear the music.

Core Science Concepts

1. Vibrations create sound - All sounds are made when something vibrates back and forth very quickly
2. Sound travels through materials - Sound waves move through air, metal, and other materials to reach our ears
3. Different materials make different sounds - The metal in brass instruments creates a bright, loud sound compared to other materials
4. Pitch depends on vibration speed - Faster vibrations make higher sounds, slower vibrations make lower sounds

Pedagogical Tip:

Have students place their hands on their throats while humming to feel vibrations firsthand before discussing how instruments work.

UDL Suggestions:

Provide multiple ways for students to experience sound concepts: visual vibration demonstrations with tuning forks in water, tactile experiences feeling speaker vibrations, and auditory comparisons of different instruments.

Zoom In / Zoom Out

1. Zoom In: At the molecular level, sound waves are created when air molecules bump into each other in a chain reaction, passing the vibration energy from the instrument to our eardrums.

2. Zoom Out: This musical performance connects to the larger acoustic environment of buildings, where architects design concert halls and classrooms to enhance or control how sound waves bounce off walls and ceilings.

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 can you hear the band from across the room? (Bloom's: Understand | DOK: 2)
4. What would happen to the sound if we played the instruments in a smaller room? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: Sound comes from the instrument itself
   Clarification: Sound comes from vibrations - the instrument just helps create and shape those vibrations

2. Misconception: Louder sounds are always higher pitched
   Clarification: Volume (loudness) and pitch (high/low) are different - you can have loud low sounds and quiet high sounds

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

Crosscutting Concepts: Cause and Effect

Science Vocabulary

* Vibration: When something moves back and forth very quickly
* Sound wave: The invisible energy that carries sound through the air
* Pitch: How high or low a sound is
* Volume: How loud or quiet a sound is
* Material: What something is made of, like metal, wood, or plastic

External Resources

Children's Books:
- The Magic School Bus Explores the Senses by Joanna Cole
- Sounds All Around by Wendy Pfeffer
- The Science of Sound by Steve Parker

YouTube Videos:
- "How Sound Works - SciShow Kids" - Simple explanation of vibrations and sound waves with animations: https://www.youtube.com/watch?v=qV4lR9EWGlY
- "Sound Vibrations for Kids" - Demonstrates visible sound vibrations using everyday materials: https://www.youtube.com/watch?v=px3oVGXr4mo