Sound

Physical Science | Lesson Guide

Kindergarten

Photo Description

People are playing brass instruments like trumpets and trombones. The instruments are shiny and make sounds when air is blown through them. Musicians are working together to make music.

Scientific Phenomena

The anchoring phenomenon is sound production through vibration. When musicians blow air into brass instruments, the air vibrates inside the metal tubes. These vibrations travel through the air as sound waves that we can hear. The length and shape of each instrument determines the pitch (high or low sounds) it makes. This demonstrates how energy (breath) is transferred into sound energy through vibration.

Core Science Concepts

1. Vibrations create sound - All sounds are made when something vibrates or shakes back and forth very quickly
2. Sound travels through air - Sound waves move through the air from the instrument to our ears
3. Different materials make different sounds - Metal instruments sound different than wood or plastic instruments
4. Pitch depends on size - Longer, bigger instruments make lower sounds; shorter, smaller instruments make higher sounds

Pedagogical Tip:

Use simple instruments like kazoos, rubber bands, or paper towel tubes to let students experience how their breath and vibrations create sound. This hands-on exploration helps make the abstract concept of sound waves concrete for young learners.

UDL Suggestions:

Provide multiple ways for students to experience sound concepts: visual representations (watching rubber bands vibrate), tactile experiences (feeling vibrations on their throat when humming), and auditory examples (comparing high and low sounds). This supports learners with different sensory preferences and abilities.

Zoom In / Zoom Out

1. Zoom In: Inside the instrument, air molecules are bumping into each other very fast, creating invisible waves that travel through the air. These tiny vibrations happen hundreds of times per second.

2. Zoom Out: Sound waves from these instruments can travel across large spaces like auditoriums or outdoor areas. The sound energy becomes part of the larger acoustic environment, mixing with other sounds in the room and potentially causing echoes off walls.

Discussion Questions

1. What do you think happens inside the trumpet when someone blows into it? (Bloom's: Analyze | DOK: 2)
2. How do you think the sound gets from the instrument to your ears? (Bloom's: Apply | DOK: 2)
3. Why do you think some instruments sound higher and some sound lower? (Bloom's: Evaluate | DOK: 3)
4. What would happen if we made the trumpet longer or shorter? (Bloom's: Predict | DOK: 2)

Potential Student Misconceptions

1. Misconception: "The instrument makes the sound by itself"
   Clarification: The musician's breath provides the energy needed to create vibrations and sound

2. Misconception: "Bigger instruments are always louder"
   Clarification: Size affects pitch (high/low), not volume (loud/soft) - how hard you blow affects loudness

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 + Music: Count the number of musicians playing instruments in the photo. Compare which types of instruments appear most and least often. Create a simple bar graph showing how many trumpets, trombones, and other brass instruments you see. This connects sound science to data representation and counting skills.

2. ELA + Sound: Read books about music and instruments together. Have students draw pictures of instruments and label them with beginning sounds (t for trumpet, f for flute). Create a class "sound word" chart with descriptive words like "loud," "soft," "high," and "low" to build vocabulary while discussing the science of sound.

3. Art + Vibration: Have students create musical instruments from recyclable materials (paper towel tubes, rubber bands, containers with beans). Paint and decorate their homemade instruments, then test them to see what sounds they make. This combines hands-on science exploration with creative expression and fine motor skill development.

4. Social Studies + Teamwork: Discuss how the musicians in the photo work together as a group to make music. Compare this to how communities work together. Talk about different jobs people have (like being a musician) and how they contribute to our neighborhoods and celebrations.

STEM Career Connection

1. Musician/Instrumentalist: A musician plays instruments like trumpets and trombones to make beautiful music for people to enjoy. They practice a lot to learn how to control their breath and fingers to make different sounds and melodies. Some musicians play in bands, orchestras, or at special events.
   Average Annual Salary: $35,000 - $50,000 USD

2. Acoustical Engineer: An acoustical engineer is a scientist who studies how sound works and travels. They design concert halls, recording studios, and even instruments to make sure sound quality is the best it can be. They use science and math to understand vibrations and waves.
   Average Annual Salary: $65,000 - $85,000 USD

3. Music Teacher: A music teacher helps students learn how to play instruments like brass instruments and understand how music works. They teach kids about vibrations, pitch, and rhythm while helping them develop their musical talents and love of music.

Average Annual Salary: $40,000 - $60,000 USD

NGSS Connections

- Performance Expectation: K-PS2-1 Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object
- Disciplinary Core Ideas: PS4.A (Wave Properties)
- Crosscutting Concepts: Cause and Effect

Science Vocabulary

* Vibration: When something moves back and forth very quickly
* Sound wave: Invisible vibrations that travel through air to make sounds we hear
* Pitch: How high or low a sound is
* Energy: The power needed to make something happen or move
* Instrument: A tool used to make music sounds

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