

Sound

Key Words • sound • vibrate • pitch • volume



Getting the Idea

When you hear a person talking, a dog barking, or a police siren, you hear sound. Some sounds are very loud. Others are soft. Some sounds are high, like a whistle. Others are low, like the rumble of a train. But all sounds are alike in some ways.

What Is Sound?

Remember that energy is the ability to make something move or change. **Sound** is a form of energy you can hear. Every sound is made by something vibrating. When something **vibrates**, it moves back and forth very fast. The movement is called *vibration*.

When you talk, the vocal cords in your throat vibrate. Air vibrates inside a flute when a person blows into it. Clapping your hands makes the air around them vibrate. When these things vibrate, sound is made.



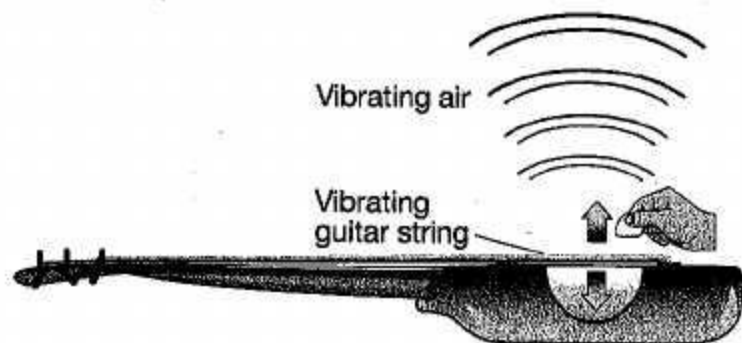
It is possible for sound to shatter glass.
That is because sound is a form of energy.

Sound Moves through Matter

Sound can move through materials. It can move through solids, liquids, and gases. It makes these materials vibrate because they are matter. Sound cannot move through empty space. There is no matter to vibrate in empty space.

Vibrations in one material can cause vibrations in a material next to it. This is how sound travels. Think about what happens when someone plucks a guitar string. The string vibrates. Each time the string moves, it bumps against air that is nearby. The string makes the air vibrate, too. That air bumps against more air, and so on. The energy of the vibrations moves through the air.

The sound is like the ripples in a pond when you toss a pebble into it. Sound travels away from the guitar in all directions. Soon the sound reaches you, and you hear the sound of the guitar.



Sound moves better through some materials than others. Try tapping lightly on your desk. Listen to the sound. Now put your ear on your desk and tap it lightly again. Can you hear the sound better? That is because the sound moves better through the solid desk than through the gases in air. Sound travels best through solids, less well through liquids, and least well through gases.

Pitch

One property of sound is pitch. **Pitch** is how high or low a sound is. How high the pitch is depends on how fast the object is vibrating. If an object vibrates very quickly, it makes a sound with a high pitch. If an object vibrates slowly, it makes a sound with a lower pitch.

Pitch changes with the length of an object. Shorter objects vibrate faster and have higher pitches. Longer objects vibrate more slowly and have lower pitches. If you change an object's length, you can change its pitch. Guitar players can change the pitch of the sound by pressing on the strings. This makes the strings shorter. Shorter strings have a higher pitch.

Pitch also changes with the thickness of an object. Thinner objects have higher pitches. Thicker objects have lower pitches. The thicker strings on a guitar vibrate more slowly than thinner strings. Thicker strings make sounds with lower pitches than thinner strings do.

Pitch changes with the tightness of an object, too. Tight objects vibrate faster than loose objects. The tighter the string on a guitar is, the higher the pitch of the sound it makes. Guitar players tune their guitars by turning a key to make a string tighter or looser.

Volume

Another property of sound is volume. **Volume** is the loudness or softness of a sound. A yell and a train whistle are loud sounds. A whisper and a finger snap are soft sounds.

Strong vibrations make the volume loud. Weak vibrations make the volume soft. It takes more energy to make stronger vibrations, or louder sounds. It takes less energy to make weaker vibrations, or softer sounds.

If you ring a small bell hard, it makes a loud sound. The sound has a high volume. If you ring the bell gently, it makes a soft sound. The sound has a low volume. But no matter how hard you ring the bell, its pitch does not change. The bell still makes the same high sound. Only the volume of the sound changes.

You can change the volume of sound by changing how hard you hit or pluck an object. Say you are clapping your hands. If you clap your hands harder, you use more energy. The volume gets louder. If you clap your hands more gently, you use less energy. The volume gets softer.

Volume changes with distance. The closer the object making the sound is, the louder the sound will be. Think about how thunder gets louder as a storm gets closer. The farther away the object making the sound is, the softer the sound will be.

Discussion Question

Radios and music players have volume controls. When you turn or push the controls a certain way, louder sounds are made. What do you think changes when you move the controls to cause the louder sounds?



Lesson Review

1. Which sentence about sound is TRUE?
 - A. Sound cannot move through water.
 - B. Sound can travel through empty space.
 - C. Sound moves better through some materials than others.
 - D. Sound cannot move from one material to another.
2. A student blows a whistle hard. Then the student blows it gently. Which property of the sound changes?
 - A. direction
 - B. height
 - C. pitch
 - D. volume
3. The pitch of the sound made by a guitar string does NOT depend on which of these?
 - A. the thickness of the string
 - B. how hard the string is plucked
 - C. the length of the string
 - D. how tight the string is
4. A piano can make sounds with different pitches. What happens when the sound changes from a low pitch to a high pitch?
 - A. Nearby air vibrates faster.
 - B. Nearby air vibrates more slowly.
 - C. The volume of the sound is higher.
 - D. The volume of the sound is lower.