



**Day 2 – Grade
4 - Science**



*Investigating
Sound*

Performance Indicator: 4.P.4B.2: Analyze and interpret data from observations and measurements to describe how changes in vibration affects the pitch and volume of sound.



Essential Questions:

How does changing different variables related to vibrations, affect the volume of sound?

I-Can Statements:

I can describe what happens volume when different variables are changed.



Engage Activity



Click on the link
below, log into
Discovery
Education, and
complete the
sound exploration.

Volume
Exploration

Engage Activity

Now that you have completed the sound exploration, think about what you learned and complete the fill in the blank activity below. You may revisit the sound exploration if need help.

_____ depends on the energy of _____ waves. The amount of energy in _____ waves, determines the _____ of music. As the volume changes, the _____ in the sound waves change.

Exploration Time

Pitch is a measure of how high or low something sounds and is related to the speed of the vibrations that produce the sound.

Volume is a measure of how loud or soft something sounds and is related to the strength of the vibrations.

Sound is caused by vibrations (back and forth movements that occur very quickly)

Sound **vibrations** can be transferred from one material to another.

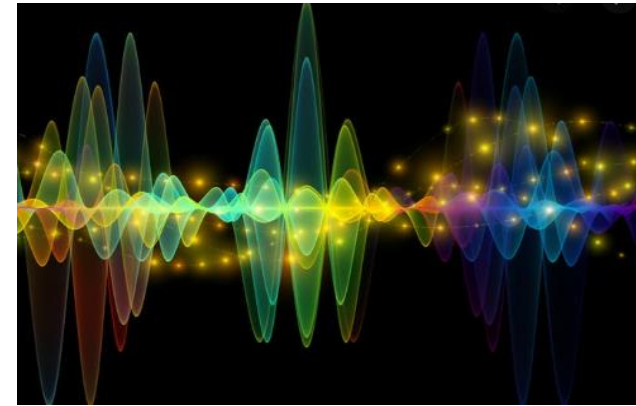


Exploration Time

Click on the link to the right, log into your Discovery Education account, and watch the video on sound.



Vibration and Sound



How did you like the video? If you really liked the video, then give it a thumbs up. You can do this by clicking on the thumbs up emoji and dragging it into the box. If you didn't like the video, then click on the thumbs down emoji and drag it into the box.



Exploration Time

Please read the Science A-Z Sound book below and answer the questions that follow.



 Science a-z

Visit www.sciencea-z.com



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Sound



Written by Robert N. Knight

www.sciencea-z.com

KEY ELEMENTS USED IN THIS BOOK

The Big Idea: Sound is made of waves that move through tiny particles of matter. Sound moves through air and water, and even through most solid things. Sound is one of our primary sources of information about the world around us. It can also provide enjoyment in the form of voices and music. Understanding how sound works can help us appreciate the science behind one of our most important senses.

Key words: cochlea, deaf, decibel, ear, ear canal, eardrum, echo, energy, hear, hearing aid, liquid, nerve, particle, pitch, solid, sonic boom, sound, sound wave, vibrate, vibration, volume

Key comprehension skill: Interpret charts, graphs, and diagrams
Other suitable comprehension skills: Cause and effect; sequence events; main idea and details

Key reading strategy: Ask and answer questions
Other suitable reading strategies: Retell; summarize; visualize; connect to prior knowledge

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Sound

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Reading Levels	
Learning A-Z	N
Lexile	520L
Correlations	
Fountas and Pinnell*	M

*Correlated independent reading level



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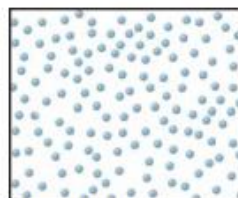
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What Is Sound?

Do you know what sound is?
Do you know how it gets from
one place to another? Do you
know how you
hear sound?
Read this book
to find out.



Jets and rockets make a lot of noise when they take off.



tiny particles of air

This photo of Earth from space shows layers of air above it.

A thin layer of air surrounds Earth. Air is made of tiny **particles**. Sound moves through these particles to get to your ears.

Sound is a kind of **energy**. Like all energy, sound can move things. It can move the particles that make up air. The particles move back and forth and **vibrate** when there is sound. What makes the particles vibrate?

Let's think about a bat and ball. If you hit a ball with a bat, they will vibrate. This makes the air around them vibrate. The vibrations move away from the bat and ball as sound energy.



Air vibrates after a bat hits a ball.

WOWSER!

Sound moves very fast. Sound near the ground can travel at 1,200 kilometers per hour (750 mph). But it moves more slowly high above Earth because there are fewer air particles.



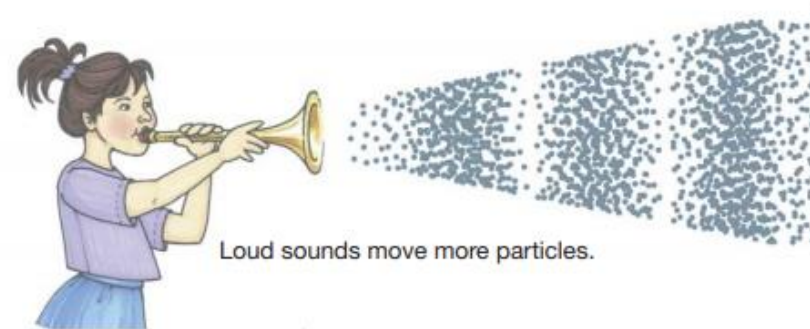
Water waves move over the top of the water. Sound waves move out in every direction.

How Do Waves Travel?

Sound energy moves through air as a **sound wave**. In some ways, it is like a water wave moving across water. But sound waves move in all directions. The sound you hear comes to your ears as sound waves.

A sound wave has two parts. One part has air particles packed closely together. The other part has air particles spread out. One part of the wave always follows the other part in a regular way.

Different kinds of sounds make waves that look different.



Loud sounds move more particles.



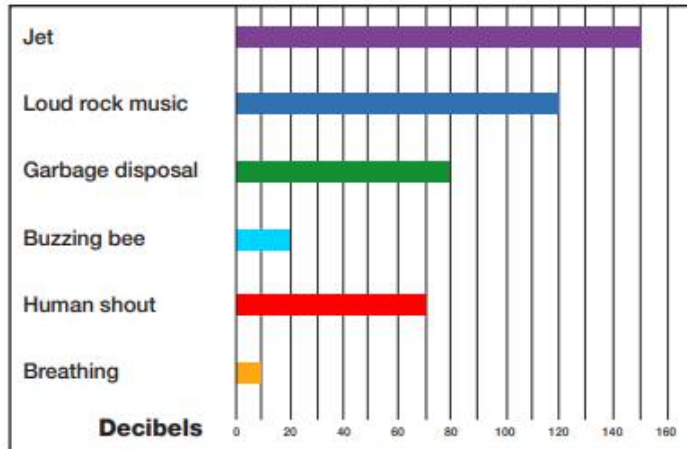
Soft sounds move fewer particles.

How Sounds Are Different

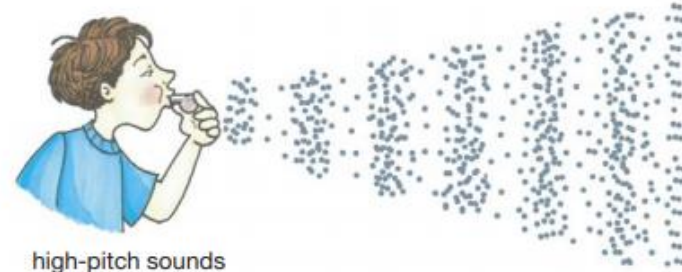
Waves from a loud sound look different than waves from a soft sound.

Loud sounds come from things that move more air. Hitting a drum hard makes it vibrate more, and the air moves more. The sound is louder than if you hit the drum softly. It has more **volume**.

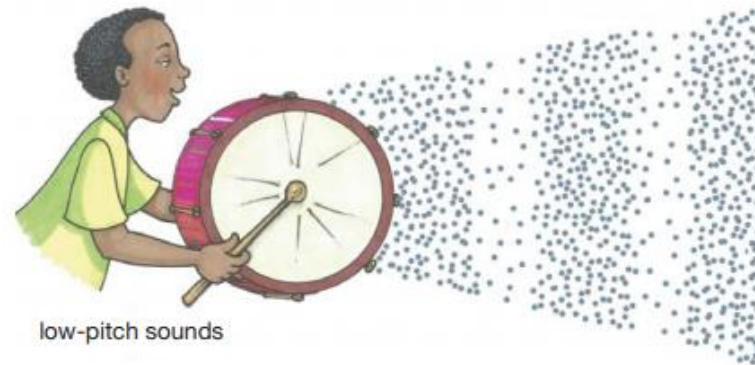
HOW LOUD IS IT?



Sound is not just loud or soft. It can also be high and low. This is called **pitch**. Thunder is loud. The sound it makes has a low pitch. A little bird makes a soft sound. The sound has a high pitch. The pictures show how low and high sound waves are different.



high-pitch sounds

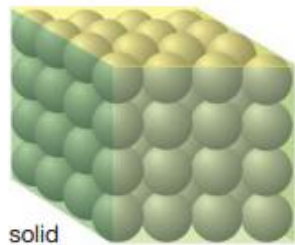


low-pitch sounds

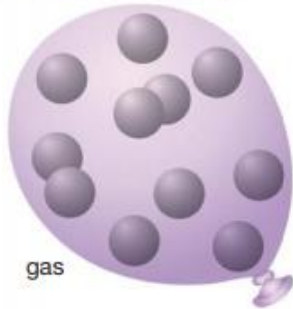
Sound Moves Through Things

You learned that sound waves move through air. They move through solid things such as rocks, too, and liquids such as water.

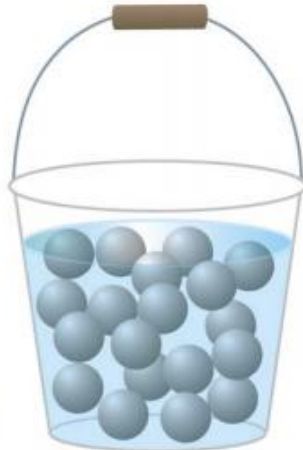
Particles that make up water and rock are closer together. Sound waves move faster through these things than through air.



solid



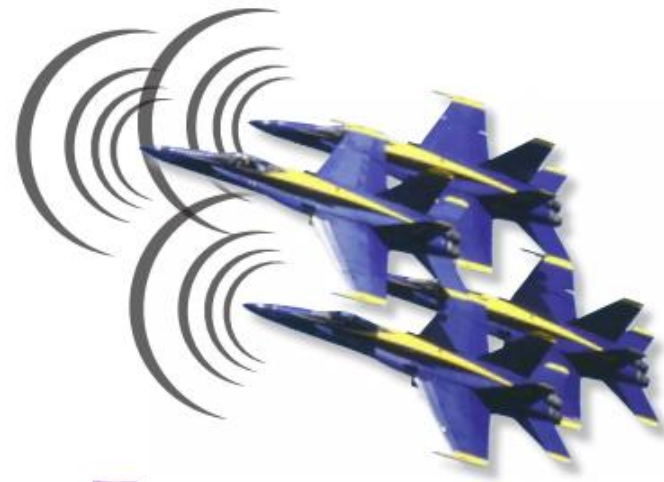
gas



liquid

Do You Know?

Some planes fly faster than sound. Sound waves pile up in front of the plane. You can hear a loud boom when the plane breaks through the sound waves. This is called a **sonic boom**.



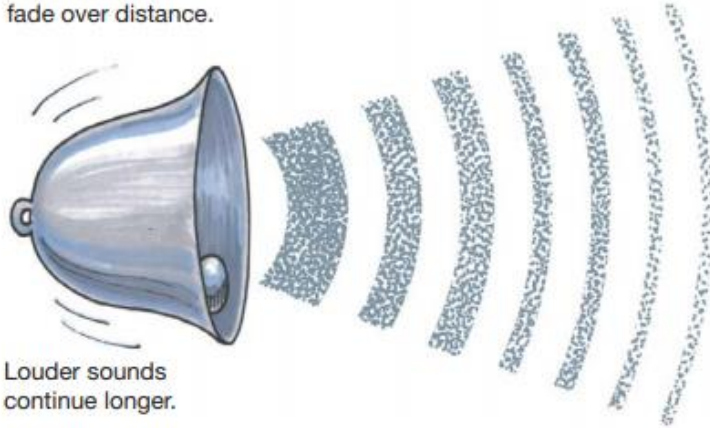
Try This

Listen for sounds.

1. Get paper and a pencil.
2. Turn off things that make sound.
3. Look at the time. Be still and listen for 1 minute.
4. Write down what you hear.
5. Read your list to other kids.



Softer sounds
fade over distance.



Louder sounds
continue longer.

What Happens to Sound Waves?

You cannot hear a small bell ring when you are far away from it.

The sound wave does not have enough energy to reach you.

You can hear a large bell from far away. The big bell has more energy. Its sound waves go farther.

You can hear a sound echo in a big empty room. An **echo** happens when sound waves bounce off hard walls.

Putting soft things in the room will take away the echo. The soft things soak up the sound waves.

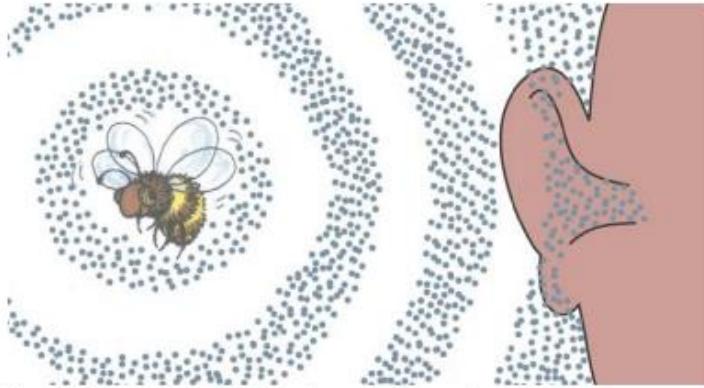


Sound is absorbed by soft things in this room.



Dolphins and bats make clicking sounds. When the sound hits objects, it bounces back. The time it takes tells them how far away the object is.





Your outer ears send sound waves to your inner ears.

How We Hear

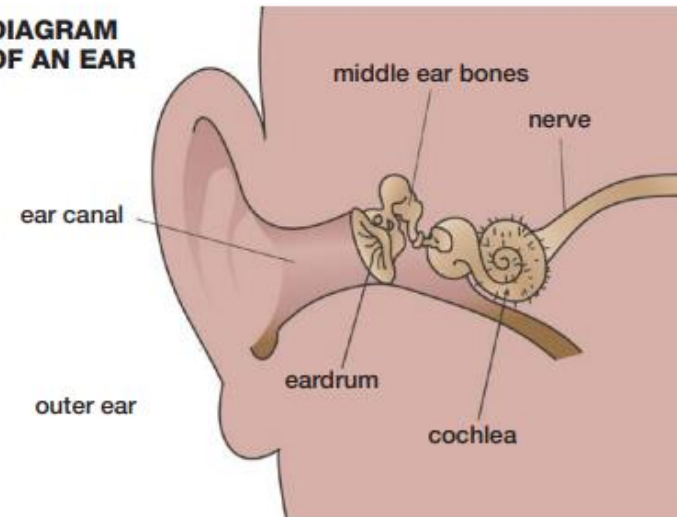
Do you think ears look funny? They are shaped the way they are to help them gather sound. The sound waves move into your ears from the outside.

The sound waves move into your ears through a small tunnel. An **eardrum** is at the end of each tunnel. The eardrum vibrates when sound waves hit it.

Three tiny bones are in back of the eardrum. The eardrum makes the bones vibrate.

Deep inside your ear is a special part filled with liquid. The tiny bones make the liquid vibrate. Thin **nerves** change the liquid vibrations into signals that go to the brain. The nerves carry the signals to the brain.

DIAGRAM
OF AN EAR



Taking Care of Our Ears

A person who cannot hear well or at all is **deaf**. Hearing aids can help some deaf people hear better. Other deaf people use their hands and fingers to talk.

It is important to take care of your ears. Do not put things in your ears. If you hear loud sounds, put something over your ears.



When the alarm rings, your brain says, "Wake up!"

Pretend an alarm clock rings. The sound waves go in your ears and vibrate your eardrums. These vibrations change to a signal that goes to your brain. Your brain figures out that the alarm is ringing. Your brain tells you to get out of bed.



Using sign language to communicate



	Glossary
deaf	able to hear very little or not at all (p. 18)
eardrum	a thin patch of skin in the ear that vibrates when sound waves strike it (p. 15)
echo	when sound bounces off a hard surface (p. 14)
energy	any force that can move things or do work (p. 5)
nerves	thin threads that carry messages between the brain and other parts of the body (p. 16)
particles	tiny portions of matter (p. 5)

pitch	how high or low a sound is (p. 10)
sonic boom	a loud noise made by something traveling faster than sound (p. 12)
sound wave	the movement of sound energy through air, liquid, or solid (p. 7)
vibrate	to move back and forth very quickly (p. 5)
volume	how loud or soft a sound is (p. 9)

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Exploration Time

Please complete the book quiz by reading each question carefully and placing your answers on the table below. Click in the cell on the table and type your answer.



Question	Answer
1	
2	
3	

Name _____ Date _____

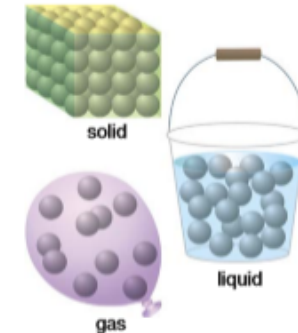
Directions: Read each question and choose the best answer.

1. Sound occurs when particles of air _____.

- Ⓐ vibrate
- Ⓑ heat up
- Ⓒ slow down
- Ⓓ change their shape

2. Which statement about sound waves is correct?

- Ⓐ They move through air, liquids, and solids at the same speed.
- Ⓑ They move faster through liquids than through air.
- Ⓒ They move slower through solids than through air.
- Ⓓ They move faster in air than through solids or liquids.



3. Read this sentence: *He sings in the same pitch I do.* Which sentence uses the same meaning for the word **pitch**?

- Ⓐ She can pitch a ball very fast.
- Ⓑ Pitch in and clean your room.
- Ⓒ Let's pitch the tent.
- Ⓓ Try to hum at a high pitch.



Exploration Time

Please complete the book quiz by reading each question carefully and placing your answers on the table below. Click in the cell on the table and type your answer.

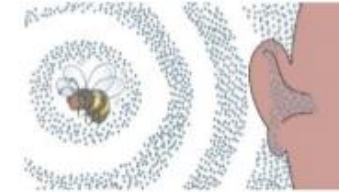


Question	Answer
4	
5	
6	

Name _____ Date _____

4. Which detail is *not* true about sound waves?

- Ⓐ They have parts where particles of air are squeezed together.
- Ⓑ They have parts where particles of air are spread out.
- Ⓒ They move in every direction.
- Ⓓ They only move in one direction.

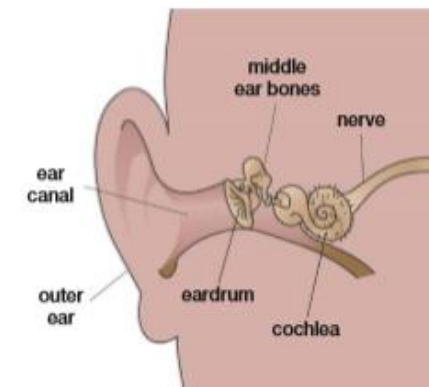


5. Why do sounds get quieter and then die out?

- Ⓐ The sound waves lose their energy.
- Ⓑ The source of the sound moves farther away.
- Ⓒ The sound waves get too big and fall apart.
- Ⓓ The sound waves bounce off objects.

6. Why is the shape of the ear important?

- Ⓐ It gathers sound waves.
- Ⓑ It helps us make sounds.
- Ⓒ It can hold liquid.
- Ⓓ It is the same shape as the brain.



Book Quiz continued on following page

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Exploration Time

Please complete the book quiz by reading each question carefully and placing your answers on the table below. Click in the cell on the table and type your answer.



Question	Answer
7	
8	
9	

Name _____ Date _____

7. Why is sign language important to people who are deaf?

- Ⓐ It is the easiest language to learn.
- Ⓑ It is quieter than normal speech.
- Ⓒ It is a way to talk without using sound.
- Ⓓ It is a fun way for everyone to talk.

8. To describe how loud or quiet a sound is, we can measure its _____.

- Ⓐ echo
- Ⓑ volume
- Ⓒ pitch
- Ⓓ cochlea

9. How can a person prevent hearing damage?

- Ⓐ keep the volume lower on the TV
- Ⓑ wear ear protection
- Ⓒ turn down loud music
- Ⓓ all of the above



Exploration Time

Please complete the book quiz by reading each question carefully and placing your answers on the table below. Click in the cell on the table and type your answer.



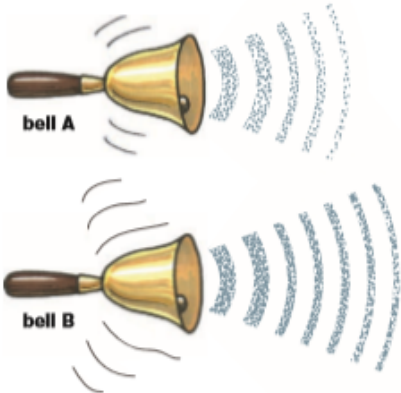
Question	Answer
10	
11	
12	

Name _____ Date _____

Directions: Use the diagrams below to answer questions 10 and 11.

10. Which bell is producing the louder volume?

- (A) bell A
- (B) bell B
- (C) Both bells are producing the same volume.
- (D) Bells do not produce volume.



11. Which statement is true about bell A and bell B?

- (A) Bell A is producing a higher pitch than bell B.
- (B) Bell B is producing a higher pitch than bell A.
- (C) Both bells are producing the same pitch.
- (D) Bells do not produce pitch.

12. Extended Response: Write *three* sentences about a sound you can hear right now.

- Explain what you think made the sound.
- Describe the volume of the sound.
- Describe the pitch of the sound.



So What Have I Learned?

Use the space below to show what you have learned about sound from this lesson.

3

New vocabulary words(type a word in each of the 3 boxes below)

2

Facts

1

Sentence about pitch or volume

Pitch
Volume
Sound
vibrate

