Lesson 3

Sound Travels Through Many Things

A QUICK LOOK

Big Idea

Sound travels through air and other materials. Sound travels through some materials better than others.

Overview

Children establish that sound travels through air. Then they experiment with sound traveling through many different materials. They conduct tests to discover that sound travels through some substances better than others.

Key Notes

- The exploration section of this lesson includes several parts. Plan ahead to allow ample time for children's self-directed exploration during the "Searching the Classroom" activity.
- For more information about the science content of this lesson, see the "Sound Travels" section of the Teacher Background Information.

Lesson 3

Standards and Benchmarks

This lesson supports Science as Inquiry Standard A as the children carry out one of the many "different kinds of investigations" that scientists conduct "depending on the questions they're trying to answer."

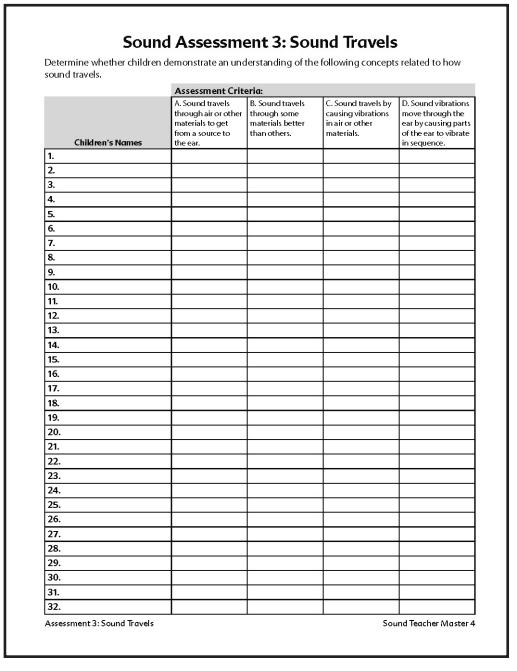
Lesson Goals

1. Recognize that sound travels through air and other materials.
2. Deduce, as a result of experimentation, that sound travels through some materials better than others.

Assessment

During or after the lesson, review pages 5 and 6 in the children's science notebooks to assess how well they were able to identify materials through which sound travels well and those through which it does not, as well as whether they were able to apply this understanding to the "Building a Sound Container" exercise. You can record what you learn about each child's current level of understanding on Assessment 3, which can also be used with the next several lessons.

Notes



Sound Assessment 3: Sound Travels

Determine whether children demonstrate an understanding of the following concepts related to how sound travels.

Children's Names	Assessment Criteria: A. Sound travels through air or other materials to get from a source to the ear.	B. Sound travels through some materials better than others.	C. Sound travels by causing vibrations in air or other materials.	D. Sound vibrations move through the ear by causing parts of the ear to vibrate in sequence.
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Assessment 3: Sound Travels — Sound Teacher Master 4

Teacher Master 4, Assessment 3

Materials

Item	Quantity	Notes
ExploraGear		
Foam pad	1	For pencil experiment.
Plastic lid from ExploraGear storage container	1	For pencil experiment.
Roasting pan	1	For pencil experiment.
Slide whistle (optional)	1	To produce sound during the sensory observation.
Classroom Supplies		
Chart paper or large copy paper	1 sheet	To make enlarged version of *Science Notebook* page 5 to record class results.
Pencils	1 per pair	For pencil experiment.
Pillow or cushion	1	For pencil experiment.
Wood table, desk, or bench	1	For pencil experiment.
Curriculum Items		
***Sound Science Notebook*, pages 5 and 6**		
Sound Assessment 3: Sound Travels (optional)		
Family Link "Bathtub and Swimming Pool Sound Experiments"		

NOTES

Preparation

- ❑ Close doors and windows to make the classroom as quiet as possible.
- ❑ Test some wood structures in your classroom (tables, desks, benches, etc.) with the tapping-pencil experiment and select the one that transmits sound best. Clear off the surface for the introductory discussion.
- ❑ Distribute materials to the following "listening stations":
  - Foam station—A foam pad and several pencils
  - Pan station—A disposable roasting pan and several pencils
  - Lid station—A plastic lid and several pencils
  - Pillow station—A pillow or cushion and several pencils
- ❑ Make a copy of the **Family Link "Bathtub and Swimming Pool Sound Experiments"** for each child.
- ❑ Prepare an enlarged version of science notebook page 5, either on a photocopy machine or by copying the prompts onto chart paper. This will be used during the synthesizing discussion and, later, in the **Science Center**.

Vocabulary

travel. . . . . To pass or move from one place to another.

Teaching the Lesson

Engage

Sensory Observation

1. Stand in front of the children and ask in your regular speaking voice whether they can hear you. Or, blow the slide whistle and ask whether they can hear it.

MANAGEMENT NOTE: Have children use "thumbs up" (meaning yes) or "thumbs down" (meaning no) signals to indicate whether they heard you.

2. Ask children to consider the following questions:
   - What was the source of the sound? *(Voice or slide whistle)*
   - Did the sound stay at the source? *(No)*
   - Did the source move? *(No)*
   - Did the source have to carry or bring the sound to you so you could hear it? *(No)*
3. Use the children's responses to establish that sound can travel from one place (its source) to another (someone who hears the sound).
4. Ask children what they think sound traveled *through* to get from you to them. *(Air)*
5. Discuss whether children think sound can travel through other materials, besides air. In the course of discussion:
   - Encourage children to articulate reasons for their responses.
   - Invite children to suggest ways they might test their ideas, as well as specific materials they would like to test.

TEACHER NOTE: Write down ideas and questions that emerge (as well as possible materials to test) and encourage children to pursue them, either as part of the exploration, if appropriate, or later in the Science Center or at home.

NOTES

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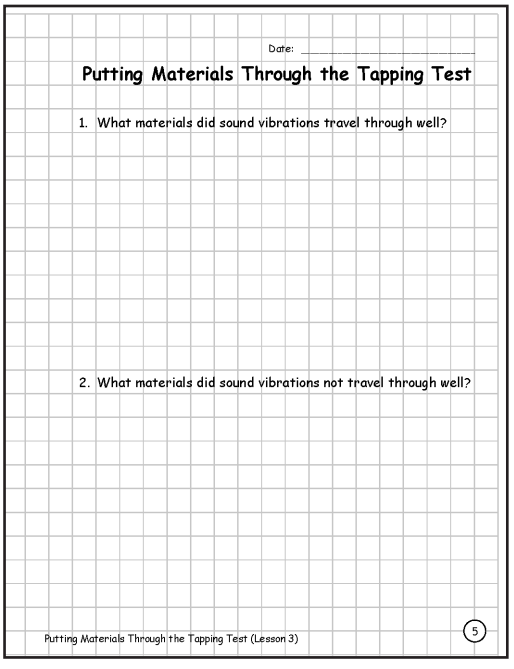
Explore

Modeling an Exploration

1. Gather the class around the wood table (or other structure) that you selected in advance and ask for silence.
2. Lightly tap a pencil on the surface of the wood and ask the class to report what they heard.
3. Ask them what the sound produced by the pencil traveled through to reach their ears. *(The sound traveled through the air.)*
4. Select several volunteers to place one ear flush on the surface of the wood and cover their other ear with their hand.
5. Again, lightly tap the pencil on the table or desk.
   a. Have the volunteers report what they heard. *(The children should clearly hear the sound of the pencil hitting the surface of the wood.)*
   b. Ask the class what the sound traveled through to reach the volunteers' ears this time. *(Wood)*
   c. Ask the volunteers to compare the sound of the pencil through the desk and through the air and share their observations with the class. *(The sound of the pencil hitting the wood should be much louder through the desk than through the air alone.)*

Management Note: If possible, repeat this step with other volunteers to give more children a chance to experience the results firsthand. It would be ideal to quickly give all children a turn to hear the difference before they return to their seats.

6. Based on the trial, ask the class whether they think sound can travel through wood and, if so, why or why not. *(The children are likely to respond that sound travels well through wood since they could hear the pencil better through the desk than through air alone.)*
7. Direct the children's attention to page 5 of their science notebooks. Review the two prompts with the class and have the children record "wood" in the space under prompt #1.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Putting Materials Through the Tapping Test

1. What materials did sound vibrations travel through well?

2. What materials did sound vibrations not travel through well?

Putting Materials Through the Tapping Test (Lesson 3) 5

***Science Notebook* page 5**

Testing Materials at Listening Stations

1. Divide the class into four groups and point out the listening stations to the children.
2. Explain that the groups will rotate through the stations, and at each station, they should do the following:
   - Conduct the same tapping-pencil experiment to see whether sound vibrations travel well through the material at the station.
   - Record their findings for the station on page 5 of their science notebooks.

MANAGEMENT NOTE: If time is limited, the groups can visit fewer stations. Each child should visit at least two stations to develop a sense of the differences between how various materials transmit sound vibrations.

Searching the Classroom

TEACHER NOTE: Make sure you reserve enough time for the class to do this exploration. Experimenting in a self-directed fashion and making their own connections helps children develop their inquiry skills and synthesize what they've learned.

1. Direct the children to work in pairs and continue their investigation of sound transmission through various materials. Give each pair a pencil and challenge them to search the classroom and find and record:
   - At least one additional item through which sound travels well
   - At least one additional item through which sound does not travel well

TEACHER NOTE: Remind children of any materials they suggested testing during the sensory observation at the beginning of the lesson.

2. Allow five to ten minutes for children to tap and listen through various items and materials in the classroom.
3. Remind children to record their findings on page 5 in their science notebooks.

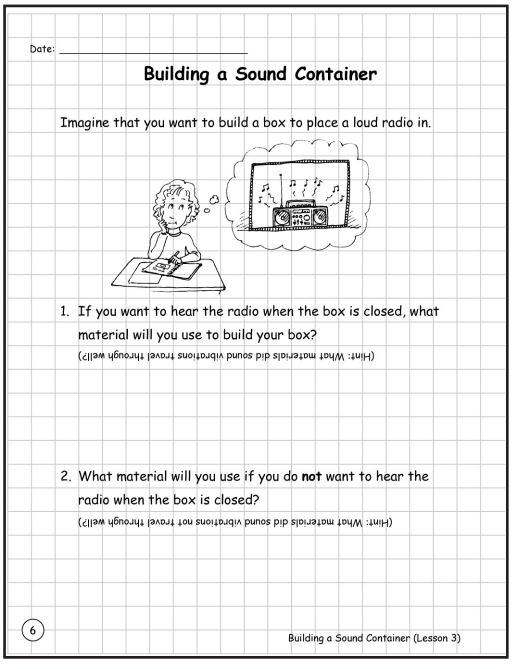
NOTES

Notes

This discussion offers several opportunities to revisit the "I Wonder" circle as children share their discoveries, think about why they might have gotten these results, and are encouraged to continue to wonder, try, observe, and record in the coming days.

assessment opportunity

Children's entries in their science notebooks will provide information about their understanding of this lesson's Big Idea.



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Building a Sound Container

Imagine that you want to build a box to place a loud radio in.

1. If you want to hear the radio when the box is closed, what material will you use to build your box?
(Hint: What materials did sound vibrations travel through well?)

2. What material will you use if you do **not** want to hear the radio when the box is closed?
(Hint: What materials did sound vibrations not travel through well?)

6 Building a Sound Container (Lesson 3)

***Science Notebook* page 6**

Reflect and Discuss

Synthesizing

1. Gather the class together and have the groups share and compare their findings. Compile the class results on an enlarged version of science notebook page 5. Post this sheet in the Science Center after the lesson.
2. With the children, make a plan to retest any materials they disagree about, either during the meeting or afterwards. Also encourage children to test other materials they are curious about and add them to the record sheet in the Science Center.

Teacher Note: Point out that sharing and comparing findings and doing further experimentation to resolve disagreements or answer new questions are important aspects of scientific work.

3. Invite children to share any ideas they have about why sound travels through some things better than others. Leave this discussion open-ended, without attempting to offer any technical explanations. Remind the class that unanswered questions inspire scientists to conduct new investigations.

Teacher Note: Note any ideas from this discussion that you might want to revisit during the next lesson, which introduces how sound travels.

4. Either now or later, have the children use what they've learned to complete page 6 of their science notebooks, which is about building a "sound container."

Ongoing Learning

Science Center

Post the enlarged version of science notebook page 5 that you used in the synthesizing discussion. Challenge the children to continue to test materials that interest them and add their findings to the chart. Have your class generate a list of additional materials and structures they can test in their homes or on the playground, such as countertops, rugs, curtains, patios, sidewalks, park benches, slides, monkey bars, or the grass.

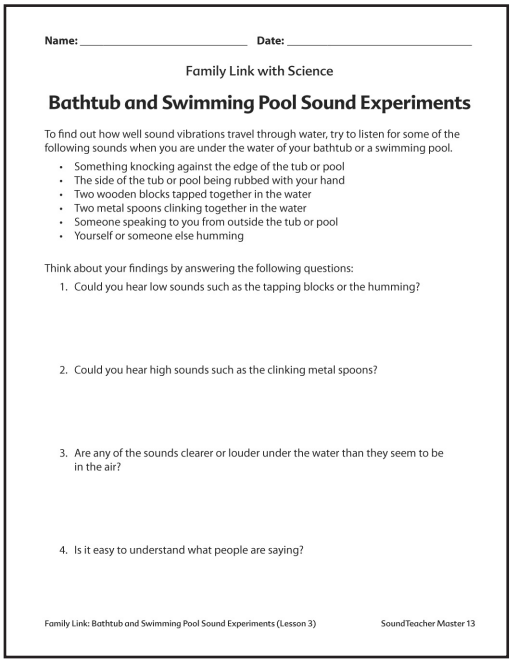
Family Link

Discuss the Family Link "Bathtub and Swimming Pool Sound Experiments" before sending it home. Tell the children they will use their ears to test sounds in the water while they are in a bathtub or swimming pool. Remind them to think about the following things while they're in the water:

- Can they hear low sounds, such as a low voice or hands drumming on the floor?
- Can they hear high sounds, such as whistling?
- Are any of the sounds clearer or louder when heard through the water than they seem to be in the air?
- Is it easy to understand what people are saying under water?

Notes

Materials: Enlarged version of science notebook page 5, pencils



Name: _____ Date: _____

Family Link with Science

Bathtub and Swimming Pool Sound Experiments

To find out how well sound vibrations travel through water, try to listen for some of the following sounds when you are under the water of your bathtub or a swimming pool.

- Something knocking against the edge of the tub or pool
- The side of the tub or pool being rubbed with your hand
- Two wooden blocks tapped together in the water
- Two metal spoons clinking together in the water
- Someone speaking to you from outside the tub or pool
- Yourself or someone else humming

Think about your findings by answering the following questions:

1. Could you hear low sounds such as the tapping blocks or the humming?

2. Could you hear high sounds such as the clinking metal spoons?

3. Are any of the sounds clearer or louder under the water than they seem to be in the air?

4. Is it easy to understand what people are saying?

Family Link: Bathtub and Swimming Pool Sound Experiments (Lesson 3) SoundTeacher Master 13

Teacher Master 13, Family Link

NOTES

Extending the Lesson

Further Science Explorations

Making Soundproof Boxes

Have the children use their knowledge that sound vibrations travel through some materials better than others to construct soundproof boxes. Supply an assortment of potential soundproofing materials (such as wood blocks, aluminum foil, plastic wrap, foam sheets or peanuts, bubble wrap, and fabric), a collection of cardboard shoe boxes, and adhesives (glue or tape), as well as an assortment of noisemakers (dried beans, small bells, marbles, etc.). Challenge the children to make a shoe box that is soundproof by lining its interior or covering it with a material that prevents sound vibrations from passing through. Remind them to place a noisemaker in the box before covering it so they can test whether their soundproofing worked.

Sound Travels in All Directions

Conduct the following variation on the sensory observation to help children grasp the concept that sound travels in all directions.

1. Ask children whether they think sound travels in all directions. Encourage them to explain their thinking.
2. Stand in front of the children and ask them in your regular speaking voice whether they can hear you. Or, blow the slide whistle and ask whether they can hear it.

MANAGEMENT NOTE: Have children use "thumbs up" (meaning yes) or "thumbs down" (meaning no) signals to indicate whether they heard you.

3. Repeat step 2 several times, but vary your position relative to the children.
   - Stand at the back or side of the room.
   - Have some children sit while others stand.
   - Have children form a circle, with you in the center. Talk and rotate while you are in the center.
   - While in the circle, have some children step forward and others step back.
4. Ask the children whether they could hear you when you or they were in different places. Verify that each of them could hear you, even if they were in different locations relative to you.

5. Use the children's responses to establish that sound can travel in many directions simultaneously.
6. You might want to revisit or conduct the Further Science Exploration "Seeing Vibrations In Water" from Lesson 2 and point out that the ripples from the vibration move outward in all directions.

"I Thought I Heard a Puddy Cat" (Game)

Play a fun indoor game that reinforces the concept that sound travels and emphasizes listening to the direction a noise is coming from.

1. Choose one child to be a "listener"; choose another child to be a cat. Have the rest of the children pick different animal noises to make. (You might call the listener a mouse or a bird.)
2. When you signal, have the children wander around the room making their animal noises. The sounds can be low, high, soft, or loud, and the children can move anywhere around the room as long as they are within earshot of the listener.
3. At a second signal, have the children stop in their positions.
4. Tell the listener to try to point out the "cat." If he or she can name the cat within three tries, the cat becomes the listener. If not, the listener keeps the role for another round.
5. After a few rounds of the game, have the children share what they've noticed. Try to elicit the observations that it's possible to:
    - Hear many sounds at the same time.
    - Tell which direction sounds are coming from.
    - Pick a certain noise out of a roomful of noises.


NOTES

Science Notebook page 5

Date: _____

Putting Materials Through the Tapping Test

1. What materials did sound vibrations travel through well?

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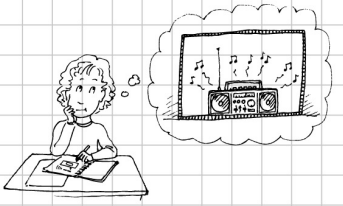
Science Notebook page 6

Date: _____

Building a Sound Container

Imagine that you want to build a box to place a loud radio in.



1. If you want to hear the radio when the box is closed, what material will you use to build your box?
(Hint: What materials did sound vibrations travel through well?)

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Teacher Master 4, Assessment 3

Sound Assessment 3: Sound Travels

Determine whether children demonstrate an understanding of the following concepts related to how sound travels.

	Assessment Criteria:			
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Teacher Master 13, Family Link

Name: _____ **Date:** _____

Family Link with Science

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4. Is it easy to understand what people are saying?