Sound
Lesson 4b: Sound Moves through Air

Grade 1	**Length of lesson:** 35 minutes	**Placement of lesson in unit:** 4b of 7 lessons on sound
Unit central question: Why do we hear sound?		**Lesson focus questions:** How does sound move from a soundmaker to our ears? What is our evidence?
Main learning goal: When something vibrates, it makes the air around it vibrate.		
Science content storyline: For us to hear sound, it must move from a vibrating object to our ears. All soundmakers vibrate and cause the air around them to vibrate. When these vibrations move through the air and reach our ears, we hear sound.		
Ideal student response to the focus questions: Soundmakers vibrate when they make a sound. This makes the air all around them vibrate too. When these vibrations move through the air to my ears, I can hear sound.		

Preparation

Materials Needed
- Science notebooks
- Chart paper and markers
- Tuning fork (from lesson 2b)
- Extra-long Slinky (from lesson 3)
- Computer (for showing video clip)

Student Handouts
- 3.1 Sound on the Move (from lesson 3)

Ahead of Time
- Review the Sound Content Background Document.
- Prepare to play a 25-second YouTube video *(What Is Sound?)* showing what happens to the air when a tuning fork is vibrating. Link to the video at https://www.youtube.com/watch?v=27a26e2CnuM.
- **ELL support:** Meet with ELL students in advance and introduce them to the lesson content, structure, materials, and activities so they know what's expected of them and can participate more fully in the lesson. Review the concept that air, though invisible, is all around us and plays an important role in our ability to hear sound. Also review what a model is. Students can build on the informal models used in lessons 1 and 2 or the more formal Slinky model used in lesson 3. Introduce the video and the dot model used in this lesson and give students time to explore it. Be explicit about what each part of the model represents and how the parts relate to how sound moves from a soundmaker to our ears. Also review key vocabulary terms, including *model*, *evidence*, *tuning fork*, and *vibrate/vibrations*.

Lesson 4b General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
5 min	**Link to previous lesson:** The teacher engages students in reviewing what they learned in the previous lesson about how sound moves from a soundmaker to their ears and how air is involved.	• For us to hear sound, it must move from a vibrating object to our ears. • When soundmakers vibrate, the vibrations move through the air to our ears, and we hear sound.
2 min	**Lesson focus questions:** The teacher reviews the focus questions from the previous lesson: *How does sound move from a soundmaker to our ears? What is our evidence?* Then the teacher highlights key science ideas about how sound moves from a tuning fork to their ears.	
8 min	**Setup for activity:** Students revisit the idea that air carries vibrations from a soundmaker to their ears even though they can't see it. Then the teacher announces that in today's activity, students will consider another model to help them understand how sound moves from a tuning fork to their ears.	• For us to hear sound, it must move from a vibrating object to our ears. • When soundmakers vibrate, the vibrations move through the air to our ears, and we hear sound.
5 min	**Activity:** Students watch and discuss a video in which scientists use a dot model to show how sound moves through the air from a soundmaker to the ear.	• Vibrating objects cause the air around them to vibrate. When these vibrations move through the air to our ears, we hear sound.
6 min	**Follow-up to activity:** Students answer the focus questions by using what they learned from the video to explain how sound moves from a soundmaker to their ears through the air.	
8 min	**Synthesize/summarize today's lesson:** The teacher engages students in reviewing what happens when sound moves from a tuning fork to their ears. Then students revise their drawings from the previous lesson based on what they learned from the dot model.	• In science, our ideas change as we learn more.
1 min	**Link to next lesson:** The teacher summarizes key science ideas from the lesson and announces that in the next lesson, students will investigate where sound goes and whether it moves in different directions.	

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5 min	**Link to Previous Lesson** **Synopsis:** The teacher engages students in reviewing what they learned in the previous lesson about how sound moves from a soundmaker to their ears and how air is involved. **Main science idea(s):** • For us to hear sound, it must move from a vibrating object to our ears. • When soundmakers vibrate, the vibrations move through the air to our ears, and we hear sound.	Ask questions to elicit student ideas and predictions. Ask questions to probe student ideas and predictions. Ask questions to challenge student thinking.	**Show slides 1 and 2.** **NOTE TO TEACHER:** *Begin the lesson by striking a tuning fork on the bottom of your shoe or on the palm of your hand. Then engage students in telling a sound story.* Let's review what happens when I strike this tuning fork. What is the tuning fork doing? Who can tell us how the sound moves from the tuning fork to our ears? **Show slide 3.** In our last lesson, we talked about what is in the space between the tuning fork and our ears. What did we discover? What is in that space? How did we find out that air was in that space?	It's making a sound. It's vibrating. The tuning fork is moving back and forth really fast. When the tuning fork vibrates, the vibrations move across the room to our ears, and we hear sound. Air. We collected some in air in plastic bags.	How is it making a sound? What do you mean by "vibrating"?

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			Right! We collected air in the plastic bags. Where did we find air in our room?	Some air was by the door. We could see the bag puff up. We could feel the air in the bag. Yes. We found more air by the windows. We found some up by the ceiling, too. Because the bag was puffy and looked full. The bag was hard when we pushed on it.	How did we know that air was in the bag? Did we find air anywhere else? How did we know that air was in the bag?
			After we collected the air in our four bags, what did we decide about air in the room? If air is everywhere in the room, do you think there's air between the tuning fork and our	We decided that air was everywhere in the room.	

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			ears?	Yes. I don't know.	Why do you think that?
2 min	**Lesson Focus Questions** **Synopsis:** The teacher reviews the focus questions from the previous lesson: *How does sound move from a soundmaker to our ears? What is our evidence?* Then the teacher highlights key science ideas about how sound moves from a tuning fork to their ears.	Set the purpose with a <u>focus question</u> or goal statement. Highlight key science ideas and focus question throughout.	**Show slide 4.** Today we'll think some more about our focus questions from last time: *How does sound move from a soundmaker to our ears? What is our evidence?* **ELL support:** During the lesson preview, review ELL students' ideas about sound from lesson 4a. Add conceptual building blocks to this foundation so that students can move toward more-scientific understandings of the content. Earlier in this unit, we learned that when a soundmaker vibrates, it can make things around it vibrate. **NOTE TO TEACHER:** *If you conducted the optional extension activity with the clucker cup and the rice in lesson 2, you may want to remind students that the clucker made the rice vibrate.* We also learned from our Slinky model that vibrations move from a soundmaker to our ears. And in our last lesson, we learned that air is in the space between the tuning fork and our ears, and it carries vibrations from the tuning fork to our ears. Today we'll gather more evidence to help us		

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			understand how sound moves from a tuning fork to our ears.		
8 min	**Setup for Activity** **Synopsis:** Students revisit the idea that air carries vibrations from a soundmaker to their ears even though they can't see it. Then the teacher announces that in today's activity, students will consider another model to help them understand how sound moves from a tuning fork to their ears. **Main science idea(s):** • For us to hear sound, it must move from a vibrating object to our ears. • When soundmakers vibrate, the vibrations move through the air to our ears, and we hear sound.	Ask questions to elicit student ideas and predictions. Engage students in analyzing and interpreting data and observations.	So we know that air is in the space between a soundmaker and our ears, and vibrations travel through the air from the soundmaker to our ears. We also know that vibrating objects made other things vibrate. **Show slide 5.** Do you think that the air between a tuning fork and our ears vibrates when the tuning fork makes a sound? Why or why not? **Turn and Talk (3 min):** Talk about these questions with an elbow partner. What do you know about sound and vibrations from our investigations that could help you figure out the answer? **Whole-class share-out:** Who would like to share your ideas? Do you think the air between a tuning fork and our ears vibrates when the tuning fork makes a sound? Why or why not?	We don't think the air is vibrating, because we would feel it if it was.	So you think that if you can't feel the air vibrating, maybe it's not happening? Any other ideas?

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				We think the air is everywhere, so maybe the tuning fork could make it vibrate. Well, the air is the only thing between the tuning fork and our ears, so we thought maybe it could vibrate like the Slinky.	What makes you think so?
		Make explicit links between science ideas and activities **before** the activity.	**Show slide 6.** Remember when we used the Slinky model to show how vibrations move from the tuning fork to our ears? **NOTE TO TEACHER:** *Hold up the Slinky and review what the parts of the model represented in lesson 3.* Today we'll learn about another model that will help us understand how sounds move from a soundmaker to our ears.		
5 min	**Activity** **Synopsis:** Students watch and discuss a video in which scientists use a dot model to show how sound moves through the air	Select content representations and models matched to the learning goal and	**Show slide 7.** Scientists make different kinds of models to show what they think is happening and then use them to test their ideas. Because we can't see air, some scientists		

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	from a soundmaker to the ear. **Main science idea(s):** • Vibrating objects cause the air around them to vibrate. When these vibrations move through the air to our ears, we hear sound.	engage students in their use. Make explicit links between science ideas and activities **during** the activity.	created a model to find out whether air vibrates when a soundmaker makes a sound. Let's watch a short video clip that shows what they discovered. In this video, dots are used to represent air so we can see what actually happens when sound vibrations move through the air. **NOTE TO TEACHER:** *Show the video clip of sound moving from a tuning fork to an ear. You can link to the clip at https://www.youtube.com/watch?v=27a26e2CnuM.* *During the video, you may want to turn the sound off and highlight the following key ideas:* • *The soundmaker vibrates; then the air vibrates.* • *Vibrations move through the air to the ear.* • *The vibrations hit the eardrum.* • *The eardrum sends a message to the brain, and we hear sound.* **Show slide 8.** Now that we've watched the video, what do you think?		
		Engage students in analyzing and interpreting data and observations.	When the tuning fork vibrates and makes a sound, can it make the air vibrate too?	Yes. Because there is air between the tuning	Why do you think that?

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			Do you think the vibrations travel through the air? Do you think the vibrations can reach our ears so we hear sound? That sounds like an idea we could think about and test in another lesson.	fork and our ears. Yes, because the air is all around us. If the vibrations keep going that far, we could hear sound. If the tuning fork was really far away, maybe the vibrations wouldn't get to our ears.	What do you mean by "going that far?"
6 min	**Follow-Up to Activity** **Synopsis:** Students answer the focus questions by using what they learned from the video to explain how sound moves from a soundmaker to their ears through the air. **Main science idea(s):** • Vibrating objects cause the air around them to vibrate. When these vibrations move through the air to our ears, we hear sound.	Highlight key science ideas and focus question throughout. Engage students in constructing explanations and arguments.	**Show slide 9.** Let's use what we've learned about air today to answer our focus questions, *How does sound get from a sound maker to my ear? What evidence do we have?* **Turn and Talk:** Share your ideas with an elbow partner and then write them in your science notebooks. Try to use the words *vibrate* and *vibrations* in your explanations. And be prepared to share your ideas with the class. **NOTE TO TEACHER:** *As pairs work together on their answers, listen to students' explanations and encourage them to use the word* vibrate *or* vibration*s. You should hear*		

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			students saying something like this: "Soundmakers make the air vibrate, and the vibrations move through the air like waves to our ears." **Whole-class share-out:** Who would like to share your ideas for answering our focus questions? What did you learn from today's video clip?	Sound can move through the air. Vibrations move through the air to our ears. They push on the air and make it vibrate. The air vibrates across the room to our ears. *[Misconception]* The air vibrates, and the vibrations move like ocean waves from the soundmaker to our eardrums.	Can you use the word *vibrations* in your answer? Do you know now how that happens? How do the vibrations move? What does the air do?
8 min	**Synthesize/Summarize**		**Show slide 10.**		

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	Today's Lesson **Synopsis:** The teacher engages students in reviewing what happens when sound moves from a tuning fork to their ears. Then students revise their drawings from the previous lesson based on what they learned from the dot model. **Main science idea(s):** • In science, our ideas change as we learn more.	Select content representations and models matched to the learning goal and engage students in their use.	Now let's revisit our drawings from last time that show how sound moves from a tuning fork to our ears. Think about how we might change them to show what we learned today. **NOTE TO TEACHER:** *On a document reader, project handout 3.1 (Sound on the Move) from lesson 4a and ask students to locate their own drawings. Revise the class drawing based on students' responses. If you also created a class drawing on chart paper, you may want to revise this drawing as well.* What happens at the tuning fork? How does it make sound? **NOTE TO TEACHER:** *Point to the tuning fork on the handout.* How did we show the tuning fork vibrating on the handout last time? What happens in this space between the tuning fork and the ear? **NOTE TO TEACHER:** *Point to the space between the tuning fork and the ear on the handout.* How did we show the air vibrating last time?	It vibrates. The tuning fork vibrates. We put little lines around the tuning fork. The tuning fork makes vibrations that move through the air. The air vibrates. We drew wavy *[or squiggly]* lines from the tuning	What do you mean by "it"? What does the air do?

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				fork to the ear.	
			What else could we draw to show the air vibrating?	We could use dots like in the video.	
			NOTE TO TEACHER: *On your copy of the handout, draw dots in the space between the tuning fork and the ear to represent vibrations.*		
			Then what happens here?	The vibrations go through the air to the ear.	What happens when the vibrations reach our ears?
			NOTE TO TEACHER: *Point to the ear on the handout.*		
				We hear sound.	
			Last time, you revised your drawings to show how sound vibrations move through the air from the tuning fork to our ears. After watching the video today and seeing the dot model, we know even more about what happens, don't we?		
			NOTE TO TEACHER: *Students' revised drawings from the previous lesson should show vibrations moving through the air from the tuning fork to the ear. Students may have drawn the vibrations as wavy or squiggly lines.*		
			Remember, just like scientists, we can change or add to our ideas when we learn more about something we're investigating. That doesn't always mean our original ideas were wrong. It just means that we have more information and evidence.		

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			Show slide 11. Based on what we learned from the video clip, I'd like you to change or add to your drawings from our last lesson. What is missing from your drawings? What could we add or change to make them better so they answer our focus questions more accurately? OK, take a few minutes to make any changes to your drawings that you think will make them better or more accurate. Be prepared to share your drawings and how you think sound moves from the tuning fork to your ears. **NOTE TO TEACHER:** *Give students 2–3 minutes to revise their drawings. Have them use a pencil to make their changes. Students should add something about air and show it vibrating. One way to do this is to write the*	I don't have air in my picture. I could add the word *air*. I could add dots to show air. I could put little curved lines in the air to show it's vibrating.	How would you show air in your drawing? How could you show the air vibrating?

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			word air *in the space between the tuning fork and the ear. They could also draw dots to represent the air and make wavy lines around the dots. Encourage students to label their pictures if they draw dots.* **Individual work time.** **Whole-class share-out:** How did you change your drawings to show what you learned today? Who would like to share? **NOTE TO TEACHER:** *During this share-out, you may want to display students' drawings on a document reader as students explain them. Use this opportunity to assess students' understandings of the science content so you can build on key ideas or modify your approach in upcoming lessons.* What other changes did you make to your drawings? What did you learn today that helped you make these changes to your drawings?	I added curvy lines to show the tuning fork vibrating. I added air to my picture. I put curved lines around the word *air* to show it was vibrating. I drew dots to show air, like in the video.	How did you show air vibrating in your picture?

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1 min	**Link to Next Lesson** **Synopsis:** The teacher summarizes key science ideas from the lesson and announces that in the next lesson, students will investigate where sound goes and whether it moves in different directions.	Summarize key science ideas. Link science ideas to other science ideas.	**Show slide 12.** So far in this unit, we've learned that all soundmakers vibrate. These vibrations move through the air, and when they reach our ears, we hear sound. Today we learned how the air carries sound from one place to another. The video clip we watched showed us how vibrations from an object make the air molecules around it push into each other. These collisions cause the air to vibrate, and the vibrations travel through the air in waves to our ears. Then our eardrums send a message to our brains, and we hear sound. Isn't that cool? **Show slide 13.** Next time, we'll find out more about where sound goes. Do you think it only goes straight to our ears, or does it move in different directions?		