Sound
Lesson 2b: More Soundmakers: Do They Vibrate?

Grade 1	**Length of lesson:** 42 minutes	**Placement of lesson in unit:** 2b of 7 lessons on sound
Unit central question: Why do we hear sound?		**Lesson focus questions:** Do soundmakers always vibrate? What is our evidence?
Main learning goal: To produce sound, objects must move back and forth quickly (vibrate).		
Science content storyline: All objects produce sounds by vibrating or moving back and forth quickly. Sometimes we can see these vibrations, and sometimes we can't. Even if we can't see an object vibrating, we may be able to feel the vibrations or see other objects move when a vibrating soundmaker touches them.		
Ideal student response to the focus questions: If something makes a sound, it must be vibrating. Even if we can't see the vibrations, we might be able to feel them or see other objects move when a vibrating soundmaker touches them.		

Preparation

Materials Needed
- Science notebooks
- Chart paper and markers
- Tuning fork (1 per pair)
- **Optional extension activity:**
  - Small cup of uncooked grains of rice
  - Small cup of water
  - Paper towels

Student Handouts
- 2.1 More Soundmakers: Do They Vibrate? (from lesson 2a)
- 2.2 Another Soundmaker: Does It Vibrate? (1 per student)

Ahead of Time
- Review the Sound Content Background Document.
- **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. Give students time to experiment with the tuning fork so they understand how it works and what they're expected to do with it. Also orient students to the data table they'll be using. Introduce the word *tuning fork* and review the words *predict/prediction* and *hum*.

Lesson 2b General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
5 min	**Link to previous lesson:** The teacher engages students in reviewing the evidence they gathered in the previous lesson that helped them determine whether different soundmakers vibrated when they made sounds.	• Sometimes we can see a soundmaker vibrate, and sometimes we can't. Even if we can't see the vibrations, we can gather additional evidence that will help us determine whether a soundmaker is vibrating when it makes a sound.
2 min	**Lesson focus questions:** Students consider whether they can always feel objects vibrate when they make sounds, even if they can't see the vibrations. Then the teacher reviews the focus questions from the previous lesson: *Do soundmakers always vibrate? What is our evidence?*	
6 min	**Setup for activity:** The teacher introduces a new soundmaker, and students consider the kind of evidence they could collect to help them determine whether the soundmaker is vibrating. Then they predict whether the soundmaker will vibrate when it makes a sound.	
15 min	**Activity:** Working in pairs, students test their predictions by gathering evidence to help them determine whether the tuning fork vibrates when it makes a sound. Then students record their evidence on their data tables.	• We can collect evidence that helps us know whether a soundmaker is vibrating, even if we can't see the vibrations. For example, we may be able to feel the object vibrating or see other objects move or vibrate when the soundmaker touches them.
6 min	**Follow-up to activity:** Students share the evidence they collected to help them determine whether the tuning fork vibrated when it made a sound.	• If an object produces a sound, it must be vibrating. • We can gather evidence that tells us whether a soundmaker is vibrating, even if we can't see the vibrations. For example, we may be able to feel an object vibrate or see other objects move or vibrate when the soundmaker touches them.
6 min	**Synthesize/summarize today's lesson:** The teacher engages students in summarizing key ideas and evidence from all of their investigations so far.	
2 min	**Link to next lesson:** The teacher reviews the unit central question, and students share their ideas for answering it based on what they've learned so far. Then the teacher announces that in the next lesson, students will investigate how sounds move from a vibrating object to their ears.	

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
5 min	**Link to Previous Lesson** **Synopsis:** The teacher engages students in reviewing the evidence they gathered in the previous lesson that helped them determine whether different soundmakers vibrated when they made sounds. **Main science idea(s):** • Sometimes we can see a soundmaker vibrate, and sometimes we can't. Even if we can't see the vibrations, we can gather additional evidence that will help us determine whether a soundmaker is vibrating when it makes a sound.	Ask questions to probe student ideas and predictions.	**Show slides 1 and 2.** Last time, we investigated two different soundmakers—a clucker and you! How did you know the clucker vibrated when it made a sound? What evidence did you find? **NOTE TO TEACHER:** *Have students locate their data tables from the previous lesson (handout 2.1, More Soundmakers: Do They Vibrate?) and look at the evidence they recorded.* **Turn and Talk:** Look at the evidence you recorded on your data tables last time. Then turn to your elbow partner and share one piece of evidence that the clucker vibrated when it made a sound. Be prepared to share your evidence with the class. **ELL support:** During the lesson preview, let ELL students know you'll be asking them to share their ideas with the class (if time allows). Give them an opportunity to practice answering the Turn and Talk question. Then make sure to ask them to share their ideas during the actual lesson. Let students know it's OK to repeat someone else's ideas. This is good practice and will make their thinking		

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		Ask questions to probe student ideas and thinking. Ask questions to challenge student thinking.	visible. **Whole-class share-out:** Who would like to share? What evidence did you find that the clucker vibrated when it made a sound? **NOTE TO TEACHER:** *As students share their evidence, record it on chart paper. Ask probe and challenge questions to make student thinking visible.* Did anyone see the clucker vibrating when it made a sound? If you couldn't see the clucker vibrating, how did you find other evidence to help you figure out whether the clucker was vibrating when it made a sound? Now let's talk about our other soundmaker—you! What evidence did you find that you and your partner vibrated when you made sounds?	I could feel the clucker vibrate when I touched the cup and the string. No. But I could hear it screech! We felt the cup and the string, and that told us the clucker was vibrating. I could feel my throat vibrating when I was humming. They felt buzzy.	Does anyone else have evidence to share? What did the vibrations feel like?

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			Did anyone see any vibrations when you and your partner were humming?	I could see my partner's throat moving up and down when she hummed.	Did you find any other evidence?
				I think she was swallowing.	What do you mean by "moving up and down"?
				I guess they're not the same thing.	Is swallowing the same as vibrating or moving back and forth quickly? Does it match our definition?
			If you couldn't see any vibrations when you and your partner were humming, how did you find other evidence to help you figure out whether something was vibrating when you made a sound?	We felt our throats, and that told us something was vibrating.	
			NOTE TO TEACHER: *Have a show of hands to make sure everyone agrees that they couldn't see either soundmaker vibrate when they made sounds, but they could feel the vibrations.*		

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			Let's have a show of hands. Who agrees that you couldn't see the clucker vibrating when it made a sound, but you could feel the vibrations? Who agrees that you couldn't see any vibrations when you and your partner were humming, but you could feel them? So do we all agree that we couldn't see either of our two soundmakers vibrating when they made sounds, but we could feel the vibrations?		
2 min	**Lesson Focus Questions** **Synopsis:** Students consider whether they can always feel objects vibrate when they make sounds, even if they can't see the vibrations. Then the teacher reviews the focus questions from the previous lesson: *Do soundmakers always vibrate? What is our evidence?* **Main science idea(s):** • Sometimes we can see a soundmaker vibrate, and sometimes we	Ask questions to elicit student ideas and predictions.	Last time, we discovered that we can't always *see* vibrations when objects make sounds. **Show slide 3.** Now I'd like you to think about another question: Can we always *feel* objects vibrating when they make sounds, even if we can't see the vibrations? **NOTE TO TEACHER:** *Just have students think about this question. Don't ask for responses at this point.* So if you walk into your house and hear your mom and dad talking even though you can't see them, does that mean		

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	can't. Even if we can't see the vibrations, we can gather additional evidence that will help us determine whether a soundmaker is vibrating when it makes a sound.	Make explicit links between science ideas and activities **before** the activity. Set the purpose with a <u>focus question</u> or goal statement.	they're making vibrations? **Show slide 4.** Today we'll investigate a new soundmaker and look for evidence that it's vibrating. Our focus questions for this lesson are the same as last time: *Do soundmakers always vibrate? What is our evidence?* The evidence we gather today, along with all of the evidence we've already collected, will help us answer these questions.	Probably, because their throats might be vibrating like ours were.	
6 min	**Setup for Activity** **Synopsis:** The teacher introduces a new soundmaker, and students consider the kind of evidence they could collect to help them determine whether the soundmaker is vibrating. Then they predict whether the soundmaker will vibrate when it makes a sound. **Main science idea(s):**	Select content representations and models matched to the learning goal and engage students in their use.	**Show slide 5.** The soundmaker we'll look at today is called a *tuning fork*. **NOTE TO TEACHER:** *Hold up a tuning fork for students to see and make a sound with it by striking it on the bottom of your shoe or on the palm of your hand. Don't strike the tuning fork on a hard surface, because that will damage it.* Do any of you have a piano at home? Or have you seen a piano here at school?		

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	• Sometimes we can see a soundmaker vibrate, and sometimes we can't. Even if we can't see the vibrations, we can gather additional evidence that will help us determine whether a soundmaker is vibrating when it makes a sound.	Make explicit links between science ideas and activities **before** the activity. Highlight key science ideas and focus question throughout. Ask questions to elicit student ideas and predictions.	People use a tuning fork to make a sound that tells them whether a piano is playing the correct notes. A tuning fork also helps the person tuning the piano fix the keys if they're playing the wrong notes. **ELL support:** If ELL students find this explanation difficult to understand, you may need to use alternative wording. Our goal for today's investigation is to look for evidence that tells us whether a tuning fork vibrates when it makes a sound. The evidence we collect will help us answer our focus questions, *Do soundmakers always vibrate? What is our evidence?* **Show slide 6.** What kinds of evidence could we look for that would tell us whether a tuning fork vibrates when it makes a sound? What ideas do you have?	We could watch the tuning fork and see if it's vibrating. It might shake back and forth really fast. We could listen to	What do you think you might see?

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			What if we can hear the tuning fork make a sound, but we can't see it vibrating? What other evidence could we look for? **ELL support:** Give ELL students time to practice answering these questions during the lesson preview. **NOTE TO TEACHER:** *Students may come up with a variety of ways to tell whether the tuning fork is vibrating. If they don't mention touching it to feel vibrations, you don't need to bring it up. Students will figure this out during the investigation. Allow students to test all of their ideas during the activity, but make sure they touch the tuning fork to see if they can feel vibrations.* **Show slide 7.** Now let's look at the handout we'll be using for this investigation. **NOTE TO TEACHER:** *Distribute handout 2.2 (Another Soundmaker: Does It Vibrate?) and have students paste it into their science notebooks. Then orient students to the data table on the handout.*	the sound. It might make a dinging sound. Maybe we could touch the tuning fork like we did with our throats and the clucker. We might feel the tuning fork shaking back and forth a little, and that would tell us it's vibrating.	Can you describe what you might hear? How would that tell you whether the tuning fork vibrated?

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		Ask questions to elicit student ideas and predictions.	Before we talk about the handout, I'd like you to paste it into your science notebooks using your glue sticks. Now let's look at the data table on the handout. The first column, column A, shows a picture of our soundmaker. Who can remember what this soundmaker is called? Column B is where you'll write your predictions, just like you did last time. **NOTE TO TEACHER:** *Point to column B on the slide.* What do you think will happen when we make a sound with the tuning fork? Do you think it will vibrate? If you think the tuning fork will vibrate, you'll write the word *yes* in column B next to the picture. If you think it won't vibrate, you'll write the word *no* next to the picture. Remember, you can't make a "wrong" prediction, but you should have good reasons for your ideas. I may ask you to explain your reasons, so be ready to give them when you share your predictions. Now take a minute to write your	A tuning fork.	

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		Ask questions to probe student ideas and predictions.	predictions on your handouts. **NOTE TO TEACHER:** *Hold up the tuning fork so everyone can see it. Then have students record their predictions.* **Show slide 8.** **Whole-class share-out:** Who would like to share your prediction using the sentence starter on the slide? *I predict that the tuning fork [will/won't] vibrate when it makes a sound.* **NOTE TO TEACHER:** *Display the handout on a document reader and record students' predictions on the data table. (Or record them on chart paper.) Ask students to explain the reasons for their predictions and probe their thinking.* **ELL support:** During the lesson preview, let ELL students know you'll be asking them to share their predictions with the class (if time permits). Give them an opportunity to practice making predictions. Then make sure to ask them to share their ideas during the actual lesson. Let students know it's OK to repeat someone else's ideas. This is good practice and will make their thinking visible.	I predict that the tuning fork *will* vibrate when it makes a sound. Because it has to vibrate if it makes a sound. I predict the tuning fork won't vibrate. Because it's made of heavy metal, and I don't think metal	Why do you think the tuning fork will vibrate? Does anyone have a different prediction or reason? Why do you think it won't vibrate?

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				can move back and forth really fast.	
15 min	**Activity** **Synopsis:** Working in pairs, students test their predictions by gathering evidence to help them determine whether the tuning fork vibrates when it makes a sound. Then students record their evidence on their data tables. **Main science idea(s):** • We can collect evidence that helps us know whether a soundmaker is vibrating, even if we can't see the vibrations. For example, we may be able to feel the object vibrating or see other objects move or vibrate when the soundmaker touches them.	Make explicit links between science ideas and activities **during** the activity. Select content representations and models matched to the learning goal and engage students in their use.	**Show slide 9.** Now it's time to test our predictions. First, watch carefully how I make a sound with the tuning fork so you and your partner will know what to do. **NOTE TO TEACHER:** *Draw students' attention to the students on the slide who are making a sound with a tuning fork. Then have students gather around so they can watch you demonstrate how to make a sound with the tuning fork. Strike the tuning fork on the bottom of your shoe or on the palm of your hand to make a sound. Don't strike the tuning fork on a hard surface, because this will damage it. After you strike the tuning fork, ask students whether they can see any vibrations. (They shouldn't be able to.)* **Show slide 10.** Now I'd like you to pair up with an elbow partner and take turns making a sound with the turning fork just like I did. First, look carefully to see if something is vibrating. Then see if you can feel any vibrations like we did with our throats and the clucker. Touch the ends of the tuning		

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		Ask questions to elicit student ideas and predictions.	fork *very* gently while it's making a sound. Work together on this. As you make a sound with the tuning fork, have your partner gently touch it. Then switch and have your partner make a sound while you touch the tuning fork. Take turns making a sound with the tuning fork and holding it against a desk. What do you see and hear? Can you feel the tuning fork vibrating? When you see the room light blink, stop making sounds and lay the tuning forks on your desks. **NOTE TO TEACHER:** *Direct students to pair up with an elbow partner. Then give each pair a tuning fork. Have pairs take turns making sounds with their tuning forks. You might want to turn the room light on and off as a signal for students to share the tuning fork with their partners. Give pairs 2 minutes to experiment with the tuning fork. Then give them 3–4 minutes to take turns making sounds with the tuning fork and looking for evidence. Allow a total of 8 minutes for the investigation and discussion. Circulate around the room during the activity and ask pairs elicit and probe questions about what they see and feel as they work.*		

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		Ask questions to probe student ideas and predictions.	**Whole-class share-out:** So what evidence did you find that the tuning fork was vibrating when it made a sound? Did you see any vibrations? What did you feel when you touched the tuning fork? **Show slide 11.** OK, now I'd like you to record your evidence in column C on your data tables. You may also sketch what you saw or felt.	I could hear it vibrating! The tuning fork made a buzzing sound. No, but I could hear it ping! It tickled my fingers when I touched it. I could feel it vibrating! The tuning fork.	What do you mean by "tickled"? What do you mean by "it"? Where were you touching the tuning fork when you felt the vibrations?

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			NOTE TO TEACHER: *Point to the correct column on the data table where students should write and/or sketch their evidence.*		
			Optional extension activity (7 min) **NOTE TO TEACHER:** *Engage students in the following activity if they aren't convinced that tuning fork was vibrating, or if you have time for another activity.* How many of you could see the tuning fork vibrating when it made a sound? How many of you could feel it vibrate? So even though we couldn't see the tuning fork vibrate, you could feel the vibrations. Let's see if we can find more evidence that the tuning fork vibrates when it makes a sound. **NOTE TO TEACHER:** *Have students gather around so everyone can see. Then make a sound by striking the tuning fork on the bottom of your shoe or the palm of your hand and immediately place the tuning fork on the surface of a cup of rice. Students should be able to see the rice move. Alternately, strike the tuning fork and immediately place it in a shallow cup of water. Students should see the water splash out all around the cup.*		

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			What did you see happening when I made a sound with the tuning fork and then put the tuning fork in the cup of rice? What happened to the rice?	I saw the rice moving when you put the tuning fork in the cup. It was vibrating and jumping around.	How was the rice moving? What do you think caused the rice to move?
			Is this evidence that the tuning fork was vibrating? **NOTE TO TEACHER:** *Show students that the rice doesn't move if the tuning fork isn't vibrating and making a sound. Give them time to write or sketch this additional evidence in column C of their data tables.*	Yes, because even if we couldn't see the tuning fork vibrate, we could see the rice moving.	
			What did you see happening when I made a sound with the tuning fork and then put the tuning fork in the cup of water? What happened to the water?	The water splashed out of the cup. The tuning fork made the water	What do you think caused the water to splash out of the cup?

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			Is this evidence that the tuning fork was vibrating?	splash. Yes. Because nothing else was touching the water, so the tuning fork must have been vibrating and making the water splash!	Why do you think this is evidence that the tuning fork was vibrating?
		Engage students in analyzing and interpreting data and observations.	Earlier you predicted whether the tuning fork would vibrate when it made a sound. Then you tested your predictions and collected evidence. **Show slide 12.** Now let's think about what actually happened. Did the tuning fork vibrate when it made a sound? How do you know? Use the evidence on your data tables to answer the question in column D. If the tuning fork vibrated when it made a sound, write *yes* in column D. If it didn't vibrate, write *no*. It's OK if your answer in column D doesn't match your prediction in column B.		

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			You'll have an opportunity to share your answers with the class afterward, so be ready to explain your reasons for answering the way you did. **ELL support:** During the lesson preview, let ELL students know you'll be asking them to share their ideas with the class (if time permits). Give them an opportunity to practice answering the question on the handout. Then make sure to ask students to share their ideas during the actual lesson. Let them know it's OK to repeat someone else's ideas. This is good practice and will make their thinking visible.		
6 min	**Follow-Up to Activity** **Synopsis:** Students share the evidence they collected to help them determine whether the tuning fork vibrated when it made a sound. **Main science idea(s):** • If an object produces a sound, it must be vibrating. • We can gather evidence that tells us whether a soundmaker is vibrating, even if we	Engage students in analyzing and interpreting data and observations. Engage students in constructing explanations and arguments. Engage students in communicating in scientific	**Show slide 13.** Who would like to share how you answered the question in column D? What did you write on your handout? Did the tuning fork vibrate? How do you know? What evidence did you collect?	I said yes. I could feel the tuning fork shaking when I touched it with my fingers.	Why did you answer yes? How do you know the tuning fork was vibrating?

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	can't see the vibrations. For example, we may be able to feel an object vibrate or see other objects move or vibrate when the soundmaker touches them.	ways.		I put no. Because I didn't see it vibrate. I couldn't see the tuning fork vibrate either, but I wrote yes because I felt it vibrate. **For optional activity:** I saw the water and the rice moving around in the cups.	Did anyone have a different answer? Why did you write no? How do you know the tuning fork wasn't vibrating? Did you collect any other evidence? Do others agree or disagree? Do you have anything to add? **For optional activity:** Why do you think the rice and the water were moving around?

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				Because the vibrations from the tuning fork were rubbing off on the rice and the water and making them move.	Any ideas?
6 min	**Synthesize/Summarize Today's Lesson** **Synopsis:** The teacher engages students in summarizing key ideas and evidence from all of their investigations so far. **Main science idea(s):** • If an object produces a sound, it must be vibrating. • We can gather evidence that tells us whether a soundmaker is vibrating, even if we can't see the vibrations. For example, we may be able to feel an object vibrate or see other objects move or vibrate when the soundmaker touches them.	Highlight key science ideas and focus question throughout. Engage students in making connections by synthesizing and summarizing key science ideas. Engage students in analyzing and interpreting data and observations. Engage students in constructing explanations and arguments.	**Show slide 14.** Let's revisit the focus questions we've been thinking about the past couple of days: *Do soundmakers always vibrate? What is our evidence?* So far in this unit, we've made sounds with • a ruler, • a rubber band stretched across a plastic container, • each of you when you hummed, • a clucker, and • a tuning fork. **Show slide 15.** Raise your hand if you think the *ruler* vibrated when it made a sound. How do you know the ruler was vibrating? What evidence do you have? **NOTE TO TEACHER**: *Use this strategy*	I could feel the ruler moving up and down when I	*Challenge questions to ask if students don't think a soundmaker vibrated:*

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		Ask questions to probe student ideas and predictions. Ask questions to challenge student thinking.	*to make a quick assessment of whether students realize that all of the soundmakers vibrated. If some students don't raise their hands to indicate that a particular soundmaker vibrated, ask questions to probe and challenge their thinking.* **Show slide 16.** Raise your hand if you think the *rubber band* vibrated when it made a sound. How do you know the rubber band was vibrating? What evidence do you have? **Show slide 17.** Raise your hand if you think *you* vibrated when you hummed. How do you know you were vibrating? What evidence do you have? **Show slide 18.** Raise your hand if you think the *clucker* vibrated when it made a sound. How do you know the clucker was	held it down on the table. I could feel the rubber band vibrate when I touched it. I felt my throat vibrate.	• Why do you think this soundmaker didn't vibrate? • What evidence do you have? How does what you felt relate to vibrations? What did others find?

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			vibrating? What evidence do you have?	I felt the cup and the string vibrate when I touched them.	
			Show slide 19. Raise your hand if you think the *tuning fork* vibrated when it made a sound. How do you know the tuning fork was vibrating? What evidence do you have?	I felt the tuning fork vibrate when I touched it. **For optional activity:** I saw the rice jumping in the cup.	
			Show slide 20. What about other kinds of soundmakers? For example, do you think that objects like a trumpet, a whistle, or a cell phone vibrate when they make sounds?	**For optional activity:** I saw the water splash around.	
			Do you think they might vibrate even if	Yes.	Why do you think so?

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		Highlight key science ideas and focus question throughout. Engage students in using and applying new science ideas in a variety of ways and contexts.	we can't see the vibrations? So how would you answer our focus questions, *Do soundmakers always vibrate? What is our evidence?*	Yes. Just because you can't see vibrations doesn't mean they aren't there. Soundmakers always vibrate when they make sounds. My evidence is that all of the soundmakers vibrated when they made sounds. I could see or feel the vibrations. I don't think that soundmakers always vibrate. They only vibrate when they make sounds. The ruler and the rubber band didn't start vibrating until we plucked them.	How do you know? Does anyone disagree or have something to add? How do you know?
2 min	**Link to Next Lesson**		**Show slide 21.**		

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	Synopsis: The teacher reviews the unit central question, and students share their ideas for answering it based on what they've learned so far. Then the teacher announces that in the next lesson, students will investigate how sounds move from a vibrating object to their ears.	Link science ideas to other science ideas. Ask questions to elicit student ideas and predictions.	Remember our unit central question, *Why do we hear sound?* What ideas do you have now? **Show slide 22.** So we know that objects make sounds because we can see, hear, or feel them vibrate. But how can we hear the sounds that vibrating objects make? How does the sound get to our ears? Great discussion, everyone! We'll talk more about these ideas next time!	We hear sound because things vibrate. The objects making the sounds vibrate. We can see, hear, or feel the vibrations. The sound must move from the object to our ears.	What things vibrate? What's your evidence?