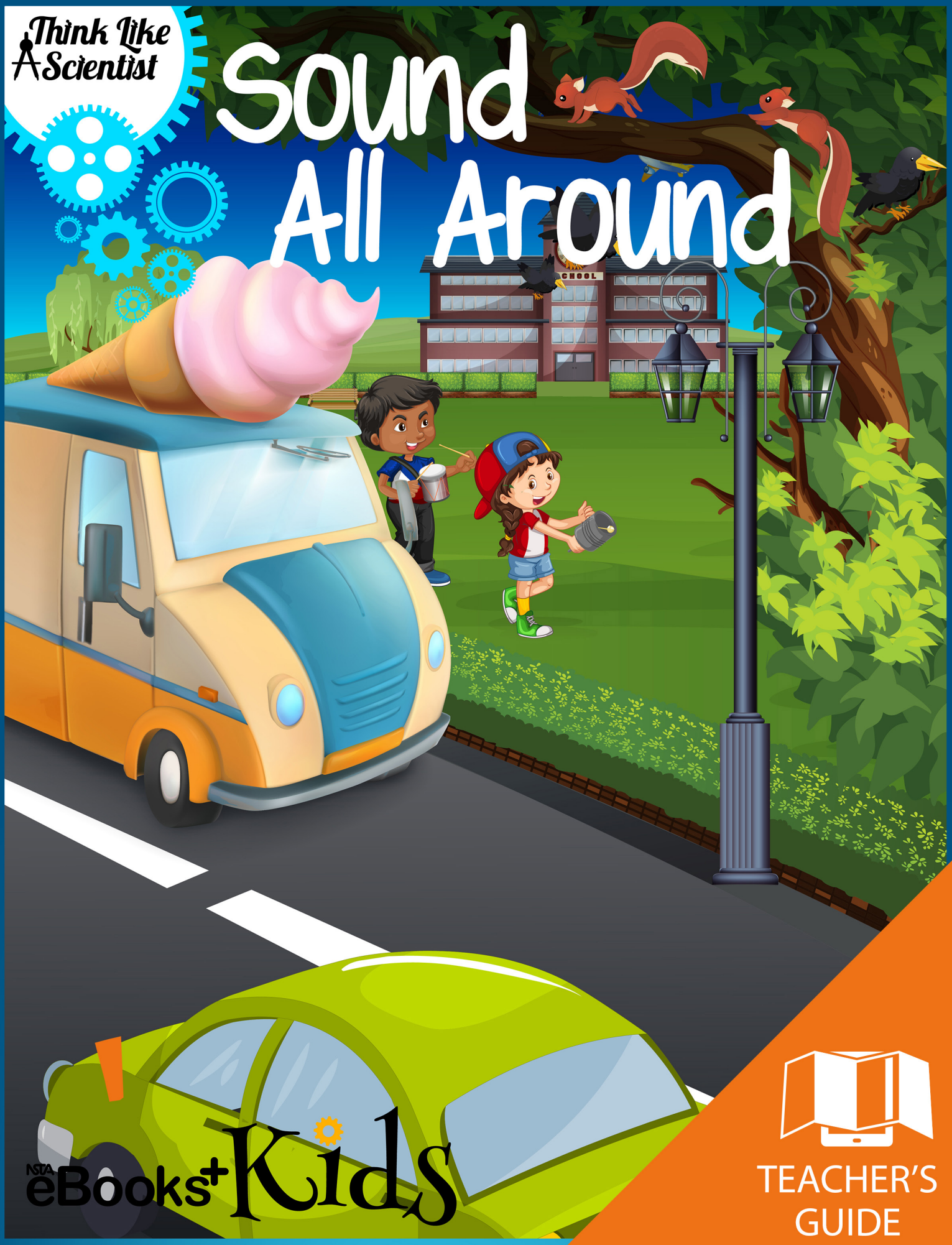

Think Like A Scientist
Sound All Around
SCHOOL
NSTA eBooks+Kids
TEACHER'S GUIDE

Overview

This teacher's guide is designed to provide ideas for how to use pages of the *Sound All Around* e-book with students. It explains the concepts and suggests what to look for in students' learning, while also supplying information about how they are practicing science and using crosscutting concepts.

Teachers who follow the guide while addressing the specific needs of their classroom will be able to:

- Engage students in grade-level appropriate, three-dimensional learning;
- Use the e-book as a tool in class-wide, small group, or independent explorations of its content;
- Facilitate investigations that utilize the e-book content and connect it with students' own classroom and community;
- Provide additional ideas and activities that utilize the e-book content but are not included in the e-book itself;
- Explore how STEM content can be effectively integrated into literacy (English language arts); and
- Provide guidance for teachers to design their own activities based on content from this e-book.

Book Description

The *Sound All Around* e-book uses a variety of everyday events to explore how sound is made, how it travels, how it is heard, and what it is used for. Molly and Juan are characters who guide students as they make discoveries, use interactives, and try hands-on activities to put concepts into context and use inventive critical thinking in a playful exploration of sounds all around.

Grade 1
Lexile® Measure: 470L

The Driving Question

A driving question is one that drives the teaching and learning for a given unit, or even an entire school year. It provides context for the purpose of student exploration and understanding of a phenomenon. This e-book is written around the driving question:

How is sound made?

Three-Dimensional Learning and the *Sound All Around* E-book

You will notice throughout the document that certain words and phrases are highlighted in different colors: blue, green, and orange. These colors correspond to the practices (blue), crosscutting concepts (green), and disciplinary core ideas (orange). The book also incorporates engineering design (purple). This will help you quickly notice how each of the three dimensions and engineering design are used on a page. Refer back to this section for the full descriptions.

This e-book does not use all of the grade-level elements for the practices and crosscutting concepts, but that does not mean that you should not be aware of the other practices and concepts your students need to know. For a full list of all the grade-level elements for the science and engineering practices and crosscutting concepts, refer to Appendix A.

For ideas for engaging in literacy, refer to Appendix B.

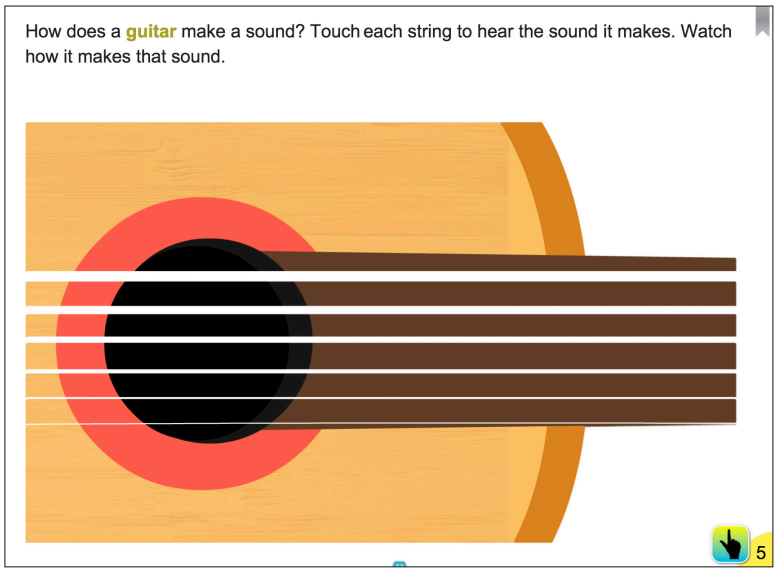
Disciplinary Core Ideas (DCIs)

This e-book examines a disciplinary core idea while using crosscutting concepts and practices to create a three-dimensional understanding of sound.

The disciplinary core idea addressed includes:

PS4.A: Wave Properties **Sound can make matter vibrate, and vibrating matter can make sound.**

Page 5



On this page, the students zoom in to take a closer look at the guitar and investigate how the strings are used to make sounds. At this point, you can choose if you would like to introduce the word *vibrate*. You can ask students what things they know that vibrate. Some may say cell phones on silent. Ask students if the vibrating cell phone makes a sound (it does). This will help solidify the concept that things that make sounds vibrate.

Students will notice that the thickest string at the top makes the lowest sound and vibrates the slowest. Each string below the top string vibrates progressively faster and produces a higher pitched sound.

Introduce a real or toy guitar to small groups of students. Ask student to tell you how to make sounds from the guitar. It is fun if you pretend you don't know how and try silly things like touching the string with one finger or blowing on it. Children will become invested in explaining how the guitar actually works (argument from evidence). Allow each student to demonstrate making sounds. Ask children inquiry questions to deepen their observations and explanations.

Possible inquiry prompts (cause and effect, structure and function, system and system models):

- Look closely at the strings. What do you see change when they are plucked?

Topic 3

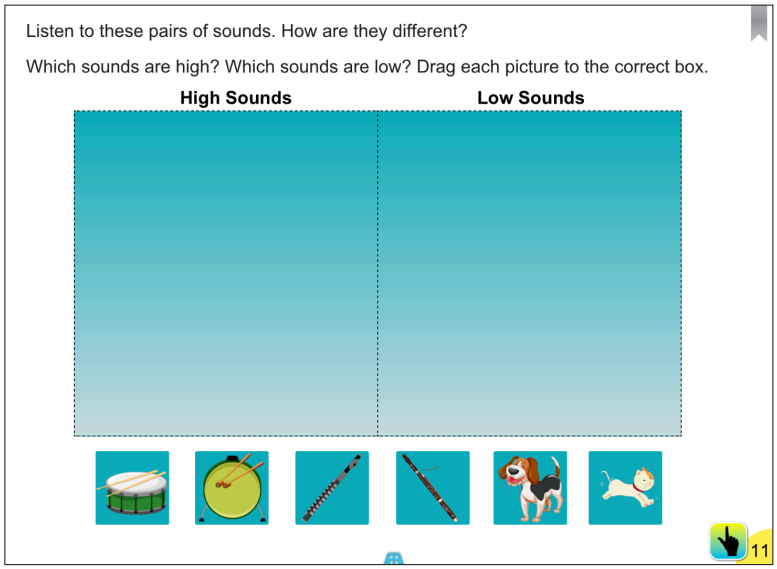
How Are Sounds Different?

In the previous topic, students explored how motion and sound are related. They may have already made observations and asked questions about the differences in the sounds they explored and produced. In this topic, students are guided to tune into how sounds differ in volume and pitch. They listen to the differences, make observations, explain their ideas with evidence, and try out different models to see how the way things move affects the volume and pitch of sounds.

By the end of the topic, students will be able to:

- predict how different sounds can be made by the same instrument,
- plan and conduct an investigation on how size and shape of an object changes the sound it produces, and
- construct explanations using cause and effect and patterns in data as evidence for how different materials make different sounds.

Page 11



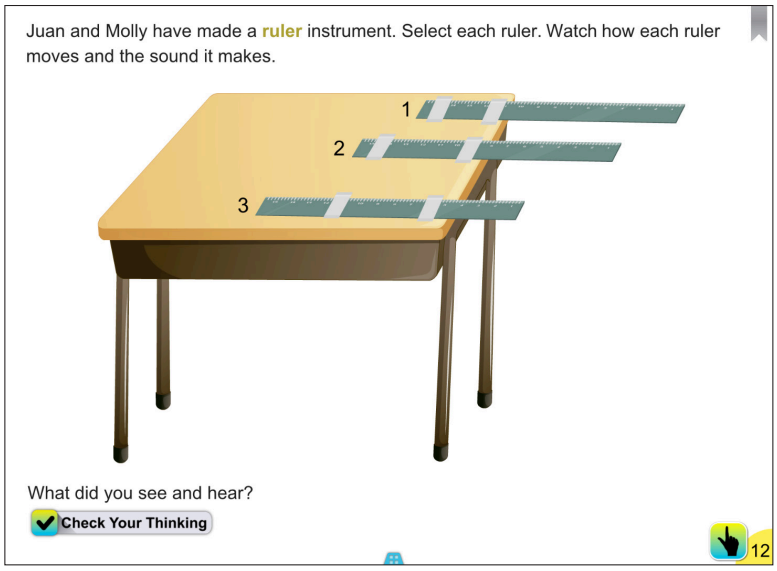
Students make observations by comparing sounds made by pairs of objects, one low and one high (scale). This interactive activity allows students to listen and compare sounds as many times as they like in order to hear the differences and draw conclusions about how sounds are different. Students then use the chart to record their observations and make decisions based on evidence about which sound is high and which is low in each pair.

Differentiated Instruction

Use this interactive as an assessment to see if students are hearing the difference in pitch. For those having difficulty, use these reinforcement activities:

- Play notes on a xylophone and have children raise their hands higher each time the note gets higher. Mix it up so children are matching their hand position to the sounds.
- Make sure children can recognize the words *high* and *low* and write these on two index cards. Play a game where children hold up the correct word when they hear a corresponding high or low sound. You can make these using a variety of instruments and your own voice. Invite students to make high and low sounds, too!

Page 12



The vibrating ruler experiment is a fun way for children to see and hear the changes in pitch associated with the length of the object (ruler) vibrating. Exploring this through the interactive allows students to investigate the model repeatedly as they change the variable of length (structure and function) and interpret the change in the resulting pitch of the sound.

This investigation will demonstrate that the ruler that hangs over the table farthest will vibrate the slowest and have the lowest pitch. Each of the other two will increase in speed of vibration and rise in pitch according to the length of the ruler overhanging the table.

Thinking Beyond

Try this experiment in the classroom.

1. Students hang their ruler about halfway off the edge of their table or desk. Have them hold the ruler on the surface with one hand and use a finger on their other hand to tap the free end. Allow time to record everything they notice about the sound and the movement of the ruler as it vibrates (patterns, cause and effect, scale).

Safety Notes

Students must wear eye protection (safety glasses or goggles) when participating in this activity.