Sound

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About **Sound**

DeltaScienceModules, THIRD EDITION

Students explore how sounds are produced and how the sense of hearing detects and interprets sounds. Sound surrounds us—in fact, students will discover that they cannot create silence. They use tuning forks to see and feel the vibrations that are sound waves. Next, students make ear trumpets to catch and amplify sounds just as ears do. They experiment with echoes to see which surfaces absorb or reflect sound waves. They even get a chance to make music. Students model percussion, stringed, and wind instruments as they create sounds by striking, plucking, and blowing. They learn to vary pitch and volume by varying string thickness and tension. For a concluding concert, students tune an orchestra of original instruments.

In the Delta Science Reader *Sound,* students read about what causes sound, how sound travels, and how sounds are different. They learn how our voices and ears work to allow us to speak and hear. They discover how different types of musical instruments make sounds. They also read about audiologists, people who test hearing. Finally, students find out how certain animals use echolocation to find out about their surroundings.

Overview Chart for Hands-on Activities

Hands-on Activity	Student Objectives
1 **How Do Sounds Vary?** *page 13*	• use a variety of objects to produce sounds • describe sounds and distinguish between them • hypothesize as to what factors determine differences in sounds
2 **Good Vibrations** *page 21*	• use a tuning fork to produce a sound • feel a tuning fork's vibration and observe it ripple the surface of water • produce sound by causing a piece of paper and a strip of plastic to vibrate • infer that vibrations produce sound
3 **How Sound Travels** *page 29*	• construct a string-and-spoon assembly to produce sounds that travel through both air and a solid • construct a setup to demonstrate the movement of chalk outward from a plucked string • infer that vibrating objects create sound waves that travel through both air and solids
4 **How We Hear Sounds** *page 37*	• construct and use a cone to demonstrate how the outer ear captures sound waves • study a diagram of the human ear • identify the parts of the ear and their functions
5 **Bouncing Sound** *page 45*	• distinguish between *absorb* and *reflect* • try to bounce sound off two different surfaces • compare the ability of different materials to absorb or reflect sound
6 **Musical Vibrations** *page 51*	• produce sounds by hitting a bottle, plucking a string, and blowing across the opening of a bottle • relate these methods of producing sounds to ways musical instruments are played • classify recorded sounds made by musical instruments into three categories
7 **Loud or Soft?** *page 59*	• listen to and identify sounds as loud or soft • operationally define *volume* • infer how loud and soft sounds are produced • describe the relationship of applied energy to strength of vibration and volume of sound
8 **High or Low?** *page 67*	• listen to, describe, and predict changes in the pitch of a sound • identify sounds as higher or lower than others • operationally define *pitch* • infer that the volume and pitch of a sound depend on the strength and rate of vibration
9 **Plink-Plunk, Toot-Toot** *page 73*	• predict and hear the change in pitch when the length of a vibrating object is increased • change the pitch of three vibrating objects by varying their lengths • infer the relationship between the length of a vibrating object and the pitch it produces
10 **Thick and Thin** *page 83*	• predict and then hear the effect of the thickness of a plucked rubber band on the pitch of its sound • compare pitches of sounds made by plucking rubber bands and hitting paper-plate "gongs" of various thickness • infer the relationship between thickness and pitch
11 **Mounting Tension** *page 91*	• predict the changes in pitch when tension is increased on a rubber band and a drumhead • predict and compare the changes in pitch of sounds produced by different objects at different degrees of tension • infer the relationship between tension and pitch
12 **Rhythm Band** *page 99*	• choose, construct, and play wind, percussion, or stringed instruments • vary the volume and (if possible) the pitch of the sounds their instruments make • accompany a simple recorded melody with their instruments
Assessment *page 107*	• See page 107.

Process Skills	Vocabulary	Delta Science Reader
observe, communicate, hypothesize, compare	**silence, sound**	pages 2–3, 6–7
observe, communicate, infer	**tuning fork, vibrate, vibration, vocal cords**	pages 2–3
make and use models, infer	**pluck, sound waves**	pages 2–3, 4–5
collect, record, display, or interpret data; communicate	**ear canal, eardrum, inner ear, middle ear, outer ear**	pages 10–11, 14
compare, use variables, infer	**absorb, echo, reflect**	pages 8, 15
compare, classify, infer, hypothesize	**percussion instrument, stringed instrument, wind instrument**	pages 12–13
compare, define based on observations, infer	**energy, loud, soft, volume**	pages 6–7, 9
compare, define based on observations, infer	**high, low, pitch**	pages 6–7
predict, use variables, infer	**length**	pages 6–7, 12–13
predict, use variables, compare, infer	**thickness**	page 7
predict, use variables, compare, infer	**tension**	page 7
make and use models, classify		pages 6–7, 12–13

See the following page for the Delta Science Reader Overview Chart.

Overview Chart for Delta Science Reader *Sound*

Selections	Vocabulary	Related Activity
Think About...		
What Causes Sound? *page 2*	energy, compression, sound, sound wave, vibrate, wavelength	Activities 1, 2, 3
How Does Sound Travel? *page 4*	sonic boom, speed of sound	Activity 3
How Are Sounds Different? *page 6*	amplitude, loudness, pitch, volume	Activities 1, 7, 8, 9, 10, 11, 12
How Is Sound Absorbed and Reflected? *page 8*	absorb, echo, reflect, sonar	Activity 5
What Is Noise Pollution? *page 9*	decibel, noise pollution	Activity 7
How Do We Speak and Hear? *page 10*	auditory nerve, ear canal, eardrum, inner ear, middle ear, vocal cords	Activity 4
How Do Musical Instruments Make Sounds? *page 12*	percussion instrument, stringed instrument, tuning fork, wind instrument	Activities 6, 9, 12
People in Science		
• **Audiologists** *page 14*		Activity 4
Did You Know?		
• **About Echolocation** *page 15*	echolocation, ultrasonic	Activity 5

See pages 115–123 for teaching suggestions for the Delta Science Reader.

MATERIALS LIST

Sound

Quantity	Description
1	ball, tennis
16	boards, wooden
32	bottles, plastic
2	buttons, plastic
1	card, index
1	cassette, *Sounds*
1	chalk, colored, p/12*
1	clothespin
32	combs
16	containers, plastic
2	cubes, wooden, small
1	fishing line, 25 m*
2	foam pieces
2	marbles
1	mirror, pocket
1	Musical Instrument Recipe Cards
1	nail
32	paper, construction, black*
20	plastic sheets, 30 cm × 30 cm*
3	plates, paper, p/35
1	rubber bands, brown, 3 widths, p/54
10	rubber bands, red, 12 cm
2	rubber stoppers
32	screw eyes
8	sound boxes, with lids, p/2
2	straws, plastic, p/50*
1	string*
1	tape, masking*
50	tongue depressors
1	transparency, Diagram of the Ear
16	tumblers, plastic
16	tuning forks
2	washers
1	waxed paper, roll*
1	xylophone
1	**Teacher's Guide**
8	**Delta Science Readers**

Quantity	Description
	TEACHER-PROVIDED ITEMS
1	bicycle
1	cassette player
1	hammer
1	overhead projector
24	paper clips
48	paper, plain*
–	paper towels*
17	pencils
17	scissors
16	spoons, metal
1	stringed instrument (optional)
–	water, tap*

* = consumable item

† = in separate box

To order consumable items or refill kits, please call 1-800-442-5444.

ACTIVITY SUMMARY

In this Delta Science Module, students explore the world of sound and discover the answers to questions such as these: What is sound? Why do sounds differ? How do we make sounds? How do we hear sounds?

ACTIVITY 1 Students try unsuccessfully to create total silence, later discussing the sounds they still managed to hear. They create sounds and think of words to describe them and to distinguish one from another. From their classmates' verbal descriptions of sounds, they try to identify the unseen objects and actions that produced those sounds.

ACTIVITY 2 Students use a tuning fork to explore the relationship between sound and vibration. They listen to sounds and observe the vibrations of objects as they produce those sounds. They infer that when applied energy makes an object vibrate, its vibrations produce sound.

ACTIVITY 3 Students listen to sounds as they travel both through air and through a solid material. To simulate the movement of sound waves through air, they coat a string with chalk, pluck it, and observe that the vibrating string throws the chalk outward into the surrounding air.

ACTIVITY 4 Students exaggerate the shape and function of the outer ear by making "ear trumpets"—paper cones that they hold to their ears. They find they can hear soft and distant sounds better with the cones than without.

ACTIVITY 5 Students bounce sound off a large wall to create an echo, but they find that sound does not return an echo from a mass of bushes. Students then compare the characteristics of surfaces that affect their ability to either absorb or reflect sound.

ACTIVITY 6 Students investigate three ways to produce sound: by striking an object, plucking strings, or blowing across an opening in an object. They relate these methods of sound production to those that musicians use to play the three major categories of musical instruments: percussion instruments, stringed instruments, and wind instruments.

ACTIVITY 7 Students experiment with volume. They compare loud and soft sounds and discover the different ways in which they are produced. They investigate and describe the relationship of applied energy to the strength of an object's vibration and the volume of sound produced.

ACTIVITY 8 Students investigate pitch in this activity. They listen to and classify sounds according to whether they are higher or lower in pitch than other sounds. They discover an important distinction between pitch and volume: pitch varies with the rate of vibration, while volume varies with the strength of vibration.

ACTIVITY 9 Students' study of pitch continues as they explore the effect of changes in length on the pitch of sound in a stringed instrument, a percussion instrument, and a wind instrument. They infer the relationship between length of an object and the pitch it produces.

ACTIVITY 10 Students extend the exploration of pitch to the variable of thickness. They build stringed and percussion instruments to test that variable and draw conclusions about the relationship between thickness and pitch.

ACTIVITY 11 Students use their stringed and percussion instruments to investigate the relationship between tension and pitch.

ACTIVITY 12 Students use imagination as well as experience gained in the previous activities to construct a variety of musical instruments. With all their instruments, they accompany a simple recorded melody.