Real World Science: Sound

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Congratulations!

You have chosen a learning program that will actively motivate your students AND provide you with easily accessible and easily manageable instructional guidelines designed to make your teaching role efficient and rewarding.

The AIMS Teaching Module provides you with a video program keyed to your classroom curriculum, instructions and guidelines for use, plus a comprehensive teaching program containing a wide range of activities and ideas for interaction between all content areas. Our authors, educators, and consultants have written and reviewed the AIMS Teaching Modules to align with the Educate America Act: Goals 2000.

This ATM, with its clear definition of manageability, both in the classroom and beyond, allows you to tailor specific activities to meet all of your classroom needs.
RATIONALE

In today’s classrooms, educational pedagogy is often founded on Benjamin S. Bloom’s “Six Levels of Cognitive Complexity.” The practical application of Bloom’s Taxonomy is to evaluate students’ thinking skills on these levels, from the simple to the complex: Knowledge (rote memory skills), Comprehension (the ability to relate or retell), Application (the ability to apply knowledge outside its origin), Analysis (relating and differentiating parts of a whole), Synthesis (relating parts to a whole), and Evaluation (making a judgment or formulating an opinion).

The AIMS Teaching Module is designed to facilitate these intellectual capabilities, AND to integrate classroom experiences and assimilation of learning with the students’ life experiences, realities, and expectations. AIMS’ learner verification studies prove that our AIMS Teaching Modules help students to absorb, retain, and to demonstrate ability to use new knowledge in their world. Our educational materials are written and designed for today’s classroom, which incorporates a wide range of intellectual, cultural, physical, and emotional diversities.
ORGANIZATION AND MANAGEMENT

To facilitate ease in classroom manageability, the AIMS Teaching Module is organized in four sections. You are reading Section 1, Introduction to the Aims Teaching Module (ATM).

SECTION 2, INTRODUCING THIS ATM will give you the specific information you need to integrate the program into your classroom curriculum.

SECTION 3, PREPARATION FOR VIEWING provides suggestions and strategies for motivation, language preparedness, readiness, and focus prior to viewing the program with your students.

SECTION 4, AFTER VIEWING THE PROGRAM provides suggestions for additional activities plus an assortment of consumable assessment and extended activities, designed to broaden comprehension of the topic and to make connections to other curriculum content areas.
FEATURES

INTRODUCING EACH ATM

SECTION 2

Your AIMS Teaching Module is designed to accompany a video program written and produced by some of the world’s most credible and creative writers and producers of educational programming. To facilitate diversity and flexibility in your classroom, your AIMS Teaching Module features these components:

Themes

The Major Theme tells how this AIMS Teaching Module is keyed into the curriculum. Related Themes offer suggestions for interaction with other curriculum content areas, enabling teachers to use the teaching module to incorporate the topic into a variety of learning areas.

Overview

The Overview provides a synopsis of content covered in the video program. Its purpose is to give you a summary of the subject matter and to enhance your introductory preparation.

Objectives

The ATM learning objectives provide guidelines for teachers to assess what learners can be expected to gain from each program. After completion of the AIMS Teaching Module, your students will be able to demonstrate dynamic and applied comprehension of the topic.
PREPARATION FOR VIEWING

SECTION 3
In preparation for viewing the video program, the AIMS Teaching Module offers activity and/or discussion ideas that you may use in any order or combination.

Introduction To The Program
Introduction to the Program is designed to enable students to recall or relate prior knowledge about the topic and to prepare them for what they are about to learn.

Introduction To Vocabulary
Introduction to Vocabulary is a review of language used in the program: words, phrases, usage. This vocabulary introduction is designed to ensure that all learners, including limited English proficiency learners, will have full understanding of the language usage in the content of the program.

Discussion Ideas
Discussion Ideas are designed to help you assess students’ prior knowledge about the topic and to give students a preview of what they will learn. Active discussion stimulates interest in a subject and can motivate even the most reluctant learner. Listening, as well as speaking, is active participation. Encourage your students to participate at the rate they feel comfortable. Model sharing personal experiences when applicable, and model listening to students’ ideas and opinions.

Focus
Help learners set a purpose for watching the program with Focus, designed to give students a focal point for comprehension continuity.

Jump Right In
Jump Right In provides abbreviated instructions for quick management of the program.

AFTER VIEWING THE PROGRAM

SECTION 4
After your students have viewed the program, you may introduce any or all of these activities to interact with other curriculum content areas, provide reinforcement, assess comprehension skills, or provide hands-on and in-depth extended study of the topic.
**SUGGESTED ACTIVITIES**

The Suggested Activities offer ideas for activities you can direct in the classroom or have your students complete independently, in pairs, or in small work groups after they have viewed the program. To accommodate your range of classroom needs, the activities are organized into skills categories. Their labels will tell you how to identify each activity and help you correlate it into your classroom curriculum. To help you schedule your classroom lesson time, the AIMS hourglass gives you an estimate of the time each activity should require. Some of the activities fall into these categories:

- **Meeting Individual Needs**
  These activities are designed to aid in classroom continuity. Reluctant learners and learners acquiring English will benefit from these activities geared to enhance comprehension of language in order to fully grasp content meaning.

- **Curriculum Connections**
  Many of the suggested activities are intended to integrate the content of the ATM program into other content areas of the classroom curriculum. These cross-connections turn the classroom teaching experience into a whole learning experience.

- **Critical Thinking**
  Critical Thinking activities are designed to stimulate learners’ own opinions and ideas. These activities require students to use the thinking process to discern fact from opinion, consider their own problems and formulate possible solutions, draw conclusions, discuss cause and effect, or combine what they already know with what they have learned to make inferences.

- **Cultural Diversity**
  Each AIMS Teaching Module has an activity called Cultural Awareness, Cultural Diversity, or Cultural Exchange that encourages students to share their backgrounds, cultures, heritage, or knowledge of other countries, customs, and language.

- **Hands On**
  These are experimental or tactile activities that relate directly to the material taught in the program. Your students will have opportunities to make discoveries and formulate ideas on their own, based on what they learn in this unit.

- **Writing**
  Every AIMS Teaching Module will contain an activity designed for students to use the writing process to express their ideas about what they have learned. The writing activity may also help them to make the connection between what they are learning in this unit and how it applies to other content areas.

- **In The Newsroom**
  Each AIMS Teaching Module contains a newsroom activity designed to help students make the relationship between what they learn in the classroom and how it applies in their world. The purpose of In The Newsroom is to actively involve each class member in a whole learning experience. Each student will have an opportunity to perform all of the tasks involved in production: writing, researching, producing, directing, and interviewing as they create their own classroom news program.

- **Extended Activities**
  These activities provide opportunities for students to work separately or together to conduct further research, explore answers to their own questions, or apply what they have learned to other media or content areas.

- **Link to the World**
  These activities offer ideas for connecting learners’ classroom activities to their community and the rest of the world.

- **Culminating Activity**
  To wrap up the unit, AIMS Teaching Modules offer suggestions for ways to reinforce what students have learned and how they can use their new knowledge to enhance their world view.
**VOCABULARY**

Every ATM contains an activity that reinforces the meaning and usage of the vocabulary words introduced in the program content. Students will either read or find the definition of each vocabulary word, then use the word in a written sentence.

**CHECKING COMPREHENSION**

Checking Comprehension is designed to help you evaluate how well your students understand, retain, and recall the information presented in the AIMS Teaching Module. Depending on your students’ needs, you may direct this activity to the whole group yourself, or you may want to have students work on the activity page independently, in pairs, or in small groups. Students can verify their written answers through discussion or by viewing the video a second time. If you choose, you can reproduce the answers from your Answer Key or write the answer choices in a Word Bank for students to use. Students can use this completed activity as a study guide to prepare for the test.

**CONSUMABLE ACTIVITIES**

The AIMS Teaching Module provides a selection of consumable activities, designed to specifically reinforce the content of this learning unit. Whenever applicable, they are arranged in order from low to high difficulty level, to allow a seamless facilitation of the learning process. You may choose to have students take these activities home or to work on them in the classroom independently, in pairs or in small groups.

**CHECKING VOCABULARY**

The Checking Vocabulary activity provides the opportunity for students to assess their knowledge of new vocabulary with this word game or puzzle. The format of this vocabulary activity allows students to use the related words and phrases in a different context.

**TEST**

The AIMS Teaching Module Test permits you to assess students’ understanding of what they have learned. The test is formatted in one of several standard test formats to give your students a range of experiences in test-taking techniques. Be sure to read, or remind students to read, the directions carefully and to read each answer choice before making a selection. Use the Answer Key to check their answers.
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

After you have completed this AIMS Teaching Module you may be interested in more of the programs that AIMS offers. This list includes several related AIMS programs.

ADDITIONAL READING SUGGESTIONS

AIMS offers a carefully researched list of other resources that you and your students may find rewarding.

ANSWER KEY

Reproduces tests and work pages with answers marked.
THEMES

Real World Science: Sound explores how sounds are produced and interpreted by humans and other animals. It discusses the basic principles of sound, including amplitude and frequency. In addition, the program explores how sound travels through various mediums, including air and water.

OVERVIEW

Sound is produced by a type of movement called vibration. This movement is a form of energy that moves molecules in waves. Sound can travel through any medium, although it travels more quickly through solids than liquids. Sound waves are actually a special type of wave known as longitudinal. These waves move back and forth like a spring. The molecules are squeezed together in an area of compression, while they are stretched apart in an area of rarefaction. The high points of a wave are known as crests and the low points are called troughs. Amplitude, frequency and wavelength are properties that describe a sound wave and its resulting sound.

OBJECTIVES

- To better understand decibels, amplitude, frequency and wavelength.
- To discuss how vibrations produce sound and how sound travels through air and other mediums.
- To examine how animals use echolocation to survive.
- To explore how the human body translates vibrations into sounds.
Use this page for your individual notes about planning and/or effective ways to manage this AIMS Teaching Module in your classroom.

Our AIMS Multimedia Educational Department welcomes your observations and comments. Please feel free to address your correspondence to:

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Editorial Department
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Chatsworth, California 91311-4409
INTRODUCTION TO THE PROGRAM

Sound is everywhere. We hear sounds as soon as we wake up in the morning, and we continue to hear a mixture of sounds all day long. Voices, music, bells and motors are just some of the things we hear. All of these sounds are produced by a movement called vibration. Molecules moving back and forth produce waves of energy. This energy is carried to our ears, where tiny organs send signals to our brain. The entire process takes only a fraction of a second. In that short time, differences in pitch and frequency help us determine the source of the sound, giving us information about the world around us.

INTRODUCTION TO VOCABULARY

Before starting the program, write the following words on the board. Ask the class to discuss the meaning of each word, and review the terms that are unfamiliar to students.

**molecule** - smallest part of matter that still has the properties of matter

**energy** - any force which causes something to act in a new way

**sound** - energy created by the vibration of objects

DISCUSSION IDEAS

Ask students to think about what causes sound. Why are sounds produced? How do they travel from an object to our ears? Why do we know the difference between a bell and a shout?

FOCUS

As a class, discuss some of the ways that sound is used by humans. How would life be different without sound? In what ways would it be more difficult? Ask the class to keep these questions in mind as they begin the program.
JUMP RIGHT IN

HOW TO USE THE REAL WORLD SCIENCE: SOUND AIMS TEACHING MODULE

Preparation

- Read Real World Science: Sound Themes, Overview, and Objectives to become familiar with program content and expectations.

- Use Preparation for Viewing suggestions to introduce the topic to students.

Viewing REAL WORLD SCIENCE: SOUND

- Set up viewing monitor so that all students have a clear view.

- Depending on your classroom size and learning range, you may choose to have students view Real World Science: Sound together or in small groups.

  Some students may benefit from viewing the video more than one time.

After Viewing REAL WORLD SCIENCE: SOUND

- Select Suggested Activities that integrate into your classroom curriculum. If applicable, gather materials or resources.

- Choose the best way for students to work on each activity. Some activities work best for the whole group. Other activities are designed for students to work independently, in pairs, or in small groups. Whenever possible, encourage students to share their work with the rest of the group.

- Duplicate the appropriate number of Vocabulary, Checking Comprehension, and consumable activity pages for your students.

  You may choose to have students take consumable activities home, or complete them in the classroom, independently, or in groups.

  Administer the Test to assess students’ comprehension of what they have learned, and to provide them with practice in test-taking procedures.

- Use the Culminating Activity as a forum for students to display, summarize, extend, or share what they have learned with each other, the rest of the school, or a local community organization.
SUGGESTED ACTIVITIES

Writing

Sound has fascinated scientists for centuries. Students may recognize the names of scientists who have contributed to our knowledge of sound. Several of these names have been added to our vocabulary, describing principles related to sound.

Ask students to choose a person from the list below. Have each student write a one-page summary of their chosen person’s contributions to the study of sound. Encourage students to use library books and encyclopedia articles to learn more about their chosen subjects.

Alexander G. Bell
Emile Berliner
Thomas A. Edison
Hermann Helmholtz
Ernst Mach

Meeting Individual Needs

Ask students to name an example of each type of sound listed below. Encourage them to explain their answers.

• sound with a high frequency (examples should include high-pitched sounds, like a whistle)
• sound with a low frequency (examples should include low-pitched sounds, like a tuba)
• sound with a high amplitude (examples should include loud sounds, like an airplane)
• sound with a low amplitude (examples should include soft sounds, like a whisper)

Extended Activity

Discuss the Doppler effect with students. When a train passes by, the pitch of the train’s whistle seems to drop. Why does this happen? As the train approaches, more sound waves are hitting your ear. The waves are crowded together or compressed. When the train passes, the waves get farther apart. This makes the pitch of the whistle appear to change. Actually, the sound of the whistle does not change. This is called the Doppler effect.
Hands On

Ask students to perform the following simple experiments.

Place a watch or small clock face down on a table. Press your ear to the table. What do you hear? What does this prove about sound? (You will hear the tick of the watch or clock. This proves that sound can travel through a solid substance.)

Make a tin-can telephone. Tape each end of a long piece of twine to the bottom of a used tin can. (Be sure to use cans that have no sharp edges.) Ask a friend to take one can while you take the other. Stretch the string until it makes a straight line. Talk quietly into the open end of one can while a friend listens to the open end of the other can. What happens? How does the sound travel from one can to another? (Vibrations from your voice travel down the string to the other can.)

Link to the World

We use sounds in many ways. Alarm clocks wake us up. Bells tell us when class is over. Music entertains us, and voices help us recognize each other.

One type of sound, known as ultrasound, has proven to be especially useful to humans. Ultrasound vibrates at a frequency too high for humans to hear. Ultrasonic waves can be focused and directed to a particular spot. Sonar uses ultrasonic waves to detect submarines and other objects in the ocean. Manufacturers use ultrasound to detect cracks and other flaws in furniture, cars and machines. Ultrasonic waves can also be used to break down germs in milk, a process called pasteurization. Doctors can use ultrasonic waves to treat diseases, sterilize surgical instruments, and view the inside of the body.

Connection to Science

Humans produce sound by breathing out and flexing the muscles that surround the vocal cords. The cords are membranes that vibrate, and therefore make sound waves, when air flows past them. We can change the pitch of our voice by changing the tightness of the muscles near our vocal cords.

Animals make sounds in many different ways. Some have vocal cords that produce sound in a way similar to humans. Others use various body parts to produce sound. The cricket rubs its wings together to produce a chirping noise. Bumblebees buzz because their wings vibrate in the air. Ask each student to choose a favorite animal. Have them use library books to investigate how the animal produces sound. Some good choices include dolphins, birds, dogs, cats and snakes.
**Critical Thinking**

An echo occurs when sound waves strike a surface with a density different than the surrounding air. A good example is a brick wall. If we shout at a brick wall, we hear our voice a first time, then again as it bounces off the wall and back to our ears. However, as we move closer to the wall, the echo disappears. What could be the reason?

Ask students to practice hearing the echo of their voices by shouting at a distant wall. As they move closer to the wall, what happens? Does the echo arrive sooner or later? How could this be related to the disappearance of the echo at a close distance?

(ANSWER: As we move closer to a wall, an echo arrives more quickly. Eventually, the echo disappears. The sensation of a sound only lasts for one-tenth of a second. If an echo is made within one-tenth of a second, our ears cannot distinguish between the two sounds. Instead, the sounds are combined into one louder sound. If we are too close to a surface, there is no time for the echo to travel back to our ears and produce a separate sound.)

**Connection to Art**

Study a diagram of the outer, middle and inner ear with the class. Discuss each part of the ear and its function, including:

- the auricle—the fleshy part of the outer ear that collects sound waves
- the eardrum—membrane that vibrates when sound waves reach it
- the hammer and anvil—tiny bones that carry sound waves to the inner ear
- the stirrup—tiny bone that moves in and out of the cochlea like a plunger
- the cochlea—coiled organ filled with fluid; sends sound messages to the brain

**Culminating Activity**

Ask students to spend a day thinking about and recording the sounds around them. Have them keep a record of the sounds they notice in a Sound Diary. How many sounds do they hear in an average day? Which sounds are the most noticeable? Which are the least? Which sounds are the most common? Which sounds are helpful?

After they have created a Sound Diary, ask students to write a short paper describing how important sound is to them. What would life be like without sound?

NOTE: Students who are hearing challenged should be encouraged to focus on another sense. For instance, they may want to create a Sight Diary.
## VOCABULARY

The following terms are from *Real World Science: Sound*. Fill in the number of each term next to its closest definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vibration</td>
<td>___ property that describes how loud or soft a sound is</td>
</tr>
<tr>
<td>eardrum</td>
<td>___ measurement of the distance between two high points or low points on a wave</td>
</tr>
<tr>
<td>Hertz</td>
<td>___ property of sound that measures the number of waves passing a certain point in a given period of time</td>
</tr>
<tr>
<td>longitudinal</td>
<td>___ type of wave that moves back and forth, like a spring</td>
</tr>
<tr>
<td>amplitude</td>
<td>___ unit of measurement used to measure amplitude</td>
</tr>
<tr>
<td>decibel</td>
<td>___ movement of an object or an object’s molecules, either back and forth or up and down</td>
</tr>
<tr>
<td>wavelength</td>
<td>___ special device used to detect objects in deep waters</td>
</tr>
<tr>
<td>frequency</td>
<td>___ process used by animals to locate objects using echoes</td>
</tr>
<tr>
<td>echolocation</td>
<td>___ organ that receives vibrations and sends information about those vibrations to the brain</td>
</tr>
<tr>
<td>sonar</td>
<td>___ unit of measurement used to measure frequency</td>
</tr>
</tbody>
</table>

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CHECKING COMPREHENSION

Read the following sentences and circle the letter of the word that best fills each blank.

Sound is produced by a type of movement called ___1___. This movement is a form of energy that moves ___2___ in the form of waves. Sound can travel through any medium, although it travels more quickly through ___3___ than liquids. Sound waves are actually a special type of wave known as ___4___. These waves move back and forth like a ___5___. The molecules are squeezed together in an area of ___6___, while they are stretched apart in an area of ___7___. The high points of a wave are known as ___8___ and the low points are called ___9___. ___10___ is the property that describes how loud or soft a sound is, and it is measured by the height of a sound wave.

1. A. oscillation  
   B. vibration  
   C. radar  
   D. fusion

2. A. cells  
   B. light  
   C. molecules  
   D. nerve endings

3. A. gases  
   B. outer space  
   C. air  
   D. solids

4. A. longitudinal  
   B. supersonic  
   C. compressed  
   D. lateral

5. A. spinning top  
   B. spring  
   C. pendulum  
   D. leaf blowing in the wind

6. A. rarefaction  
   B. amplitude  
   C. compression  
   D. longitude

7. A. rarefaction  
   B. frequency  
   C. vibration  
   D. compression

8. A. Hertz  
   B. crests  
   C. amps  
   D. decibels

9. A. troughs  
   B. echoes  
   C. subregions  
   D. sonars

10. A. frequency  
    B. amplitude  
    C. medium  
    D. wavelength
REAL WORLD SCIENCE: SOUND
Review Questions

Answer the following questions based on what you learned in the program Real World Science: Sound.

1. Why do sounds travel faster in warm air than in cold air?

2. How do bats use echolocation to “see” where they are going?

3. What happens when sound waves reach the eardrum?

4. Why is there no sound in outer space?

5. What is amplitude and how is it measured?

6. What is frequency and how is it measured?

7. What is sonar and how is it used?
TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1. ___ Amplitude determines the pitch of a sound.
2. ___ When a sound is over 120 decibels, the sensation of sound is replaced by the sensation of pain.
3. ___ Humans can hear sounds with much higher frequencies than the sounds heard by dogs.
4. ___ Bats navigate using a process known as echolocation.
5. ___ The quality of a medium that describes how quickly molecules move against each other is known as elasticity.
6. ___ The colder a medium gets, the faster sound will travel through it.
7. ___ In outer space, there is no sound because the air is too dense.
8. ___ A longitudinal wave moves back and forth like a spring.
9. ___ The high points of a wave, called troughs, represent the rarefactions of the wave.
10. ___ Wavelength is the measurement of the distance between two high points or low points on a wave.
WHICH ONE?

Circle the correct choice for each question below.

1. Which sound has a higher pitch?  
   - birdsong  
   - lion’s roar

2. In which medium does sound travel faster?  
   - steel  
   - hydrogen

3. Which sound has a lower amplitude?  
   - a whisper  
   - a trumpet

4. Which sound has a higher frequency?  
   - a flute  
   - a tuba

5. Which sound has a lower pitch?  
   - a gong  
   - a whistle

6. In which medium does sound travel more slowly?  
   - air  
   - water

7. Which frequency can be heard by bats, but not by humans?  
   - 45,000 Hertz  
   - 15,000 Hertz

8. Which sound is in the threshold of sensation?  
   - 70 decibels  
   - 140 decibels

9. Which sound has a higher sound wave?  
   - an airplane  
   - a telephone

10. In which medium does sound travel more quickly?  
    - warm air  
    - cold air
SOUND PUZZLE

S_____________________
There is no sound in outer _____ because there is no air for sound waves to travel through.

O_____________________
Many sounds with a frequency _____ 20,000 Hertz can be heard by animals, such as dogs and bats.

U_____________________
Sounds with a frequency _____ 20 Hertz cannot be heard by humans.

N_____________________
_____ carry sound wave signals from the inner ear to the brain.

D_____________________
_____ is a way to describe how closely molecules are packed together.

W_____________________
Sound travels in longitudinal _____ .

A_____________________
The loudness or softness of a sound is known as its _____ .

V_____________________
_____ is the movement of an object back and forth or up and down.

E_____________________
The _____ is a tiny organ that turns sound waves into signals that travel to the brain.

S_____________________
Any object that travels faster than the speed of sound is called _____ .
WORD SEARCH

Each word below was discussed in the program. Write the definition of each word, using a dictionary for words that are unfamiliar. Then circle each word you find in the word search. They may be arranged horizontally, vertically, diagonally, forward or backward.

wavelength - the measurement of the distance between two high or low points on a wave
medium - any solid, liquid or gas
compression - place in a sound wave where molecules are squeezed together
rarefaction - place in a sound wave where molecules are stretched apart
amplitude - describes how loud or soft a sound is
frequency - number of sound waves that pass a certain point during a given time period
echolocation - process of using echoes to navigate or locate objects
pitch - the highness or lowness of a pitch

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TEST

Circle the phrase which best answers each question.

1. Sound is energy created by movements known as:
   • ions.
   • mediums.
   • Hertz.
   • vibrations.

2. Sound travels through the air in the form of a _________ wave.
   • ultraviolet
   • radio
   • longitudinal
   • sonar

3. In outer space, there is no sound because:
   • there is no medium to carry sound waves.
   • the air temperature is too cold.
   • it is too dark for sound waves to travel.
   • the atmosphere is too dense.

4. In a sound wave, there are areas of compression and areas of:
   • rarefaction.
   • echolocation.
   • polarity.
   • transference.

5. The loudness or softness of a sound is known as its:
   • frequency.
   • pitch.
   • amplitude.
   • wavelength.
6. At 120 decibels, the sensation of sound is replaced by the sensation of:

- pitch.
- supersonic sound.
- silence.
- pain.

7. Frequency determines pitch, which is:

- the distance between two high points or low points on a wave.
- the highness or lowness of a sound.
- the size of a sound wave.
- the loudness of a sound.

8. Bats navigate by using a process known as:

- the Doppler effect.
- oscillation.
- circumnavigation.
- echolocation.

9. Sound travels more slowly when a medium becomes:

- warmer.
- colder.
- more dense.
- less elastic.

10. Objects that travel faster than the speed of sound are called:

- harmonic.
- supersonic.
- stereophonic.
- amplified.
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

You and your students might also enjoy these other AIMS Multimedia programs:

#2570 - Real World Science: Electricity
#2571 - Real World Science: Scientific Method
#2572 - Real World Science: Magnetism
#2569 - Real World Science: Matter - Solids, Liquids and Gases
ANSWER KEY for page 18

VOCABULARY

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<td>3. Hertz</td>
<td>___ property of sound that measures the number of waves passing a certain point in a given period of time</td>
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<tr>
<td>4. longitudinal</td>
<td>___ type of wave that moves back and forth, like a spring</td>
</tr>
<tr>
<td>5. amplitude</td>
<td>___ unit of measurement used to measure amplitude</td>
</tr>
<tr>
<td>6. decibel</td>
<td>___ movement of an object or an object’s molecules, either back and forth or up and down</td>
</tr>
<tr>
<td>7. wavelength</td>
<td>___ special device used to detect objects in deep waters</td>
</tr>
<tr>
<td>8. frequency</td>
<td>___ process used by animals to locate objects using echoes</td>
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<td>9. echolocation</td>
<td>___ organ that receives vibrations and sends information about those vibrations to the brain</td>
</tr>
<tr>
<td>10. sonar</td>
<td>___ unit of measurement used to measure frequency</td>
</tr>
</tbody>
</table>

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VOCABULARY

The following terms are from *Real World Science: Sound*. Fill in the number of each term next to its closest definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. vibration</td>
<td>movement of an object or an object’s molecules, either back and forth or up and down</td>
</tr>
<tr>
<td>2. eardrum</td>
<td>organ that receives vibrations and sends information about those vibrations to the brain</td>
</tr>
<tr>
<td>3. Hertz</td>
<td>unit of measurement used to measure frequency</td>
</tr>
<tr>
<td>4. longitudinal</td>
<td>type of wave that moves back and forth, like a spring</td>
</tr>
<tr>
<td>5. amplitude</td>
<td>property of sound that measures the number of waves passing a certain point in a given period of time</td>
</tr>
<tr>
<td>6. decibel</td>
<td>property that describes how loud or soft a sound is</td>
</tr>
<tr>
<td>7. wavelength</td>
<td>measurement of the distance between two high points or low points on a wave</td>
</tr>
<tr>
<td>8. frequency</td>
<td>special device used to detect objects in deep waters</td>
</tr>
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</tbody>
</table>
REAL WORLD SCIENCE: SOUND
Review Questions

Answer the following questions based on what you learned in the program Real World Science: Sound.

1. Why do sounds travel faster in warm air than in cold air?
   Warm molecules move and bounce off each other more quickly than cold molecules.

2. How do bats use echolocation to “see” where they are going?
   Bats make a high-pitched noise that bounces off of other objects, making an echo. By listening to the echoes, the bats can determine their distance from objects and what the objects are.

3. What happens when sound waves reach the eardrum?
   The eardrum turns the sound waves into signals that are carried by nerves to the brain. The brain interprets the signals into specific sounds.

4. Why is there no sound in outer space?
   Most of outer space is empty, with no air or other mediums. Sound waves cannot travel unless they are carried by the molecules of a medium.

5. What is amplitude and how is it measured?
   Amplitude describes how loud or soft a sound is. Amplitude is measured by the height of a sound wave. The unit of measurement used for amplitude is the decibel.

6. What is frequency and how is it measured?
   Frequency is the number of sound waves that pass a certain point in a given time. Frequency determines a sound’s pitch—the highness or lowness of a sound. Frequency is measured in Hertz.

7. What is sonar and how is it used?
   Sonar (Sound Navigation And Ranging) is a device used by scientists, sailors and others to navigate and to locate objects in deep water. A signal is sent into the water. When it hits an object, the signal bounces back to the source. By knowing the speed of sound, scientists can calculate the size of the object and how far away it is.
TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1. F Amplitude determines the pitch of a sound.
2. T When a sound is over 120 decibels, the sensation of sound is replaced by the sensation of pain.
3. F Humans can hear sounds with much higher frequencies than the sounds heard by dogs.
4. T Bats navigate using a process known as echolocation.
5. T The quality of a medium that describes how quickly molecules move against each other is known as elasticity.
6. F The colder a medium gets, the faster sound will travel through it.
7. F In outer space, there is no sound because the air is too dense.
8. T A longitudinal wave moves back and forth like a spring.
9. F The high points of a wave, called troughs, represent the rarefactions of the wave.
10. T Wavelength is the measurement of the distance between two high points or low points on a wave.
WHICH ONE?

Circle the correct choice for each question below.

1. Which sound has a higher pitch?  
   - birdsong  
   - lion’s roar

2. In which medium does sound travel faster?  
   - steel  
   - hydrogen

3. Which sound has a lower amplitude?  
   - a whisper  
   - a trumpet

4. Which sound has a higher frequency?  
   - a flute  
   - a tuba

5. Which sound has a lower pitch?  
   - a gong  
   - a whistle

6. In which medium does sound travel more slowly?  
   - air  
   - water

7. Which frequency can be heard by bats, but not by humans?  
   - 45,000 Hertz  
   - 15,000 Hertz

8. Which sound is in the threshold of sensation?  
   - 70 decibels  
   - 140 decibels

9. Which sound has a higher sound wave?  
   - an airplane  
   - a telephone

10. In which medium does sound travel more quickly?  
    - warm air  
    - cold air
S ________________  There is no sound in outer ____ because there is no air for sound waves to travel through.

O ________________  Many sounds with a frequency ____ 20,000 Hertz can be heard by animals, such as dogs and bats.

U ________________  Sounds with a frequency ____ 20 Hertz cannot be heard by humans.

N ________________  ____ carry sound wave signals from the inner ear to the brain.

D ________________  ____ is a way to describe how closely molecules are packed together.

W ________________  Sound travels in longitudinal ____.

A ________________  The loudness or softness of a sound is known as its ____.

V ________________  ____ is the movement of an object back and forth or up and down.

E ________________  The ____ is a tiny organ that turns sound waves into signals that travel to the brain.

S ________________  Any object that travels faster than the speed of sound is called ____.
WORD SEARCH

Each word below was discussed in the program. Write the definition of each word, using a dictionary for words that are unfamiliar. Then circle each word you find in the word search. They may be arranged horizontally, vertically, diagonally, forward or backward.

wavelength - the measurement of the distance between two high or low points on a wave
medium - any solid, liquid or gas
compression - place in a sound wave where molecules are squeezed together
rarefaction - place in a sound wave where molecules are stretched apart
amplitude - describes how loud or soft a sound is
frequency - number of sound waves that pass a certain point during a given time period
echolocation - process of using echoes to navigate or locate objects
pitch - the highness or lowness of a pitch
TEST

Circle the phrase which best answers each question.

1. Sound is energy created by movements known as:
   - ions.
   - mediums.
   - Hertz.
   - vibrations.  [Correct answer]

2. Sound travels through the air in the form of a ________ wave.
   - ultraviolet
   - radio
   - longitudinal  [Correct answer]
   - sonar

3. In outer space, there is no sound because:
   - there is no medium to carry sound waves.  [Correct answer]
   - the air temperature is too cold.
   - it is too dark for sound waves to travel.
   - the atmosphere is too dense.

4. In a sound wave, there are areas of compression and areas of:
   - rarefaction.  [Correct answer]
   - echolocation.
   - polarity.
   - transference.

5. The loudness or softness of a sound is known as its:
   - frequency.
   - pitch.
   - amplitude.  [Correct answer]
   - wavelength.
6. At 120 decibels, the sensation of sound is replaced by the sensation of:

• pitch.
• supersonic sound.
• silence.
• **pain.**

7. Frequency determines pitch, which is:

• the distance between two high points or low points on a wave.
• **the highness or lowness of a sound.**
• the size of a sound wave.
• the loudness of a sound.

8. Bats navigate by using a process known as:

• the Doppler effect.
• oscillation.
• circumnavigation.
• **echolocation.**

9. Sound travels more slowly when a medium becomes:

• warmer.
• **colder.**
• more dense.
• less elastic.

10. Objects that travel faster than the speed of sound are called:

• harmonic.
• **supersonic.**
• stereophonic.
• amplified.