Sound
Section 1 The Nature of Sound

CHAPTER 10

Scan Use the checklist below to preview Section 1 of your book.

- Read all section titles.
- Read all bold words.
- Read all charts and graphs.
- Look at all the pictures and read their captions.
- Think about what you already know about sound.

Write three facts you discovered about the nature of sound as you scanned the section.

1. 
2. 
3. 

Review Vocabulary Define amplify in a sentence that shows its scientific meaning.

amplify

New Vocabulary Define the following terms.

eardrum

cochlea

Academic Vocabulary Use a dictionary to define medium as a noun that might relate to sound.

medium

120 Sound
Section 1 The Nature of Sound (continued)

Main Idea

Vibrations and Sound
I found this information on page _________.

Details

Complete the diagram showing what vibrates to produce each sound on the right.

- music from the radio
- people speaking
- all sound

Sound Waves
I found this information on page _________.

Sequence the steps involved in creating a sound wave from a speaker. The steps are written in scrambled order at right. Write the steps in the correct order in the boxes on the left.

1. The air molecules collide with other air molecules.
2. A speaker vibrates.
3. A sound wave forms.
4. Energy is transferred between air molecules.
5. Some energy is transferred to these air molecules.
6. The speaker collides with nearby air molecules.

Moving Through Materials
I found this information on page _________.

Classify the words liquid, solid, and gas on the continuum below. Describe how close the molecules are to each other in each phase.

sound travels slowest

sound travels fastest

- liquid
- solid
- gas
Section 1 The Nature of Sound (continued)

Main Idea

How does temperature affect the speed of sound?
I found this information on page ____________.

Details

Compare the speed of the sound of a child yelling outside when it is 10° C to the speed of the sound when it is 30° C.

Human Hearing

Create your own sketch of an ear. Label and describe what each part of the ear does to enable you to hear.

- anvil
- cochlea
- ear canal
- eardrum
- hammer
- stirrup
- outer ear
- middle ear
- inner ear

SYNTHESIZE IT

Predict how hearing would change in a person with a damaged eardrum and hypothesize why this would be.
Preview the photos and illustrations in Section 2. Read the captions. Write three things you think will be discussed in this section.

1.  

2.  

3.  

Review Vocabulary

Define frequency in a sentence that shows its scientific meaning.

frequency  

New Vocabulary

Define the following terms.

intensity  

loudness  

decibel  

pitch  

Doppler effect  

Academic Vocabulary

Use a dictionary to define volume as it relates to sound.

volume
Main Idea

Intensity and Loudness

I found this information on page ________

Create density drawings of molecules in sound waves with a high level of intensity and a low level of intensity. Label a rarefaction and a compression.

<table>
<thead>
<tr>
<th>Low Intensity</th>
<th>High Intensity</th>
</tr>
</thead>
</table>

I found this information on page ________

Compare the travel distance and energy of high and low intensity sound waves. Identify which wave will travel farther, and which wave will lose its energy more quickly.

Complete the paragraph to summarize loudness.

The perception of intensity is ________. Loud sounds come from ________ that have ________ and ________. When these waves reach your ear, they cause your ________ to ________ than sound waves with ________. This leads to ________ of the bones of the ________ and of the ________ in the inner ear. As a result, you hear a ________ sound.
Section 2 Properties of Sound (continued)

Main Idea

Intensity and Loudness
I found this information on page _________.

Details

Identify the following key characteristics of sound intensity.
- how sound intensity is measured
- level of sound intensity that damages human hearing
- level of the faintest sound humans can hear

Organize information about sound frequencies in the table.

<table>
<thead>
<tr>
<th>Name</th>
<th>Frequencies</th>
<th>Humans can hear?</th>
<th>Use or Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrasonic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sonic</td>
<td>20 Hz-20,000 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultrasonic</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Doppler Effect

I found this information on page _________.

Complete the graphic organizer about the Doppler effect.

When a source of sound is moving you, compressions are _______, so the sound has a _____ frequency and a _____ pitch.

When a source of sound is you, compressions are _______, so the sound has a _____ frequency and a _____ pitch.

Connect It

Design a simple experiment to show younger students that sound intensity decreases with distance.
Sound
Section 3  Music

Define the headings, photos, illustrations, and captions in Section 3. Write three questions you have about this section.

1. __________________________________________

2. __________________________________________

3. __________________________________________

Review Vocabulary

resonance

Define resonance to show its scientific meaning.

New Vocabulary

Read the definitions below, then write the key term for each one in the left column.

made of sounds that are deliberately used in a regular pattern

describes the differences among sounds of the same pitch and loudness

a vibration with a frequency that is a multiple of the fundamental frequency

a hollow space filled with air that makes sound louder when the air inside of it vibrates

Academic Vocabulary

fundamental

Use a dictionary to define fundamental as an adjective.

_________________________________________________
Section 3 Music (continued)

**Main Idea**

**Making music**
- I found this information on page _____.

**Details**

- Distinguish between music and noise in your own words. Give one example of each.

- I found this information on page _____.

- Summarize the 3 things that determine the natural frequency of a guitar string.

  1. __________
  2. __________
  3. __________

- Sequence steps in the resonance of a woodwind instrument.

  ![Diagram]

**Sound** 127
Section 3 Music (continued)

Main Idea

Sound Quality
I found this information on page _____.

Musical Instruments
I found this information on page _____.

Details

Analyze the factors that cause each musical instrument to have its own unique sound quality.

Complete the table showing the different types of musical instruments and how they produce sound.

<table>
<thead>
<tr>
<th>Type of Instrument</th>
<th>How is sound produced?</th>
<th>What is the resonator?</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brass and Woodwinds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percussion</td>
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<td></td>
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</tr>
</tbody>
</table>

CONNECT IT

Design a musical instrument. Make a sketch of the instrument and describe how it produces music, how you change notes, and what the resonator is.
Sound
Section 4 Using Sound

Objectives Before you read Section 4, think about places where concerts take place. What sound advantages do indoor concerts have over open air concerts?

1. ________________________________________________________________________

Review Vocabulary

Define echo in a sentence of your own.

echo ________________________________________________________________________

New Vocabulary

Define the following key terms. Then use each term in a sentence.

acoustics ____________________________________________________________________

____________________________________________________________________________

echolocation __________________________________________________________________

____________________________________________________________________________

sonar ________________________________________________________________________

____________________________________________________________________________

ultrasound ___________________________________________________________________

____________________________________________________________________________

Academic Vocabulary

Use a dictionary to define design.

design ______________________________________________________________________
## Main Idea

**Acoustics**

I found this information on page ___.

**Echolocation**

I found this information on page ___.

**Sonar**

I found this information on page ___.

## Details

**Summarize** three characteristics of a room that can affect reverberation. List three materials or ways to reduce reverberation.

<table>
<thead>
<tr>
<th>Factors that Affect Reverberation</th>
<th>Ways to Reduce Reverberation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Model** a bat using echolocation to identify an insect. Be sure to include the sound waves being sent from the bat and reflecting to the bat from the insect.

**Summarize** how bats use echolocation to hunt.

**Sequence** the steps involved in using sonar to find the distance to an underwater object.

1. A sound pulse is emitted toward the bottom of the ocean.
   
   2.

   3.

   4.

   5.
Section 4 Using Sound (continued)

Main Idea

I found this information on page

Details

Identify four uses of sonar.

Organize information about the uses of ultrasound in medicine.

Uses of Ultrasound

Ultrasound

examine

parts such as:

Ultrasound in Medicine to treat:

Not as useful for:

SYNTHESIZE IT

Think about what you have learned about how particles absorb energy from waves to predict how ultrasonic treatments are able to break up kidney stones.