

# Guided Lesson Notes

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Sound Waves

**Directions:** Complete this study guide as you move through the lesson. By taking notes, you are more likely to remember what you are learning. The completed study guide can be used for practice activities and to prepare for quizzes and exams. Be sure to save each study guide so you can access it when you need it.

### Essential Vocabulary

As you encounter these scientific terms in the lesson, enter the meaning and an example (or two) for each. You can even draw a picture. If there are other unfamiliar words you find, enter them in the blank spaces provided.

<i>pitch</i>	<i>frequency</i>
<i>loudness</i>	<i>Doppler effect</i>
<i>intensity</i>	<i>decibel</i>

<i>ultrasonic</i>	<i>infrasonic</i>

## Introduction

Fill in the blanks below about sound.

\_\_\_\_\_ are produced by \_\_\_\_\_ within  
 \_\_\_\_\_. It is simple to see this in a \_\_\_\_\_ or a \_\_\_\_\_  
 as the sounds are produced by \_\_\_\_\_. Even your  
 \_\_\_\_\_ is caused by the vibrations of your \_\_\_\_\_  
 \_\_\_\_\_. These vibrations cause \_\_\_\_\_ in the  
 \_\_\_\_\_ around them causing \_\_\_\_\_  
 \_\_\_\_\_ waves.

## The Nature of Sound

1. What kind of waves are sound waves?

**2. Do sound waves require a medium? What happens to the medium in a sound wave?**

**3. Identify the typical speed of sound (at 20°C or room temperature).**

**4. What happens to the speed of sound as the temperature increases?**

**5. What does the term supersonic mean?**

**6. Define pitch. What does it mean to say that pitch is a human perception?**

**7. Fill in the blanks below about pitch and frequency.**

A high-pitched sound like that from a violin has a \_\_\_\_\_  
\_\_\_\_\_ of vibration.

A low-pitched sound like that from a tuba has a \_\_\_\_\_  
\_\_\_\_\_ of vibration.

**8. How do the frequencies of two notes one octave apart compare?**

**9. On average, what is the lowest frequency a person can hear? What is the highest frequency a person can hear?**

**10. Why don't people hear anything when ultrasound imaging is done in a medical office?**

**11. Define infrasonic.**

## Nature of Sound Review

Match the terms on the left to their definitions on the right.

Letter Match : Sound Term		Definitions
	supersonic	a. This determines the pitch of a sound.
	mach	b. Below the human hearing range
	frequency	c. The term used to describe a multiple of the speed of sound
	octave	d. This occurs when the frequency of a sound doubles.
	ultrasonic	e. Faster than the speed of sound
	infrasonic	f. Above the human hearing range

## The Wave Equation

1. Write the wave equation in both forms. Then define all the variables.

$v =$	
$\lambda =$	



$f =$	
$T =$	

2. In the example involving a man breathing argon to change the pitch of his voice, two of the three variables in the primary wave speed equation changed. Which one value remained constant?

**Sound Wave Practice Problems**

Select one of the problems listed and complete the table with the appropriate information. Choose from: Soda bottle, Violin, Wood, or Piano.

<b>Problem:</b>	
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Picture	Given/Find	Equation	Solution

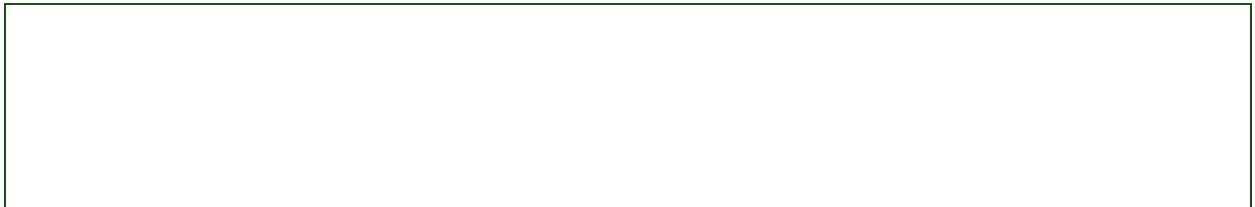


## Doppler Effect

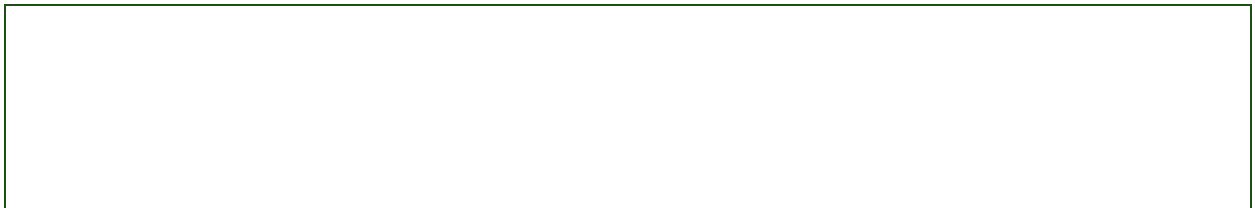
1. Sketch a drawing of the Doppler effect. Identify where a low frequency will be heard and where a high frequency will be heard.



2. Define the Doppler effect.



3. Why do both the frequency and wavelength of the sound being generated seem to be changed when they arrive at an observer?



## Sound Intensity

1. Define sound intensity.



2. Write the formula for sound intensity. Then define each of the variables.

$I =$	
$P =$	
$r =$	

3. What are the units for sound intensity?

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4. How are decibels defined in the video?

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### Sound Intensity Practice Problems

Select one of the problems listed and complete the table with the appropriate information. Choose from: Amplifier, Umpire, or Orchestra.

Problem:	
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Picture	Given/Find	Equation	Solution