

# Sound (p. 543 – 551)

## I. Properties Of Sound

1. Define the term sound waves.

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Sound Waves – longitudinal waves caused by vibrations  
(carry energy through a medium)

2. What produces all types of sound?

- Vibrations by an object

3. What is the speed of sound in air at room temperature?

346 meters / second

4. Sound travels through all mediums at the same rate.

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Circle One : True  False

5. Differentiate between sound loudness and sound intensity.

Loudness : Human perception of sound intensity

Intensity : Rate at which a sound wave transmits through a given area of a medium

A whisper can be louder than a person shouting.

6. Why can a quiet whisper not be heard on the opposite side of a room?

- Intensity is too low to travel the distance.  
(Air particles absorb the energy.)

7. How does increasing sound wave amplitude relate to :

Intensity = Increases      Loudness = Increases

8. The term "loud" can be interpreted differently by people.

Circle One : True  False

9. Define the term decibel.

Decibel – unit for sound intensity (abbreviated dB)

10. What do the following decibel levels represent?

10x greater for every 1.0 increase

0 dB = Threshold of Hearing      120 dB = Threshold of Pain

11. A higher pitch corresponds with a higher frequency (something vibrating rapidly).

Circle One : True  False

12. What is the frequency range of human hearing?

20 Hz to 20,000 Hz

13. Any sound that has a frequency below the range of human hearing is called

infrasound, whereas any sound that has a frequency above the range of hearing is called ultrasound.

- Infrasound
1. Wind
  2. Heavy Machinery
  3. Earthquakes
  4. Meteors
  5. Nuclear Explosions
  6. Supersonic Aircraft
  7. Avalanche
  8. Storms
  9. Auroras

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**II. Musical Instruments**

(Do you really listen to music?)

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1. All musical instruments use standing waves to produce sound.

Circle One : True False

YouTube  
Timbre

Gives instrument a distinct sound

2. Differentiate between fundamental frequency and natural frequency.

Fundamental : Main tone that is heard + played

Natural : Particular set of frequencies at which an object vibrates

Mythbusters

- Nikola Tesla  
"Earthquake Machine"

3. Sound on a guitar is loudest when forced vibrations vibrate at the fundamental frequency. natural

Circle One : True False

4. Define the term resonance.

Resonance - phenomenon that occurs when two objects naturally vibrate at the same frequency (string + guitar body = amplified)

YouTube

Wine Glass

5. What are four factors that affect the natural frequency of any object?

- Shape
- Size
- Mass
- Material

**III. Hearing & The Ear**

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1. Complete the flowchart showing how sound waves are interpreted.

The outer ear gathers sound waves.

The middle ear amplifies the waves.

The inner ear converts sound waves into nerve impulses and are sent to the brain.

The brain decodes and interprets nerve impulses.

Complications

- Deafness
- Positional Vertigo
- Motion Sickness

- \* Audiologists \*
- \* Rock Concerts \*
- \* Silly Silo \*

**IV. Ultrasound & Sonar**

1. Define the term sonogram.

Sonogram - video images of ultrasound wave signals (Don't always trust "girl" diagnosis.)

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2. Medically, what are three uses of ultrasonic waves? (Not in the book.)

- Pregnancies
- Kidney Stones
- Heart Disease Detection

3. Define the term sonar.

Sonar - system that uses the reflection of sound waves to detect objects underwater

Form of ultrasound

4. What are three uses of sonar? (Not in the book.)

- Detecting submarines
- Find schools of fish
- Map ocean floor