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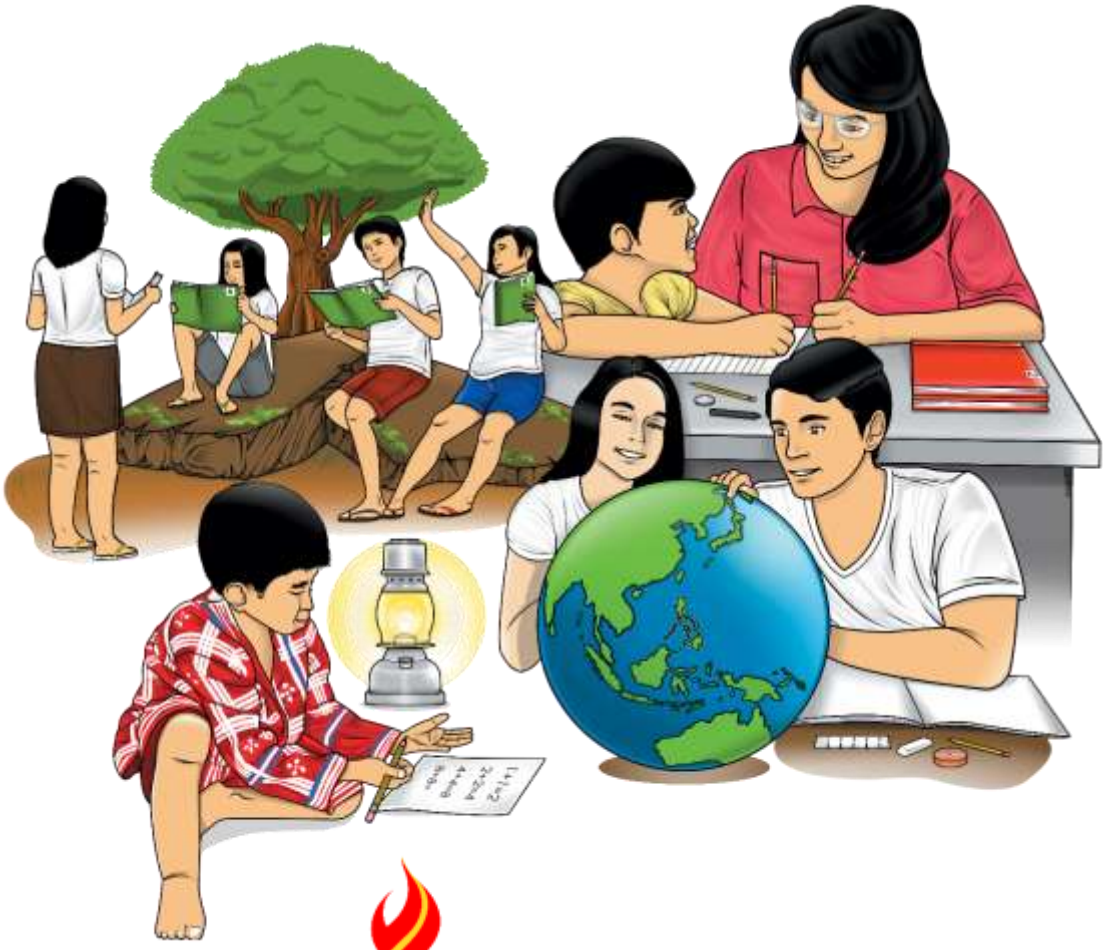
# Science

## Quarter 3 – Module 4
## It's Nice to HEAR You!



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7

# Science

## Quarter 3 – Module 4

## It's Nice to HEAR You!

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# Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

# *What I Need to Know*

Hello my dear learner! You may be curious as to how sound is made. As living organisms, we are surrounded by many sounds. Some are low but some are high. Some are soft but some are loud. When we sing a song or when we tap on objects, we produce sounds. Sound enables us to communicate with one another. In order to have a healthy communication we need to consider how it is produced and its basic characteristics. These characteristics will be explained as we go along with our discussion.

**Most Essential Learning Competency**

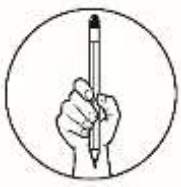
Describe the characteristics of sound using the concept of wavelength, velocity, and amplitude.

This module is focus on.

**Lesson 1** – Characteristics of Sound

After going through this module, you are expected to:

1. identify the characteristics of sound using the concept of wavelength, velocity, and amplitude; and
2. describe the characteristics of sound.



# *What I Know*

**Directions:** Read the questions carefully and choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. What do we call the vibration that propagates as an acoustic wave through a transmission medium such as gas, liquid or solid?
   A. Song
   B. Sound
   C. Wave
   D. Zone

2. Sound plays a vital role in our daily living. Communication is one among of its uses. Can we also use sound in emergency response?
   A. No, because sound is used only for communication.
   B. No, because it leads others in panic if a loud sound will be produced.
   C. Yes, because a loud sound can drive away a strong typhoon or flood.
   D. Yes, because a loud sound can be the fastest way inform the community that a disaster might come.

3. Which of the following gives the correct order of speed of sound from slowest to fastest in the given material?
    A. air, steel, water
    B. steel, water, air
    C. water, air, steel
    D. air, water, steel

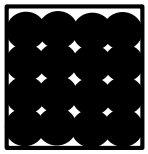
4. Which of the following is **NOT** capable of transporting sound?
    A. Air
    B. Ice
    C. Water
    D. Vacuum

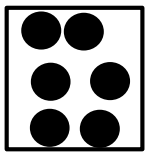
5. Which of the following describes sound wave?
    A. Oceanic wave
    B. Standing wave
    C. Transverse wave
    D. Longitudinal wave

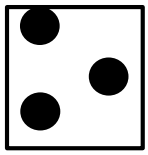
6. Which of the following is **NOT** a characteristic of sound?
    A. Amplitude
    B. Velocity
    C. Wavelength
    D. Zone

7. In what material does sound travel the fastest?
    A. Gas
    B. Liquid
    C. Solid
    D. Vacuum

For item numbers 8-10: Solids, liquids, and gases are different in terms of its molecules. These molecules are important in production and transmission of sounds effectively.

SOLID 

LIQUID 

GAS 

8. Which of the following statements BEST describes the relationship between ~~a~~ sound and medium?
    A. Sound is affected by different media.
    B. Sound cannot pass in different media except in gas.
    C. Sound is affected by different molecules of each given material. Thus, it makes this travels fast and slow.
    D. Sound is not affected by different molecules of each given material. Thus, it makes this travels fast and slow.

9. What makes sounds travel faster in solid than in gas?
   A. The arrangement of molecules
   B. The arrangement of the container
   C. The temperature of each material
   D. The temperature of each container

10. Which of the following is **INCORRECTLY** matched in terms of the arrangement of molecules?
   A. Gas-far
   B. Liquid-very far
   C. Solid-compact
   D. Solid-condensed

11. Which of the following statements are TRUE on solid materials?

| | |
|---|---|
| I. | Solid materials make sound moves fast. |
| II. | Solid materials have compact molecules. |
| III. | Solid materials are the best materials that allows sound to moves fastest |
| IV. | Solid materials does not allow sound particles to move faster than in other materials |

   A. I and II only
   B. II and III only
   C. I, II, and III only
   D. II, III and IV only

12. Read the statements carefully. Which of the following BEST describes the two statements given?

| |
|---|
| Statement I: Sound is a longitudinal wave.<br>Statement II: Sound may pass through different materials with different speeds. |

   A. Both statements I and II are TRUE.
   B. Both statements I and II are FALSE.
   C. Statement I is FALSE while statement II is TRUE.
   D. Statement I is TRUE while statement II is FALSE.

13. Read the statements carefully. Which of the following BEST describes the two statements given?

| |
|---|
| Statement I: Molecules of gases are farther apart; it makes sound travels the slowest.<br>Statement II: Molecules of solid are very close; it makes sound travels the fastest. |

   A. Both statements I and II are TRUE.
   B. Both statements I and II are FALSE.
   C. Statement I is False while statement II is TRUE.
   D. Statement I is TRUE while statement II is FALSE.

14. Which of the following statements are TRUE about the speed of sound?

| | |
|---|---|
| I. | The speed of sound may vary in each material. |
| II. | The speed of sound depends in one material. |
| III. | The speed of sound changes as it passes through different media. |
| IV. | The speed of sound is constant as it passes through different media. |

A. I and II only
B. I, II and III only
C. II, III and IV only
D. I, II and III only

15. Each object can produce a unique sound. Are all objects able to produce sound without producing any vibrations?
A. No, because all objects are vibrating objects.
B. Yes, objects can make sound without vibration.
C. No, because to produce sound it requires vibrations.
D. Yes, objects can produce sound with and without vibrations.

**Lesson 1**

# Characteristics of Sound

## *What's In*

Hello, Learner! In the previous module, you inferred that waves carry energy. Waves can be typified according to the direction of motion of the vibrating particles with respect to the direction in which the waves travel. The different types of waves are transverse, longitudinal and surface waves. These waves can carry energy through vibrations.

But how are vibrations produced? Does sound have vibrations too? Is this vibration produced related to the characteristics of sound? The answer is yes. This time we will try to identify the three concepts in describing the characteristics of sound.

**Directions:** Find the 3 words that will describe characteristics of sound using the word bank below. Underline the word and describe each of them on the space provided. Write your answer on a separate sheet of paper.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U | N | J | J | S | T | O | P | X | V | W | T |
| I | F | A | D | C | H | F | H | U | H | W | N |
| A | M | P | L | I | T | U | D | E | Y | V | H |
| Z | T | C | V | E | L | O | C | I | T | Y | P |
| W | A | V | E | L | E | N | G | T | H | E | H |
| K | Z | R | D | I | Y | W | Y | H | D | R | A |
| A | W | U | C | E | K | X | E | U | Z | Z | I |
| I | T | C | B | V | E | T | V | T | E | G | F |

1.

2.

3.

## *What's New*

The previous activity asked you to identify the different characteristics of sound. This time we will describe each of its characteristic using the poem below.

This poem will explain more about the concept of each characteristic. Let's start by reading the poem and answering the guide questions below. Write your answer on a separate sheet of paper.

**CAN YOU HEAR ME?**

by: Jaypee Kadalem Balera

Sounds are everywhere
They are different, you can compare
From one medium they are there
Some of them are nice to hear

Sounds have different speeds
Depends on the medium its velocity indeed
Some are slow but some are fast if you believe
They travel in gas, liquid and also in solid

If you hear them loud
It's amplitude makes it like sound of a crowd
The distance of crest or trough
Makes the beauty that is true

If it seems the sound is close or away
Wavelength will tell you how far its way
Just hear to make them stay
To understand them clear of what they say

The beauty of sound goes around
Appreciate the gift that makes them bound
Remember that sound make us bond
Vibration is the cause that produces sound

**Guide Questions:**

**Directions:** Read the questions carefully. Write your answer on a separate sheet of paper.

1. Do sounds vary in speed? If yes, how?
2. How does the poem define amplitude?
3. How does the poem define wavelength?
4. How does sound produce?

## *What is It*

When we talk, it is observed that our vocal chords vibrate. The vibrations make us produce a variety of sounds. Vibration can either be to-and-fro or back-and-forth. It is a disturbance that travels through different media. This movement travels from our ears and is interpreted by our brain. Sound waves are longitudinal waves are classified as mechanical waves because it needs a medium in order to propagate.

Sound waves can travel in different medium such as solid, liquid and gas. How? Try to do this?

Set-up 1

Place your ear against one end of a table top. Ask your friend or family member to gently tap the other end of the table. Listen.
Try again but this time your ear should not be touching the table. Listen.

Set-up 2

Place your ear on a surface of a pail full of water. Ask your friend or family member to gently tap the container on the other side Listen
Try again but this time your ear should not touch the water. Listen.

Set-up 3

Ask your friend or family member to stand a distance away from you while holding can. Have them tap the can then listen.
Try again but this time asks your friend or family member to move 10 steps forward. Listen.

In the previous set-up, you have observed that sound is produced by tapping the table, container and can. The vibrations created by tapping produced the sound. This also shows that sound travels through different media. Sound is more distinct in solids than in any other medium. It is louder than that ~~of~~ in liquid and in gas. It is because the particles of a solid are more compact than that of liquid and gas. This allows for sound to travel~~s~~ fastest in solid and slowest in gas. Can you identify which of the following states of matter do the figures represent?

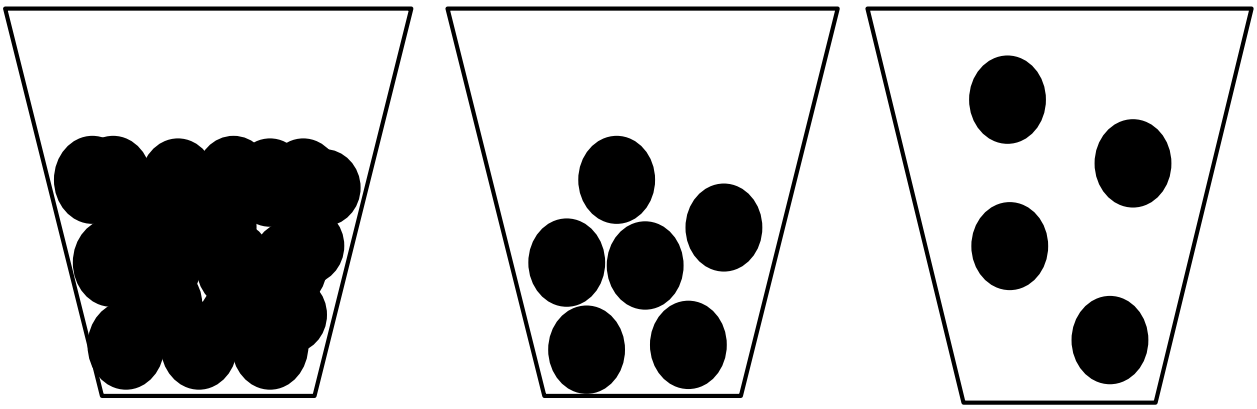


Figure 1: States of matter

The table shows the speed of sound in different media.

| **MATERIALS** | **SPEED OF SOUND v (m/s)** |
|---|---|
| Air (0°C) | 331 |
| He (0°C) | 1005 |
| H (20°C) | 1300 |
| Water | 1440 |
| Seawater | 1560 |
| Iron and Steel | 5000 |
| Aluminum | 5100 |
| Hardwood | 4000 |

The speed of sound is also dependent on other factors such as (1) atmospheric pressure, (2) relative humidity, and (3) atmospheric temperature. These factors are also identified in your previous lesson. Just for example in low lands with hot surroundings, sound travels faster. Why? Because there is more molecular interaction that takes place in hot air. Hot air has more kinetic energy and so there is an increase in the mean velocity of the molecules.

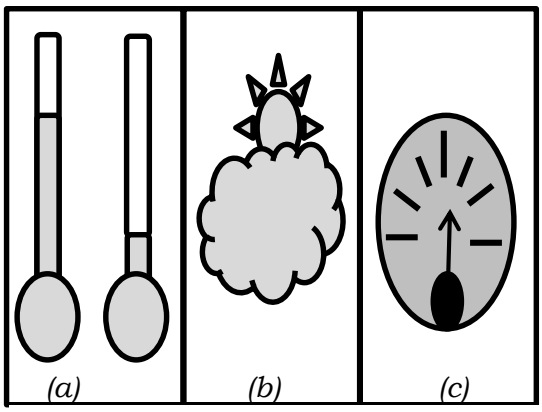
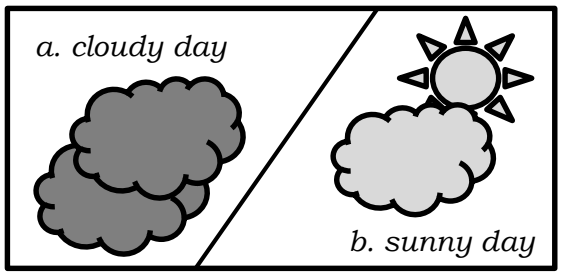


*Figure 2: a. thermometer, b. cloudy weather c. hygrometer*

Sound also travels faster in a less dense substance. Hence, sound waves travel slower in humid air during cloudy day than in dry air during sunny day.




Sound also possesses characteristics of a wave. These are frequency, wavelength, amplitude, speed or velocity, period and phase. Moreover, it has properties which are pitch and loudness of sound. Pitch refers to highness and

lowness of sound. Loudness is how soft or how intense the sound is as perceived by the ear and interpreted by the brain.

Sound can be identified using the pitch and loudness. How? Try to do this?

| |
|---|
| Get 2 different metal spoons with different sizes.<br>Drop it to the ground one after the other.<br>Listen to the sound produced |

.

| |
|---|
| Get 2 different metal plates with different sizes.<br>Drop it to the ground one after the other.<br>Listen to the sound produced. |

You have observed that each material has different pitch and loudness. The thin metal spoon or plate has a higher pitch while a bigger metal spoon or plate is louder than the other.

When we listen to music, we talk about pitch in terms of how we *perceive* what we hear, but pitch is actually directly related to the physics of sound waves. The *frequency* of a sound wave creates what we hear or perceive as *pitch*. It is a measurement of how fast the sound wave vibrates. As shown in Figure 3, the more quickly a sound wave vibrates (the shorter the period), the higher the pitch; slower vibration (longer period) results in a lower pitch. Everything we hear is made of sound waves and, therefore, has a pitch.

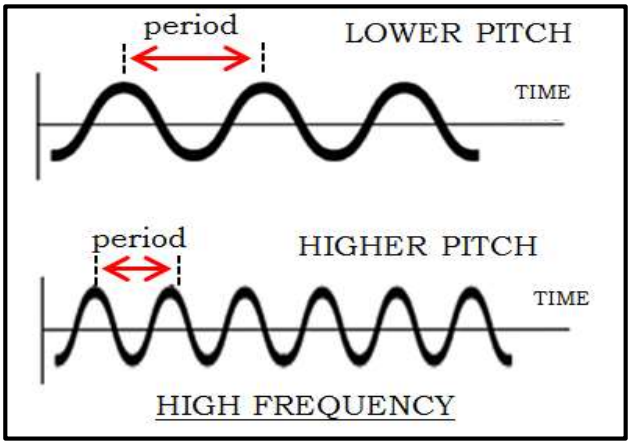



*Figure 3: Relationship of pitch with frequency*

The loudness is the measure of response of a sound by human ear. The loudness of a sound is directly related to the square of its amplitude. As shown in Figure 4 when the sound waves have small amplitude, the sound will be soft. On the other hand, is the sound waves have a large amplitude the sound will be loud.

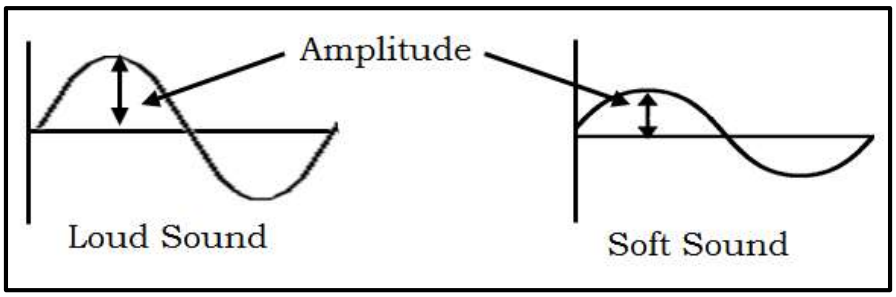



*Figure 4: Relationship of amplitude and loudness*

The loudness and intensity of sound may also affect our hearing. The amount of energy that a sound wave carries can damage our ears. High amplitude sound usually carry large energy and have higher intensity while low amplitude sound carry lesser amount of energy and have lower intensity. Sounds at or below 70dBA are considered safe while any sound at or above 85dBA will more likely ~~to~~ damage our hearing over time.

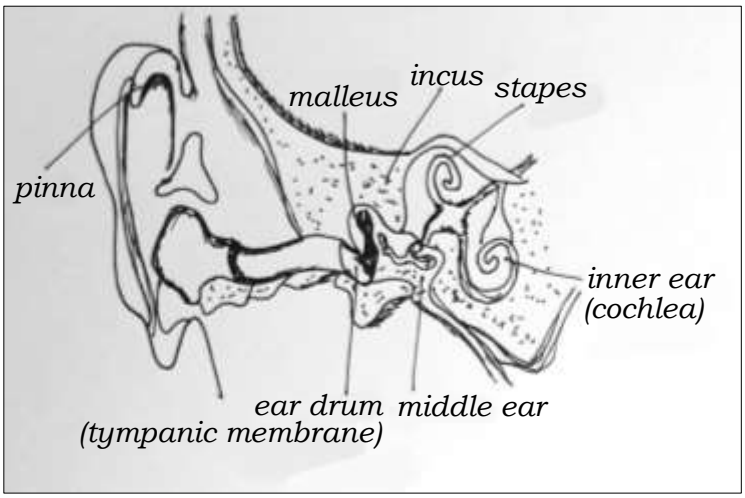



*Figure 5: Anatomy of the ear*

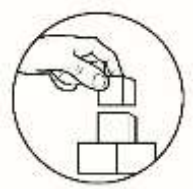
These sounds are collected by the outer ear called pinna and focus them into the ear canal. This canal transmits the sound waves to the eardrum.

At the end of the ear canal is the ear drum that separates the outer and the middle ear physically. Air vibrations set the eardrum membrane (tympanum) in motion that causes the smallest bones to move (hammer/ malleus, anvil/incus and stirrup/stapes). These three bones convert the small amplitude vibrations of the ear drum into large amplitude oscillations. These oscillations are transferred to the inner ear through the oval window.

The large amplitude oscillations create waves that travel in liquid (cochlea) and are converted into electrical impulses, which are sent to the brain by auditory nerve. The brain interprets these signals as words, music or noise. Loud noise can damage cells and membranes in the cochlea inside our ears. Exposure to loud sound for a long period of time may cause damage and overwork hair cells in our ears, which can make cells die.

The table shows the sound level from different sound sources.

| Source of sound | LEVEL (dB) |
|---|---|
| Jet engine, 30 m away | 140 |
| Amplified rock music | 115 |
| Normal conversation | 60 |
| Library | 40 |
| Close whisper | 20 |
| Normal breathing | 10 |



## *What's More*

**Directions:** Fill in the following circles with greater than (>) or less than sign (<). Write your answers on a separate sheet of paper.

Situation Number 1:

Karlee's father is very familiar with the speed of sound. He is able to identify in which material can sound have the fastest speed. Use these symbols to compare which material can transmit sound greater/faster.

| | | |
|---|---|---|
| AIR | ◯ | HELIUM |
| WATER | ◯ | SEA WATER |
| IRON STEEL | ◯ | ALUMINUM |
| HARD WOOD | ◯ | AIR |

Situation Number 2:

Cloe's mother is very familiar with the intensity of sound. She is able to identify which source of sound has the least loud sound. Use these symbols to compare. Which situation or location has a greater/louder sound?

| | | |
|---|---|---|
| JET ENGINE | | NORMAL BREATHING |
| LIBRARY | | AMPLIFIED ROCK MUSIC |
| JET ENGINE | | NORMAL CONVERSATION |
| NORMAL BREATHING | | LIBRARY |

## *What I Have Learned*

**Directions:** Read carefully and answer the following. Write your answers on a separate sheet of paper.

**Test A.** Arrange the following materials where sound can travel the slowest to the fastest, 1 as the slowest and 8 as the fastest.

| | | | | |
|---|---|---|---|---|
| Air | Helium | Hydrogen | Aluminum | Hardwood |
| Iron and Steel | | Water | Seawater | |

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

**Test B.** Arrange the following source of sound from the lowest to highest sound level/amplitude of sound, 1 as the lowest and 6 as the highest.

| Jet engine | Close whisper | Library | Rock Music | Normal talking |
|---|---|---|---|---|

1. _____
4. _____
2. _____
5. _____
3. _____
6. _____

## *What I Can Do*

In this present time, environmental problems are one of the major disaster that affects our community. To inform everybody on the coming disater, we can create loud sounds from different things in order to produce sound with larger amplitude, longer wavelenghth and faster velocity. As a student, we must be prepared in order to make ourself and others safe.

**Directions:** Draw an object that can be used as an early warning device considering a loud sound must be produced. Write you're answer in a separate sheet of paper.

**Directions:** Study the table below and grade your output based on the given criteria below.

| Criteria | Advanced 10 points | Proficient 7 points | Developing 5 points | Beginning 3 points | Rate |
|---|---|---|---|---|---|
| **Content** The output | | | | | |
| a. is relevant to the lesson<br>b. can produce loud sound<br>c. can be effectively used during a disaster<br>d.is easy to recognize<br>f. Other indicators please specify _____. | Satisfies at least **five** indicators | Satisfies only **four** indicators | Satisfies only **three** indicators | Satisfies only **one or two** indicator/s | |
| **Originality** The output | | | | | |
| a. reflects original work<br>b. manifests creativity<br>d. displays good presentation<br>e. catches attention<br>f. Other indicators, please specify _____. | Satisfies at least **five** indicators | Satisfies only **four** indicators | Satisfies only **three** indicators | Satisfies only **one or two** indicator/s | |
| **Neatness** The output | | | | | |
| a. is visually appealing<br>b. contains no scratches, tears, rips, marks or folds<br>c. has color coordination<br>d. has color contrast<br>e. manifest cleanliness<br>f. Other indicators, please specify _____. | Satisfies at least **five** indicators | Satisfies only **four** indicators | Satisfies only **three** indicators | Satisfies only **one or two** indicator/s | |
| | | | | **Total** | |

## *Assessment*

**Directions:** Read carefully and analyze the questions. Write your answer on a separate sheet of paper.

1. Which of the following is **NOT** a characteristic of sound?
   A. Amplitude
   B. Velocity
   C. Wavelength
   D. Zone

2. In which of the following materials does sound travel the fastest?
   A. Helium
   B. Sea water
   C. Spoon
   D. Fresh water

3. In which of the following does sound travel the slowest?
   A. Hardwood
   B. Helium
   C. Hydrogen
   D. Seawater

4. Which of the following is the correct sequence on the transmission of sound in the ear?
   A. Ear canal – ear drum – middle ear (malleus, incus, and stapes) - cochlea
   B. Ear canal – middle ear (malleus, incus, and stapes) - cochlea - ear drum
   C. Middle ear (malleus, incus, and stapes) - cochlea - ear drum - ear canal
   D. Middle ear (malleus, incus, and stapes) - ear drum - ear canal - cochlea

5. Which of the following media does sound travels fastest?
   A. Air
   B. Helium
   C. Hydrogen
   D. Water

6. Which of the following media does sound travels the slowest?
   A. Aluminum
   B. Harwood
   C. Helium
   D. Seawater

7. Which of the following figures is the correct diagram of a noise?

A. 

B. 

C. 

D. 

8. Is it TRUE that all objects produce different sounds?

A. No, because objects are in uniform materials.
B. No, because all objects have the same sound even ~~if~~ when using different materials.
C. Yes, because they are all made from different manufacturers.
D. Yes, because objects are made from different materials with different properties.

9. What is the correct arrangement of materials where sound travels the fastest slowest?

A. Solid – Liquid - Gas
B. Gas – Solid - Liquid
C. Liquid – Gas - Solid
D. Gas – Liquid - Solid

10. Karen was asked by her science teacher if the movement of sound can be faster in solid than in liquid. She answered yes. Is Karen correct?

A. No, because sound travels faster in liquid than in solid.
B. No, because solid and liquid have the same speed of sound.
C. Yes, because solid components are more elastic than liquid.
D. Yes, because the molecules are more compressed in solid than in liquid.

11. How do humans benefit from sound?

A. It is used for respiration.
B. It is used for circulation.
C. It is used for communication.
D. It is used for the decomposition of wastes.

12. Read the statements carefully. Which of the following BEST describes the two statements given?

| |
|---|
| Statement I: Sound makes us understand others.<br>Statement II: Sound gives us idea on the things around us. |

A. Both statements I and II are TRUE.
B. Both statements I and II are FALSE.
C. Statement I is FALSE while statement II is TRUE.
D. Statement I is TRUE while statement II is FALSE.

13. Read the statements carefully. Which of the following BEST describes the two statements given?

| |
|---|
| Statement I: Amplitude focuses on the loudness and intensity of sound.<br>Statement II: Frequency talks about the range of vibrations occurring in sound. |

A. Both statements I and II are TRUE.
B. Both statements I and II are FALSE.
C. Statement I is FALSE while statement II is TRUE.
D. Statement I is TRUE while statement II is FALSE.

14. Sound can damage our ears. How can we protect our ears from getting damaged by sound?

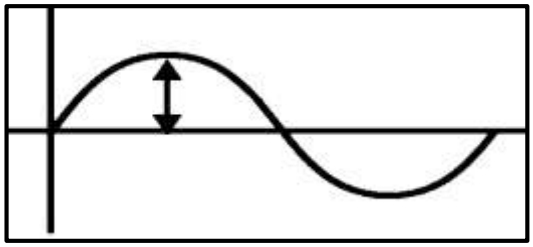
| |
|---|
| I. Keep away from sound with highest pitch and frequency.<br>II. Lessen the loudness of the source of sound.<br>III. Stay away from high amplitude sound that carries large energy. |

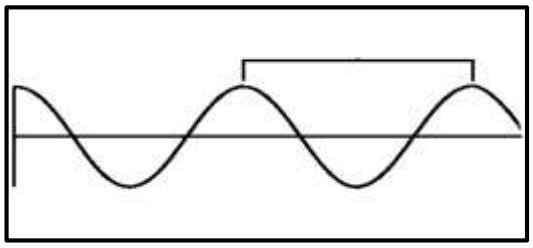
A. I and II only
B. I and III only
C. II and III only
D. I, II and III

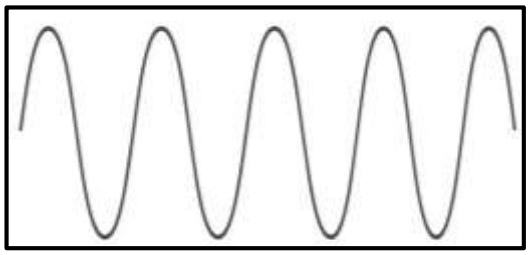
15. What will happen if our ear absorbs high intensity sound?
A. Some parts of the ear will carry out 50% of its function.
B. Our ears would be damaged but it will take hours? to function normally.
C. Our ears will no longer perform its function and we will become deaf.
D. The organ will be more functional as it is resistant from high intensity sound.

## *Additional Activities*

**Directions:** Using the given pictures, identify which of the following pictures refers to amplitude, frequency, wavelength of sound and describe how each one affects the characteristic of sound on the space provided. Write your answer on a separate sheet of paper.







# *Answer Key*

**Assessment**

1. D
2. D
3. A
4. A
5. A
6. A
7. C
8. D
9. A
10. D
11. C
12. A
13. A
14. D
15. C

**Additional Activities**




**What I can Do**

Score depends on the output and given criteria.

**What I have Learned**

Test A (In order)
1. Air
2. Helium
3. Hydrogen
4. Water
5. Sea Water
6. Iron and Steel
7. Aluminum
8. Hardwood

Test B
1. Normal Breathing
2. Close Whisper
3. Library
4. Normal Talking
5. Amplified Rock Music
6. Jet Engine

**What's More**




**What's New**

Answers may vary
1. Yes, sound varies in different speed, but it depends upon the medium it travels.
2. The poem defines amplitude as a sound of a crowd.
3. The open define the wavelength by distance.
4. Sound produced through vibrations.

**What's In**

In any order
1. Amplitude
2. Wavelength
3. Velocity

**What I Know**

1. B
2. D
3. D
4. D
5. D
6. D
7. C
8. C
9. A
10. B
11. C
12. A
13. A
14. B
15. C

# *References*

Asuncion, Alvie J., et al. (2017). *K to 12 Science Grade 7 Learner's Material.* First Edition. Pasig City: Bureau of Learning Resources (DepEd-BLR).

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