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P.6 SCIENCE SELF-STUDY LESSONS SET 2

12.6.20

DEAR LEARNERS, YOU ARE WELCOME TO SET TWO OF YOUR SELF -STUDY LESSONS.YOU WILL USE YOUR CLASS WORK BOOKS TO WRITE DOWN THESE NOTES AND YOU WILL ATTEMPT ALL THE GIVEN ACTIVITIES.

USE THE MK INTERGRATED SCIENCE TEXTBOOK FOR MORE READING.

THEME: MATTER AND ENERGY

TOPIC:SOUND ENERGY

TOPIC LEARNING OUTCOMES

By the end of the topic, you should be able to:

1. State the meaning of sound energy.
2. Identify the sources of sound.
3. Describe how sound travels.
4. State the different ways in which sound is produced, stored and reproduced.
5. Carry out experiments on behavior of sound with different materials.
6. Draws and labels the structure of the human ear and states the functions of each part.
7. Compare the human ear with other sound detecting organs of other animals.
8. Name the diseases and disorders of the human ear.
9. Discuss the ways of caring for the human ear.

LESSON ONE

TOPIC:SOUND ENERGY

CONTENT : SOURCES OF SOUND

By the end of the lesson, you should be able to:

a) state the meaning of sound energy.

b) mention the sources of sound.

c) describe the way sound is produced.

INTRODUCTION

- Go to the environment outside the class, listen and record the different organisms or materials that you hear producing sound. Those are examples of sound sources
- Group them into natural and artificial sources of sound

Read, spell and tell the meaning of these words

-energy -vibration -artificial -natural

SOUND ENERGY

- This is a form of energy produced by vibrations of surfaces.
- It stimulates the sense of hearing in some animals.

Sources of sound.

i) Natural sources of sound.

ii) Artificial sources of sound.

Natural sources of sound.

- These are organisms or objects that make sound but exist by nature.

Examples of natural sources of sound.

Animals	Birds	Wind
Rainfall	Lighting	Flowing water.

Artificial sources of sound.

- These are manmade sources of sound.

Examples of Artificial sources of sound.

i)	Radios	iv)	Bungles	vii)	Cars
ii)	Bells	v)	Flutes	viii)	Drum
iii)	Whistles	vi)	Guns	ix)	Guitars

Uses of sound

- For communication
- For entertainment

Music

- This is organized sound with regular vibrations.

Noise

- This is disorganized sound with irregular vibrations..

How sound is produced?

- Sound is produced by the vibrations.

NOTE:

- Vibration is the to and fro movement of an object or substance

How sound is produced by living things?

i) Animals including man produce sound by vibration of their vocal cords in the voice boxes.

ii) Birds sing by the vibration of rings of cartilage in their trachea.

iii) Bees and mosquitoes produce sound by vibration of their rapid flapping wings.

iv) Grasshoppers and crickets produce sound by rubbing their hind legs against their vibrating wings.

Exercise

1. What is sound?
2. Identify other two forms of energy besides sound energy
3. Name three artificial and natural sources of sound
    a. Artificial sources
    b. Natural sources
4. How is sound produced?
5. Why is sound regarded as a form of energy?
6. How do animals produce sound?
7. Why are birds regarded as natural sources of sound?

LESSON TWO

THEME: MATTER AND ENERGY

TOPIC:SOUND ENERGY

SUB TOPIC: MUSICAL INSTRUMENTS

By the end of the lesson, you should be able to :

a) give the meaning of musical instruments

b) state the types of musical instruments with examples of each.

c) describe how each type of musical instruments produces sound.

Read, spell and give the meaning of the following words

-Vibration -music -percussion

Introduction

- Observe the different musical instruments in the environment or music room.
- Find out how they are played and the parts that produce the vibrations when being played . Group them basing on how they are played

Musical instruments

- These are instruments that produce music when played well

Types of musical instruments

i) String instruments

ii) Wind instruments

iii) Percussion instruments

(a) String instruments.

These are instruments which produce sound by vibrations of the strings when plucked.

Examples of string instruments.

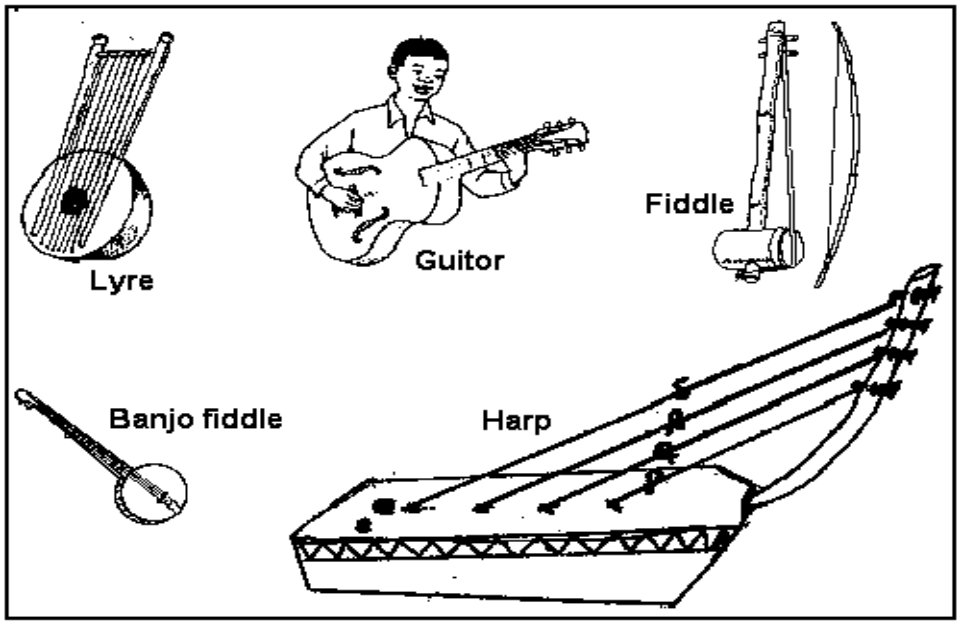
i) Guitar

ii) Lyre

iii) Harp

iv) Violin

v) Tube fiddle

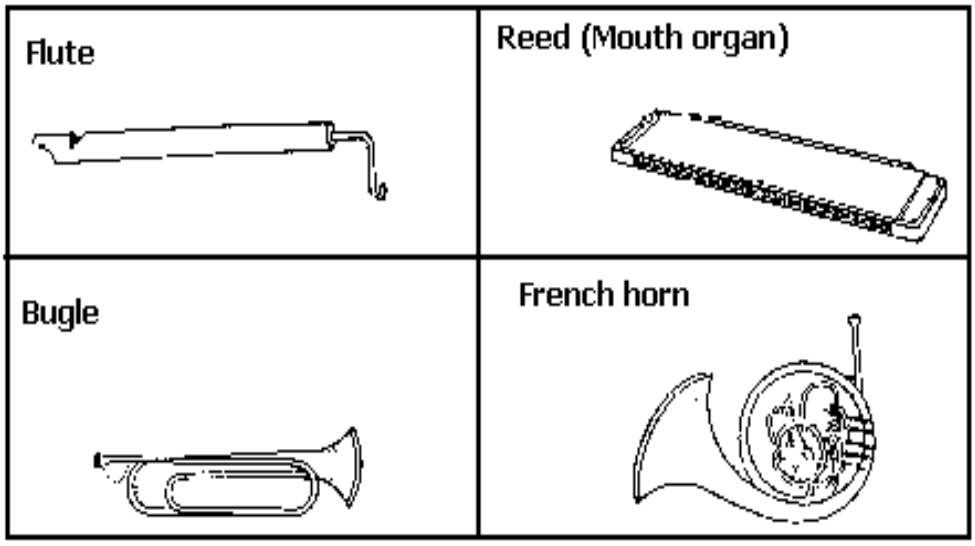


(b) <u>Wind instruments</u>

These are instruments which produce sound by vibration of air blown in them.

<u>Examples of wind instruments</u>

i)	Flute	iii)	Saxophoe	v)	Bottle
ii)	Trumpet	iv)	Pan pipes	vi)	Horn



(c) <u>Percussion instruments.</u>

- These are instruments which produce sound by vibration after striking or beating them.
- They produce sound by vibration of their skin when beaten or struck***.***

<u>Examples of percussion instruments</u>.

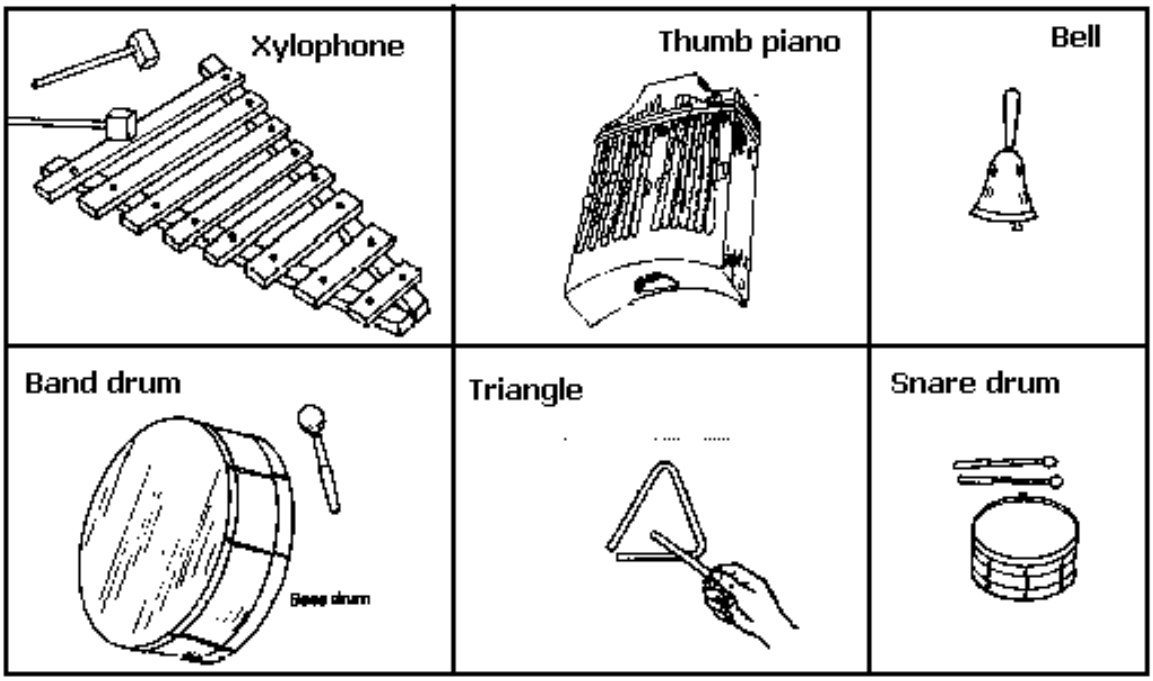
i) A drum produces sound by striking it then the skin vibrates.

ii) Shakers produce sound by striking them and they vibrate.

iii) Xylophones produce sound by striking them and they vibrate.

iv) Rattles -

v) Bells



1 . Name at least two types of instruments.

2 In which way is sound energy important to birds?

3 What can you do to make a tube fiddle produce sound?

4 How do the following instruments produce sound ?

1. Drum
2. Flute
3. Bow harp
4. Xylophone

ii. Which is a tube fiddle grouped under stringed instruments?

LESSON THREE

THEME: MATTER AND ENERGY

TOPIC:SOUND ENERGY

SUB TOPIC: PROPERTIES OF SOUND

By the end of the lesson, you should be able to:

a) identify the properties of sound

b) state the means by which sound travels

c) mention the speed of sound in the different states of matter

Vocabulary

Read and give the meaning of the following terms:

-molecules -vacuum - matter

Introduction

- When a school bell is rang, its sound reaches the ears of pupils in the entire school.
- This happens because sound can travel fro its source to other areas

Properties of sound

1. Sound travels to all directions from its source
2. Sound can be reflected
3. Sound can be high or low
4. Sound can be loud or soft

How sound travels.

- Sound travels through matter by means of sound waves.
- Sound waves travel to all directions from a vibrating object but become weaker as they move away from the vibrating object.

NOTE:

- Sound does not travel through a vacuum because a vacuum has no medium to transmit sound. i.e. a vacuum has no molecules to transmit sound
- A vacuum is a space without matter.

The speed of sound.

- Sound travels at different speed in different states of matter

i) Speed of sound in solids is 1500m/sec.

ii) The speed of sound in normal air or gases is 330m/sec.

iii) The speed of sound in liquids is 1484m/sec.

Therefore sound travels fastest in solids and slowest in gases.

Factors that affect the speed of sound.

(a) Temperature

- We hear very clearly and easily at night than day because during night, the temperatures are low and waves travel very near to the ground level. While during day, the waves move far from the ground.

(b) Heat

The heat of the day makes sound waves rise high making it difficult to hear.

(c) **Wind**. This can carry sound further if it is blowing in the same direction. If the wind blows against the sound, it is obstructed.

(d) **Altitude**.

Sound waves move easily along a lower altitude than climbing or going up a hill or mountain.

Exercise

1. How does a teacher's voice reach the reach the pupil's ears in class?
2. Why is sound able to travel through matter?
3. Name the human body organ that uses sound energy
4. State any two properties of sound
5. Give a reason why sound can't travel through a vacuum.
6. Why can't sound travel through a vacuum?
7. Mention any two properties of sound.

LESSON FOUR

THEME: MATTER AND ENERGY

TOPIC:SOUND ENERGY

SUB TOPIC: ECHOES

By the end of the lesson, you should be able to:

1. define an echo in relation to sound
2. state the importance and dangers of echoes
3. suggest the right ways of controlling echoes

Read and give the meaning of the following terms

echo - reflected - absorb - depth

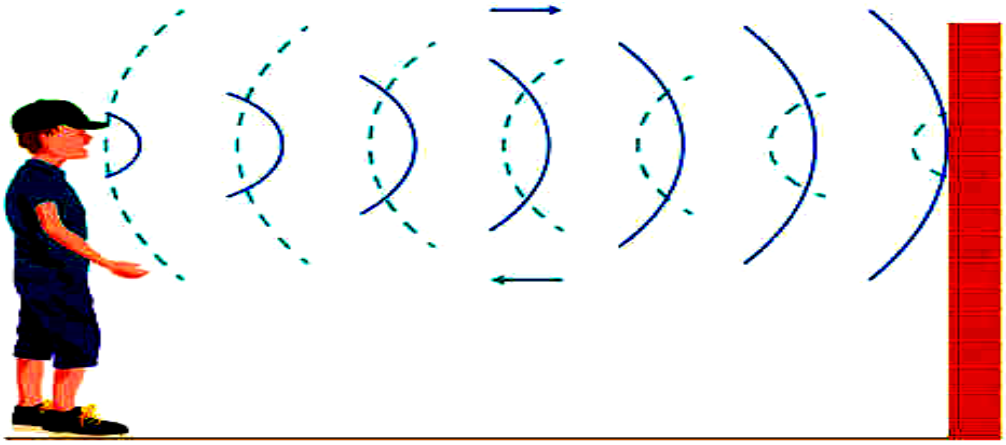
Introduction

- If you stand near an empty hall or tall building and shout your name once, You may hear your name more than once, this is because the hall or tall building bounces or reflects the sound back to you..
- That reflected sound is an echo

ECHOES

- **An echo** is a reflected sound.
- It is caused by the obstruction of sound waves by an obstacle or barrier.

Echoes are heard mostly around tall buildings, walls, cliffs, caves, mountains and empty big rooms.



Importance of Echoes.

i) Bats use echoes to locate food and obstacles when flying.

ii) Echoes are used by pilots to detect hills or mountains when flying aeroplanes to avoid accidents.

iii) Whales use echoes to detect and dodge obstacles ahead of them when swimming

iv) Echoes are used by sailors to record the depth of the sea to avoid accidents of crashing ice bergs or rocks.

Calculations on echoes

1. It took 3 seconds to hear the echo of a man chopping wood.

How far was the man from the chopping place?

$$\text{Distance} = \frac{S \times T}{2}$$

$$= \frac{(330 \times 3)}{2} \text{metres}$$

$$= \frac{990}{2}$$

$$= 495 \text{ metres}.$$

Note

- We divide by two because the distance is covered twice.ie, the distance covered by the sound and the echo.

2. Amooti was standing across a valley, which was 660 metre away from the cliff, if he shouts. How long will he take to hear the echo.

$$\text{Time} = \frac{D}{S}$$

$$= \frac{660\text{m} \times 2}{330\text{m/sec}}$$

$$= \frac{2}{1}$$

$$= 2 \times 2 \text{ sec}$$

$$= 4\text{sec.}$$

Disadvantages of echoes

- They disorganize communication
- Disorganize entertainment

How to prevent echoes.

i) By covering walls with soft boards.

ii) By putting thick curtains in the rooms.

iii) By putting ceiling boards in the rooms.

Note:

- The above materials control echoes by absorbing sound waves

Exercise

1. How do soft woolen materials reduce echoes in music studios?
2. Identify any two animals that use echoes
3. Identify any four factors that affect the speed of sound.
4. What is an echo?
5. State any two uses of echoes to people.
6. How does wind affect the speed of sound?
7. How can echoes be controlled in theatres?

LESSON FIVE

THEME: MATTER AND ENERGY

TOPIC: SOUND ENERGY

SUB TOPIC: PITCH AND VOLUME OF SOUND

By the end of the lesson, you should be able to:

a) give the meaning of pitch

b) identify the factors that determine pitch of sound

c) explain how each factor affects pitch of sound

Read and give the meaning of the following terms

-pitch - tension - frequency

CONTENT : PITCH AND VOLUME OF SOUND

- Pitch is the highness or lowness of sound

Factors that determine the pitch of sound.

i) Size of the vibrating surface.

ii) Tightness or looseness (tension) of the vibrating object.

iii) Frequency

a) **Frequency**

- This is the number of vibrations produced per second.

How frequency determines pitch.

i. Quick vibration produce high frequency and therefore high pitch of sound.

ii. Low vibrations produce low frequency and therefore low pitch of sound.

ie.

1. 

Slow vibration, low frequency, low pitch

2.

Quick vibrations, high frequency, high pitch.

b) **Size of the vibrating surface**

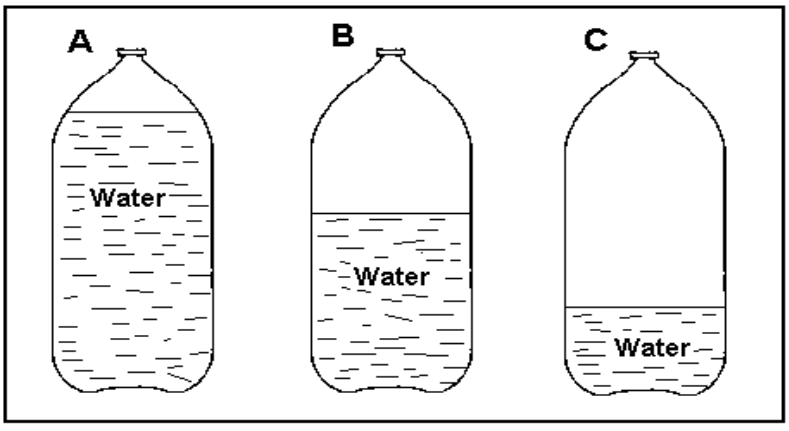
A 

B 

C 

- A small object makes a high pitch than a big object.
- Drum A produces the highest pitch because its small vibrating surface produces quick vibrations
- Drum B produces the lowest pitch because its large vibrating surface gives slow vibrations

In wind instruments

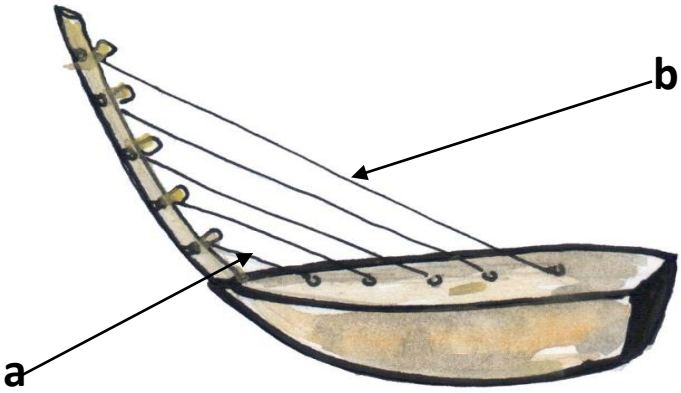


- Bottle A produces the highest pitch because it has a small empty space which gives it quick vibrations of air

- Bottle C produces the lowest pitch because it has a large empty space which gives it slow vibrations of air

c) **Length of the object.**

The bow harp.



- String **a** gives the highest pitch because it is short to produce quick vibrations.
- String **b** gives the lowest pitch because it is long to produce slow vibrations

VOLUME OF SOUND.

- Volume is the loudness or softness of sound.
- The volume of sound depends on its amplitude.
- Amplitude is the width of the vibrations or waves.
- The greater the amplitude, the louder the sound, the smaller the amplitude, the softer the sound.
  i.e

large amplitude / loud sound.


Great amplitude gives loud sound

small amplitude / soft sound


Small amplitude gives soft sound

Exercise

1. What is pitch of sound?
2. How does frequency determine pitch of sound?
3. Identify three factors that may affect pitch of sound
4. Give a reason why a short string may produce high pitched sound than a long one.
5. How can one adjust pitch of sound in a tube fiddle?
6. Define “volume” of sound
7. What is amplitude?

LESSON SIX

THEME: MATTER AND ENERGY

TOPIC: SOUND ENERGY

SUB TOPIC: STORING AND REPRODUCING STORED SOUND

By the end of this lesson you should be able to:

a) identify the methods used to store sound

b) states the devices used to store sound

c) gives the importance of storing sound

Read and give the meaning of the following terms

-notation -recording -pitch -sol-fa

Introduction

- When sound is produced, sometimes its stored for future use. Most of us have radios or phones where we play songs that we like over and over again.
- We can replay those songs because they were stored and the different devices like phones, radios, DVD players etc help us reproduce the stored sound.

How to store sound.

There are two methods used to store sound which include:

i) Recording sound on devices

ii) Writing sound in notation form or sol-fa notation..

Devices that can store sound.

i) Magnetic tapes

ii) Video tapes

iii) Reel tapes / cine films

iv) Compact Discs(CDs)

v) Digital Versatile Discs (DVDS)

vi) Video Compact Discs (VCDS)
vii) Mp3
viii) I-pods
ix) Digital Audio Tapes (DAT)
x) Flash Discs.

Devices which can record sound.

i) Audio tape recorders
ii) Video cameras
iii) Cine camera
iv) Computers
v) Video cassette recorders (VCR)
vi) Phones

Devices that reproduce sound.

- Cassette players
- DVD players
- Compact Discs
- Mp3 players
- Projectors
- Grammy phones
- Computers
- Video decks

How to reproduce sound.

i) By cassette tape playing

ii) By DVD playing

iii) By video disc playing

iv) By singing sol-fa

v) By CD playing

Materials on which different devices store sound.

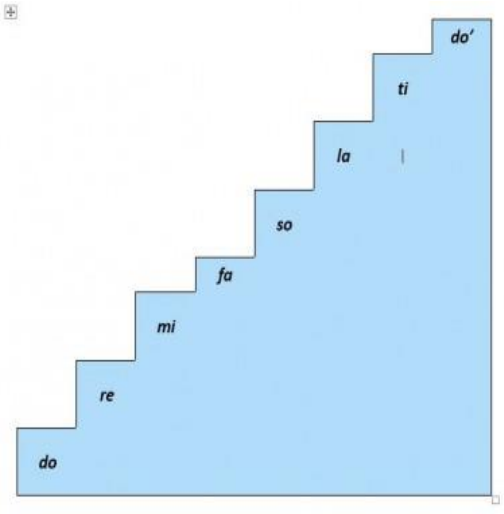
Device	Material
Audio tape recorder	Cassette tapes
Video cameras	Video tapes and cassette tapes
Cine cameras	Cine film
Computers	CDS, MP3, VCD, DVD, ipods VCDS, VCR

Methods of writing music.

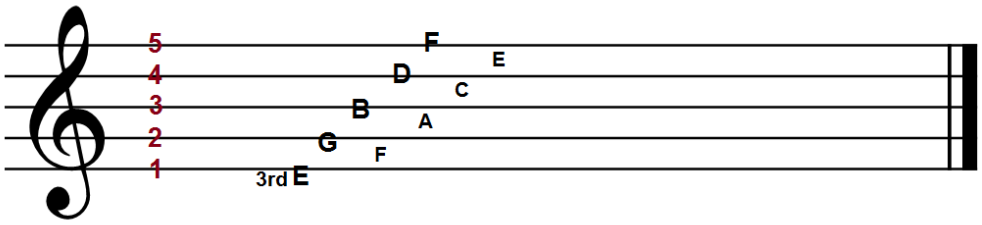
iv) By sol-fa notation

v) By staff notation

Sol-fa notation.



Staff notation formula



Lines are ' Every Good Boy Does Fine

Space is ' FACE

Exercise

1. Name two methods of writing music
2. How can sound be stored?
3. Give three ways of reproducing stored sound.

LESSON SEVEN

TOPIC: SOUND ENERGY

SUB TOPIC: THE HUMAN EAR

- **By the end of this lesson ,you should be able to:**

a) Identify the different parts of the ear.

b) State the importance of each part on a human body

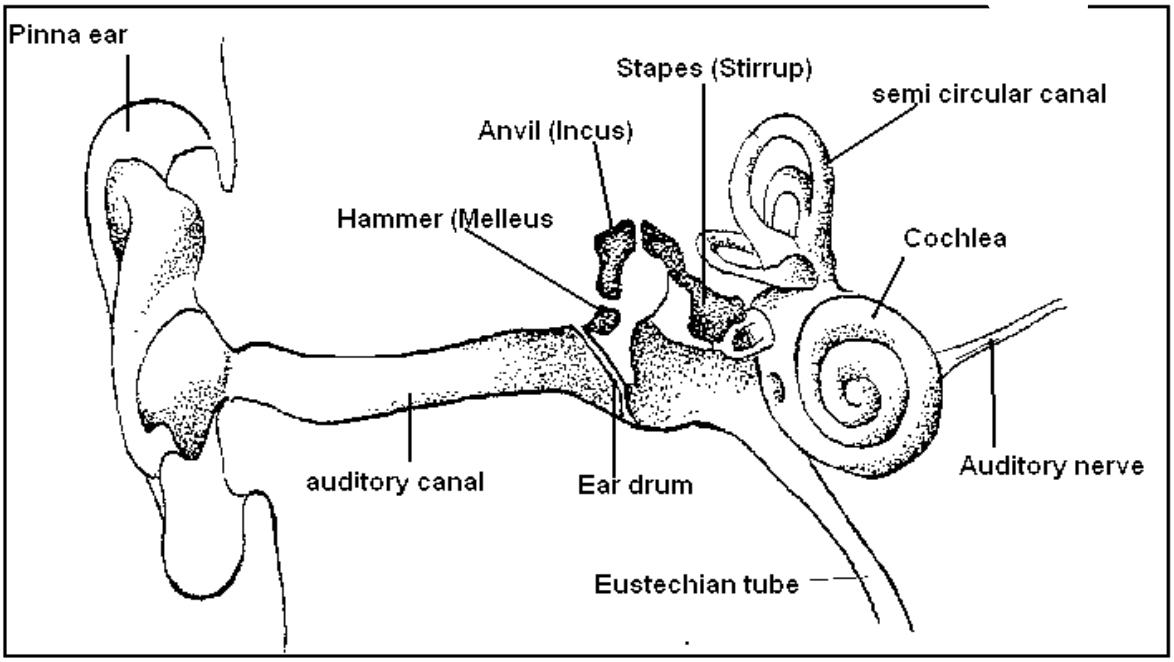
c) Identify ways of caring for the human ear.

d) Identify diseases that attack the human ear.

Introduction

- When sound is produced it stimulates the sense organ for hearing and that the human ear.
- The human ear is divided into three major parts, namely;
    - The outer ear
    - The middle ear
    - The inner ear.

THE HUMAN EAR



1. **The Outer Ear**

This is made up of the pinna and Auditory canal.

(a) Pinna

Traps or collects sound waves and sends them to the auditory canal.

vi) Pinnae of different animals are large and broad in order to trap the sound waves very well.

(b) <u>Auditory canal</u>

It sends sound waves into the middle ear.

vii) It has hairs and wax to trap and catch dust and other foreign bodies to prevent them from entering the ear.

2. <u>The middle Ear</u>.

It consists of the ear drum and ossicles.

(a) <u>Ear drum</u>

- It vibrates according to the pattern of sound waves and sends sound vibrations to the Ossicles.
- The ear drum changes sound waves to vibration

(b) **<u>Ossicles</u>**.

- - They amplify vibrations and transmit them to the inner ear between the ear and the atmospheric pressure
- Ossicles are the 3 small bones namely; malleus or Hammer, Incus or Anvil and Stapes or Stirrup (MIS/HAS)

i) The three small bones join the outer ear and the oval window.

ii) The stapes / stirrup is the smallest bone in the human body.

iii) The middle ear is connected to the Eustachian tube.

iv) The main function of the Eustachian tube is to balance air pressure

- They amplify vibrations and transmit them to the inner ear between the ear and the atmospheric pressure.

<u>The Inner Ear</u>.

It consists of two main parts

i) Cochlea and semicircular canals.

(a) <u>The cochlea</u>

i) Receives sound ***vibrations*** and change them to nerve signals or impulses.

<u>Auditory nerves</u>.

i) Takes nerve impulses to the brain for interpretation.

Semi – circular canals

ii) Balance the body in its right posture.

it has the same function as the cerebellum of the brain.

NB

The cochlea and semicircular canals are filled with fluids called peri-lymph and endo-lymph

Exercise

1. Draw the structure of a human ear, and on it indicate
    a. the auditory canal
    b. eustachian tube,
    c. pinna
    d. cochlea
    e. semi –circular canals
2. State the function of the following parts of the human ear.
    a) The pinna
    b) The ear drum
    c) The ossicles
    d) The cochlea

LESSON EIGHT

TOPIC: SOUND ENERGY

SUB TOPIC: The human ear

By the end of this lesson,you should be able to

a) Identify the different parts of the ear.
b) State the importance of the human ear on the body.
c) Identify ways of caring for the human ear.
d) Identify diseases that attack the human ear.

Functions of the ear.

i) For hearing.

ii) For balancing the body.

Organs for hearing in other living organisms

i) Fish – lateral line

ii) Snakes – Ear drum under the belly

Care of the Ears.

i) Regular cleaning of the ears.

ii) Avoid areas with too much sound.

iii) Avoid using sharp objects to clean your ears.

iv) Avoid pushing things in your ears like seeds and beads.

NOTE:

- It is not advisable to clean the ear with sharp objects because they can damage the ear drum and lead to deafness.
- Eat food rich in a balanced diet.
- Too much wax in the ear can lead to partial deafness. It will also lead to accumulation of dust in the ear.

Symptoms of a sick Ear.

v) Pain in the ear.

vi) Rise in the temperature.

Examples of Ear defects

i) Permanent deafness. This is when one looses the sense of hearing and it can no longer be corrected.

ii) Partial deafness. This is when a person is unable to hear low sound. You need to shout in order for that person to hear you.

iii) Sensory deafness. This is a defect caused to to the damage of the auditory nerves that send sound impulses to the brain for interpretation.

Causes of Ear defects

(a) Permanent deafness.

- Inheritance from parents.
- German measles.
- Damage of the ear drum

(b) Partial deafness

i) Too much wax in the ear.

(c) Sensory deafness.

i) Old age
ii) Injury of auditory nerve.
iii) Serious fracture of the skull.

How to control Ear defects.

i) Immunize children against German measles
ii) Remove wax regularly
iii) Good feeding in old age.
iv) Avoid loud noise.

Proper removal of wax from Ears.

We can properly remove wax from the ears by:

i) Using ear buds.
ii) By use of syringe / syringing
iii) Use of soft corner of handkerchief.

Diseases of the ears

1. Otitis
   i) Otitis media – this attacks the middle ear
   ii) Otitis externa– this attacks the outer ear
   iii) Otitis interna- this attacks the inner ear
2. Boils
3. Labyrinthitis- caused by virus

Activity

1. State any two functions of the ear.
2. Which part of the ear does the same function as the cerebellum of the brain?
3. Suggest any four ways of caring for your ears.
4. Name any two ear defects
5. How can one control partial deafness the ears?
6. Apart from hearing, state any other importance of the ear to the body.
7. Why isn’t it advisable to use sharp instruments to clean the ear?
8. Apart from hearing, how else are ears important to the body?