

SUMMARY SHEET

Pedagogical Approach: Student – led

Learner Previous Knowledge

Waves, its characteristics and its components such as amplitude, wave length, frequency and time period

Sound energy is carried in the form of waves

Target Knowledge for this Topic

Sound and its production

Know that sound is a type of wave; Find out about the various types and sources of sound; Experiment how sound is produced through vibration; Understand various characteristics of sound; Experiment and test how sound travels; Find out how sound gets reflected;

Human Ear

Study how sound travels in human ear;

Noise pollution

Classifying sound as either pleasant or unpleasant; Investigate about the sources of noise pollution, its impacts on human body and ways to curb it

Learning Goals

More Complex Learning Goal- Students will be able to draw conclusions about how frequency and amplitude affect the quality of sound and how noise pollution impacts the human body

Target Learning Goal- Students will be able to describe the relationship between frequency and amplitude with the loudness and pitch of sound, explain how sound travels and gets reflected

Simpler Learning Goal- Students will be able to state the properties of sound and list the causes, effects and measures of noise pollution.

Period No.**Lesson Objectives****Teaching Learning Materials Required**

1

- Demonstrate how sound is produced by a vibrating body

- Board and markers
- Worksheet 1
- Activity: (for each group) bell, gong, rubber band, pencil box, two pencils, metal dish, spoon water

2	Explain how humans produce sound.	- Board and markers - Worksheet 2 - Reference sheet 1 - Activity - (for each group) two identical rubber strips
3	Deduce that sound needs a medium to travel.	- Board and markers - Worksheet 3 - Activity 1: (one per group) metal or wooden scale - Activity 2: (one per group) bucket, water, bell
4	Explain how human ear works.	- Board and markers - Worksheet 4 - Activity: (for each group) plastic can or cup whose base has been removed, used balloon, rubber band, few grains
5	Recall properties of wave such as amplitude and frequency and associate with sound wave	- Board and markers - Worksheet 5 - Activity: (for each group) metal/wooden ruler, metallic glass, metallic spoon, thermocol ball suspended by thread
6	Analyse the relationship between loudness, pitch and frequency of the sound produced	- Board and markers - Worksheet 6
7	Understand effects of noise pollution	- Board and markers - Worksheet 7 - Worksheet 8

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------

Period 1

Lesson Objectives

At the end of this lesson students will be able to:

- Demonstrate how sound is produced by a vibrating body

Teaching Learning Materials required

- Board and markers
- Worksheet 1
- Activity: (for each group) bell, gong, rubber band, pencil box, two pencils, metal dish, spoon water

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 or 5

Lesson Beginning <u>Time:</u> 10 min <u>Purpose:</u> • Activate the prior knowledge	<u>Introduction to the topic</u> • Introduce the topic of sound by asking students to make a list of sounds that they hear around them. Ask them to be quiet and just listen to the ambient sounds. Then ask them to look around and observe things and guess which objects will produce what kind of sound. • Pose questions such as: ○ Why does sound play an important role in our lives? ○ How does it travel from one place to another? ○ Do you think sound is made from objects? ○ How come some sounds are louder than others? • Collate all answers and ensure that all students are on the same page. • State that we will study about sound in detail in this lesson. Inform them that they will be doing activities to deduce how sound is produced.
Lesson Middle <u>Time:</u> 20 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Activities</u> • Distribute worksheet 1 to all the students. • Ask the students to do the activities as per the instructions and answer the observation questions. • Let there be a whole class discussion and all the answers can be discussed together. • All the students must be in consensus with the answers.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Recap students' learning	Wrap up the class by clearing any doubts that the students may have.
--	--

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Annexure: 1A

Skill: Drawing Inferences

Activity 1

Material: Bell, gong

Instructions: Hang a bell freely and strike it with a gong. Listen to the sound produced carefully. Touch the bell after striking the gong. Now hold the bell firmly with one hand and strike the gong.

Questions

1. Did the bell stop ringing soon after striking the gong? _____
2. What did you feel when you touched it? _____
3. Did the ring when you held it? _____
4. Touch the bell again after it has stopped ringing. Do you still feel the vibrations? _____

Activity 2

Material: rubber band, pencil box, two pencils

Instructions: Wrap the rubber band around the box along its longer side. Insert two pencils at right angles under the rubber band so that the band is lifted. Pluck the rubber band in the middle.

Questions

1. Do you hear any sound? _____
2. Does the band vibrate? _____
3. Hold the band with one finger and try to pluck it without vibrating it. Do you hear any sound?

Think about all the observations in the above activities.

How do you think sound is produced? Which motion is observing when sound is produced?

- I think sound is produced when object _____ (talk about movement).
- _____ of an object produces sound.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Can you see vibrations in all objects which produce sound? For example, did you 'see' the vibrations when you rang the bell?

In all cases, vibrations_____.

Attempt the following questions

I. Categorize the following instruments in the categories: sound produced by striking them, sound produced due to stretched string, sound produced due to stretched membrane, sound produced due to filling instrument with water. (You can add more instruments in the list).

'Instrument	Parts which vibrates to produce sound
Guitar	Stretched string
Drum	
Sitar	
Flute	
Piano	
Tabla	
Jal tarang	
Sarangi	

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------

Period 2

Lesson Objectives

At the end of this lesson students will be able to:

- Explain how humans produce sound.

Teaching Learning Materials required

- Board and markers
- Worksheet 2
- Reference sheet 1
- Activity - (for each group) two identical rubber strips

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4-5 each

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Activate prior knowledge	<u>Whole Class Discussion</u> • Recap the topic of sound by exchanging the homework done. Pose questions such as: ○ What is sound? ○ How is it produced? ○ What is essential for us to hear sound? • Ensure that the class is in consensus with the answers. • Now pose the question: 'How do human beings produce sounds? Do they also have to produce vibrations for it?' • Now speak something while keeping your finger on your throat. What do you feel? Do you feel vibrations? How have you produced sound? Inform students that they will now see a video and find out answers to these questions.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Worksheet</u> • Distribute worksheet 2 to all students. • Inform the students that the rubber strips which produce sound in this activity are similar to our vocal chords which we have in our throat. Ask the students to do the activity and see how sound can be produced. • Let there be a whole class discussion now. The students may discuss all the answers of the questions based on the activities. • Arrive at a common consensus.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



	Discuss the production of sound with reference sheet 1
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish Up	<u>Finish Up</u> Wrap up the discussion by clearing doubts if the students have.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Annexure 2A

Skill: Spirit of Inquiry

How do we produce sounds? Let us find out!

Activity

Material: two identical rubber strips

Instructions:

Keep the rubber strips one over the other. Stretch them wide. Now blow air through the gap between them. Do you hear any sound? This is exactly how our vocal cords work.

Questions:

1. Based on the above activity, how do you think our vocal cords produce sound?

2. Will sound be produced, if the rubber strips are loose? Why?

Answer the following questions

1. What produces sound in our body? Name the part.

2. What is the voice box called?

3. How are the vocal cords placed when you are not talking and only breathing?

4. How do the vocal cords work to produce sound?

5. What is the wind pipe called? _____

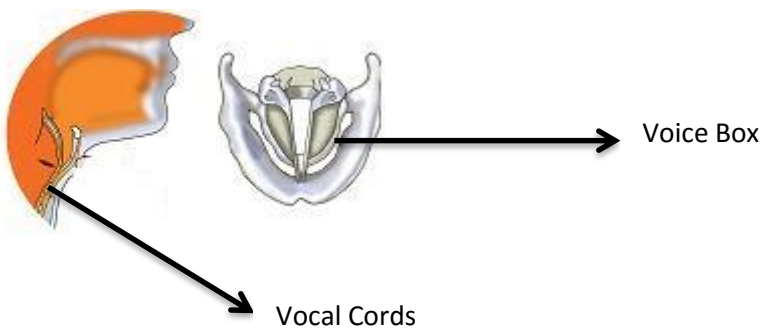
6. Name the parts which work together for our speech.

Reference sheet 1

- The human voice is produced because of the vocal folds (vocal cords) which are the primary sound source.
- When producing sound, the lungs blow air against vocal cords that are closed, but more loosely than they would be during swallowing. Air pushes through the very small space between the vocal folds which result in vibration of vocal cords.
- The vocal cords are located deep in the larynx (also known as the voice box).
- They are protected by a firm shell of cartilage and connecting ligaments.
- Men and women have different vocal cord sizes. Adult male voices are usually lower pitched and have larger folds. Children have very short vocal cords.

How do we produce sound?

1. Air comes out of the lungs, through the trachea, and into the larynx.
2. The air makes the vocal folds vibrate
3. When the vocal folds vibrate, they alternately trap air and release it.
4. This creates a sound wave.
5. The vocal cords, lungs and tongue together help in making coherent speech.



Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Period 3

Lesson Objectives

At the end of this lesson students will be able to:

- Deduce that sound needs a medium to travel.

Teaching Learning Materials required

- Board and markers
- Worksheet 3
- Activity 1: (one per group) metal or wooden scale
- Activity 2: (one per group) bucket, water, bell

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 6

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> Activate prior knowledge	<u>Recap</u> • Ask the students to discuss what they know about the topic sound. • Give them 5 minutes for discussion. • Tell the students that they know that sound needs a medium to travel from one place to another. Ask the students how they are able to hear sound of a train from a distance even if they do not actually stand at the platform or near the rails? How has sound travelled in this case? • Pose the question: 'Is air the only medium for sound to travel?' • Inform the students that they will now find out if sound travels from one place to another through any other mediums other than air by doing some interesting activities.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Activities</u> • Distribute worksheet 3 to all students. • Let them follow the instructions and do the activities in pairs within the group. • Each group must collate the observations. • There can be a whole class discussion in which the observations can be discussed. • They must arrive at a common consensus.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	<u>Finish Up</u> • Wrap up the class by clearing doubts.
---	--

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Worksheet 3

Skill: Observation and Investigation

How does sound travel?

Activity 1

Material: metre scale of wood or metal

Instructions:

Hold one end of the scale to your ear. Ask another group member to tap the other end gently or scratch it.

Questions

1. Can you hear the tapping or scratching sound? _____
2. Were other people standing near you able to hear this sound? _____
3. Give your observation, how do you think the sound travelled? What was its medium?

Activity 2

Material: bucket filled three-fourth with water, bell

Instructions

Put the bell in water but let it not touch the bottom or the sides. Put your ear to the surface of the water and ring the bell.

Questions

1. Were you able to listen to the sound of the bell? _____
2. What can you deduce from this activity? _____

- What do you deduce from the above activities with respect to medium for sound to travel?

I deduce that _____

- List the mediums through which sound can travel.

- i. _____
- ii. _____
- iii. _____

Information

- Sound needs a medium to travel.
- The medium is the substance or material that carries sound.
- Sound waves can travel through a medium such as a solid, liquid, or gas.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



- Sound travels about four times faster and farther in water than it does in air. This is why whales can communicate over huge distances in the oceans!!
- Sound waves travel about thirteen times faster in wood than air.
- Sound can travel in air at approximately 330 meters per second. This is fast but not nearly as fast as light which travels at 300 000 kilometers per second.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Lesson Plan 4

Lesson Objectives

At the end of this lesson students will be able to:

- Explain how human ear works.

Teaching Learning Materials required

- Board and markers
- Worksheet 4
- Activity: (for each group) plastic can or cup whose base has been removed, used balloon, rubber band, few grains

Details of Teaching Learning Experience

Seating Arrangement: - 6-8groups

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> Activate prior knowledge	<u>Brainstorming</u> • Introduce the topic by asking students: ○ Which organ is connected with hearing? ○ What can be the purpose of external ear? Why do you think it is needed? • Collate all the answers and then inform the students that they will find out how exactly our ear helps us in listening to sounds.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Activity</u> • Distribute worksheet 4 to all groups. • Ask them to do the given activity. • Ask the different groups now to share their answers to all the questions. • Ensure that the whole class arrives at a consensus.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	<u>Finish Up</u> • Wrap up the class by clearing any doubts that the students may have.
---	---

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Worksheet 4

Skill: Drawing Inferences

How can you listen to sounds with your ears?

Activity

Material: plastic can or cup whose base has been removed, used balloon, rubber band, few grains

Instructions:

1. Stretch the balloon over one end of the cup to cover it completely and fix it in its place with a rubber band. This is your stretched membrane.
2. Place a few grains over the stretched balloon.
3. Now ask your friend to speak in the cup from the other end and observe what happens to the grains.

Questions:

1. What did you observe when your friend spoke inside the cup?

2. Where do you think the sound waves of your friend's voice must have struck?

3. Why did the grains jump up and down?

Which part of this activity is similar to the ear drum?

In your own words, explain briefly how you are able to hear sound.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Period 5

Lesson Objectives

At the end of this lesson students will be able to:

- Understand properties of wave such as amplitude and frequency and associate with sound wave

Teaching Learning Materials required

- Board and markers
- Worksheet 5
- Activity: (for each group) metal/wooden ruler, metallic glass, metallic spoon, thermocol ball suspended by thread

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 or 5

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> Activate prior knowledge	<u>Brainstorming</u> • Inform the students that before they begin any discussion they will do an activity in pairs and then participate in a brainstorming session. • Distribute worksheet 5 to all students. • Ask students to do the activity and jot down the observations. • Give 5-7 minutes for the activity. • Follow the activity with a whole class brainstorming and ask the following questions: ○ The scale projecting outside vibrated. What kind of motion is that? ○ What was the difference in the vibrations when the distance was varied from the edge of the table? ○ When the length of the vibrating part of the scale is reduced what effect does it have on the vibrations produced? ○ Based on the activity, can you now state what is frequency? ○ Were the vibrations identical irrespective of the length of the scale projected out of the table top or were they different? ○ Now can you recall what is amplitude? ○ Suppose you measure the time it takes for a pendulum to make one complete swing from one end to another. What have you calculated? • Ensure that the students are in consensus with the answers.
--	--

	Inform the students that now they will do an activity to study how frequency and amplitude of sound is associated with the quality of sound.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	- Assign the items needed to do the activity 2. - Let them follow the instructions in the annexure. - Instruct the students to write their observation and attempt the questions. - After the students have attempted the activity, let there be a discussion on the answers within the groups. Let the groups discuss arrive at a common consensus.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish Up	<u>Finish Up</u> Wrap up the class by clearing doubts.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Worksheet 5

Skill: Drawing Inferences

Recalling characteristics of waves

Activity

Material: wooden/metallic ruler

Instructions

1. Work in pairs for this activity.
2. Ask one student of the pair to hold a meter scale on the edge of their table.
3. Only a small part of it must rest on the table and the other part must be projecting out.
4. Press the part on the table with one hand and ask the other student of the pair to press the projecting part gently once.
5. Observe how it vibrates.
6. Touch the ruler at various distances from the edge of the table and let the scale vibrate. Does it make a difference?
7. Now reduce the length of the projected part of the ruler and repeat. What do you observe?

Activity 2

Material: metallic glass, metallic spoon, thermocol ball suspended by thread

Instructions

1. Hit the spoon gently on the rim of the glass and listen to the sound.
2. Now hit it hard on the rim and listen to the sound.

What difference do you observe in both cases?

3. Now hold the suspended thermocol ball near the rim of the glass and strike the glass gently. Observe the ball displaced from its position due to the vibrations.
4. Hit the rim hard and again observe the thermocol ball being displaced due to vibration.

The displacement of the ball is measure of the amplitude of vibration of the tumbler.

Comparing the amplitudes of the vibrations of the tumbler in step 3 and 4, in which case was the amplitude larger?

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------

Based on the experiments which conclusion is correct from the following?

- When the amplitude is larger the sound produced is loud.
- When amplitude is larger the sound produced is feeble.

Information

- ❖ Unit of frequency is Hertz.
- ❖ Unit of loudness of sound is Decibel.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------

Period 6

Lesson Objectives

At the end of this lesson students will be able to:

- Analyse the relationship between loudness, pitch and frequency of the sound produced

Teaching Learning Materials required

- Board and markers
- Worksheet 6

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4-6

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> Activate prior knowledge	<u>Group Discussion</u> - Begin the class by asking groups to discuss the definitions of frequency and amplitude among themselves. - Randomly ask students definitions of them and then pose questions such as: - If the amplitude is higher then loudness will be higher or lower? - What is frequency? - If a fork vibrates 12 times in a minute what is its time period? - Let the whole class participate in the discussion and ensure that all agree with the answers. - Inform the students that now they will analyze the relationship between loudness of sound and relationship in pitch and frequency.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	<u>Analysis</u> - Distribute worksheet 6 to each group. - Ask the groups to work in pairs. - Each group should have 4 pair of students. - Instruct the students to focus on the given data and attempt questions based on it. - After the pairs have completed the worksheet, they should have a group discussion where they can exchange their answers. - This can be followed by a whole class discussion in which the groups can

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



	exchange their answers. • Ensure that all the students are on the same page.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up • Homework Distribution	<u>Finish Up</u> • Wrap up the class by clearing doubts. <u>Homework Assignment</u> • Find out information on noise pollution: what are its causes, effects and prevention, from the internet, encyclopedia or your textbook.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Worksheet 6

Skill: Analytical Thinking

Information

- Loudness of sound is proportional to the square of the amplitude of the vibration which produces sound. Hence if you double the amplitude, the loudness increases four times.
- Loudness is expressed in unit of decibels. [dB]
- More the amplitude louder is the sound.
- Above 80DdB the noise becomes painful.

I. Observe the data given in the table given below

Telephone dial tone	80dB
Normal conversation	60dB
Disco 1m away from speaker	100dB
Quiet library	30dB
Average Home	50dB

Based on your knowledge of loudness and amplitude answer following questions:

1. Which is the loudest among the given options? _____
2. Which one will have highest amplitude? _____
3. Which one will have lowest amplitude? _____

Information

- The frequency determines the pitch or shrillness of the sound.
- If the frequency is more, the sound will have higher pitch and will be shrill.
- If frequency is less, then the pitch and shrillness will be lower

II. Based on the information, analyze the given cases.

1. A baby was singing a song and his father too was singing the song at the same decibel of loudness in another room where Ram could not see them. Yet it was easy for Ram to recognize the baby's voice. Why is it so?

2. Sheetal and Mina had 2 different sound producing instruments. Sheetal had the drum while Mina had a whistle. When they played them and the loudness was measure the decibels were identical. Yet it is easy to recognize the sounds. What can be the reason?

Information

- Sounds of frequencies less than 20 vibrations per second (20 Hertz) cannot be detected by humans. These are called inaudible sounds.
- Sounds of frequencies higher than 20,000 vibrations per second (20000Hertz) are also inaudible.
- The range of audible frequencies is therefore 20-20000Hz
- Sound which causes discomfort is called 'Noise' while sound which is pleasant to hear is 'musical' or 'pleasant'.
- When sound waves are produced at high frequency, they are supposed to have high pitch. Higher the frequency, higher is the sound's pitch and vice versa.
- In our voice box, the greater the tension in our vocal cords (stretching tightly) higher will be the pitch and lower the tension, lower will be the pitch. Can you now guess why some people have high pitched voice naturally? How must their vocal cords be placed?
- A low pitched sound can be loud or soft just as a high pitched sound.

III. Based on the above information, analyze the reasons for the following

1. Police use high frequency whistles which cannot be heard by humans.

2. A band was practicing their songs. Rohan enjoyed listening to them. After sometime, the drum player stopped keeping up with the drum and started beating the drum randomly. Rohan was fairly irritated with this. Why did Rohan enjoy initially and then found the same instruments producing the sounds disagreeable later?

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Period 7

Lesson Objectives

At the end of this lesson students will be able to:

- Understand the effects of noise pollution

Teaching Learning Materials required

- Board and markers
- Worksheet 7
- Worksheet 8

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 6

Lesson Beginning <u>Time:</u> 10 min <u>Purpose:</u> Activate prior knowledge	• Ask the students to share their homework • Collate their responses on the board.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> • Develop conceptual understanding	• Distribute worksheet 7 to the students. • Let them attempt the questions after discussing in their groups. • Discuss the answers of the questions. • Make sure all are on same page for the answers.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up • Homework Distribution	<u>Finish Up</u> • Wrap up the class by clearing any doubts that the student may be having. <u>Homework Assignment</u> • Distribute worksheet 8 as home assignment.

Class:8	Subject: Science	Topic: Sound
----------------	-------------------------	---------------------



Worksheet 8

Skill: Analytical Thinking

1. Why are loudspeakers not allowed after 10pm?

2. It is not healthy to live on a busy street at a city centre. Why?

3. Give 3 ways by which you, as student, can help in reducing noise pollution.

4. How will you ensure minimum noise creation in your school?
