

08

INTRODUCTION TO SOUND

In this chapter, we will learn about:

- Sound
- How is sound produced?
- Intensity of sound
- Medium for sound to travel
- Noise and its effects on human health
- Measures to reduce noise pollution

We hear different sounds in our surroundings. For example, we hear chirping of birds, car horns and sounds of rickshaws. We listen to the teacher in the classroom. We enjoy music. Have you ever thought how sound is produced and how it reaches us?



How do some sounds affect our ears? In this chapter we shall find answers to these questions.

How is Sound Produced?



Activity 8.1

- Take a tuning fork.
- Strike it against a rubber pad and hold it close to your ear.
- ❖ Do you hear any sound?
- Again strike the tuning fork against the rubber pad and observe its prongs.

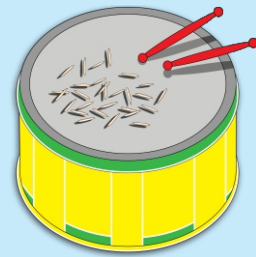


Q: Can you see them vibrating?



Activity 8.2

- Get a drum and sticks. Place a few dry rice grains on the skin of the drum.
- Strike the skin of the drum with a stick and observe.



Q: What two things happen on striking the drum?

1. _____

2. _____

Q: What do you conclude from this activity?

Sound is produced by vibrating objects.

In a drum, skin vibrates to produce sound. In a guitar, strings vibrate to produce sound. In a flute, air particles vibrate to produce sound (Figure 8.1). In our throat, vocal cord vibrates to produce sound.



Guitar

Figure 8.1



Flute

Intensity of Sound

Sounds of drum, rickshaw, train's whistle, donkey, etc. are very loud. On the other hand, the sounds of chirping of birds, rustling of leaves, ticking of clocks are soft. The loudness of a sound is related to its intensity. Loud sounds have high intensity (Figure 8.2) and soft sounds have low intensity (Figure 8.3).



Train's whistle



Rickshaw's noise

Figure 8.2 Objects producing high/loud sounds



Chirping of bird



Ticking of clock

Figure 8.3 Objects producing soft/pleasant sounds

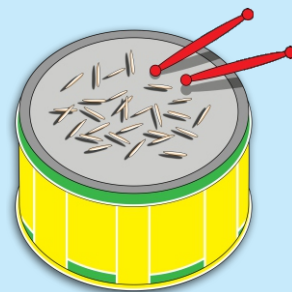


Activity 8.3.a

- Take a large drum. Place some rice grains on it and beat it with heavy sticks.

Q: What kind of sound is produced?

Q: How much do the rice grains jump?

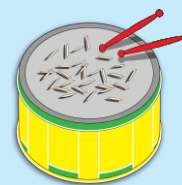


Activity 8.3.b

- Now take a small drum, place rice grains on it and beat it with light sticks.

Q: What kind of sound is produced?

Q: How much do the rice grains jump now?



Objects vibrating strongly produce loud sounds and objects vibrating slowly produce soft sounds.

Medium for Sound to Travel

Does the sound need a material medium to travel around?

Most of the sounds that we hear reach us by traveling through air. Air is a medium through which sound can travel.

However, the sound can also travel through liquids and solids. We

can understand this by the following activities.



Activity 8.4

- Take a plastic tub and fill it with water.
- Take a plastic bottle and cut it from its bottom.
- Dip the lower side of the bottle in the water and bring your ear in contact with the mouth of the bottle.
- Ask your friend to strike two steel spoons with each other inside the water.
- Do you hear sound of striking spoons from within the water through the plastic bottle?



Q: What do you conclude from this activity?

We can conclude from the above activity that sound can travel through liquids.



Activity 8.5

- As shown in the figure place your ear to the wall.
- Ask your friend to go outside the room and gently tap the other side of the wall with a wooden hammer.
- Can you hear the tapping sound?
- How has the tapping sound reached you?
- What have you learnt from this activity?



We learn that sound can travel through solids.

i Interesting Information

The sound travels fastest in solids. It travels slower in liquids and slowest in gases as compared to solids and liquids.

Sound cannot travel through vacuum



Figure 8.4

If a jet plane passes over at low height, a loud sound is heard. But when the same jet plane is flying at very great height, we hear less sound due to thin air and long distance (Figure 8.4).

? Do You Know?

When astronauts land on the Moon, they cannot talk to each other as we do on the Earth. There is no air on the Moon. Hence, they talk through radio phone fitted in their space suits.



NOISE

We feel pleasure to hear music or chirping of bird in the garden (Figure 8.5). There are some other sounds which we do not like to hear such as sounds of heavy traffic, barking of dogs, road construction machinery, hammering on metal sheets, etc (Figure 8.6). These are unpleasant sounds and termed as noise. They are irritating, affect our ears and other body systems badly.



Figure 8.5 Pleasant sound producers

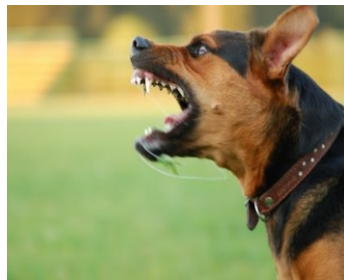


Figure 8.6 Noisy sound producers

Effects of Noise on Human Health

Noise affects not only our hearing but also our health. We cannot think and work properly at noisy places (Figure 8.7).

People living in noisy areas often suffer from headache, blood pressure and many other diseases. Noise makes people irritated. Noise may even disturb our nervous systems.



Figure 8.7 Effect of noise

Measures to Reduce Noise Pollution

Excessive noise that may harm human health is called noise pollution. There are laws to reduce noise pollution but due to lack of awareness, people do not care about them. The need is that people should try to understand the importance of these laws and should follow them strictly. Government also tries to create awareness about noise in the public through media.

Bus stands, airports and factories need to be shifted away from residential areas. Use of horns near hospitals, educational institutions and libraries should strictly be prohibited (Figure 8.8).



Figure 8.8 Blowing of horns is prohibited near hospitals and schools

Proper silencers should be used in the vehicles. The volumes of TVs or tape recorders should be kept low. The use of loud speakers at high volume has been prohibited. Trees should be grown wherever possible because they help to reduce noise and other other types of pollution.

KEY POINTS

- Sound is produced by vibrating objects.
- Loudness of a sound is related to its intensity.
- A medium is needed for the sound to travel.
- Sound can travel through solids easily.
- Sound can also travel through liquids and gases.
- Sound cannot pass through vacuum.
- Unpleasant sounds are called noise.
- Noisy sounds are irritating and produce bad effects on human brain and health.
- Musical sounds produce pleasant effects on human brain and health.
- Excessive noise that may harm human health is called noise pollution.
- Noise pollution can be reduced by obeying noise laws strictly and by shifting factories, airports, etc. away from residential areas.
- Tree plantation also helps to reduce noise and other types of pollution.

GLOSSARY

Sound:	Sensation of hearing
Vibration:	Back and forth motion of an object
Sound intensity:	Loudness of sound
Medium:	Material through which sound can travel
Noise:	Sound which produces unpleasant effect on us
Musical sound:	Pleasant sound
Noise pollution:	Excessive and unbearable noise
Vacuum:	Place without air

EXERCISE

8.1. Fill in the blanks.

Complete the sentences by choosing appropriate words from the following word bank:

noise pollution, wings, soft sound, vibrates, solids, vacuum,
noise, pleasant, gases, musical

- (i) When an object moves back and forth it _____.
- (ii) Humming birds make a humming sound by motion of their _____.
- (iii) Sound travels faster in _____.
- (iv) Sound produced by an aeroplane is _____.
- (v) Our ears and nervous system are affected very badly by _____.
- (vi) The sound produced by a flute is a _____ sound.
- (vii) We cannot hear the sounds of explosions taking place in the Sun because sound cannot travel through _____.
- (viii) Sound travels slower in _____.

8.2 Circle the correct option.

- (i) Sound is produced by:
 - a. solid
 - b. liquid
 - c. gas
 - d. vibrating objects
- (ii) Sound cannot travel through:
 - a. oxygen
 - b. water
 - c. wood
 - d. vacuum
- (iii) Intensity of sound is related to
 - a. production of sound
 - b. loudness of sound
 - c. speed of sound
 - d. traveling of sound
- (iv) Noise is produced by:
 - a. rustling of leaves
 - b. chirping of a bird
 - c. barking of a dog
 - d. ticking of a clock

(v) Noise can cause:

- a. malaria
- b. high blood pressure
- c. cough
- d. flu

(vi) Which sound is the loudest?

- a. heartbeat
- b. sound of a flute
- c. pressure horn
- d. rustling of leaves

(vii) Which of the following statements is correct?

- a. sound can travel through vacuum.
- b. sound travels faster in air than liquid.
- c. sound travels faster in solid than air.
- d. sound cannot travel through a solid.

(viii) A soft sound is produced by:

- a. beating a drum
- b. playing a flute
- c. heavy traffic
- d. hammering

8.3 Separate soft and loud sounds.

Whisper	Purring of cat	Power mower
Aeroplane	Taking off aeroplane	Saw, Rustling of leaves
Vacuum cleaner	Motorcycle	Ticking of clock

Soft sounds	Loud sounds

8.4 Match each statement of column A with the relevant statement of column B.

A	B
Musical sound	Loud speaker
Noise	Vacuum
Sound travels faster in	Flute
Sound cannot travel through	Solids

8.5 Short Answer Questions.

- (i) What is sound?
- (ii) How is sound produced?
- (iii) What is meant by intensity of sound?
- (iv) What is noise?
- (v) What is noise pollution?
- (vi) Give two examples of loud sounds other than the examples given in the text.
- (vii) Give two examples of soft sounds other than the examples given in the text.

8.6 Give four examples of the following:

- (i) Pleasant sound (ii) Unpleasant sound

8.7 Describe the effects of noise on human health.

8.8 How can noise pollution be reduced?

8.9 Does sound travel outside Earth's atmosphere in space? Explain.

PROJECT

Take an empty shoe box and some rubber bands of different sizes. Construct a simple musical instrument from these things.