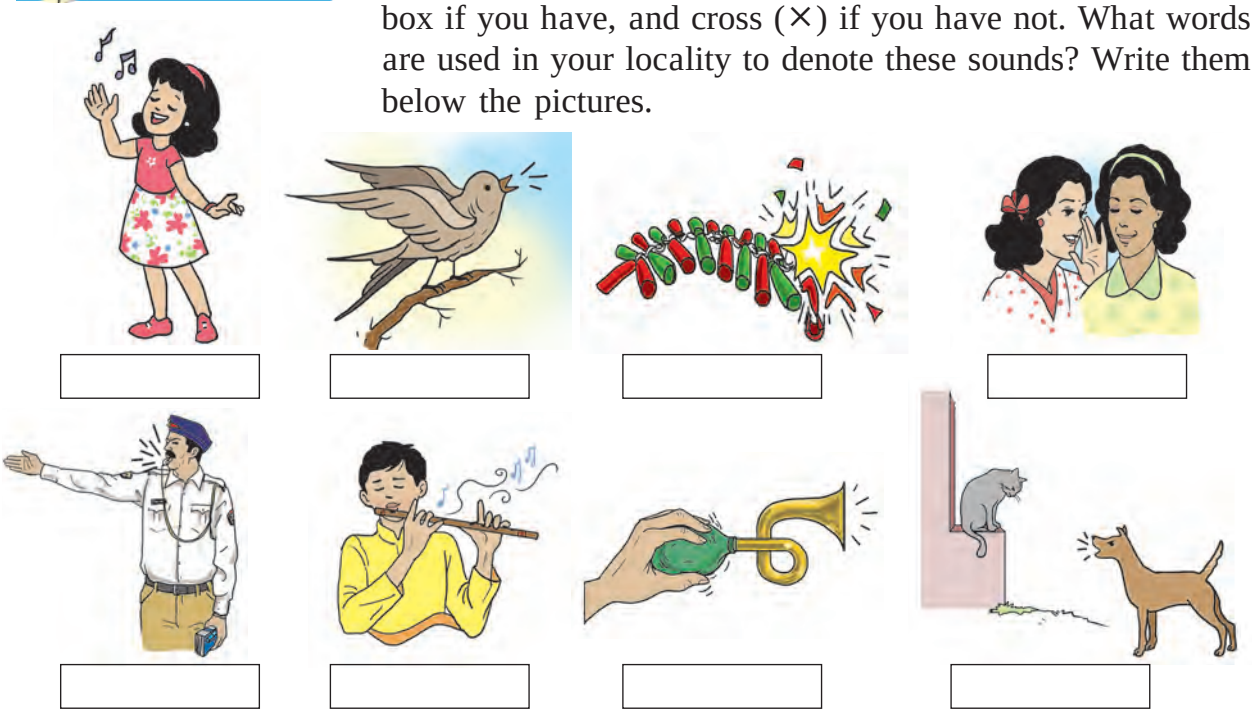
13. Sound

Can you tell?

Some sounds are depicted in the pictures below.
Have you heard these sounds? Put a tick mark (✓) in the box if you have, and cross (×) if you have not. What words are used in your locality to denote these sounds? Write them below the pictures.



13.1 : Examples of various sounds

1. Which sounds do you hear during the recess in the school?

2. When there is silence in the classroom, close your eyes and sit quietly. Which sounds in your surroundings can you hear now?

Prepare a common list of all these sounds and discuss them. You will see that there is a lot of diversity in the innumerable sounds that we hear. Classify these sounds in two ways – soft/loud and pleasant/unpleasant.

Some sounds are loud and are heard easily while some others are very soft and cannot be heard unless we listen attentively. We like some sounds. On the other hand, we get annoyed by some other sounds.

How are sounds produced?

Try this.

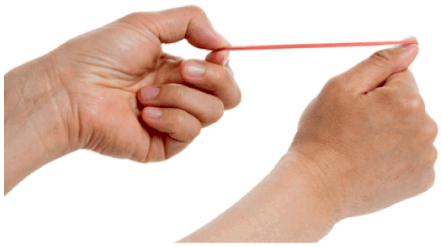
1. When a song is being played on a radio or a music system in the house, place your hand on its speaker. What do you feel?

Put off the music. What do you feel now?

13.2 : Speakers

2. Take a rubber band and stretch it as shown in the picture. Pluck the stretched band.

Apart from the movement of the rubber band, what else did you notice?



13.3 : A stretched rubber band

13.4 : Tabla

3. Spread some sawdust or mustard seeds or sand on the diaphragm of a tabla. Knock on the diaphragm lightly with a finger.

What do you see happening so long as the tabla makes a sound? What happens when the sound stops?

What do we understand from these observations?

The objects that produce sound, that is, the diaphragm of the speaker, the rubber band, the diaphragm of a tabla, show a certain movement. That is, they have a certain kind of motion. They oscillate rapidly. In other words, they vibrate.

The vibration of an object is necessary for the production of sound. As long as the object vibrates, the sound is heard. When the vibration stops, the sound also stops.

The object due to which sound is produced is called the source of that sound.

Use your brain power!

When a metal dish falls on the floor, it makes a loud noise. What do we do to stop the noise? What is the effect of that action?

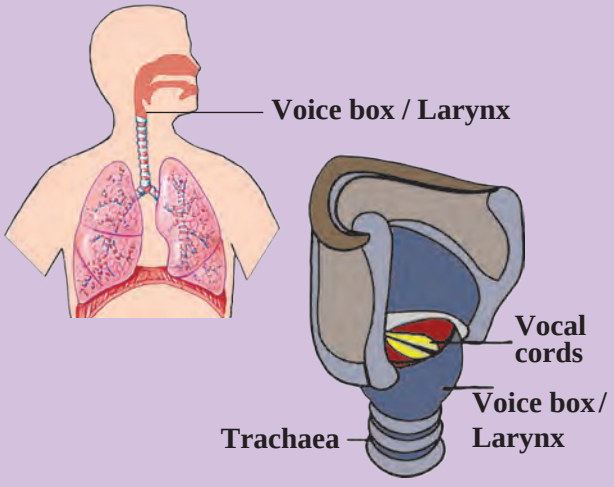
Try this.

The sounds of a sitar, a bell, water that drops from a tap, a saucer that breaks on falling down - what is it that vibrates when these sounds are produced?

Do you know?

Acoustics : The science of sound, resonance, including the production, propagation and effects of sound is called acoustics. The intensity of sound is measured in a unit called decibel (dB).

The vibration of the vocal cords in our larynx or 'voice box' also produces sound. The voice box is located in our throat. The quality of the sound produced in the larynx depends upon the tautness of the vocal cords.



Let's try this.

Take a pot filled with water.
Strike it lightly on its rim.

What do you see?

Why are waves formed on the water in the pot?

13.5 : Vibrations in the water and production of sound

How sound is heard

There is air around a source of sound. As the source of sound begins to vibrate, the layer of air nearest to the source also vibrates. A wave of vibrations of that sound spreads in all the directions from the source of sound. Such a wave is called a sound wave. The sound waves reach our ears. There is a delicate diaphragm or eardrum in the cavity of our ears. It starts vibrating, too. The sensation produced by these vibrations are passed on to the brain through the nerves in the ears and we hear the sound.

Let's try this.

Water balloon

Air balloon

13.6 : Propagation of sound

Propagation of sound

1. Take two balloons. Fill air in one and water in the other. Press the balloon filled with air against your ear as shown in the picture. Rub a finger on the balloon and listen to the sound.
Repeat the same activity with the balloon filled with water.
Through which balloon do we hear a clearer sound?

2. Stand at the end of a big table and make a friend stand at the other end. Ask the friend to knock lightly on the table. You will hear a faint sound.

Now you press your ear to the table and ask the friend to repeat the knock. What difference do you notice?

Sound travels in the form of waves through air, water or through a solid and reaches our ears. Sound is propagated more clearly through a liquid than through air. It is heard most clearly through a solid. Why is this so?

Transmission of sound occurs at a different speed through different mediums. Transmission of sound is faster through a liquid than through a gas, and faster through a solid than through a liquid.

New words

Propagation of sound

Sound is said to be propagated when sound waves spread in all directions from a source of sound.

The medium of propagation of sound

The substance around a source of sound through which sound waves spread is called the medium of propagation of sound.

Use your brain power!

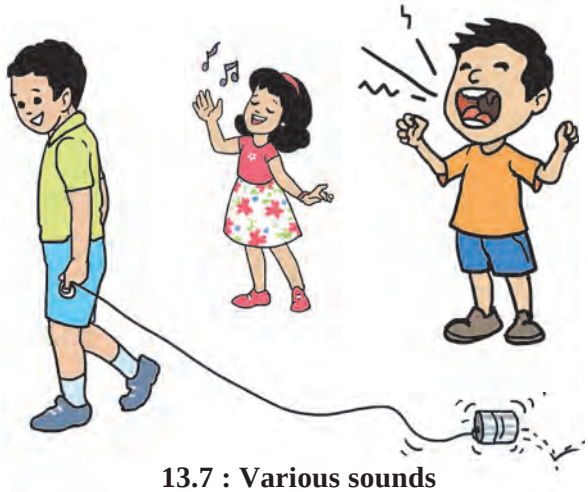
If a bell is hung in a vacuum container, will its sound be heard outside?

New word

Vacuum means an empty space from where air is partially removed.

Observe and discuss :

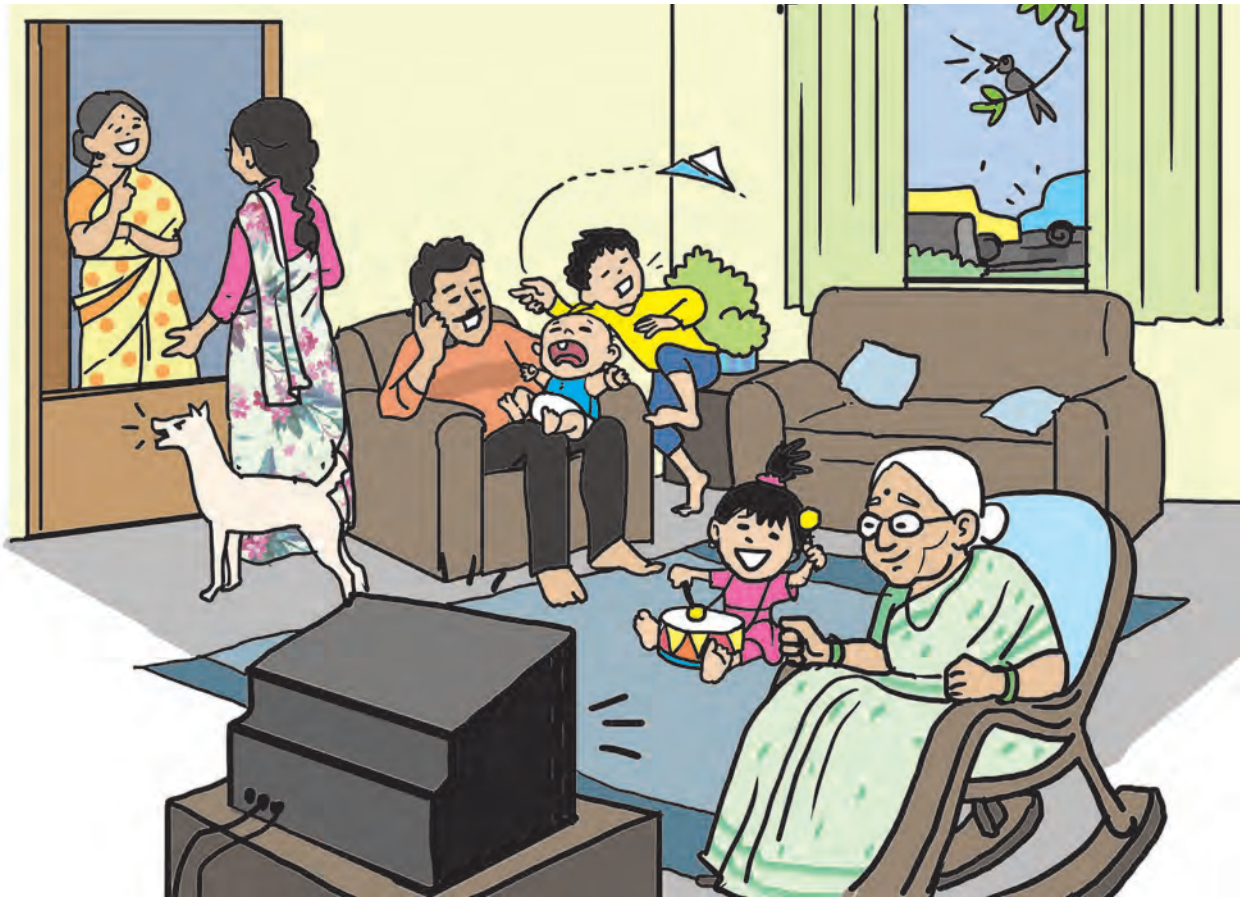
1. Which of these sounds is pleasant?
2. Which sounds are a nuisance to people?



13.7 : Various sounds

Noise pollution

A loud sound is harsh to the ear. Such sounds produce noise.



13.8 : A noisy scene

1. Make a list of all the sounds implied in the picture.
2. How would this atmosphere affect a person who is not feeling well?
3. Would you be able to study in these conditions?

The situations shown in the two pictures on page 94 are often seen around us. Some of the sounds they depict are pleasant while others are harsh. Very loud or continuous noise has adverse effects on the people of that locality. Their hearing may get impaired which can even lead to deafness. It can also cause restlessness, irritability and mental exhaustion. One cannot work with concentration. This kind of continuous noise which may have ill effects is called noise pollution.

Noise pollution occurs when we hear one or many sounds harmful to the ear.

Measures for preventing noise pollution

1. As far as possible, we should avoid blowing the horn.
2. The volume of the TV or radio in the house should be restricted to those watching the programmes.
3. Vehicles should be maintained properly to reduce the unnecessary sounds they produce.
4. Factories, airports, railway stations and bus stands should be located at the proper distance, away from residential areas.

Always remember...

Some of the sounds that we enjoy can be a nuisance for others.

Believe it or not !

Birds like the robin and the woodcock can recognize the sound of an earthworm in the soil, and find their prey. This is because their hearing organs are very sensitive. Some species of grasshopper produce a sound by rubbing their legs together while flying in the air.

The flapping of the wings of the bee or the mosquito produces a humming sound. Have you heard such sounds?

What we have learnt–

- Vibrations are required for the production of sound.
- A medium is required for the propagation of sound.
- Sound is propagated through gaseous, liquid and solid mediums.
- Noise is disagreeable, irregular and loud.
- Noise pollution occurs due to continuous noise. Noise pollution has adverse effects on our health.
- Heavy traffic and industrial areas cause the maximum noise pollution.
- Noise pollution is a social problem.
- It is necessary that everybody takes measures to prevent noise pollution.
- Blowing the horns of vehicles is prohibited near places like schools and hospitals. These rules should always be followed.

Exercise

1. Fill in the blanks with the proper words.

(a) The propagation of sound does not occur through a …….. .

(b) Noise pollution is a ……. issue.

(c) The sound which is disagreeable to the ears is called….. .

(d) Noise has adverse effects on our ..... .

2. What should we do ?

(a) The silencer of a motorcycle is broken.

(b) A factory in the surroundings is producing continuous loud noise.

3. Write the answers in your own words.

(a) What is meant by vibration ?

(b) Explain with the help of practical examples how sound is propagated through solids.

(c) What is meant by noise pollution?

(d) What measures will you take to control noise pollution ?

4. Complete the table.

Nature of sound	Unpleasant	Pleasant
Speaking		
Whispering		
Aeroplane sounds		
Horns of Vehicles		
Railway Engine		
Rustling of leaves		
Neighing of a horse		
Ticking of a clock		

Project :

- Prepare a list of the harsh sounds heard near your house. Write about those sounds which produce noise pollution.
- Collect information about places where loud noise is prohibited and discuss why it is so.

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