CHAPTER 11

Sound

Ring! Bang! Thud! Thump! Boom! Beep! Inside the house the music system is playing loudly, your mother is grinding some *masalas*, and your younger brother is playing with the utensils in the kitchen. Outside, children are bouncing a ball on the ground; a driver is blowing a car horn. It seems that everyone and everything around you is making a sound.

Activity 1

Close your eyes and listen for two minutes to all the sounds in your classroom. Write a list of all the sounds that you heard.

Which of these sounds are loud and which are soft?

Which of these sounds would you not hear in a forest?

Which are the sounds that you might hear in your home as well?

Which ones are made by living things and which ones by non-living things?

Exercise 1

Make a list of sounds that you might hear in each of these places.

i. a football field during a match

ii. a park

iii. a mountain when you go on a nature trek

Activity 2

You will need: an empty bottle, a sheet of paper, a rubber band

Try to make as many different sounds as you can with each of these things.

When these objects were lying on the table did they make any sound? What did you have to do to each of them to make a sound?

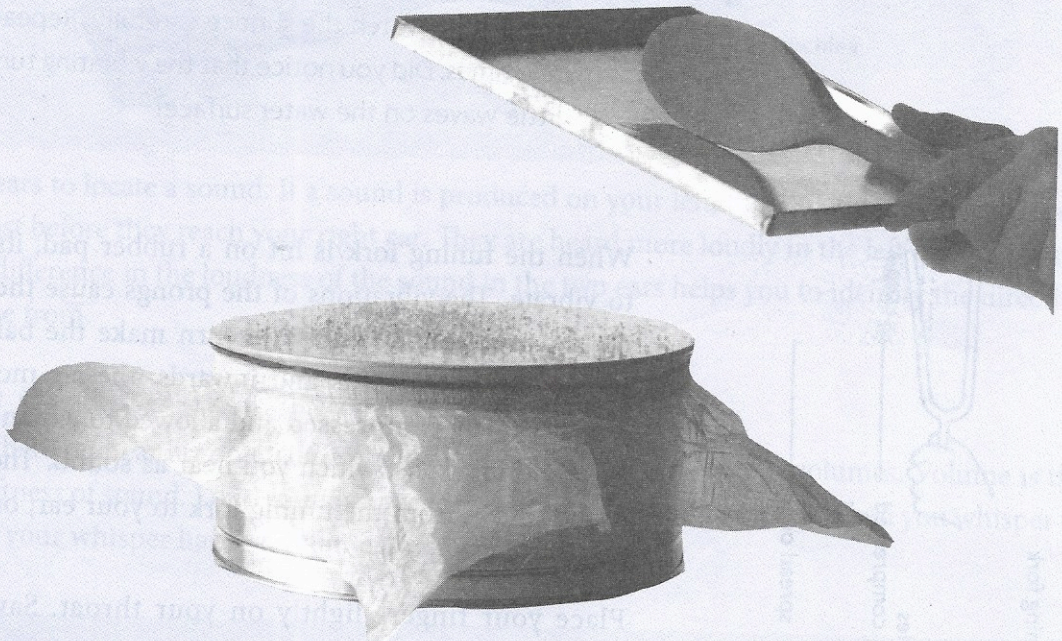
Stretch the rubber band between the fingers of one hand and flick it with the fingers of your other hand. What happens? Do you hear a sound?

The rubber band vibrates; it quickly moves backward and forward. **When something makes a sound, it is vibrating. All sounds are made by vibrations.** Sometimes you cannot see the vibrations when the sound is being produced, but you can see their effect.

Activity 3

You will need: a colourless polythene packet, a tin can, a rubber band, a few rice grains, a metal tray or a steel vessel, a wooden spoon or ruler

Cut the polythene packet and stretch the polythene sheet over the open mouth of the can. Use the rubber band to hold the plastic in place. Place a few rice grains on the plastic. Hold the metal tray or the steel vessel near the can. Tap it hard with a wooden spoon or ruler. What happens to the rice grains?

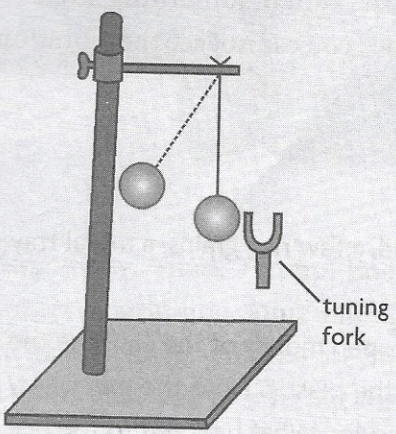


Complete these sentences explaining what happened.

The metal tray _____ when it is hit with the ruler. These vibrations make the _____ around it vibrate too. The vibrations pass through the air and make the stretched plastic start vibrating as well. This makes the _____ move.

Activity 4

You will need: a tuning fork, a rubber pad, a bowl of water, a sellotape, a piece of thread, a table tennis ball, a stand, a shallow dish with water

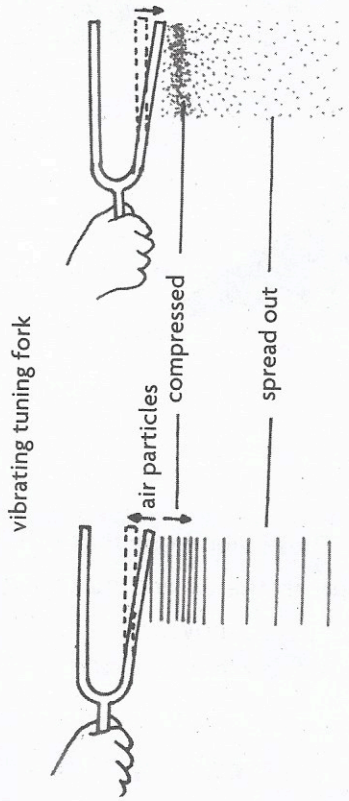


i. Hit the tuning fork against a rubber pad and then hold it near your ears.

ii. Strike it again and look at it closely. Can you see the vibrations that cause the sound?

iii. Fasten a piece of thread to the table tennis ball using a small piece of sellotape. Tie the thread to a stand as shown. Strike the tuning fork on the rubber pad and hold it close to the ball so that it just touches the ball. Repeat this action a few times and observe what happens.

iv. Fill a shallow dish with water. Strike the tuning fork and quickly lower it until one prong just touches the surface of the water. Watch the surface carefully. Repeat your actions few times. Did you notice that the vibrating tuning fork made little waves on the water surface?



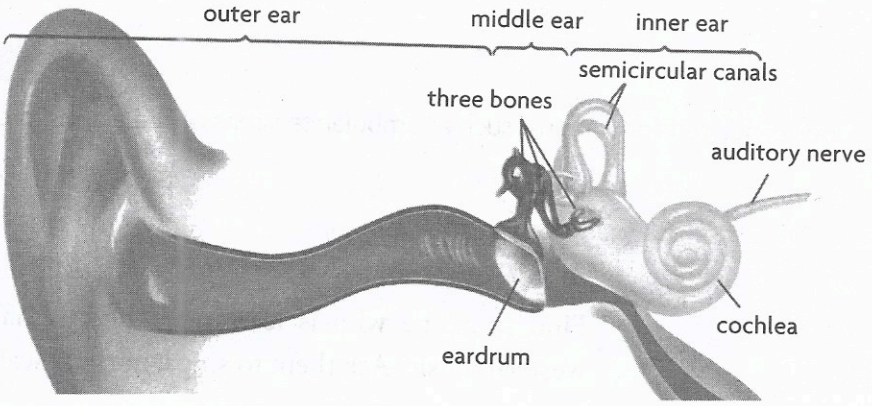
When the tuning fork is hit on a rubber pad, its prongs begin to vibrate. The vibrations of the prongs cause the air molecules around it to vibrate. These in turn make the ball vibrate. As a prong moves outwards and inwards, the air molecules nearby are alternately **compressed** and allowed to **expand**. This forms a wave of vibrations, which you hear as sound. The air molecules do not move from the tuning fork to your ear; only the wave of sound does.

Place your fingers lightly on your throat. Say a few words. Do you feel something vibrating in your throat? What you feel are your vocal cords, which vibrate as you speak. Vocal cords are thin folds at the top of your windpipe. When you talk you move air from your lungs past your vocal cords. The air makes your vocal cords vibrate. Your vibrating vocal cords make sounds.

The Ear

The sounds that you hear are vibrations of the air around you. The outer part of the ear channels vibrations down to a thin membrane called the **eardrum** which is stretched very tightly. The ear drum

then begins to vibrate and the vibrations are passed on to three tiny bones (the **hammer**, the **anvil** and the **stirrup**) in the **middle ear**. From here, the vibrations are passed on to the **inner ear**. The inner ear consists of a 34 mm long, coiled tube called the **cochlea**. The cochlea is filled with fluid and contains hair cells which are very sensitive to vibrations. The vibrations are then transmitted by the **auditory nerve** to the brain which registers the sound.



We need two ears to locate a sound. If a sound is produced on your left, the vibrations of the air reach your left ear just before they reach your right ear. They are heard more loudly in the left ear than in the right ear. The difference in the loudness of the sound in the two ears helps you to identify the direction the sound came from.

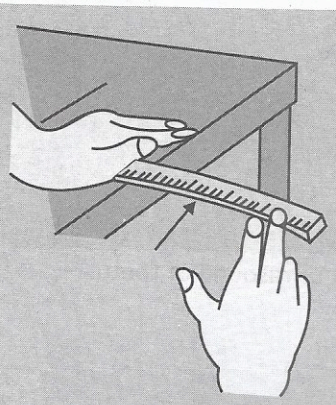
Volume of a Sound

Some sounds that you hear are soft, some are loud. Sound can have different volumes. Volume is the loudness or softness of sound. Loud sounds have more volume than soft sounds. When you whisper to someone, then your whisper has less volume than normal talking.

Activity 5

You will need: a 30 cm metal ruler

Hold the ruler so that it extends about 15 cm over the edge of a table. Flick the free end. Observe the vibrations and listen to the sound. Flick it again, this time make it vibrate with larger amplitude. This means, the scale should move a larger distance on both sides from the rest position. Was the sound produced both times the same? What changes did you notice? What does loudness depend upon?



Loudness or the volume of a sound depends on the amplitude of vibrations. Large amplitudes produce loud sounds while small amplitudes produce soft sounds.