

# Biology

## Hearing

### Learning objectives

- The students learn about how our sense of hearing works and how we can damage it.
- In the project stage, students measure some sounds and report back to the class.

### Warmer

Copy the table below onto the board and ask the students to complete it. (Answers are given in brackets.)

	verb	sense
ears	hear	hearing
eyes	(see)	(sight)
nose	(smell)	(smell)
tongue	(taste)	(taste)
fingers	(touch/feel)	touch

In pairs, ask the students to discuss these questions.

- With our sense of hearing we can hear our friends and listen to our favourite music. What can we do with the other senses?
- What couldn't we do if we lost one of the senses?
- Which do you think is the most/least important sense?
- Is there a sixth sense? What is it?

- Ask the students to look at the title, headings and pictures in the text and ask *Which sense are we going to look at? What information will we find out about it?* Next, ask the students to look at the picture of the ear and try to say what each part (e.g. ear canal, eardrum, cochlea) does. Then ask them to read the information quickly and check their ideas and answer the question.

### Answer

It sends electrical signals to the brain.

- Ask the students to look at the words in the box, which are all parts of our hearing system, and say what each part does. If necessary, point out that there are definitions of *auditory* and *nerve* in the Key Words box at the bottom of the text.

Next, ask them to read the section *How the parts work* again to check their answers. Then ask them to complete the sentences with three of the words.

### Mixed ability

Pair up a stronger student with a weaker student. Ask the stronger student to explain to the weaker one how the parts work in their own language first. Then ask them to complete the sentences together.

### Answers

1 eardrum 2 ossicles 3 cochlea

### Extension activity

Copy the picture of the ear onto the board (or ask a student to do this), ask volunteers to come to the board and label the parts and also to demonstrate with arrows how sound passes through the ear.

### Background information

**Noise-induced hearing loss:** Sudden loud sounds or loud sounds for a long period of time can damage the hair cells in our ears. These hair cells help produce the electrical signals which are sent from the cochlea to the brain. Any damage to these hair cells may cause temporary or permanent hearing loss and unfortunately, once they are damaged, these cells don't grow back.


- Ask the students to look at the sound wave diagrams in the text again and to say what the difference between amplitude (the distance between the top and bottom of a wave. If the distance is larger, the sound is louder) and pitch is (the distance from the beginning of a wave to the end. If the distance is shorter, the sound is higher). Then ask them to discuss the questions in small groups.

### Suggested answers

- Amplitude is the distance between the top and bottom of a sound wave. It tells us how loud or soft a sound is. The sound of children shouting has a high amplitude and falling snow has a low amplitude.
- Pitch is the distance from the beginning to the end of a sound wave. It tells us how high or low a sound is. A whistle has a high pitch and the sea has a low pitch.
- Loud sounds can damage the parts inside your ear and cause temporary or permanent hearing loss (see background information above).
- First, ask the students to identify the photos and match them with the words in the box. Now ask them to put them in order from loud to soft and also to complete the chart. Point out that if we listen to sounds at 90 dB or higher for long periods of time, we can damage our hearing, and at 125 db, our ears can begin to hurt.

## Answers

- a whispering b hair dryer c rock concert  
d fireworks e light rain f busy traffic  
4 rock concert 6 busy traffic 8 hair dryer  
10 light rain 12 whispering

- 5  1.24 Tell the class they are going to listen to a safety message about loud music. Ask them to read the questions first and try to guess the answers. Then ask them to listen and check their ideas. Point out that the answers on the recording are not in the same order as the questions. Play the recording at least twice. If necessary, play the recording for a third time and stop it after each answer is given. Ask the students if they were surprised by any of the answers.

## Answers

- 1 We may hear a ringing sound that lasts for minutes or even hours.
- 2 90 to 100 decibels
- 3 You should keep your distance from the speakers, i.e. not stand close to the speakers. Because the vibrations damage their eardrums.
- 4 With earphones, the sound is closer to your eardrum and your middle and inner ear. Old-fashioned headphones are safer but you have to be careful with them too.
- 5 Can you hear the music?

## Audioscript

**Speaker:** We all know that really loud noises, like the sounds of jet planes or firecrackers, can damage our eardrums. For example, if someone sets off a firecracker, we may hear a ringing sound that lasts for minutes or even hours. And if we're too close, the vibrations could even break our eardrums. That would really hurt! But those loud sounds aren't the only dangers to your hearing. More typical, everyday sounds can also be a problem. For example, you can damage your hearing if you go to a concert and stand too close to the speakers. Your ears might be ringing for more than a day after that. The same is also true if you listen to your MP3 player at full volume. You might not notice it, but those little earphones can produce about 90 to 100 decibels of sound. That's the same as a hairdryer or motorcycle! That volume probably won't break your eardrums, but if you listen to loud music like that for a long time, or for several hours a day, it will slowly damage the tiny bones inside your ears. After a while, they won't vibrate properly any more. You can also damage your cochlea, which sends auditory signals to your brain. So what can you do to protect your ears? First of all, avoid any extremely loud noises, if you can. When you go to concerts, keep your distance from the speakers. And when you listen to music, try to keep the volume down. Small earphones that go inside your ears are also worse, because the sound is closer to your eardrum and your middle and inner ear. You might want to try old-fashioned headphones that cover your ears. They're safer, but you have to be careful with them too. A good way to check the volume is to ask other people around you if they can hear your music. If they can hear it clearly, then the volume is probably too high.

## Cooler

In small groups, ask the students to think about the other four senses (sight, smell, taste and touch) and to think of ways we could damage these senses, and things we can do to protect ourselves.

## Project

Tell the class they are going to guess the decibels of some sounds and then check their ideas using a decibel meter or the internet.

Ask the students, in pairs, to read the list of types of sound in the Project box and to choose eight sounds. If necessary, brainstorm some typical sounds in the house, e.g. the washing machine, a football match on TV, someone snoring, etc.

Next ask them to copy the chart in exercise 4 and complete it with their chosen sounds. Remind them to try to write them from loud (1) to soft (8).

Next, find a free decibel meter app for mobile phones and ask the students to download it onto their phones. Then ask the students to measure their chosen sounds, produce a chart and present it to the class. Encourage them to say which sounds they could guess correctly and which sounds surprised them because they were either louder or softer than they expected.

If some of your students can't download a decibel meter app, either pair them up with someone who can **or** ask them to look up the answers on the internet **or** download the app onto a class laptop and do the exercise together **or** buy a decibel meter for the class to use to measure sounds in the school.