

# Unit IV. How does sound travel and how do we hear it?

**Key Question: How does sound travel and how do we hear it?**



**Student name:**

**Class:**

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## Activity 1 – Can sound move things?

- Build a drum. Stretch a sheet thin rubber (a piece of balloon) over one end of a can or a cardboard tube that has both ends open and secure it with a rubber band. Now pull the edges of the rubber so that it fits as tightly as possible.
- Talk into the open bottom of the can while touching the balloon.



1. What does your voice do to the stretched balloon?

2. Can you feel the vibrations coming from your voice?

Yes       No

3. How do you think the vibrations get from your mouth to the drum?

- Place a few grains of uncooked rice on the drum. Talk into the open bottom of the tube.

- 4. Can you make the rice grains move?  
Can you make the rice grains jump?



- 5. Explain how do you think the sound of your voice moves the rice grains.

- 6. What do you think: can sound travel without air? Write your hypothesis.

- 7. Watch the movie 'Sound alarm in the jar'. What happens to the sound of the alarm when the air was being pumped out of the jar?

- 8. What is necessary for sound to travel? Was your hypothesis correct?

## Activity 2 – Does sound travel through things?

9. Can you hear through walls?

Yes       No

10. Explain why do you think this happens?



Your classmate knocks at one end of a table while you listen with an ear against the other end of the table. Cover with your hand your other ear so you can listen only with the ear close to the table.

11. Can you hear your classmate knocking?

Yes       No

12. Explain why do you think this happens?

13. If all air in the classroom would be replaced with water, could you still hear? Explain your reasoning.

Now you are going to make your own investigation. In this investigation you will use the €Sense sound sensor and will find out through which materials sound travels.

- Design a fair investigation in which you will test how sound travels through different materials. You can use materials, which you have got from your teacher but you can

also use materials and objects in your classroom.

Remember **never** place the sound sensor in water!

- 14.** Describe below your plan for the investigation, what you will measure and how. What will you change in your test? What will you keep the same?

- Ask for your plan to be approved by your teacher before you continue.
- List the materials you are going to test.
- Before you start your measurement make a prediction, write yes if you think sound travels through, or no if you think that this is not the case.
- Carry out your measurements and record the measurement results in the table.

INVESTIGATED MATERIAL	DOES SOUND TRAVEL THROUGH?	
	MY PREDICTION	MY MEASUREMENT

**15.** Does sound travels through different materials?

Yes

No

**16.** Can you find out through which materials sound travels the best?

**17.** How?

**18.** Do you know why?

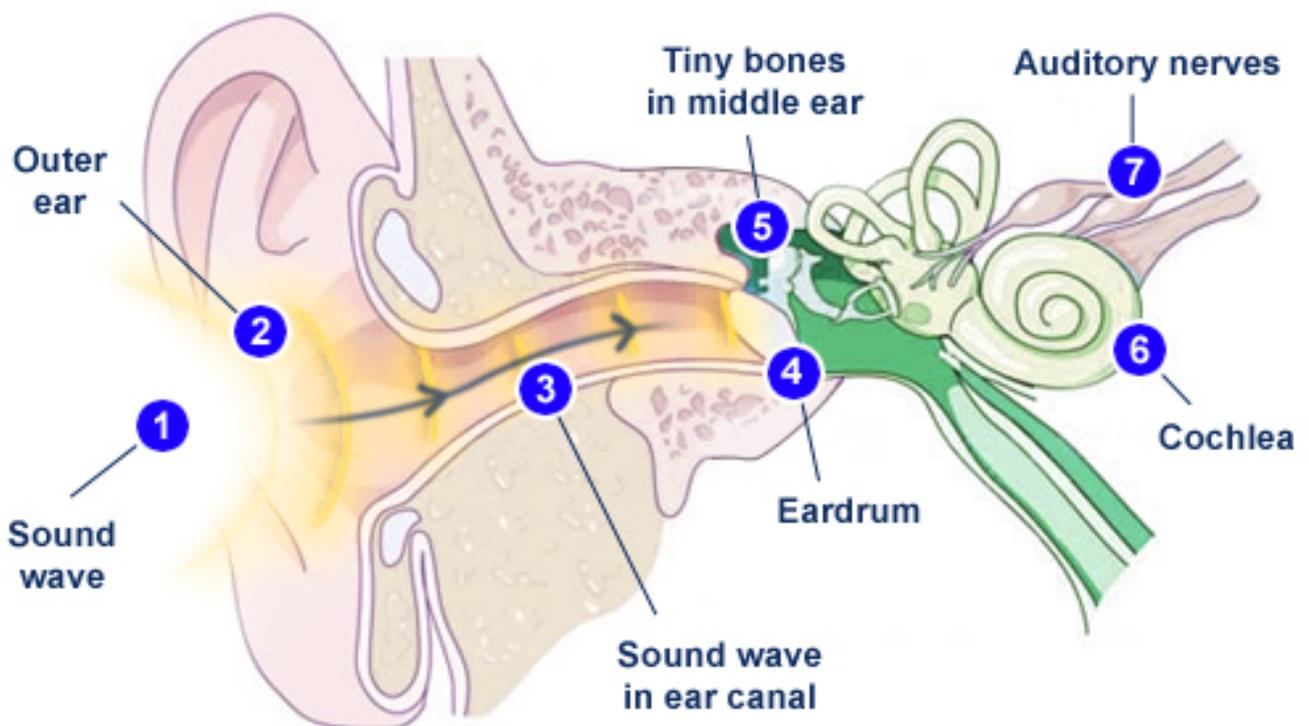
### Activity 3 – How do you hear sound?

19. Sounds come to you from all directions. Explain how they get to your ears. What do you think is the purpose of your outer ear?

- Read the explanation 'How does your ear work?'.

#### Explanation: How does your ear work?

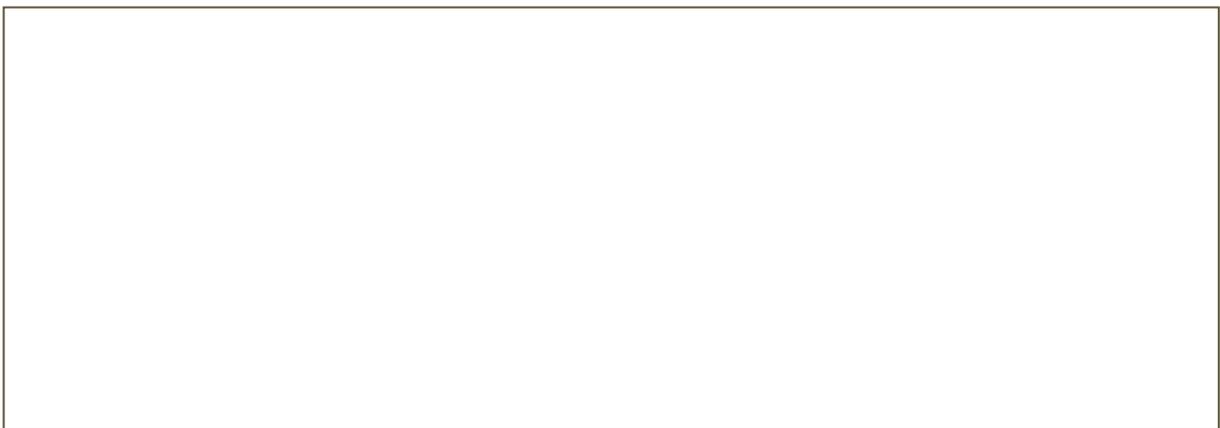
Your eardrum is a piece of skin just like the drum with the stretched balloon made in Activity 1. It vibrates when sounds reach your ear. The little vibrations of the eardrum move small bones in the middle part of the ear. The bones are fixed to the eardrum, so they move back and forth as the eardrum vibrates. The bones carry the vibrations to your inner ear, where they are detected and translated into signals to the brain. This all happens very quickly. After the sound has reached the outer ear, it takes very little time for the message to travel to the brain.



**20.** You need to take good care of your ears, explain why you think this is necessary.



**21.** Discuss with your classmate how you can take care of your ears. Write down how it can be done.



## Activity 4 – How can you hear better?

- 23.** If someone is talking softly, you may be able to hear him better if you hold your hands behind your ears. Why would this help you to hear better?

- Make an ear trumpet.  
Roll a sheet of paper into a cone.  
Tape the edges of the paper so the cone does not come apart. If you like, cut out and tape a handle.
- Listen to a sound with and without your ear trumpet. Do you hear any difference?



- Now instead of your ear use the sound sensor and measure how the ear trumpet influences the measured sound level. Write your findings.

- 24.** What do you think would a larger trumpet help more?

- Test it by making a larger trumpet. Was your hypothesis correct?

## Questions

- A.** Indians used to put their ears to the ground to hear horses running away. Explain how do they hear the sound.

- B.** Many animals such as rabbits have big, cone-shaped ears. How do these special ears help the animals survive?

- C.** What will happen to your hearing if the eardrum of your ear is broken?  
Can you imagine when such a thing can happen?