

Good Vibrations




Science Film Festival
 Knowledge Through Entertainment

KEY OBJECTIVES

Understanding how we hear and ways in which hearing can be impaired

INTRODUCTION

Many people are faced with hearing loss at some stage of their life, or may be born with little or no hearing. The process of “hearing” has a number of stages and mechanisms. Damage or interruption to any of these stages can result in hearing loss or deafness.

Sound - as we usually think of it - is a vibration of the air. Typically an object vibrates in response to being hit, shaken, stretched and released, or set in motion by some fluid (air or water) moving over it. Once an object is vibrating it causes the air around it to vibrate, and these disturbances travel out like ripples in a pond, carrying the energy of the vibration away.

These vibrations, small changes in pressure, can be captured by our outer ears (the fleshy bits we use to hold our glasses), and funnel the vibrations through the ear canal to our middle ear. The middle ear is a delicate mechanism made of thin membranes and tiny bones that converts the vibrations in the air into vibrations in the fluid of the inner ear.

Within the inner ear, tiny sensory cells can respond to the vibrations in the fluid to create electrical signals - nerve impulses - that can travel to the brain to be perceived as sounds of many different tones and volumes.

The following simple activities can help students understand some of the process and how it can be affected.

KEYWORDS

Inner ear

outer ear

ear drum

sensory cell

vibration

membrane

LEVEL

Primary School

TIME FOR ACTIVITY

15 min

GUIDING QUESTIONS

How do we hear?
 What are some ways that our hearing can become impaired?



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MATERIALS & PREPARATION

- **Tube (cardboard or plastic tube about 20 -30 cm long and 2 to 3 cm in diameter)**
- **Balloons x 2**
- **Some fine dry powder (such as sand, salt or sugar)**
- **Optional - an aluminum pie plate**
- **A medium sized jar or container with a wide opening (10-20 cm wide).**
- **Scissors**

TASKS & PROCEDURE

Activity 1

- 1) Inflate a balloon to about 20-25 cm diam - tie it off.
- 2) Have pairs of people sit close together facing each other.
- 3) Have one of them hold the balloon in front of their face, but hold it lightly between the tips of their fingers. Have the other person lean in close to the balloon and sing or talk at the balloon.
- 4) What does the other person feel? How do the vibrations change with the other person singing high or low notes, talking soft or loud?

Activity 2

- 1) Take a balloon and with the scissors cut the stem of the balloon off.

- 2) Stretch the balloon out over the open mouth of the jar or container to form a drum skin.
- 3) Sprinkle a little fine sand, salt or sugar over the drum skin.
- 4) Try singing near the drum. Ask what the students see?
- 5) Take the tube and put that to your mouth and try again directing the open end of the tube close to the drum skin (sing, don't blow!). What can they notice now?
- 6) Then take some cotton wool and block the tube about halfway along, try singing again. Ask what has happened?

POSSIBLE EXTENSIONS

The balloon in both activities behaves a lot like the outer and middle ear. The vibrations in the air are captured by the stretched balloon, and cause it to vibrate.

We see the vibrations being passed onto the sand as it starts to jump and move in response to the sound.

Singing into the tube helps direct and concentrate the vibrations (just like our outer ear and ear canal).

The other ear canal and the middle ear can both become inflamed, and infected, and if untreated becomes a condition called "glue-ear" - which leads to significant hearing loss.

SOURCES Presented by **Dr. Stuart Kohlhagen/The Science Nomad**