Human Ear and Ear Disorders

Activity Overview

Listen... do you hear something? If so, you know your ear and your brain are busy sensing and interpreting the sound. The human ear is a fascinating organ because it is made up of three tiny bones that work together to transmit sound. These bones inside the ear are so small that they could fit on your thumbnail. In this activity, students will explore the parts of the human ear, the functions of these parts, and several common ear disorders that affect the sense of hearing.

Essential Questions

1. How are structures and functions related in nature?
2. What systems are found in the human body?
3. How are the body systems interrelated?
4. How does the human body process information?
5. What causes body system disorders?

Objectives

- Review how humans receive important information about their surroundings from the sense of hearing
- Conduct in-depth research using multiple sources to review the parts of the ear and their functions
- Build a model of the human ear
- Explain what a hearing disability is, how it occurs, and how it affects a person’s ability to gather information
- Conduct in-depth research about some common ear disorders
- Create 3D presentations that explain how a specific ear disorders affect the brain's regular abilities to process and respond to sensory stimuli

Introduction

Prior to this activity, students should complete Neurons and Synapses in VIVED Science. To begin, ask students to describe the different kinds of sounds that they are able to hear with their ears. Then ask them to imagine what it would be like to be deaf and what activities would be really hard to do without the sense of hearing. Explain to the students that they will take a deeper look at the human ear and research different ear disorders.
zSpace Activity

Instructions for VIVED Science

CENTER 1:
1. Open the Human Ear session and follow the instructions.
2. Complete the Human Ear worksheet as you progress through the session. Draw a cross section of the ear and label its parts.

CENTER 2:
1. Using textbooks and the Internet, conduct in-depth research about the parts of the human ear and their functions.
2. Record your findings in the chart on the Human Ear worksheet.

CENTER 3:
1. Follow these directions to build a simple model of the human ear. First, roll and tape a small piece of construction paper in a funnel shape at one end of a toilet paper roll to represent the outer ear. The toilet paper tube represents the ear canal.
2. Tape a piece of plastic wrap tightly around the other end of the toilet paper tube to represent the eardrum.
3. Place your ear model on a piece of construction paper on your desk.
4. Cut out pictures of a hammer, anvil, and stirrup to represent the names of the three small bones in the middle ear and place them on the construction paper behind the ear drum.
5. Cut out a snail to represent the cochlea and place that behind the three small bones.
6. Cut a piece of string and attach it to the cochlea to represent the nerves that connect the ear to the brain.
7. When you are finished building your model, glue all earpieces in order onto the construction paper.

CENTER 4
1. Working in pairs or small groups, choose a common ear disorder to study (for example, otitis media, tinnitus, Meniere's disease, barotrauma, or otosclerosis).
2. Conduct in-depth research about the causes, symptoms, and treatments of your ear disorder using textbooks and the Internet.
3. Draw a picture of an ear with this disorder and record your findings on the Ear Disorders worksheet.
4. Using the Ear model in VIVED Science, create a presentation that labels the parts of the ear and points out which areas are affected by your chosen disorder.
5. If possible, upload a picture of an ear with this disorder and add it to your presentation.
6. Show your presentation to the class and explain the causes, symptoms, and treatments for your chosen disorder. Be sure to explain how this disorder interrupts or changes the brain's regular abilities to process and respond to stimuli from the ear.

Session - Human Ear

Activity Questions Provided in VIVED Science
1. Ears are essential for the sense of hearing. Let’s take a closer look at the structures inside a human ear.
2. The human ear is divided into three sections: the outer ear, middle ear, and inner ear. On the next few slides, let’s analyze the structures within each section.
3. The Outer Ear. The outer ear consists of the outer skin and cartilage (called the pinna) as well as the ear canal, which leads to the middle ear. Remove the outer ear and look at it up close.
4. **The Middle Ear.** The middle ear consists of the eardrum, malleus (hammer), incus (anvil), and stapes (stirrup). Lift up each structure and take a closer look.

5. **The Inner Ear.** The inner ear consists of the semicircular canals, the cochlea, and the eustachian tube. Remove each structure and look at it more closely.

6. Finally, you will notice three different sensory nerves that send information to the brain. Lift up and analyze each nerve.

7. Now you know all about the structures inside a human ear. Conduct further research to find out the functions of these structures.

**Closing**

After the students complete their worksheets, ear models, and presentations, review the parts of the ear and their functions. Share observations about how the ear model replicates the actions within the ear. Draw conclusions about how the brain processes and responds to stimuli from the ear and share thoughts about common ear disorders and the importance of the sense of hearing.

**Questions for Discussion**

1. How does the ear model replicate the actions within the ear?
   
   *The plastic wrap represents the eardrum. When you make loud noises, the grains of rice bounce on the plastic wrap. Sound causes vibrations on the eardrum, which then sends messages to the brain about the sounds that you are hearing.*

2. What types of sounds caused the greatest vibrations?
   
   *The louder the sounds and the closer the source, the bigger the vibrations on the plastic wrap.*

3. Are there ways to prevent some ear disorders or reverse their effects?
   
   *Yes: Do not listen to really loud music.*

4. How would your life be different if you had one of these disorders?
   
   *I would have to use my other senses more to understand what people were communicating to me.*

5. Do you know anyone or have you read about anyone who has any of these disorders?
   
   *Helen Keller was deaf and blind but she learned to speak.*

Extension Activity: Research the ears of other animals and compare their parts/functions with those of the human ear.

Extension Activity: Try to learn how to communicate using basic sign languages.

Extension Activity: Write a narrative describing what it would be like to be deaf. For example, you could write about the different events in your regular day and explain how being deaf would make these things more difficult.

Follow-up activity: *Human Eye and Eye Disorders* - VIVED Science

**Differentiation**

- Provide paper copies of diagrams to students to use as a reference
- Provide a handout with a list of vocabulary terms and definitions that will appear in the activity
- Allow students to provide answers that are handwritten, typed, or verbal
- Give students a variety of presentation styles to choose from (using charts/graphs, PowerPoint, making 3D presentations, creating videos/movies, making posters)
Resources

http://www.educationworld.com/a_sites/sites020.shtml