**Waves**

**Lesson #6:** **Ears**

**Supplementary Lesson to be taught by the Classroom Teacher**

**Time Frame:** 60 minutes

*Please write the vocabulary on the board before each lesson.*

**Vocabulary**

**Pinna**- The visible part of the ear that resides outside of the head and collects sound waves.

**Middle Ear**- The part of the ear that transmits energy from sound waves in the air to fluid-membrane waves in the cochlea. The middle ear houses the eardrum and ossicles.

**Eardrum**- The part of the ear that transmits sound from the air to the ossicles in the middle ear.

**Ossicles**- The three smallest bones in the human body. They are located in the middle ear.

**Inner Ear**- The innermost part of the ear, which houses the cochlea and a system for balance.

**Cochlea**- The part of the ear that is filled with a watery liquid, which moves in response to the vibrations coming from the middle ear. As the fluid moves, thousands of “hair cells” are set in motion and covert that motion to electrical signals that are communicated via neurotransmitters to many thousands of nerve cells.

**Learning Standards:**

*Science*

Science and Engineering Practices

1. Develop a model using an analogy, example, or abstract representation to describe a scientific principle.
2. Develop a model to describe phenomena.

**Student will be able to:**

1. Understand how the ear senses sound and vibrations.
2. Create and label an ear.

**Resources and Materials:**

|  |  |
| --- | --- |
| **Item** | **Amount** |
| Science Journals |  |
| “Hearing Sounds” article | 25 (in bin) |
| Ear diagram Fill-in-the-blanks worksheet | 25 (in bin) |
| Pop-up tent | 1 (in bin) |
| Yellow Play-Doh | 1 container (in bin) |
| Yarn | 1 ball (in bin) |
| 2-liter bottles | 2 (in bin) |
| Mustard | 1 bottle (in bin) |
| Toy hammer | 1 (in bin) |
| Toy drumstick | 1 (in bin) |
| Triangle | 1 (in bin) |
| Bin | 1 (in bin) |
| Duster | 1 (in bin) |
| Jump ropes | 3 (in bin) |
| Pillow | 1 (in bin) |

**Focus Activity:**  Read the article “Hearing Sounds” and take a tour of the ear with your students. It is not necessary for students to memorize each term and function, but they should begin to develop a general understanding that many parts of the ear work together to allow us to hear.

**Introduction:** Fill out the Ear Diagram: Fill-in-the-blanks worksheet and discuss how the parts of the ear function together to allow us to hear.

**Activity: Build an Ear (see the Diagram of the Ear Model and Actual Parts of the Ear for a more visual understanding of how the model matches up with the ear)**

1. Divide students into three groups and give each group a bucket of items. One bucket should contain materials to make the outer ear, a second for the middle ear, and a third for the inner ear. Make labels for each part of the ear as you go.
2. Use the pop-up play tent as the pinna. Leave one flap open to represent the ear hole and the other flap down to represent the eardrum.
3. Inside, use yellow play-doh as earwax and brown yarn as hairs.
4. The middle ear, ear canal, is under a desk.
5. Use an empty two-liter bottle as the Eustachian tube. Use another two-liter bottle filled with mustard and water to represent the Eustachian tube filled with mucus when someone is sick. (optional)
6. Use a toy hammer to represent the hammer, a toy drumstick to represent the anvil, and a triangle to represent the stirrup.
7. Put a bin of water surrounding the cochlea. The cochlea should be made of a duster, which will be like the hairs, sitting in water – there is liquid around the cochlea.
8. Use jump ropes to represent the auditory nerves.
9. Use a pillow for the brain.
10. Now that your ear is set up, have some students act as the brain and others act as sound waves. Tell the sound wave students a riddle. Have one student crawl through the ear to tell someone in the brain. Then tell another student the answer to the riddle. Have that student crawl through the ear to tell the message to the brain.

**Closure:** Talk to students about the importance of protecting their ears. Here are some things they can do to protect their ears:

* Keep your outer ears clean by washing them when you wash your face.
* Don’t poke anything into your ear canal--not even a cotton swab.
* Loud noise can damage your hearing. Any noise that makes your ears ring or feel dull is too loud.
* See your doctor if your ears hurt or if they feel blocked up.
* Use sunscreen and a hat to protect the outside and top of your ears when you are outside in the sun.

**Assessment**: Ear Diagram: Fill-in-the-blanks worksheet, participation in building the ear





