1 - 3 - 6 Plan!
Early Hearing Detection & Intervention Fan!

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Summary
Students learn about the Early Hearing Detection and Intervention Program (EHDI) at the Centers for Disease Control and Prevention (CDC), build a simple ear model, and use the ear model to observe how otoacoustic emission (OAE) screening can detect some types of hearing loss. This lesson would be a good addition to a unit on how the ear works.

Learning Outcomes
- Students will be able to model how OAE screening works.
- Students will be able to state the importance of early hearing detection and intervention.
- Students will be able to use their model to study how the ear detects sound.

Materials
OAE Model materials. Each lab group needs:
- 0.25–0.75 liter (or similar size) plastic water bottle with the bottom cut off
- One square of plastic wrap
- One or two rubber bands
- A small amount of sand (about half a teaspoon)
- Marble or similar small ball that can pass through the neck of the water bottle
- Sheet of paper

Total Duration
3 hours

Procedures

Teacher Preparation
To prepare for this lesson, obtain the materials needed to build the ear model. Also print an Otoacoustic Emissions Simulation Reflection worksheet for each student in the class. This worksheet is found in Step 5.

Step 1–Introduction **Duration: 50 minutes**
Discuss sound and hearing
To introduce students to sound and hearing concepts, review the anatomy of the ear and physiology of hearing. The links “Tour of the Ear,” “How We Perceive Sound: The Ear,” and “Sound Properties and Their Perception” can provide pictures and extra information. Next, orally pre-assess hearing test knowledge. Review important concepts by asking students to define and explain aspects of sound and hearing. Ask students to take turns answering. Record the answers on the board for all to see.

Web Resources
Title: Tour of the Ear
URL: http://www.betterhearing.org/hearing_loss/resound.htm
Description: This Web resource provides an online tour of the ear and describes ear

anatomy. An interactive depiction of the ear is provided along with descriptions of its parts.

Title: Sound and Hearing
URL: http://hyperphysics.phy-astr.gsu.edu/hbase/sound/ear.html
Description: This illustrated hypertext site describes the physics of sound perception in the ear. The site also provides detailed definitions for many parts of the ear. The site is part of the Hyper Physics website housed in Georgia State University's Department of Physics and Anatomy.

Title: How We Perceive Sound: The Ear
URL: http://library.thinkquest.org/19537/Ear.html
Description: This site presents an exploration of the ear structure and describes ways in which the outer, middle, and inner ears collect sound. It also includes information about how the brain interprets sound. This ThinkQuest website is sponsored by the Oracle Education Foundation.

Title: Lesson 2: Sound Properties and Their Perception
URL: http://www.glenbrook.k12.il.us/gbssci/phys/Class/sound/u11l2d.html
Description: This Web resource reviews the acoustics of hearing. It explains how the ear serves as a transducer that converts sound energy to mechanical energy, which results in a nerve impulse.

Title: JPG of the external ear
URL: http://depts.washington.edu/otoweb/images/ex_ear.jpg
Description: This Web resource provides a detailed and labeled jpg document of the internal and external ear. The website is sponsored by the Department of Otolaryngology-Head and Neck Surgery at the University of Washington.

Title: Hearing and Hearing Loss Prevention
URL: http://chppm-www.apgea.army.mil/hcp/hhlpPrint.htm
Description: This U.S. Army Center for Health Promotion and Preventive Medicine site reviews ear function, tells how noise causes hearing loss, shows the frequencies of various phonemes, and suggests how to avoid noise-induced hearing loss.

Step 2 **Duration: 15 minutes**

Introduce the CDC EHDI Program

After introducing the basics of sound and hearing, introduce the EHDI program using slides 1-4 of the "OAE Modeling Activity" PowerPoint presentation and the URL listed below, which provides additional information on the EHDI programs at CDC and in states and territories.

Web Resource

Title: Early Hearing Detection and Intervention Program (EHDI)
URL: http://www.cdc.gov/ncbddd/ehdi/default.htm
Description: This website describes the activities of the EHDI program and lists resources for information about infant hearing loss, describes the goals of EHDI, and discusses related research projects.

Supplemental Document

Title: OAE Modeling Activity.PPT

Description: This PowerPoint presentation contains instructions for making and using the OAE model. Slides 1-4 provide an overview of the presentation and information on EHDI programs.

Step 3 **Duration: 15 minutes**

Introduce otoacoustic emissions and automated auditory brainstem response hearing tests

Begin this step by differentiating between otoacoustic emissions (OAE) and automated auditory brainstem response (AABR) as methods for screening. The Web resource "Just in Time for Pediatric Primary Care Providers" can be used to show a short definition and photograph of each test. Definitions can also be found in slides 5 and 6 of the "OAE Modeling Activity" PowerPoint file. After discussing the two tests, illustrate how OAE and AABR are conducted by showing the video "Giving Your Baby a Sound Beginning." Then explain that sounds cause the hair cells in the cochlea to vibrate, stimulate the auditory nerve, and produce very faint noise, called otoacoustic emissions, which can be measured by very sensitive microphones. The activity in Step 4 will model the OAE test.

Web Resources

Title: Giving Your Baby a Sound Beginning
URL: http://www.audiology.org/consumer/guides/giving.php
Description: This short video reiterates the need for early screening and shows the OAE and AABR hearing tests being given to a baby. The video can be downloaded for free, is open captioned, and is also available in Spanish.

Title: Just in Time for Pediatric Primary Care Providers
URL:
http://www.cdc.gov/ncbddd/ehdi/documents/Just%20In%20Time%20for%20PCP.pdf
Description: Page 7 of the booklet "Just In Time" is a large print, projector-friendly graphic describing OAE and AABR and showing pictures of babies receiving the OAE and AABR tests.

Supplemental Document

Title: OAE Modeling Activity.PPT
Description: This PowerPoint presentation contains instructions for making and using the OAE model. Slides 5 and 6 contain information on the OAE and AABR tests.

Step 4 **Duration: 15 minutes**

Create the model

Inform students that they will construct a model ear in groups to illustrate how an OAE test works. Walk the students through the lab using slides 7-9 of the "OAE Modeling Activity" PowerPoint presentation. The notes section of the presentation has additional information for the teacher.

Supplemental Document

Title: OAE Modeling Activity.PPT
Description: This PowerPoint presentation contains instructions for making and using the OAE model in slides 7-9.

Step 5 **Duration: 20 minutes**

Experiment using OAE model

After constructing the model ears, use slides 10–12 of the PowerPoint presentation to guide the students through the following experiments that demonstrate:

- The detection of an OAE response suggests the ear is functioning normally. In this experiment, the marble (sound) is dropped into the bottle (ear canal) and strikes the plastic wrap (the tympanic membrane). When the marble hits the plastic wrap, the sand (cochlear hair cells) moves and students should be able to hear a small sound (the OAE response).

- The absence of an OAE response might suggest the ear canal is blocked. In this experiment, the paper in the bottle (blockage) prevents the marble (sound) from reaching the plastic wrap (the tympanic membrane), and there is no OAE response.

- The absence of an OAE response might suggest hair cells are missing or damaged. In this experiment, the sand (cochlear hair cells) is removed so when the marble (sound) reaches the plastic wrap (tympanic membrane), it does not make a sound (the OAE response).

Have students record the results of their experiments on the "Otoacoustic Emissions Simulation Reflection" handout.

Supplemental Documents

Title: Otoacoustic Emissions Simulation Reflection
Description: This worksheet allows students to review the results of the experiments as well as other concepts covered throughout the lesson. This worksheet serves as an assessment tool. A key to the worksheet is also provided.

Title: Otoacoustic Emissions Simulation Reflection Key
Description: This document is a key to the Otoacoustic Emissions Simulation Reflection student worksheet.

Title: OAE Modeling Activity.PPT
Description: This PowerPoint presentation contains directions for the OAE modeling activity in slides 10-12.

Step 6 **Duration: 25 minutes**

Putting it all together and reviewing experimental results

Review the results of the experiments with the students using questions on slides 13 and 14 of the PowerPoint presentation. Also review the student handout "Otoacoustic Emissions Simulation Reflection," which will serve as an assessment.

Supplemental Documents

Title: Otoacoustic Emissions Simulation Reflection
Description: This worksheet allows students to review the results of the experiments as well as other concepts covered throughout the lesson. This worksheet serves as an assessment tool. A key to the worksheet is also provided.

Title: Otoacoustic Emissions Simulation Reflection Key

Description: This document is a key to the Otoacoustic Emissions Simulation Reflection student worksheet.

Title: OAE Modeling Activity.PPT
Description: This PowerPoint presentation contains a summary of the modeling activity in slides 13 and 14.

Conclusion **Duration: 30 minutes**

Developing questions for further study

Making the OAE model and discussing the experimental results should generate student questions for further study. Generate discussion among students about other related topics. Some topics could include testing hearing throughout life, aspects of noise pollution, the use of cochlear implants, and aspects of deaf culture. Which of these questions should receive the most emphasis depends on your other goals for the class. Some suggested discussion topics and activities are listed in the "Modifications" section and are contained on slide 16 of the PowerPoint presentation.

Assessment

In Steps 5 and 6, students will complete "Otoacoustic Emissions Simulation Reflection," a worksheet about the results of the experiments using the OAE model.

Modifications

Extensions

1. Hear Today, Gone Tomorrow?

Explain that hearing loss can occur at any age and discuss the five main causes of hearing loss which are:

a. Heredity: at least 100 hereditary syndromes can result in hearing loss.
b. Infections, such as bacterial meningitis and rubella (German measles).
c. Acoustic trauma produced by acute or chronic exposure to loud sounds.
d. Prescription drugs, such as streptomycin and tobramycin.
e. Presbycusis, the hearing loss of old age, is thought to result from repeated acoustic trauma and hardening of microscopic blood vessels in the inner ear with aging.

Emphasize that because there are so many causes of hearing loss, hearing should be checked throughout life. In this extension, hearing students can experience being hard of hearing using sound files from "Impressions of Hearing Loss and Tinnitus."

Web Resources

Title: Impressions of hearing loss and tinnitus
URL: http://www.hear-it.org/forside.dsp?area=244
Description: This site includes a number of sound files simulating normal hearing, conductive and sensorineural hearing loss, and tinnitus. It also has seven pure tone files.

2. Hearing Preservation

Noise-induced hearing loss is a major concern in our modern, noisy society. Students can learn about hearing preservation with the "Noise-induced Hearing Loss Fact Sheet" and the Army's website entitled "Hearing and Hearing Loss Prevention." If sound meters are available, instruct students to monitor noise levels in the classroom, at lunch, during a pep rally, and from the earphones of their MP3 player. (The American Speech-Language-Hearing Association has a campaign to promote safe use of headphones and earbuds that may be helpful – see http://www.asha.org/listentoyourbuds/.) Students can demonstrate their learning by making illustrated posters to encourage people to use ear protection in noisy environments.

Web Resources

Title: Noise-induced Hearing Loss Fact Sheet
URL: http://www.hei.org/news/facts/nihlfact.htm
Description: This fact sheet from the House Ear Institute of Los Angeles describes both the cause and measurement of noise-induced hearing loss (NIHL). Photomicrographs of healthy and damaged cochlear hair cells are displayed and hearing conservation tips and warning signs of NIHL are described. The site suggests that otoacoustic emissions may be more sensitive to subtle damage in the inner ear than a pure tone threshold test; thus, OAE testing may be appropriate for adults as well as infants.

Title: Hearing and Hearing Loss Prevention
URL: http://chppm-www.apgea.army.mil/hcp/hhlp.aspx
Description: This U.S. Army Center for Health Promotion and Preventive Medicine site reviews ear function, tells how noise causes hearing loss, shows the frequencies of various phonemes, and suggests how to avoid noise-induced hearing loss.

3. Noise Pollution

Students can read about noise pollution and measure sound levels. If students are able to use sound meters to observe that sound intensity decreases with the square of the distance, they can then use that information to keep their ears away from extremely loud sound insults. Use the Web resources below to learn more about noise pollution awareness, conduct a lab about sound intensity, and calculate expected sound levels for various distances.

Web Resources

Title: Noise Pollution
URL: http://www.macalester.edu/psychology/whathap/UBNRP/Audition/site/bj.html
Description: This site describes the sources and effects of noise pollution. References are included.

Title: Noise Pollution Clearinghouse
URL: http://www.nonoise.org/
Description: The Noise Pollution Clearinghouse is a nonprofit organization with a mission to raise awareness about noise pollution and help communities combat secondhand noise. Be sure to check the quiet classroom link for information about improving the acoustics of your classroom. The calculations involved make a fine math assignment!

Title: Noise Pollution
URL: http://www.pasco.com/experiments/earth/february_2003/home.html
Description: This site has lab instructions for measuring sound intensity using Pasco probes. Information on the experimental procedure, data analysis, and extensions are provided. Teachers using other brands of equipment can modify the lesson.

Title: Spreadsheet converts sound levels
URL: http://www.edn.com/article/CA529388.html
Description: This website has an Excel spreadsheet that calculates expected sound levels for various distances from this site. Calculated results can be compared with experimental results.

Title: The ear's protective mechanisms
URL: http://hyperphysics.phy-astr.gsu.edu/hbase/sound/protect.html#c1
Description: The ear is not a passive receptor; rather, it has limited ability to protect itself from loud noises. This site has drawings illustrating the protective response and how the ability to respond changes with age.

4. Cochlear Implants

Use the links below to illustrate how cochlear implants work. Students can then write paper describing the pros and cons of using cochlear implants. The Web resources "Cochlear Implants," "Sound from Silence: The Development of Cochlear Implants," "Cochlear implants – wiring for sound," "Growing Up Different – Each Sound is a Present," and "Introduction to cochlear implants" will be of use to students on a variety of issues surrounding cochlear implants.

Web Resources

Title: Cochlear Implants
URL: http://www.nidcd.nih.gov/health/hearing/coch.asp
Description: This site explains how cochlear implants work and describes the characteristics for the ideal cochlear implant candidate. Website includes links to more information.

Title: Sound from Silence: The Development of Cochlear Implants
URL: http://www.beyonddiscovery.org/content/view.article.asp?a=252
Description: From the National Academy of Sciences, "the story of how research into the structure of the inner ear was combined with research in the telecommunications industry to produce a device which enables deaf people to hear." Part 10: The Inner Ear Produces Sound is an ideal extension for this lesson plan because it is about OAE.

Title: Cochlear implants – wiring for sound
URL: http://www.science.org.au/nova/029/029key.htm
Description: This site explains how cochlear implants work and includes diagrams showing the parts of the cochlear implant in situ. A glossary of audiologic terms is presented. Many links and activities enrich this site from the Australian Academy of Science.

Title: Growing Up Different – Each Sound is a Present
URL: http://www.pbs.org/saf/1205/features/cochlear2.htm
Description: A *Scientific Frontiers* episode in which host Alan Alda introduces issues concerning the cochlear implant. Video can be streamed online. Links and teaching guide are available.

Title: Introduction to cochlear implants
URL: http://www.utdallas.edu/~loizou/cimplants/tutorial/

Description: This site, sponsored by the University of Texas, Dallas, provides a historical look at the invention of cochlear implants with an emphasis on electrical engineering.

5. Deaf World

The study of deaf language and culture may meet standards for language arts, foreign language, and social studies. Students may use the Web resources listed below as starting points to explore “Deaf World,” the culture and languages of the deaf.

Web Resources

Title: Information on Deafness
URL: http://clerccenter.gallaudet.edu/InfoToGo/index.html
Description: This site has “info to go” for assistive devices, careers, deaf culture, education, etc. Be sure to scroll down to “Especially for Children and Their Teachers” to find information on “How Deaf People Communicate.”

Title: Sound and Fury
URL: http://www.pbs.org/wnet/soundandfury/
Description: This website accompanies the 2001 PBS presentation, *Sound and Fury*. Deaf culture and the controversy about cochlear implants are described with passion. Lesson plans about deaf culture and the science of sound are included.

Title: National Association of the Deaf
URL: http://www.nad.org
Description: National Association of the Deaf (NAD) advocates for accessibility and civil rights for deaf and hard-of-hearing Americans. The FAQ section can be a useful resource for civil rights questions.

Title: Subject-based Deaf and Hard of Hearing Internet Resources
URL: http://wally.rit.edu/internet/subject/deafness.html
Description: Hosted by the Rochester Institute of Technology, this Wallace Library Web resource has links to many sites for and about deaf culture. Everything from the ASL Teachers' Association to ZoomText Software, including deaf firefighters, Keresan Pueblo Indian Sign Language, and hearing dogs, can be found at this very comprehensive site.

Title: Gallaudet University
URL: http://www.gallaudet.edu/
Description: This site provides information about Gallaudet University, which is located in Washington, D.C. Most students who attend Gallaudet University are deaf or hard of hearing.

Title: National Theater of the Deaf
URL: http://www.ntd.org
Description: National Theater of the Deaf (NTD) is a professional signing theater which includes a children’s division, “Little Theatre of the Deaf,” which features as guests the stars of Sesame Street. The website calendar contains booking information, shows the NTD travel itinerary, and lists Sesame Street airing dates. Links to other deaf theaters such as SignStage.org and DeafWest.org are present.

Literature Resource

Book: Greenberg J. *In This Sign*. New York: Henry Holt and Company LLC; 1970.

ISBN: 0805007229
Description: Joanne Greenberg's novel follows the challenges of a couple who is deaf, attending school, earning a living, and rearing a child who can hear during the early and mid 20th century.

Other Modifications
Some special needs students may need to have their bottles precut.
Students who have vision difficulties may be able to hear the marble bounce, if the classroom is sufficiently quiet. They may also be grouped with seeing students who can describe the results.

Education Standards

National Science Education Standards
LIFE SCIENCE, CONTENT STANDARD C:
As a result of their activities in grades 5–8, all students should develop understanding of

- **Structure and function in living systems**
- Reproduction and heredity
- Regulation and behavior
- Populations and ecosystems
- Diversity and adaptations of organisms

SCIENCE AND TECHNOLOGY, CONTENT STANDARD E:
As a result of activities in grades 5–8, all students should develop

- **Abilities of technological design**
- Understandings about science and technology

California State Standards - Grade 7

5. **The anatomy and physiology of** plants and **animals illustrate the complementary nature of structure and function. As a basis for understanding this concept:**
   a. *Students know* plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
   b. *Students know* organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.
   c. *Students know* how bones and muscles work together to provide a structural framework for movement.
   d. *Students know* how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.
   e. *Students know* the function of the umbilicus and placenta during pregnancy.
   f. *Students know* the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.
   g. *Students know* how to relate the structures of the eye and ear to their functions.

7. **Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:**
   a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.

b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).
e. Communicate the steps and results from an investigation in written reports and oral presentations.

Reference

1. National Academy of Sciences. Sidebar - The Five Main Causes of Hearing Loss [online]. 2003 [cited 2005 Jul 7]. Available from URL: http://www.beyonddiscovery.org/content/view.page.asp?I=262.
2. Smith R, Green G, Van Camp G. University of Washington, Seattle. Deafness and Hereditary Hearing Loss Overview [online]. 2005 Feb 18 [cited 2005 Aug 8]. Available from URL: http://www.geneclinics.org/profiles/deafness-overview/details.html.

Otoacoustic Emissions Simulation Reflection

1 - 3 - 6 Plan! Early Hearing Detection & Intervention Fan!

Karin E. Westerling, CDC's 2005 Science Ambassador Program

Name _____
Date _____
Period_____

INSTRUCTIONS: Answer these questions as you experiment with your OAE model. Use complete sentences. 25 points total

Pre-lab questions:

1a. What is otoacoustic emission (OAE) screening?

_____

_____

1b. How does OAE screening work in a real ear?

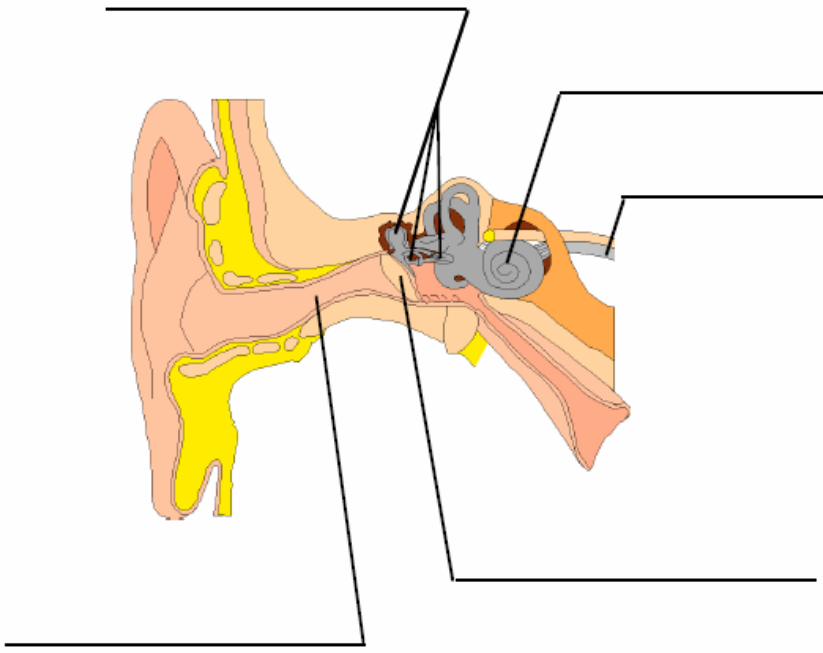
_____

_____

_____

_____

1c. Label the picture.



(2)

Lab questions:

2a. Compare your model to a real ear. What parts of the ear are represented in the model?

2b. What parts of the real ear are missing in the model?

Hearing ear model:

3a. What did you observe when you dropped the marble into the model representing a hearing ear?

3b. What do sound waves do in the hearing ear that is similar to the action of the marble?

Blocked ear:

4a. What did you observe when you dropped the marble into the model representing a blocked ear?

4b. Why do you think this occurred?

4c. What do sound waves do in a blocked ear that is similar to the action of the marble?

Ear with missing or damaged hair cells:

5a. What did you observe when you dropped the marble into the model representing an ear with missing or damaged cochlear hair cells?

5b. Why do you think this occurred?

5c. What similar activity occurs in a real ear that has missing or damaged hair cells?

6. How is your model similar to OAE screening?

Post-experiment questions:

7. What aspects of hearing are not modeled in the experiments using the model ear?

8. What aspects of hearing are not tested by OAE or modeled in this activity?

9. Why is it important to test the hearing of very young babies?

10. What are the three components of the Early Hearing Detection and Intervention Program (EHDI) and when should they be done?

Otoacoustic Emissions Simulation Reflection

1 - 3 - 6 Plan! Early Hearing Detection & Intervention Fan!

Karin E. Westerling, CDC's 2005 Science Ambassador Program

Name _____
Date _____
Period_____

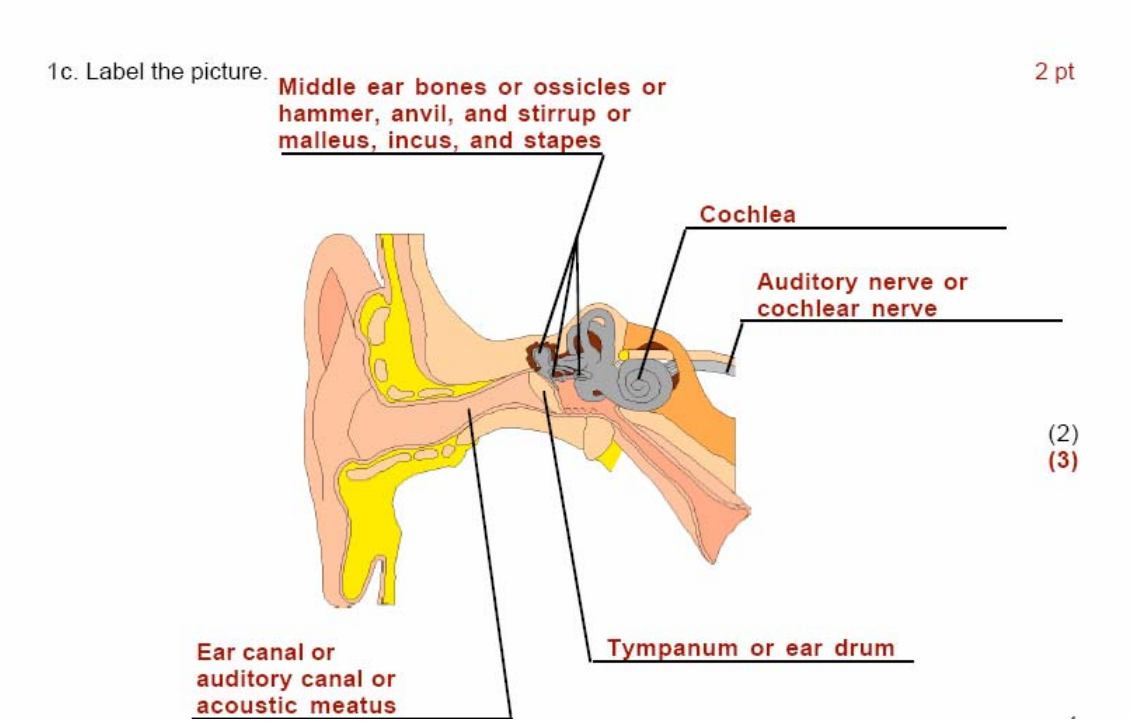
INSTRUCTIONS: Answer these questions as you experiment with your OAE model. Use complete sentences. 25 points total

Pre-lab questions:

1a. What is otoacoustic emission (OAE) screening? 1 point
Otoacoustic emissions screening is one test to determine if the ear can hear.

1b. How does OAE screening work in a real ear? 1 point
It measures the inaudible sounds made by the cochlear hair cells when they move.

1c. Label the picture. 2 points



Lab questions:

2a. Compare your model to a real ear. What parts of the ear are represented in the model? 2 points

The bottle represents the outer and middle ear.
The plastic wrap represents the tympanic membrane.
The sand represents the cochlear hair cells.

2b. What parts of the real ear are missing in the model? 2 points

The three bones of the middle ear are missing in the model.
The auditory nerve sending impulses to the brain are not represented.

Hearing ear model:

3a. What did you observe when you dropped the marble into the model representing a hearing ear? 1 point

When the marble hit the plastic wrap, the sand bounced and made a little noise.

3b. What do sound waves do in the hearing ear that is similar to the action of the marble? 1 point

When a real ear undergoes an OAE test, the cochlear hair cells move and make a little noise in response to the outside sound.

Blocked ear:

4a. What did you observe when you dropped the marble into the model representing a blocked ear? 1 point

The marble hit the blockage and did not reach the plastic wrap.

4b. Why do you think this occurred? 1 point

The marble got stuck in the paper

4c. What do sound waves do in a blocked ear that is similar to the action of the marble? 1 point

In a real ear, the cochlear hair cells could not move and make sounds because something (unexpected ear canal shape, nonfunctioning middle ear bones, etc.) blocked the sound reaching them (4).

Ear with missing or damaged hair cells:

5a. What did you observe when you dropped the marble into the model representing an ear with missing or damaged cochlear hair cells? 1 point

The marble hit the plastic wrap, but no sand was present in the ear model, so the model didn't produce the noise that was heard before in the hearing ear model.

5b. Why do you think this occurred? 1 point

There was no sand in the model.

5c. What similar activity occurs in a real ear that has missing or damaged hair cells? 1 point

In a real ear, the cochlear hair cells are missing or damaged so there is no sound to be detected.

6. How is your model similar to OAE screening? 2 points

In a hearing ear, sound enters the ear and echoes back from the hair cells in the cochlea (5). In an ear with hearing loss, the hair cells in the cochlea may not be present or may be damaged, so they do not make any sound. The marble entered the hearing ear model and hit the plastic wrap. When the marble hit the plastic wrap, the sand bounced and made a noise. In the hearing loss model, the sand was not present, so it did not make the same noise.

Post Experiment Questions:

7. What aspects of hearing are *not* modeled in the experiments using the model ear? 1 point

The nervous system carrying information to the brain and the brain processing the information as sound were not modeled in this activity.

8. What aspects of hearing are *not* tested by OAE nor modeled in this activity? 1 point

The nervous system carrying information to the brain and the brain processing the information as sound are not tested by OAE and were not modeled in this activity.

1. Why is it important to test the hearing of very young babies? 2 points

It is important to identify children with hearing loss as early as possible so that intervention can begin. Early intervention is important for development of speech, language, cognitive, and psychosocial abilities (6).

2. What are the three components of the Early Hearing Detection and Intervention Program (EHDI) and when should they be done? 3 points

The EHDI Program calls for hearing screening no later than 1 month of age. Complete hearing tests for babies who had unusual hearing screening results should occur no later than 3 months of age. Interventions such as hearing aids and sign language for deaf babies should be introduced no later than 6 months of age (6).

References

1. National Deaf Children's Society. Newborn Hearing Screening [online]. 2005 [cited 2005 Jul 25]. Available from URL: http://www.ndcs.org.uk/information/newborn_hearing_screening/.
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3. Children's Hospital Boston. Anatomy and Physiology of the Ear [online]. 2001. [cited 2005 Aug 9]. Available from URL: http://www.childrenshospital.org/az/Site820/mainpageS820P0.html.
4. McLaughlan A. Infant hearing screening. [cited 2005 July 25]. Available from URL: http://www.deafnessatbirth.org.uk/content2/audio/screen/02/content.pdf.
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