GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

CAREER, TECHNICAL, AND AGRICULTURAL EDUCATION

COURSE: All CTAE Programs

UNIT FS 7.3: Hearing Loss Prevention

INTRODUCTION

Annotation:

In this unit, students will learn which sounds are damaging to the ear and how sound is measured. Hearing protection devices and their proper uses are introduced. Students learn the long term effects that high noise levels have on the inner ear.

Although this unit is appropriate anytime, May is National Hearing Month and it is suggested to teach this unit during this time. It is also highly recommended to use during the beginning days of the school year.

Note: Sound level meters are required for Lesson 2. These can be obtained from many vendors including Radio Shack. The lower cost models (under $100 each) will work find. It is suggested that five or more meters be purchased for the school to be shared among all CTAE programs when this unit is taught. Meters are not required for Lesson 1.

Grade(s):

X	9th
X	10th
X	11th
X	12th

Time: One to five 50 minute periods.

Author: Frank Flanders, Christy Bryan, and Amanda Stephens

Additional Author(s): Portions of this unit were reviewed by Janet Ehlers of the National Institute for Occupational Safety and Health.

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards:

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

GPS Academic Standards:

SCSh2 Students will use standard safety practices for all classroom laboratory and field investigations.

a. Follow correct procedures for use of scientific apparatus.
b. Demonstrate appropriate techniques in all laboratory situations.
c. Follow correct protocol for identifying and reporting safety problems and violations.

National / Local Standards / Industry / ISTE:

ESS06 Safety, Health and Environmental: Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.

UNDERSTANDINGS & GOALS

Enduring Understandings:

Protection from hearing loss is of vital importance on the job as well as in everyday life. Permanent hearing loss can occur much easier than most people realize. If hearing is damaged once, it is damaged forever!

Essential Questions:

- How can hearing loss be prevented?
- What sounds and sound levels may damage hearing?
- What is the proper use of hearing protection devices?
- How could hearing loss impact you in the future?
- How can sound be measured?

Knowledge from this Unit:

Students will be able to:

- Identify sound levels that may damage hearing.
- Name the parts of the human ear.
- Describe how and why hearing loss occurs.

Skills from this Unit:

Students will be able to:

- Adjust, modify, or remove noises/music to protect hearing.
- Prepare and apply hearing protection devices.
- Measure sound levels in decibels.

ASSESSMENTS

Assessment Method Type:

X Pre-test
X Objective assessment - multiple-choice, true- false, etc.
_x_ Quizzes/Tests
__ Unit test
X Group project
____ Individual project
____ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
____ Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
X Dialogue and Discussion
__ Student/teacher conferences
_x_ Partner and small group discussions
_x_ Whole group discussions
_x_ Interaction with/feedback from community members/speakers and business partners
X Constructed Responses
_x_ Chart good reading/writing/listening/speaking habits
_x_ Application of skills to real-life situations/scenarios
X Post-test

Assessment Attachments and / or Directions:

Hearing Loss Prevention Exam
Hearing Loss Prevention Quiz

• LESSON 1: LISTEN UP -- BEFORE IT IS TOO LATE!

1. Interest approach – Mental set
   Do this before announcing the Unit/lesson topic.
   - Provide each student with 1 or 2 ear plugs. (Foam plugs cost about ten cents per set of 2.)
   - Ask students what this item is used for. (Someone in the class will know.)
   - Have the students insert the plugs in their ears. Note that the proper method of insertion will be demonstrated later.
   - Tell students that:
     - May is National Hearing Month and this unit is on preventing hearing loss.
       - Students may want to wear one ear plug throughout the day in recognition of National Hearing Month
     - Ask students to name sources of ear-damaging sounds. Examples: iPods, airplanes, school shop/lab noises, concerts, etc.
       - Anything over 85 decibels (db) can damage hearing.
       - iPods can be cranked to 115 db.
       - In France iPods are limited by law to 100 db.
   - Tell students that noise is the invisible health threat because you do not realize the damage is happening.
   - Remind students that "**Hearing Loss is Forever!**"
     - Write this on the board – have students write it in their notes.
   - Demonstrate the sound level meter – if available. Show the class the meter.
     - Ask what this device is.
     - Make or have the class make different sounds. Ask the class what they think the decibel level is for each sound.
       Examples:
       - drop a book
       - pound your fist on a table
       - yell a word
       - etc.

2. Identify the standards. Standards should be posted in the classroom.

   CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

3. Review Essential Question(s). Post Essential Questions in the classroom.
   - How can hearing loss be prevented?
   - What sounds and sound levels may damage hearing?
   - What is the proper use of hearing protection devices?
   - How could hearing loss impact you in the future?
   - How can sound be measured?

4. Identify and review the unit vocabulary. Terms may be posted on word wall.

Decibel	Cochlea	Ear Drum
Stereocilia	Sound Waves	Hearing Protection Device

Noise Levels	Formable Earplugs	Pre-molded Earplugs
Earmuffs	Canal Caps	Ear Canal
Noise Reduction Rating	Hearing Aid	Auditory Canal

5. Ask the students if they have hearing loss or know anyone who has hearing loss.
    - How did it happen?
    - What are common causes of hearing loss?

6. Ask the students how sound is measured. How might they know when sounds are too loud?
    - A decibel is the unit used to measure the loudness of sound.
    - Decibel levels for each item showing in the graph may vary.
    - Once the sound is above 85 decibels, your hearing is in danger.
    - If you need to raise your voice to be heard at arm's length away, the noise is probably loud enough to damage your hearing.

7. Present the **Listen Up! Preventing Hearing Loss** PowerPoint to the students and lead them through **Activities I, II,** and **III** (these activities are included in the PowerPoint).
   Complete
    - **Activity I: Rating Sound Levels**
    - **Activity II: Rating Toll Sound Level**
    - **Activity III: Hearing Loss Simulation**

   Discuss these questions with the class.
    - What happened to your model of the inner ear (stereocilia)?
    - Do you think doctors can repair those tiny hair cells (stereocilia)?
    - What are some sounds that are loud enough to damage the ear?
    - What can you use to protect your ear and reduce hearing loss?

8. Have students complete the activity **Vocabulary Mix.**
    - Review the Vocabulary Mix.

9. Give students the **Hearing Loss Prevention Quiz**.

10. Summary:
    - Review the **Hearing Loss Prevention Quiz**.
    - Lead class in review of hearing protection.
    - Ask each student to name one thing they learned.
    - Have a student write important points on the board.
    - Have students record important points in their notebooks.

• LESSON 2: THE SCIENCE OF HEARING LOSS

1. Provide the students with the information sheet **The Science of Hearing Loss.**

2. Ask students to read the materials and study the diagram.

3. Discuss the information sheet.
    - Ask students to find the:
        - Ear drum
        - Auditory Canal
        - Cochlea

- Auditory Nerve
- Ask students to explain how sound waves are converted to something we 'hear.'

• LESSON 3: HEARING LOSS PREVENTION DEVICES

1. Provide students with the information sheet **Types of Hearing Prevention.**

2. Explain each type of hearing protection.

3. Provide each student with the information sheet **Inserting Formable Ear Plugs.**

4. Have students silently read the information sheet.

5. Demonstrate inserting formable ear plugs.
   - Follow each step from the handout carefully.
   - Have students follow the steps on the handout.
   - Have one volunteer insert plugs in their ears in front of the class.
   - Have students find a partner. The partners should demonstrate inserting the plugs into their ears.

6. Summary
   - Ask students the types of hearing protection.
   - Ask students the most important points of inserting foam ear plugs.

• LESSON 4: MEASURING SOUND LEVELS

1. Review Essential Questions. Post Essential Questions in the classroom.
   - How can sound be measured?
   - Discuss answers:
     - Human ear detection – guessing may be pretty accurate with training.
     - Meter – most accurate.

2. Review terms related to Lesson 4.

Decibel (db)	Noise Reduction Rating
Stereocilia	Sound Level Meter

3. Ask students: Who would use a sound meter?
   Sample answers:
   - Safety Inspectors
   - Manufacturing Plan Employees
   - Doctors
   - MP3 Manufacturers
   - Government Safety Officials (OSHA)
   - School Officials (for shops/labs)

4. Have a student crank up their mP3 player or iPod to their usual listening level.
   - Place the ear plugs onto the sound level meter probe.
   - Discuss the results with the class.

5. Divide the class into groups. Provide each group with a sound level meter.

6. Have students measure sounds around the school and record their results on the **Measuring Sound Levels** worksheet.

7. Discuss the results.
   - Were any surprising?
   - What sound was the loudest?
   - Etc.

8. Have students graph the sound levels they measured by hand or using computer software such as Microsoft Excel.

9. Summary. Write "Listen up before it is too late" on the board.
   - Discuss the hearing unit with the students.
   - Ask each student something they learned from the unit.
   - Ask selected students the sounds in their life they need to be concerned about. Examples: lawnmower, power blower, chair saw, iPods, stereo music, car sound systems, concerts etc.

10. Administer the Unit Exam.
    - Review the exam questions after the test.

• ATTACHMENTS FOR LESSON PLANS

- **Listen Up! Hearing Loss Prevention** PowerPoint
- **Hearing Loss Prevention Exam with Key**
- **Hearing Loss Prevention Quiz with Key**
- **Activity I: Rating Sound Levels**
- **Activity II: Rating Tool Sound Levels**
- **Activity III: Hearing Loss Simulation**
- **Measuring Sound Levels**
- **Vocabulary Mix- Hearing Loss Prevention**
- **Inserting Earplugs Student Information Sheet**
- **The Science of Hearing Student Information Sheet**
- **Types of Hearing Protection Student Information Sheet**

CULMINATING PERFORMANCE TASK

Culminating Unit Performance Task Title:

Measure common sounds with a sound level meter. This activity is included in Lesson 4.

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Attachments for Culminating Performance Task:

Measuring Sound Levels

UNIT RESOURCES

Materials & Equipment:

- Pipe cleaners needed for Activity III
- Foam Ear plugs for each student
- Sound level meters

21st Century Technology Used:

X	Slide Show Software	X	Graphing Software	X	Audio File(s)
	Interactive Whiteboard		Calculator		Graphic Organizer
	Student Response System		Desktop Publishing		Image File(s)
	Web Design Software		Blog		Video
	Animation Software		Wiki	X	Electronic Game or Puzzle Maker
	Email		Website		