Impaired Senses

Course
Pathophysiology

Unit III
Fundamentals of Pathophysiology

Essential Question
What effects do changes in the sensory system have on the individual?

TEKS
130.208 (c)
1A
2A,2B,2C,2D, 2E,2F,2G,2H
3A
4D,4E

Prior Student Learning
Anatomy and Physiology: Special Senses

Estimated time
4 hours

Rationale
Any changes to sensory perception such as aging, trauma, and disease affect health and wellness.

Objectives
Upon completion of this lesson, the student will be able to

- Describe the function of the sensory system
- Perform tasks that challenge sensory input
- Analyze responses to the sensory input tasks

Engage
A new student is attending your high school. The student is legally blind. She has limited vision in one eye due to a congenital birth defect. She wears glasses which allow her to see large objects.

Brainstorm what the teacher and you can do to help this student.

Some answers might include

- Allow her to sit in the front of the class.
- Allow her to record the lectures with a tape recorder
- Provide materials in large print format or Braille as required
- Provide oral or taped testing
- Warn her before rearranging the classroom
- Assign a student to orient her to the school and have a student assist her in getting to her classes and lunch

Key Points

I. Communication Circuit
   A. Efferent nerves
   B. Afferent nerves
   C. Decision-making
   D. the purpose of memory

II. Special senses
   A. Sight
   B. Hearing
   C. Taste
   D. Touch (mechanical)
   E. Smell

III. Possible causes that impair efferent pathways or the interpretation of sensory input

Activity

I. Complete the Impaired Senses Laboratory Investigation

Assessment

Laboratory Investigation Rubric

Materials

STATION 1

1. One dozen different colors of embroidery floss skeins with the same color intensity
2. Several file folders
3. 3 X 5 white index cards and tape or glue
4. Red, green, blue, and yellow sheets of transparency film

Teacher's note

1. *Cut six-inch lengths of floss from the skeins of floss and place them in groups together inside a file folder*
2. *Mount one four-inch length piece of red, green, blue, and yellow floss to the four separate 3 X 5 index cards. Only one piece of floss should be on each card*

STATION 2

1. Surgical latex gloves
2. Several small objects like a sewing needle, a strand of hair, coins, and a piece of thread placed on a smooth flat surface

STATION 3

1. Blind fold
2. Balance board
3. Watch with a second hand

STATION 4

1. Reaction ruler
2. Pen and paper

STATION 5

1. Marker
2. Paper plates
3. Plastic spoons
4. Nose clamps
5. Blindfold
6. One jar each of the following strained baby foods: peaches, apricots, pineapple, and tutti-frutti

Teacher's note:

1. *Remove the labels from each jar of baby food and re-label the jars #1, #2, etc.*
2. *Conceal as much of the jar as possible to limit visual recognition*
3. *Keep a record of the flavors*

Accommodations for Learning Differences

For reinforcement, the student will review and repeat the laboratory investigation.

For enrichment, the student will research how a decreased level of consciousness (coma) influences sensory perception.

National and State Education Standards

National Health Science Cluster Standards

HLC01.01 Academic Foundations Health care workers will know the academic subject matter required for proficiency within their area. They will use this knowledge as needed in their role. Describe the basic structures and functions of cells, tissues, organs and systems as they relate to homeostasis. Analyze the interdependence of the body systems as they relate to wellness, disease, disorders, therapies and care rehabilitation. Compare selected diseases/disorders including respective classification, causes, diagnoses, therapies, and care/rehabilitation to include biotechnological applications. Analyze body system changes in light of diseases, disorders and wellness.

TEKS

130.208 (c)(1)(A) demonstrate safe practices during laboratory and field investigations; and

130.208 (c)(2)(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;

130.208 (c)(2)(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;

130.208 (c)(2)(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;

130.208 (c)(2)(D) distinguish between scientific hypotheses and scientific theories;

130.208 (c)(2)(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;
130.208 (c)(2)(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;
130.208 (c)(2)(G) analyze, evaluate, make inferences, and predict trends from data; and
130.208 (c)(2)(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.
130.208 (c)(3)(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;
130.208 (c)(4)(D) examine the body's compensating mechanisms occurring under various conditions; and
130.208 (c)(4)(E) analyze how the body attempts to maintain homeostasis when changes occur.

Texas College and Career Readiness Standards

Science Standards

I Nature of Science: Scientific Ways of Learning and Thinking

E. Effective communication of scientific information

1. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic

2. Use essential vocabulary of the discipline being studied

Cross Disciplinary Standards

I Key Cognitive Skills

C. Problem solving

1.Analyze a situation to identify a problem to be solved

2. Develop and apply multiple strategies to solving a problem

3. Collect evidence and data systematically and directly relate to solving a problem

E. Work Habits

1. Work independently

2. Work collaboratively

II Foundational Skills

C. Research across the curriculum

1. Understand which topics or questions are to be investigated

2. Explore a research topic

4. Evaluate the validity and reliability of sources

5, Synthesize and organize information effectively

IMPAIRED SENSES
LABORATORY INVESTIGATION

Purpose:
In this lab, students will perform tasks that challenge their sensory input, and analyze their responses.

STATION 1

MATERIALS

1. One dozen different colors of embroidery floss skeins with the same color intensity
2. Several file folders
3. 3 X 5 white index cards and tape or glue
4. Red, green, blue, and yellow sheets of transparency film

PROCEDURE

1. While looking through one of the transparency film sheets sort the six-inch lengths of floss by color to match the floss located on each of the index cards
2. Repeat the test using EACH transparency film

QUESTIONS

1. How did looking through each of the four transparency films affect your perception of color?

2. How do vision impairments affect the way you view your environment?

3. Research and report on the following: cataracts, glaucoma, and presbyopia.

STATION 2

MATERIALS

1. Surgical latex gloves
2. Several small objects like a sewing needle, a strand of hair, coins, and a piece of thread placed on a smooth flat surface

PROCEDURE

1. Attempt to pick up the various objects and hold them
2. Put on a pair of latex gloves and attempt to pick up and hold the various objects
3. Put a second pair of gloves on over the first pair and attempt to pick up and hold the objects

QUESTIONS

1. How did the application of the gloves affect your ability to pick up objects?

2. How does a decreased sense of touch influence your ability to pick up small objects?

3. Research and report on the following: rheumatoid arthritis, osteoarthritis, muscular dystrophy, and Parkinson's Disease.

STATION 3

MATERIALS

1. Blind fold
2. Balance board
3. Watch with a second hand

PROCEDURE

1. Balance on one foot for one minute. Count how many times you sway significantly or touch the other foot to the ground
2. Repeat the procedure wearing a blindfold
3. Repeat steps 1 and 2 standing on a balance board

QUESTIONS

1. How does vision affect your ability to balance?

2. Predict other physiological conditions that effect balance.

3. Research and report on the following: tumors of the cerebellum, inner ear infections, and tinnitus resulting from medications.

STATION 4

MATERIALS

1. Reaction ruler
2. Pen and paper

PROCEDURE

1. One student drops the ruler as another attempts to catch it with his or her thumb and forefinger
2. Determine the reaction time by recording where the thumb and forefinger are on the ruler for three attempts
3. Calculate the average reaction distance for each of three attempts with the reaction ruler
4. Repeat the procedure with your lab partner deliberately and actively distracting you with noise and motion
5. Put on an eye patch and repeat steps 1, 2, and 3

QUESTIONS

1. What was the original reaction distance?

2. Did the reaction distance change with increased sensory input?

3. How did the eye patch affect the reaction time?

4. Research and report on the following: carpal tunnel syndrome, muscular dystrophy, drug abuse, and disability due to burns or trauma.

STATION 5

MATERIALS

1. Marker
2. Paper plates
3. Plastic spoons
4. Nose clamps
5. Blindfold
6. One jar each of the following strained baby foods: peaches, apricots, pineapple, and tutti-frutti

PROCEDURE

1. Place the blindfold over a student's eyes
2. Apply the nose clamp to limit his or her sense of smell
3. Students will taste various foods and try to distinguish the flavors
4. Remove the nose clamp and repeat the taste test
5. Compare your perception of taste with the actual list of flavors

QUESTION

1. Determine the degree of accuracy in identifying the various flavors.

2. How did the lack of smell affect your ability to taste?

3. Research and report on the following: upper respiratory infections, smoking, and inhalant abuse.

Conclusion

1. If one sense is impaired, how does the brain compensate for a sensory impairment?

    a. Can it overcome the loss?

    b. Give an example.

2. List the causes of sensory impairment.

Laboratory Investigation Rubric

Student:_____ Date:_____

Scoring Criteria	4 Excellent	3 Good	2 Needs Some Improvement	1 Needs Much Improvement	N/A
Problem is appropriately identified.					
Problem is precise, clear, and relevant.					
Association between the problem and the predicted results is direct and relevant.					
All variables are clearly operationalized.					
Demonstrates comprehension of the use of scientific concepts and vocabulary.					
All significant data is measured.					
Data is recorded effectively and efficiently.					
Data table is well designed to the task requirements.					
All graphs are appropriate.					
All data accurately plotted.					

Graph visually compelling; highlights conclusions of the study.					
Conclusion relates directly to the hypothesis.					
Conclusion has relevancy in resolution of the original problem.					
Conclusion relates the study to general interest.					