Unit 7 : Digestive/Urinary System

Content Area:
Course(s):
Time Period:
Length:
Status:

Science
Anatomy and Physiology
Fourth Marking Period
3 Weeks
Published

Unit Overview

This unit deals with the chemical and physical mechanisms of digestion, elimination, transportation, and absorption within the body to change the food and derive energy. It also explains the role of the urinary system to regulation of body wastes (i.e. water, electrolyte balance, volume of body fluids). This unit also discusses the function of filtration, reabsorption and secretion of urine by the kidneys.

STAGE 1- DESIRED RESULTS

Standards- 2020 New Jersey Student Learning Standards- Science

SCI.9-12.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
SCI.9-12.HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Science and Engineering Practices

- Analyzing and Interpreting Data
- Asking Questions and Defining Problems
- Constructing Explanations and Designing Solutions
- Developing and Using Models
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information
- Planning and Carrying Out Information
- Using Mathematics and Computational Thinking

Cross Cutting Concepts

Cause and Effect

- Energy and Matter
- Influence of Engineering, Technology, and Science on Society and the Natural World
- Interdependence of Science, Engineering, and Technology
- Patterns
- Scale, Proportion, and Quantity
- Stability and Change
- Structure and Functions
- Systems and System Models

Disciplinary Core Ideas

Physical Sciences

- PS1A: Structure and Properties of Matter
- PS1B: Chemical Reactions
- PS1C: Nuclear Processes
- PS2A: Forces and Motion
- PS2B: Types of Interaction
- PS3A: Definitions of Energy
- PS3B: Conservation of Energy and Energy Transfer
- PS3C: Relationship Between Energy and Forces
- PS3D: Energy in Chemical Processes and Everyday Life
- PS4A: Wave Properties
- PS4B: Electromagnetic Radiation
- PS4C: Information Technologies and Instrumentation

Life Sciences

- LS1A: Structure and Functions
- LS1B: Growth and Development of Organisms
- LS1C: Organization for Matter and Energy Flow in Organisms
- LS1D: Information Processing
- LS2A: Interdependent Relationships in Ecosystems
- LS2B: Cycles of Matter and Energy Transfer in Ecosystems
- LS2C: Ecosystems Dynamics, Functioning, and Resilience
- LS2D: Social Interactions and Group Behavior

- LS3A: Inheritance of Traits
- LS3B: Variation of traits
- LS4A: Evidence of Common Ancestry and Diversity
- LS4B: Natural Selection
- LS4C: Adaptation
- LS4D: Biodiversity and Humans

Earth and Space Sciences

- ESS1A: The Universe and its Stars
- ESS1B: Earth and the Solar System
- ESS1C: The History of Planet Earth
- ESS2A: Earth Materials and Systems
- ESS2B: Plate Tectonics and Large-Scale Systems
- ESS2C: The Role of Water in Earth's Surface Processes
- ESS2D: Weather and Climate
- ESS2E: Biogeology
- ESS3A: Natural Resources
- ESS3B: Natural Hazards
- ESS3C: Human Impacts on Earth Systems
- ESS3D: Global Climate Change

Engineering. Technology. and Applications of Science

- ETS1A: Defining and Delimiting an Engineering Problem
- ETS1B: Developing Possible Solutioins
- ETS1C: Optimizing the Design Solution

Essential Questions

- How are body structures important in the transportation of substances ?
- How are body structures important in the absorption of substances ?
- How are body structures important in the excretion and regulation of wastes ?
- Why is nutrition and digestive tract health vital to survival? How does the structures of the digestive tract relate to its function?
- What are the components for the Urinary System? Why is the Urinary System essential to human survival?

Enduring Understanding

The organization of the digestive organs and tissues relate to their functions.

The body's need for certain essential nutrients dictates how food molecules are digested and absorbed by the body.

Enzymes play an important role in digestion and excretion.

The organs and tissues of the Urinary System work to eliminate organic waste products from the body fluids.

Students will know...

Vocabulary definitions:

Students will know the following vocabulary terms: alimentary canal, metabolism, oral cavity, tonsils, pharynx, gastric glands,

accessory digestive organs, gastrointestinal tract, peristalsis, nephrons, glomerular filtration, tubular reabsorption, renal tubule.

Misconceptions:

Students may think only the digestive organs are involved in the digestive process. Students often believe that kidneys are involved in only producing urine. Students sometimes think that controlling of blood glucose levels involves only the digestive process. Students often believe that the fat causes only harm to the body.

Students will be able to...

- Analyze the role of digestive organs in the digestive process.
- Construct a model of the food in each stage of the digestive process.
- Recognize that the nephron is the structural and functional unit of the kidney, and describe its anatomy.
- Compare the course and length of the male urethra to that of the female.

STAGE 2- EVIDENCE OF LEARNING

Formative Assessment

- 3- Minute Pause
- A-B-C Summaries
- Analogy Prompt
- Choral Response
- Debriefing
- Exit Card / Ticket
- Hand Signals
- Idea Spinner
- Index Card Summaries
- Inside-Outside Circle Discussion (Fishbowl)
- Journal Entry
- Misconception Check
- Observation
- One Minute Essay
- One Word Summary
- Portfolio Check
- Questions & Answers
- Quiz
- Self-Assessment
- Student Conference
- Think-Pair-Share
- Web or Concept Map

Authentic Assessments

- Lab dissections
- Computer research and activities
- Video questions and discussion
- Writing a journal to explain the journey of a slice of a pizza through the digestive system.

• www.purposegames.com (used for practice with labelling portions of the system)

Benchmark Assessments

Chapter test on Digestive system.

Chapter test on Urinary system.

STAGE 3- LEARNING PLAN

Instructional Map

- Use a dissectible human torso model to demonstrate the pathway of food digestion through the alimentary canal organs. Point out the accessory organs and structures.
- Point to digestive system organs in a torso model and ask students to identify whether chemical and/or mechanical digestion takes place; the nutrient that will be extracted after digestion; and, if chemical digestion, what enzymes are being used? If mechanical digestion, is it through segmentation or churning or another method?
- Have students place iodine drops on cornstarch or potato starch. The color indicator will be black on contact with starch. In a test tube with some starch, have students spit into the test tube. Have students add iodine at the end of class and compare colors. Alternatively, have students heat their tubes in a water bath to speed up the reaction and then add iodine at the end. The iodine should remain yellowish, or if in midprocess, less dark than starch alone, as the amylase in the saliva has broken down the starch to simpler sugars.
- When discussing the swallowing mechanism, have students place their hands on their larynx so that they can feel it rise when they swallow. Remind them of the function of the epiglottis. Provide small cups of water as needed.
- Show the film Super Size Me and assign your students a paper covering the issues and debates raised by this movie. For example, they could discuss whether they felt that the movie was an unbiased presentation of the obesity/fast food issue or propaganda against big-money corporations, and why. Another possible topic for a paper is a discussion on who should bear the burden of responsibility for obesity and its health effects and costs. Why or why not? The students could also discuss the likelihood of eating a more healthful diet and the reasoning for it. Additional topics covering issues raised by this movie can be found on the Internet.
- Have students watch the film Forks over Knives and have them analyze the diet proposed in the film using the concepts covered in the nutrition portion of the chapter.

Modification/Differentiation of Instruction

Differentiation Strategies for Special Education Students

- Remove unnecessary material, words, etc., that can distract from the content
- Use of off-grade level materials
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Time allowed
- Level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Varied homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Ability to work at their own pace
- Present ideas using auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment
- Differentiated checklists and rubrics, if available and appropriate

Differentiation Strategies for Gifted and Talented Students

- Increase the level of complexity
- Decrease scaffolding
- Variety of finished products
- Allow for greater independence
- Learning stations, interest groups
- Varied texts and supplementary materials
- Use of technology
- Flexibility in assignments
- Varied questioning strategies
- Encourage research
- Strategy and flexible groups based on formative assessment or student choice

- Acceleration within a unit of study
- Exposure to more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace
- After mastery of a unit, provide students with more advanced learning activities, not more of the same activity
- Present information using a thematic, broad-based, and integrative content, rather than just singlesubject areas

Differentiated Strategies for ELL Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials, including visuals
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Allow students to work at their own pace
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Role play
- Provide graphic organizers, highlighted materials
- Strategy and flexible groups based on formative assessment

Differentiation Strategies for At Risk Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials

- Deliver the content in "chunks"
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment

504 Plans

Students can qualify for 504 plans if they have physical or mental impairments that affect or limit any of their abilities to:

- walk, breathe, eat, or sleep
- communicate, see, hear, or speak
- read, concentrate, think, or learn
- stand, bend, lift, or work

Examples of accommodations in 504 plans include:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

Modification Strategies

- Cooperative Grouping
- Extended Time
- Frequent Breaks
- Highlighted Text
- Interactive Notebook
- Modified Test
- Oral Directions
- Peer Tutoring
- Preferential Seating
- Re-direct
- Repeated Drill and Practice
- Shortened Assisgnment
- Teacher Notes
- Tutorials
- Use of Additional Reference Materials
- Use of Audio Resources

Differentiation Strategies

High Preparation

- Alternative Assessments
- Choice Boards
- Games and Tournaments
- Group Investigations
- Guided Reading
- Independent Research / Project
- Interest Groups
- Learning Contracts
- Leveled Rubrics
- Literature Circles
- Multiple Intelligence Options
- Multiple Texts

- Personal Agendas
- Project Based Learning (PBL)
- Stations / Centers
- Think-Tac-Toe
- Tiered Activities / Assignments
- Varying Graphic Organizers

Low Preparation

- Choice of Book / Activity
- Cubing Activities
- Exploration by Interest (using interest inventories)
- Flexible Grouping
- Goal Setting With Student
- Homework Options
- Jigsaw
- Mini Workshops to Re-teach or Extend Skills
- Open-ended Activities
- Think-Pair-Share by Readiness, Interest, or Learning Style
- Use of Collaboration
- Use of Reading Buddies
- Varied Journal Prompts
- Varied Product Choice
- Varied Supplemental Materials
- Work Alone / Together

Horizontal Intergration- Interdisciplinary Connections

See Appendix

Vertical Integration- Discipline Mapping

Science classes are designed around the Performance Expectations, Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in the NGSS. In grade 6, students complete a unit on "Diversity of Life". This leads into "Populations and Ecosystems" in grade 7. In grade 8, students study "Human Systems Interactions" and "Heredity and Adaptations." Following Biology in 9th grade, students take Chemistry in 10th grade. Then, students have taken this full year course of Human Anatomy and Physiology. Anatomy and Physiology being a full year course will focus on having students gain a deeper understanding of the Performance Expectations outlined in the NGSS, particularly in Life Sciences and Engineering Design. Following this course, students will have the option to choose from Physics, Human Impact on the Environment, Forensics and Zoology.

Additional Materials

Digestive lab- Students will utilize models to construct a model of the digestive system including metabolic pathways.

Urinalysis lab- Students will examine the structures of a cow kidney.

Crash course on youtube.com on Digestive system

Modeling Digestion Activity

Using Dialysis Tubing to Model Kidney Function Activity

Learning Activity #1 :

The Cookie Digestion Project

Students will draw, outline, and label the structures associated with the digestive system. They will then trace the digestion of the ingredients associated with a cookie, applying when, where, and how each ingredient is digested within the organs responsible in the body. Students will then display and present their findings to the class.

Learning Activity #2 :

Students will apply knowledge of specific digestion processes to a new situation of digesting the ingredients of a pizza. Students will analyze what ingredients are digested at specific organs of the digestive system, and the processes of how the item is broken down for use in the body.