

CURRICULUM

FOR

HUMAN BODY

SYSTEMS

GRADES 11 & 12

This curriculum is part of the Educational Program of Studies of the Rahway Public Schools.

ACKNOWLEDGMENTS

Dr. Susan Dube, Supervisor of Science & Technology Education

The Board acknowledges the following who contributed to the preparation of this curriculum.

Dr. Susan Dube

Dr. Tiffany A. Beer, Director of Curriculum and Instruction

Subject/Course Title:
Human Body Systems
Grades 11 & 12

Date of Board Adoptions:
September 21, 2021

RAHWAY PUBLIC SCHOOLS CURRICULUM

Science – Grade

PACING GUIDE

Unit	Title	Pacing
1	Levels of Organization	3 weeks
2	Integumentary System	3 weeks
3	Skeletal System	5 weeks
4	Muscular System	3 weeks
5	Nervous System	4 weeks
6	Endocrine & Reproductive Systems	3 weeks
7	Cardiovascular System	4 weeks
8	Lymphatic & Immune System	4 weeks
9	Digestive System	4 weeks
10	Respiratory System	4 weeks
11	Urinary System	3 weeks

ACCOMMODATIONS

<p>504 Accommodations:</p> <ul style="list-style-type: none"> • Provide scaffolded vocabulary and vocabulary lists. • Provide extra visual and verbal cues and prompts. • Provide adapted/alternate/excerpted versions of the text and/or modified supplementary materials. • Provide links to audio files and utilize video clips. • Provide graphic organizers and/or checklists. • Provide modified rubrics. • Provide a copy of teaching notes, especially any key terms, in advance. • Allow additional time to complete assignments and/or assessments. • Provide shorter writing assignments. • Provide sentence starters. • Utilize small group instruction. • Utilize Think-Pair-Share structure. • Check for understanding frequently. • Have student restate information. • Support auditory presentations with visuals. • Weekly home-school communication tools (notebook, daily log, phone calls or email messages). • Provide study sheets and teacher outlines prior to assessments. • Quiet corner or room to calm down and relax when anxious. • Reduction of distractions. • Permit answers to be dictated. • Hands-on activities. • Use of manipulatives. • Assign preferential seating. • No penalty for spelling errors or sloppy handwriting. • Follow a routine/schedule. • Provide student with rest breaks. • Use verbal and visual cues regarding directions and staying on task. • Assist in maintaining agenda book. 	<p>IEP Accommodations:</p> <ul style="list-style-type: none"> • Provide scaffolded vocabulary and vocabulary lists. • Differentiate reading levels of texts (e.g., Newsela). • Provide adapted/alternate/excerpted versions of the text and/or modified supplementary materials. • Provide extra visual and verbal cues and prompts. • Provide links to audio files and utilize video clips. • Provide graphic organizers and/or checklists. • Provide modified rubrics. • Provide a copy of teaching notes, especially any key terms, in advance. • Provide students with additional information to supplement notes. • Modify questioning techniques and provide a reduced number of questions or items on tests. • Allow additional time to complete assignments and/or assessments. • Provide shorter writing assignments. • Provide sentence starters. • Utilize small group instruction. • Utilize Think-Pair-Share structure. • Check for understanding frequently. • Have student restate information. • Support auditory presentations with visuals. • Provide study sheets and teacher outlines prior to assessments. • Use of manipulatives. • Have students work with partners or in groups for reading, presentations, assignments, and analyses. • Assign appropriate roles in collaborative work. • Assign preferential seating. • Follow a routine/schedule.
<p>Gifted and Talented Accommodations:</p> <ul style="list-style-type: none"> • Differentiate reading levels of texts (e.g., Newsela). • Offer students additional texts with higher lexile levels. • Provide more challenging and/or more supplemental readings and/or activities to deepen understanding. • Allow for independent reading, research, and projects. • Accelerate or compact the curriculum. • Offer higher-level thinking questions for deeper analysis. • Offer more rigorous materials/tasks/prompts. • Increase number and complexity of sources. • Assign group research and presentations to teach the class. • Assign/allow for leadership roles during collaborative work and in other learning activities. 	<p>ELL Accommodations:</p> <ul style="list-style-type: none"> • Provide extended time. • Assign preferential seating. • Assign peer buddy who the student can work with. • Check for understanding frequently. • Provide language feedback often (such as grammar errors, tenses, subject-verb agreements, etc...). • Have student repeat directions. • Make vocabulary words available during classwork and exams. • Use study guides/checklists to organize information. • Repeat directions. • Increase one-on-one conferencing. • Allow student to listen to an audio version of the text. • Give directions in small, distinct steps. • Allow copying from paper/book. • Give student a copy of the class notes. • Provide written and oral instructions. • Differentiate reading levels of texts (e.g., Newsela). • Shorten assignments. • Read directions aloud to student. • Give oral clues or prompts. • Record or type assignments. • Adapt worksheets/packets. • Create alternate assignments. • Have student enter written assignments in criterion, where they can use the planning maps to help get them started and receive feedback after it is submitted.

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| | <ul style="list-style-type: none">• Allow student to resubmit assignments.• Use small group instruction.• Simplify language.• Provide scaffolded vocabulary and vocabulary lists.• Demonstrate concepts possibly through the use of visuals.• Use manipulatives.• Emphasize critical information by highlighting it for the student.• Use graphic organizers.• Pre-teach or pre-view vocabulary.• Provide student with a list of prompts or sentence starters that they can use when completing a written assignment.• Provide audio versions of the textbooks.• Highlight textbooks/study guides.• Use supplementary materials.• Give assistance in note taking• Use adapted/modified textbooks.• Allow use of computer/word processor.• Allow student to answer orally, give extended time (time-and-a-half).• Allow tests to be given in a separate location (with the ESL teacher).• Allow additional time to complete assignments and/or assessments.• Read question to student to clarify.• Provide a definition or synonym for words on a test that do not impact the validity of the exam.• Modify the format of assessments.• Shorten test length or require only selected test items.• Create alternative assessments.• On an exam other than a spelling test, don't take points off for spelling errors. |
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UNIT OVERVIEW

Content Area: Human Anatomy

Unit Title: Levels of Organization

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will learn about the different levels of organization in the human body and the characteristics of each level of organization. General organization of the human body will be introduced including the organ systems of the body.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

New Jersey Student Learning Standards for Science:

Science

HS-LS1-1. Construct an application based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.] [Assessment Boundary: Assessment does not include the cellular processes involved in the feedback mechanism.]

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

NJ SLS Companion Standards: Reading and Writing Standards for History, Social Studies, Science, and Technical Subjects:

RST.9-10.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

RST.9-10.8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

RST.9-10.9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

NJSLSA.W6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

WHST.9-10.1. Write arguments focused on discipline-specific content.

. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

. Develop claim(s) and counterclaims using sound reasoning and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

Unit Understandings:

Students will understand that...

- The body is organized in different levels from very small subatomic particles to organ systems that make up human beings.
- The human body includes various cavities that house different organs that complete different functions within the body.
- The body needs to maintain homeostasis.
- The cells help the body maintain homeostasis.

Essential Questions:

- How is the human body organized?
- How do cells maintain balance within the human body?
- Why does the body need to maintain homeostasis?

Knowledge and Skills:

Students will know...

- All materials that comprise the human body are made of chemicals and chemicals consist of atoms which contain subatomic particles
- The cell is the basic unit of structure and function for all organisms and provide structure and function of the body
- Organelles carry out specific activities
- A tissue is specialized cells assembled into layers or masses that have specific functions and are organized into organs
- Organs are made up of different tissues and a group of organs that function closely together comprise an organ system
- Interacting organ systems make up an organism
- Homeostasis is the tendency toward a relatively stable equilibrium between interdependent elements, especially as maintained by physiological processes

Students will be able to...

- use models and anatomical and directional vocabulary to describe the location of major parts of the body including different cavities and organs.
- perform an experiment to test feedback mechanisms associated with homeostasis (i.e. heart rate, temperature...).
- create a model of positive and negative feedback loops and will use their model to explain why the body needs to maintain homeostasis.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Do Now question responses
- Oral questioning
- Pear Deck activities
- Homeostasis Gizmos activity
- Lab activities
- Lab reports
- Worksheets
- Vocabulary quiz
- EdPuzzle activities
- **End of Unit Assessment:**
 - Students will explain homeostasis and how the body maintains homeostasis
 - Students will explain the body’s organizational systems

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Using models, students will collaboratively work together in small groups to use anatomical and directional vocabulary to describe the location of major parts of the body.
- Students will perform an experiment to test feedback mechanisms associated with homeostasis (i.e. heart rate, temperature...).
- Students will create a model of positive and negative feedback loops and will use their model to explain why the body needs to maintain homeostasis.
- Students will participate in the homeostasis gizmos simulation activity

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010

Equipment Needed:

- Projector
- Laptop
- Gizmos
- EdPuzzle

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Integumentary System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will learn about what constitutes an organ. They will learn that the skin is the largest organ in the body and it is part of the integumentary system. Students will discover the function of the skin and its tissues as it relates to the regulation of body temperature.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and function even as external conditions change within the range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and

propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

9.3HL-DIA.5 Select, demonstrate and interpret diagnostic procedures.

9.3HL-HI.2 Describe the content and diverse uses of health information.

NJ SLS Companion Standards: Reading and Writing Standards for History, Social Studies, Science, and Technical Subjects:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

- The role of skin in maintaining homeostasis.
- What homeostasis is
- The structure of the layers of the skin
- The functions of the skin
- The skin helps regulate body temperature

Unit Essential Questions:

- What is the skin's role in maintaining homeostasis?
- How does that endocrine and integumentary system work together?
- What are the effects of aging and the environment on the integumentary system?

Knowledge and Skills:

Students will know...

- That organs are made up of two or more types of tissues that are grouped together and perform specialized functions
- Skin is strong yet flexible covering of our bodies
- The skin has two distinct layers: the inner layer and the outer layer

- Melanin provides skin color
- The functions of the skin

Students will be able to...

- Discuss the functions of skin
- Describe the layers of the skin
- Explain what determines skin color
- Explain how skin regulates body temperature

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Do Now question responses
- Oral questioning
- Pear Deck activities
- **End of Unit Assessment:**
 - Students will label models of the layers of skin and identify important features and functions
 - Students will explain the role of skin in homeostasis
 - Students will explain different types of skin cancers

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

Modeling Layers of Skin: Students will draw and label a model of the layers of skin, identifying the major important features (e.g. hair, nails, epidermis, dermis, glands...). Students will then use a model to argue with evidence the type of skin they are looking at (thick vs thin) then identify where on the body it could be found and why it is there.

Homeostasis of the Skin: Students will participate in an experiment to test the effects of various insulating properties of the skin and its effect on thermoregulation. Still will write a lab report to share their findings.

Diseases of the Skin: Students will look at pictures of people with various skin diseases. They will generate a list of questions about the images. They will research a skin disease specifically finding the symptoms, causes, treatments, and prognosis as well as various other questions about their specific skin disease. They will present their findings to their peers.

Biology of Skin Color: <https://www.biointeractive.org/classroom-resources/biology-skin-color>

- Skin model flip book: https://drive.google.com/file/d/1IpRx4S5P5PMvcCBEKwgdWcqz_5ZlO_Dg/view
- Lab stations activity: http://www.haspi.org/uploads/6/5/2/9/65290513/07a_integumentary_system.pdf
- Structure of the skin diagram: <https://drive.google.com/file/d/1nRrZd7Oj8mGVVHgmZJhk-KvYvJnsyiq/view>

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010
- <https://www.biointeractive.org/classroom-resources/biology-skin-color>
- <http://sciencenetlinks.com/student-teacher-sheets/integumentary-system/>
- <http://sciencenetlinks.com/lessons/skin-cancer-1/>
- http://www.haspi.org/uploads/6/5/2/9/65290513/07a_integumentary_system.pdf

Equipment Needed:

- Smartboard
- Chromebooks

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Skeletal System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students begin this unit by learning about the structure, classification, and functionality of the different types of bones found in the body. The unit culminates with a study of all of the major bones of the body. Students will learn to identify these different bones based upon the variety of markings and shapes of the bones.

Approximate Length of Unit: 5 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and function even as external conditions change within the range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

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9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

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9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

9.3HL-DIA.5 Select, demonstrate and interpret diagnostic procedures.

9.3HL-HI.2 Describe the content and diverse uses of health information.

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NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

- The skeletal system is composed of bones, cartilage, joints and ligaments.
- Bones make up most of the skeleton.
 - There are four main cell types that compose bone tissue, each with a specific function: osteogenic cells, osteocytes, osteoblasts and osteoclasts. The microscopic anatomy of compact bone includes osteons.
- Bones are classified by their shape.
 - The structure of a typical long bone can be explored.
- Specific bones of the skeleton can be studied by their subdivisions: the axial skeleton and the appendicular skeleton.
- Cartilage is found in areas of the nose, ears, ribs and joints.
- Joints can be classified by structure or by function.
- The general structure of synovial joints may be explored.
- Ligaments connect bone to bone, stabilizing joints.
- The skeletal system provides support for the human body, protects soft organs, allows for movement due to attachment of muscles, stores minerals and fat and forms blood cells.
- Processes of the skeletal system include hematopoiesis, ossification and bone growth and remodeling.
- A comparison of male to female, juvenile to adult or human to other vertebrate skeletons may be explored.

Unit Essential Questions:

- How do the axial and appendicular skeletons have similarities and differences? How do these similarities and differences allow them to perform the functions required of the skeletal system?
- How are bones classified and how are the structures of these bones similar and different?
- How are the bones in our body named, oriented, and located?
- Why are there so many different ways that someone can fracture a bone?

Knowledge and Skills:

Students will know...

- The axial skeleton is the trunk of our body, the main purpose for this skeleton system is to protect the underlying organs of the head, abdomen, and thorax. The appendicular skeleton's purpose is to allow our body a range of motion so that movement is possible.
- Bones are classified either as long, short, irregular, or flat. The structure of these bones is dependent on the function required of them. For example, the bones in the skull are mostly flat bones to provide a nearly solid layer of protection for the brain from the outside environment.
- Bones in our body are named based upon the location of the bone, and usually originate from a Greek or Latin word origin. There are 206 bones in the body with 83 unique names.
- Bones can fracture in any number of ways based upon what type of bone is being fractured, the age and health of the person whose bone it is, and the type and strength of the force being placed upon these bones. These different factors can cause a variety of different fractures that medical professionals (and anatomy students) are trained to recognize and diagnose.

Students will be able to...

- Describe and explain bone structure and function.
- Compare and contrast joint types.
- Compare and contrast three types of lever system represented in the human body.
- Describe and explain sliding filament mechanism
- Use data to explain the effects of aging on the skeletal system

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Do Now question responses
- Oral questioning
- Pear Deck activities

End of Unit Assessment:

- Students will be able to identify different types of bones and their function
- Compare and contrast different joint types
- Compare and contrast three types of lever system represented in the human body

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Students will complete the “anatomy of a bone” diagram:
https://www.biologycorner.com/anatomy/skeletal/bone_coloring.html
- Students will use a Venn Diagram (or similar organizer of choice) to compare and contrast the functions, bone categories and structures of the bones of the axial vs appendicular skeleton
- Students are divided into lab groups. Each group is given a set of bone pictures and a set of four notecards. At this point students will open their bone set and place all of the bones under the

corresponding notecard category.

- Students will illustrate a balance model demonstrating the negative feedback control mechanism for maintaining blood calcium level. The model must include the hormones used and the control center, receptor and effector in this situation.

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010

Equipment Needed:

- Smartboard
- Chromebooks

RAHWAY PUBLIC SCHOOLS CURRICULUM

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Muscular System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will learn about the different types of muscles and which muscle systems are utilized, whether or not those muscles are voluntary or involuntary, as well as smooth, cardiac, or skeletal. Students will learn the structures that create movement in our bodies.

Approximate Length of Unit: 3 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and function even as external conditions change within the range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

9.3HL-DIA.5 Select, demonstrate and interpret diagnostic procedures.

9.3HL-HI.2 Describe the content and diverse uses of health information.

NJ SLS Companion Standards: Reading and Writing Standards for History, Social Studies, Science, and Technical Subjects:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

- A skeletal muscle is composed of a variety of tissues
- Skeletal muscle tissue differs from smooth muscle tissue and cardiac muscle tissue

Unit Essential Questions:

- How do the muscular and skeletal system work together to allow for bodily movement?
- How does the muscular and skeletal systems help the body maintain homeostasis?

Knowledge and Skills:

Students will know...

- The muscles work in conjunction with the skeletal system to allow movement of the body

- There are different types of muscles: smooth, skeletal, and cardiac

Students will be able to...

- Describe the structure of a skeletal muscle
- Name the major parts of a skeletal muscle fiber and describe the function of each
- Identify type, location, and function of major muscles in human body.
- Explain how muscular and skeletal systems work together to allow for bodily movement
- Explain how the muscular and skeletal systems help the body maintain homeostasis

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Do Now question responses
- Oral questioning
- Pear Deck activities

End of Unit Assessment:

- Students will explain the role of the different muscle groups in movement.
- Students will explain how the skeletal and muscular systems work together to help the body maintain homeostasis

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Muscle structure activity: https://drive.google.com/file/d/1Zzp4srhC3c3_LKSuY5zqZm5x2VQg04vk/view
- Muscle Structure Cloze Activity: https://drive.google.com/file/d/1kFAW0m6S0CBrVDw2oJADNYpuQX_MJg5-/view
- Students will participate in different activities (walking, running, and jumping) to identify different muscles used for different movements
- Students will play “Simon Says” with range of motion of muscles
- Muscle Fatigue Lab: <https://drive.google.com/file/d/1KvzHttQ3ucgoP7345LzBGk82Ttk-8JED/view>

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010

Equipment Needed:

- Smartboard

RAHWAY PUBLIC SCHOOLS CURRICULUM

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Nervous System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will describe the structure and function of the major parts of the nervous system and neuron. Students interpret graphs of action potentials; research diseases associated with the nervous system and present their findings.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and function even as external conditions change within the range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

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9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

9.3HL-DIA.5 Select, demonstrate and interpret diagnostic procedures.

9.3HL-HI.2 Describe the content and diverse uses of health information.

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NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

- The nervous system is a communication system of cells
- The nervous system can detect changes in the body, make decisions, and stimulate muscles or glands to respond
- The nervous system helps maintain homeostasis
- The nervous system is predominantly composed of neural tissue but also includes blood vessels and connective tissue
- Neural tissue consists of two types of cells: nerve cells or neurons and neuroglia

Unit Essential Questions:

- How does the nervous system help the body to maintain homeostasis?
- What is the relationship between the endocrine and nervous systems?
- How does the “message” to move travel from the brain to a particular muscle?
- How does the structure of the neuron relate to its function?

Knowledge and Skills:

Students will know...

- The basic functions of the central and peripheral nervous system.
- The difference between autonomic and somatic nervous systems, including a comparison and contrasting of parasympathetic and sympathetic division of autonomic nervous system.
- The anatomical structure of a neuron.
- The difference between neurons as afferent, efferent, or as interneurons.
- How action potentials are generated and propagated along neurons.
- The structure and function of a synapse.
- The roles of sensory receptors and effectors

Students will be able to...

- Describe the organization of the nervous system.
- Describe the three basic functions of the nervous system.
- Describe the series of events that results in an action potential.
- Analyze a graph of an action potential.
- Describe major sense organ structure and function.
- Describe the functional components of a reflex arc and the ways reflexes maintain homeostasis.
- Research and present on a disease of the nervous system.
- Use or generate a model to explain how the features of nervous system work together to send or receive a message
- Be able to explain why the speed of a reflex (involuntary contractions) occurs faster than voluntary contractions

<i>EVIDENCE OF LEARNING</i>

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Class discussions on multiple topics to verbally assess if students comprehend the material.
- Quizzes
- Do Now question responses
- Oral questioning
- Pear Deck activities
- **End of Unit Assessment:**
 - Students will explain the function of the component parts of the nervous system.
 - Students will create a model evidencing the way the nervous system functions.

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Students will do a series of hands-on activities and simulations to describe the structure and function of the nervous system. They will explore the role of the sense organs.
- Students will analyze and interpret graphs how an action potential is generated and propagated graphically and through models (online or physical simulation).
- Students will perform a variety of reflex activities (such as eye, patella reflex) and collect data (qualitative and/or quantitative).

- Students will choose a disease associated with the nervous system.

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010
- Nervous system animation: <https://www.youtube.com/watch?v=-s8yEhRZgvw>

Equipment Needed:

- Smartboard
- Bottles
- Balloon

RAHWAY PUBLIC SCHOOLS CURRICULUM

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Endocrine & Reproductive System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students describe the structure and function of the major parts of the endocrine and reproductive systems. Students model and explain how the organs of the endocrine and reproductive systems help maintain homeostasis.

Approximate Length of Unit: 3 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and function even as external conditions change within the range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

9.3HL-DIA.5 Select, demonstrate and interpret diagnostic procedures.

9.3HL-HI.2 Describe the content and diverse uses of health information.

NJ SLS Companion Standards: Reading and Writing Standards for History, Social Studies, Science, and Technical Subjects:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

- The endocrine system is comprised of glands that secrete hormones: pituitary gland, thyroid gland, parathyroid gland, adrenal glands, pancreas, ovaries, testes, pineal gland, and thymus
- The reproductive system is comprised of male and female components. The female components include ovaries, uterine tubes, uterus, vagina, clitoris, and vulva. The male components include the scrotum, testes, epididymides, ductus deferentia, seminal vesicles, prostate gland, bulbourethral glands, urethra, and penis.
- The endocrine system controls metabolic activities of body structures
- The male reproductive system produces and maintains sperm cells and transfers sperm cells into the female

reproductive tract.

- The female reproductive system produces and maintains egg cells, receives sperm cells, and supports the development of an embryo and function in the birth process

Unit Essential Questions:

- How does the endocrine system help the body maintain homeostasis?
- What is the relationship between the reproductive and endocrine systems?
- How do the structures of the reproductive and endocrine systems relate to their functions?

Knowledge and Skills:

Students will know...

- The function of the male and female reproductive systems.
- The sources and functions of semen.
- The structure and function of the mammary glands.
- The phases and regulation of the ovarian cycle.
- The processes of fertilization, implantation and placenta formation.
- The major events of embryonic and fetal development

Students will be able to...

- List the major endocrine and exocrine glands and organs, and describe their locations in the body.
- Describe how hormones are classified chemically.
- Describe the two major mechanisms by which hormones bring about their effects on their target tissues and explain how hormone release is regulated, positive and negative feedback systems
- Ask questions to clarify the relationships about the role of DNA and chromosome in coding the instructions for characteristic traits passed from parents to offspring.
- Describe the production of sex cells.
- Describe the structures and functions of the reproductive system.
- Describe the role of the endocrine system in relationship to other body systems.
- Develop a model to represent the positive feedback loop of childbirth and the female monthly cycle.
- Explain how the organs of the reproductive and endocrine systems help to maintain homeostasis.
- Analyze and interpret data from urine or blood work samples.
- Research and communicate their findings on a genetic disease of the reproductive system.
- Use models and/or illustrations to identify the main structures associated with glands and their associated target cells/organs.
- Describe how the endocrine system regulates metabolism, maintains homeostasis, regulates growth and development, and controls reproduction through hormonal release.
- Draw examples of negative and positive feedback loops. Predict the effect of changes in hormone levels.
- Explore and discuss homeostatic imbalances including hyper- and hypo- functions of glands, diabetes (type I and type II), gigantism and dwarfism.
- Conduct investigations to understand and explain the endocrine system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Class discussions on multiple topics to verbally assess if students comprehend the material.
- Quizzes
- Do Now question responses

- Oral questioning
- Pear Deck activities
- **End of Unit Assessment:**
 - Students will label the component parts of the reproductive system.
 - Students will explain the role of the component parts of the endocrine and reproductive systems.

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Students will complete a case study: “What’s wrong with Timothy?”
<https://www.biologycorner.com/2017/01/22/case-study-endocrine-system/>
- Describe how the endocrine system regulates metabolism, maintains homeostasis, regulates growth and development, and controls reproduction through hormonal release.
- Draw examples of negative and positive feedback loops. Predict the effect of changes in hormone levels.
- Explore and discuss homeostatic imbalances including hyper- and hypo- functions of glands, diabetes (type I and type II), gigantism and dwarfism.
- Conduct investigations to understand and explain the endocrine system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.
-
- Students will analyze graphs of the hormone levels associated with the female monthly cycle. They will then use the graphs and various models to answer questions about the cycle, using evidence to support their answers.
- Students will create a model of a positive feedback loop within the body (ex. childbirth as it relates to homeostasis). They will then use a feedback loop model to explain how the endocrine system works to maintain homeostasis within the body.
- Students will work collaboratively to learn about the various functions and locations of endocrine glands within the human body. They will share out their findings to their peers then be able to use the information acquired to make a claim with evidence as to the role of various glands and their jobs within the human body (e.g. What would happen if the gland did not exist?).
- Students will choose a disease associated with the endocrine and/or reproductive systems. They will generate a written summary about the disease: statistics, causes, symptoms and treatments.

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010
- <https://www.biologycorner.com/2017/01/22/case-study-endocrine-system/>
- <http://www.bozemanscience.com/endocrine-system>
- <https://www.youtube.com/watch?v=eWHH9je2zG4>

Equipment Needed:

- Smartboard

RAHWAY PUBLIC SCHOOLS CURRICULUM

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Cardiovascular System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will learn about the anatomy of the heart and the names of all of the major chambers, valves, and vessels. The students will describe how those components help blood cycle through the body and how that cycle is controlled by an electrical impulse generated inside of the heart. Students will research a variety of disorders and diseases that a person with an unhealthy heart might be exposed to.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.] [Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.]

Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.] [Assessment Boundary: Assessment does not include the cellular processes involved in the feedback mechanism.] Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and function even as external conditions change within the range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3).

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

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design solutions.

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9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

9.3HL-DIA.5 Select, demonstrate and interpret diagnostic procedures.

9.3HL-HI.2 Describe the content and diverse uses of health information.

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NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

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NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Students will understand that...

- The Atria are the receiving chambers of the heart and ventricles expel blood from the heart.
- They are named right or left depending on their location in the heart. The tricuspid valve separates the right atrium from the right ventricle to prevent the backflow of blood.
- The bicuspid valve separates the left atrium from the left ventricle and also prevents backflow.

- Semilunar valves are at the bottom of the aorta and pulmonary artery and prevent blood from flowing back into the ventricles.
- The systemic pathway sends oxygen rich blood to the entire body and back to the heart.
- The pulmonary pathway is necessary to take oxygen depleted blood to the lungs and back.
- After the sinoatrial node fires, there is a pause in the impulse at the atrioventricular node to allow the atria to finish contracting. From there the impulse travels through the AV bundle and its branches, terminating in Purkinje fibers which innervate and allow the ventricles to contract.
- Build up of fatty plaques on artery walls can cause the delicate endothelium to rupture.
- This condition is exacerbated by high blood pressure. When the endothelium ruptures it causes an unwanted clot to form, blocking the blood supply to the heart muscle, resulting in a myocardial infarction.

Unit Essential Questions:

- What is the function of the heart, and vessels, and how do they maintain a healthy body?
- How do atria and ventricles differ in function and what are the major chambers and valves in the heart?
- Why are there two pathways of blood flow out of the heart and to where do they travel?
- How does the electric impulse generated at the sino-atrial node travel through the rest of the heart?
- How does atherosclerosis lead to heart attacks?

Knowledge and Skills:

Students will know...

- The pericardium covers the heart.
- The heart is divided into four chambers: two atria and two ventricles that communicate through atrioventricular orifices on each side
- The skeleton of the heart consists of fibrous rings that enclose the bases of the pulmonary artery, aorta, and atrioventricular orifices
- Blood flows through the heart moving blood low in oxygen and high in carbon dioxide through the right side of the heart through the venae cava and coronary sinus into pulmonary circulation.
- Oxygenated blood returns to the left side of the heart through the pulmonary veins and from the left ventricle to the aorta
- The cardiac cycle: the atria contract (atrial systole) while the ventricles relax (ventricular diastole); the ventricles contract (ventricular systole) while the atria relax (atrial diastole)
- Pressure in the chambers rises and falls in cycles

Students will be able to...

- Explain how blood flows through the heart
- Analyze basic structures and functions of the cardiovascular (components of blood, structures and functions of blood components, structures and functions of the cardiovascular system, conduction system of the heart, cardiac cycle)
- Conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis

<i>EVIDENCE OF LEARNING</i>

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Class discussions on multiple topics to verbally assess if students comprehend the material.
- Quizzes.
- Do Now question responses
- Oral questioning
- Pear Deck activities
- **End of Unit Assessment:**
 - Students will explain the role of the component parts of the heart
 - Students will model how blood flows through the heart
 - Students will explain the importance of cardiac health as it relates to overall health

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Students will participate in the virtual lab: <https://www.biointeractive.org/classroom-resources/cardiology-virtual-lab>
- Students will create a model demonstrating the flow of blood in, through, and out of the heart.
- Students will participate in a Blood Pressure / Heart Rate Lab:
 - Students will explore the physiological changes that occur to the cardiovascular system before, during, and after exercise. Students will take their heart rate and blood pressure readings using the appropriate instruments before the lab begins, after completing a 5-minute exercise, and 10 minutes after they have finished their exercise. They will try and analyze patterns in their data and compare that to what a stereotypical data set for a ‘healthy’ heart would look like.
- Students will research a disease and then create an audiovisual presentation about their disease making sure to place an emphasis on how the disease is caused at a cellular / tissue level, and what can be done to treat/prevent it as well as whether or not the disease is caused by environmental factors or genetic conditions.

<i>RESOURCES</i>

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010

Equipment Needed:

- Smartboard
- Airplane photos

RAHWAY PUBLIC SCHOOLS CURRICULUM

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Lymphatic and Immune System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will learn about the structure and function of the lymphatic system. The connections between the lymphatic system and the immune system will be delineated.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

- 9.3HL-DIA.5** Select, demonstrate and interpret diagnostic procedures.
- 9.3HL-HI.2** Describe the content and diverse uses of health information.

NJ SLS Companion Standards: Reading and Writing Standards for History, Social Studies, Science, and Technical Subjects:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

- The lymphatic system includes lymph, lymphatic vessels, lymph nodes and the immune system.
- The interrelated functions include the removal of fluid from tissues, absorption of large fatty acids in small intestines and transport of white blood cells to the lymph nodes.
- The structure of a lymph node is bean-shaped with blood vessels, nerves, efferent lymphatic vessels attached to the indented region. Afferent lymphatic vessels enter on the convex surface.
- Lymph nodes are enclosed in connective tissue that extends into the nodes and subdivides them into nodules
- Nodules contain masses of lymphocytes and macrophages and spaces through which lymph flows
- Processes include defense through specific and nonspecific resistance.

Unit Essential Questions:

- How does the immune system work?
- How does the immune system function in conjunction with other systems?
- How does the immune system fight disease?

Knowledge and Skills:

Students will know...

The lymphatic system includes lymph, lymphatic vessels, lymph nodes and the immune system.

- The lymphatic system has multiple, interrelated functions.
 - They include the removal of fluid from tissues, absorption of large fatty acids in small intestines and transport of white blood cells to the lymph nodes.

- The immune system consists of white blood cells that destroy foreign antigens.
- Tissue fluid that has entered into lymphatic capillaries becomes lymph.
- Multiple lymphatic capillaries form lymphatic vessels.
- As lymph circulates through the body, it passes through multiple lymph nodes. These lymph nodes contain lymphocytes which destroy foreign antigens.
- Processes of the lymphatic system include defense through nonspecific and specific resistance.
 - Examples of nonspecific resistance include mechanical barriers such as the skin, enzymes, species resistance and mucous membranes.
 - In specific resistance, antibodies are produced that defend the body against foreign antigens.
- Memory cells are produced following an infection that allow for possible immunity against a specific antigen upon re-exposure.
- A comparison of primary versus secondary immune responses can be explored.
- Homeostatic imbalances are explored. These include, but are not limited to, autoimmune disorders, parasitic diseases, allergies, bacterial versus viral infections and ringworm.
- Vaccinations provide the body with either long-term protection or short-term protection against many pathogens.

Students will be able to...

- Identify and describe the major parts of the lymphatic pathways.
- Describe the general function of the lymphatic system.
- Describe how tissue fluid and lymph form and explain lymph function.
- Describe a lymph node and its major functions.
- Create a flowchart to demonstrate the circulation of lymph throughout the body.
- Explain how the immune system works.
- Distinguish between innate (nonspecific) and adaptive (specific defenses) and cite examples of each.
- Distinguish between primary and secondary responses.
- Distinguish between active and passive immunity.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Class discussions on multiple topics to verbally assess if students comprehend the material.
- Quizzes.
- Do Now question responses
- Oral questioning
- Pear Deck activities
- **End of Unit Assessment:**
 - Students will explain the major parts of the lymphatic system and its functions.
 - Students will explain the connection between the lymphatic system and the body’s immune system
 - Students will describe the role of the immune system in the maintenance of homeostasis.

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Students will participate in a case study to diagnose a “patient” based upon test results presented:
https://sciencecases.lib.buffalo.edu/cs/files/autoimmune_disease.pdf
- Create a flowchart to demonstrate the circulation of lymph throughout the body.
- Create a public service announcement highlighting the benefits of vaccinations for children, including risks to

the population at large.

- Compare the treatment of bacterial and viral infections, include concepts of nonspecific and specific resistance.
- Design an experiment to test the effectiveness of antibacterial products.

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010
- <https://www.biointeractive.org/classroom-resources/cells-immune-system>
- https://sciencecases.lib.buffalo.edu/cs/files/autoimmune_disease.pdf

Equipment Needed:

- Smartboard

RAHWAY PUBLIC SCHOOLS CURRICULUM

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Digestive System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will learn about the structures and functions of the digestive system and discuss its relationship to diet and metabolism. Common disorders related to the digestive system will be presented.

Approximate Length of Unit: 4weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

9.3HL-DIA.5 Select, demonstrate and interpret diagnostic procedures.

9.3HL-HI.2 Describe the content and diverse uses of health information.

NJ SLS Companion Standards: Reading and Writing Standards for History, Social Studies, Science, and Technical Subjects:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

- The digestive system consists of the gastrointestinal tract (alimentary canal) as well as various accessory organs including the teeth, tongue, salivary glands, liver, gallbladder and pancreas.
- The digestive system processes and supplies the molecules needed to sustain the living tissues within the body through the absorption of nutrients.
- Six major functions of the digestive system include secretion, ingestion, mechanical processing, enzymatic digestion, absorption and excretion.
- The lining of the digestive system protects surrounding tissues from the mechanical and enzymatic stresses of the digestive process.
- Processes of the digestive system include the mechanical and chemical breakdown of food into small molecules which are then absorbed by the digestive tract.
- Specific actions within the digestive system include mastication, peristalsis, segmentation and the release of hormones and enzymes necessary for digestion.
- The metabolic functions of the accessory organs play strategic roles in the breakdown of food products, the maintenance of glucose levels within the blood and the regulation of homeostasis in the body.
- Indigestible material is excreted as waste.
- Homeostatic imbalances are explored. These include, but are not limited to, conditions such as gallstones, heartburn, ulcers, dehydration, diarrhea, cirrhosis and cancers of the digestive system.

Unit Essential Questions:

- How does the digestive system break down food products, maintain glucose levels within the blood, and regulate homeostasis in the body?
- What are some common disorders of the digestive system?
- What are the main components of the digestive system?

Knowledge and Skills:

Students will know...

- The digestive system consists of the gastrointestinal tract (alimentary canal) as well as various accessory organs including the teeth, tongue, salivary glands, liver, gallbladder and pancreas.
- The digestive system processes and supplies the molecules needed to sustain the living tissues within the body through the absorption of nutrients.
- Processes of the digestive system include the mechanical and chemical breakdown of food into small molecules which are then absorbed by the digestive tract.

Students will be able to...

- Describe the overall structure and function of the digestive system.
- Differentiate between organs of the alimentary canal and accessory digestive organs.
- Describe the location and function of the peritoneum and the peritoneal cavity.
- Explain the dental formula and differentiate between deciduous and permanent teeth.
- Describe the composition and functions of saliva.
- Explain the role of bile and pancreatic juice in digestion.
- List the major functions of the large intestine. Explain how constipation and diarrhea can occur.
- Describe the process of absorption of digested foodstuffs that occurs in the small intestine.
- Describe how variations in diet affect the digestive system and the body as a whole.
- List the six major nutrient categories.
- Define metabolism, catabolism, and anabolism.
- Explain the important events and products of cellular respiration.
- List and describe several metabolic functions of the liver.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Class discussions on multiple topics to verbally assess if students comprehend the material.
- Quizzes
- Do Now question responses
- Oral questioning
- Pear Deck activities
- **End of Unit Assessment:**
 - Students will explain the role of a specific enzyme in the digestive process.
 - Students will explain how hydrochloric acid (HCl) in the stomach aids in digestion and provides protection from pathogens.
 - Students will describe the six major functions of the digestive system. (secretion, ingestion, mechanical processing, enzymatic digestion, absorption and excretion)
 - Students will differentiate mechanical and chemical breakdown of food.

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Students will complete “Maria’s Problem” case study related to the digestive system:
<https://serendipstudio.org/exchange/waldron/enzymes>; https://serendipstudio.org/sci_edu/waldron/pdf/EnzymeProtocol.pdf
- Students will complete online quiz about digestion: https://www.proprofs.com/quiz-school/story.php?title=digestive-system-quiz_4
- Students will complete case study:
https://higher.ed.mheducation.com/sites/0072943696/student_view0/chapter16/case_study_peptic_ulcer.html

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology* McGraw Hill, 2010
- <https://serendipstudio.org/exchange/waldron/enzymes>
- https://www.proprofs.com/quiz-school/story.php?title=digestive-system-quiz_4
- <https://www.niddk.nih.gov/health-information/digestive-diseases/digestive-system-how-it-works>
- <https://apps.spokane.edu/InternetContent/AutoWebs/garybr/Digestion%20Lab%20PDF.pdf>
- Case study: peptic ulcer:
https://higher.ed.mheducation.com/sites/0072943696/student_view0/chapter16/case_study_peptic_ulcer.html
- <http://www.bozemanscience.com/digestive-system>
- Crash Course Part 1 Digestive System:
<https://www.youtube.com/watch?v=yIoTRGfcMqM&feature=youtu.be>
- Crash Course Part 2 Digestive System:
<https://www.youtube.com/watch?v=pqgcEIaXGME&feature=youtu.be>
- Crash Course Part 3 Digestive System:
<https://www.youtube.com/watch?v=jGme7BRkpuQ&feature=youtu.be>

Equipment Needed:

- Smartboard

RAHWAY PUBLIC SCHOOLS CURRICULUM

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Respiratory System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will explain the structures and functions of the respiratory system. Students will explore health issues related to respiratory problems.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CL.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

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9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

- 9.3HL-DIA.5** Select, demonstrate and interpret diagnostic procedures.
- 9.3HL-HI.2** Describe the content and diverse uses of health information.

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- NJSLSA.R8.** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
- NJSLSA.R10.** Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
- RST.9-10.1.** Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
- RST.9-10.3.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- RST.9-10.7.** Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- NJSLSA.W1.** Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
- NJSLSA.W2.** Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
- NJSLSA.W8.** Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
- NJSLSA.W9.** Draw evidence from literary or informational texts to support analysis, reflection, and research.
- WHST.9-10.1.** Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

- The respiratory system consists of the airways, lungs and diaphragm.
- The respiratory system transports and exchanges gases including oxygen and carbon dioxide.

Unit Essential Questions:

- How does the respiratory system function?
- How does the respiratory system work with the cardiovascular system?
- How can the environment impact respiratory health?
- How can respiratory volume be impacted?
- How can disease affect the respiratory system?
- How can exercising affect respiration?

Knowledge and Skills:

Students will know...

- The respiratory system consists of the airways, lungs and diaphragm.
- The airways include the nasal and oral cavities, pharynx, larynx, trachea, bronchi, bronchioles and alveoli.
- The respiratory system transports and exchanges gases including oxygen and carbon dioxide.
- Processes involved in the respiratory system include respiration mechanics and gas exchange.

- Respiration mechanics is the process by which humans breathe and includes the movement of the diaphragm and pressure-volume relationships.
- Gas exchange refers to the diffusion of gases across the alveolar epithelium in the respiratory system and capillary endothelium of the cardiovascular system.
- Lung volumes and capacities can be measured using spirometry.
- Homeostatic imbalances are explored. These include, but are not limited to, asthma, chronic obstructive pulmonary disease (COPD), tuberculosis, cystic fibrosis and the effects of smoking and pollution.

Students will be able to...

- Identify the general functions of the respiratory system and its organs.
- Explain why respiration is necessary for cellular survival.
- Using a model or diagram, locate, name and describe the organs of the respiratory system.
- Explain how inspiration and expiration are accomplished.
- Explain how to determine breathing rate and depth.
- Explain how the structure in each portion of the respiratory tree supports its function.
- Explain what factors alter respiratory volumes and investigate factors which alter respiratory volumes.
- Describe gas exchange in the pulmonary and systemic circuits.
- Explore and discuss homeostatic imbalances including asthma, chronic obstructive pulmonary disease (COPD), tuberculosis, cystic fibrosis and the effects of smoking and pollution.
- Design a model to show how cold/flu impacts respiratory function. Use the model to investigate how various remedies alleviate symptoms.
- Investigate factors which alter respiratory volumes. Compare breathing in obstructive and restrictive diseases. Collect data on respiratory volumes during obstructive and restrictive respiratory disorders.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Class discussions on multiple topics to verbally assess if students comprehend the material.
- Do Now question responses
- Oral questioning
- Pear Deck activities
- Quizzes
- **End of Unit Assessment:**
 - Students will explain the general function of the respiratory system and its organs.
 - Students will describe gas exchange within the respiratory system.
 - Students will explain what happens when homeostatic imbalances occur within the respiratory system.

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Students will participate in a respiratory system webquest:
<http://www.pendleton.k12.ky.us/userfiles/129/Classes/299/BasicRespiratoryWebquest.pdf>
- Students will participate in a respiratory system lab activity:
<https://www.lifescitrc.org/download.cfm?submissionID=4283>
- Students will participate in the lung model and breathing lab:
https://drive.google.com/file/d/1Yk390KK4_ZEmG44T4TuxmmK9QpDAAb33/view

RESOURCES

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology*, McGraw Hill, 2010
- <https://www.blf.org.uk/support-for-you/how-your-lungs-work/why-do-we-breathe>
- <https://www.healthline.com/health/alveoli-function>
- <https://www.mada.org.il/en/about/engineer/challenge/respiratory-system>
- <https://medlineplus.gov/respiratoryfailure.html>
- <http://www.pendleton.k12.ky.us/userfiles/129/Classes/299/BasicRespiratoryWebquest.pdf>
- https://drive.google.com/file/d/1Yk390KK4_ZEmG44T4TuxmmK9QpDAAb33/view

Equipment Needed:

- Smartboard
- Balloons
- Rubber bands

RAHWAY PUBLIC SCHOOLS CURRICULUM

UNIT OVERVIEW

Content Area: Human Body Systems

Unit Title: Urinary System

Target Course/Grade Level: Human Body Systems, 11th and 12th grade

Unit Summary: Students will learn about the structure and function of the urinary system. Homeostatic imbalances within the urinary system will be explored.

Approximate Length of Unit: 3 weeks

LEARNING TARGETS

New Jersey Student Learning Standards:

Science:

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others.

9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

9.3HL.1 Determine academic subject matter, in addition to high school graduation requirements, necessary for pursuing a health science career.

9.3HL.2 Explain the healthcare worker's role within their department, their organization and the overall healthcare system.

9.3HL-DIA.5 Select, demonstrate and interpret diagnostic procedures.

9.3HL-HI.2 Describe the content and diverse uses of health information.

NJ SLS Companion Standards: Reading and Writing Standards for History, Social Studies, Science, and Technical Subjects:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

WHST.9-10.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

Unit Understandings:

Students will understand that...

The urinary system is a regulatory system that helps maintain homeostasis. The structures of the urinary system include the kidneys, ureters, bladder and urethra.

- Each kidney consists of the renal cortex, medulla and renal pyramids.
 - The functional unit of the kidney is the nephron.
 - The renal pelvis is a funnel-shaped chamber that is connected to the ureter.
- The primary functions of the urinary system are excretion, elimination and regulation of blood volume and pressure.
- Processes of the urinary system include filtration, reabsorption and secretion, which occurs in the nephrons.
- Urine is normally a clear, yellow, sterile solution but the composition can vary slightly between individuals.
 - Urinalysis is a diagnostic tool for detecting substances and conditions in the body.
 - Antidiuretic hormone (ADH) and aldosterone hormones influence the volume and concentration of urine.
 - Caffeine and alcohol act as diuretics and can lead to short or long-term kidney issues.
- Homeostatic imbalances are explored. These include, but are not limited to, urinary tract infections, kidney stones, nephritis and acute and chronic kidney disease.

Unit Essential Questions:

- How does the urinary system function?
- How are osmosis and diffusion involved in urine formation?
- How does the urinary system help maintain homeostasis?
- Why are kidneys important?
- How do kidneys work?
- How does blood flow through the kidneys?

Knowledge and Skills:

Students will know...

- The urinary system is a regulatory system that helps maintain homeostasis.
- The structures of the urinary system include the kidneys, ureters, bladder and urethra.
- The primary functions of the urinary system are excretion, elimination and regulation of blood volume and pressure.
- Processes of the urinary system include filtration, reabsorption and secretion.

Students will be able to...

- Identify the organs and discuss the functions of the urinary system.
- Identify the parts of the nephron responsible for filtration, reabsorption and secretion, and describe the mechanisms underlying each of these functional processes
- Discuss the physical and chemical characteristics of urine.
- Identify the ureters, the urinary bladder, and the male and female urethra
- Illustrate or describe the roles of osmosis and diffusion in the process of urine formation.
- Illustrate filtration, secretion and reabsorption of ions/molecules in the kidney.
- Explain the relationship between the renal system and other organ systems (e.g., vascular).
- Compare the functions of current hemodialysis machines with the actual kidneys.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Class discussions on multiple topics to verbally assess if students comprehend the material.
- Do Now question responses
- Oral questioning
- Pear Deck activities
- Quizzes
- **End of Unit Assessment:**
 - Students will identify the organs of the urinary system and explain the respective functions within the system.
 - Students will explain the relationship between the renal system and other organ systems in the maintenance of homeostasis.

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Students will create a model of the flow of blood through the kidneys:
https://www.biologycorner.com/anatomy/urinary/kidney_coloring.html
- Students will label a model of the urinary system:
https://www.biologycorner.com/anatomy/urinary/urinary_labeling.html
- Students will build a kidney model using household items:
<https://www.halfahundredacrewood.com/anatomy-experiments-kidney-model/>
- Students will participate in a kidney filtration simulation:
http://kneville.weebly.com/uploads/5/2/3/1/52311313/kidney_filtration.pdf

RESOURCES

- Students will participate in a coffee filter kidney lab: <https://sciencing.com/experiment-filters-explain-kidney-works-8034005.html>

Teacher Resources:

- Textbook- *Holes Anatomy and Physiology McGraw Hill 2010*
- <https://www.niddk.nih.gov/health-information/kidney-disease/kidneys-how-they-work>
- https://www.biologycorner.com/anatomy/urinary/kidney_coloring.html
- https://www.biologycorner.com/anatomy/urinary/urinary_labeling.html
- <https://www.halfahundredacrewood.com/anatomy-experiments-kidney-model/>
- <https://sciencing.com/experiment-filters-explain-kidney-works-8034005.html>

Equipment Needed:

- Smartboard