Unit 6- Blood/Cardiovascular/Respiratory System

Content Area: **Science**
Course(s): **Anatomy and Physiology**
Time Period: **Third Marking Period**
Length: **4 Weeks**
Status: **Published**

Unit Overview

This unit describes the interrelationship of the Blood, Cardiovascular and Respiratory Systems. The Respiratory System supplies the blood with oxygen in order for the blood to deliver oxygen to all parts of the body. The Cardiovascular System transports blood and oxygen from the lungs to tissues in the body and back to the heart.

STAGE 1- DESIRED RESULTS

Standards- 2020 New Jersey Student Learning Standards- Science

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

Science and Engineering Practices

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

Cross Cutting Concepts

- Cause and Effect

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

Disciplinary Core Ideas

Physical Sciences

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

Life Sciences

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

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

Earth and Space Sciences

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

Engineering. Technology. and Applications of Science

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

Essential Questions

- How do the respiratory system and circulatory systems work together ?
- Why is it important to maintain the right amounts of oxygen and carbon dioxide in the the internal environment of the human body ?
- How does the right amount of fluids in the human body sustain blood pressure of the body ?
- What are the components of blood and how do they function?
- What are the structures of the heart and how do they function ?
- What are the major arteries and veins of the body ?
- How does the heart work in a pulmonary and systemic circulation?

Enduring Understanding

- Blood serves as a vehicle for distributing body heat, nutrients, respiratory gases, and other substances throughout the body.
- The heart is a pump that pumps blood throughout the body.
- The signifigance of the four-chambered heart structure.
- Trace the pathway of the oxygen and carbon dioxide exchange.

Students will know...

Vocabulary definitions:

Students will know the following vocabulary definitions: Pulmonary circulation, Systemic circulation, Hepatic circulation, Coronary diseases, Anti-body, Antigens, Plasma, Red Blood cells, White blood cells, Trachea, Lungs, Nasal passage.

Misconceptions:

Students often believe that blood is produced by the heart and travels to different places.

Students may also believe that blood is blue inside the body.

Students sometimes think that the heart is the center or the processing center for all feelings and emotions.

Students may think that only pollution could cause a lot of respiratory diseases.

Students will be able to...

- Indicate the composition and volume of whole blood.
- Evaluate the role of ABO and Rh blood groups in the health of an individual.
- Analyze the blood clotting process.
- Design a model of the heart to understand the process of the blood circulation.
- Trace the pathway of blood through the heart, into the body and back.
- Compare and contrast the structure and function of the arteries, veins, and arterioles.

STAGE 2- EVIDENCE OF LEARNING

Formative Assessment

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

Authentic Assessments

- Homework
- Lab Reports
- Writing Assessments
- Sheep Heart Dissection
- Exhaling CO2 lab report
- Clay model of the system

- Student cardio fitness laboratory assessing blood pressure and pulse

Benchmark Assessments

Chapter test on Cardiovascular system

Chapter test on Respiratory system

STAGE 3- LEARNING PLAN

Instructional Map

- On the board, outline the constituents of blood, including plasma and all the formed elements, as well as the percentages of each that are normally found in healthy blood. Play a video on centrifugal blood separation to allow students to visualize the areas of separation between the erythrocytes, white blood cells and platelets, and plasma.
- Have students research diseases that are transmitted via blood. Discuss why many of these diseases are increasing in incidence and explain why careful handling of blood in the clinical agency is vitally important. Present information on standard precautions as recommended by the Centers for Disease Control and Prevention.
- Use a dissectible heart model to show heart structure.
- Use a dissectible human torso model to point out the major arteries and veins of the body.
- Have students trace the pathway of oxygenated, deoxygenated, and mixed blood in the fetal heart using a prepared diagram. Have students label the structures where blood is mixed.
- Have students run in place or do jumping jacks for three minutes, then have them record their radial pulse (pointing out that a radial pulse is always thumb side). Have them continue to take their pulse every 30 seconds for five minutes, then graph the results. Point out that a steep decline in the first minute or so indicates rapid recovery by the heart.
- Provide the students with a diagram of the major blood vessels for labeling. For further help, allow students to work with a dissectible human torso model or an online resourc to allow them a more three-dimensional view of the vessels.

Modification/Differentiation of Instruction

Differentiation Strategies for Special Education Students

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

<u>Differentiation Strategies for Gifted and Talented Students</u>

- Increase the level of complexity
- Decrease scaffolding
- Variety of finished products
- Allow for greater independence
- Learning stations, interest groups
- Varied texts and supplementary materials
- Use of technology
- Flexibility in assignments
- Varied questioning strategies
- Encourage research
- Strategy and flexible groups based on formative assessment or student choice
- Acceleration within a unit of study
- Exposure to more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace
- After mastery of a unit, provide students with more advanced learning activities, not more of the same activity
- Present information using a thematic, broad-based, and integrative content, rather than just single-

subject areas

Differentiated Strategies for ELL Students

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

Differentiation Strategies for At Risk Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge

- Define key vocabulary, multiple-meaning words, and figurative language
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment

504 Plans

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

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

Examples of accommodations in 504 plans include:

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

Modification Strategies

- Cooperative Grouping
- Extended Time

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

Differentiation Strategies

High Preparation

- Alternative Assessments
- Choice Boards
- Games and Tournaments
- Group Investigations
- Guided Reading
- Independent Research / Project
- Interest Groups
- Learning Contracts
- Leveled Rubrics
- Literature Circles
- Multiple Intelligence Options
- Multiple Texts
- Personal Agendas
- Project Based Learning (PBL)
- Stations / Centers
- Think-Tac-Toe
- Tiered Activities / Assignments

- Varying Graphic Organizers

Low Preparation

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

Horizontal Intergration- Interdisciplinary Connections

See Appendix

Vertical Integration- Discipline Mapping

In grade 6, students complete a unit on "Diversity of Life". This leads into "Populations and Ecosystems" in grade 7. In grade 8 students study "Human Systems Interactions" and "Heredity and Adaptations." In freshman year, students study Biology, a full year required course, and in sophomore year take Chemistry. After that, students have taken Anatomy and Physiology. This course will continue to focus on having students gain a deeper understanding of the Performance Expectations outlined in the NGSS, particulary in Life Sciences and Engineering Design. After this, students will be able to chose from Physics, Human Impact on the Environment, Forensics and Zoology.

Additional Materials

- Have students watch a video on the therapeutic uses of leeches to stimulate discussion of how modern medicine can utilize old folk remedies: http://www.pbs.org/wgbh/nova/body/leeches.html.
- Demonstrate the Heimlich maneuver (on self and on another individual) as a technique for removing a foreign body, such as aspirated food, from the trachea or pharynx. Bring in a nebulizer and describe its uses in the treatment of asthma.
- Demonstrate the cohesive effect that exists between the two pleural layers by putting a drop of water on a glass slide and then covering it with a second slide. Show that the slides easily move from side to side but are difficult to pull apart directly.
- Use a "model lung" consisting of a bell jar with balloon "lungs" and a rubber "diaphragm" to illustrate the fact that volume changes in the thorax lead to the flow of gases in and out of the lungs during breathing. Show prepared slides or diagrams of healthy lung tissue and lung tissue from patients who died from emphysema or lung cancer.
- Show preserved specimens of diseased lungs that exhibit signs of COPD, emphysema, cancer, or pulmonary embolism.
- Discuss altitude-induced illnesses—how they occur, and their consequences. A PBS Nova podcast that can springboard discussion can be found here, along with other discussion resources: http://www.pbs.org/wgbh/nova/denali.