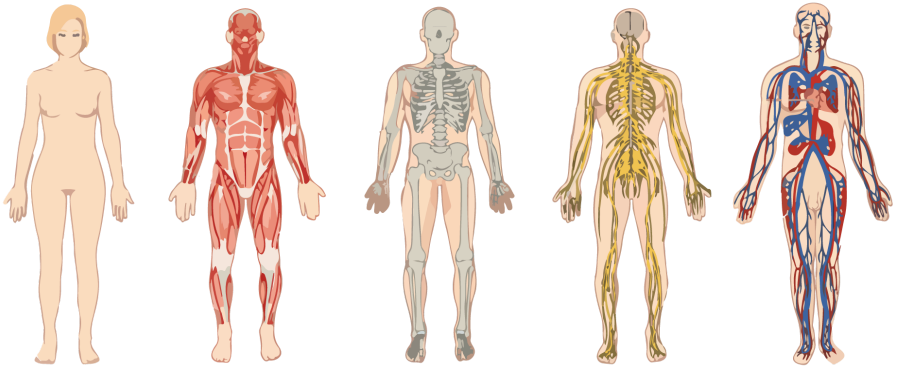
ANATOMY & PHYSIOLOGY CURRICULUM



Grade Level(s): 11th & 12th	**Curriculum Author(s):** Shelly Stone

Human Anatomy and Physiology is for students who are preparing for careers in the allied health fields or who are interested in this subject. Emphasis is placed on a detailed study of the human body by systems and discussions of recent medical advances and laboratory experiences. Dissections are used to enhance course material.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner Attribute and Indicator**
Human Body: An Orientation (2-3 weeks)	How do the interactions between molecular, cellular, and organismal levels contribute to the functioning and health of human beings?	Molecular and cellular interactions support the structure and function of the whole body. These connections are key to maintaining health.	TCC3(9-12); TCC4(9-12); TI3(9-12)
Cells and Medical Imaging (2-3 weeks)	What are the molecular components and structural adaptations of the cell membrane that contribute to its functions?	The cell membrane's structure—made of lipids, proteins, and carbohydrates—enables selective transport, communication, and protection, supporting overall cell function and homeostasis.	TCC2(9-12)
Tissues (2-3 weeks)	How do the structures of tissues relate to their functions?	Tissues have distinct structures that are closely tied to their specific functions—such as movement, support, protection, or communication—in the body.	TI2(9-12)
Body Membranes and Integumentary System (2-3 weeks)	What are the main components of the integumentary system, and how do they work together to protect the body?	The skin, hair, nails, and glands form a barrier that protects the body from physical, chemical, and biological threats.	TI2(9-12); TCC1(9-12)
Skeletal System (4 weeks)	What are the primary functions of the skeletal system, and how do they contribute to overall health and survival?	The skeletal system provides support, protection, movement, blood cell production, and mineral storage—essential for survival and health.	TCC2(9-12); TCC4(9-12); TI2(9-12)

Muscular System (3 weeks)	How does the structure of muscles enable their function in the body?	Muscle fibers are organized to contract efficiently, allowing muscles to generate force and produce movement.	TCC2(9-12)
Nervous System (4 weeks)	What is the overall structure and function of the nervous system?	The nervous system includes the brain, spinal cord, and nerves, working together to control body functions, process information, and respond to stimuli.	TCC1(9-12; TCC2(9-12)
Special Senses (4 weeks)	How do the special senses interact with and influence each other to detect and process environmental stimuli?	The special senses work together to collect and process sensory input, creating a complete picture of the environment.	TCC1(9-12); TCC2(9-12)
Blood & Circulatory System (4-5 weeks)	How does the structure of the circulatory system facilitate the movement of blood and how do the main components of blood contribute to its overall function?	The heart, arteries and veins each play key roles in transporting red blood cells, white blood cells, platelets, and plasma, supplying oxygen, fighting infection, and maintaining homeostasis.	TCC1(9-12)
Lymphatic/ Immune Systems (1 week)	Why is the lymphatic system essential for maintaining homeostasis?	The lymphatic system helps maintain fluid balance, supports immune defense, and removes waste from tissues.	TI2(9-12)
Respiratory System (1-2 weeks)	How does the structure of the respiratory system enable it to facilitate efficient gas exchange and energy production?	The respiratory system's branching airways and thin alveoli maximize surface area for gas exchange, supplying oxygen for energy production.	TCC1(9-12)
Digestive System (2 weeks)	How does the structure of the digestive system enable it to efficiently break down food and absorb nutrients?	The digestive system's specialized organs and enzymes work together to break down food and absorb nutrients through a highly folded, efficient	TCC4(9-12)

		surface.	

adapted from Wiggins, G. & McTighe, J. (2005). Understanding by Design (2nd Edition). ASCD.)

Unit 1- Human Body: An Orientation

Desired Results - Students will know the body systems, how the body maintains homeostasis, and proper terminology to describe anatomical structure in the body

Established Goals:

NGSS Standards

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.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC3(9-12): I can integrate relevant information to produce multiple valid solutions.
TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.
TI3(9-12): I can formulate and investigate probing questions to further my learning.

Understandings: Students will understand that...

- Homeostasis keeps internal conditions stable, allowing the body to function properly. Disruptions can lead to illness or dysfunction.
- Molecular and cellular interactions support the structure and function of the whole body. These connections are key to maintaining health.
- Using accurate terminology improves clarity and precision in discussing the body, supporting effective communication in science and healthcare.

Essential Questions:

- Why is homeostasis important to the human body?
- How do the interactions between molecular, cellular, and organismal levels contribute to the functioning and health of human beings?
- How does understanding anatomical and physiological terminology enhance our ability to communicate about human health and function?

Students will know…	**Students will be able to…**
• the difference between the terms “anatomy” and “physiology”. • the different levels of organization and give an example at each level within a given system (atoms, molecules, compounds, macromolecules, cells, tissues, organs, organ systems, organism). • survival needs and life functions of humans. • the relationships among directional and body terms	• compare and contrast positive and negative feedback mechanisms for homeostatic regulation. • demonstrate the use of anatomical terms and directional terms using dissection methods on a “Pickle Man”. • answer “At the Clinic” questions at the end of the chapter.
Key Vocabulary: Cell, tissue, organ, organ systems, homeostasis, negative and positive feedback, receptor effector, homeostatic imbalance, language of Anatomy: anatomical position, directional terms, regional terms for body regions, body cavities, body planes	
Assessment Evidence	
Performance Tasks: • Introduction to Body systems activity - APK • Body Diagrams • Homeostasis STEM GIZMO • Medical Disorders Research Activity • Introduction to Dissection Lab- “Pickle Man” - Students need to show understanding of anatomical and physiological terminology to complete the dissection.	**Other Evidence:** Class Notes Guided reading Quiz body systems/function/organs Directional terms worksheet Review Kahoot Summative:Test Ch. 1 Orientation of Human Body Systems · Students will provide a consistent, meaningful interpretation of the key issues/concepts through multiple choice, labeling diagrams, and “At the Clinic” questions. The “At the Clinic” questions are either short answers or essays where the student is given a medical scenario where they answer questions pertaining to the scenario.
Learning Plan	
TCC3(9-12): I can integrate relevant information to produce multiple valid solutions • Quiz on body systems, functions, and organs NGSS HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	

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

- Gizmo Homeostasis STEM case
- Body Regions & Body Cavities
- Worksheets 2,3,10,12 & 13

TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.

- Lab: Introduction to Dissection – “The Pickle Man” – teacher designed – students use terminology that they have learned to dissect a “pickle man”.

TI3(9-12): I can formulate and investigate probing questions to further my learning.

- Research a medical disease.
- Ch. 1 Test Orientation of Human Body

Teacher Resources:
Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access to text; Introduction Human Machine Video

(adapted from Wiggins, G. & McTighe, J. (2005). Understanding by Design (2nd Edition). ASCD.)

Unit 2- Cells and Medical Imaging

Desired Results

Established Goals:

NGSS

- **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.
- **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.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

Understandings: Students will understand that...

- Organelles have specialized roles that work together to maintain cellular balance and perform essential functions like energy production, protein synthesis, and waste removal.
- The cell membrane's structure—made of lipids, proteins, and carbohydrates—enables selective transport, communication, and protection, supporting overall cell function and homeostasis.
- Medical imaging technologies offer different perspectives on body structure and function, enhancing diagnosis, treatment, and understanding of human anatomy and physiology.

Essential Questions:

- What are the roles of specific organelles in maintaining cellular homeostasis and supporting cellular functions?
- What are the molecular components and structural adaptations of the cell membrane that contribute to its functions?
- How do different imaging techniques provide unique insights into anatomical structures and physiological functions?

Students will know…	Students will be able to...
• the structure of the cell membrane and explain how it maintains homeostasis within the cell. • the different cell organelles and their importance in keeping the cell alive. • different forms of medical imaging	• explain how a cell membrane responds to different solutions to maintain homeostasis • research medical imaging techniques and present them to the class using technology

Key Vocabulary: Cell organelles: nucleus, cytoplasm, nuclear envelope, chromatin, chromosome, nucleolus, ribosome, endoplasmic reticulum, Golgi apparatus, lysosome, vacuole, mitochondrion, chloroplast, cytoskeleton, centriole, cell membrane, lipid bilayer, cell wall, selectively permeable, interstitial fluid, intracellular fluid, Types of transport: diffusion, facilitated diffusion, active transport, endocytosis, phagocytosis, pinocytosis, exocytosis, concentration, equilibrium, osmosis, isotonic, hypotonic, hypertonic, and Medical Imaging Techniques

Assessment Evidence

Performance Tasks:	Other Evidence:
• Cell Organelle chart • Lab: Membrane Transport using a Dialysis Bag Summative:To investigate the permeability of a model cell membrane to different substances. These experiments cover various principles related to cell membranes, such as permeability, diffusion, osmosis, and temperature effects • Performance Based Assessment: Medical Imaging Report	Class Notes Guided Reading At the Clinic Questions • Bozeman Edpuzzles: Cells and Cell Organelles / Diffusion Experiment / How does the cell work? • Review Kahoot • Quiz: cell organelles and types of transport

Learning Plan

Performance Tasks:
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.

- Cell Organelle chart
- Ch. 3 Notes Cell Organelles
- Ch. 3 Guided Reading

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

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

- Ch. 3 Cell Membrane Notes
- Lab: Membrane Transport using a Dialysis Bag

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

- Performance Based Assessment: Medical Imaging Report

Teacher Resources:
Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access to text

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Unit 3- Tissues

Desired Results

Established Goals:

NGSS

HS-LS1.A: Structure and Function

- *Tissues and organs are composed of cells that have specific functions, and these tissues work together to form organ systems.*

NGSS Alignment:

Integrates HS-ETS1-1 and HS-ETS1-2, encouraging problem-solving and innovation in tissue engineering.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.

Understandings: Students will understand that...

- Tissues have distinct structures that are closely tied to their specific functions—such as movement, support, protection, or communication—in the body.
- Tissues combine in specific ways to form organs, which work together in systems to carry out complex body functions.
- Tissues support homeostasis by performing specialized roles that help regulate internal conditions and respond to changes in the body.
- Tissues repair and regenerate through cellular processes like inflammation, cell division, and remodeling, which help restore structure and function.

Essential Questions:

- How do the structures of tissues relate to their functions?
- How do tissues work together to form organs and organ systems?
- In what ways do tissues contribute to the overall homeostasis of an organism?
- What mechanisms do tissues use to repair and regenerate after injury or damage?

Students will know…	Students will be able to...
● the definition of tissue ● the function, structure and location of epithelial, connective, muscle, and nervous tissue. ● the differences between types of epithelial, connective, muscle and nervous tissues. ● How tissues Contribute to the Overall Homeostasis of an Organism.	● draw different tissues under 100X and 400X using a microscope. ● identify tissues under the microscope or using a picture. ● explain how tissues repair and regenerate

Key Vocabulary: *Epithelial: simple epithelium, stratified epithelium, transitional epithelium, glandular epithelium, connective: extracellular matrix, cartilage, bone, areolar, adipose, reticular, blood, muscle: skeletal, cardiac, smooth, and nervous tissues. Regeneration, fibrosis*

Assessment Evidence	
Performance Tasks: Lab: Microscopic Examination of Tissues: Summative. Students draw 11 different tissue slides using a microscope under low and high power. They also research information using their textbook in terms of location of the tissue, function and any special features of the tissue. Tissue Lab Practical – Stations are set up around the classroom and students go to each station to identify a tissue sample under the microscope, or a drawing on an index card or identify specific information such as: where the tissue is found or what is the function of that tissue. They can use their microscope drawings from the Summative assessment.	**Other Evidence:** Review Kahoot Quiz on tissues

Learning Plan
NGSS HS-LS1.A: Structure and Function: Tissues and organs are composed of cells that have specific functions, and these tissues work together to form organ systems. *HS-LS1.A: Structure and Function: Tissues and organs are composed of cells that have specific functions, and these tissues work together to form organ systems.* ***NGSS Alignment:*** *Supports HS-LS1-4 and MS-LS1-1 by illustrating cell differentiation and tissue structure.* TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge. ● ***Lab: Microscopic Examination of Tissues Objective:*** *Use microscopes or digital imaging to examine tissue samples, identifying different cell types and their organization.* ● Tissue Lab Practical
Teacher Resources: Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access to text

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Unit 4- Body Membranes and Integumentary System

Desired Results

Established Goals:

HS-LS1-1., HS-LS1.A: *Structure and Function: The skin and its associated structures (e.g., hair, nails, glands) are organized into a system that performs essential functions like protection, sensation, and temperature regulation.*

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.*

- ***Objective:*** *Students can conduct experiments to observe tissue repair and regeneration, analyzing factors that influence these processes.*
- ***NGSS Alignment:*** *Supports MS-LS1-5 and HS-LS1-4 by examining the mechanisms of tissue growth and regeneration.*

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.
TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.

Understandings: Students will understand that...

- The skin, hair, nails, and glands form a barrier that protects the body from physical, chemical, and biological threats.
- The skin's layered structure supports its roles in defense, sensory detection, and regulation of body temperature.
- The integumentary system works with other systems—like nervous and circulatory—to manage temperature, fluid balance, and immune responses.
- Melanin helps determine skin color and protects cells by absorbing harmful UV radiation, reducing the risk of DNA damage.

Essential Questions:

- What are the main components of the integumentary system, and how do they work together to protect the body?
- How does the structure of the skin contribute to its functions, such as protection, sensation, and temperature regulation?
- In what ways does the integumentary system interact with other body systems to maintain homeostasis?
- What is the role of melanin in the skin, and how does it affect skin color and protection against UV radiation?

Students will know…	Students will be able to...
• the general functions of the four body membrane types (cutaneous, mucous, serous and synovial) and give the location in the body. • how the structure of the skin affects its functions. • the functions of the skin appendages (nails, hair, sebaceous glands and sudoriferous glands) • how imbalances or diseases in the body can manifest themselves through the skin. • How to differentiate between first, second, and third degree burns in terms of parts of skin that is damaged, what the characteristics are for each type of burn and what repair happens. • the purpose of the “Rule of Nines”. • the characteristics of different types of skin cancer: basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. • how skin heals itself.	• diagram the skin labeling its structures. • compare the structure of the major membrane types. • design and conduct an experiment to answer the question, “Is all Human Hair the Same?” • answer “At the Clinic” questions at the end of the chapter.
Key Vocabulary: Epithelial membranes, cutaneous, mucous, and serous, synovial membranes, integumentary system, epidermis, dermis hypodermis, melanin, papillary layer, reticular layer, homeostatic imbalance, skin appendages, sebaceous gland, sebum, sudoriferous gland, eccrine gland, apocrine gland, hair, nails, burns, skin cancer	
Assessment Evidence	
Performance Tasks: Lab: Burns and Homeostasis Lab:Hair Analysis “Is All Human Hair the Same? GIZMO: Human Homeostasis	**Other Evidence:** Unit class Notes Guided Reading • Unit Test- Summative- Students will provide a consistent, meaningful interpretation of the key issues/concepts through multiple choice, labeling diagrams, and “At the Clinic” questions. The “At the Clinic” questions are either short answers or essays where the student is given a medical scenario where they answer questions pertaining to the scenario.

	• Case study on skin burns – Students read scenarios about burns and answer questions. • Cancer worksheet • Review Kahoot

Learning Plan

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

- ***NGSS Alignment:*** *Supports MS-LS1-5 and HS-LS1-4 by examining the mechanisms of tissue growth and regeneration.*

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.

- Lab: Burns and Homeostasis Students research various burn types and create a model of them. Then they research tissue growth and repair.

- Lab: Hair Analysis Lab: "Is All Human Hair the Same? Students design an experiment to answer the question and write a lab conclusion supporting their hypothesis.

TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.

- Gizmo Human Homeostasis: To survive in a changing environment, all organisms must maintain relatively stable internal conditions. Thermoregulation is one of the clearest examples of homeostasis in our bodies. Core temperatures in humans must remain between about 30 °C and 41 °C (86 °F–106 °F) for survival. Several processes, both voluntary and involuntary, help maintain normal body temperature.

Teacher Resources:
Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access to text

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Unit 5- Skeletal System

Desired Results

Established Goals:

HS-LS1-1.,LS1.A: *Structure and Function*

- *The skeletal system provides structure and support for the body, protects vital organs, and works with the muscular system to facilitate movement.*
- *Bones are living tissues that undergo constant remodeling through the activity of osteoblasts and osteoclasts.*

Developing and Using Models:

- *Students can create models to represent the organization of the skeletal system and its integration with other body systems.*

Crosscutting Concepts:

- ***Structure and Function:***
  - *Understanding how the shape and composition of bones relate to their specific functions, such as support, protection, and movement.*
- ***Systems and System Models:***
  - *Explore how the skeletal system interacts with the muscular system to produce movement.*

HS-LS1-2*.,* ***LS1.B:*** *Growth and Development of Organisms*

  - *Bones grow and develop through processes such as endochondral ossification, where cartilage is gradually replaced by bone tissue.*
  - *Bone remodeling is influenced by factors like nutrition, hormones, and physical activity.*

Constructing Explanations and Designing Solutions:

- *Explain how bones grow, develop, and repair themselves.*

Crosscutting Concepts:

- *Examine how genetic and environmental factors influence bone growth and development.* ***HS-LS1-3.*** *,*
- **Case Study Analysis of Bone Disorders: NGSS Alignment:** Supports **HS-LS1-6** by examining the impact of genetic and environmental factors on skeletal health.

Human Anatomy and Physiology Connections

While NGSS does not specifically address the skeletal system in its standards, the following connections can be made to align with biology and health education:

- **Bone Structure and Function:**
  - Explore the anatomy of bones, including the microscopic structure of compact and spongy bone, and understand their roles in protection and movement.
- **Joints and Movement:**
  - Investigate different types of joints (e.g., hinge, ball-and-socket) and how they contribute to the range of motion and flexibility.
- **Bone Health and Disease:**
  - Examine factors affecting bone health, such as osteoporosis, fractures, and the impact of nutrition and exercise on bone density.
- **Developmental Biology:**
  - Study the process of bone development from infancy through adulthood, including growth plate function and the role of hormones.
- **Technological and Medical Applications:**
  - Explore advancements in medical imaging, prosthetics, and treatments for skeletal system disorders.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.
TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.
TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.

Understandings: Students will understand that...	**Essential Questions:**
• The skeletal system provides support, protection, movement, blood cell production, and mineral storage—essential for survival and health. • Bone and joint structures are specialized to support weight, enable movement, and withstand stress in different parts of the body. • Muscles pull on bones to create movement, with joints acting as levers—requiring close coordination between both systems. • Nutrition, physical activity, hormones, and age all impact bone health. Healthy habits can strengthen bones and prevent disease. • Skeletal diseases and disorders can weaken bones, impair movement, and reduce quality of life, requiring medical management and prevention. • Bones interact with systems like muscular, circulatory, and endocrine to support movement, protect organs, produce blood cells, and regulate minerals.	• What are the primary functions of the skeletal system, and how do they contribute to overall health and survival? • How does the structure of bones and joints relate to their specific functions in the human body? • In what ways do the skeletal and muscular systems work together to facilitate movement? • What factors influence bone health, and how can individuals maintain a healthy skeletal system throughout their lives? • How do diseases and disorders affect the skeletal system, and what are the implications for human health? • How do bones interact with other body systems to maintain homeostasis and support overall body function?
Students will know…	**Students will be able to...**
• the functions of the skeletal system. • the structure of bone and describe how it gets made, repaired and remodeled. • the different types of bone fractures in terms of causes, what happens to the bone and how the bone is repaired • the difference between the axial and appendicular skeleton. • the different types of joints: synarthroses, amphiarthroses and diarthroses • the race and sex of a person can be determined by measurement and observations of their bones	• compare and contrast the pelvic girdles, femur bone, humerus bone, tibia bone and skull. Then use the information to determine the sex and the race of a person. • Identify and label the bones found in the body, including individual skull bones. • label and describe the macroscopic and microscopic anatomical features of a long bone. • use a caliper to determine the difference between male and female pelvises by measuring different attributes of the bones. • research a bone disorder or knee surgery, create a PowerPoint presentation and present it to the class. • answer “At the Clinic” questions at the end of the chapter.
Key Vocabulary: skeletal, cardiac, smooth, endomysium, perimysium, fascicle, epimysium, sarcolemma, myofibrils, sarcomeres, myosin, actin, motor unit, neuromuscular junctions, synaptic cleft, neurotransmitter, acetylcholine, action potential, graded response, muscle twitches, tetanus,	

aerobic respiration, anaerobic glycolysis, lactic acid formation, muscle fatigue, oxygen debt, isotonic contractions, isometric contractions, flaccid, origin, insertion, body movements: flexion, extension, rotation, abduction, adduction, circumduction, dorsiflexion and plantar flexion, inversion, eversion, supination, pronation, opposition, prime mover, antagonist, synergist, fixators, frontalis, orbicularis oris, buccinators, zygomaticus, masseter, temporalis, platysma, sternocleidomastoid, pectoralis major, intercostal muscles, rectus, abdominus, external oblique, internal oblique, transversus abdominis, trapezius, latissimus dorsi, erector spinae, deltoid, biceps brachii, brachialis, triceps brachii, gluteus maximus, gluteus medius, iliopsoas, adductor muscles, hamstring group: biceps femoris, semimembranosus, semitendinosus, sartorius, rectus femoris, vastus muscles, tibialis anterior, extensor digitorium longus, fibularis gastrocnemius, soleus, muscular dystrophy,

Assessment Evidence

Performance Tasks:

Disarticulated Skeleton Activity

Investigation: Estimate Height from the Length of Bones

Bone identification Lab: Male or Female - Students are given bones from a crime scene of three different victims and using a caliper, meter stick and other observations determine the sex and race of the victims.

Skeletal System Case Studies- Students take the role of a medical intern at Waterbury Hospital in the emergency room. They preside over cases and evaluate the different x-rays to classify the break, order more testing and advise treatment.

Bone disorder project - Students research a bone disorder or disease and create a presentation. They then present what they have found to the class.

Muscle and Bone Gizmo

Other Evidence:

- Bone tissue guided learning
- Class notes
- Guided Reading
- Long Bone Guided Learning & Labeling
- Edpuzzle Bone Remodeling and Modeling and Ossification
- Skull Diagrams coloring & labeling
- Cranial Bone Quiz
- Caliper practice activity
- Edpuzzle: Living Body Bones and Joints
- Vertebrae, Ribs, Shoulder girdle, arm, hand, leg, foot & whole skeleton labeling
- Edpuzzle: Skeletal System Review
- Label Skeleton: Skeletal Anatomy Viewer Bone ID
- Review Kahoot
- Unit 5 Test: Summative- Students will provide a consistent, meaningful interpretation of the key issues/concepts through multiple choice, labeling diagrams, and “At the Clinic” questions. The “At the Clinic” questions are either short answers or essays where the student is given a medical scenario where they answer questions pertaining to the scenario.

Learning Plan
HS-LS1-1.,LS1.A: *Structure and Function: The skeletal system provides structure and support for the body, protects vital organs, and works with the muscular system to facilitate movement.* ***Developing and Using Models:*** *Students can create models to represent the organization of the skeletal system and its integration with other body systems.* ***Crosscutting Concepts: Structure and Function:*** *Understanding how the shape and composition of bones relate to their specific functions, such as support, protection, and movement.* ● Disarticulated Skeleton Activity ● Bone tissue guided learning ● Long Bone Guided Learning & Labeling ● Investigation: Estimate Height from the Length of Bones ● Bone identification Lab: Male or Female ***Systems and System Models:*** *Explore how the skeletal system interacts with the muscular system to produce movement.* ● Muscle and Bone Gizmo **TCC2(9-12)**: I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions. ● Investigation: Estimate Height from the Length of Bones ● Bone identification Lab: Male or Female ***HS-LS1-2., LS1.B:*** *Growth and Development of Organisms. Bones grow and develop through processes such as endochondral ossification, where cartilage is gradually replaced by bone tissue. Bone remodeling is influenced by factors like nutrition, hormones, and physical activity.* ***Constructing Explanations and Designing Solutions:*** *Explain how bones grow, develop, and repair themselves.* ● Edpuzzle Bone Remodeling and Modeling and Ossification ● Long Bone Guided Learning & Labeling ● Bone identification Lab: Male or Female **NGSS Alignment: Supports HS-LS1-6** by examining the impact of genetic and environmental factors on skeletal health. **Case Study Analysis of Bone Disorders: Objective:** Students analyze case studies of bone diseases (e.g., osteoporosis) to understand their causes, symptoms, and treatments.

- Skeletal System Case Studies
- Bone Disorder Project

Vol TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.
- Skeletal System Case Studies

Vol TI.2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.
- Bone Disorder Project

HS-LS1-3. *Examine how genetic and environmental factors influence bone growth and development.*

- Bone Disorder Project

Teacher Resources: Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access to text

Unit 6- Muscular System

Desired Results

Established Goals:

HS-LS1-1.,**LS1.A:** Structure and Function

- The muscular system is essential for movement, stability, and posture, working closely with the skeletal system to produce coordinated actions.
- Muscles are composed of specialized cells called muscle fibers, which contract to facilitate movement.

LS1.C: Organization for Matter and Energy Flow in Organisms

- The muscular system requires energy in the form of ATP for muscle contractions.
- Different types of muscle tissues (skeletal, cardiac, and smooth) perform various functions, from voluntary movement to involuntary actions like digestion and heartbeat.

Science and Engineering Practices:

Planning and Carrying Out Investigations:

- Conduct experiments to investigate muscle fatigue and the effects of exercise on muscle performance.
- **Example Activity:** Measure muscle strength and endurance before and after physical activity, analyzing data to understand the role of ATP and oxygen in muscle function.

Crosscutting Concepts: **Systems and System Models:**

- Explore the interaction between the muscular and other body systems, including the skeletal and nervous systems. Growth and Development of Organisms (HS-LS1-5) **Disciplinary Core Ideas:**

  LS1.B: Growth and Development of Organisms

  - Muscle growth occurs through hypertrophy and the repair of muscle fibers in response to exercise and physical stress.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

Understandings: Students will understand that...

- Muscle fibers are organized to contract efficiently, allowing muscles to generate force and produce movement.
- Muscles attach to bones and pull on them to create movement, with joints acting as pivot points for coordinated motion.
- Muscle performance is influenced by exercise, nutrition, age, genetics, and overall health.
- The muscular system helps regulate body temperature, maintain posture, and support circulation—all vital to homeostasis.
- The nervous system sends signals to muscles, controlling voluntary and involuntary movements with precise timing and coordination.
- Muscular disorders can limit movement, reduce strength, and affect daily function, often requiring medical care or rehabilitation.

Essential Questions:

- How does the structure of muscles enable their function in the body?
- How do the muscular and skeletal systems work together to produce movement?
- What factors affect muscle strength, endurance, and flexibility?
- How does the muscular system contribute to homeostasis in the human body?
- How does the nervous system coordinate muscle contractions and movements?
- What are common muscular system disorders, and how do they impact human health?

Students will know…

- the functions of the muscular system.
- how the nervous system is involved in muscle contraction.
- the roles of actin, myosin, calcium ions and ATP in muscle contraction.
- what causes different degrees of contraction.
- Three types of muscle tissue (smooth, skeletal and cardiac) create the body movements and transport of materials in the body.
- muscle performance depends on adequate amounts of oxygen to the muscle tissue.
- muscular contraction is controlled by the nervous system through electrical and chemical signaling.

Students will be able to...

- compare and contrast the three types of muscle tissue in terms of structure, function, where found in the body and whether it is voluntarily or involuntarily controlled.
- classify muscles based on how they are named.
- explain how muscles get fatigued
- determine different effects on muscle contraction
- perform and explain the 13 body movements (flexion, extension, rotation, abduction, adduction, circumduction, dorsiflexion, plantar flexion, inversion, eversion, and opposition).
- identify and label major muscles of the body and their functions.
- perform a Chicken Wing dissection

• Actin, myosin, Ca^{+2} and ATP have a role in the cellular and molecular basis of muscle contraction.	• answer “At the Clinic” questions at the end of the chapter.

Key Vocabulary: skeletal, cardiac, smooth, endomysium, perimysium, fascicle, epimysium, sarcolemma, myofibrils, sarcomeres, myosin, actin, motor unit, neuromuscular junctions, synaptic cleft, neurotransmitter, acetylcholine, action potential, graded response, muscle twitches, tetanus, aerobic respiration, anaerobic glycolysis, lactic acid formation, muscle fatigue, oxygen debt, isotonic contractions, isometric contractions, flaccid, origin, insertion, body movements: flexion, extension, rotation, abduction, adduction, circumduction, dorsiflexion and plantar flexion, inversion, eversion, supination, pronation, opposition, prime mover, antagonist, synergist, fixators, frontalis, orbicularis oris, buccinators, zygomaticus, masseter, temporalis, platysma, sternocleidomastoid, pectoralis major, intercostal muscles, rectus, abdominus, external oblique, internal oblique, transversus abdominis, trapezius, latissimus dorsi, erector spinae, deltoid, biceps brachii, brachialis, triceps brachii, gluteus maximus, gluteus medius, iliopsoas, adductor muscles, hamstring group: biceps femoris, semimembranosus, semitendinosus, sartorius, rectus femoris, vastus muscles, tibialis anterior, extensor digitorium longus, fibularis gastrocnemius, soleus, muscular dystrophy

Assessment Evidence

Performance Tasks: *Lab: Grip Strength and Muscle Fatigue* · *Lab: Chicken Wing Dissection* Case of the Tired Swimmer	**Other Evidence:** Edpuzzle: Crash Course Introduction to muscle system Edpuzzle: Muscle System Vocab Quiz muscle anatomy and contraction Edpuzzle: Body Movement Terms Muscle Naming and labeling: Head, Trunk, Arm, Leg, and whole body Edpuzzle: Brain Pop: Duchenne muscular Dystrophy Edpuzzle: What is Myasthenia Gravis**?** Muscle Disease Documentary Labeling Muscle structure google slides Labeling Muscles Google slides At the clinic chapter questions Review Kahoot Unit 6 Muscular System Test: Summative- Students will provide a consistent, meaningful interpretation of the key issues/concepts through multiple choice, labeling diagrams, and “At the Clinic” questions. The “At the Clinic” questions are either short answers or essays where the student is given a medical scenario where they answer questions pertaining to the scenario.

Learning Plan

HS-LS1-1.,LS1.A: *Structure and Function. The muscular system is essential for movement, stability, and posture, working closely with the skeletal system to produce coordinated actions. Muscles are composed of specialized cells called muscle fibers, which contract to facilitate movement.*

- *Muscle and Bone Gizmo*
- Labeling Muscle structure google slides
- Labeling Muscles
- Ch. 6 Muscular System Class Notes
- Ch. 6 Muscular System Guided Reading
- *Lab: Chicken Wing Dissection*
- *Lab: Grip Strength and Muscle fatigue*
- Edpuzzle: Crash Course Introduction to muscle system
- Edpuzzle: Muscle System Vocab
- Quiz muscle anatomy and contraction
- Edpuzzle: Body Movement Terms
- Muscle Naming and labeling: Head, Trunk, Arm, Leg, and whole body

.

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

- *Lab: Chicken Wing Dissection*

LS1.C: *Organization for Matter and Energy Flow in Organisms. The muscular system requires energy in the form of ATP for muscle contractions.*

Science and Engineering Practices: ***Planning and Carrying Out Investigations:*** *Conduct experiments to investigate muscle fatigue and the effects of exercise on muscle performance. Crosscutting Concepts:* ***Systems and System Models:*** *Explore the interaction between the muscular and other body systems, including the skeletal and nervous systems.*

- *Lab: Grip Strength and Muscle Fatigue*

Growth and Development of Organisms (HS-LS1-5) ***Disciplinary Core Ideas:***

- ***LS1.B:*** *Growth and Development of Organisms*
  - *Muscle growth occurs through hypertrophy and the repair of muscle fibers in response to exercise and physical stress.*

○ Edpuzzle: Brain Pop: Duchenne muscular Dystrophy ○ Edpuzzle: What is Myasthenia Gravis**?** ○ Muscle Disease Documentary
Teacher Resources: Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print.; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access

(adapted from Wiggins, G. & McTighe, J. (2005). Understanding by Design (2nd Edition). ASCD.)

Unit 7 - Nervous System

Desired Results

Established Goals:

HS-**LS1: From Molecules to Organisms: Structures and Processes**

- **LS1.A: Structure and Function.** The Nervous System Structure: The nervous system is comprised of specialized cells called neurons that transmit signals. Brain Organization: The brain has distinct regions responsible for different functions, such as sensory processing, motor control, and cognitive abilities. Communication Pathways: The peripheral nervous system includes sensory and motor pathways that connect the CNS to the rest of the body.
- **LS1.D: Information Processing.** Sensory Reception: Different sensory receptors detect specific stimuli, sending signals to the brain for processing. Neural Processing: The brain processes sensory inputs and coordinates appropriate responses, often involving multiple brain regions. Response and Adaptation: Organisms respond to stimuli via nervous and muscular systems, adapting to environmental changes.

Science and Engineering Practices (SEP) Asking Questions and Defining Problems. Formulate questions regarding how neurons communicate or how the brain processes information.

Developing and Using Models. Create models of neurons to understand their structure and function. Model the reflex arc to demonstrate neural pathways.

Analyzing and Interpreting Data. Investigate how changes in sensory input affect response time or reflex actions. Analyze data from brain scans to understand functional areas of the brain.

Constructing Explanations and Designing Solutions. Explain the impact of neurological disorders on the nervous system. Design experiments to test hypotheses about sensory perception.

Crosscutting Concepts (CCC). Cause and Effect. Examine how specific stimuli cause nerve impulses and how these lead to responses.

Systems and System Models. Study the nervous system as an interconnected network involving various subsystems (CNS and PNS).

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.
TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

Understandings: Students will understand that...

- The nervous system includes the brain, spinal cord, and nerves, working together to control body functions, process information, and respond to stimuli.
- Neurons transmit electrical and chemical signals to communicate rapidly and accurately across the body.
- Different brain regions have specialized structures that support functions like thinking, movement, memory, and emotion.
- Reflexes are fast, automatic responses that help the body protect itself and maintain internal stability.
- The nervous system monitors internal and external conditions, sending signals to other systems to adjust and maintain balance.
- Nervous system disorders can disrupt communication in the body, leading to physical, mental, or sensory impairments.

Essential Questions:

- What is the overall structure and function of the nervous system?
- How do neurons communicate and transmit information throughout the body?
- How does the brain's structure relate to its functions?
- How do reflexes demonstrate the nervous system's role in maintaining homeostasis?
- How does the nervous system coordinate with other body systems to maintain balance and respond to changes?
- What are some common disorders of the nervous system, and how do they affect human health?

Students will know…

- that different cells are found in the nervous system. (neurons, astrocytes, microglial, oligodendrocytes, Schwann cells, ependymal cells and satellite cells)
- the structure and function of the nervous system.
- the five types of receptors and their functions.
- how the senses receive stimuli and process the information.
- how nerve impulses travel from one neuron to the next.
- the coverings of the brain and how each protects the brain.
- how the brain is protected.

Students will be able to...

- draw, label and describe the functions of parts of a neuron.
- compare and contrast the central nervous system and peripheral nervous systems in terms of organs and functions.
- draw and describe a reflex arc.
- label and describe the parts of the brain and their functions.
- compare and contrast the sympathetic nervous system and the parasympathetic nervous system in terms of situations when that system is used, neurotransmitters involved, target organs involved and the responses of those target organs in the body.

• the functions of the twelve pairs of cranial nerves, spinal nerves and spinal nerve plexuses. • the developmental aspects of the brain	• Conduct an experiment to gather information and data about use of the body senses to determine which sensory scenario creates the fastest reaction time. • Research information about how specific drugs affect the brain and report it back to the class in a presentation using technology. • Dissect a sheep brain and identify structures.
Key Vocabulary: Central nervous system, peripheral nervous system, stimuli, sensory input, integration, motor output, somatic nervous system, voluntary, involuntary, autonomic, neuroglia, astrocytes, microglia, ependymal, oligodendrocytes, Schwann cells, neuron, axon, dendrites, axonal terminals, neurotransmitters synaptic cleft, myelin sheath, Nodes of Ranvier, white matter, grey matter, cutaneous, proprioceptors, Meissner corpuscle, Pacinian corpuscles, efferent, afferent, association , polarized, action potential, nerve impulse, repolarization, reflex arc, somatic, cerebral hemisphere, lobes; parietal, occipital, temporal, and frontal, fissures, gyri, cerebral cortex, corpus callosum, diencephalon, thalamus, hypothalamus, limbic system, pituitary gland, mammillary bodies, epithalamus, pineal body, choroid plexus, brain stem, cerebral aqueduct, cerebral peduncles, corpora quadrigemina, pons, medulla oblongata, reticular formation, cerebellum, meninges, cerebrospinal fluid, blood-brain barrier, Alzheimer's disease, Huntington's disease, Parkinson's disease, concussion, contusion, cerebral edema, cerebral accident, spinal cord, white matter, grey matter, cranial nerves, spinal nerves, nerve plexuses, sympathetic division, parasympathetic division, cerebral palsy	
Assessment Evidence	
Performance Tasks: Lab: Reaction Time- Students design an experiment to evaluate their reaction time using different sensory receptors. Lab: Brain Dissection Activity: How do impulses travel? Students model an impulse traveling with myelinated and unmyelinated neurons. Activity: Reflex hammers-What are reflex arcs? Students work with reflex hammers to observe knee reflexes Activity: Investigating a Concussion Drug Dosage GIZMO	**Other Evidence:** Nervous system pre- test Ch. 7 Nervous System Class Notes Nervous System Guided Reading Nerves and Neuroglia Google Slides Labeling CNS Brain Anatomy Labeling Brain Google Slides Labeling Brain Function Chart Quiz – Brain anatomy At the clinic chapter questions Brain coverings- label diagram Quiz – Cranial Nerves & Spinal cord "A Closer Look" worksheet Perfect Storm Reading and Questions- Explains the effect of drowning on the nervous system

Effects of Drugs on the Brain Project or Nervous System Disorder project -Summative. Students research a particular drug or disorder on how it acts on the brain and what effects it has on their body. They then present what they have found to the class.	Review for Nervous System Test- Crossword puzzle Review Kahoot Nervous System Test- Summative- Students will provide a consistent, meaningful interpretation of the key issues/concepts through multiple choice, labeling diagrams, and “At the Clinic” questions. The “At the Clinic” questions are either short answers or essays where the student is given a medical scenario where they answer questions pertaining to the scenario.

Learning Plan

HS-LS1: From Molecules to Organisms: Structures and Processes

- ***LS1.A: Structure and Function.*** *The Nervous System Structure: The nervous system is comprised of specialized cells called neurons that transmit signals. Brain Organization: The brain has distinct regions responsible for different functions, such as sensory processing, motor control, and cognitive abilities. Communication Pathways: The peripheral nervous system includes sensory and motor pathways that connect the CNS to the rest of the body.*
  - Nervous system pre- test
  - Ch. 7 Nervous System Class Notes
  - Nervous System Guided Reading
  - Nerves and Neuroglia Google Slides Labeling
  - CNS Brain Anatomy Labeling
  - Brain Google Slides Labeling
  - Brain Function Chart
  - Lab: Brain Dissection
  - Activity: How do impulses travel? Students model an impulse traveling with myelinated and unmyelinated neurons.
  - Activity: Reflex hammers-What are reflex arcs? Students work with reflex hammers to observe knee reflexes
- ***LS1.D: Information Processing.*** *Sensory Reception: Different sensory receptors detect specific stimuli, sending signals to the brain for processing. Neural Processing: The brain processes sensory inputs and coordinates appropriate responses, often involving multiple brain regions. Response and Adaptation: Organisms respond to stimuli via nervous and muscular systems, adapting to environmental changes.*
  - Lab: Reaction Time- Students design an experiment to evaluate their reaction time using different sensory receptors.
  - Lab: Brain Dissection
  - Activity: How do impulses travel? Students model an impulse traveling with myelinated and unmyelinated neurons.
  - Activity: Reflex hammers-What are reflex arcs? Students work with reflex hammers to observe knee reflexes

Science and Engineering Practices (SEP) Asking Questions and Defining Problems. Formulate questions regarding how neurons communicate or how the brain processes information. **Developing and Using Models.** Create models of neurons to understand their structure and function. Model the reflex arc to demonstrate neural pathways. **Analyzing and Interpreting Data.** Investigate how changes in sensory input affect response time or reflex actions. Analyze data from brain scans to understand functional areas of the brain. **Constructing Explanations and Designing Solutions.** Explain the impact of neurological disorders on the nervous system. Design experiments to test hypotheses about sensory perception.

- Lab: Reaction Time- Students design an experiment to evaluate their reaction time using different sensory receptors.
- Activity: How do impulses travel? Students model an impulse traveling with myelinated and unmyelinated neurons.
- Activity: Reflex hammers-What are reflex arcs? Students work with reflex hammers to observe knee reflexes
- Activity: Investigating a Concussion
- Effects of Drugs on the Brain Project or Nervous System Disorder project
- Drug Dosage GIZMO

Crosscutting Concepts (CCC). Cause and Effect. Examine how specific stimuli cause nerve impulses and how these lead to responses. **Systems and System Models.** Study the nervous system as an interconnected network involving various subsystems (CNS and PNS).

- Lab: Reaction Time- Students design an experiment to evaluate their reaction time using different sensory receptors.

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.
TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

- Lab: Reaction Time- Students design an experiment to evaluate their reaction time using different sensory receptors.
- Effects of Drugs on the Brain Project or Nervous System Disorder project

Teacher Resources: Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print.; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access

(adapted from Wiggins, G. & McTighe, J. (2005). Understanding by Design (2nd Edition). ASCD.)

Unit 8- Special Senses

Desired Results - Students will understand how we see, hear, taste, smell, and maintain balance.

Established Goals:

LS1: From Molecules to Organisms: Structures and Processes

- ***LS1.A: Structure and Function. Sensory Organs****: Each sense has specialized organs that detect specific stimuli, such as the eyes for vision, ears for hearing, tongue for taste, nose for smell, and vestibular system for balance.* ***Receptor Cells****: Specialized receptor cells in these organs convert stimuli into electrical signals that the brain can interpret.* ***Pathways****: Neural pathways transmit sensory information from receptors to specific brain regions for processing.*
- ***LS1.D: Information Processing. Sensory Processing****: The brain integrates and interprets sensory information to produce perceptions, responses, and behaviors.* ***Signal Transduction****: Sensory receptors transduce physical or chemical stimuli into electrical signals.* ***Integration and Response****: The nervous system integrates information from multiple sensory modalities to produce coordinated responses.*

Science and Engineering Practices (SEP)

Developing and Using Models. Construct models of sensory organs to understand their anatomy and function. Use diagrams to trace the pathways of sensory information from receptors to the brain.

Planning and Carrying Out Investigations. Design experiments to test hypotheses about sensory perception and thresholds. Investigate factors that affect sensory perception, such as adaptation or interference.

Analyzing and Interpreting Data. Analyze data from sensory experiments to draw conclusions about sensory function and perception. Compare sensory responses under different conditions to understand variability**.**

Constructing Explanations and Designing Solutions Explain how specific sensory receptors and pathways contribute to perception and behavior. Design solutions to mitigate sensory impairments or enhance sensory experiences.

Crosscutting Concepts (CCC). Structure and Function. Explore how the anatomy of sensory organs is adapted to their specific functions. Investigate how the structure of receptor cells determines their sensitivity to stimuli. **Systems and System Models.** Study the sensory systems as

interconnected networks that contribute to overall perception. Analyze how sensory information is integrated across systems to produce coherent experiences.**Cause and Effect.** Examine how stimuli cause specific receptor activations and subsequent neural responses. Analyze how alterations in sensory input can affect perception and behavior.**Stability and Change.** Investigate how sensory systems maintain stability through adaptation and homeostasis. Explore changes in sensory perception due to aging, injury, or environmental factors.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.
TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

Understandings: Students will understand that...

- The special senses work together to collect and process sensory input, creating a complete picture of the environment.
- Each sense organ has specialized structures designed to detect specific stimuli and convert them into neural signals.
- The brain interprets and combines sensory signals to create meaningful perceptions and guide responses.
- Advances in research and technology improve diagnosis, treatment, and quality of life for individuals with sensory impairments.
- Both genetic traits and environmental factors shape how the special senses develop and function over time.

Essential Questions:

- How do the special senses interact with and influence each other to detect and process environmental stimuli?
- How do the anatomical structures of the special senses contribute to their function?
- How does the brain integrate information from the special senses to form perceptions?
- How do technological and scientific advancements enhance our understanding and treatment of sensory disorders?
- How do genetics and the environment influence the development and function of the special senses?

Students will know…

- describe the different types of receptors found in the sense organs.
- Identify and label the structures of the eye and the muscles surrounding the eye.
- the functions of each eye structure
- how the rods and cones located on the retina helps us see.
- accessory structures of the eye and how they affect the

Students will be able to...

- dissect a sheep eye and identify structures.
- use different types of eye tests and processes to assess vision: Snellen eye chart, astigmatism, accommodation, pupillary reflex, optical illusions, convergence, and photopupillary reflex
- design and conduct an experiment to determine if there is a relationship between taste and smell.
- conduct a series of experiments to assess how we hear.

eye. ● the difference between emmetropia, myopia and hyperopia. ● the causes, effects, and treatments for glaucoma and cataracts. ● the structures and function of the ear and how it allows us to hear. ● how the equilibrium organs of the ear help maintain balance. ● how we taste food. ● how we smell. ● the relationship between taste and smell.	

Key Vocabulary:

Sight, smell, taste, smell, eye, Meibomian glands, ciliary glands, conjunctiva, lacrimal apparatus, sclera, cornea, choroid, ciliary body, lens, iris, pupil, retina, optic nerve, fovea centralis, aqueous humor, vitreous humor, canal of Schlemm, photoreceptors, Ophthalmoscope exam, accommodation, astigmatism, blind spot, cataract, emmetropia, glaucoma, hyperopia, myopia, refraction, optic cortex, pupillary and convergence reflexes, optic chiasma, optic tracts, binocular vision, hemianopia, ear, mechanoreceptors, pinna, external auditory canal, ceruminous glands, tympanic membrane, oval window, ossicles, malleus, incus, stapes, bony labyrinth, cochlea, vestibule, semicircular canals, perilymph, endolymph, organ of corti, cochlear nerve, static equilibrium, otolithic membrane, vestibular nerve, dynamic equilibrium, crista ampullaris, cupula, conduction deafness, sensorineural deafness, olfactory receptors, chemoreceptors, papillae, gustatory cells, strabismus, presbyopia

Assessment Evidence

Performance Tasks:	**Other Evidence:**
● Sheep Eye Dissection Lab: students dissect a sheep eye to view the structures of the eye. ● Eye tests Lab: Students examine different types of eye tests and processes: Snellen eye chart, astigmatism, accommodation pupillary reflex, optical illusions, convergence, and photopupillary reflex ● Lab: How do we hear? Students explore the properties of sound and how they are perceived by the ear using tuning forks or sound generators to explore pitch, volume, and frequency.	● Ch. 8 Special Senses Class Notes ● Special Senses Guided Reading ● Eye Labeling Diagrams ● Quiz: Labeling structures of the eye ● Ear labeling Diagrams ● Quiz: Labeling structures of the ear ● At the clinic questions ● Review Kahoot ● Unit Test: Summative- Students will provide a consistent,

• Skittles Taste and Smell lab: Students design and experiment to analyze how taste and smell interact and explain the role of chemoreceptors in detecting chemical stimuli. • Senses, Vision 2 and Vision 3 Gizmos	meaningful interpretation of the key issues/concepts through multiple choice, labeling diagrams, and “At the Clinic” questions. The “At the Clinic” questions are either short answers or essays where the student is given a medical scenario where they answer questions pertaining to the scenario.

Learning Plan

LS1: From Molecules to Organisms: Structures and Processes

- ***LS1.A: Structure and Function. Sensory Organs****: Each sense has specialized organs that detect specific stimuli, such as the eyes for vision, ears for hearing, tongue for taste, nose for smell, and vestibular system for balance.* ***Receptor Cells****: Specialized receptor cells in these organs convert stimuli into electrical signals that the brain can interpret.* ***Pathways****: Neural pathways transmit sensory information from receptors to specific brain regions for processing.*
  - Ch. 8 Special Senses Class Notes
  - Special Senses Guided Reading
  - Eye Labeling Diagrams
  - Ear labeling Diagrams
  - Senses, Vision 2 and Vision 3 Gizmos
- ***LS1.D: Information Processing. Sensory Processing****: The brain integrates and interprets sensory information to produce perceptions, responses, and behaviors.* ***Signal Transduction****: Sensory receptors transduce physical or chemical stimuli into electrical signals.* ***Integration and Response****: The nervous system integrates information from multiple sensory modalities to produce coordinated responses.*
  - Ch. 8 Special Senses Class Notes
  - Special Senses Guided Reading
  - Lab: How do we hear? Students explore the properties of sound and how they are perceived by the ear using tuning forks or sound generators to explore pitch, volume, and frequency.
  - Skittles Taste and Smell lab: Students design and experiment to analyze how taste and smell interact and explain the role of chemoreceptors in detecting chemical stimuli.

Science and Engineering Practices (SEP)Developing and Using Models. Construct models of sensory organs to understand their anatomy and function. Use diagrams to trace the pathways of sensory information from receptors to the brain. **Planning and Carrying Out Investigations.** Design experiments to test hypotheses about sensory perception and thresholds. Investigate factors that affect sensory perception, such as adaptation or interference. **Analyzing and Interpreting Data.** Analyze data from sensory experiments to draw conclusions about sensory function and perception. Compare sensory responses under different conditions to understand variability**. Constructing Explanations and Designing Solutions** Explain how specific sensory receptors and pathways contribute to perception and behavior. Design

solutions to mitigate sensory impairments or enhance sensory experiences.

- Lab: How do we hear? Students explore the properties of sound and how they are perceived by the ear useing tuning forks or sound generators to explore pitch, volume, and frequency.
- Skittles Taste and Smell lab: Students design and experiment to analyze how taste and smell interact and explain the role of chemoreceptors in detecting chemical stimuli.

Crosscutting Concepts (CCC). Structure and Function. Explore how the anatomy of sensory organs is adapted to their specific functions. Investigate how the structure of receptor cells determines their sensitivity to stimuli. **Systems and System Models.** Study the sensory systems as interconnected networks that contribute to overall perception. Analyze how sensory information is integrated across systems to produce coherent experiences.**Cause and Effect.** Examine how stimuli cause specific receptor activations and subsequent neural responses. Analyze how alterations in sensory input can affect perception and behavior.**Stability and Change.** Investigate how sensory systems maintain stability through adaptation and homeostasis. Explore changes in sensory perception due to aging, injury, or environmental factors.

- Sheep Eye Dissection Lab: students dissect a sheep eye to view the structures of the eye.
- Eye tests Lab: Students examine different types of eye tests and processes: Snellen eye chart, astigmatism, accommodation pupillary reflex, optical illusions, convergence, and photopupillary reflex
- Lab: How do we hear? Students explore the properties of sound and how they are perceived by the ear using tuning forks or sound generators to explore pitch, volume, and frequency.
- Skittles Taste and Smell lab: Students design and experiment to analyze how taste and smell interact and explain the role of chemoreceptors in detecting chemical stimuli.

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.
TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

- Lab: How do we hear? Students explore the properties of sound and how they are perceived by the ear using tuning forks or sound generators to explore pitch, volume, and frequency.
- Skittles Taste and Smell lab: Students design and experiment to analyze how taste and smell interact and explain the role of chemoreceptors in detecting chemical stimuli.

Teacher Resources: Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print.; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access

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Unit 9- Blood & Circulatory System

Desired Results -Students will gain a comprehensive understanding of the blood and circulatory system and their critical roles in maintaining health and homeostasis.

Established Goals:

LS1: From Molecules to Organisms: Structures and Processes

- LS1.A: Structure and Function. Heart Anatomy: The heart's chambers, valves, and blood vessels are structured to efficiently pump and direct blood flow. Blood Components: Blood is composed of red blood cells, white blood cells, platelets, and plasma, each with specific functions. Vascular Network: The circulatory system includes arteries, veins, and capillaries that transport blood throughout the body.
- LS1.B: Growth and Development of Organisms. Developmental Changes: The circulatory system develops through specific stages, influencing growth and health.
- LS1.D: Information Processing. Homeostasis and Regulation: The circulatory system plays a key role in maintaining homeostasis by regulating body temperature, pH levels, and fluid balance.

Science and Engineering Practices (SEP) Developing and Using Models.
Create models of the heart and blood vessels to illustrate blood flow and circulation.
Use diagrams to map out the systemic and pulmonary circuits of the circulatory system.

Planning and Carrying Out Investigations.
Design experiments to measure heart rate and blood pressure under different conditions.
Investigate factors that affect blood flow and circulation, such as exercise and stress.

Analyzing and Interpreting Data.
Analyze data from circulatory experiments to understand cardiac output and vascular resistance.
Compare circulatory responses to various stimuli and conditions.

Constructing Explanations and Designing Solutions.
Explain how the structure of the heart and blood vessels supports efficient blood circulation.
Design solutions to address circulatory disorders, such as atherosclerosis and hypertension.

Crosscutting Concepts (CCC) Structure and Function.
Explore how the anatomy of the circulatory system supports its function in nutrient and oxygen transport.
Investigate how the design of blood vessels influences blood flow and pressure.

Systems and System Models.
Study the circulatory system as an interconnected network that supports overall body function.
Analyze how the circulatory system interacts with other systems, such as the respiratory and immune systems.

Stability and Change.
Examine how the circulatory system maintains homeostasis and responds to changes in the environment.
Investigate the effects of lifestyle choices and diseases on circulatory health.

Energy and Matter.
Understand how the circulatory system transports energy-rich nutrients and removes waste products.
Explore the role of the circulatory system in energy distribution and metabolism.

HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Example: *Use models to demonstrate how blood components work together to maintain homeostasis.*

HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. Example: *Investigate how the circulatory system responds to physical activity.*

HS-LS1-5: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. Example: *Explore how blood cells are produced in the bone marrow and differentiate into various types.*

HS-LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. Example: *Explain how blood transports nutrients and gasses at the molecular level.*

HS-LS1-7: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken, and new compounds are formed that can transport energy to cells. Example: *Illustrate how oxygen is transported by hemoglobin and used in cellular respiration.*

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.

Understandings: Students will understand that... ● Red cells, white cells, platelets, and plasma each play key roles in transporting substances, fighting infection, and maintaining balance. ● Blood typing is crucial for safe transfusions, as the immune system reacts to incompatible blood types as foreign threats. ● White blood cells detect, attack, and destroy harmful pathogens, forming a vital part of the body's immune defense. ● Malfunctioning blood cells can lead to conditions like anemia, clotting disorders, or immune deficiencies, affecting overall health. ● The heart's chambers, valves, and muscle layers are designed to keep blood flowing in the right direction with each beat. ● The circulatory system delivers oxygen and nutrients, removes waste, and helps regulate temperature and pH—key to system-wide balance. ● Innovations in medicine and technology improve the diagnosis, monitoring, and treatment of heart and blood vessel conditions.	**Essential Questions:** ● How do the main components of blood contribute to its overall function? ● Why is blood typing important, and how does it relate to the immune response? ● How do white blood cells protect the body from infection and disease? ● What happens when blood cells are not functioning correctly? ● How does the structure of the heart enable it to efficiently pump blood throughout the body? ● How does the circulatory system maintain homeostasis and support other body systems? ● How do scientific and technological advancements contribute to our understanding and treatment of circulatory disorders?
Students will know… ● the components of blood and describe the function of each. ● what is hematopoiesis. ● the basis for the ABO blood groups in humans and how to determine blood type. ● the basis of adverse reactions in blood transfusions and organ transplants. ● the location of the heart and identify its anatomical areas on a diagram. ● the pathway of blood through the heart and body. ● the pulmonary and systemic circuits ● the components of the intrinsic conduction system and explain how it coordinates the beating of the heart. ● what affects cardiac output and what situations may change it. ● the differences between arteries and veins in terms of structure, pressure and function.	**Students will be able to...** ● compare and contrast red blood cells and white blood cells in terms of where made and functions. ● diagram, explain and sequence the events of hemostasis ● determine blood types of offspring given parent blood types or a child and one parent using Punnett Squares. ● conduct blood typing procedures to determine the blood types of four unknown simulated blood samples. ● dissect a heart and identify its structures and functions. ● palpate an artery to find a pulse. ● use a sphygmomanometer to take someone's blood pressure. ● design, conduct and analyze an experiment to see how either pulse or blood pressure is affected under abnormal conditions

• the major arteries and veins on a diagram. • what is “special” about the circulations of the digestive organs, the brain and the fetus. • what blood pressure is and what factors may affect it. • how gases and molecules are transferred between the bloodstream and cells or vice versa. • problems with the cardiovascular system such as heart attacks, murmurs, arteriosclerosis, etc. in terms of cause, effect on heart, diagnosis, and treatment.	

Key Vocabulary:

Formed elements, plasma, hematocrit, erythrocytes, hemoglobin, anemia, polycythemia, leukocytes, leukocytosis, leukopenia, platelets, hematopoiesis, hemocytoblast, erythropoietin, hemostasis, coagulation, thrombocytopenia, hemophilia, transfusion, agglutination, ABO blood group, Rh blood group, cross matching, heart, pericardium, visceral pericardium, epicardium, parietal pericardium, myocardium, endocardium, atria, ventricles, interventricular septum, superior and inferior vena cava, pulmonary trunk, pulmonary arteries and veins, pulmonary circulation, aorta, systemic circulation, atrioventricular valves, bicuspid, tricuspid, chordae tendineae, semilunar valves coronary blood vessels, angina pectoris, myocardial infarction, intrinsic conduction system, sinoatrial node, atrioventricular node, bundle of His, Purkinje fibers, pacemaker, fibrillation, systole and diastole contraction, cardiac cycle. Cardiac output, stroke volume, arteries, arterioles, venules, veins, capillaries, tunica interna, tunica media, tunica externa, varicose veins, thrombophlebitis, pulmonary embolism, special circulations: brain and circle of Willis, hepatic portal, and fetal circulation, vital signs, pulse ,blood pressure, systolic and diastolic pressure, peripheral resistance, hypotension, circulatory shock, atherosclerosis, angioplasty, hypertension, coronary heart disease

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Lab: Blood typing: Students determine the blood types of four unknown simulated blood samples and answer questions concerning the procedure. • Activity: Hemostasis mini project drawings: Students illustrate the process of hemostasis and also problems with hemostasis: thrombus, embolus, thrombocytopenia and hemophilia • Lab: Heart dissection – students dissect a sheep’s heart and answer questions about the dissection.	• Blood APK Google from • Unit class notes • Unit Guided Reading • Blood Cells Google slides • Blood Typing genetic problems • Blood Detective DVD- Rare blood disorders are diagnoses for Patients. • Whose Baby is it? Carolina Biological Activity

• Lab: Effects of activity on heart rate or blood pressure – students design and conduct their own experiment to see how pulse rate or blood pressure is affected under abnormal conditions.	• Edpuzzle: The Beast Within-Physiology of a Heart Attack • Cardiovascular System google slides • Quiz: heart anatomy – given a diagram and a word bank, students label the diagram. • At the clinic questions • Review Kahoot • Review Bingo • Unit Test Blood & Circulatory Test-: Summative- Students will provide a consistent, meaningful interpretation of the key issues/concepts through multiple choice, and "At the Clinic" questions. The "At the Clinic" questions are either short answers or essays where the student is given a medical scenario where they answer questions pertaining to the scenario.

Learning Plan

LS1: From Molecules to Organisms: Structures and Processes

- ***LS1.A: Structure and Function. Heart Anatomy: The heart's chambers, valves, and blood vessels are structured to efficiently pump and direct blood flow. Blood Components: Blood is composed of red blood cells, white blood cells, platelets, and plasma, each with specific functions. Vascular Network: The circulatory system includes arteries, veins, and capillaries that transport blood throughout the body.***
  - Blood APK Google from
  - Unit class notes
  - Unit Guided Reading
  - Blood Cells Google slides
  - Blood Typing genetic problems
  - Activity: Hemostasis mini project drawings: Students illustrate the process of hemostasis and also problems with hemostasis: thrombus, embolus, thrombocytopenia and hemophilia
  - Lab: Heart dissection – students dissect a sheep's heart and answer questions about the dissection.
- ***LS1.B: Growth and Development of Organisms. Developmental Changes: The circulatory system develops through specific stages, influencing growth and health.***
  - Unit class notes
  - Unit Guided Reading

LS1.D: Information Processing. Homeostasis and Regulation: The circulatory system plays a key role in maintaining homeostasis by regulating body temperature, pH levels, and fluid balance.

- Unit class notes
- Unit Guided Reading
- Lab: Blood typing: Students determine the blood types of four unknown simulated blood samples and answer questions concerning the procedure.

Science and Engineering Practices (SEP) Developing and Using Models. Create models of the heart and blood vessels to illustrate blood flow and circulation. Use diagrams to map out the systemic and pulmonary circuits of the circulatory system. **Planning and Carrying Out Investigations.** Design experiments to measure heart rate and blood pressure under different conditions. Investigate factors that affect blood flow and circulation, such as exercise and stress. **Analyzing and Interpreting Data.** Analyze data from circulatory experiments to understand cardiac output and vascular resistance. Compare circulatory responses to various stimuli and conditions. **Constructing Explanations and Designing Solutions.** Explain how the structure of the heart and blood vessels supports efficient blood circulation. Design solutions to address circulatory disorders, such as atherosclerosis and hypertension.

- Unit class notes
- Unit Guided Reading
- Blood Cells Google slides
- Cardiovascular System google slides
- Lab: Heart dissection – students dissect a sheep's heart and answer questions about the dissection.
- Activity: Hemostasis mini project drawings: Students illustrate the process of hemostasis and also problems with hemostasis: thrombus, embolus, thrombocytopenia and hemophilia

Crosscutting Concepts (CCC) Structure and Function. Explore how the anatomy of the circulatory system supports its function in nutrient and oxygen transport. Investigate how the design of blood vessels influences blood flow and pressure. **Systems and System Models.** Study the circulatory system as an interconnected network that supports overall body function. Analyze how the circulatory system interacts with other systems, such as the respiratory and immune systems. **Stability and Change.** Examine how the circulatory system maintains homeostasis and responds to changes in the environment. Investigate the effects of lifestyle choices and diseases on circulatory health. **Energy and Matter.** Understand how the circulatory system transports energy-rich nutrients and removes waste products. Explore the role of the circulatory system in energy distribution and metabolism.

- Blood Typing genetic problems
- Blood Detective DVD- Rare blood disorders are diagnoses for Patients.
- Whose Baby is it? Carolina Biological Activity
- Edpuzzle: The Beast Within-Physiology of a Heart Attack
- Lab: Heart dissection – students dissect a sheep's heart and answer questions about the dissection.

HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Example: *Use models to demonstrate how blood components work together to maintain homeostasis.*

- Lab: Effects of activity on heart rate or blood pressure – students design and conduct their own experiment to see how pulse rate or blood pressure is affected under abnormal conditions.
- Activity: Hemostasis mini project drawings: Students illustrate the process of hemostasis and also problems with hemostasis: thrombus, embolus, thrombocytopenia and hemophilia

HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. Example: *Investigate how the circulatory system responds to physical activity.*

- Lab: Effects of activity on heart rate or blood pressure – students design and conduct their own experiment to see how pulse rate or blood pressure is affected under abnormal conditions.

HS-LS1-5: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. Example: *Explore how blood cells are produced in the bone marrow and differentiate into various types.*

- Lab: Blood typing: Students determine the blood types of four unknown simulated blood samples and answer questions concerning the procedure.
- Activity: Hemostasis mini project drawings: Students illustrate the process of hemostasis and also problems with hemostasis: thrombus, embolus, thrombocytopenia and hemophilia
- Blood Detective DVD- Rare blood disorders are diagnoses for Patients.

HS-LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. Example: *Explain how blood transports nutrients and gasses at the molecular level.*

- Blood Typing genetic problems
- Blood Detective DVD- Rare blood disorders are diagnoses for Patients.
- Whose Baby is it? Carolina Biological Activity
- Edpuzzle: The Beast Within-Physiology of a Heart Attack

HS-LS1-7: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken, and new compounds are formed that can transport energy to cells. Example: *Illustrate how oxygen is transported by hemoglobin and used in cellular respiration.* ***Systems and System Models.****Understand the circulatory system as an interconnected system.*

Structure and Function. *Relate the structure of blood cells and vessels to their functions.* ***Cause and Effect.*** *Explore how diseases or conditions (e.g., anemia, clotting disorders) affect blood function.****Stability and Change.****Investigate how homeostasis is maintained in response to internal and external changes.*

- Edpuzzle: The Beast Within-Physiology of a Heart Attack
- Blood Detective DVD- Rare blood disorders are diagnoses for Patients.
- Lab: Effects of activity on heart rate or blood pressure – students design and conduct their own experiment to see how pulse rate or blood pressure is affected under abnormal conditions.

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.

- Lab: Effects of activity on heart rate or blood pressure – students design and conduct their own experiment to see how pulse rate or blood pressure is affected under abnormal conditions.

Teacher Resources: Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print.; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access

(adapted from Wiggins, G. & McTighe, J. (2005). Understanding by Design (2nd Edition). ASCD.)

Unit 10- Lymphatic / Immune System

Desired Results - Students will understand that the lymphatic system is an essential part of the human anatomy, playing a crucial role in maintaining fluid balance, supporting the immune system, and facilitating the transport of nutrients and waste products.

Established Goals:

LS1: From Molecules to Organisms: Structures and Processes

- ***LS1.A: Structure and Function. Anatomy of the Lymphatic System****: The lymphatic system includes lymph nodes, lymph vessels, lymphatic organs (such as the spleen and thymus), and lymph fluid, each with specific roles in maintaining health.* ***Fluid Balance****: The lymphatic system helps regulate interstitial fluid levels, preventing tissue swelling and maintaining fluid homeostasis.*
- ***LS1.B: Growth and Development of Organisms. Immune Function****: The lymphatic system is a key component of the immune system, facilitating the transport of immune cells and the detection of pathogens.*
- ***LS1.D: Information Processing. Immune Response****: The lymphatic system plays a role in recognizing and responding to foreign invaders, such as bacteria and viruses, through the activation of lymphocytes and the production of antibodies.*

Science and Engineering Practices (SEP).
Investigate how the lymphatic system responds to infections and injuries.

Analyzing and Interpreting Data.
Compare lymphatic responses to various pathogens and environmental factors.

Constructing Explanations and Designing Solutions.
Explain how the structure of the lymphatic system supports its roles in fluid balance, immune response, and nutrient transport.

Crosscutting Concepts (CCC). Systems and System Models.
Study the lymphatic system as an interconnected network that supports overall body function and immune health.
Analyze how the lymphatic system interacts with other systems, such as the circulatory and immune systems.

Stability and Change.
Examine how the lymphatic system maintains homeostasis and responds to changes in the environment, such as infections and injuries.
Investigate the effects of lifestyle choices, such as diet and exercise, on lymphatic health and immune function.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.

Understandings: Students will understand that...

- The lymphatic system helps maintain fluid balance, supports immune defense, and removes waste from tissues.
- Lymph vessels, nodes, and organs are structured to collect, filter, and return fluid to the bloodstream while detecting pathogens.
- The lymphatic system works with blood vessels and immune cells to detect and fight infections, preventing disease and promoting health.

Essential Questions:

- Why is the lymphatic system essential for maintaining homeostasis?
- How does the structure of the lymphatic system facilitate its functions?
- How does the lymphatic system interact with the circulatory and immune systems to protect the body from disease?

Students will know…

- the function of the the major lymphatic vessels (Lymph nodes, Peyer's patches, spleen, tonsils, thymus, mucosa-associated lymphatic tissue)
- the nonspecific and specific defenses and give and example of each.
- the inflammatory process.
- What are antigens and antibodies and explain how an antigen/antibody reaction occurs.
- the importance of phagocytes and natural killer cells
- the differences between B lymphocytes and T lymphocytes.
- the difference between active and passive immunity.
- what an autoimmune disease is, give an example and discuss how it affects the body.

Students will be able to...

- discuss HIV in terms of how it is transmitted, how it gets through our defense system, effects on the body, and treatments.
- answer at the clinic questions

Key Vocabulary: lymph, lymph nodes, spleen, thymus, tonsils, Peyer's patches, nonspecific defense system, specific defense system, nonspecific response, immunity, pathogens, phagocytes, natural killer cells, inflammatory response, chemotaxis, pus, antimicrobial, complement, interferon, fever, pyrogens, antigen, antibody, humoral immunity. lymphocytes, memory cells, secondary response, active immunity, passive immunity, vaccines, monoclonal antibodies, allergies, anaphylactic shock, immunodeficiency, autoimmune deficiencies,

Assessment Evidence

Performance Tasks:

- Lymphatic Disorder Research Project: Students will investigate common lymphatic system disorders and present their findings, emphasizing the role of the lymphatic system in maintaining health. Summative

Other Evidence:

- Lymphatic Unit Class Notes
- Lymphatic Unit Guided Reading
- Autoimmune Diseases worksheet
- At the clinic questions
- Review Kahoot
- Quiz: Lymphatic and Immune systems

Learning Plan

LS1: From Molecules to Organisms: Structures and Processes

- ***LS1.A: Structure and Function. Anatomy of the Lymphatic System****: The lymphatic system includes lymph nodes, lymph vessels, lymphatic organs (such as the spleen and thymus), and lymph fluid, each with specific roles in maintaining health.* ***Fluid Balance****: The lymphatic system helps regulate interstitial fluid levels, preventing tissue swelling and maintaining fluid homeostasis.*
  - Lymphatic Unit Class Notes
  - Lymphatic Unit Guided Reading
  - Autoimmune Diseases worksheet
- ***LS1.B: Growth and Development of Organisms. Immune Function****: The lymphatic system is a key component of the immune system, facilitating the transport of immune cells and the detection of pathogens.*
  - Lymphatic Unit Class Notes
  - Lymphatic Unit Guided Reading
  - Autoimmune Diseases worksheet
  - *Lymphatic Disorder Research Project*
- ***LS1.D: Information Processing. Immune Response****: The lymphatic system plays a role in recognizing and responding to foreign invaders, such as bacteria and viruses, through the activation of lymphocytes and the production of antibodies.*
  - Lymphatic Unit Class Notes
  - Lymphatic Unit Guided Reading

- Autoimmune Diseases worksheet
- *Lymphatic Disorder Research Project*

Science and Engineering Practices (SEP). Investigate how the lymphatic system responds to infections and injuries. **Analyzing and Interpreting Data.** Compare lymphatic responses to various pathogens and environmental factors.**Constructing Explanations and Designing Solutions.** Explain how the structure of the lymphatic system supports its roles in fluid balance, immune response, and nutrient transport.

- Lymphatic Unit Class Notes
- Lymphatic Unit Guided Reading
- Autoimmune Diseases worksheet
- *Lymphatic Disorder Research Project*

Crosscutting Concepts (CCC). Systems and System Models. Study the lymphatic system as an interconnected network that supports overall body function and immune health. Analyze how the lymphatic system interacts with other systems, such as the circulatory and immune systems.**Stability and Change.** Examine how the lymphatic system maintains homeostasis and responds to changes in the environment, such as infections and injuries. Investigate the effects of lifestyle choices, such as diet and exercise, on lymphatic health and immune function.

- Lymphatic Unit Class Notes
- Lymphatic Unit Guided Reading
- Autoimmune Diseases worksheet
- *Lymphatic Disorder Research Project*

TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.

- *Lymphatic Disorder Research Project*

Teacher Resources: *Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print.; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access*

(adapted from Wiggins, G. & McTighe, J. (2005). Understanding by Design (2nd Edition). ASCD.)

Unit 11- Respiratory System

Desired Results - Students will understand how oxygen gets from the atmosphere into our bodies, how much air we have in our lungs, and how breathing can be impaired.

Established Goals:

LS1: From Molecules to Organisms: Structures and Processes

- **LS1.A: Structure and Function. Anatomy of the Respiratory System**: The respiratory system comprises structures such as the nose, trachea, bronchi, lungs, and diaphragm, each with specific roles in facilitating gas exchange. **Gas Exchange**: The respiratory system enables the exchange of oxygen and carbon dioxide between the atmosphere and the bloodstream, essential for cellular respiration.
- **LS1.C: Organization for Matter and Energy Flow in Organisms. Oxygen Delivery**: Oxygen is transported from the lungs to body tissues, where it is used for cellular respiration to produce energy. **Carbon Dioxide Removal**: Carbon dioxide, a waste product of cellular respiration, is transported from tissues to the lungs for exhalation.

Science and Engineering Practices (SEP)

- **Developing and Using Models.** Create models of the respiratory system to illustrate airflow, gas exchange, and the mechanics of breathing. Use diagrams and animations to visualize the alveoli's structure and function in gas exchange.
- **Planning and Carrying Out Investigations.** Design experiments to study the effects of exercise, altitude, and pollutants on respiratory function. Investigate the impact of respiratory disorders on lung capacity and breathing efficiency.
- **Analyzing and Interpreting Data.** Analyze data from respiratory experiments to understand the relationships between lung function, oxygen delivery, and energy production. Compare respiratory responses to various environmental conditions and physical activities.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions

Understandings: Students will understand that...	**Essential Questions:**
• The respiratory system’s branching airways and thin alveoli maximize surface area for gas exchange, supplying oxygen for energy production.	• How does the structure of the respiratory system enable it to facilitate efficient gas exchange and energy production? • How do the respiratory, circulatory, and nervous systems work

• These systems coordinate to deliver oxygen, remove carbon dioxide, and adjust breathing based on the body's needs. • Respiratory disorders can impair breathing and oxygen delivery, but many can be managed or prevented through lifestyle choices and medical care.	together to maintain health and homeostasis? • What are common disorders of the respiratory system, and how can they be prevented or treated?
Students will know… • the name and structure of the organs of the respiratory system (nasal cavity, pharynx, larynx, trachea, bronchi, alveoli, lungs). • how to label a diagram of the respiratory organs. • the protective mechanisms of the respiratory system. • how gas exchange happens between the alveoli and the bloodstream. • how breathing is controlled by the nervous system. • factors that affect breathing. • the difference between tidal volume, vital capacity, inspiratory reserve volume, expiratory reserve volume and residual volume.	**Students will be able to...** • examine the differences in vital capacities of students in the class. • answer at the clinic questions
Key Vocabulary: Cellular respiration, external respiration, internal respiration, pulmonary ventilation, expiration, inspiration, tidal volume, vital capacity, expiratory volume, inspiratory reserve volume ,residual volume, expiration, lungs, nasal cavity, pharynx, larynx, epiglottis, trachea, Heimlich maneuver, visceral pleura, bronchioles, alveoli, diaphragm, external internalcostals, asthma, chronic bronchitis, pneumonia, hypoxia, hyperventilation apnea, cyanosis, lung cancer, dyspnea, emphysema, cystic fibrosis	
Assessment Evidence	
Performance Tasks: • Lab: Vital Capacity –Summative- students determine if there is a correlation between gender, body size, disease or habits on the vital capacity of students in the class.	**Other Evidence:** • Respiratory Class Notes • Respiratory Guided Reading • Respiratory Labeling Diagram • At the clinic questions • Review Kahoot • Quiz: Respiratory system

Learning Plan
LS1: From Molecules to Organisms: Structures and Processes ● **LS1.A: Structure and Function. Anatomy of the Respiratory System**: The respiratory system comprises structures such as the nose, trachea, bronchi, lungs, and diaphragm, each with specific roles in facilitating gas exchange. **Gas Exchange**: The respiratory system enables the exchange of oxygen and carbon dioxide between the atmosphere and the bloodstream, essential for cellular respiration. ○ Respiratory Class Notes ○ Respiratory Guided Reading ○ Respiratory Labeling Diagram ● **LS1.C: Organization for Matter and Energy Flow in Organisms. Oxygen Delivery**: Oxygen is transported from the lungs to body tissues, where it is used for cellular respiration to produce energy. **Carbon Dioxide Removal**: Carbon dioxide, a waste product of cellular respiration, is transported from tissues to the lungs for exhalation. ○ Respiratory Class Notes ○ Respiratory Guided Reading ○ Respiratory Labeling Diagram **Science and Engineering Practices (SEP). Developing and Using Models.** Create models of the respiratory system to illustrate airflow, gas exchange, and the mechanics of breathing. Use diagrams and animations to visualize the alveoli's structure and function in gas exchange. **Planning and Carrying Out Investigations.** Design experiments to study the effects of exercise, altitude, and pollutants on respiratory function. Investigate the impact of respiratory disorders on lung capacity and breathing efficiency. **Analyzing and Interpreting Data.** Analyze data from respiratory experiments to understand the relationships between lung function, oxygen delivery, and energy production. Compare respiratory responses to various environmental conditions and physical activities. ● Lab: Vital Capacity **TCC1(9-12)**: I can ask purposeful, insightful questions to find a variety of innovative solutions ● Lab: Vital Capacity
Teacher Resources: Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print.; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access

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Unit 12 - Digestive System

Desired Results

Established Goals:

LS1: From Molecules to Organisms: Structures and Processes

- **LS1.A: Structure and Function**
  - **Digestive System Anatomy**: The digestive system consists of organs such as the mouth, esophagus, stomach, intestines, liver, and pancreas, each playing specific roles in digestion and absorption.
  - **Enzymatic Function**: Digestive enzymes break down food into smaller molecules for absorption, highlighting the system's biochemical complexity.
- **LS1.C: Organization for Matter and Energy Flow in Organisms**
  - **Nutrient Absorption**: The digestive system facilitates the absorption of nutrients, water, and minerals, essential for cellular functions and energy production.
  - **Energy Transfer**: Digestion and metabolism convert food into usable energy, linking the digestive system to cellular respiration.

Science and Engineering Practices (SEP) Developing and Using Models.

- Create models of the digestive system to illustrate the flow of food, mechanical and chemical digestion, and nutrient absorption.
- Use diagrams and animations to visualize enzyme action and nutrient transport.
- Planning and Carrying Out Investigations.
- Design experiments to study the effects of different diets, enzymes, and pH levels on digestion. Investigate the impact of digestive disorders on nutrient absorption and health.

Crosscutting Concepts (CCC) Structure and Function

- Explore how the anatomy of the digestive system supports its functions in food breakdown, nutrient absorption, and waste elimination. Investigate how specialized structures, such as villi and microvilli, enhance nutrient uptake.

Systems and System Models

- Study the digestive system as an interconnected network that supports overall health and energy balance.
- Analyze how the digestive system interacts with other systems, such as the circulatory and endocrine systems.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.

Understandings: Students will understand that...

- The digestive system's specialized organs and enzymes work together to break down food and absorb nutrients through a highly folded, efficient surface.
- The digestive, circulatory, and endocrine systems coordinate to regulate digestion, absorb nutrients, and distribute them to cells for energy, growth, and repair.
- Digestive disorders can affect nutrient absorption and comfort, but many can be managed through diet, lifestyle, or medical treatment.
- Advances in diagnostics, imaging, and treatment options have improved our ability to detect, manage, and understand digestive health.

Essential Questions:

- How does the structure of the digestive system enable it to efficiently break down food and absorb nutrients?
- How do the digestive, circulatory, and endocrine systems work together to maintain health and homeostasis?
- What are common disorders of the digestive system, and how can they be prevented or treated?
- How do scientific and technological advancements contribute to our understanding and treatment of digestive disorders?

Students will know…

- the functions of the organs of the alimentary canal of the digestive system (oral cavity, pharynx, esophagus, stomach, small intestine, large intestine, rectum, anus).
- the functions of the accessory organs of the digestive system (liver, gall bladder and pancreas).
- where proteins, carbohydrates, lipids and nucleic acids are broken down in the digestive system, name what enzymes are involved with breaking down each macromolecule and where those enzymes come from.
- the endocrine function of the pancreas in maintaining homeostasis in terms of glucose levels in the blood.

Students will be able to...

- take a given meal and explain how it is digested in terms of the sequence of digestive organs the meal is passing through, where each component of the meal is getting digested, by what enzyme(s), where those enzymes are coming from and what the food is being broken down into.
- answer at the clinic questions
- dissect a Rat

Key Vocabulary: Alimentary canal, saliva, mechanical digestion, chemical digestion, peristalsis, mouth, pharynx, esophagus, stomach, gastric juices, small intestine: duodenum, junum, and ileum, pancreas, gallbladder, bile, large intestine, liver, enzymes, amylase, trypsin, chymotrypsin, carboxypeptidase, lipases, absorption, defecation, colon, anus, ulcer

Assessment Evidence	
Performance Tasks: ● Celiac Disease Case Study ● Rat Dissection- Summative- Students dissect a Rat looking at all of the organs in the body systems studied this year and complete a comprehensive final lab report.	**Other Evidence:** ● Unit Digestive System Class Notes ● Digestive System Guided Reading ● Digestion Chart ● Digestive System Google Slides ● Review Kahoot ● Digestive System Quiz

Learning Plan

LS1: From Molecules to Organisms: Structures and Processes

LS1.A: Structure and Function. Digestive System Anatomy: The digestive system consists of organs such as the mouth, esophagus, stomach, intestines, liver, and pancreas, each playing specific roles in digestion and absorption. **Enzymatic Function**: Digestive enzymes break down food into smaller molecules for absorption, highlighting the system's biochemical complexity.

- Unit Digestive System Class Notes
- Digestive System Guided Reading
- Digestion Chart
- Digestive System Google Slides

LS1.C: Organization for Matter and Energy Flow in Organisms. Nutrient Absorption: The digestive system facilitates the absorption of nutrients, water, and minerals, essential for cellular functions and energy production. **Energy Transfer**: Digestion and metabolism convert food into usable energy, linking the digestive system to cellular respiration.

- Unit Digestive System Class Notes
- Digestive System Guided Reading
- Digestion Chart
- Digestive System Google Slides

Science and Engineering Practices (SEP)

- Digestion Chart

- Digestive System Google Slides
- Celiac Disease Case Study

Crosscutting Concepts (CCC)
- Digestion Chart
- Digestive System Google Slides
- Celiac Disease Case Study
- *Rat Dissection*

TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.
- *Rat Dissection*

Teacher Resources: Marieb, Elaine N., R.N., PhD. Essentials of Human Anatomy and Physiology. 7th ed. San Francisco: Benjamin Cummings, 2003. Print.; Marieb, Elaine N., R.N., PhD. Anatomy and Physiology Coloring Workbook. 6th ed. San Francisco: Addison Wesley Longman, Inc., 2000. Print. ISBN# 0-8053-4913-8; Teacher resources for textbook; Teacher made PowerPoints; Online Access