DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Anatomy and Physiology

Grade Level: 11/12

Date of Board Approval: __2024_____

Curriculum Writing Committee: Danielle Giordano, Andrew Rupp, Bernadine Salak

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Marking Period Course Grade Weighting

Major Assessments	**45%**
Skills Application	**30%**
Skills Practice	**20%**
Participation	**5%**
Total	**100%**

Curriculum Map

Overview:
This course is designed to elaborate on concepts learned during the human component of Biology. An overview of the 11 major organ systems will give students a fundamental basis for the specific structure and function of the organs involved with certain organ systems. The course will begin with introductory terminology, biochemistry, cytology, and histology. The specific organ systems covered by the curriculum are the integumentary, skeletal, muscular, nervous, cardiovascular, respiratory, digestive, endocrine, lymphatic, urinary, and reproductive systems. Students will use a variety of learning styles and laboratory activities to facilitate understanding. Several organs (brain, eye, and heart) may be dissected to further investigate the anatomy as well as the physiology of these organs. A summative dissection of a fetal pig could enrich the students' experiences that had been explored throughout their time in the course.

Time/Credit for the Course: One full year, meeting daily for ~46 minutes/ 1 credit

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Goals:

1. **Marking Period One: Over a 45-day period of time, students will aim to understand:**

UNIT 1: Introduction to Anatomy and Physiology (Approximately 10 days)

- The origins of medical science and anatomy and physiology
- Levels of organization in the body
- Core themes in anatomy and physiology
- Anatomical Terminology - directional terms and planes
- Brief overview of organ systems and the cavities that they are located in
- Life and the maintenance of life, including life-span changes

UNIT 2: Review of Biological Principles - Chemical Basis of Life/Cells and Cellular Metabolism (Approximately 15 days)

- Importance of chemistry in anatomy and physiology
- Review of macromolecules
- Chemical constituents of cells
- Cell structure and function
- The role of cell transport in maintaining homeostasis
- Cell cycle
- Biotechnology (stem and progenitor cells, CRISPR)
- Cell death
- Cellular metabolic processes

UNIT 3: Tissues (Approximately 20 days)

- Histology and the four types of tissue in the body (epithelial, connective, muscle, nervous, plus membranes), their structure, location, and function.
- Epithelial—simple squamous, simple cuboidal, simple columnar, pseudostratified columnar, stratified squamous, stratified cuboidal, stratified columnar, transitional, glandular epithelium.
- Connective—areolar, adipose, reticular, dense regular, dense irregular, elastic, hyaline cartilage, elastic cartilage, fibrocartilage, osseous tissue, blood
- Muscle—skeletal, smooth, cardiac. Nervous—neurons, neuroglia
- Membranes—serous, mucous, cutaneous, synovial

2. **Marking Period Two: Over a 45-day period of time, students will aim to understand:**

UNIT 4: Integumentary System (Approximately 15 days)

- Tissues and organization of the skin
- The structure and function of the skin and its accessory structures - hair, glands, nails, sensory receptors
- Overall skin functions
- Disorders of the skin - including the healing of wounds and burns
- Life-span changes of the integument

UNIT 5: Skeletal System (Approximately 30 days)

- Classification of bones by shape and structure - long, short, flat, irregular
- Skeletal organization - axial and appendicular
- Long bone anatomy

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- Bone development and growth (endochondral vs. intramembranous)
- Bone fractures and healing
- Lifespan changes to the skeletal system
- Axial Skeleton Anatomy
    - Skull
        - Bones: frontal, parietal, occipital, temporal, sphenoid, ethmoid, maxilla, palentine, zygomatic, lacrimal, nasal, vomer, inferior nasal concha, mandible, malleus, incus, stapes
        - Structures: coronal suture, sagittal suture, lambdoid suture, squamous suture, mental foramen, zygomatic process, external acoustic meatus, mastoid process, styloid process, foramen magnum, 4 sinuses (frontal, maxilla, ethmoid, sphenoid), alveolar margins, occipital condyle
    - Vertebral Column
        - Bones: hyoid, 7 cervical vertebra (atlas/axis), 12 thoracic vertebra, 5 lumbar vertebra, sacrum, coccyx
        - Structures: body, vertebral foramen, spinous process, transverse process, transverse foramen, articular processes/facets
    - Thoracic Cage
        - Bones: 24 ribs (vertebrosternal, vertebrochondral, vertebral), sternum (manubrium, body, xiphoid process)
        - Structures: costal cartilage, clavicular notch, jugular notch, sternal angle, head/neck of rib
    - Pectoral girdle
        - Bones: scapula, clavicle
        - Structures: coracoid process, acromion process, spine, glenoid cavity
- Appendicular Skeleton Anatomy
    - Upper limb
        - Bones: humerus, radius, ulna, carpals, metacarpals, phalanx (28)
        - Structures: greater tubercle, lesser tubercle, head, coronoid fossa, olecranon fossa, medial epicondyle, capitulum, trochlea; radial tuberosity, styloid process, ulnar notch; trochlear notch, olecranon process, coronoid process, head, styloid process, radial notch
    - Pelvic Girdle
        - Bones: ilium, ischium, pubis
        - Structures: iliac crest, obturator foramen, acetabulum, pubic symphysis, sacroiliac joint
    - Lower Limb
        - Bones: femur, tibia, fibula, patella, tarsal, metatarsal, phalanx (28)
        - Structures: head, greater trochanter, lesser trochanter, linea aspera, lateral condyle, medial condyle, intercondylar fossa; tibial tuberosity, anterior crest, medial malleolus, intercondylar eminence; lateral malleolus, Achilles' tendon

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3. Marking Period Three Over a 45-day period of time, students will aim to understand:

UNIT 6: Articulations and Movement (Approximately 5 days)

- Types of joints and joint movements with a focus on synovial joints
    - Fibrous (syndesmosis, sutures, gomphosis)
    - Cartilaginous (synchondrosis, symphysis)
    - Synovial (ball and socket, condylar, plane, hinge, pivot, saddle) joints
    - Specific synovial joints: Shoulder, elbow, hip, knee
- Life-span changes of joints
- Synovial movements
    - flexion, extension, hyperextension, dorsiflexion, plantar flexion, abduction, adduction, rotation, circumduction, supination, pronation, eversion, inversion, protraction, retraction, elevation, depression, opposition.

UNIT 7: Muscular System (Approximately 25 days)

- Microanatomy of skeletal muscle tissue
- Physiology of muscle contraction and actions (sliding filament theory) and muscular responses
- Characteristics of smooth and cardiac muscle
- Muscular System lifespan changes
- Major skeletal muscles:
    - Muscles of the Head and Neck:
        - frontalis, nasalis, procerus, occipitalis, orbicularis oculi, orbicularis oris, buccinator, zygomaticus major/minor, platysma, masseter, temporalis; sternocleidomastoid,
    - Muscles of the Chest, Back, Torso, and Arm
        - Erector spinae group (iliocostalis, longissimus, spinalis), quadratus lumborum, trapezius, rhomboid major/minor, levator scapulae, serratus anterior, pectoralis minor; coracobrachialis, pectoralis major, teres major, latissimus dorsi, supraspinatus, deltoid, subscapularis, infraspinatus, teres minor; biceps brachii, brachialis, brachioradialis, triceps brachii, supinator, pronator teres, pronator quadratus; flexor carpi radialis, flexor carpi ulnaris, palmaris longus, 6 flexor digitorum (profundus/superficialis), extensoR carpi radialis (longus/brevis), extensor carpi ulnaris, extensor digitorum; external oblique, internal oblique, transverse abdominis, rectus abdominis; psoas major
    - Muscles of the Leg
        - iliacus, gluteus maximus, gluteus medius, gluteus minimus, piriformis, tensor fasciae latae, pectineus, adductor longus, adductor magnus, gracilis; hamstring group (biceps femoris, semitendinosus, semimembranosus); quadriceps femoris group (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius); tibialis anterior, extensor digitorum longus, extensor hallucis longus, gastrocnemius, soleus, plantaris, flexor digitorum longus, tibialis posterior
- Major muscular structures: epicranius, iliotibial tract tendon, Achilles' tendon, popliteal space, carpal tunnel, linea alba

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UNIT 8: Nervous System (Approximately 15 days)

- General organization and functions of the nervous system (Central N.S. and Peripheral N.S); Sympathetic vs. Autonomic
- Types of cells of the nervous system and their functions
    - Neurons
        - Classified by functions: Sensory, Integrative (interneurons), Motor
        - Classified by structure: Multipolar, Bipolar, Unipolar
        - General anatomy of a neuron
    - Neuroglial cells
        - Astrocytes, oligodendrocytes, microglia, ependymal, Schwann, Satellite
- The pathway of a nerve impulse and a reflex arc
- Synapse, Action potential, synaptic transmission and impulse processing
- Structure and Function of the Central Nervous System
    - Brain - cerebrum: frontal lobe, temporal lobe, cerebral cortex, parietal lobe, occipital lobes, corpus callosum, optic chiasm, hypothalamus, thalams; cerebellum, brainstem: midbrain, pons, medulla oblongata; Spinal cord
    - Meninges, ventricles and cerebrospinal fluid, sulci, gyri
- Life-span changes of the nervous system and sensory function
- General characteristics of sensory functions, receptors, sensation, and perception, general senses, special senses

4. **Marking Period Four: Over a 45-day period of time, students will aim to understand:**

UNIT 9: Endocrine System (Approximately 5 days)

- General organization, structural and functional characteristics of the endocrine system:
- Glands and hormones
- Impacts of stress on the well-being of the body
- Life-span changes of the endocrine system

UNIT 10: Cardiovascular System (Approximately 10 days)

- Characteristics of blood, blood cells (erythrocytes, leukocytes, thrombocytes), plasma, hemostasis, blood groups and transfusions
- Organization of the of the cardiovascular system
    - Blood vessels - veins, arteries, capillaries
    - The structure and function of the heart
        - Heart valves and sounds
        - Blood flow through the heart
        - Cardiac conduction of the heart
        - Heart rate, blood pressure, and changes to heart rhythms
- Life-span changes of the cardiovascular system.

UNIT 11: Lymphatic System and Immunity (Approximately 5 days)

- General organization, structural and functional characteristics of the Lymphatic system:
- Lymph nodes, lymph vessels, lymph fluid, spleen, thymus

- Disorders of lymphatic system
- Life-span changes of the Lymphatic system

UNIT 12: Digestive System, Nutrition, and Metabolism (Approximately 5 days)

- General organization, structural and functional characteristics of the Digestive system:
- Gastrointestinal/Alimentary canal structures:
    - Mouth: teeth, salivary glands
    - Esophagus, Stomach, Small intestine, Large intestine, Rectum, Anus
    - Accessory Structures: Pancreas, Liver, Gallbladder
- Cellular use of nutrients, metabolism, healthy eating
- Disorders of the Digestive System
- Life-span changes of the Digestive system

UNIT 13: Respiratory System (Approximately 5 days)

- General organization, structural and functional characteristics of the Respiratory System
- Nasal and oral cavity - pharynx, larynx
- Trachea, Bronchi, Bronchioles, Lungs, Alveoli, Diaphragm
- Mechanics and control of breathing - inhalation (inspiration), exhalation (expiration); gas exchange and transport
- Disorders of the Respiratory System
- Life-span changes of the Respiratory system

UNIT 14: Urinary System (Approximately 5 days)

- General organization, structural and functional characteristics of the Urinary System
- Kidneys: Urine formation, storage, and elimination
- Ureters, Bladder, Urethra
- Body fluid balance and compensation
- Disorders of the Respiratory System
- Life-span changes of the Respiratory system

UNIT 15: Reproductive System, Pregnancy, Growth, and Development (Approximately 5 days)

- General organization, structural and functional characteristics of the Reproductive System
- Male vs. Female reproductive structures (organs and hormones)
- Review of meiosis and sex cell formation
- Fertilization and Fetal Development
- Life-span changes of the Respiratory system

UNIT 16: Fetal Pig Dissection or other Exploratory Lab Activities (Approximately 5 days)

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Big Ideas

Big Idea #1: Humans are organisms that are made up of eleven organ systems, all of which are composed of specialized cells, tissues, and organs that allow for the structural and functional necessities in order to maintain life.

Big Idea #2: Human organ systems work together to maintain homeostasis for the normal well-being of an individual.

Big Idea #3: Life-span changes and disorders can affect the structural and functional features of a human's organ systems, which can have adverse effects on the health of an individual.

Big Idea #4: Human anatomy and physiology is based on an extensive amount of health science terminology, most of which stem from Greek or Latin origins.

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Textbook and Supplementary Resources

Name of Textbook: *Hole's Human Anatomy and Physiology*

Textbook ISBN#: 978-0-076-80996-7

Textbook Publisher & Year of Publication: McGraw-Hill Education, 2019

Supplemental Resources: *Hole's Human Anatomy and Physiology* website & online resources

McGraw Hill Connect, LearnSmart, Anatomy & Physiology Revealed
Supplemental readings
Internet Resources
Video Examples
Textbook images and review sheets
Anatomy coloring sheets
HHMI Bio interactive activities
TED Talks
Nucleus Biology
Shared Google Drive Resources

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Curriculum Plan

Unit 1: Introduction to Anatomy and Physiology **Time Range in Days:** Approximately 10 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.

2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).
BIO.B.3.3.1 Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation.

Objectives: (Students will be able to)

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of anatomy terminology. (DOK 1)
2. Identify some of the early discoveries that lead to our current understanding of the human body. (DOK 1)
3. Explain how anatomy and physiology are related, but also how they can be differentiated. (DOK 3)
4. List the levels of organization in the human body and the characteristics of each. (DOK 1)
5. Summarize the major characteristics of life and the requirements that are necessary to maintain them. (DOK 2)
6. Explain the importance of homeostasis for survival and describe the parts of a homeostatic mechanism and explain how they function together. (DOK 3)
7. Identify and organize the major body cavities, regions, and planes, and organ systems of the body, including the organs and functions of each system. (DOK 2)
8. Investigate changes related to aging, form the microscopic to the whole-body level. (DOK 3)

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Core Activities and Corresponding Instructional Methods:

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of anatomy terminology.
    a. Read from the top of page 10 in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Identify some of the early discoveries that lead to our current understanding of the human body.
    a. Read from or present information from Ch. 1.1 "Origins of Medical Science" in *Holes Human Anatomy & Physiology* (pages 10 - 11) to provide an overview of historical events that inspired an interest in studying the human body.
    b. Use supplemental resources (i.e., historical articles or videos) to explore ways in which the study of the human form has changed and developed over time and what the field currently consists of.
    c. Emphasize the importance of dissections in the study of human anatomy.
3. Explain how anatomy and physiology are related, but also how they can be differentiated.
    a. Read from or present information from Ch. 1.2 "Anatomy and Physiology" in *Holes Human Anatomy & Physiology* (pages 11 - 12) to compare and contrast ***anatomy*** (structures of the body) and ***physiology*** (the functioning of the body).
    b. Have students practice identifying examples of anatomy and physiology in the human body.
    c. Emphasize the *principle of complementarity,* which states that structure and function are related for overall functioning of the body. Have students brainstorm everyday examples of this principle to reinforce the relationship between structure and function.
4. List the levels of organization in the human body and the characteristics of each.
    a. Read from or present information from Ch. 1.3 "Levels of Organization" in *Holes Human Anatomy & Physiology* (page 12) to review the levels of biological organization for multicellular organisms and how they apply to the human body.
    b. Have students provide example definitions of each hierarchical level (atomic, molecules, organelle, cell, tissue, organ system, organism)
5. Summarize the major characteristics of life and the requirements that are necessary to maintain them, including the importance of homeostasis for survival.
    a. Read from or present information from Ch. 1.4 "Core Themes in Anatomy and Physiology" and 1.5 "Life and Maintenance of Life" in *Holes Human Anatomy & Physiology* (pages 14 - 16) to identify the key concepts common to the body and all of its systems, as well as the underlying mechanisms by which these concepts work.
    b. Students should revisit their understanding of characteristics of life from their previous studies in Biology, and now apply them to the human body.
    c. Provide examples of metabolism and the major requirements of organisms.
    d. Describe the parts of a homeostatic mechanism and have students be able to analyze and understand negative and positive feedback loops in maintaining homeostasis.
6. Identify and organize the major body cavities, regions, and planes, and organ systems of

the body, including the organs and functions of each system.

a. Read from or present information from Ch. 1.6 “Organization of the Human Body” in *Holes Human Anatomy & Physiology* (pages 20-22) to identify the organization and layout of the human body.
b. Read from or present information from Ch. 1.8 “Anatomical Terminology” in *Holes Human Anatomy & Physiology* (pages 29-32) to identify the directional terms that are used to compare body structures, as well as the planes that are used to section the body to view structures from specific perspectives.
c. Have the students draw a picture, create a model, or perform a “Gummy Bear” Dissection, to demonstrate an understanding of directional terms and the organization of the human body.
d. Read from or present information from Ch. 1.6 “Organization of the Human Body” in *Holes Human Anatomy & Physiology* (pages 22-28) to identify the characteristics of the 11 body systems.
e. Have the students read about or watch a video and then practice identifying the major characteristics of the 11 body systems.

7. Investigate changes related to aging, from the microscopic to the whole-body level.
    a. Read from or present information from Ch. 1.7 “Lifespan Changes” in *Holes Human Anatomy & Physiology* (pages 29) to explore ways in which the body changes over a lifetime.
8. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
9. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
10. Extensions in *Holes Anatomy and Physiology* Textbook:
    a. Career corner: *Emergency Medical Technician*
    b. Clinical Application: *Ultrasonography and Magnetic Resonance Imaging: A Tale of Two Patients*
    c. Medical and Applied Science
    d. Vocabulary Reference plates pages 39-58

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Homework – example problems from the textbook and workbook for each section
Quizzes/graded assignments

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Summative:

Common Assessment Unit 1 (Consists of both Multiple Choice and Free Response Questions)

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Unit 2: Review of Biological Principles - Chemical Basis of Life/Cells and Cellular Metabolism

Time Range in Days: Approximately 15 days

Standards (by number): PA Keystone Biology Academic Standards
3.1.B.A2, 3.1.B.A5, 3.1.B.A7, 3.1.B.A8, 3.1.C.A2, 3.1.C.A7, 3.2.C.A2, 4.2.5.C, 3.1.B.A9, 3.1.B.B6., 3.1.B.C4., 4.1.10.F., 4.2.10.D., 4.4.10.E., 3.1.10.A2, 3.1.10.A5, 3.1.10.A6., 3.1B.A1., 3.1.B.A5

2025 Standards:
3.1.9-12.F 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.
3.1.6-8.A Conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells.
3.1.6-8.B Develop and use a model to describe the function of a cell as a whole and the ways that parts of cells contribute to the function.
3.1.6-8.C Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells
3.1.9-12.D Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Anchors:
BIO.A.2.1 Describe how the unique properties of water support life on Earth.
BIO.A.2.2 Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).
BIO.A.2.3 Explain how enzymes regulate biochemical reactions within a cell.
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
BIO.A.4.1 Identify and describe the cell structures involved in transport of materials into, out of, and throughout a cell.
BIO.A.4.2 Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.

Eligible Content:
BIOA.2.1 Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion).
BIO.A.2.2.1 Explain how carbon is uniquely suited to form biological macromolecules.
BIO.A.2.2.2 Describe how biological macromolecules form from monomers.
BIO.A.2.2.3 Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular

organisms).
BIO.A.4.1.1 Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell.
BIO.A.4.1.2 Compare the mechanisms that transport materials across the plasma membrane (i.e., passive transport—diffusion, osmosis, facilitated diffusion; and active transport—pumps, endocytosis, exocytosis).
BIO.A.4.1.3 Describe how membrane-bound cellular organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify essential word roots from Chapter 2, 3, and 4 ("Chemical Basis of Life, Cells, Cellular Metabolism") to assess prior knowledge of basic biological ideas in biochemistry and cellular biology. (DOK 1)
2. Recall that the study of the living body requires an understanding of chemistry. (DOK 2)
3. Identify the importance of atoms, compounds, and (macro)molecules in a cell's composition and the major inorganic and organic molecules (i.e., water, oxygen, carbon dioxide, inorganic salts, carbohydrates, lipids, proteins, and nucleic acids) that play a role in the human body (DOK 1)
4. Review the structural and functional characteristics of a eukaryotic cell, including the components of and mechanisms by which the cell membrane maintains homeostasis. (DOK 1 and 3)
5. Recall the stages of the cell cycle and role of mitosis in basic growth and repair of body tissues (DOK 1)
6. Explain how stem cells and progenitor cells affect tissue development and differentiation. (DOK 3)
7. Distinguish between types of cell death - apoptosis and necrosis (DOK 2)
8. Identify types of chemical reactions that occur within the body (synthesis (anabolic) /decomposition (catabolic)) and review the catalytic importance of enzymes in chemical reactions (DOK 1 and 3)
9. Recall the cooperative role that cell structures play in protein synthesis (DOK 1)

Core Activities and Corresponding Instructional Methods:

1. Identify essential Latin/Greek-based word roots (prefixes/suffixes) in chapter 2, 3, 4 to review basic biological concepts.
    a. Read pages 60, 85, and 123 from *Holes Human Anatomy & Physiology* to have students review word roots that apply to vocabulary in this section.
    b. Students should identify examples of the given prefixes and suffixes.
2. Read from or present information from Ch. 2, pages 65 - 67 and 70 - 79 in *Holes Human Anatomy & Physiology* to review levels of biological organization and how atoms form inorganic and organic compounds and molecules and their biochemical importance in the human body.

   a. Use graphic organizers, guided outlines, diagram sheets, textbook presentations and images, and/or other resources to allow students to review biochemistry topics related to organization of life-cells, tissues, organs, organ systems.
3. Read from or present information from Ch. 3, pages 86 - 117 in *Holes Human Anatomy & Physiology to* review the structural and functional characteristics of a eukaryotic cell, including the components of and mechanisms by which the cell membrane in maintaining homeostasis; the cell cycle and mitosis; stem cells and differentiation; cancer and cell death.
   a. Use visuals, animations, and/or videos to reinforce cell structure and function and special cell processes. (Ex. "Eukaryotic Cell Model Click and Drag")
   b. Review the role of Adenosine Triphosphate as the energy molecule that is required in Active Transport.
   c. Read case studies or watch videos pertaining to instances in which homeostasis is affected due to an inability to control cell transport. (ie., *Chubby Emu* - "Mom Drinks 3 Gallons of Water in 2 Hours" or "Muckbanger Ate 1 Gallon Pickles: This is What Happened to Her Brain")
4. Read from or present information from Ch. 4, pages 123 - 142 in *Holes Human Anatomy & Physiology to* review chemical reactions that occur within the body and how cell structures work together to build proteins.
5. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
6. Possible Activities: Cell organelle campaign posters, Cell metabolism laboratory, Cell cycle mini research, Cell differentiation Frankenstein's monster activity.
7. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
8. Extensions in *Holes Anatomy and Physiology* Textbook:
   a. Career corner: *Anesthesiologist Assistant Cytotechnologist; Personal Trainer*
   b. Reading: *2.1 From Science to Technology—Radioactive Isotopes Reveal Physiology; and/or 2.3 CT Scanning and PET Imaging*
   c. Clinical Applications: *3.1 Faulty Ion Channels Cause Disease; 3.2 Disease at the Organelle Level; Inborn Errors of Metabolism*
   d. Reading: *From Science to Technology—Stem Cells to Study and Treat Disease; The Human Metabolome; DNA Profiling Frees a Prisoner*

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Homework/Classwork – example problems from the textbook/web resources for each section

Quizzes/graded assignments

Summative:

Common Assessment Unit 2 (Consists of both Multiple Choice and Free Response Questions)

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Unit 3: Tissues **Time Range in Days:** Approximately 20 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A
Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
Eligible Content:
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

Objectives: (Students will be able to)

1. Identify essential Latin/Greek-based word roots (prefixes/suffixes) in Chapter 5 "Tissues" (DOK 1)
2. Identify intercellular junctions in tissues. (DOK 1)
3. Identify the four types of tissue (epithelial, connective, muscle, nervous) in the body and their structure, cell types, location, and function. (DOK 1)
    a. Epithelial—simple squamous, simple cuboidal, simple columnar, pseudostratified columnar, stratified squamous, stratified cuboidal, stratified columnar, transitional, glandular epithelium.
    b. Connective—areolar, adipose, reticular, dense regular, dense irregular, elastic, hyaline cartilage, elastic cartilage, fibrocartilage, osseous tissue, blood
    c. Muscle—skeletal, smooth, cardiac
    d. Nervous—neurons, neuroglia
    e. Membranes—serous, mucous, cutaneous, synovial
4. Distinguish between and draw/classify all four types of tissues using microscopes and various media sources. (DOK 2)
5. Explain how glands are classified. (DOK 3)
6. Differentiate between the four major types of membranes in the body (cutaneous, serous, mucous, and synovial). (DOK 3)
7. Observe patterns in body organization by recognizing that most organs are composed of multiple and often similar tissue types due to certain necessary requirements that all organs require. (DOK 2)

Core Activities and Corresponding Instructional Methods:

1. Identify essential word roots for Histology.
    a. Read from Chapter 5, page 150, from *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.

   b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Chapter 5, "Tissues," pages 150 - 151, in *Holes Human Anatomy & Physiology* to identify intercellular junctions, the role that the cell membrane plays in forming cell junctions, and specific types of cell junctions that exist in various tissues in the body.
3. Read from or present information from Chapter 5, "Tissues," pages 151 - 160, in *Holes Human Anatomy & Physiology* to identify the cell types; naming rules; structural and functional characteristics of epithelial tissues of the body.
   a. Have students practice drawing pictures, creating models, coloring, and/or identifying various examples (both illustrative and microscopic images) of epithelial tissues. (Ex. Epithelial Tissue Click and Drag)
   b. Possible videos: Human Biology Explained Classification of Epithelia , Professor Dave Explains - Epithelia , What's Up Dude - Epithelia
   c. Classify structural and functional differences between glands of the body.
4. Read from or present information from Chapter 5, "Tissues," pages 160 - 170, in *Holes Human Anatomy & Physiology* to identify the cell types; fibers; extracellular matrix; structural and functional characteristics of connective tissues of the body.
   a. Have students practice drawing pictures, creating models, coloring, and/or identifying various examples (both illustrative and microscopic images) of connective tissues. (Ex. Connective Tissue Sorting Activity)
   b. Possible videos: Professor Dave Explains - Connective Tissue , What's Up Dude - Connective Tissue
5. Read from or present information from page 171 about Types of membranes of the body - correlate the information to epithelial and connective tissues.
6. Read from or present information from Chapter 5, "Tissues," pages 171 - 172, in *Holes Human Anatomy & Physiology* to briefly provide an overview of general characteristics and types of the three types of muscle tissue.
   a. Have students practice drawing pictures, coloring, and/or identifying various examples (both illustrative and microscopic images) of muscle tissues.
   b. Possible video: Professor Dave Explains - Muscle Tissue
7. Read from or present information from Chapter 5, "Tissues," pages 173, in *Holes Human Anatomy & Physiology* to briefly provide an overview of nerve cells (neurons, neuroglial cells) and the role that the nervous system plays in electrochemical control of the body.
   a. Have students practice drawing pictures, coloring, and/or identifying various examples (both illustrative and microscopic images) of muscle tissues. (Ex. Muscle and Nervous Tissue Sorting Activity)
   b. Possible video: Professor Dave Explains - Nervous Tissue
8. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
9. Possible Activities: Histology disorder "You Make the Call" Activity (Diagnosis of Disease) Epithelial tissue biopsy activity, Tissue Models
10. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.

11. Extensions from *Holes Anatomy and Physiology* textbook:
    a. Career Corner: *Tissue Recovery Technician*
    b. From Science to Technology: *Nanotechnology Meets the Blood-Brain Barrier; Tissue Engineering: Building a Replacement Bladder*
    c. Clinical Application: *The Body's Glue: The Extracellular Matrix; Abnormalities of Collagen*

Assessments:

Diagnostic:

Teacher prepared diagnostic test

Teacher questioning and observation

Formative:

Teacher observations, questioning techniques

Define Vocabulary words for this unit

Group activities

Homework/Classwork – examples from the textbook/web resources for each section

Epithelial Tissue Quiz

Connective Tissue Quiz

Summative:

Histology Common Assessment (Consists of both Multiple Choice, Matching, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 4: Integumentary System **Time Range in Days:** Approximately 15 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
Eligible Content:
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

Objectives: (Students will be able to)

1. Identify essential Latin/Greek-based word roots (prefixes/suffixes) in Chapter 6 "Integumentary System" (DOK 1)
2. Describe the structure of the layers of the skin, including the types of cells and tissues that form each layer.(DOK 3)
3. Summarize factors that determine skin color (DOK 3)
4. Describe the structural and functional characteristics of accessory structures associated with the skin (nails, hair, skin glands) (DOK 3).
5. List various skin functions and explain how the skin helps regulate body temperature. (DOK 2)
6. Describe wound healing and types of burns. (DOK 2)
7. Identify various disorders of the skin and how such disorders may affect a person's homeostasis (DOK 1)
8. Summarize life-span changes in the integumentary system. (DOK 2)

Core Activities and Corresponding Instructional Methods:

1. Identify essential word roots for the Integumentary System.
    a. Read from Chapter 6, page 179, from *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Chapter 6 "Integumentary System," pages 179 - 184 in *Holes Human Anatomy & Physiology* to discuss the tissue layers of the skin and factors that affect skin color.
    a. Possible videos: Ted-Ed - The Science of Skin - Emma Bryce , Ted-Ed - The Science of Skin Color

3. Read from or present information from Chapter 6 "Integumentary System," pages 185 - 189 in *Holes Human Anatomy & Physiology* to discuss the structural and functional characteristics of accessory structures of the skin, including fingernails, hair, skin glands (sebaceous, apocrine and merocrine sweat glands).
    a. Have students color, sketch, or create a model of the anatomy of the skin to reinforce their understanding of the structure and function of the skin's parts.
    b. Possible videos: What is Skin? National Geographic , Ted-Ed - The Science of Skin - Emma Bryce , Ted-Ed - Why do Some People go Bald?
4. Read from or present information from Chapter 6 "Integumentary System," pages 190 - 191 in *Holes Human Anatomy & Physiology* to discuss functions of the skin including protection from pathogens, abrasions, and UV radiation; prevention of water loss; sensation; production of Vitamin D; and especially temperature regulation.
    a. Possible videos: Ted-Ed - Why do we Sweat? , Ted-Ed - Immunology of Skin
5. Read from or present information from Chapter 6 "Integumentary System," pages 191 - 193 in *Holes Human Anatomy & Physiology* to better understand the healing of wounds and burns and how burns are classified based on the number of tissue layers that are affected.
    a. Possible videos: Ted-Ed - How Do Scars Form?
6. Read about or watch videos featuring case studies pertaining to skin disorders and the mechanisms by which such illnesses can disrupt a person's overall well-being and ability to maintain homeostasis. (Many excerpts are provided within Chapter 6 of the textbook)
7. Read from or present information from Chapter 6 "Integumentary System," pages 194 - 195 in *Holes Human Anatomy & Physiology* to discuss life-span changes of the Integumentary System, including age spots, wrinkling, Vitamin D deficiency, and hair loss or discoloration.
8. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
9. Possible activities: Skin sensory neuron laboratory; 3D Skin models with lesions; 3D print models; Wound and other skin lesion modeling; Fingerprint laboratory; Effectiveness of sunscreen; Integumentary system "You Make the Call;" Tattoo research
10. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Homework/Classwork – examples from the textbook/web resources for each section
Skin Structure Labeling Assessment

Summative:

Integumentary System Common Assessment (Consists of both Multiple Choice, Matching, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 5: Skeletal System **Time Range in Days:** Approximately 30 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapters 7 to assess prior knowledge of skeletal system terminology. (DOK 1)
2. Distinguish between long bones, short bones, flat bones, and irregular bones (DOK 2)
3. Differentiate between the axial and appendicular skeleton (DOK 3)
4. Describe the macroscopic and microscopic structure of a long bone and list the functions of these parts. (DOK 1)
5. Distinguish between intramembranous and endochondral bones, the cells that play a role in these processes, and the mechanisms that allow bones to grow, develop, and repair themselves. (DOK 3)
6. Discuss the major functions of bones. (DOK 1)
7. Identify the bones that compose the cranium and identify their major features. (DOK 1)
    a. Cranial Bones - Frontal, Parietal, Occipital, Temporal,
    b. Processes/Openings - Styloid processes, Mastoid processes, Foramen magnum, Occipital condyles, Zygomatic processes/arches, External acoustic/auditory meatus
    c. Sutures - Coronal, Sagittal, Squamous, Lambdoid
8. Identify the bones that compose the face and identify their major features. (DOK 1)
    a. Facial bones - Lacrimal, Ethmoid, Sphenoid, Nasal, Zygomatic, Maxilla, Mandible, Vomer, Palatine,
    b. Processes/Openings - Infraorbital foramen, Supraorbital foramen, Mental foramen, Inferior nasal conchae, Palatine process, Alveolar margins, Sinuses,

   c. Sinuses - Frontal, Maxilla, Ethmoid, Sphenoid
   d. Ear bones - Malleus, Incus, Stapes
9. Locate the bones that compose the vertebral column and identify their major features. (DOK 1)
   a. Hyoid
   b. Vertebrae - 7 Cervical (including Atlas, Axis); 12 Thoracic; 5 Lumbar; Sacrum, Coccyx
   c. Vertebrae Features - Body, Vertebral foramen, Spinous process, Transverse processes, Transverse foramen, Dens, (Pedicle, Lamina, Superior/Inferior Articular Processes/Facets - Discussed, but not necessarily assessed)
10. Locate the bones that compose the thoracic cage and identify their major features. (DOK 1)
   a. 24 ribs - Vertebrosternal (true); Vertebrochondral (false); Vertebral (floating)
   b. Costal cartilage, intercostal muscles
   c. Sternum - Manubrium, Clavicular notch, Jugular notch; Body of sternum; Xiphoid Process
   d. Rib anatomy (Discussed, but not necessarily assessed) - Head neck, Sternal angle, Articular facets, Tubercles
11. Locate the bones that compose the pectoral girdle and identify their major features. (DOK 1)
   a. Clavicle - Sternal end, Acromial end, Conoid tubercle
   b. Scapula - Coracoid process, Acromion process, Spine, Glenoid cavity/fossa
12. Locate the bones that compose the upper limb (arm) and identify their major features. (DOK 1)
   a. Humerus - Greater tubercle, lesser tubercle, head, coronoid fossa, olecranon fossa, medial epicondyle, capitulum, trochlea
   b. Radius - Radial tuberosity, styloid process, ulnar notch
   c. Ulna - Trochlear notch, olecranon process, coronoid process, styloid process, radial notch
   d. Carpals
   e. Metacarpals
   f. Phalanges - 1-5, Distal, Middle, Proximal
   g. Sesamoid bone
13. Locate the bones that compose the pelvic girdle and identify their major features. (DOK 1)
   a. Bones - Ilium, Ischium, Pubis
   b. Structures - iliac crest, obturator foramen, acetabulum, pubic symphysis, sacroiliac joint
14. Locate the bones that compose the lower limb (leg) and identify their major features. (DOK 1)
   a. Femur - Head, greater trochanter, lesser trochanter, linea aspera, lateral condyle, medial condyle, intercondylar fossa
   b. Tibia - Tibial tuberosity, anterior crest, medial malleolus, intercondylar eminence

c. Fibula - Lateral malleolus
d. Patella
e. Tarsals
f. Metatarsals
g. Achilles tendon
h. Phalanges - 1-5, Distal, Middle, Proximal

15. Examine the life-span changes in the skeletal system. (DOK 2)

Core Activities and Corresponding Instructional Methods:

1. Identify essential word roots for the Skeletal System.
    a. Read from Chapter 7, page 201, from *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Chapter 7.1 "Skeletal System," pages 201 - 202 and 7.4, pages 213 - 216 in *Holes Human Anatomy & Physiology* to discuss the characteristics that distinguish the four classes of bones - long, short, flat, and irregular and the way in which the skeleton is divided into two main divisions - axial and appendicular.
    a. Have the students practice identifying examples of long, short, flat, and irregular bones through the use of a disarticulated skeleton or a coloring/labeling activity.
    b. Have the students practice identifying bones of the axial vs. appendicular skeleton by sketching, labeling, or coloring a picture of the skeleton or through the use of an articulated skeleton.
    c. Possible videos to show: Introduction to Skeletal System in 7 Minutes, What's Up Dude: Types of Bones,
    d. Possible Activities: Candy microscopic bone model, Bone growth model, Long bone dissection
3. Read from or present information from Chapter 7.1 and 7.2 "Skeletal System," pages 201 - 209 in *Holes Human Anatomy & Physiology* pertaining to long bone macro/microanatomy and bone growth and development.
    a. Have the students practice coloring/labeling examples of long bone anatomy, including the endosteum, periosteum, diaphysis, epiphyses, compact bone, spongy bone, epiphyseal plate/line, medullary cavity, blood vessels, and yellow/red bone marrow. (Possible videos: What's Up Dude: Structure of Long Bone or Human Biology Explained: Parts of Long Bone)
    b. Have the students practice coloring/labeling numerous examples of bone tissue, including the intricate detail of compact bone, spongy bone, trabeculae, the organization of the osteon (Haversian system), lamellae, central and perforating canals, osteocytes, canaliculi, and lacunae. (Possible videos: Medic Tutorials: Compact Bone Structure , What's Up Dude Structure of Bone Tissue), or Amgen Introduction to Bone Biology)
    c. Identify and distinguish between the types of cells that play a role in bone development, growth, and repair (mesenchymal cells, osteoclasts and osteoblasts) (Possible video: Amgen Bone Remodeling and Modeling or Amgen Osteoclasts and Osteoblasts)

   d. Sequence the series of steps that occur in endochondral and intramembranous bone development and growth and similarities/differences between the two processes.
   e. Identify types of fractures and the mechanisms by which a bone repairs itself. Distinguish between types of fractures by analyzing figures, sketching, or using celery to model the various ways that bones can break. (Possible video: Amgen Anatomy of a Fracture as a Result of Systemic Bone Loss)
   f. Watch Discovery Education: Body Story Episode 2 - Breaking Down to reinforce the content in sections 7.1 and 7.2.
   g. Possible activity: What type of Bone Break? and/or X-ray laboratory
4. Read from or present information from Chapter 7.3 "Skeletal System," pages 210 - 212 in *Holes Human Anatomy & Physiology* to emphasize the many functions that bones serve including support, protection, movement, blood cell formation (hematopoiesis), and storage of inorganic salts Calcium and Phosphorus.
5. Read from or present information from Chapter 7.5 "Skeletal System," pages 216 - 226 in *Holes Human Anatomy & Physiology* to discuss the bones and features of the skull including cranial bones, facial bones, sinuses, sutures, and openings.
   a. Have students practice identifying the skeletal features of the skull through drawing, coloring, labeling various examples of the anatomical structures. (Ex. Skull Labeling Practice)
   b. Allow students to interact with a model of a skull.
   c. Find a credible video source (YouTube) that highlights features of the skull.
   d. Refer to reference plates on pages 253 - 267 in *Holes Human Anatomy & Physiology* to visualize real images of the skull.
6. Read from or present information from Chapter 7.6 "Skeletal System," pages 217 - 231 in *Holes Human Anatomy & Physiology* to discuss the bones and features of the vertebral column.
   a. Have students practice identifying the skeletal features of the vertebral column through drawing, coloring, labeling various examples of the anatomical structures.
   b. Allow students to interact with models of vertebrae using both the articulated and disarticulated skeleton.
   c. Find a credible video source (YouTube) that highlights features of the vertebral column.
7. Read from or present information from Chapter 7.7 "Skeletal System," page 232, in *Holes Human Anatomy & Physiology* to discuss the bones and features of the thoracic/rib cage.
   a. Have students practice identifying the skeletal features of the rib cage through drawing, coloring, labeling various examples of the anatomical structures.
   b. Allow students to interact with models of the rib cage bones and their features using both the articulated and disarticulated skeleton.
   c. Find a credible video source (YouTube) that highlights features of the thoracic cage.
8. Read from or present information from Chapter 7.8 "Skeletal System," page 232 - 234, in *Holes Human Anatomy & Physiology* to discuss the bones and features of the pectoral girdle.
   a. Have students practice identifying the skeletal features of the clavicles and scapula through drawing, coloring, labeling various examples of the anatomical structures.

   b. Allow students to interact with models of the clavicles and scapula bones and their features using both the articulated and disarticulated skeleton.
   c. Find a credible video source (YouTube) that highlights features of the pectoral girdle.
9. Read from or present information from Chapter 7.9 "Skeletal System," page 234 - 239, in *Holes Human Anatomy & Physiology* to discuss the bones and features of the upper limbs (arms/hands).
   a. Have students practice identifying the skeletal features of the arms and hands through drawing, coloring, and labeling various examples of the anatomical structures.
   b. Allow students to interact with models of the arm and hand bones and their features using both the articulated and disarticulated skeleton.
   c. Find a credible video source (YouTube) that highlights skeletal features of the upper limbs.
   d. Possible activity: Anatomically correct hand turkey
10. Read from or present information from Chapter 7.10 "Skeletal System," page 239-242, in *Holes Human Anatomy & Physiology* to discuss the bones and features of the pelvic girdle, including the hip bones and their interaction with the sacrum.
   a. Have students practice identifying the skeletal features of the pelvic girdle through drawing, coloring, labeling various examples of the anatomical structures.
   b. Allow students to interact with models of the hip bones and their features using both the articulated and disarticulated skeleton.
   c. Find a credible video source (YouTube) that highlights skeletal features of the pelvic girdle.
11. Read from or present information from Chapter 7.11 "Skeletal System," page 242-247, in *Holes Human Anatomy & Physiology* to discuss the lower limbs (legs and feet).
   a. Have students practice identifying the skeletal features of the legs and feet through drawing, coloring, labeling various examples of the anatomical structures.
   b. Allow students to interact with models of the legs and feet and their features using both the articulated and disarticulated skeleton.
   c. Find a credible video source (YouTube) that highlights skeletal features of the lower limbs.
12. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
13. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
14. Possible videos for naming bones: Dr. Mashburn Skeletal System Playlist
15. Extensions from Holes Anatomy and Physiology textbook:
   a. Career Corner: *Radiologic Technologist*
   b. Clinical Application: *Fractures, Disorders of the Vertebral Column*

DELAWARE VALLEY SCHOOL DISTRICT

Assessments:

Diagnostic:

Teacher prepared diagnostic test

Teacher questioning and observation

Formative:

Teacher observations, questioning techniques

Define Vocabulary words for this unit

Group activities

Homework/Classwork – examples from the textbook/web resources for each section

Bone Anatomy Quizzes/graded assignments

Summative:

Introductory Skeletal Organization and Tissue Assessment

Axial Skeleton Assessment (with lab practical component) - (Consists of both Multiple Choice, Matching, and Free Response Questions)

Appendicular Skeleton Assessment (with lab practical component) - (Consists of both Multiple Choice, Matching, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 6: Articulations and Movement **Time Range in Days:** Approximately 5 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A
Anchors:
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
Eligible Content:
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

Objectives: (Students will be able to)

1. Identify word roots from Chapters 8 to assess prior knowledge of joints and movement terminology. (DOK 1)
2. Investigate the types of joints and joint movements. (DOK 3)
    a. Fibrous - syndesmosis, sutures, gomphosis
    b. Cartilaginous—synchondrosis, symphysis
    c. Synovial—ball and socket, hinge, condyloid, plane, saddle, pivot
        i. Shoulder, elbow, hip, knees
3. Investigate joint movements. (DOK 3)
    a. Synovial movements: flexion, extension, hyperextension, dorsiflexion, plantar flexion, abduction, adduction, rotation, circumduction, supination, pronation, eversion, inversion, protraction, retraction, elevation, depression, opposition.

Core Activities and Corresponding Instructional Methods:

1. Identify essential word roots for the Skeletal System.
    a. Read from Chapter 8, page 269, from *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read or present information from Chapter 8, “Joints of the Skeletal System,” pages 269 - 288, in *Holes Human Anatomy & Physiology* to have students identify types of joints and movement of the body.
    a. Have students practice identifying types of joints and movement through labeling, matching, or citing examples using their own body. (“Simon-Says-style”)
    b. Have students analyze videos in which people are performing various dances, sports movements, acrobatics, martial arts, etc. and identify the types of movements that may be involved.
    c. Ask students to choreograph their own steps to an action to demonstrate knowledge of joints and movements of the body.
3. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.

4. Possible Activities: Movement project, Prosthetic limb design challenge
5. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
6. Extensions from Holes Anatomy and Physiology textbook:
    a. Career Corner: *Physical Therapy Assistant*
    b. Clinical Application: *Joint Disorders, Replacing Joints*

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Classwork – example problems from the textbook and workbook for each section

Summative:

Joints and Movement Project

DELAWARE VALLEY SCHOOL DISTRICT

Unit 7: Muscular System **Time Range in Days:** Approximately 25 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.

2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapter 9 to assess prior knowledge of muscular system terminology. (DOK 1)
2. Recall and differentiate between the 3 types of muscle tissue - skeletal, smooth, and cardiac. (DOK 1 and 3)
3. Distinguish between the connective tissues associated with muscles (DOK 2)
4. Describe the microscopic structure of skeletal muscle tissue and the bundle-within-a bundle organization of muscle tissue. (DOK 1)
5. Summarize the physiology of muscle contraction (Sliding Filament Theory) and analyze how muscle tissue responds to stimuli. (DOK 3, 4)
6. Investigate the impacts of temperature, oxygen debt, energy, and fatigue on muscle tissue and performance. (DOK 3)
7. Recognize characteristics used to name muscles: size, shape, location, direction/orientation of fibers, number of origins, points of attachments, and action. (DOK 1)
8. Identify and locate the major skeletal muscles of each body region and identify the general actions of each muscle. (DOK 1)
    a. Muscles of Facial Expression and Mastication:
        i. *Frontalis, nasalis, procerus, occipitalis, orbicularis oculi, orbicularis oris, buccinator, zygomaticus major/minor, platysma, masseter, temporalis*
    b. Muscles that move the Head and Vertebral Column:
        i. *Sternocleidomastoid, erector spinae group (iliocostalis, longissimus, spinalis), quadratus lumborum*
    c. Muscles that Move the Pectoral Girdle:

i. *Trapezius, rhomboid major/minor, levator scapulae, serratus anterior, pectoralis minor*

d. Muscles that Move the Arm, Forearm, Hand:
   i. *Coracobrachialis, pectoralis major, teres major, latissimus dorsi, supraspinatus, deltoid, subscapularis, infraspinatus, teres minor; biceps brachii, brachialis, brachioradialis, triceps brachii, supinator, pronator teres, pronator quadratus; flexor carpi radialis, flexor carpi ulnaris, palmaris longus, flexor digitorum (profundus/superficialis), extensor carpi radialis (longus/brevis), extensor carpi ulnaris, extensor digitorum*

e. Muscles of the Abdominal Wall: *External oblique, internal oblique, transverse abdominis, rectus abdominis*

f. Muscles that Move the Thigh, Leg, Foot:
   i. *Psoas major, iliacus, gluteus maximus, gluteus medius, gluteus minimus, piriformis, tensor fasciae latae, pectineus, adductor longus, adductor magnus, gracilis; hamstring group (biceps femoris, semitendinosus, semimembranosus); quadriceps femoris group (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius); tibialis anterior, extensor digitorum longus, extensor hallucis longus, gastrocnemius, soleus, plantaris, flexor digitorum longus, tibialis posterior*

g. Major muscular structures:
   i. *epicranius, iliotibial tract tendon, Achilles' tendon, popliteal space, carpal tunnel, linea alba*

9. Investigate the life-span changes of muscle. (DOK 3)

Core Activities and Corresponding Instructional Methods:

1. Identify essential word roots for the Muscular System.
   a. Read from Chapter 9, page 293, from *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
   b. Students should define and provide examples of the given prefixes and suffixes.
2. Review the three types of muscle tissue from the Histology Unit.
   a. Read from or present information from Chapter 9.1 "Skeletal Muscle Tissue, "pages 293 - 297, in *Holes Human Anatomy & Physiology* to recall the characteristics of skeletal muscle tissue (reviewed from Histology Unit).
   b. Read from or present information from Chapter 9.4, and 9.5 "Smooth Muscle and Cardiac Muscle," pages 308 - 310 in *Holes Human Anatomy & Physiology* to recall the characteristics of smooth and cardiac muscle tissue (reviewed from Histology Unit).
   c. Refer to the chart on page 310 in *Holes Human Anatomy & Physiology* to distinguish between the three types of muscle tissue.
   d. Possible video: Teach PE - Types of Muscle
3. Read from or present information from Chapter 9.1 "Skeletal Muscle Tissue, " pages 293 - 297, in *Holes Human Anatomy & Physiology* to identify the connective tissues that play a vital role in the structure of skeletal muscle tissue and the "bundle-within-a-bundle" organization of muscle tissue.

   a. Have students practice drawing or labeling examples of skeletal muscle tissue using a variety of materials - pictures, interactive Ch. 9 Skeletal Muscle click-n-drags, models, and such.
   b. Have students practice drawing or labeling examples of a sarcomere (the primary contractile unit of muscle) using a variety of materials - pictures, interactive click-n-drags, models, and such.
   c. Possible video: Teach PE - Structure of Skeletal Muscle
4. Read from or present information from Chapter 9.2 "Skeletal Muscle Contraction, "pages 298 - 304, in *Holes Human Anatomy & Physiology* to understand the sequence of events that are necessary for muscle contraction referred to as the Sliding Filament Theory.
   a. Have students identify the factors that play a role in muscles contraction - Nerve impulse from a motor neuron, neurotransmitter (Acetylcholine), oxygen, Calcium, ATP, Actin, Myosin, and the Troponin-Tropomyosin complex.
   b. Have students practice identifying or sorting the steps of the Sliding Filament theory using
   c. Possible video: Nucleus Medical Media - How Muscles Work , Amoeba Sisters - Types of Muscles and Sliding Filament Theory , Dr. Matt and Dr. Mike Sliding FIlament Theory , Dr. Matt and Dr. Mike Rigor Mortis and Muscle Contraction
5. Refer to information form pages 302 - 304 in *Holes Human Anatomy & Physiology* to briefly discuss the impacts of temperature, oxygen debt, energy, and fatigue on muscle tissue and performance.
   a. Possible Lab Activity - *Muscle Fatigue Lab*
   b. Possible video*:* Nonstop Neuron - How Muscles Get Tired , Ted-Ed - How Do Steroids Affect Muscles
6. Have students begin to recognize names of muscles by identifying terms and word parts that pertain to characteristics used to name muscles: size, shape, location, direction/orientation of fibers, number of origins, points of attachments, and action.
   a. Refer to pages 312-313 in *Holes Human Anatomy & Physiology* to discuss origin and insertions; agonist, antagonist, prime movers and synergists.
7. Read from or present information from Chapter 9.7 "Major Skeletal Muscles, "pages 313-340, in *Holes Human Anatomy & Physiology* to identify major muscles of the body including:
   a. Muscles of facial expression and mastication (pages 313 - 316); muscles of the head and vertebral column (page 317 - 319)
      i. Have students complete *Lab 14* provided in the resources for *Holes Human Anatomy & Physiology to reinforce material pertaining to muscles of head, face and neck.*
      ii. Have students practice sketching or labeling muscles of the head, face, and neck (ex. "Celebrity Face Activity")
      iii. Refer to reference plates on pages 347 - 358 in *Holes Human Anatomy & Physiology* to visualize real images of muscles.
      iv. Possible video: Neural Academy - Muscles of Facial Expression and Mastication

b. Muscles that move the pectoral girdle (page 319); muscles that move the arm, forearm, hand (pages 319-326)*;* muscles of the abdominal wall (pages 326 and figure on 330)
    i. Have students complete *Lab 15* provided in the resources for *Holes Human Anatomy & Physiology* to reinforce material pertaining to muscles of the pectoral girdle, arm, hand, and abdomen.
    ii. Have students practice sketching or labeling muscles for this section (Ex. Lab 15 "Click and Drag")
    iii. Refer to reference plates on pages 347-358 in *Holes Human Anatomy & Physiology* to visualize real images of muscles.
c. Muscles that move the thigh, leg, and foot (pages 328-340)
    i. Have students complete *Lab 16* provided in the resources for *Holes Human Anatomy & Physiology* to reinforce material pertaining to muscles of the thigh, leg, and foot.
    ii. Have students practice sketching or labeling muscles for this section (Ex. Lab 16 "Click and Drag")
    iii. Refer to reference plates on pages 347 - 358 in *Holes Human Anatomy & Physiology* to visualize real images of muscles.
d. Major muscular structures
    (Refer to objectives for complete list of muscles)

8. Read from or present information from Chapter 9.8 "Life-span Changes "page 341, in *Holes Human Anatomy & Physiology* to discuss aging-related changes that occur in the muscular system and how exercise can help maintain a healthy muscular system.
9. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
10. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
11. Extensions from *Holes Anatomy and Physiology* textbook:
    a. Career Corner: Massage Therapist
    b. Clinical Applications: *Some Muscular System Disorders; Use and Disuse of Skeletal Muscles; TMJ Syndrome*

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Classwork – example problems from the textbook and workbook for each section

Summative:

"Muscular Tissue Anatomy and Organization" Assessment

DELAWARE VALLEY SCHOOL DISTRICT

"Major Muscles of the Body" Assessments (each section mentioned previously will be assessed to demonstrate comprehension of the locations of the major muscles of the body.)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 8: Nervous System **Time Range in Days:** Approximately 15 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.

2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapters 10, 11, 12 to assess prior knowledge of nervous system terminology. (DOK 1)
2. Describe the general characteristics and 3 major functions of the nervous system--receiving information, (sensory), deciding what to do (integrative), and acting on those decisions (motor) (DOK 1)
3. Differentiate between the structural and functional characteristics of the two divisions of the nervous system - Central Nervous System (CNS) and Peripheral Nervous System (PNS) (DOK 2)
4. Distinguish between the somatic and autonomic of the PNS, including a comparison between the sympathetic (“fight-or-flight”) vs. parasympathetic (“rest and digest”) divisions. (DOK 2)
5. Identify the two types of cells, neurons and neuroglial cells, that compose nervous tissue and describe their structure and function. (DOK 1)
6. Classify neurons by structure - unipolar, bipolar, multipolar. (DOK 2)
7. Classify neurons by function - sensory, interneurons, motor. (DOK 2)
8. Apply a general understanding of cell anatomy and transport to the understanding of membrane potential in neurons. (DOK 4)
9. Examine neurophysiology and the mechanisms by which a nerve impulse is transmitted. (DOK 3)
10. Examine the manner in which neurotransmitters are transported across a synapse and the way in which substances such as medications, drugs, alcohol, etc. can affect these chemicals’ transmission. (DOK 2)

11. Identify the general structural and functional characteristics of the Central Nervous System (CNS) (DOK 1)
12. Examine the structures that protect the brain and spinal cord including the cranium, meninges, and cerebrospinal fluid. (DOK 2)
13. Identify and define the brain's anatomy and physiology: regions (hindbrain, midbrain, and forebrain), ventricles, lobes, fissures, functional areas, divisions, the cerebrum, the cerebellum, and brainstem (DOK 1)
14. Observe how higher mental functions are distinguished, measured, and clinically evaluated (DOK 2)
15. Dissect an animal brain to further explore the anatomy. (DOK 3)
16. Explain how the CNS helps to maintain homeostasis. (DOK 1)
17. Define a reflex arc and be able to label the transmission of a nerve impulse along the pathway (sensory neurons/afferent - interneurons of spinal cord/integrative - motor neurons/efferent) (DOK 1)
18. Test and explain basic reflexes (DOK 2)
19. Distinguish between the basic functions of cranial and spinal nerves and be able to define ascending/afferent pathways vs. descending efferent pathways. (DOK 3)
20. Recall examples of sensory receptors, particularly in the skin and distinguish between general senses vs. special senses (DOK 1 and 2)
21. Identify how general sensory receptors are classified, how sensory perception allows for us to be aware of our environments, and how receptors can adapt to certain stimuli (ex. dilation of pupils) (DOK 3)
22. Examine symptoms (vertigo, pain, numbness, paralysis, hearing loss, etc.) of dysfunction of cranial and spinal nerves (DOK 2)
23. Discuss the relationship between the senses of smell and taste and examine the anatomy of these sense organs. (DOK 3)
24. Make observations of the parts of both the ear and eye and discuss the functions of each part. (DOK 2)
25. Dissect an eye to examine the anatomy. (DOK 3)
26. Describe the aging-associated changes to the nervous system and the diminishing capacity of the senses. (DOK 2)
27. Identify types of mental health illnesses that can impact the nervous system, particularly the brain. (DOK 1)

Core Activities and Corresponding Instructional Methods:

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of nervous system terminology.
    a. Read from Chapter 10, 11, and 12, pages 360, 390, and 445 in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Chapter 10.1, "General Characteristics of the Nervous System," pages 360-361, and Chapter 10.2,"General Functions of the Nervous

System," pages 361-362 in *Holes Human Anatomy & Physiology* to understand the structural and functional importance of the nervous system.
    a. Use scenarios that are common to the students when discussing the 3 major functions of the nervous system - sensory, integrative, motor. Practice sketching or labeling examples.
    b. Have students practice labeling or sketching the divisions of the Nervous System (CNS vs. PNS) and identify their major roles in the body.
    c. Have students identify examples of the somatic nervous system and autonomic nervous system through the use of scenarios. Be sure to mention instances in which the sympathetic and parasympathetic divisions are in control. (Refer to Chapter 11.7, "Autonomic Nervous System," pages 428-438, in *Holes Human Anatomy & Physiology* for a deeper look into these division of the nervous system*)*
3. Read from or present information from Chapter 10.3, "Description of Cells of the Nervous System," page 363, and 10.4 "Classification of Cells of the Nervous System," pages 363 - 370, in *Holes Human Anatomy & Physiology* to identify the cells the structural and functional characteristics of the cells that make up nervous tissue, including neurons and neuroglial cells.
    a. Have students practice sketching or labeling various images of cells of the nervous system.
    b. Refer to the "Clinical Application" on page 367 the textbook to discuss Multiple Sclerosis and its effects on the neuron and myelin coating.
4. Read from or present information from Chapter 10.5, "The Synapse" pages 370-372, Chapter 10.6, "Cell Membrane Potential," pages 372-378, and Chapter 10.7, "Synaptic Transmission, "pages 378-380 in *Holes Human Anatomy & Physiology* to understand how neurons transmit nerve impulses to react to stimuli a person's environment.
    a. Have students review the movement of ions across the cell membrane to understand how membrane potential is maintained.
    b. Have students examine an action potential to understand how the neuron's membrane potential changes due to the movement of Sodium and Potassium across the cell membrane.
    c. Discuss types of neurotransmitters and their influence on actions of the body - refer to the chart on page 380 to examine neurotransmitters and their actions.
    d. Use the "Clinical Applications" from this section to enhance the discussion of nerve impulses and factors that influence them.
5. Read from or present information from Chapter 11.1, "General Characteristics of the Division of the Central Nervous System" page 390, in *Holes Human Anatomy & Physiology* to identify established facts about the brain, spinal cord, brainstem, white vs. gray matter, and listing of the tissues that protect the brain.
6. Read from or present information from Chapter 11.2, "Meninges" page 391, and Chapter 11.3, "Ventricles and Cerebrospinal Fluid," pages 392 - 395, in *Holes Human Anatomy & Physiology* to discuss the protections of the brain, their development, and complications that arise if such tissues are damaged.
    a. Refer to the Clinical Applications on "Traumatic Brain Injuries," page 392, and "Cerebrospinal Fluid Pressure," page 396.

7. Read from or present information from Chapter 11.4, "Brain "page 395 - 409, in *Holes Human Anatomy & Physiology* to discuss the developmental, structural, functional characteristics of the brain.
    a. Have students practice drawing or labeling pictures of the brain's anatomy or use interactive Ch. 11 Brain click-n-drags, models, and such.
    b. Viewer discretion advised: watch a video of an unfixed human brain.
    c. Dissect an animal's brain to examine the anatomical features that are similar to that of a human brain. (see Virtual Sheep Brain Dissection)
    d. Watch educational videos to explore the many functions of the parts of the brain.
8. Read from or present information from Chapter 11.5, "Spinal Cord" pages 409 - 417, in *Holes Human Anatomy & Physiology* to summarize the structural and functional features of the spinal cord and its role in the reflex arc and quick sensory perceptions.
9. Read from or present information from Chapter 12, "Nervous System," in *Holes Human Anatomy & Physiology* to explore the special senses including taste, sight, touch, smell, and hearing.
    a. Have students examine the anatomy of sense organs not previously studied including the mouth/tongue, ear, eye, and nose.
    b. Have students perform a cow or sheep eye dissection to identify the anatomical features of the eye.
10. Complete one or more labs to explore the nervous system, including but not limited to:
    a. *Reaction time lab, Cranial nerve lab, Cerebellum function lab, Reflex lab, Vision testing, Senses challenge, Smell and taste discrimination, Senses challenge interactive lab, Visually impaired catch, Mapping blind spots lab activity, Vision testing lab*
11. Present the students with case studies or examples of mental health/nervous system conditions that disrupt the overall health of an individual - including life span changes that occur. (Chapter 12.5 - beginning on pages 483)
    a. Have students watch videos of neurological disorders and discuss the symptoms, causes, treatments/remedies, and effects on one's well-being.
    b. Discuss mental health - signs, symptoms, and treatments.
    c. Present various video resources that deal with neurological disorders and some signs and symptoms. (The Body Series)
12. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
13. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
14. Extensions from *Holes Anatomy and Physiology* textbook:
    a. Career Corner: *Pharmacist; Occupational Therapist; Audiologist*
    b. Clinical Applications: *Migraine, Multiple Sclerosis, Factors Affecting Impulse Conduction, Opiates in the Human Body, Drug Addiction, Traumatic Brain Injury, Cerebrospinal Fluid Pressure, Parkinson Disease, Brain Waves, Use of Reflexes, Amyotrophic Lateral Sclerosis, Spinal Cord Injuries, Spinal Nerve Injuries, Treating*

DELAWARE VALLEY SCHOOL DISTRICT

Pain, Mixed-Up Senses—Synesthesia, Smell and Taste Disorders, Getting a Cochlear Implant, Hearing Loss, Refraction Disorders

Assessments:

Diagnostic:

Teacher prepared diagnostic test

Teacher questioning and observation

Formative:

Teacher observations, questioning techniques

Define Vocabulary words for this unit

Group activities

Classwork – example problems from the textbook and workbook for each section

Summative:

"Introduction to the Nervous System" Assessment

"Brain and Central Nervous System" Assessment

DELAWARE VALLEY SCHOOL DISTRICT

Unit 9: Endocrine System **Time Range in Days:** Approximately 5 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.

2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapter 13 to assess prior knowledge of Endocrine System terminology. (DOK 1)
2. Examine the general characteristics of the endocrine system. (DOK 1)
3. Compare the major endocrine system glands and their hormones. (DOK 3
    a. Pituitary, thyroid, parathyroid, adrenal, pancreas, pineal, thymus, testes, ovaries, placenta
4. Analyze the role of stress and your endocrine system health. (DOK 4)
5. Describe some of the changes associated with aging of the endocrine system. (DOK 2)

Core Activities and Corresponding Instructional Methods:

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of endocrine system terminology.
    a. Read from Chapter 13, pages 490, in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Ch. 13 “Endocrine System,” pages 490 - 524, in *Holes Human Anatomy & Physiology* to discuss the structural and functional characteristics of the Endocrine system.
    a. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
    b. Use diagrams, coloring sheets, readings, models, note outlines, and notes to provide students with resources for learning and mastering the anatomy of the

endocrine system. (Ex. "Click and Drag Endocrine System" and "Endocrine - Review Worksheet")

c. Use videos or animations to enhance the content. (Ex. Crash Course - Endocrine System or Ted-Ed Emma Bryce - How Do Hormones Work?)
d. Read and review current issues and articles related to the endocrine system and hormones, including the clinical applications within Chapter 13.
e. Complete hormone and gland flow charts or organizers to show glands, hormones, and issues.

3. Extensions from *Holes Anatomy and Physiology* textbook:
    a. Career Corner: *Diabetes Educator*
    b. Clinical Applications: *Abusing Hormones to Improve Athletic Performance; Growth Hormone Ups and Downs; Disorders of the Adrenal Cortex; Diabetes Mellitus*
    c. From Science to Technology: *Treating Diabetes*

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Classwork – example problems from the textbook and workbook for each section

Summative:

Endocrine System Quiz

DELAWARE VALLEY SCHOOL DISTRICT

Unit 10: Cardiovascular System **Time Range in Days:** Approximately 10 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.

2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapters 14 and 15 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Explain the functions of blood (DOK 3)
3. Identify the dissolved substances in plasma (DOK 1)
4. Compare and contrast the concentrations, structures, and functions of formed elements (Erythrocytes, Leukocytes, Thrombocytes) (DOK 3)
5. Explain the processes and sequence of events involved in hemostasis and the impact of hemostatic disorders. (DOK 3)
6. Compare and contrast blood types and explain the importance of blood typing in performing blood transfusions. (DOK 3)
7. Identify blood disorders and their treatments. (DOK 1)
8. Distinguish between the structures and functions of the heart, including the pericardium, heart wall, atria, ventricles, and pulmonary and semilunar valves. (DOK 2)
9. Summarize cardiac muscle activity and electrical conduction and correlate these events to an electrocardiogram (DOK 2)
10. Summarize the flow of blood through the heart and the entire body. (DOK 2)
11. Distinguish between pulmonary and systemic circulation. (DOK 2)
12. Compare and contrast different types of blood vessels, both structurally and functionally. (DOK 3)
13. Identify major arteries and veins. (DOK 1)
14. Describe the life-span changes in the cardiovascular system. (DOK 1)

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Core Activities and Corresponding Instructional Methods:

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of cardiovascular system terminology.
    a. Read from Chapter 14, page 530, and Chapter 15, page 559, in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Chapter 14.1 - 14.3, "Characteristics of Blood," "Blood Cells," and "Plasma," pages 530 - 545, in *Holes Human Anatomy & Physiology* to discuss the functions and components of blood tissue.
    a. Have students practice identifying the components of the blood and their specific functions. (Ex. Blood "Click and Drag and Concept Map")
    b. Show the students an example of blood volume for the average person
    c. Discuss how a blood sample can be separated and measured by volume using a centrifuge. (Demonstrate the use of a centrifuge if applicable)
3. Read from or present information from Chapter 14.4, "Hemostasis" pages 545 - 550, in *Holes Human Anatomy & Physiology* to discuss blood clotting and the stoppage of blood.
    a. Refer back to Discovery Challenge: Body Story (Episode 2)- Breaking Down to discuss the events that take place when blood vessels are severed during a bone fracture.
4. Read from or present information from Chapter 14.5, "Blood Groups and Transfusions" pages 550 - 554, in *Holes Human Anatomy & Physiology* to review blood types and how they are determined through the inheritance of antigens on the red blood cells.
    a. Use graphic organizers to display blood types.
    b. Review compatibility for blood transfusions. (Ex. The Nobel Prize - The Blood Typing Game)
    c. Explain how the RH-factor affects fetal mortality in a condition known as erythroblastosis fetalis and the preventative treatment that is administered for mothers who have RH- blood.
5. Read from or present information from Chapter 15.1, "General Characteristics of the Cardiovascular System," page 559, and Chapter 15.2, pages 559 - 568, "The Heart," in *Holes Human Anatomy & Physiology* to distinguish between pulmonary and systemic circulation and to highlight the structural and functional characteristics of the heart.
    a. Have students practice labeling features of the cardiovascular system and the heart using various images, videos, their own sketches, and the like. (Ex. "Click and Drag Blood Circulation, Vessels, and the Heart")
    b. Refer to section 15.5 "Paths of Circulation" to compare pulmonary circulation and systemic circulation.
    c. Compare a closed circulatory system to an open circulatory system found in other species.
    d. Have students view a demonstration of or dissect a sheep heart to understand the anatomy of a mammal heart.
    e. Supplemental: have students use various materials to create a model of the heart and depict the flow of blood through the heart. (Ex. Rice crispy heart model)
    f. Have students draw blood flow through the heart in a sequential manner.

6. Read from or present information from Chapter 15.2, pages 568 - 576, "The Heart," in *Holes Human Anatomy & Physiology* to discuss the cardiac cycle and the conduction system of the heart.
    a. Have students practice labeling the nerve bundles within the heart that are responsible for cardiac conduction - sinoatrial (SA) node, atrioventricular (AV) node, atrioventricular bundle, left and right bundle branches, and Purkinje fibers.
    b. Have students listen to heart sounds, including their own using stethoscopes.
    c. Have students practice distinguishing between "normal" heart sounds vs. murmurs/irregularities.
    d. Have students analyze an electrocardiogram (ECG/EKG) to be able to describe the activities in the heart as represented by the "peaks and valleys" on the graph.
    e. Compare a "normal" ECG to an "irregular" ECG.
    f. Refer to the *Clinical Application: Arrhythmias,* on page 578-579 in the *Holes* textbook.
7. Read from or present information from Chapter 15.3, pages 576 - 584, "Blood Vessels" in *Holes Human Anatomy & Physiology* to compare blood vessels of the body - veins, arteries, venules, arterioles, capillaries.
    a. Refer to "Click and Drag" Blood Circulation, Vessels, and the Heart" to practice identifying characteristics of blood vessels.
    b. Point out major blood vessels of the body.
8. Read from or present information from Chapter 15.4, pages 584 - 592, "Blood Pressure" in *Holes Human Anatomy & Physiology* to discuss how blood pressure is measured and the actions of the heart that are being accounted for.
    a. Compare "diastole" and "systole" in relation to blood pressure.
9. Read from or present information from Chapter 15.8, pages 610, "Lifespan Changes" in *Holes Human Anatomy & Physiology* to discuss changes that occur within the cardiovascular system as a person ages.
10. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
11. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
12. Extensions from *Holes Anatomy and Physiology* textbook:
    a. Career Corner: *Blood bank technologist; Perfusionist*
    b. Clinical Applications: *Universal Precautions; Treating Sickle Cell Disease; Leukemia; Replacing the Heart—From Transplants to Stem Cell Implants; Arrhythmias; Blood Vessel Disorders; Hypertension; Exercise and the Cardiovascular System; Molecular Causes of Cardiovascular Disease*
    c. From Science to Technology: *Altering Angiogenesis*

DELAWARE VALLEY SCHOOL DISTRICT

Assessments:

Diagnostic:

Teacher prepared diagnostic test

Teacher questioning and observation

Formative:

Teacher observations, questioning techniques

Define Vocabulary words for this unit

Group activities

Classwork – example problems from the textbook and workbook for each section

Summative:

Blood Quiz

Cardiovascular System and the Heart Assessment (Consists of Matching, Multiple Choice, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 11: Lymphatic System and Immunity **Time Range in Days:** Approximately 5 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.

2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapter 16 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Identify the primary functions of the lymphatic system. (DOK1
3. Summarize the parts of the major lymphatic pathways. (DOK 2)
4. Compare the circulation of blood in a closed loop system to the open system displayed in the lymphatic system. (DOK 3)
5. Describe formation of lymph from tissue fluid. (DOK 1)
6. List and define the major organs of the lymphatic system based on location and function. (DOK 1)
7. Compare and contrast innate (specific) and adaptive (nonspecific) body defenses. (DOK 2)
8. Examine allergic reactions. (DOK 3)
9. Identify major disorders of the lymphatic system and their treatment. (DOK 1)
10. Describe life-span changes in immunity. (DOK 1)

Core Activities and Corresponding Instructional Methods:

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of lymphatic/immune system terminology.
    a. Read from Chapter 16, page 619, in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.

2. Read from or present information from Chapter 16.1 "Lymphatic Pathways," pages 619 - 622, in *Holes Human Anatomy & Physiology* to provide an overview of the functions of the lymphatic system and the lymphatic capillaries, vessels, trunks, and ducts, that form the lymphatic pathways.
    a. Have students practice drawing or labeling images of the lymphatic pathways.
    b. Use various videos to display the structure and function of the lymphatic system. (Alila Medical Media - Lymphatic System or FuseSchool Lymphatic System)
3. Read from or present information from Chapter 16.2 "Tissue Fluid and Lymph," pages 622-623, in *Holes Human Anatomy & Physiology* to understand how lymph is formed due to fluid accumulation in body tissues.
    a. Show a video of a person suffering from lymphedema to emphasize why the lymphatic system is so vital to homeostasis. (Monique Samuels)
4. Read from or present information from Chapter 16.3 "Lymphatic Tissues and Lymphatic Organs," pages 623-627, in *Holes Human Anatomy & Physiology* to summarize the location and functioning of organs of the lymphatic system.
    a. Have students practice drawing or labeling images of the lymphatic organs.
5. Read from or present information from Chapter 16.4 "Body Defenses Against Infection (Immunity)," pages 628-643, in *Holes Human Anatomy & Physiology* to provide a brief overview of the body's defense mechanisms against pathogens by means of lymphocytes, antibodies, and more.
    a. Use videos to help add to the information presented (GCSE Biology - Immune System)
    b. Examine allergic reactions and the consequences of disruptions to the normal functioning of the immune system.
6. Read from or present information from Chapter 16.5 "Lifespan Changes" pages 644-645 - 643, in *Holes Human Anatomy & Physiology* to explore the changes that occur to an individual's health and the lymphatic system as he/she ages.
7. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
8. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
9. Extensions from Holes Anatomy and Physiology textbook:
    a. Career Corner: *Public Health Nurse*
    b. Clinical Applications: *Immunity Breakdown: HIV/AIDS*
    c. From Science to Technology: *Immunotherapy*

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit

Group activities
Homework – example problems from the textbook and workbook for each section
Quizzes/graded assignments

Summative:

Final Exam Assessment (Consists of both Matching, Multiple Choice, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 12: Digestive System, Nutrition, and Metabolism **Time Range in Days:** Approximately 5 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A
Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)
1. Identify word roots from Chapters 17 and 18 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Define the processes carried out by the digestive system. (DOK 1)
3. Name, label, and describe the functions of the organs of the digestive system. (DOK 2)
    a. Mouth, salivary glands, pharynx, esophagus, stomach, pancreas, liver, gallbladder, small intestine, large intestine.
4. Explain the role of enzymes and the accessory organs in the process of digestion. (DOK 3)
5. Describe aging-related changes in the digestive system. (DOK 2)
6. Explain the cellular use of nutrients, metabolism, and healthy eating. (DOK 3)

Core Activities and Corresponding Instructional Methods:
1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of digestive system/nutrition terminology.
    a. Read from Chapter 17, page 652, and Chapter 18, page 697, in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Chapter 17 “Digestive System,” pages 652-689, in *Holes Human Anatomy & Physiology* to provide an overview of the structural and functional characteristics of the digestive system, including the parts that make up the alimentary

canal, accessory structures/organs, and the enzymes that are involved in breaking down food.

   d. Have students practice drawing or labeling images of the digestive system structures and the functions that they perform. (Ex. "Click and Drag Labeling Structures of Digestive System" and "Click and Drag Functions of Digestive System")
   e. Use various videos to display the structure and function of the digestive system. (Ex. 3D4Medical - Gastrointestinal Tract , GCSE Biology - Digestive System , GCSE Biology - Digestive Enzymes

3. Read from or present information from Chapter 18 "Digestive System," pages 697-725, in *Holes Human Anatomy & Physiology* to revisit biomolecular content that was discussed in unit 2 and also from Biology, while applying new knowledge of nutrition and healthy eating.
   a. Take notice of Figure 18.21 featuring "choosemyplate.gov"
   b. Refer to the 18.3 *Clinical Application* on page 723 featuring "Nutrition and the Athlete."
4. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
5. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
6. Extensions from *Holes Anatomy and Physiology* Textbook:
   a. Career Corner: *Endoscopy Technician; Registered Dietician*
   b. Clinical Application: *Dental Caries; A Common Problem: Heartburn; Replacing the Liver; Hepatitis; Gallbladder Disease; Disorders of the Large Intestine; Obesity; Dietary Supplements—Proceed with Caution; Nutrition and the Athlete*

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Homework – example problems from the textbook and workbook for each section
Quizzes/graded assignments

Summative:

Final Exam Assessment (Consists of both Matching, Multiple Choice, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 13: Respiratory System **Time Range in Days:** Approximately 5 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A
Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapter 19 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Identify the main functions of the respiratory system. (DOK 1)
3. Summarize the processes of respiration, including pulmonary, external, and internal. (DOK 2)
4. Identify the organs of the respiratory system on the basis of their location, structure, and functions, including protective mechanisms. (DOK 1)
5. Categorize the structural features of the lungs in relation to the events of inspiration and expiration. (DOK 2)
6. Measure respiratory volumes and relate them to factors affecting breathing and the role of Boyle's Law in respiration. (DOK 1)
7. Identify the sources of respiratory control. (DOK 1)
8. Identify disorders and diseases of the respiratory system and their treatments. (DOK 1)
9. Describe how aging affects the respiratory system. (DOK 1)

Core Activities and Corresponding Instructional Methods:

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of respiratory system terminology.
    a. Read from Chapter 19, page 732, in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.

2. Read from or present information from Chapter 19.1- 19.3 "Respiratory System and Breathing Mechanics," pages 732-750, and in *Holes Human Anatomy & Physiology* to provide an overview of the structural and functional characteristics of the respiratory system, including the nose, mouth, sinuses, pharynx, larynx, trachea, bronchial tree, and lungs, in addition to an understanding of the mechanics of breathing, inspiration, expiration, the influence of air pressure and Boyle's Law, respiratory volume, and lung capacities.
    a. Have students practice drawing or labeling images of the respiratory system structures and the functions that they perform. (Ex. "Click and Drag Respiratory System")
    b. Use various videos to display the structure and function of the respiratory system. (Ex. How the Respiratory System Works - Whats Up Dude , Alila Medical Media - Respiratory System, or Lungs - Nat Geo 101)
    c. Show students an easy lung model using balloons and a soda bottle.
    d. Perform a lung physiology lab if time permits.
3. Read from or present information from Chapter 19.7 "Life-Span Changes," pages 763, *Holes Human Anatomy & Physiology* to discuss ways in which the respiratory system changes as someone ages.
4. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
5. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
6. Extensions in *Holes Human Anatomy & Physiology* textbook:
    a. Career corner: *Respiratory Therapist*
    b. Clinical Applications: *The Effects of Cigarette Smoking on the Respiratory System, Lung Irritants, Respiratory Disorders that Decrease Ventilation: Bronchial Asthma and Emphysema, Exercise and Breathing, Effects of High Altitude, Disorders that Impact Gas Exchange*

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Homework – example problems from the textbook and workbook for each section
Quizzes/graded assignments

Summative:

Final Exam Assessment (Consists of both Matching, Multiple Choice, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 14: Urinary System **Time Range in Days:** Approximately 5 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A

Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapters 20 and 21 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Name the organs of the urinary system and list their functions. (DOK 1)
3. Describe the structure and function of the kidney in the process of fluid balance and urine formation. (DOK 1)
4. Examine the process of micturition. (DOK 2)
5. Explain the importance of the water balance and electrolyte balance. (DOK 3)
6. Explain the process of compensation. (DOK 3)

Core Activities and Corresponding Instructional Methods:

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of respiratory system terminology.
    a. Read from Chapter 20, page 770, and Chapter 21, page 805, in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Chapter 20 “Urinary System,” pages 770-798 in *Holes Human Anatomy & Physiology* to provide an overview of the structural and functional characteristics of the urinary system including the kidneys, bladder, ureters, urethra, and how homeostasis can be disrupted if the system is damaged.

   a. Have students practice drawing or labeling images of the urinary system structures and the functions that they perform.
   b. Use various videos to display the structure and function of the urinary system. (Ex. Cognito - How the Kidneys Work , Cognito - Structure of Kidneys, or Cognito - Kidney Failure , CTESkills.com - Urinary System in 7 Minutes , Bozeman Science - Urinary System
2. Read from or present information from Chapter 20.5 "Life-Span Changes," pages 799, *Holes Human Anatomy & Physiology* to discuss ways in which the urinary system changes as someone ages.
3. Read from or present information from Chapter 21 "Water, Electrolyte. And Acid-Base Balance," pages 805-820 in *Holes Human Anatomy & Physiology* to review fluid and electrolyte transport and their effects on homeostasis within the body.
4. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
5. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
6. Extensions from *Holes Anatomy and Physiology* textbook:
   a. Career Corner: Dialysis Technician; Medical Technologist
   b. Clinical Application: Glomerulonephritis; The Nephrotic Syndrome; Chronic Kidney Disease; Urinalysis: Clues to Health; Water Balance Disorders; Sodium and Potassium Imbalances

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Homework – example problems from the textbook and workbook for each section
Quizzes/graded assignments

Summative:

Final Exam Assessment (Consists of both Matching, Multiple Choice, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 15: Reproductive System, Pregnancy, Growth, and Development
Time Range in Days: Approximately 5 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A
Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives: (Students will be able to)

1. Identify word roots from Chapters 22, 23, 24 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Outline the process of meiosis and the formation of sex cells. (DOK 1)
3. Describe the structure and function of each part of the male and female reproductive systems and explain the role of hormones. (DOK 1, 3)
4. Describe fertilization. (DOK 1)
5. Investigate the stages of pregnancy. (DOK 3)
6. Analyze the aging process and the role of genomes aging. (DOK 4)

Core Activities and Corresponding Instructional Methods:

1. Identify Latin/Greek-based word roots (prefixes/suffixes) to assess prior knowledge of respiratory system terminology.
    a. Read from Chapter 22, page 825, in *Holes Human Anatomy & Physiology* to have students explore word roots that apply to vocabulary in this section.
    b. Students should define and provide examples of the given prefixes and suffixes.
2. Read from or present information from Chapter 22 “Reproductive System,” pages 826 - 853 in *Holes Human Anatomy & Physiology* to provide an overview of the structural and functional characteristics of the reproductive system including a brief review of meiosis for both males (spermatogenesis) and females (oogenesis); the male reproductive structures (testes, prostate, penis, urethra, and urethra); the female reproductive structures (ovaries, fallopian tubes, uterus, cervix, and vagina); fertilization; pregnancy; and role of hormones.

   c. Have students practice drawing or labeling images of the reproductive system structures and the functions that they perform.
   d. Use various videos to display the structure and function of the reproductive system. (Ex. Bozeman Science - The Reproductive System , Professor Dave - The Reproductive System, or CTESkills.com - Medical Terminology for Male Reproductive System , CTESkills.com - Medical Terminology for Female Reproductive System , Revision Monkey - The Reproductive Systems , Dandelion Medical Animation - From Fertilization to Childbirth
3. Present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
4. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the content of this section.
5. Extensions from *Holes Anatomy and Physiology* textbook:
   a. Career Corner: Nurse-Midwife; Physician's Assistant; Genetic Counselor
   b. Clinical Application: Prostate Cancer; Male Infertility; Female Infertility; Treating Breast Cancer; Assisted Reproductive Technologies; Some Causes of Birth Defects; Human Milk—The Perfect Food for Human Babies; Living to 100—and Beyond; Down Syndrome.

Assessments:

Diagnostic:

Teacher prepared diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questioning techniques
Define Vocabulary words for this unit
Group activities
Homework – example problems from the textbook and workbook for each section
Quizzes/graded assignments

Summative:

Final Exam Assessment (Consists of both Matching, Multiple Choice, and Free Response Questions)

DELAWARE VALLEY SCHOOL DISTRICT

Unit 16:Fetal Pig Dissection or Other Exploratory Lab Activities
Time Range in Days: Approximately 5 days

Standards: PA Keystone Biology Assessment Anchors and Enhanced Standards
3.1.B.A1, 3.1.B.A5, 3.1.B.A6, 3.1.B.C2, 4.1.3.A, 4.1.4.A
Anchors:
BIO.A.1.1 Explain the characteristics common to all organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.
2025 Standards:
3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Eligible Content:
BIO.A.1.1.1 Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2.1 Compare cellular structures and their functions in prokaryotic and eukaryotic cells.
BIO.A.1.2.2 Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).
BIO.A.4.2.1 Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).

Objectives (The teacher will choose which objectives the students will focus on for this section)

1. Dissect a fetal pig to compare the content that they have learned about body systems to a mammal that has similar anatomy to a human.
2. Revisit an activity from earlier in the year called “No Guts,No Glory” to compare current knowledge with their previous knowledge about the human body’s anatomy.
3. Explore careers in health science and present their findings to the rest of the class.
4. Choose a health science related topic to investigate and present findings on.

Core Activities and Corresponding Instructional Methods:

1. The teacher will provide the students with a guided set of instructions to perform a fetal pig dissection. Supplemental videos and images can be used to enhance the instruction OR the activity can be substituted with a virtual option of choice.
2. The teacher will guide the students through “No Guts, No Glory” to see what the students have learned from earlier in the year. There is an option to play the activity as a game similar to “Headbands.”
3. The teacher can use a template such as this: Health Science Career Project to have the students explore careers in health science and present their findings to the class.
4. Students can explore health science topics of their choice and present the information in the form of a poster, infographic, or short video.

DELAWARE VALLEY SCHOOL DISTRICT

Assessments:

Diagnostic:

Teacher prepared diagnostic test

Teacher questioning and observation

Formative:

Teacher observations, questioning techniques

Group activities

Summative:

Final product produced from chosen activity