DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

____Anatomy and Physiology_____

Grade Level: 11 and 12

Date of Board Approval: ____2019_____

DELAWARE VALLEY SCHOOL DISTRICT

Planned Instruction

Title of Planned Instruction: Anatomy and Physiology

Subject Area: Science **Grade(s): 11/12**

Course Description:

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 will conclude the exploration of human anatomy and physiology.

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

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DELAWARE VALLEY SCHOOL DISTRICT

Curriculum Map

1. **Marking Period One:**

- **Overview based on 45 days:**
  i. UNIT 1: Introduction to Human Anatomy and Physiology (Ch. 1)
  ii. UNIT 2: Chemical Basis of Life (Ch. 2)
  iii. UNIT 3: Cells and Cellular Metabolism (Ch. 3/4)
  iv. UNIT 4: Tissues (Ch. 5)
  v. UNIT 5: Integumentary System (Ch. 6)

- **Goals:**
  i. **Understanding of:**
    1. The origins of medical science, anatomy and physiology, the levels of organization in the body, the core themes in anatomy and physiology, life and the maintenance of life, the organization of the human body, life-span changes, and anatomical terminology. (7-10 days)
    2. The importance of chemistry in anatomy and physiology, the structure of matter, and the chemical constituents of cells. (3-5 days)
    3. Cell structure and function, the cell cycle, biotechnology (stem and progenitor cells, CRISPR), cell death, and cellular metabolic processes. (5-7 days)
    4. Histology and the four types of tissue in the body (epithelial, connective, muscle, nervous, plus membranes), their structure, location, and function. (12-15 days)
       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. Membranes—serous, mucous, cutaneous, synovial
       d. Muscle—skeletal, smooth, cardiac
       e. Nervous—neurons, neuroglia
    5. Integumentary system with the skin and its tissues, accessory structures of the skin (hair, nails, sensory receptors), skin functions, the healing of wounds and burns with the modeling of skin lesions, and life-span changes of the integument. (7-10 days)

2. Marking Period Two:

- **Overview based on 45 days:**
  i. UNIT 6: Skeletal System (Ch. 7/8)
  ii. UNIT 7: Muscular System (Ch. 9)

- **Goals:**
  - **i. Understanding of:**
    1. Bone shape and structure, bone development and growth, bone function, skeletal organization (axial and appendicular). (20-25 days)
       a. Skull
          i. Bones: frontal, parietal, occipital, temporal, sphenoid, ethmoid, maxilla, palentine, zygomatic, lacrimal, nasal, vomer, inferior nasal concha, mandible, malleus, incus, stapes
          ii. 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
       b. Vertebral Column
          i. Bones: hyoid, 7 cervical vertebra (atlas/axis), 12 thoracic vertebra, 5 lumbar vertebra, sacrum, coccyx
       c. Structures: body, vertebral foramen, spineous process, transverse process, transverse foramen
       d. Thoracic Cage
          i. Bones: 24 ribs (vertebrosternal, vertebronchondral, vertebral), sternum (manubrium, body, xiphoid process)
          ii. Structures: costal cartilage, clavicular notch, sternal angle
       e. Pectoral girdle
          i. Structures: coracoid process, acromion process, spine, glenoid cavity
          ii. Bones: scapula, clavicle
       f. Upper limb
          i. Bones: humerus, radius, ulna, carpals, matacarpals, phalanx (28)
          ii. 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; sesamoid bone

g. Pelvic Girdle
    i. Bones: ilium, ischium, pubis
    ii. Structures: iliac crest, obturator foramen, acetabulum, pubic symphysis, sacroiliac joint
h. Lower Limb
    i. Bones: femur, tibia, fibula, patella, tarsal, metatarsal, phalanx (28)
    ii. Structures: head, greater trochanter, lesser trochanter, linea aspera, lateral condyle, medial condyle, interconylar fossa; tibial tuberosity, anterior crest, medial malleolus, intercondylar eminence; lateral malleolus, Achilles' tendon
i. Life-Span Changes of skeleton

2. Types of joints and joint movements with a focus on synovial joints, life-span changes of joints. (5 days)
    a. Fibrous (syndesmosis, sutures, gomphosis); cartilagenous (synchondrosis, symphysis) ; synovial (ball and socket, condylar, plane, hinge, pivot, saddle) joints.
    b. Specific synovial joints: Shoulder, elbow, hip, knee.
    c. Synovial movements: flexion, extension, hyperextension, dorsiflexion, plantar flexion, abduction, adduction, rotation, circumduction, supination, pronation, eversion, inversion, protraction, retraction, elevation, depression, opposition.
3. Structure of a skeletal muscle, physiology of muscle contraction, muscular responses, characteristics of smooth and cardiac muscle, skeletal muscle actions and muscle life-span changes. (20-25 days)
    a. Major skeletal muscles: frontalis, nasalis, procerus, occipitalis, orbicularis oculi, orbicularis oris, buccinator, zygomaticus major/minor, platysma, masseter, temporalis; sternocleidomastoid, erector spinae group (iliocostalis, longissimus, spinalis), quadratus lumborum, trapezius, rhomboid major/minor, levator scapulae, serratus anterior, pectoralis minor; coracobrachialis, pectoralis major, teres major, latissiumus 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; external oblique, internal oblique, transverse abdominus, rectus abdominis; psoas major, illiacus, 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

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

3. Marking Period Three:

- **Overview based on 45 days:**
  i. UNIT 8: Nervous System and Special Senses (Ch 10, 11, 12)
  ii. UNIT 9: Endocrine System (Ch 13)
  iii. UNIT 10: Blood and Cardiovascular System (Ch 14, 15)

- **Goals:**
  i. Understanding of:
  1. General characteristics and functions of the nervous system, nervous system cell structure and function, synapse, cell membrane potential, synaptic transmission and impulse processing, characteristics and divisions of the nervous system, meninges, ventricles and cerebrospinal fluid, brain, spinal cord, peripheral nervous system, autonomic nervous system, life-span changes of nervous system. (15-20 days)
  2. General characteristics of sensory functions, receptors, sensation, and perception, general senses, special senses, life-span changes of sensory function. (7-10 days)
  3. General characteristics of the endocrine system, endocrine glands and hormones, impacts of stress, life-span changes of the endocrine system. (3-5 days)
  4. Characteristics of blood, blood cells (erythrocytes, leukocytes, thrombocytes), plasma, hemostasis, blood groups and transfusions. (3-5 days)
  5. Characteristics of the cardiovascular system, the heart, major blood vessels, blood pressure, arterial and venous

systems, life-span changes of the cardiovascular system. (7-10 days)

4. Marking Period Four:

- **Overview based on 45 days:**
  i. UNIT 11: Lymphatic System and Immunity (Ch. 16)
  ii. UNIT 12: Digestive System, Nutrition and Metabolism (Ch. 17, 18)
  iii. UNIT 13: Respiratory System (Ch. 19)
  iv. UNIT 14: Urinary System, Water, Electrolyte, and Acid-Base Balance (Ch. 20, 21)
  v. UNIT 15: Reproductive System, Pregnancy, Growth, and Development, Genetics and Genomics (Ch. 22, 23, 24)
  vi. UNIT 16: Fetal Pig Dissection

- **Goals:**
  i. Understanding of:
    1. Lymphatic pathways, tissue fluid and lymph, lymphatic organs and tissues, bodily defenses against disease, life-span changes of lymphatic system. (5-7 days)
    2. Characteristics of the digestive system, organs of the digestive system and functions (mouth, salivary glands, pharynx, esophagus, stomach, pancreas, liver, gallbladder, small intestine, large intestine), life-span changes of digestive system; cellular use of nutrients, metabolism, healthy eating. (7-10 days)
    3. Respiratory system organs, breathing mechanism, control of breathing, gas exchanges and transport, life-span changes of respiratory system. (7-10 days)
    4. Characteristics of urinary system, kidneys, urine formation, storage, and elimination, life-span changes of urinary system, body fluid balance, compensation. (5-7 days)
    5. Meiosis and sex cell formation, overview of male and female reproductive systems (organs and hormones); pregnancy, prenatal period, postnatal period, aging, genetics and genomics. (7-10 days)
    6. Fetal Pig Dissection (3-4 days)

Curriculum Plan
Unit 1: Introduction to Human Anatomy and Physiology

Marking Period: 1

Standard(s):
PA Academic Standards:
http://static.pdesas.org/content/documents/Academic_Standards_for_Science_and_Technology_and_Engineering_Education_(Secondary).pdf

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:
http://static.pdesas.org/content/documents/PA%20Core%20Standards%20for%20Writing%20in%20Science%20and%20Technical%20Subjects%20March%202014.pdf

CC.3.6.11-12.C, CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):
https://www.stateboard.education.pa.gov/Documents/About%20the%20Board/Board%20Actions/2010/Keystones%20Biology%20Anchors%20and%20Eligible%20Content%20September%2016%202010.pdf

BIO.A.1.1, BIO.A.1.2, BIO.A.2., BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Patterns: Observed patterns of forms and events guide organization and classification and prompt questions about relationships and the factors that influence them.

Essential Questions:
How are patterns used to predict the outcome of an event or form?

3. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

Essential Questions:
How is form related to function?

Overview:
Human anatomy and physiology are the studies of the human body and how it works. Our bodies are communities of cells, which are specialized to take on specific and necessary responsibilities, and together they maintain an environment within the body in which they can all live. Learning anatomy and physiology requires familiarity with the language used to describe structures and functions. Cells aggregate and interact to form tissues, which in turn layer and fold and intertwine to form organs, which in turn connect into organ systems. Unit one explores the origins of medical science, anatomy and physiology, the levels of organization in the body, the core themes in anatomy and physiology, life and the maintenance of life, the organization of the human body, life-span changes, and anatomical terminology including directional terminology, regions and cavities of the body, and introductory prefixes, suffixes, and word parts. This unit will introduce anatomy and the basic structure of the human body utilizing anatomical terminology.

Goals:
For students to define anatomy and physiology and the relationship that exists between them; to review necessary life functions and characteristics and how the human body is organized; to better understand the homeostatic mechanisms that are essential for maintaining life; and to begin using proper anatomical and medical terminology.

1. Origins of medical science
2. Anatomy and physiology terminology
3. Levels of organization in the body
4. Core themes in anatomy and physiology
5. Life and the maintenance of life
6. The organization of the human body
7. Life-span changes
8. Anatomical terminology

Objectives:
1. Identify word roots 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. (DOK 3)

4. List the levels of organization in the human body and the characteristics of each. (DOK 1)
5. Differentiate between the key concepts in anatomy and physiology. (DOK 3)
6. List and describe the underlying mechanisms in anatomy and physiology. (DOK 1)
7. Summarize the major characteristics of life. (DOK 2)
8. Provide examples of metabolism. (DOK 1)
9. Summarize the major requirements of organisms. (DOK 2)
10. Explain the importance of homeostasis for survival. (DOK 3)
11. Describe the parts of a homeostatic mechanism and explain how they function together. (DOK 3)
12. Identify and organize the major body cavities, membranes, and organ systems of the body, including the organs and functions of each system. (DOK 2)
13. Investigate changes related to aging, form the microscopic to the whole-body level. (DOK 3)
14. Use proper terminology to describe relative positions, body sections, and body regions. (DOK 1)

Core Activities and Corresponding Instructional Methods:

1. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Students will read and discuss chapter 1 (Introduction to Human Anatomy and Physiology) and vocabulary, concepts and diagrams will be presented in a way that students can use the material as a study tool for mastery of the main ideas and terminology.
3. Use graphic organizers, guided outlines, diagram sheets, textbook presentations and images, and/or other resources to allow students to better understand the main concepts of the chapter including: defining anatomy and physiology; levels of structural organization; basic structural and functional characteristics of the eleven body systems; mechanisms for maintaining life and human survival needs; homeostatic control mechanisms and imbalance; directional terms; regional terms; body planes and sections; and body cavities and membranes.
4. Ask the students to create a diagram or other visual representation that highlights the organization of the human body or a specific organ system—including the planes, regions, cavities, and organs shown in anatomical position.
5. Show a video or animation to reinforce topics in chapter 1 if applicable.
6. Review and reflect on Chapter 1 content for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments

- **Summative:**
  - Quizzes
  - Common Assessment for Unit 1

Extensions:
Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading—career corner—Emergency Medical Technician
Textbook reading—1.1 Clinical Application—Ultrasonography and Magnetic Resonance Imaging: A Tale of Two Patients
Medical and Applied Sciences Vocabulary
Reference plates (p. 39-58)
Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapter 1
Textbook 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
Shared Google Drive Resources

Unit 2: Chemical Basis of Life

Marking Period: 1

Standard(s):
PA Academic Standards:
3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):
BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?
   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
   Chemical reactions are driven by matter and energy flowing through different organizational levels of biological systems which form different products.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.
   Use a model to illustrate how cells use carbon, hydrogen, oxygen, nitrogen and sulfur to synthesize biological models.

2. Unifying Themes: Patterns: Observed patterns of forms and events guide organization and classification and prompt questions about relationships and the factors that influence them.

   Essential Questions:
   How are patterns used to predict the outcome of an event or form?

   Concepts:
   Identify and describe various ways models are used to explain, interpret, and predict, biological phenomena/systems.

Competencies:
Describe the structure and function of all macromolecules

3. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.
   Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

   Competencies:
   Compare and contrast the structural and functional similarities and differences among living things.

Overview:
At the cellular level of organization, biology becomes chemistry. A cells' working parts, its organelles, are intricate assemblies of molecules. The molecules that build the cells that build the tissues and organs are composed of atoms and chemistry plays a role in anatomy and physiology. This unit examines the chemical basis of the human body, including the major elements, compounds, and molecules that are vital to the body's structure and function; identify and describe the structure and function of organic macromolecules, including carbohydrates, lipids, proteins, and nucleic acids; and examine the key roles of organic chemistry in cells of the human body.

Goals:
For students to better understand the chemical basis of life by identifying major elements and molecules that are found in the human body and the factors that can affect the structure and functioning of such molecules through the exploration of the importance of chemistry in anatomy and physiology, the structure of matter, and the chemical constituents of cells.

Objectives:
1. Identify word roots from Chapter 2 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Distinguish how the study of living materials requires and understanding of chemistry. (DOK 2)

3. Describe the relationship among matter, atoms, and compounds and how chemical reactions occur within the body. (DOK 1)
4. Compare and contrast acids, bases, salts, and the importance of pH and buffers to human physiology. (DOK 3)
5. Examine the major inorganic and organic molecules in cells; including water, oxygen, carbon dioxide, inorganic salts, carbohydrates, lipids, proteins, and nucleic acids. (DOK 1)

Core Activities and Corresponding Instructional Methods:

1. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Students will read and discuss chapter 2 (Chemical Basis of Life) and vocabulary, concepts and diagrams will be presented in a way that students can use the material as a study tool for mastery of the main ideas and terminology.
3. Use graphic organizers, guided outlines, diagram sheets, textbook presentations and images, and/or other resources to allow students to better understand the main concepts of the chapter including: the importance of chemistry in anatomy and physiology, the structure and properties of matter, and the chemical constituents of cells.
4. Use visuals/animations to review essential topics pertaining to biochemistry if applicable.
5. Review and reflect on Chapter 2 content for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words on p. 60 to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines
- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 2

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading—career corner—Anesthesiologist Assistant
Textbook reading—2.1 From Science to Technology—Radioactive Isotopes Reveal Physiology; and/or 2.3 CT Scanning and PET Imaging

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapter 2
Textbook 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
Shared Google Drive Resources

Unit 3: Cells and Cellular Metabolism

Marking Period: 1

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Compare cellular structures and their functions in prokaryote and eukaryote cells.

   Organisms maintain homeostasis in response changing conditions via positive and negative feedback mechanisms

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

   Create a model to explain, compare, and contrast the structure and function of prokaryote and eukaryote cells.

   Plan and conduct an investigation to provide evidence and explain the function of positive and negative feedback mechanisms in maintaining homeostasis that is utilized.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

   Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

   Competencies:
   Compare and contrast the structural and functional similarities and differences among living things.

Overview:
An average human body consists of about 30 trillion cells, the smallest units of life. The 290 different varieties of cells making up a human body work with each other, as tissues, organs, and organ systems to maintain the internal environment that keeps them and the person alive, despite the ever-changing conditions on the outside. Cells are the basis of life. Students will recognize that human body cells are eukaryotic; identify examples of cell specialization and the formation of tissues; explain the significance of cell parts and how their structure relates to their function; describe the mechanisms and the energy requirements that allow materials to move into and out of a cell; and review how each process relates to the human body. In Chapter 4, students will examine the whole picture of the cell to include metabolic processes within the cell.

Goals:
For students to review and master the understanding of eukaryotic cell structure and function in relation to the human body in addition to cell organelle function and the process of cell transport. Students will examine the cell cycle, biotechnology associated with cytology, cell death, and cellular metabolic processes.

Objectives:
1. Identify word roots from Chapters 3 and 4 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Explain how the components of a cell's membrane provide its functions. (DOK 3)
3. Describe the general characteristics of a cell and explain how the components of the cell function. (DOK 1)
4. Explain how substances move into and out of cells. (DOK 3)
5. Describe the cell cycle and role of mitosis. (DOK 1)

6. Explain how stem cells and progenitor cells make possible the growth and repair of tissues and how cells differentiate. (DOK 3)
7. Discuss apoptosis, necrosis, and mitosis. (DOK 2)
8. Compare and contrast anabolism and catabolism. (DOK 3)
9. Investigate the role of enzymes in metabolic rates. (DOK 3)

Core Activities and Corresponding Instructional Methods:

1. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and review content in chapters 3 and 4—Cells and Cellular Metabolism and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use a graphic organizer to review the structure and function of cell organelles.
4. Examine the diagrams in chapters 3 and 4 to show cell structure and metabolic pathways.
5. Use visuals, animations, and/or videos to reinforce special cell processes.
6. Possible activities based on time to explore cytology, including but not limited to:
    a. Cell organelle campaign posters
    b. Cell metabolism laboratory
    c. Cell cycle mini research
    d. Cell differentiation Frankenstein's monster activity
7. Review and reflect on Chapters 3 and 4 content for the common assessment.

Assessments:

- **Diagnostic:**
    - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
    - Informal questioning
    - Teacher observation
    - Discussion questions
    - Chapter outlines

- **Formative:**
    - Teacher observation
    - Discussion
    - Chapter practice questions within chapter
    - Chapter practice questions at the end of chapter
    - Class Projects, Activities, Laboratory Experiments
- **Summative:**
    - Quizzes
    - Common Assessment for Unit 3 (Ch. 3 and 4)

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading—Career Corner—Cytotechnologist; Personal Trainer

Text reading—Clinical Applications—3.1 Faulty Ion Channels Cause Disease; 3.2 Disease at the Organelle Level; Inborn Errors of Metabolism
Textbook reading—From Science to Technology—Stem Cells to Study and Treat Disease; The Human Metabolome; DNA Profiling Frees a Prisoner
Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapters 3 and 4
Textbook 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
Shared Google Drive Resources

Unit 4: Tissues

Marking Period: 1

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Compare cellular structures and their functions in prokaryote and eukaryote cells.

   Organisms maintain homeostasis in response changing conditions via positive and negative feedback mechanisms

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

   Create a model to explain, compare, and contrast the structure and function of prokaryote and eukaryote cells.

   Plan and conduct an investigation to provide evidence and explain the function of positive and negative feedback mechanisms in maintaining homeostasis that is utilized.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

   Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

   Competencies:
   Compare and contrast the structural and functional similarities and differences among living things.

Overview:
In all complex organisms, cells are organized into tissues, which are layers or groups of similar cells. Tissues associate, assemble, and interact to form organs that have specialized functions. The study of tissues (histology) will assist understanding in later chapters of the physiology of organs and organ systems and their contributions to homeostasis. This unit will provide students with an extension of how the body is organized by providing a detailed overview of the four main types of tissues, including their locations, specific classifications, and roles in the body. Students will identify the structural and functional characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue. Additionally, students will study the relationships between tissue types in organ systems and membranes of the body. Most organs contain all four tissue types and their arrangement determines the organ's structure and capabilities.

Goals:
For students to be able to describe structural and functional characteristics of the four types of tissue in the human body and differentiate specific tissue types from one another based on the roles that they play in organ systems and their appearance under a microscope and in magnified images.

Objectives:
1. Identify word roots from Chapter 5 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Identify the 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. Membranes—serous, mucous, cutaneous, synovial
   d. Muscle—skeletal, smooth, cardiac
   e. Nervous—neurons, neuroglia
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. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapter 5, “Tissues” and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use a graphic organizer for classifying tissue types based on their structural and functional characteristics.
4. Have the students use “A Brief Atlas of the Human Body” for extra practice identifying tissues.
5. Provide the students with histology coloring sheets.
6. Have the students use various media sources as well as microscopes to identify tissue types from real specimen.
7. Possible activities based on time to explore histology, suggested but not limited to:
   a Histology drawings based on slides and diagrams
   b Histology disorder “You Make the Call” Activity (Diagnosis of Disease)
   c Epithelial tissue biopsy activity
   d Tissue Models
8. Review and reflect on Chapter 5 content for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions

- Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments

- **Summative:**
  - Quizzes
  - Common Assessment for Unit 4 (Ch 5)

Extensions:
Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner: Tissue Recovery Technician
- From Science to Technology:
  - Nanotechnology Meets the Blood-Brain Barrier
  - Tissue Engineering: Building a Replacement Bladder
- Clinical Application:
  - The Body's Glue: The Extracellular Matrix
  - Abnormalities of Collagen

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapter 5
Textbook online resources—McGraw Hill Connect, Learnsmart, Anatomy & Physiology Revealed
"A Brief Atlas of the Human Body" diagram workbook
Supplemental readings
Internet Resources
Video Examples
Textbook images and review sheets
Anatomy coloring sheets
HHMI Biointeractive activities

TED Talks
Shared Google Drive Resources

Unit 5: Integumentary System

Marking Period: 1

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2, 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Compare cellular structures and their functions in prokaryote and eukaryote cells.

   Organisms maintain homeostasis in response changing conditions via positive and negative feedback mechanisms

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

   Create a model to explain, compare, and contrast the structure and function of prokaryote and eukaryote cells.

   Plan and conduct an investigation to provide evidence and explain the function of positive and negative feedback mechanisms in maintaining homeostasis that is utilized.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

   Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

   Competencies:
   Compare and contrast the structural and functional similarities and differences among living things.

Overview:
Two or more types of tissues structurally connected and performing shared specialized functions constitute an organ. The skin, the largest organ in the body by weight, and its various accessory structures (hair, nails, sensory receptors, and glands) make up the integumentary system. Skin is a strong yet flexible covering of our bodies. Students will study the skin and its appendages to gain an understanding of the three-layer organization of the integumentary system. Additionally, students will identify the primary functions of the skin which include protection, temperature regulation, sensory reception, absorption, vitamin D synthesis, and immune responses. Students will be able to make the correlation between the overall structure and functioning of the skin and gain a sense for what may happen to the well-being of the human body if a wound, burn, disease or disorder should affect the integumentary system as well as changes over a life-span.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the integumentary system and how the skin is able to heal.

Objectives:
1. Identify word roots from Chapter 6 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Describe the structure of the layers of the skin and summarize factors that determine skin color. (DOK 3)
3. Describe the accessory structures associated with the skin (nails, hair, skin glands) and explain the functions of each accessory structure. (DOK 3).
4. List various skin functions and explain how the skin helps regulate body temperature. (DOK 2)

5. Describe wound healing and types of burns. (DOK 2)
6. Summarize life-span changes in the integumentary system. (DOK 2)

Core Activities and Corresponding Instructional Methods:

1. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapter 6- "Integumentary System" and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use graphic organizers, guided notes, or other instructional strategies to present the key vocabulary and topics for the integumentary system.
4. Use diagrams, coloring sheets, videos, animations, readings and/or models to provide students with resources for learning and mastering the anatomy of the integumentary system.
5. Model wound healing using textbook resources.
6. Examine life-span changes of the integumentary system.
7. Use a lab activity to allow students to investigate the sensory functions of the skin. Suggested activities but not limited to:
    a. Skin sensory neuron laboratory
    b. 3D Skin models with lesions
    c. 3D print models
    d. Wound and other skin lesion modeling
    e. Fingerprint laboratory
    f. Effectiveness of sunscreen
    g. Integumentary system "You Make the Call"
    h. Tattoo research
8. Review and reflect on Chapter 6 content for the common assessment.

Assessments:

- **Diagnostic:**
    - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
    - Informal questioning
    - Teacher observation
    - Discussion questions
    - Chapter outlines

- **Formative:**
    - Teacher observation
    - Discussion
    - Chapter practice questions within chapter
    - Practice worksheets
    - Diagram reviews
    - Chapter practice questions at the end of chapter
    - Class Projects, Activities, Laboratory Experiments

- **Summative:**
  - Quizzes
  - Common Assessment for Unit 5 (Ch 6)

Extensions:
Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading:

- Career Corner:
  - Burn Technician
- Clinical Application:
  - Indoor Tanning and Skin Cancer
  - Hair Loss
  - Acne
  - Elevated Body Temperature

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapter 6
Textbook 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
Shared Google Drive Resources

Marking Period Two:

- **Overview based on 45 days:**
  i. UNIT 6: Skeletal System (Ch 7/8)
  ii. UNIT 7: Muscular System (Ch 9)

- **Goals:**
  - **i. Understanding of:**
    1. Bone shape and structure, bone development and growth, bone function, skeletal organization (axial and appendicular). (20-25 days)
       a. Skull
          i. Bones: frontal, parietal, occipital, temporal, sphenoid, ethmoid, maxilla, palatine, zygomatic, lacrimal, nasal, vomer, inferior nasal concha, mandible, malleus, incus, stapes
          ii. 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
       b. Vertebral Column
          i. Bones: hyoid, 7 cervical vertebra (atlas/axis), 12 thoracic vertebra, 5 lumbar vertebra, sacrum, coccyx
       c. Structures: body, vertebral foramen, spineous process, transverse process, transverse foramen
       d. Thoracic Cage
          i. Bones: 24 ribs (vertebrosternal, vertebronchondral, vertebral), sternum (manubrium, body, xiphoid process)
          ii. Structures: costal cartilage, clavicular notch, sternal angle
       e. Pectoral girdle
          i. Bones: scapula, clavicle
          ii. Structures: coracoid process, acromion process, spine, glenoid cavity
       f. Upper limb
          i. Bones: humerus, radius, ulna, carpals, matacarpals, phalanx (28)
          ii. 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; sesamoid bone
       g. Pelvic Girdle
          i. Bones: ilium, ischium, pubis

ii. Structures: iliac crest, obturator foramen, acetabulum, pubic symphysis, sacroiliac joint

h. Lower Limb
   i. Bones: femur, tibia, fibula, patella, tarsal, metatarsal, phalanx (28)
   ii. Structures: head, greater trochanter, lesser trochanter, linea aspera, lateral condyle, medial condyle, interconylar fossa; tibial tuberosity, anterior crest, medial malleolus, intercondylar eminence; lateral malleolus, Achilles' tendon

i. Life-Span Changes of skeleton

2. Types of joints and joint movements with a focus on synovial joints, life-span changes of joints. (5 days)
   a. Fibrous (syndesmosis, sutures, gomphosis); cartilagenous (synchondrosis, symphysis) ; synovial (ball and socket, condylar, plane, hinge, pivot, saddle) joints.
   b. Specific synovial joints: Shoulder, elbow, hip, knee.
   c. Synovial movements: flexion, extension, hyperextension, dorsiflexion, plantar flexion, abduction, adduction, rotation, circumduction, supination, pronation, eversion, inversion, protraction, retraction, elevation, depression, opposition.
3. Structure of a skeletal muscle, physiology of muscle contraction, muscular responses, characteristics of smooth and cardiac muscle, skeletal muscle actions and muscle life-span changes. (20-25 days)
   a. Major skeletal muscles: frontalis, nasalis, procerus, occipitalis, orbicularis oculi, orbicularis oris, buccinator, zygomaticus major/minor, platysma, masseter, temporalis; sternocleidomastoid, erector spinae group (iliocostalis, longissimus, spinalis), quadratus lumborum, trapezius, rhomboid major/minor, levator scapulae, serratus anterior, pectoralis minor; coracobrachialis, pectoralis major, teres major, latissiumus 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; external oblique, internal oblique, transverse abdominus, rectus abdominis; psoas major, illiacus, 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

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

Unit 6: Skeletal System

Marking Period: 2

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2, 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Compare cellular structures and their functions in prokaryote and eukaryote cells.

   Organisms maintain homeostasis in response changing conditions via positive and negative feedback mechanisms

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

   Create a model to explain, compare, and contrast the structure and function of prokaryote and eukaryote cells.

   Plan and conduct an investigation to provide evidence and explain the function of positive and negative feedback mechanisms in maintaining homeostasis that is utilized.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

   Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

   Competencies:
   Compare and contrast the structural and functional similarities and differences among living things.

Overview:
A bone may appear to be inert because of nonliving material in the extracellular matrix of bone tissue. However, bone also includes active, living tissues: bone tissue, adipose tissue, bone marrow, cartilage, dense connective tissue, blood, and nervous tissue. Bones are not only alive, but also multifunctional. Bones, the organs of the skeletal system, support and protect softer tissues, provide points of attachment for muscles, house blood-producing cells and store inorganic salts. Students will first learn that the skeletal system is a sturdy framework that is composed of various types of bones and supporting cartilages, ligaments, and joints that not only support the structure of the body, but also protect major organs like the heart, lungs, and brain, and produce blood cells via the bone marrow. A major focus will be the structure and function of bone tissue and the dynamics of its formation and remodeling throughout life. The second area of study will focus on the anatomy of the two divisions of the skeletal system – the axial and appendicular skeleton. Students will work to memorize the major bones and markings of these two divisions. Finally, students will examine the types of joint and joint movements with a focus on the synovial joints. Life-span changes of the skeletal system will also be examined.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the skeletal system and its articulations.

Objectives:
1. Identify word roots from Chapters 7 and 8 to assess prior knowledge of anatomy terminology. (DOK 1)

2. Distinguish between long bones, short bones, flat bones, and irregular bones (DOK 2)
3. Describe the macroscopic and microscopic structure of a long bone and list the functions of these parts. (DOK 1)
4. Distinguish between intramembranous and endochondral bones and describe how bones grow, break, and repair themselves. (DOK 3)
5. Discuss the major functions of bones. (DOK 1)
6. Differentiate between the axial and appendicular skeleton (DOK 3)
7. Locate the bones that compose the skull and identify their major features. (DOK 1)
    a. Frontal
        i. Coronal suture
    b. Parietal
        i. Sagittal suture
    c. Occipital
        i. Lambdoid suture
        ii. Foramen magnum
        iii. Occipital condyle
    d. Temporal
        i. Squamous suture
        ii. Zygomatic process/arch
        iii. External acoustic/auditory meatus
        iv. Mastoid process
        v. Styloid process
    e. Sphenoid
    f. Ethmoid
    g. Maxilla
        i. Alveolar margins
    h. Palatine
    i. Zygomatic
    j. Lacrimal
    k. Nasal
    l. Vomer
    m. Inferior nasal conchae
    n. Mandible
        i. Mental foramen
        ii. Alveolar margins
    o. Malleus
    p. Incus
    q. Stapes
    r. Sinuses
        i. Frontal
        ii. Maxilla
        iii. Ethmoid
        iv. Sphenoid

8. Locate the bones that compose the vertebral column and identify their major features. (DOK 1)
    a. Hyoid
    b. Vertebrae
        i. 7 Cervical
            1. Atlas
            2. Axis
        ii. 12 Thoracic
        iii. 5 Lumbar
        iv. Sacrum
        v. Coccyx
        vi. Vertebral features:
            1. Body
            2. Vertebral foramen
            3. Spineous process
            4. Transverse process
            5. Transverse foramen
            6. Pedicle
            7. Lamina
            8. Dens
9. Locate the bones that compose the thoracic cage and identify their major features. (DOK 1)
    a. 24 ribs
        i. Vertebrosternal (true)
        ii. Vertebronchondral (false)
        iii. Vertebral (floating)
    b. Costal cartilage, clavicular notch, sternal angle
    c. Sternum
        i. Manubrium
        ii. Body of sternum
        iii. Xyphoid process
10. Locate the bones that compose the pectoral girdle and identify their major features. (DOK 1)
    a. Pectoral girdle
        i. Scapula
            1. Coracoid process, acromion process, spine, glenoid cavity/fossa
11. Locate the bones that compose the upper limb and identify their major features. (DOK 1)
    a. Upper limb
        i. Humerus
            1. Greater tubercle, lesser tubercle, head, coranoid fossa, olecranon fossa, medial epicondyle, capitulum, trochlea
        ii. Radius
            1. Radial tuberosity, styloid process, ulnar notch
        iii. Ulna

1. Trochlear notch, olecranon process, coranoid process, styloid process, radial notch

iv. Carpals
v. Metacarpals
vi. Phalanges
1. Sesamoid bone

12. Locate the bones that compose the pelvic girdle and identify their major features. (DOK 1)
    a. Pelvic Girdle
        i. Ilium
        ii. Ischium
        iii. Pubis
    b. Structures: iliac crest, obturator foramen, acetabulum, pubic symphysis, sacroiliac joint
13. Locate the bones that compose the lower limb and identify their major features. (DOK 1)
    a. Bones:
        i. Femur
            1. Head, greater trochanter, lesser trochanter, linea aspera, lateral condyle, medial condyle, intercondylar fossa
        ii. Tibia
            1. Tibial tuberosity, anterior crest, medial malleolus, intercondylar eminence
        iii. Fibula
            1. Lateral malleolus
        iv. Patella
        v. Tarsals
        vi. Metatarsals
            1. Achilles tendon
        vii. Phalanges
14. Examine the life-span changes in the skeletal system. (DOK 2)
15. Investigate the types of joints and joint movements. (DOK 3)
    a. Fibrous-syndesdmosis, sutures, gomphosis
    b. Cartilaginous—synchondrosis, symphysis
    c. Synovial—ball and socket, hinge, condyloid, plane, saddle, pivot
        i. Shoulder, elbow, hip, knee.
16. 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. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.

2. Ask the students to read and discuss chapters 7 and 8, “Skeletal System” and “Joints of the Skeletal System” and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the microanatomy.
4. Use a lab activity to allow students to investigate the microscopic structure of the skeleton. Suggested activities by not limited to this list:
    a. Possible activities:
        i. Candy microscopic bone model
        ii. Bone growth model
        iii. Long bone dissection
5. Examine types of bone fractures and show examples of each.
6. Fill in graphic organizer/guided notes/charts that identify the bones of the skull and label a skull diagram.
7. Fill in graphic organizer/guided notes/charts that identify the bones of the torso (thoracic cage and vertebral column) and label a diagram.
8. Fill in graphic organizer/guided notes/charts that identify the bones of the pectoral girdle and arm and label a diagram.
9. Fill in graphic organizer/guided notes/charts that identify the bones of the pelvic girdle and leg and label a diagram.
10. Use reference plates (p. 253-267) to locate bones and bone structures.
11. Use diagrams, coloring sheets, videos, animations, readings and/or models to provide students with resources for learning and memorizing the bones of the axial and appendicular skeleton.
12. Use a graphic organizer to allow students to distinguish between the different types of joints and movements in the body.
13. Use a lab activity to allow students to investigate the skeleton and joints. Suggested activities by not limited to this list:
    a. Practice practical exams
    b. Anatomically correct hand turkeys
    c. Full skeleton paper drawings / chalk drawings
    d. What type of bone break? X-ray laboratory
    e. Movement project
    f. Prosthetic limb design challenge
14. Review and reflect on Chapters 7 and 8 content for the common assessment.
15. Administer 2 practical exams for the skeletal system: axial and appendicular skeletons.

Assessments:

- **Diagnostic:**
    - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
    - Informal questioning
    - Teacher observation
    - Discussion questions

        - Chapter outlines

    - **Formative:**
        - Teacher observation
        - Discussion
        - Chapter practice questions within chapter
        - Chapter practice questions at the end of chapter
        - Class Projects, Activities, Laboratory Experiments
        - Bone Dissection
        - Practice Practical exams
    - **Summative:**
        - Quizzes
        - Practical exams
            - Axial
            - Appendicular
        - Common Assessment for Unit 6 (Ch 7 and 8)

Extensions:
Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner
    - Radiologic Technologist
    - Physical Therapy Assistant
- Clinical Application
    - Fractures
    - Disorders of the Vertebral Column
    - Joint Disorders
    - Replacing Joints

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapters 7 and 8
Textbook online resources—McGraw Hill Connect, Learnsmart, Anatomy & Physiology Revealed
“A Brief Atlas of the Human Body”—Lab Manuel
Supplemental readings

Internet Resources
Video Examples
Textbook images and review sheets
Anatomy coloring sheets
HHMI Biointeractive activities
TED Talks
Shared Google Drive Resources

Unit 7: Muscular System

Marking Period: 2

Standard(s):
PA Academic Standards:

3.1.12.A1 ,3.1.12.A2., 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2, 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
Everything we do to express ourselves uses muscles. Consciously controlled skeletal muscles are necessary for all coordinated movements and behind the scenes, the involuntary, non-consciously controlled smooth and cardiac muscles are active, too. Students will begin in chapter 9 by distinguishing between the types of connective tissue coverings on the muscles, as well as the microscopic structure of a skeletal muscle. The physiology of muscle contraction will be examined along with muscular responses to stimuli. Students will then briefly review the structure of cardiac and smooth muscle. Once the foundation of muscle tissue is built, students will begin to learn about approximately 75 superficial skeletal muscles. The unit will conclude with the examination of life-span changes of muscles.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the muscular system.

Objectives:
1. Identify word roots from Chapter 9 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Examine the connective tissue associated with muscles. (DOK 1)
3. Describe the microscopic structure of skeletal muscle. (DOK 1)
4. Examine the physiology of muscle contraction and analyze how muscle tissue responds to stimuli. (DOK 3, 4)
5. Investigate the impacts of temperature, energy, and fatigue on muscle tissue and performance. (DOK 3)
6. Distinguish between the structures and functions of smooth and cardiac muscle tissue. (DOK 2)
7. Identify and locate the skeletal muscles of each body region and describe the actions of each muscle. (DOK 1)
    a. Major skeletal muscles:
        i. Muscles of Facial Expression and Mastication:
            1. Frontalis, nasalis, procerus, occipitalis, orbicularis oculi, orbicularis oris, buccinator, zygomaticus major/minor, platysma, masseter, temporalis
        ii. Muscles that move the Head and Vertebral Column:
            1. Sternocleidomastoid, erector spinae group (iliocostalis, longissimus, spinalis), quadratus lumborum
        iii. Muscles that Move the Pectoral Girdle:

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

iv. Muscles that Move the Arm, Forearm, Hand:
1. Coracobrachialis, pectoralis major, teres major, latissiumus 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

v. Muscles of the Abdominal Wall:
1. External oblique, internal oblique, transverse abdominus, rectus abdominis

vi. Muscles that Move the Thigh, Leg, Foot:
1. Psoas major, illiacus, 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

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

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

Core Activities and Corresponding Instructional Methods:

1. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapter 9, "Muscular System" and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the microanatomy of skeletal muscular tissue and the connective tissue associated with muscle.
4. Use diagrams and graphic organizers to compare and contrast smooth and cardiac muscle tissue.
5. Investigate the impacts of temperature, energy, and fatigue on muscle tissue and performance.
    a Possible Laboratory Activities:
        i Muscle fatigue lab
        ii Chicken wing dissection
6. Use diagrams, coloring sheets, videos, animations, readings and/or models to provide students with resources for learning and memorizing the major muscle groups of the body.

7. Ask the students to sketch the muscles on a real picture of a person to understand the spatial relationship and where muscles are located in relation to one another.
8. Have students practice muscle movements to better understand how muscles work in antagonistic pairs.
9. Use reference plates on p. 347-258 to identify surface anatomy and cadaver plates of skeletal muscles.
10. Investigate the life-span changes of muscle and the role of exercise to maintain a healthy muscular system as the body ages.
11. Review and reflect on Chapter 9 content for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 7 (Ch 9)

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner:
  - Massage Therapist
- Clinical Application:
  - Some Muscular System Disorders
  - Use and Disuse of Skeletal Muscles
  - TMJ Syndrome

Disorders and Life-Span Issues
Video resources

Correctives:

Review objectives
Chapter reviews

Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapter 9
Textbook online resources—McGraw Hill Connect, Learnsmart, Anatomy & Physiology Revealed
“A Brief Atlas of the Human Body”—Laboratory Manuel
Supplemental readings
Internet Resources
Video Examples
Textbook images and review sheets
Anatomy coloring sheets
HHMI Biointeractive activities
TED Talks
Shared Google Drive Resources

Marking Period Three:

- **Overview based on 45 days:**
  i. UNIT 8: Nervous System and Special Senses (Ch 10, 11, 12)
  ii. UNIT 9: Endocrine System (Ch 13)
  iii. UNIT 10: Blood and Cardiovascular System (Ch 14, 15)

- **Goals:**
  i. Understanding of:
    1. General characteristics and functions of the nervous system, nervous system cell structure and function, synapse, cell membrane potential, synaptic transmission and impulse processing, characteristics and divisions of the nervous system, meninges, ventricles and cerebrospinal fluid, brain, spinal cord, peripheral nervous system, autonomic nervous system, life-span changes of nervous system. (15-20 days)
    2. General characteristics of sensory functions, receptors, sensation, and perception, general senses, special senses, life-span changes of sensory function. (7-10 days)
    3. General characteristics of the endocrine system, endocrine glands and hormones, impacts of stress, life-span changes of the endocrine system. (3-5 days)
    4. Characteristics of blood, blood cells (erythrocytes, leukocytes, thrombocytes), plasma, hemostasis, blood groups and transfusions. (3-5 days)
    5. Characteristics of the cardiovascular system, the heart, major blood vessels, blood pressure, arterial and venous systems, life-span changes of the cardiovascular system. (7-10 days)

Unit 8: Nervous System and Special Senses

Marking Period: 3

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
The nervous system exerts precise control over many of the body's functions, and its responsible for your awareness of some of what is happening around you.
Students will begin in chapters 10 and 11 by examining the general characteristics and functions of the nervous system. They will look at nervous system cell structure and function, identify the synapse, cell membrane potential, and impulse processing. The central and peripheral nervous system will be explored and well as the autonomic nervous system. Basic structures of the nervous system like the meninges, ventricles, brain and spinal cord anatomy, and life-span changes will be examined. Students will look at the general characteristics of sensory function, including receptors, sensation and perception. The general senses and special senses will also be examined in chapter 12.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the nervous system (neural histology, central nervous system, peripheral nervous system, autonomic nervous system, general senses and the special senses).

Objectives:
1. Identify word roots from Chapters 10, 11, 12 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
3. Describe the general functions of the nervous system. (DOK 1)
4. Identify the two types of cells that compose nervous tissue and their cell structure and function. (DOK 1)
5. Examine the functions of sensory receptors. (DOK 3)
6. Distinguish between cells and tissues that make up the nervous system (DOK 2)
7. Describe specific structural and functional characteristics of the two types of neural tissues (neurons and neuroglia) (DOK 2)
8. Distinguish between the structural and functional divisions of the nervous system (DOK 2)
9. Define neuron and its structural and functional components (DOK 2)
10. Classify neurons structurally and functionally (DOK 2)
11. Examine neurophysiology. (DOK 3)
12. Define the major brain anatomy: regions, ventricles, lobes, fissures, functional areas, divisions, and the cerebellum and spinal cord (DOK 1)

13. Describe the major regions of the brain stem, midbrain, and forebrain (DOK 1)
14. Dissect an animal brain to further explore the anatomy. (DOK 3)
15. Describe the spinal cord and its structure and function (DOK 2)
16. Explain how higher mental functions are distinguished, measured, and clinically e valuated (DOK 3)
17. Examine the structures that protect the CNS (DOK 2)
18. Explain how the CNS helps to maintain homeostasis. (DOK 1)
19. Explain the parts of the peripheral nervous system (DOK 3)
20. Explain how general sensory receptors are classified and identified (DOK 3)
21. Identify sensory adaptation (DOK 1)
22. Define sensation and its perception (DOK 1)
23. Explain the parts and functions of the cranial nerves and spinal nerves (DOK 3)
24. Examine how to determine dysfunction of cranial and spinal nerves (DOK 2)
25. Describe motor activities (DOK 1)
26. Define a reflex arc (DOK 1)
27. Test and explain basic reflexes (DOK 2)
28. Identify the autonomic nervous system and its relationship with the peripheral nervous system (DOK 1)
29. Compare and contrast the sympathetic and parasympathetic nervous systems (DOK 3)
30. Differentiate between general senses and special senses. (DOK 3)
31. Describe the differences among receptors associated with the senses of touch, pressure, temperature, and pain. (DOK 2)
32. Explain the relationship between the senses of smell and taste and examine the anatomy of these sense organs. (DOK 3)
33. Name the parts of the ear and explain the function of each part. (DOK 1)
34. Name the parts of the eye and explain the function of each part. (DOK 1)
35. Dissect an eye to examine the anatomy. (DOK 3)
36. Describe the aging-associated changes to the nervous system and the diminishing capacity of the senses. (DOK 2)

Core Activities and Corresponding Instructional Methods:

1. Ask the students to read and discuss chapters 10, 11, and 12, “The Nervous System” and “Special Senses” and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
2. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the anatomy of the nervous system and sensory organs.
3. Use notes and note outlines paired with diagrams to explore the structures and functions of the nervous system and sensory organs.
4. Ask students to label diagram sheets, observe neurological slides, and sketch the various aspects of the nervous system to understand the spatial relationships and how the nervous system works together to maintain homeostasis.
5. Complete various labs to explore the nervous system, including but not limited to:
    a. Reaction time lab

b. Sheep brain dissection
c. Cranial nerve lab
d. Cerebellum function lab
e. Reflex lab
f. Sheep eye dissection
g. Vision testing
h. Senses challenge
i. Smell and taste discrimination
j. Senses challenge interactive lab
k. Visually impaired catch
l. Mapping blind spots lab activity
m. Vision testing lab

6. Read and review current issues and articles, as well as the clinical connections in the textbook for chapters 11-12 to examine issues related to the nervous system and the sensory organs.
7. Present various video resources that deal with neurological disorders and some signs and symptoms. (The Body Series)
8. Review and reflect nervous system anatomy and physiology in preparation for the Nervous system common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 8 (Ch 10, 11, 12)

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner:
  - Pharmacist
  - Occupational Therapist

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

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapters 10, 11, 12
Textbook 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
Shared Google Drive Resources

Unit 9: Endocrine System

Marking Period: 3

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C,CC.3.6.11-12.D, CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
The hormones that the endocrine system produces have many and diverse effects on the body. The endocrine system is all about communication as cells secrete chemicals that act on other cells. Whereas the nervous system releases neurotransmitter molecules at synapses, the endocrine system releases its characteristic substances, hormones, into the bloodstream. Some hormones act briefly, others have quite long-lasting effects. Hormone actions may be subtle, their levels requiring constant adjustment to maintain homeostasis. Other hormones have dramatic effects, from overseeing the gradual growth and development of an infant into a toddle, and adolescent, and then an adult, to the immediate excitement of participating in an athletic competition.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the endocrine system.

Objectives:
1. Identify word roots from Chapter 13 to assess prior knowledge of anatomy 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. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapter 13, “The Endocrine System” and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, models, note outlines, and notes to provide students with resources for learning and mastering the anatomy of the endocrine system.

4. Use notes and note outlines to examine the structure and function of the endocrine system and its various hormones.
5. Read and review current issues and articles related to the endocrine system and hormones, including the clinical applications within Chapter 13.
6. Complete hormone and gland flow charts or organizers to show glands, hormones, and issues.
7. Review and reflect on the structures and functions of the endocrine system in preparation of the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 9 (Ch 13)

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner:
  - Diabetes Educator
- Clinical Applications:
  - Abusing Hormones to Improve Athletic Performance
  - Growth Hormone Ups and Downs
  - Disorders of the Adrenal Cortex
  - Diabetes Mellitus
- From Science to Technology
  - Treating Diabetes

Disorders and Life-Span Issues
Video resources

Correctives:

Review objectives

Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapter 13
Textbook 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
Shared Google Drive Resources

Unit 10: Blood and Cardiovascular System

Marking Period: 3

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1,3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C,CC.3.6.11-12.D,CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include: atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
Blood signifies life; it has many vital functions. This complex mixture of cells, cell fragments, and dissolved bio chemicals carries nutrients, oxygen, wastes, and hormones; helps maintain the stability of the intestinal fluid; and distributes heat. The blood, heart, and blood vessels form the cardiovascular system and link the body's internal and external environments. The heart pumps about 7,000 liters of blood through the body each day, contracting about 2.5 billion time sin an average lifetime. This muscular pump forces blood through arteries, which connect to smaller-diameter vessels called arterioles. Arterioles branch into the tiniest tubes, the capillaries, which are sites of nutrient, electrolyte, gas, and waste exchange. Capillaries converge into venules, which in turn converge into veins that return blood to the heart, completing the closed system of blood circulation.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the blood and cardiovascular system.

Objectives:
1. Identify word roots from Chapters14 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. (DOK 3)
    a. Erythrocytes, Leukocytes, Thrombocytes
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. State the structures and functions of the heart, including the pericardium, heart wall, atria, ventricles, and valves. (DOK 1)
9. Summarize cardiac muscle activity and electrical conduction and correlate these events to an electrocardiogram (DOK 2)
10. Compare and contrast different types of blood vessels, both structurally and functionally. (DOK 3)
11. Summarize the flow of blood through the heart and the entire body. (DOK 2)
12. Distinguish between pulmonary and systemic circulation. (DOK 2)

13. Identify major arteries and veins. (DOK 1)
14. Describe the life-span changes in the cardiovascular system. (DOK 1)

Core Activities and Corresponding Instructional Methods:

1. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapters 14, 15, “Blood” and “The Cardiovascular System” and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the blood and cardiovascular system.
4. Observe preserved slides of blood under a microscope or magnified images of blood smears.
5. Complete blood typing laboratory with synthetic blood.
6. Read and review current issues and articles related to blood.
7. Generate guided exploration on the flow of blood through the heart and body.
8. Dissect sheep hearts.
9. Instruct students on taking blood pressures and vital signs.
10. Review and reflect blood and cardiovascular system topics in preparation of the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 10 (Ch 14, 15)

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner:

    - Blood bank technologist
    - Perfusionist
- 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
- From Science to Technology
    - Altering Angiogenesis

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapters 14 and 15
Textbook 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
Shared Google Drive Resources

Marking Period Four:

- **Overview based on 45 days:**
  i. UNIT 11: Lymphatic System and Immunity (Ch 16)
  ii. UNIT 12: Digestive System, Nutrition and Metabolism (Ch 17, 18)
  iii. UNIT 13: Respiratory System (Ch 19)
  iv. UNIT 14: Urinary System, Water, Electrolyte, and Acid-Base Balance (Ch 20, 21)
  v. UNIT 15: Reproductive System, Pregnancy, Growth, and Development, Genetics and Genomics (Ch 22, 23, 24)
  vi. UNIT 16: Fetal Pig Dissection

- **Goals:**
  i. Understanding of:
    1. Lymphatic pathways, tissue fluid and lymph, lymphatic organs and tissues, bodily defenses against disease, life-span changes of lymphatic system. (5-7 days)
    2. Characteristics of the digestive system, organs of the digestive system and functions (mouth, salivary glands, pharynx, esophagus, stomach, pancreas, liver, gallbladder, small intestine, large intestine), life-span changes of digestive system; cellular use of nutrients, metabolism, healthy eating. (7-10 days)
    3. Respiratory system organs, breathing mechanism, control of breathing, gas exchanges and transport, life-span changes of respiratory system. (7-10 days)
    4. Characteristics of urinary system, kidneys, urine formation, storage, and elimination, life-span changes of urinary system, body fluid balance, compensation. (5-7 days)
    5. Meiosis and sex cell formation, overview of male and female reproductive systems (organs and hormones); pregnancy, prenatal period, postnatal period, aging, genetics and genomics. (7-10 days)
    6. Fetal Pig Dissection (3-4 days)

Unit 11: Lymphatic System and Immunity

Marking Period: 4

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D,CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
Students will begin in chapter 16 by investigating lymphatic tissues, cells, and vessels. They will become aware of their locations in the body and understand the structure and function of lymph nodes and other lymphoid organs. In chapter 21 the students will observe how these organs work together to make up the immune system. They will understand the difference between innate and adaptive defenses and see how the immune system plays a role in homeostatic balances.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the lymphatic system and immunity.

Objectives:
1. Identify word roots from Chapter 16 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Identify the functions of the lymphatic system. (DOK1
3. Interpret the lymphatic network. (DOK 2)
4. List and define the major organs of the lymphatic system based on location and function. (DOK 1)
5. Compare and contrast specific and nonspecific body defenses. (DOK 2)
6. Examine allergic reactions. (DOK 3)
7. Identify major disorders of the lymphatic system and their treatment. (DOK 1)
8. Describe life-span changes in immunity. (DOK 1)

Core Activities and Corresponding Instructional Methods:
1. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapter16, “Lymphatic System and Immunity” and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the concepts of the lymphatic/immune system.
4. Provide study guides and discussions on specific and nonspecific defenses.
5. Review and reflect on concepts of the lymphatic system and the immune response for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 11 (Ch 16)

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner:
  - Public Health Nurse
- Clinical Applications:
  - Immunity Breakdown: HIV/AIDS
- From Science to Technology
  - Immunotherapy

Disorders and Life-Span Issues
Video resources

Correctives:

Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:

Primary textbook—Chapter 16
Textbook online resources—McGraw Hill Connect, Learnsmart, Anatomy & Physiology Revealed
Supplemental readings
Internet Resources

Video Examples
Textbook images and review sheets
Anatomy coloring sheets
HHMI Biointeractive activities
TED Talks
Shared Google Drive Resources

Unit 12: Digestive System, Nutrition, and Metabolism

Marking Period: 4

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D,CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
The main part of the digestive system is a long tube that extends through the body. The inside of the tube is part of the outside world, not part of the internal environment. Whereas the pH, electrolyte concentrations, and water volume of the internal environment are tightly regulated, they change from the beginning of the tube to its end and vary with the chemical nature of what we eat. Material that enters the tube is first broken down into its chemical building blocks, such as simple sugars, amino acids, nucleotides, fatty acids, and glycerol, and then absorbed across the body then recombines those building blocks into the molecules it needs. As long as all of the necessary amino acids are present in your diet in sufficient amounts, the digestive system will bring them into the internal environment, and you will be able to maintain metabolic homeostasis.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the digestive system and observe their role in the absorption of nutrients.

Objectives:
1. Identify word roots from Chapters 3 and 4 to assess prior knowledge of anatomy terminology. (DOK 1)
2. Define the processes of digestion. (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. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapters 17 and 18, “Digestive System” and “Nutrition and Metabolism” and present vocabulary and concepts in a way

that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the concepts of the digestive system.
4. Give direct instruction on the events of digestion, absorption, and elimination of waste with models, demonstrations, and video clips.
5. Preform various demonstrations and laboratory activities as applicable.
6. Review and reflect the content of the digestive and metabolic concepts for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 13

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner
  - Endoscopy Technician
  - Registered Dietician
- 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

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapters 17, 18
Textbook 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
Shared Google Drive Resources

Unit 13: Respiratory System

Marking Period: 4

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D,CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
Obtaining oxygen and removing carbon dioxide are the primary functions of the respiratory system. This system includes tubes that remove particles from incoming air and transport air into and out of the lungs, as well as microscopic air sacs where gases are exchanged. Parts of the brainstem control breathing automatically, constantly brining in oxygen to support aerobic production of ATP and constantly eliminating carbon dioxide. The respiratory system produces vocal sounds, participates in the sense of smell and plays a role in the regulation of blood pH.

Goals:
Students will examine the functional anatomy of the respiratory system. They will identify the organs involved and analyze their function in gas exchange in the body. They will then analyze how gas exchange happens within the capillaries and learn how the body organs work together to make this happen. Finally, they will observe how respiration is controlled and what homeostatic balances it maintains.

Objectives:
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. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.

2. Ask the students to read and discuss chapter 19 “Respiratory System” and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the concepts of the respiratory system.
4. Provide study guides, discussions, models, and video clips on the events of inspiration and expiration.
5. Direct instruction on Boyle’s Law.
6. Preform Lung Physiology laboratory.
7. Review and reflect on the key concepts of the respiratory system for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 13

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career corner:
  - Respiratory Therapist
- Clinical Application:
  - The Effects of Cigarette Smoking on the Respirator System
  - Lung Irritants
  - Respiratory Disorders that Decrease Ventilation: Bronchial Asthma and Emphysema
  - Exercise and Breathing
  - Effects of High Altitude
  - Disorders that Impact Gas Exchange

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapter 19
Textbook 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
Shared Google Drive Resources

Unit 14: Urinary System, Water, Electrolyte, and Acid-Base Balance

Marking Period: 4

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D,CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
A main theme in anatomy and physiology is the maintenance of a stable internal environment. We add substances to our internal environments every day. Despite all of the challenges to maintaining a constant internal environment, the composition of our body fluids remains remarkably steady, thanks largely to the urinary system. The urinary system is amazingly reliable. The kidneys excrete exactly the right amounts of whatever we take in to ensure that the composition and even the total volume of body fluids say in a range compatible with life. Each substance is handled separately. The kidneys are working constantly, yet for an occasional trip to empty the bladder, we are unaware from the moment to moment of all that they do.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the urinary system as well as the water, electrolyte, and acid-base balance.

Objectives:
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. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapters 20 and 21 and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the concepts of the urinary system, urinary organs (kidney, ureter, bladder, urethra), urine formation, storage, and elimination.
4. Examine the body fluid balance and compensation.

5. Review and reflect on the content from Chapters 20 and 21 for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words to introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 14

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner:
  - Dialysis Technician
  - Medical Technologist
- Clinical Application:
  - Glomerulonephritis
  - The Nephrotic Syndrome
  - Chronic Kidney Disease
  - Urinalysis: Clues to Health
  - Water Balance Disorders
  - Sodium and Potassium Imbalances

Disorders and Life-Span Issues
Video resources

Correctives:

Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapters 20, 21
Textbook 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
Shared Google Drive Resources

Unit 15: Reproductive System, Pregnancy, Growth, and Development, Genetics and Genomics

Marking Period: 4

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D,CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

Competencies:
Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

   Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

   Competencies:
   Compare and contrast the structural and functional similarities and differences among living things.

Overview:
Students will begin by examining meiosis and sex cell formation and will complete an overview of the male and female anatomy including special organs, sex cells and hormones involved in the creation of a zygote. Students will examine pregnancy, the prenatal period, postnatal period, aging, genetics, and genomics.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of the reproductive systems, pregnancy, and genomics.

Objectives:
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. Understanding words vocabulary roots will be introduced and discussed to assess prior knowledge.
2. Ask the students to read and discuss chapters 22-24, and present vocabulary and concepts in a way that students can use as a study tool and mastery of the main ideas and terminology.
3. Use diagrams, coloring sheets, videos, animations, readings, and/or models to provide students with resources for learning and mastering the concepts of the reproductive system, pregnancy, aging, and genomics.
4. Provide study guides and discussions on spermatogenesis and oogenesis.
5. Provide study guides and discussion on hormones and the processes and cycles of the male and female reproductive system.
6. Create a flow chart showing the process of fertilization.
7. Assign students a mini-research assignment on a specific stage of pregnancy. Students will present the pregnancy stage to the class.
8. Analyze the aging process and the role of genomes aging through reading assignments and current events.
9. Review and reflect on the content from Chapters 22,23,24 for the common assessment.

Assessments:

- **Diagnostic:**
  - Understanding words introduce word roots/parts and identify prior knowledge of anatomy terminology
  - Informal questioning
  - Teacher observation
  - Discussion questions
  - Chapter outlines

- **Formative:**
  - Teacher observation
  - Discussion
  - Chapter practice questions within chapter
  - Chapter practice questions at the end of chapter
  - Class Projects, Activities, Laboratory Experiments
- **Summative:**
  - Quizzes
  - Common Assessment for Unit 15

Extensions:

Teacher demonstrations
Extended reading—current events, articles, case studies
Textbook reading

- Career Corner:
  - Nurse-Midwife
  - Physician's Assistant
  - Genetic Counselor

- 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
- From Science to Technology:
    - Preimplantation Genetic Diagnosis

Disorders and Life-Span Issues
Video resources

Correctives:
Review objectives
Chapter reviews
Study guides
Guided reading
Anatomy coloring sheets
Reteach and retest important concepts including introductory vocabulary

Materials and Resources:
Primary textbook—Chapters 22, 23, 24
Textbook 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
Shared Google Drive Resources

Unit 16: Fetal Pig Dissection

Marking Period: 4

Standard(s):
PA Academic Standards:

3.1.12.A1, 3.1.12.A2, 3.1.12.A5, 3.1.12.A6, 3.1.12.A7, 3.4.12.B1, 3.1.B.A1, 3.1.B.A2. 3.1.B.A8.

PACS Reading and Writing for Science and Technology:

CC.3.6.11-12.C, CC.3.6.11-12.D,CC.3.6.11-12.E, CC.3.6.11-12.H.

Anchor(s):

BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.4.2

Big Idea(s): http://www.pdesas.org/CMap/CFramework

1. All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

   Essential Questions:
   How do organisms live, grow, respond to their environment and reproduce?

   Concepts:
   Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

   Competencies:
   Formulate scientific explanations through models to explain the hierarchical organization of interacting systems working together to provide specific functions within multicellular organisms.

2. Unifying Themes: Structure and Function: The way in which an object or living thing is shaped determines many of its properties and functions.

   Essential Questions:
   How is form related to function?

   Concepts:
   The pattern of form following function is reflected at all biological levels of organization.

Biological levels of organization from smallest to largest include atoms, molecules, organelles, cells, tissues, organs, organ systems, multicellular organisms, populations, and communities.

Competencies:
Compare and contrast the structural and functional similarities and differences among living things.

Overview:
Students will dissect fetal pigs as a review of all the body systems. They will observe external and internal features, identify organs, and review the functions of each organ. They will also identify the pigs as male or female based on external and internal features. Students will finally relate what they see in the fetal pig to their own bodies focusing on the similarities in both their anatomy and physiology.

Goals:
For students to be able to identify and describe the major structural and functional characteristics of all the body systems combined by dissecting a fetal pig.

Objectives:
1. Identify all the organs and systems of the fetal pig (or similar comparative organism) based on location and structure. (DOK 1)
2. Relate the organs of the fetal pig to the functions of each body system. (DOK 2)
3. Compare and contrast fetal pig anatomy to human anatomy. (DOK 3)
4. Connect all anatomy and physiology covered in the course. (DOK 4)
5. Apply all concepts from the year by completing a summative evaluation (common assessment) of the course material. (DOK 4)

Core Activities and Corresponding Instructional Methods:
1. Review all body systems through the dissection of the fetal pig, other models, charts, summaries, and video clips.
2. Review all the systems of the body using various techniques, games, or internet activities.
3. Supervise the dissection of the fetal pig or a similar alternative assignment.
4. Administer a common assessment that covers material from all course units.

Assessments:
- **Diagnostic:**
  - Informal questioning
  - Teacher observation
  - Discussion questions
- **Formative:**
  - Teacher observation
  - Discussion
- **Summative:**

- Fetal Pig Lab Report
- Anatomy Common Assessment

Extensions:
Teacher demonstrations
Video resources

Correctives:
Fetal Pig diagrams
Video examples
Review of previous units for comparison

Materials and Resources:
Primary textbook—Chapters 3 and 4
Textbook online resources—McGraw Hill Connect, Learnsmart, Anatomy & Physiology Revealed
Supplemental readings
Internet Resources
Video Examples
Shared Google Drive Resources
ZSpace alternative dissection
Fetal Pig Dissection manual and alternative assignment

APPENDIX:
Standard(s):
PA Academic Standards:
http://static.pdesas.org/content/documents/Academic_Standards_for_Science_and_Technology_and_Engineering_Education_(Secondary).pdf

3.1.12.A1. Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms.
3.1.12.A2. Evaluate how organisms must derive energy from their environment or their food in order to survive.
3.1.12.A5. Analyze how structure is related to function at all levels of biological organization from molecules to organisms.
3.1.12.A6. Analyze how cells in different tissues/organs are specialized to perform specific functions.
3.1.12.A7. Evaluate metabolic activities using experimental knowledge of enzymes. Describe the potential impact of stem cell research on the biochemistry and physiology of life.
3.4.12.B1. Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
3.1.B.A1. Describe the common characteristics of life.
3.1.B.A2. Explain the important role of ATP in cell metabolism. Explain why many biological macromolecules such as ATP and lipids contain high energy bonds. Explain the importance of enzymes as catalysts in cell reactions. Identify how factors such as pH and temperature may affect enzyme function.
3.1.B.A8. CHANGE AND CONSTANCY Recognize that systems within cells and multicellular organisms interact to maintain homeostasis.

PACS Reading and Writing for Science and Technology:
http://static.pdesas.org/content/documents/PA%20Core%20Standards%20for%20Writing%20in%20Science%20and%20Technical%20Subjects%20March%202014.pdf

CC.3.6.11-12.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CC.3.6.11-12.D. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience
CC.3.6.11-12.E. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.

Anchor(s):
https://www.stateboard.education.pa.gov/Documents/About%20the%20Board/Board%20Actions/2010/Keystones%20Biology%20Anchors%20and%20Eligible%20Content%20September%2016%202010.pdf

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.2.2 Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).
BIO.A.4.2 Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.

Primary Textbook(s) Used for this Course of Instruction

Name of Textbook: Hole's Human Anatomy & Physiology, Fifteenth Edition

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

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

Curriculum Textbook is utilized in (title of course):

Anatomy and Physiology

DELAWARE VALLEY SCHOOL DISTRICT

Checklist to Complete and Submit:
(Scan and email)

_____ Copy of the curriculum using the template entitled "Planned Instruction," available on the district website.

_____ The primary textbook form(s).

_____ The appropriate payment form, in compliance with the maximum curriculum writing hours noted on the first page of this document.

Each principal and/or department chair has a schedule of First and Second Readers/Reviewers. Each Reader/Reviewer must sign & date below.

First Reader/Reviewer Printed Name_____
First Reader/Reviewer Signature_____
Date_____

Second Reader/Reviewer Printed Name_____
Second Reader/Reviewer Signature _____
Date_____

DELAWARE VALLEY SCHOOL DISTRICT

WRITE IN INK ONLY

CURRICULUM

DELAWARE VALLEY SCHOOL DISTRICT
AUTHORIZATION FOR PAYMENT

Name:	Building:
Grade Level (Elementary Only):	Subject Area (Secondary Only):
Account Code:	Date:

Date	Service Provided (If Sub, Note Who Was Out)	No. of Hours (If Applicable)	Per Diem Hourly Rate	Total

Total Payment _____

I have completed all activities described above and have returned all equipment and materials for which I am responsible.

*This form must be submitted by an employee for payment for the following services:
(1) Substitute teacher, instructional assistant, clerical, etc.
(2) Homebound instruction
(3) Extra Curricular work i.e., coaching, intramural, club or class advisor, director for band, chorus, drama, etc., Approved Activities

This form must be submitted to the Business Office eight days prior to the payroll date.

Signature of Employee	Date
Athletic Director (if applicable)	Date
Principal/Supervisor (if applicable)	Date
Business Administrator	Date
Superintendent or Designee	Date

Revised: August 20, 2001