

Subject: Human Anatomy & Physiology I

Unit 1: Introduction to Human Anatomy and Physiology

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area School District

School: High School

Brief Summary of Unit:

The structure and function of the human body have been studied for millennia. Understanding anatomy and physiology provides us with a framework for understanding humans.

Unit 1: Introduction to Human Anatomy and Physiology

Section 1: Body Plan and Organization

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.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

Overarching Understanding:

- Body plan and organization is the basis for understanding the human form.

Topical Understandings:

- The terminology of A&P is the basis of future understanding.
- Biological levels of organization are a hierarchy that explains the organization of the human body.
- Knowing anatomical position is imperative to learning the locations of anatomical structures.
- Body planes and sections explain different views.

Essential Questions:

- Why is it difficult to separate a body part's anatomy from its physiology?
- How does form follow function?
- How is our body organized into cavities and regions?
- How do relative anatomic positions relate to positions of various organs?

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| <ul style="list-style-type: none"> • Body cavities and regions house organs and explain the organization of the human body. • Relative anatomic terms tell the relative position of body parts. | |
| Knowledge: | Skills: |
| <ul style="list-style-type: none"> • Vocabulary: anatomy, physiology, axial, appendicular, dorsal, ventral, anterior, posterior, thoracic, abdominal, pelvic, visceral membrane, parietal membrane, superior, inferior, medial, lateral, proximal, distal, superficial, deep, epigastric, hypochondriac, umbilical, lumbar, hypogastric, inguinal, sagittal, transverse, coronal. • Anatomy and physiology are interrelated. • Body cavities are named according to position. • Specific organs are located in certain cavities and have relative positions. • Locations of body cavities and the organs within each. • Difference between parietal and visceral membranes. | <ul style="list-style-type: none"> • Define anatomy and physiology and explain how they are interrelated. • Explain biological levels of organization. • Describe the locations of major body cavities. • List the organs located in each body cavity. • Name and explain the membranes associated with the thoracic and abdominopelvic body cavities. • Properly use the terms that describe relative body positions, body sections, and body regions. |

Unit 1: Introduction to Human Anatomy and Physiology

Section 2: Homeostasis

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| <p>3.1.12.A1. Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms.</p> <p>3.1.12.A5. Analyze how structure is related to function at all levels of biological organization from molecules to organisms.</p> <p>3.1.12.A8. CHANGE AND CONSTANCY Describe and interpret dynamic changes in stable systems.</p> |
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| <p>Overarching Understanding:</p> <ul style="list-style-type: none"> • The structures and functions of body parts are very closely related. • Form follows function, and function follows form. • Homeostasis is essential to maintaining a properly functioning organism. |
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| Topical Understandings: | Essential Questions: |
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| <ul style="list-style-type: none"> • Maintenance a stable internal environment is necessary for life. • Homeostatic mechanisms maintain this stability. • Most homeostatic mechanisms are controlled through negative feedback. | <ul style="list-style-type: none"> • How important is homeostasis to survival and health? • What is the necessity of learning the language of anatomy? • How is set point related to homeostasis? |
| Knowledge: | Skills: |
| <ul style="list-style-type: none"> • Vocabulary: homeostasis, set point, feedback, negative feedback, positive feedback • Feedback mechanisms are necessary for maintaining homeostasis. • At least 3 homeostatic mechanisms - 2 controlled by negative feedback, and 1 controlled by positive feedback. | <ul style="list-style-type: none"> • List the survival needs of the human body. • Define homeostasis and explain the importance. • Define negative feedback and describe its role in maintaining homeostasis and normal body function. • List general types of homeostatic mechanisms. |

Assessment

| Evaluation Criteria | Evidence of Understanding |
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| <ul style="list-style-type: none"> • Homework • Quizzes • Tests • Projects • Inquiry Based Activities • Class discussion/ group work | <ul style="list-style-type: none"> • Explain how anatomy and physiology are related. • Describe the anatomical position verbally or demonstrate it. • Use the proper anatomical terminology to describe body directions, surfaces, and body planes. • Make predictions related to homeostatic imbalances. • Use modeling to explain the function of positive and negative feedback mechanisms in maintaining homeostasis that is essential for humans. • Create an authentic scenario modeling how the cell membrane maintains homeostasis. |

Materials and Resources

| Source | Description of Use |
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| <ul style="list-style-type: none"> • A&P text: Hole’s Essentials of Human Anatomy and Physiology, 9th edition. • Human torso model • Articulated human skeleton • Direct teacher instruction • Demonstrations • Laboratory experiments • Mini-activities (e.g. simulations) • Worksheets (e.g. anatomy coloring book) • Computer-assisted instruction | <ul style="list-style-type: none"> • Materials necessary to complete the performance tasks. |
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Subject: Human Anatomy & Physiology I

Unit 2: Transport Across Membranes

Grade Level: 11-12

Designed by: Maria O’Boyle

School District: Tunkhannock Area School District

School: High School

Brief Summary of Unit:

Transport across the cell membrane: The cell exchanges materials through the cell membrane using passive and active transport. Three types of passive transport are osmosis, diffusion, and facilitated diffusion. Osmosis is the natural movement of water from a high concentration of water to a lower concentration of water. Diffusion is the natural movement of molecules from a higher concentration to a lower concentration. Facilitated Diffusion is the natural movement of molecules from a higher concentration to a lower concentration with the help of a transporter protein embedded on the cell membrane.

Active transport requires energy to occur. Active transport is “forced” movement of molecules from a lower concentration to a higher concentration. The most common type of active transport is a pump. Pumps are proteins embedded in the cell membrane, which use ATP energy to work.

Unit 2: Transport

3.1.12.A5.
Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A1: Relate changes in the environment to various **organisms'** ability to compensate using homeostatic mechanisms.

Overarching Understanding:

- Transport across cell membranes is essential for proper metabolism and maintaining homeostasis.

| Topical Understandings: | Essential Questions: |
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| <ul style="list-style-type: none"> • Explain how substances move through cell membranes. • Relate transport to homeostasis. | <ul style="list-style-type: none"> • How are transport mechanisms related to homeostasis? • Why is active transport essential to conduction of impulses in the body? • What is the role played by the cell membrane in transport of materials? |
| Knowledge: | Skills: |
| <ul style="list-style-type: none"> • Vocabulary: passive transport, diffusion, osmosis, facilitated diffusion, filtration, dynamic equilibrium, osmotic balance, solvent, solute, solution, osmotic pressure, isotonic, hypotonic, hypertonic, plasmolysis, cytolysis, endocytosis, phagocytosis, pinocytosis, exocytosis, active transport, concentration gradient | <ul style="list-style-type: none"> • With respect to the following membrane transport processes – simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, & filtration: <ul style="list-style-type: none"> • State the type of material moving in each process. • Give examples of each process in the human body. |

Assessment

| Evaluation Criteria | Evidence of Understanding |
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| <ul style="list-style-type: none"> • Homework • Quizzes • Tests • Projects • Inquiry Based Activities • Class discussion/ group work | <ul style="list-style-type: none"> • Describe the mechanism by which movement of material occurs in each process. • Discuss the energy requirements and, if applicable, the sources of energy for each process. • Demonstrate various cell transport processes and, given appropriate information, predict the outcomes of these demonstrations. • Provide specific examples to demonstrate how individual cells respond to their environment (e.g., in terms of organelle function, transport processes, protein synthesis, or regulation of cell cycle) in order to maintain homeostasis in the body. • Predict factors or situations that could disrupt organelle function, transport processes, protein synthesis, or the cell cycle. |

- Predict the types of problems that would occur if the cells could not maintain homeostasis due to abnormalities in organelle function, transport processes.

Materials and Resources

| Source | Description of Use |
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| <ul style="list-style-type: none"> • A&P text: Hole’s Essentials of Human Anatomy and Physiology, 9th edition. • Direct teacher instruction • Demonstrations • Laboratory experiments • Mini-activities (e.g. simulations) • Worksheets (e.g. anatomy coloring book) • Computer-assisted instruction | <ul style="list-style-type: none"> • Materials necessary to complete the performance tasks. |

Subject: Human Anatomy & Physiology I

Unit 3: Cellular Metabolism

Grade Level: 11-12

Designed by: Maria O’Boyle

School District: Tunkhannock Area School District

School: High School

Brief Summary of Unit:

Cells require energy and information to build and maintain the human body. A cell is the site of many metabolic reactions that maintain life. Proteins called enzymes control the interrelated reactions of metabolism.

Unit 3: Cellular Metabolism

- 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.A7.

Evaluate metabolic activities using experimental knowledge of enzymes.
 Describe the potential impact of stem cell research on the biochemistry and physiology of life.
 3.1.12 B5.
 PATTERNS
 Relate the monomer structure of biomacromolecules to their functional roles.

Overarching Understanding:

- Metabolism is the sum of chemical reactions in a cell.
- Metabolic reactions are regulated by enzymes.

| Topical Understandings: | Essential Questions: |
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| <ul style="list-style-type: none"> • Enzymes are necessary for metabolic reactions to take place. • Enzymes are necessary for metabolic reactions to take place quickly at normal body temperature. • Enzymes affect only specific substances called substrates. • Metabolism includes hundreds of specific chemical reactions that occur rapidly. | <ul style="list-style-type: none"> • How are anabolic and catabolic reactions related? • How do enzymes work to lower activation energy required for metabolic reactions? |
| Knowledge: | Skills: |
| <ul style="list-style-type: none"> • Vocabulary: anabolism, catabolism, enzyme, substrate, active site, activation energy, ATP, aerobic respiration, anaerobic respiration • Anabolic and catabolic reactions occur in different body systems. • Enzymes are three dimensional proteins that must fit with their substrate's active site. • Aerobic respiration produces more ATP molecules than anaerobic respiration. | <ul style="list-style-type: none"> • Define metabolism, anabolism and catabolism. • Explain why enzymes are necessary to metabolic reactions. • Provide examples of anabolic and catabolic reactions • Describe the processes of glycolysis, formation of acetyl CoA, the Krebs's (TCA) cycle, and the electron transport chain, including the substrates and products of each, their locations within the cell and the energy yield of each process. • Provide specific examples to demonstrate how metabolic processes respond to maintain homeostasis in the body. |

Assessment

| Evaluation Criteria | Evidence of Understanding |
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| <ul style="list-style-type: none"> • Homework | <ul style="list-style-type: none"> • Generate real life examples of anabolic and catabolic reactions. |

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| <ul style="list-style-type: none"> • Quizzes • Tests • Projects • Inquiry Based Activities • Class discussion/ group work | <ul style="list-style-type: none"> • Model enzyme-substrate reactions. • Describe the anaerobic process for generating ATP, including conditions under which it occurs and its products and their functions. • Explain the role of metabolism as it relates to other body systems to maintain homeostasis. • Predict factors or situations affecting metabolism that could disrupt homeostasis. • Predict the types of problems that would occur in the body metabolic processes could not maintain homeostasis. |
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Materials and Resources

| Source | Description of Use |
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| <ul style="list-style-type: none"> • A&P text: Hole’s Essentials of Human Anatomy and Physiology, 9th edition • Direct teacher instruction • Demonstrations • Laboratory experiments • Mini-activities (e.g. simulations) • Worksheets (e.g. anatomy coloring book) • Computer-assisted instruction | <ul style="list-style-type: none"> • Materials necessary to complete performance tasks. |

Subject: Human Anatomy & Physiology I

Unit 4: Tissues

Grade Level: 11-12

Designed by: Maria O’Boyle

School District: Tunkhannock Area School District

School: High School

Brief Summary of Unit:

Tissues are composed of specialized cells that cover body surfaces, compose glands, provide protection and support, and carry substances and information from one part of the body to another.

Unit 4: Tissues

3.1.12.A1.

Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms.

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.

Overarching Understanding:

- Cells are organized into tissues and each type of tissue is composed of similar cells specialized to carry on a specific function.

| Topical Understandings: | Essential Questions: |
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| <ul style="list-style-type: none"> • Tissues are groups of cells with specialized structural and functional roles. • Extracellular matrix separates cells. • The four major types of tissues in humans are epithelial, connective, muscle, and nervous. | <ul style="list-style-type: none"> • How is composition of each type of tissue directly related to the body parts in which it is found? |
| Knowledge: | Skills: |
| <ul style="list-style-type: none"> • Vocabulary: tissue, squamous, cuboidal, columnar, stratified, pseudostartified, transitional, distensibility, endocrine gland, exocrine gland, merocrine, apocrine, holocrine, fibroblast, macrophage, mast cell, histamine, collagen, elastin • Describe locations in the body where each type of epithelial tissue can be found. • Describe locations in the body where each type of connective tissue can be found • Describe locations in the body where each type of membrane can be found. | <ul style="list-style-type: none"> • Identify various types of epithelial tissues at the microscopic level. • Classify the different types of epithelial tissues based on distinguishing structural characteristics. • Classify the different types of connective tissues based on distinguishing structural characteristics. • Describe the structure and function of mucous, serous, cutaneous & synovial membranes. |

Assessment

| Evaluation Criteria | Evidence of Understanding |
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| <ul style="list-style-type: none">• Homework• Quizzes• Tests• Projects• Inquiry Based Activities• Class discussion/ group work | <ul style="list-style-type: none">• Explain why certain tissues are found where they are in the body. Be sure to link to “form follows function”.• Describe functions of each type of connective tissue in the human body and correlate function with structure for each tissue type.• Describe the functions of each type of epithelial tissue in the human body and correlate function with structure for each tissue type.• |

Materials and Resources

| Source | Description of Use |
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| <ul style="list-style-type: none">• A&P text: Hole’s Essentials of Human Anatomy and Physiology, 9th edition• Various epithelial tissue slides and connective tissue slides. | <ul style="list-style-type: none">• Materials necessary to complete performance tasks. |

Subject: Human Anatomy & Physiology I

Unit 5: Skin and Integument

Grade Level: 11-12

Designed by: Maria O’Boyle

School District: Tunkhannock Area School District

School: High School

Brief Summary of Unit:

Our skin is the body's first line of defense against invasion by microorganisms and parasites, loss of body water, and aids in maintaining body temperature. Skin and its accessory organs are instrumental to maintaining homeostasis.

Unit 5: Skin and Integument

3.1.12.A1.

Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms.

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.

- Overarching Understanding:
- Structure is related to function at all biological levels of organization.
- Through a variety of mechanisms organisms seek to maintain a biological balance between their internal and external environments.

| • Topical Understandings: | • Essential Questions: |
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| <ul style="list-style-type: none"> • The skin forms a barrier between us and the outside. • Skin provides a protective covering, helps regulate body temperature, and retards water loss from deeper tissues. • Skin houses sensory receptors, synthesizes various biochemicals, and excretes small quantities of waste. | <ul style="list-style-type: none"> • How are the skin and its accessory organs vital to homeostasis and good health? |
| Knowledge: | Skills: |
| <ul style="list-style-type: none"> • Vocabulary: epidermis, dermis, subcutaneous, stratum corneum, stratum basale, sebaceous gland, sudoriferous gland, hair follicle, keratin, keratinization, melanin, melanocyte, arrector pili. • Describe the structure of the layers of skin. • Describe locations in the body where each type of sudoriferous gland is most numerous and why each type is more numerous in those areas. | <ul style="list-style-type: none"> • Identify various layers of the skin. • List the general function of each layer. • List the accessory organs found in each layer and describe the functions of each. • Explain the physiological importance of the presence or absence of sebaceous glands, sudoriferous glands, and hair in the skin of the palms and fingers. • Provide specific examples to demonstrate how the integumentary system responds to maintain homeostasis in the body. |

- Explain how the integumentary system relates to other body systems to maintain homeostasis.

• **Assessment**

| • Evaluation Criteria | • Evidence of Understanding |
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| <ul style="list-style-type: none"> • Homework • Quizzes • Tests • Projects • Inquiry Based Activities • Class discussion/ group work | <ul style="list-style-type: none"> • Predict factors or situations affecting the integumentary system that could disrupt homeostasis. • Predict the types of problems that would occur in the body if the integumentary system could not maintain homeostasis. |

Materials and Resources

| Source | Description of Use |
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| <ul style="list-style-type: none"> • Light microscopes • Video flex camera A&P text: Hole's Essentials of Human Anatomy and Physiology, 9th edition. • Human torso model • Direct teacher instruction • Demonstrations • Laboratory experiments • Mini-activities (e.g. simulations) • Worksheets (e.g. anatomy coloring book) • Computer-assisted instruction | <ul style="list-style-type: none"> • Materials necessary to complete performance tasks. |

Subject: Human Anatomy & Physiology I

Designed by: Maria O'Boyle

School District: Tunkhannock Area School District

School: High School

Brief Summary of Unit:

Our skeleton is a multifunctional complex living system in which homeostasis must be maintained.

Unit 6: Skeletal System

3.1.12.A1.
Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms.
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.

- Overarching Understanding:
- Structure is related to function at all biological levels of organization.
- Through a variety of mechanisms organisms seek to maintain a biological balance between their internal and external environments.

| Topical Understandings: | Essential Questions: |
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| <ul style="list-style-type: none"> • Our skeleton is alive and multifunctional. • Bones protect and support softer tissues, house blood-producing cells, store inorganic salts, and contain passageways for blood vessel and nerves. | <ul style="list-style-type: none"> • How is the structure of the skeleton directly related to its physiology with respect to support, protection, and movement? |
| Knowledge: | Skills: |
| <ul style="list-style-type: none"> • Vocabulary: epiphysis, diaphysis, articular cartilage, periosteum, compact bone, spongy bone, medullary cavity, endosteum, intramembranous bone, endochondral bone, | <ul style="list-style-type: none"> • List and describe the cellular and extracellular components of bone. • Identify the structural components of a long bone, with emphasis |

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| <p>epiphyseal plate, ossification, osteoclast, osteoblast, hematopoiesis, suture, process, condyle, fibrous joints, cartilaginous joints, synovial joints, various bones and joints, tendon, ligament.</p> <ul style="list-style-type: none"> • Describe the major functions of the skeletal system. • Describe the general structure of bone, and list the functions of its parts. | <p>on region of longitudinal growth.</p> <ul style="list-style-type: none"> • Compare and contrast intramembranous and endochondral (intracartilagenous) bone formation • Compare and contrast the function of osteoblasts and osteoclasts during bone growth, repair, and remodeling. • Define the two major divisions of the skeletal system (axial and appendicular) and list the general bone structures contained within each. • Identify the individual bones and their location within the body. • Compare and contrast the skull of a fetus/infant with the skull of an adult. • Compare and contrast the adult male and female skeletons. • Describe the anatomical and functional classification, of joints - fibrous, cartilaginous, and synovial (six types) – and provide examples of each type. |
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- Assessment

| Evaluation Criteria | Evidence of Understanding |
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| <ul style="list-style-type: none"> • Homework • Quizzes • Tests • Projects • Inquiry Based Activities • Class discussion/ group work | <ul style="list-style-type: none"> • Provide specific examples to demonstrate how the skeletal system and articulations respond to maintain homeostasis in the body. • Describe and demonstrate the generalized movements that each structural type of synovial joint will allow. |

- Materials and Resources

| Source | Description of Use |
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| <ul style="list-style-type: none"> • A&P text: Hole's Essentials of Human Anatomy and Physiology, 9th edition • Articulated human skeleton. | <ul style="list-style-type: none"> • Materials necessary to complete performance tasks. |

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| <ul style="list-style-type: none"> • Disarticulated human skeleton. • Human torso model. • Male and female pelvises. • Color-coded skull. • Fetal skull model. • Articulated, color-coded vertebral column. • Articulated leg. • Articulated arm. | |
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Subject: Human Anatomy & Physiology I

Unit 7: Muscular System

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area School District

School: High School

Brief Summary of Unit:

Skeletal muscle is the most common type found. The anatomy of this type of muscle, and the sliding filament theory are the basis of skeletal movement.

Unit 7: Muscular System

3.1.12.A1.
Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms.

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.

- Overarching Understanding:
- Structure is related to function at all biological levels of organization.

- Through a variety of mechanisms organisms seek to maintain a biological balance between their internal and external environments.

| Topical Understandings: | Essential Questions: |
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| <ul style="list-style-type: none"> • Muscles are organs composed of specialized cells that use chemical energy stored in nutrients to contract. • Muscular actions provide all movements, provide muscle tone, propel body fluids and food, generate heartbeat, and provide heat. | <ul style="list-style-type: none"> • What is the major function of the skeletal system? • What are the similarities and differences in the three types of muscle? • What events are involved in skeletal muscle cell contraction? • What is the importance of nerve supply to healthy muscle tissue? |
| Knowledge: | Skills: |
| <ul style="list-style-type: none"> • Vocabulary: skeletal muscle, fascia, aponeurosis, tendon, fascicles, muscle fibers, myofibrils, actin and myosin protein filaments, sarcomere, sarcoplasmic reticulum, neuromuscular junction, motor unit, neurotransmitter, sliding filament theory, acetylcholine, acetylcholinesterase, lactic acid, muscle fatigue, oxygen debt, threshold stimulus, all-or-none response, muscle tone, smooth muscle, peristalsis, cardiac muscle, intercalated disc, syncytium, origin, insertion, synergists, antagonist, prime mover, flexor, extensor, • Describe the major functions of the muscular system. • Describe the general structure of skeletal muscle, and the interaction of its parts. | <ul style="list-style-type: none"> • Name the connective tissue layers that surround each cell, fascicle, muscle, and group of muscles and indicate the specific type of connective tissue that composes all of these layers. • Describe a skeletal muscle fiber including the transverse (T) tubules, sarcoplasmic reticulum and myofibrils. • Explain the organization of a myofibril. • Name, and describe the function of, each of the contractile, regulatory, and structural protein components of a sarcomere. • Explain the sliding filament theory of muscle contraction. • Explain how an electrical signal from the nervous system arrives at the neuromuscular junction. • Describe the mechanisms that muscle fibers use to obtain ATP for muscle contraction. • Explain the factors that contribute to muscle fatigue. • Explain how the name of a muscle can help identify its action, appearance, or location. |

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| | <ul style="list-style-type: none"> • Identify the origin, insertion and action of the major skeletal muscles and demonstrate these muscle actions. • Define the terms prime mover (or agonist), antagonist, synergist and fixator. |
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Assessment

| Evaluation Criteria | Evidence of Understanding |
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| <ul style="list-style-type: none"> • Homework • Quizzes • Tests • Projects • Inquiry Based Activities • Class discussion/ group work | <ul style="list-style-type: none"> • Give examples in the human body of muscles and their associated joints to illustrate each type of lever system. • Predict the types of problems that would occur in the body if the muscular system could not maintain homeostasis. |

• Materials and Resources

| • Source | • Description of Use |
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| <ul style="list-style-type: none"> • A&P text: Hole's Essentials of Human Anatomy and Physiology, 9th edition • Articulated human leg. • Articulated human arm. • Sarcomere model. • Articulated, color-coded vertebral column. • Human torso model. • Light microscope | <ul style="list-style-type: none"> • Materials necessary to complete performance tasks. |

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| <ul style="list-style-type: none"> • Microscope slides of skeletal, smooth, and cardiac muscle | |
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Subject: Human Anatomy & Physiology I

Unit 8: Nervous System

Grade Level: 11-12

Designed by: Maria O’Boyle

School District: Tunkhannock Area School District

School: High School

Brief Summary of Unit:

The nervous system coordinates and integrates the functions of other body systems so that they function normally and homeostasis is maintained.

Unit 6: Skeletal System

3.1.12.A1.
Relate changes in the environment to various organisms’ ability to compensate using homeostatic mechanisms.

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.

- Overarching Understanding:
- Big Ideas: Structure is related to function at all biological levels of organization.
- Through a variety of mechanisms organisms seek to maintain a biological balance between their internal and external environments.

| Topical Understandings: | Essential Questions: |
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| <ul style="list-style-type: none"> • All nervous system structures are classified as part of the | <ul style="list-style-type: none"> • What are the structural and functional classifications of the |

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| <p>CNS (central nervous system) or the PNS (peripheral nervous system).</p> <ul style="list-style-type: none"> The cerebral hemispheres form the largest part of the brain. | <p>nervous system?</p> <ul style="list-style-type: none"> What is a reflex arc? Why is the medulla oblongata the most vital part of the brain? What is the difference in function of the sympathetic and parasympathetic divisions of the autonomic nervous system? Why do we get some of our best ideas while we're in the shower? |
| <p>Knowledge:</p> | <p>Skills:</p> |
| <ul style="list-style-type: none"> Vocabulary: neuron, nerve impulse, cell body, dendrite, axon, nerve, neuroglial cells, CNS, PNS, sensory receptors, effectors, myelin, Schwann cells, neurilemma, nodes of Ranvier, afferent neuron, interneuron, efferent neuron, membrane potential, threshold potential, action potential, synapse, synaptic cleft, neurotransmitter, nerve, reflex arc, meninges, cerebrospinal fluid, spinal cord, spinal nerves, brain, cerebrum, corpus callosum, hemisphere, lobe, sulcus, fissure, diencephalon, basal ganglia, thalamus, hypothalamus, limbic system, brainstem, midbrain, pons, medulla oblongata, reticular formation, cerebellum, cranial nerves, plexus, sensory-somatic, autonomic, sympathetic, parasympathetic. Describe the major functions of the nervous system. Describe the general structure of a neuron, the brain, and the spinal cord. | <ul style="list-style-type: none"> Explain the structural and functional classifications of the nervous system. State the functions neurons and neuroglial cells. Describe the general structure and list the two major functions of a generalized neuron. Explain how differences in structure and function are used to classify neurons. Compare and contrast the gray matter and white matter of the brain and spinal cord. Describe the general structure of a nerve. List and explain the three types of nerves. Identify the meninges and describe their functions. Describe a reflex arc, and define a reflex. Identify the five lobes of the cerebral cortex and describe the sensory and motor functions of each. Explain hemisphere dominance. Describe the location and functions of the limbic system. Describe the relevance of the reticular formation. Explain the functions of CSF, its production, and reabsorption. Distinguish between ascending and descending tracts of the spinal cord. |

- Discuss the sympathetic and parasympathetic nervous systems and the general physiological roles of each.

Assessment

| Evaluation Criteria | Evidence of Understanding |
|--|---|
| <ul style="list-style-type: none"> • Homework • Quizzes • Tests • Projects • Inquiry Based Activities • Class discussion/ group work | <ul style="list-style-type: none"> • Describe the nervous system as a control system identifying nervous system elements. • Explain how the anatomy of each glial cell supports its function. • Interpret a graph showing voltage vs. time relationship of an action potential, and relate the terms depolarize, repolarize, and hyperpolarize to the events of an action potential. • Discuss the procedure for a lumbar puncture, and what this diagnostic test might be used for. • Propose how specific reflexes would be used in clinical assessment of nervous system function. • Provide specific examples to demonstrate how the nervous system responds to maintain homeostasis. • Predict factors or situations affecting the nervous system that could disrupt homeostasis. • Predict the types of problems that would occur in the body if the nervous system could not maintain homeostasis. • Explain how nerve damage can result in paralysis and/or loss of feeling. |

Materials and Resources

| Source | Description of Use |
|--|--|
| <ul style="list-style-type: none">• A&P text: Hole's Essentials of Human Anatomy and Physiology, 9th edition• Brain model.• Articulated, color-coded vertebral column.• Human torso model.• Direct teacher instruction• Demonstrations• Laboratory experiments• Mini-activities (e.g. simulations)• Worksheets (e.g. anatomy coloring book)• Computer-assisted instruction | <ul style="list-style-type: none">• Materials necessary to complete performance tasks. |