### Unit 1: Terminology, Tissues, and Skin

**Desired Outcomes**

**Georgia Performance Standards:**

**SAP1.** Students will analyze anatomical structures in relationship to their physiological functions.

- a. Apply correct terminology when explaining the orientation of body parts and regions.
- b. Investigate the interdependence of the various body systems to each other and to the body as a whole.
- c. Explain the role of homeostasis and its mechanisms as these relate to the body as a whole and predict the consequences of the failure to maintain homeostasis.
- d. Relate cellular metabolism and transport to homeostasis and cellular reproduction.
- e. Describe how structure and function are related in terms of cell and tissue types.

**SAP2.** Students will analyze the interdependence of the integumentary, skeletal, and muscular systems as these relate to the protection, support and movement of the human body.

- a. Relate the structure of the integumentary system to its functional role in protecting the body and maintaining homeostasis.

**Understandings:**

**Students will understand that...**

- There is a universal language used to identify the orientation of the body and its anatomical parts.
- Most cells function best within a narrow range of limits and have mechanisms for maintaining homeostasis.
- The complexity and organization of organisms accommodates the need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain the organism.
- Skin is an organ that protects the body (chemical, bacterial, physical, uv barrier), maintains homeostasis (chemical/temp.), produces vitamins.

**Essential Questions**

**TERMINOLOGY:**

1. How do anatomy and physiology affect each other?
2. How do anatomy and physiology compare/contrast to each other?
3. Why do we need to describe the body in anatomical position?
4. Why is the concept of anatomical position so important to individuals within the medical profession and scientific community?
5. How do we accurately describe locations of structures and directions as they relate to the body?
   - a. What are the correct anatomical terms to describe body directions, regions and body planes/sections?
   - b. What are the names and locations of the major body cavities and their subdivisions?
6. Why do we have serous membranes?
   - a. What are serous membranes, where are they located, and what is their function?
7. Why/how are abdominal regions and quadrants used to help diagnose disease/disorders?
   - a. What are the names of the 9 regions and 4 body quadrants of the abdominopelvic cavity and list the organs they contain?

**TISSUES**

8. What are the characteristics and how are their structures/functions of each type of tissue similar and different?
9. Identify, classify and describe the various types of connective, epithelial, muscular and nervous?

**Skin**

10. Why does the skin have layers?
11. What are the names of the layers that make up the skin and how does their structure allow them to function?
12. How are the layers of skin similar and dif.?
13. Explain how the structures in the skin layers and body membranes contribute to its ability to maintain homeostasis.
14. How do accessory organs contribute to the daily function of the integumentary system?
15. What are common disorders in terms of origin, manifestation and treatment affect the skin?
**Unit 2: Skeletal and Muscular**

**Desired Outcomes**

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<td>b. Explain how the skeletal structures provide support and protection for tissues, and function together with the muscular system to make movements possible.</td>
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**Understandings:**

Students will understand that...

The skeletal system provides a variety of functions such as protection/support, mineral storage, hematopoiesis, attachment for muscles to aid in movement.

Bone is a living tissue that changes/remodels overtime as a result of factors such as hormones, gravity, genetics, weight, gender...

The interaction (Joints, ligaments, tendons) of the muscular and skeletal system allows our body to move. Coordination of this movement is regulated by voluntary and involuntary messages from the nervous system.

Muscle contraction is dependent on a variety of nutrients/elements that we get from our diet. Poor diets can result in immature undeveloped muscles and or conditions such as cramps.

There are 3 varieties of muscles with distinct functions relating to movement of our skeleton, heart, and fluids/food.

**Essential Questions:**

**SKELETAL SYSTEM**

1. How is the human skeleton organized?
   - a. Identify bones in the axial and appendicular skeleton.

2. What types of bones make up the body, and how does their structure dictate their function?
   - a. 4 bone types, their locations, functions, anatomy

3. What are the components of a long bone and how does the structure enable it to function?

4. How is bone formed and how/why does it change throughout life?
   - a. Growth of both length and width
   - b. Remodeling
     - i. Ossification and Osteocytes
     - ii. Fontanelles and cartilage replacement
     - iii. Osteoclast vs. Osteoblasts
   - c. Bone Loss/need for calcium supplements/sources of these supplements

5. What occurs during bone repair?

6. How do disorders/disease and injury affect the skeletal system?

**MUSCULAR SYSTEM**

1. What are the functions of the muscular system?

2. What is/are the structure, location and function of smooth, cardiac and skeletal muscle?

3. How are the 3 muscle types similar and different

4. How do muscles contract?
   - a. Electrical changes
   - b. Chemical changes?
   - c. Why do your muscles “twitch” or “tingle”?

5. How and why do muscles get sore?

6. How does exercise affect your muscles?
   - a. Muscle tone
   - b. Muscle fatigue
   - c. Aerobic vs. Anaerobic Exercises
   - d. Isotonic vs. Isometric Contractions

7. How does the muscular system work with both the skeletal and nervous system achieve its purpose?

8. How do disease and injury affect muscles?
Unit 3: Nervous System, Endocrine System, and Special Senses

Desired Outcomes

Georgia Performance Standards:

SAP3. Students will assess the integration and coordination of body functions and their dependence on the endocrine and nervous systems to regulate physiological activities.
   a. Interpret interactions among hormones, senses, and nerves which make possible the coordination of functions of the body.
   b. Investigate the physiology of electrochemical impulses and neural integration and trace the pathway of an impulse, relating biochemical changes involved in the conduction of the impulse.
   c. Describe how the body perceives internal and external stimuli and responds to maintain a stable internal environment, as it relates to biofeedback.

SAP 1. Students will analyze anatomical structures in relationship to their physiological functions.
   a. Apply correct terminology when explaining the orientation of body parts and regions.
   b. Investigate the interdependence of the various body systems to each other and to the body as a whole.
   c. Explain the role of homeostasis and its mechanisms as these relate to the body as a whole and predict the consequences of the failure to maintain homeostasis.
   d. Relate cellular metabolism and transport to homeostasis and cellular reproduction.
   e. Describe how structure and function are related in terms of cell and tissue types.

Understandings:

Students will understand that...

The nervous system works by electrochemical signals in the nerves and from one nerve to the next.

The hormonal system exerts its influences by chemicals that circulate in the blood. These two systems also affect each other in coordinating body systems.

Communication between cells is required to coordinate their diverse activities. Some cells secrete substances that spread only to nearby cells. Others secrete hormones, molecules that are carried in the bloodstream to widely distributed cells that have special receptor sites to which they attach.

Multicellular animals have nervous systems formed from specialized cells that conduct signals rapidly through the nerves.

The nerve cells communicate with each other by secreting specific molecules.

Along nerve cells, electrical impulses carry information much more rapidly than is possible by diffusion or blood flow. Some drugs mimic or block the molecules involved in transmitting nerve or hormone signals and therefore disturb normal operations of the brain and body.

In sense organs, specialized cells detect light, sound, and specific chemicals and enable animals to monitor what is going on in the world around them.

Organisms have behavioral responses to internal changes and to external stimuli.

Essential Questions:

NERVOUS SYSTEM
1. How is the nervous system divided/organized?
2. How are the actions and characteristics of the PNS and CNS similar/different?
3. What is the structure and function of nervous tissue?
4. How does a nerve impulse “move” through the body?
5. How does the activity of sensory input and motor output occur?
6. How do afferent and efferent fibers function?
7. How do disorders of the nervous system affect its function and the function of other systems?

SPECIAL SENSES
1. What are the special senses?
2. How does the anatomy of the senses contribute to the physiology?
3. What are the functions of the senses?
4. How do the senses receive and send sensory information to the brain?
5. How do disorders of the senses organs affect the function and how has technology corrected some of the problems?

ENDOCRINE SYSTEM
1. What is the difference between endocrine and exocrine glands?
2. Where are endocrine glands located and how does this relate to their functions?
3. How do hormones affect target organs?
4. What role do hormones have in regulatory process in the body?
5. What are the endocrine glands and the hormones they release?
6. How do these hormones affect the body?
## Unit 4: Circulatory, Respiratory, and Immune Systems

### Georgia Performance Standards:

**SAP4.** Students will analyze the physical, chemical, and biological properties of process systems as these relate to transportation, absorption and excretion, including the cardiovascular, respiratory, digestive, excretory and immune systems.

- **d.** Analyze, and explain the relationships between the respiratory and cardiovascular systems as they obtain oxygen needed for the oxidation of nutrients and removal of carbon dioxide. Examine various conditions that change normal body functions (e.g. tissue rejection, allergies, injury, diseases and disorders) and how the body responds.

- **e.** Describe the effects of aging on body systems.

**SAP 1. Students will analyze anatomical structures in relationship to their physiological functions.**

- **a.** Apply correct terminology when explaining the orientation of body parts and regions.

- **b.** Investigate the interdependence of the various body systems to each other and to the body as a whole.

- **c.** Explain the role of homeostasis and its mechanisms as these relate to the body as a whole and predict the consequences of the failure to maintain homeostasis.

- **d.** Relate cellular metabolism and transport to homeostasis and cellular reproduction.

- **e.** Describe how structure and function are related in terms of cell and tissue types.

### Understandings:

**Students will understand that...**

- **The human circulatory system is a closed system made up of the blood, blood vessels, lymphatic system and a 4 chambered heart,**

- **Blood is the medium that transports all substances that must be carried from one place in the body to another,**

- **Blood consists of a variety of materials such as formed elements (RBC, WBC, Platelets) and plasma,**

- **The heart is a muscular pump that moves the blood within blood vessels to supply the body tissues/cells with needed gasses, nutrients, and removal of wastes,**

- **The lymphatic system removes excessive fluids leaked from the circulatory and filters them before returning them to the circulatory system,**

- **The respiratory system made up of a series of air passages and the lungs is responsible for the exchange of oxygen with carbon dioxide within the tiny blood vessels found within the walls of the lung tissue,**

- **The interaction of the cardiovascular and respiratory system allow for the gases exchange and transport of gases to regulate the amount of oxygen and carbon dioxide within the body,**

- **The immune system is designed to protect against microscopic organisms and foreign substances that enter from outside the body and against some cancer cells that arise within,**

### Essential Questions:

**CIRCULATORY SYSTEM**

1. What are the components of blood?
2. What is the function of plasma and the formed elements?
3. What are the functions of the cardiovascular system?
4. How is the structure of the heart related to its ability to function?
5. What is the pathway blood takes through the heart?
6. What factors affect blood pressure?
7. As a molecule of oxygen, what pathway would it take and the interactions that would occur as you travel through the cardiovascular system?
8. How does the lymphatic system perform its functions?
9. What are the changes that occur in the circulatory system as one ages?
10. How do disorders of the circulatory system affect the functions and how has technology corrected some of the problems?

**RESPIRATORY SYSTEM**

1. What are the functions if the respiratory system?
2. How does the respiratory system and the cardiovascular system work together?
3. What is the pathway oxygen takes through the respiratory system?
4. What are the changes that occur in the respiratory system as one ages?
5. How do disorders of the respiratory system affect the functions and how has technology corrected some of the problems?

**IMMUNE SYSTEM**

1. How does the immune system perform its functions?
2. How are specific and non-specific immunity different?
Unit 5: Digestive, Urinary, Reproductive Systems

Desired Outcomes

Georgia Performance Standards:
SAP4. Students will analyze the physical, chemical, and biological properties of process systems as these relate to transportation, absorption and excretion, including the cardiovascular, respiratory, digestive, excretory and immune systems.
   a. Describe the chemical and physical mechanisms of digestion, elimination, transportation, and absorption within the body to change food and derive energy.
   b. Relate the role of the urinary system to regulation of body wastes (i.e. water-electrolyte balance, volume of body fluids).
   c. Examine various conditions that change normal body functions (e.g. tissue rejection, allergies, injury, diseases and disorders) and how the body responds.
   d. Describe the effects of aging on body systems.
SAP 5. Students will analyze the role of the reproductive system as it pertains to the growth and development of humans.
   a. Explain how the functions of the reproductive organs are regulated by hormonal interactions.
   b. Describe the stages of human embryology and gestation including investigation of gestational and congenital disorders (e.g. ectopic pregnancy, miscarriage, cleft palate, hydrocephaly, fetal alcohol syndrome).
   c. Describe the stages of development from birth to adulthood (i.e. neonatal period, infancy, childhood, adolescence and puberty, and maturity).
SAP 1. Students will analyze anatomical structures in relationship to their physiological functions.
   a. Apply correct terminology when explaining the orientation of body parts and regions.
   b. Investigate the interdependence of the various body systems to each other and to the body as a whole.
   c. Explain the role of homeostasis and its mechanisms as these relate to the body as a whole and predict the consequences of the failure to maintain homeostasis.
   d. Relate cellular metabolism and transport to homeostasis and cellular reproduction.
   e. Describe how structure and function are related in terms of cell and tissue types.

Understandings:
Students will understand that...
Reproduction is necessary for the survival of any species.
A multicellular organism begins as a single celled that develops into an embryo in which the cells multiply and differentiate to form the many specialized cells, tissues, and organs that comprise the final organism. This differentiation is regulated through the expression of different genes.
Faulty genes can cause body parts or systems to work poorly.
The digestive system is responsible for the ingestion, digestion, and absorption of needed materials from our diet, and the elimination of wastes.
The raw materials obtained from digestion are used to provide both energy and raw materials needed for cellular activities such as growth and metabolism.
The urinary system maintains a normal blood consistency by filtering and removing metabolic wastes and other materials no longer needed by the body.

Essential Questions:
DIGESTIVE SYSTEM
1. What are the functions of the digestive system?
2. What is the pathway food takes through the tract?
3. How is the structure of the digestive organs related to their ability to function?
4. How is food broken down and nutrients absorbed?
5. How are nutrients provided by the digestive system used in the body?
6. How do disorders of the digestive system affect the functions and how has technology corrected some of these problems?
7. What are the changes that occur in the digestive system as one ages?

URINARY SYSTEM
1. What are the functions of the urinary system?
2. How does filtration and absorption occur in a nephron?
3. What is the pathway for urine formation and excretion?
4. How do disorders of the urinary system affect the functions and how has technology corrected some of these problems?
5. What are the changes that occur in the urinary system as one ages?

REPRODUCTIVE SYSTEM
1. What are the functions of the reproductive system and how are they performed?
2. How do hormones regulate the organs?
3. What are the stages from fertilization to delivery?