Curriculum Guide:

Anatomy and Physiology 1-2 and 1-2 Honors

CREATED JUNE, 2018
Revised June, 2021

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PHOENIX UNION HIGH SCHOOL DISTRICT NO. 210
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Phoenix, AZ 85012
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Executive Director of Talent, 4502 North Central, Phoenix, AZ 85012 (602) 764-1548.
Course Description:
Anatomy & Physiology 1-2 is a laboratory science course designed for students who have taken biology and wish to pursue a detailed study of human anatomy and physiology. This course provides comprehensive information about the structure and function of the human body. Topics include the body plan, homeostasis and the major systems of the body, e.g., integumentary, skeletal, muscular, immune, circulatory, respiratory, digestive, endocrine, nervous, excretory and reproductive.

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<tr>
<th>Percentage-Based Grading Weights</th>
<th>Evidence-Based Grading Competencies</th>
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<tbody>
<tr>
<td>• 40% Assignments</td>
<td>• Asking questions (for science) and defining problems (for engineering)</td>
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<td>• 45% Assessments</td>
<td>• Developing and using models</td>
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<td>• 15% CRTs</td>
<td>• Analyzing and interpreting data</td>
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<td>• Constructing explanations (for science) and designing solutions (for engineering)</td>
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<td>• Obtaining, evaluating, and communicating information</td>
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Acknowledgements

Matt Burke, Trevor G. Browne
Matthew Milmine, Camelback
Kevin Graff, Cesar Chavez
James Walliser, Alhambra
Brooke Mcomber, Central
Carrie Repp, CEE Content Specialist
This course is still in the development stage, hence this document will evolve over the next several years. Please note the date of the revision at the bottom of the page. If you are printing this document out, please check back frequently for updates.

When viewing digitally, click on the Name of the section in the table of contents to navigate directly to the first page of that section. Please use “Table of Contents” at the bottom of any page to return to this page. *Please note that this functionality is limited when you are viewing online. For best results, please select Open in Desktop App or download the document.

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## Scope and Sequence

### Quarter 1

**AZ Standards addressed during Q1:** HS.L1U1.20

**SEP's addressed during Q1:**
- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Obtaining, evaluating, and communicating information

**CCC's addressed during Q1:**
- Structure and function

<table>
<thead>
<tr>
<th>Unit 1 – The Human Body and Orientation</th>
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<tbody>
<tr>
<td>- Anatomy versus Physiology (Learning Target (LT) 1)</td>
</tr>
<tr>
<td>- Levels of organization (LO 6)</td>
</tr>
<tr>
<td>- Body systems (how structure fits function of each) (LO 5)</td>
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<td>- Homeostasis (positive and negative feedback) (LO 6)</td>
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<td>- Anatomical language (LO 2, 3)</td>
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<td>- Body cavities (LO 4)</td>
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<tr>
<th>Unit 2 – The Integumentary System</th>
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<tr>
<td>- Classification of tissues (except bone, blood, muscle, nervous) (LO 7, 8)</td>
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<tr>
<td>- Classification of membranes (LO 9)</td>
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<tr>
<td>- Layers of skin (epidermal layers, and dermis) (LO 10)</td>
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<td>- Organs of dermis (LO 11)</td>
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<tr>
<td>- Functions of skin (LO 12)</td>
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<tr>
<td>- Role of integumentary system in homeostasis (LO 12)</td>
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<tr>
<td>- Homeostatic imbalances (infections, burns, cancer, allergic conditions) (LO 13)</td>
</tr>
</tbody>
</table>

### Quarter 2

**AZ Standards:** HS.L1U1.20

**SEP's addressed during Q2:**
- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Constructing explanations (for science) and designing solutions (for engineering)
- Obtaining, evaluating, and communicating information

**CCC's addressed during Q2:**
- Cause and effect
- Structure and function

<table>
<thead>
<tr>
<th>Unit 3 – The Skeletal System</th>
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<tr>
<td>- Axial and appendicular skeletal systems (structure and function) (LO 18)</td>
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<td>- Bone classification (LO 17)</td>
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<td>- Calcium and blood homeostasis (LO 15)</td>
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<td>- Microanatomy of the compact and spongy bone (LO 14)</td>
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<tr>
<td>- Bone formation, growth, and repair (LO 16)</td>
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<tr>
<td>- Bones of the axial and appendicular skeletal systems (LO 18)</td>
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<tr>
<td>- Classification and functions of joints (LO 19, 20)</td>
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<td>- Structure of synovial joint (LO 19)</td>
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<tr>
<td>- Joint movements (LO 20, 21)</td>
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<tr>
<td>- Homeostatic imbalances (arthritis and osteoporosis) (LO 22)</td>
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</table>

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<thead>
<tr>
<th>Unit 4 – The Muscular System</th>
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<tbody>
<tr>
<td>- Organization of a muscle organ (LO 23)</td>
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<tr>
<td>- Structure of muscle fiber (LO 23, 24)</td>
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<tr>
<td>- Physiology of muscle contraction (LO 25)</td>
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<tr>
<td>- Neuromuscular junction (LO 26)</td>
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<tr>
<td>- Anaerobic vs. Aerobic respiration (LO 27)</td>
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<tr>
<td>- How muscles move bone and contraction types (LO 28, 29, 30)</td>
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<tr>
<td>- Muscles of the axial and appendicular skeletal systems (LO 32)</td>
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<tr>
<td>- Role of muscular system in maintaining homeostasis (LO 31)</td>
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<tr>
<td>- Homeostatic imbalances (LO 33)</td>
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<td>- Structure and function of a neuron (LO 34)</td>
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<td>- Action potentials (myelinated and unmyelinated) (LO 35)</td>
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<tr>
<td>- Action potential propagation (from one neuron to the next) (LO 36)</td>
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<tr>
<td>- Structure, classification, and functions of the nervous system (LO 38)</td>
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<td>- Reflex arcs (LO 39)</td>
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<td>- Protective layers and cells of the brain (LO 40)</td>
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<td>- Major brain structures and function (LO 37)</td>
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<tr>
<td>- Special senses (LO 42)</td>
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<tr>
<td>- Homeostatic imbalances (multiple sclerosis, Alzheimer’s, etc.) (LO 41)</td>
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<tr>
<td>Quarter 3</td>
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<tr>
<td><strong>AZ Standards</strong>: HS.L1U1.20</td>
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<tr>
<td><strong>SEP’s addressed during Q3</strong>: Developing and using models Obtaining, evaluating, and communicating information</td>
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<tr>
<td><strong>CCC’s addressed during Q3</strong>: Patterns Cause and effect Systems and system models Structure and function Stability and change</td>
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</tbody>
</table>
| **Unit 6 – The Endocrine System**  
- Hormones primary and secondary messengers (LO 43)  
- Control and function of pituitary gland (LO 44, 45)  
- Major endocrine glands and hormones (LO 44, 45)  
- Homeostatic imbalances (diabetes mellitus, gigantism) (LO 46) | **Unit 9 – The Respiratory System**  
- Structure and function of respiratory organs (LO 59)  
- Gas exchange (LO 60)  
- Mechanics of respiration (LO 61, 62)  
- Respiratory volumes and capacities (LO 62)  
- Homeostatic imbalances (emphysema, asthma, etc.) (LO 63, 64) |
| **Unit 7 – The Cardiovascular System**  
- Components and characteristics of blood (LO 47, 52)  
- Structure and function of heart (circulation and cardiac conduction system) (LO 48, 50, 52)  
- Cause and regulation of blood pressure (LO 53)  
- Arteries and veins of systemic circulation (LO 49, 51, 52)  
- Homeostatic imbalances (Atherosclerosis, MI, etc.) (LO 54) | **Unit 10 – The Digestive System**  
- Tissues and regulation of the alimentary canal (LO 65, 67)  
- Structure and function of organs of the alimentary canal (LO 66, 67, 68)  
- Accessory organs of digestive system (LO 66)  
- Homeostatic imbalances (obesity, celiac disease, etc.) (LO 69) |
| **Unit 8 – The Lymphatic System**  
- Structure and function of lymphatic organs (LO 55, 56)  
- Innate immune defense (LO 57)  
- Structure and function of antibodies (LO 57)  
- Adaptive immunity (cell mediated and humoral) (LO 57)  
- Primary and secondary immune response (LO 57)  
- Homeostatic imbalances (HIV) (LO 58) | **Unit 11 – The Urinary System**  
- Structure and function of kidney (LO 70)  
- Urine formation, function and characteristics (LO 71)  
- Regulation of urine output and bodily fluids (LO 71)  
- Homeostatic imbalances (diabetes insipidus, kidney stones, etc.) (LO 72) |
| **Unit 12 – The Reproductive System**  
- Structure and function of reproductive organs (LT 75)  
- Gamete production and hormonal regulation (LT 76)  
- Pathway of fertilization (sperm and egg) (LT 77)  
- Obstacles to fertilization (LT 78, 80)  
- Embryonic development (LT 79)  
- Homeostatic imbalances (STIs, infertility) (LT 78, 81) |  |
Unit Plan 1: The Human Body and Organization

Scaled Learning Targets

AZ Standards:
HS.LIU1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

Essential Standard:
A & P U 01 E1: Use positive and negative feedback mechanisms to explain how the body maintains homeostasis.

Essential Questions
1) How does the organization of the human body reveal the relationship between structure and function?
2) Why does anatomy and physiology need a special language?
3) How does your body maintain homeostasis?

Enduring Understanding
Organisms use a variety of mechanisms for maintaining homeostasis.

SEP's
Asking questions (for science) and defining problems (for engineering)
Developing and using models
Obtaining, evaluating, and communicating information

CCC's
Structure and function

Storyline:

Phenomena:

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<th>3-DIMENSIONAL RESOURCES</th>
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<tr>
<td>1. I can construct an explanation as to how anatomy (structure) relates to function (physiology).</td>
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<td>I can develop a model of how directional terms relate to regions of the body.</td>
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- **Organ System Presidential Campaign - Homeostasis**

- **Quarter 1 PBA: Blood Glucose Homeostasis – NEEDS TO BE ENTERED INTO ILLUMINATE (No Mid-Term)**

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**Key Vocabulary (Academic)**

- **Suggested Vocabulary (Content)**

Use [hyperlink](#) to visit master vocabulary list.

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### Instructional Strategies

**Cornell Notes Peer Review**

- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students' paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

**Assessment Strategies**
- Open ended questions that get students writing or talking
- Reflect on a lesson – what was learned?
- Exit tickets
- Summaries
- Response cards/white boards
- Four corners activity
- Think-pair-share
- Socratic seminars
- 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
- Journal reflections
- Analogy prompt (have students relate a topic to something else and why)

**Technology Resources**
- Edpuzzle.com, Quizlet.com, Kahoot.it,
- http://library.collaborizeclassroom.com/#!
- https://www.weebly.com/
# Unit Plan 2: The Integumentary System

**Scaled Learning Targets**

### AZ Standards:

- HS.L1UI.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

### Essential Standard:

- A & P U 02 E1: Explain how the organization and forms of cells determine the function of tissues.
- A & P U 02 E2: Explain how the integumentary system maintains homeostasis.

### Essential Questions

1) How do the components of the integument work together to repair nails?

### Enduring Understanding

- The structures of tissues determine the functions of organs
- There are several components within the integumentary system that contribute to the regulation of body temperature.

### SEP's

- Developing and using models

### CCC's

- Structure and function
- Stability and change

### Storyline

**Phenomena**

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<td>I can explain the structure and function of epithelial tissues and how they relate to homeostasis.</td>
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<td>8.</td>
<td>I can explain the structure and function of connective tissues and how they relate to homeostasis.</td>
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<td>9.</td>
<td>I can explain how the structure of membranes fits their function.</td>
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<tr>
<td>10.</td>
<td>I can explain how the structures of the epidermal layers fit their function and how they relate to homeostasis.</td>
<td>☒</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>I can explain the structures and functions of the dermal organs and how they relate to homeostasis.</td>
<td></td>
<td>☒</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>I can explain the relationship between the structure and function of the integument and accessory structures in maintaining homeostasis.</td>
<td>☒</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>I can explain the homeostatic response as a result of damage to the integument and accessory structures caused by burns, wounds, and cancer of the skin.</td>
<td></td>
<td>☒</td>
<td></td>
</tr>
</tbody>
</table>

**Key Vocabulary (Academic)**

Suggested (Content)

Use [hyperlink](#) to visit master vocabulary list.

**Instructional Strategies**

- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students' paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

**Assessment Strategies**
- Open ended questions that get students writing or talking
- Response cards/white boards
- Four corners activity
- Think-pair-share
- Socratic seminars
- 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
- Journal reflections
- Analogy prompt (have students relate a topic to something else and why)

**Technology Resources**
Edpuzzle.com, Quizlet.com, Kahoot.it,
http://library.collaborizeclassroom.com/
https://www.weebly.com/
http://turnitin.com/en_us/
# Unit Plan 3: The Skeletal System

## Scaled Learning Targets

### AZ Standards:

HS.L1U120 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

### Essential Standard:

**A & P U 03 E1:** Explain how the skeletal system facilitates movement.  
**A & P U 03 E2:** Explain how the skeletal system maintains blood and mineral homeostasis.

<table>
<thead>
<tr>
<th>Essential Questions</th>
<th>Enduring Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the skeletal system move?</td>
<td></td>
</tr>
<tr>
<td>How does the skeletal system maintain blood and mineral homeostasis?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEP's</th>
<th>CCC's</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing and using models</td>
<td>Cause and effect</td>
</tr>
<tr>
<td>Obtaining, evaluating, and communicating information</td>
<td>Structure and function</td>
</tr>
<tr>
<td></td>
<td>Stability and change</td>
</tr>
</tbody>
</table>

### Storyline Phenomena

**LEARNING TARGET**  

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
<th>STANDARD</th>
<th>3-DIMENSIONAL RESOURCES</th>
<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I can explain the structure and function of compact and spongy bone and how they help maintain homeostasis.</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>15. I can use models to construct explanations as to how the skeletal system maintains blood and mineral homeostasis.</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>Explaining Blood and Mineral Homeostasis</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>16. I can develop a model for the healing process of bone following a fracture and explain how it helps maintain homeostasis.</td>
<td>□</td>
<td>☒</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>17. I can obtain, evaluate, and communicate information for the purpose of classifying bones into the four major types: long, short, flat, and irregular.</td>
<td>□</td>
<td>□</td>
<td>☒</td>
<td></td>
</tr>
<tr>
<td>18. I can explain the structures and function of the axial and appendicular skeletal systems and explain how they help maintain homeostasis.</td>
<td>□</td>
<td>☒</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>19. I can explain the structure and function of a synovial joint</td>
<td>□</td>
<td>□</td>
<td>☒</td>
<td></td>
</tr>
<tr>
<td>20. I can use a model to construct an explanation for the range of motion of the different joints.</td>
<td>□</td>
<td>□</td>
<td>☒</td>
<td></td>
</tr>
<tr>
<td>21. I can use a model to explain how the structure of bones in the skeletal system facilitates the function of movement.</td>
<td>□</td>
<td>□</td>
<td>☒</td>
<td></td>
</tr>
<tr>
<td>22. I can explain the causes and effects of osteoporosis and other diseases of the skeletal system and explain how they disrupt homeostasis.</td>
<td>□</td>
<td>□</td>
<td>☒</td>
<td></td>
</tr>
</tbody>
</table>

Key Vocabulary (Academic)

Unit 3 The Skeletal System (Content)

Use hyperlink to visit master vocabulary list.

Instructional Strategies

- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students’ paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

**Assessment Strategies**
- Open ended questions that get students writing or talking
- Reflect on a lesson – what was learned?
- Response cards/white boards
- Four corners activity
- Think-pair-share
- Socratic seminars
- 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
- Journal reflections
- Analogy prompt (have students relate a topic to something else and why)

**Technology Resources**
Edpuzzle.com, Quizlet.com, Kahoot.it,
http://library.collaborizeclassroom.com/#!
https://www.weebly.com/
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**Quarter 1 project**

**Essential Standard:**

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
<th>STANDARDS</th>
<th>LAB/ACTIVITIES/RESOURCES</th>
<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AZ</td>
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<td>AP</td>
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</tr>
</tbody>
</table>
# Unit Plan 4: The Muscular System

**Scaled Learning Targets**

<table>
<thead>
<tr>
<th>AZ Standards:</th>
<th>Essential Standard:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS.LIU1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.</td>
<td><strong>A &amp; P U 04 E1:</strong> Explain how the muscular system causes movement. <strong>A &amp; P U 04 E2:</strong> Explain how the muscular system helps maintain temperature homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Essential Questions</th>
<th>Enduring Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the muscular system maintain homeostasis? How does the structure of skeletal muscle facilitate movement?</td>
<td>The muscular and skeletal systems work together to support and move the body.</td>
</tr>
</tbody>
</table>

**SEP’s**
- Developing and using models
- Constructing explanations (for science) and designing solutions (for engineering)

**CCC’s**
- Structure and function

## Storyline Phenomena

<table>
<thead>
<tr>
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<th>3-DIMENSIONAL RESOURCES</th>
<th>ASSMT</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>P S T AZ</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

23. I can compare and contrast the structures and functions of skeletal, cardiac, and smooth muscle and how each type assists in homeostasis.
- | | | |

24. I can develop and use a model to describe the gross anatomy of a muscle and explain why this is significant in maintaining homeostasis.
- | | | Use a toilet paper roll, construction paper, and Q-tips to construct a model of skeletal muscle. Using this model, have students describe how skeletal muscle is assembled.
| 25. I can explain how the structure of a muscle fiber allows for contraction and explain why this is significant for maintaining homeostasis. | ☐ ☒ ☐ |  
|---|---|---|
| 26. I can construct explanations as to how the nervous system controls muscle contraction and explain why this is significant for maintaining homeostasis. | ☐ ☒ ☐ | Tie in something related to muscle relaxers. |
| 27. I can use a model to compare and contrast anaerobic and aerobic respiration as they relate to muscle activity. | ☐ ☑ ☐ | Provide students with an illustration or other resource for them to assist in the construction Venn diagram. |
| 28. I can develop a model to describe muscle contraction types. | ☐ ☑ ☐ | Provide students with an explanation of the different types of muscle contractions, have students create an illustration of their interpretation of this. Could show students an actual illustration (from text book) so they can compare/modify their interpretation. |
| 29. I can develop and use a model to help explain how joints and muscle attachment points result in different lever types. | ☐ ☑ ☐ | Create different activities using string and popsicle sticks or straws to simulate the different types of levers. |
| 30. I can explain how the muscular system causes movement and how this relates to homeostasis. | ☐ ☒ ☐ |  
| 31. I can explain how the structures and functions of the muscular system help regulate homeostasis. | ☒ ☑ ☐ |  
| 32. I can explain the structure and function of the skeletal muscles of the body. | ☐ ☑ ☐ |  
| 33. I can describe muscular dystrophy and other diseases of the muscular system and how they disrupt homeostasis. | ☐ ☑ ☐ |  

**Key Vocabulary (Academic)**

Use [hyperlink](#) to visit master vocabulary list.

**Instructional Strategies**

- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students’ paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create asking a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

Assessment Strategies
- Open ended questions that get students writing or talking
- Reflect on a lesson – what was learned?
- Four corners activity
- Think-pair-share
- Socratic seminars
- 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
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Unit Plan 5: The Nervous System
Scaled Learning Targets

AZ Standards:
HS.L1U1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.
### Essential Standard:
A & P U 05 E1: Explain the role of neurons in the CNS and PNS.

### Essential Questions
- How do nerve cells communicate with one another?
- How do the brain and its major parts maintain homeostasis?

### Enduring Understanding
The nervous system senses, processes, and responds to the environment.

### CCC’s
Structure and function

### Storyline:
Phenomena

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
<th>STANDARD</th>
<th>3-DIMENSIONAL RESOURCES</th>
<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>34. I can explain the structure and function of a neuron and how this helps maintain homeostasis.</td>
<td>☒</td>
<td></td>
<td>Quarter 2 PBA – Nerve Fields – does NOT need to be entered into Illuminate</td>
<td></td>
</tr>
<tr>
<td>35. I can develop and use a model to compare and contrast how action potentials are propagated along myelinated and unmyelinated axons and how this helps maintain homeostasis.</td>
<td></td>
<td>☒</td>
<td>Use various materials that can be manipulated to have students model the propagation of action potentials on their lab tables (yarn, beads, sticks, etc.)</td>
<td></td>
</tr>
<tr>
<td>36. I can use a model to explain how neurons communicate and how this helps maintain homeostasis.</td>
<td></td>
<td>☒</td>
<td>Provide students with pictures that illustrate a step-by-step of the transmission of an impulse across a synapse. Have students summarize this process.</td>
<td></td>
</tr>
<tr>
<td>37. I can describe the structure and function of the cerebrum, diencephalon, and brain stem and their roles in maintaining homeostasis.</td>
<td></td>
<td>☒</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. I can develop and use a model to illustrate the structures and divisions of the nervous system.</td>
<td>□ ☒ ☒</td>
<td>Have students create a flow chart of the different levels of the nervous system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. I can ask questions and observe patterns to describe a reflex arc and explain the stimulus involved and explain their significance in maintaining homeostasis.</td>
<td>□ ☒ ☒</td>
<td>Provide videos so students can observe the different reflex arcs. Students then look for commonalities among them and ask questions that can then be researched or investigated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. I can describe the structures that protect the brain (cranial bones, meninges, CSF, blood brain barrier) and how they maintain homeostasis.</td>
<td>□ ☒ ☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41. I can explain the causes and effects of multiple sclerosis and other diseases of the nervous system and how they disrupt homeostasis.</td>
<td>□ ☒ ☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42. I can describe the structure and function of the organs of the special senses.</td>
<td>□ ☒ ☒</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Vocabulary (Academic)</th>
<th>Unit 5 The Nervous System (Content)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use hyperlink to visit master vocabulary list.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instructional Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.</td>
</tr>
<tr>
<td>• Compare and contrast students’ paraphrasing from previous activity.</td>
</tr>
<tr>
<td>• Perform a Close Read activity related to the unit of study.</td>
</tr>
<tr>
<td>• Flashcards - illustrated or paraphrased.</td>
</tr>
<tr>
<td>• Read and analyze a case study.</td>
</tr>
<tr>
<td>• Translate words to create a visual product, model, or drawing.</td>
</tr>
<tr>
<td>• Provide articles on different treatment options and have students compare and contrast.</td>
</tr>
<tr>
<td>• Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.</td>
</tr>
<tr>
<td>• Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.</td>
</tr>
<tr>
<td>• Provide sample tables/graphs and scientific articles/journals and have students determine meaning.</td>
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<tr>
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</tr>
<tr>
<td>• Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.</td>
</tr>
<tr>
<td>• Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.</td>
</tr>
<tr>
<td>• Describe homeostatic imbalances, causes and treatments of a case study.</td>
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<tr>
<td>• Write an experimental summary based upon original or provided findings.</td>
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<tr>
<td>• Write an argument to support one type of treatment over another, citing evidence from several sources.</td>
</tr>
<tr>
<td>• Write a song using vocabulary in context related to the unit of study.</td>
</tr>
<tr>
<td>• Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.</td>
</tr>
<tr>
<td>• Form analogies using unit vocabulary that relate to their own lives.</td>
</tr>
</tbody>
</table>
• Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

Assessment Strategies
• Open ended questions that get students writing or talking
• Reflect on a lesson – what was learned?
• Exit tickets
• Summaries
• Response cards/white boards
• Four corners activity
• Think-pair-share
• Socratic seminars
• 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
• Journal reflections
• Analogy prompt (have students relate a topic to something else and why)

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Quarter 2 project

Essential Standard:

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</thead>
<tbody>
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<td>AZ</td>
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<td>☑</td>
<td>☑</td>
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</tr>
</tbody>
</table>
Unit Plan 6: The Endocrine System

Scaled Learning Targets

AZ Standards:
HS.L1U1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

Essential Standard:
A & P U 06 Et: Explain how hormone levels are regulated and their role in positive and negative feedback mechanisms.

<table>
<thead>
<tr>
<th>Essential Questions</th>
<th>Enduring Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the endocrine system maintain homeostasis in the body?</td>
<td>The endocrine system is the chemical transmitter of the body.</td>
</tr>
</tbody>
</table>

SEP’s
Developing and using models
Obtaining, evaluating, and communicating information

CCC’s
Patterns
Cause and effect
Systems and system models

Storyline
Phenomena

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
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<th>3-DIMENSIONAL RESOURCES</th>
<th>ASSMT</th>
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<tbody>
<tr>
<td></td>
<td>P</td>
<td>S</td>
<td>T</td>
<td>AZ</td>
</tr>
<tr>
<td>43. I can use a model to compare and contrast direct gene activation and the second-messenger system.</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>Have students compare and contrast these two systems while strictly using an image of each type.</td>
</tr>
<tr>
<td>44. I can observe patterns and obtain, evaluate, and communicate information to help explain the role of the endocrine system in regards to homeostasis.</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>Students can use a chart that summarizes hormones (origin, destination, change in bodily function) to explain relationships between hormones and predict how the loss of a specific hormone would impact bodily function.</td>
</tr>
<tr>
<td>#</td>
<td>Instruction/Activity</td>
<td></td>
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</tr>
<tr>
<td>45.</td>
<td>I can explain the cause and effect of hormone level regulation and their role in positive and negative feedback mechanisms.</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>46.</td>
<td>I can explain the causes and effects of diabetes and other endocrine disorders and how they disrupt homeostasis.</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

**Key Vocabulary (Academic)**

- Use hyperlink to visit master vocabulary list.

**Instructional Strategies**

- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students’ paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

**Assessment Strategies**

- Open ended questions that get students writing or talking
- Reflect on a lesson – what was learned?
- Exit tickets
- Summaries
- Response cards/white boards
- Four corners activity
- Think-pair-share
- Socratic seminars
CURRICULUM GUIDE: ANATOMY & PHYSIOLOGY

- 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
- Journal reflections
- Analogy prompt (have students relate a topic to something else and why)

Technology Resources
Edpuzzle.com, Quizlet.com, Kahoot.it,
http://library.collaborizeclassroom.com/
https://www.weebly.com/
http://turnitin.com/en_us/
### Unit Plan 7: The Cardiovascular System

**Scaled Learning Targets**

**AZ Standards:**
HS.L1U1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

**Essential Standard:**
A & P U 07 E1: Explain the role of the cardiovascular system in the delivery of nutrients and removal of waste products.

<table>
<thead>
<tr>
<th>Essential Questions</th>
<th>Enduring Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the cardiovascular system maintain homeostasis?</td>
<td>The cardiovascular system maintains life by oxygenation of tissues and removal of waste.</td>
</tr>
</tbody>
</table>

**SEP’s**  
Developing and using models  
Analyzing and interpreting data  
Obtaining, evaluating, and communicating information  

**CCC’s**  
Cause and effect  
Systems and system models  
Structure and function

**Storyline**  
PHENOMENON:

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
<th>STANDARD</th>
<th>3-DIMENSIONAL RESOURCES</th>
<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>47. I can analyze and interpret data regarding the components of a hematocrit</td>
<td>P S T</td>
<td>AZ</td>
<td>Find/use graphs or data tables that illustrate variations in the hematocrit and resulting consequences. Example hematocrits: individuals with polycythemia, anemia, leukemia, etc. Using this information, students can try to solve the functions of the different components of a hematocrit.</td>
<td>Reg</td>
</tr>
</tbody>
</table>
### 48. I can identify and describe the structures of the heart and their functions.

<p>| | | |</p>
<table>
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</table>

### 49. I can explain the pattern of blood flow while tracing the path of blood through the pulmonary circuit, heart (including valves), and systemic circuit and explain how it assists in maintaining homeostasis.

<p>| | | |</p>
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</table>

To add the SEP standard of using models to this, find/use graphs or data tables to support causes and effects of blood flow through the body.

### 50. I can analyze and interpret data to help explain the electrical sequence of heart contraction and resulting ECG and explain its' relationship to homeostasis.

<p>| | | |</p>
<table>
<thead>
<tr>
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</table>

### 51. I can use a model to compare and contrast the three main types of blood vessels; arteries, capillaries, and veins and how their anatomy relates to homeostasis.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
</table>

Provide images or a video clip for students to use in comparing/contrasting blood vessels.

### 52. I can explain how the structure and function of the cardiovascular system helps maintain homeostasis.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
</table>

### 53. I can obtain, evaluate, and communicate information to describe the blood pressure measurements and how it helps maintain homeostasis.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Blood Pressure PBA – NEEDS TO BE ENTERED INTO ILLUMINATE (NO Mid-Term)

### 54. I can explain the causes and effects of myocardial infarction and other disorders of the heart and how they disrupt homeostasis.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

**Key Vocabulary (Academic)**

- Unit 7 The Cardiovascular System (Content)
  - Use [hyperlink](#) to visit master vocabulary list.

**Instructional Strategies**

- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students’ paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards – Illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
• Write an argument to support one type of treatment over another, citing evidence from several sources.
• Write a song using vocabulary in context related to the unit of study.
• Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
• Form analogies using unit vocabulary that relate to their own lives.
• Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

Assessment Strategies
• Open ended questions that get students writing or talking
• Reflect on a lesson – what was learned?
• Exit tickets
• Summaries
• Response cards/white boards
• Four corners activity
• Think-pair-share
• Socratic seminars
• 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
• Journal reflections
• Analogy prompt (have students relate a topic to something else and why)

Technology Resources
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http://library.collaborizeclassroom.com/#!
https://www.weebly.com/
http://turnitin.com/en_us/
# Unit Plan 8: The Lymphatic and Immune Systems

**Scaled Learning Targets**

<table>
<thead>
<tr>
<th>AZ Standards:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS.L.IU1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.</td>
</tr>
</tbody>
</table>

**Essential Standard:**

**A & P U 08 E1:** Explain how the lymphatic system helps fight infections, and the role of antibiotics.

## Essential Questions

<table>
<thead>
<tr>
<th>How does the lymphatic system help fight disease?</th>
<th>Enduring Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>The lymphatic system helps to maintain fluid balance and defend the body against disease.</td>
<td></td>
</tr>
</tbody>
</table>

## SEP’s

<table>
<thead>
<tr>
<th>Developing and using models</th>
<th>CCC’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause and effect</td>
<td></td>
</tr>
<tr>
<td>Systems and system models</td>
<td></td>
</tr>
<tr>
<td>Structure and function</td>
<td></td>
</tr>
<tr>
<td>Stability and change</td>
<td></td>
</tr>
</tbody>
</table>

## Storyline

**PHENOMENON:**

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
<th>STANDARD</th>
<th>3-DIMENSIONAL RESOURCES</th>
<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>55. I can identify the structure and function of the cells, glands and vessels of the lymphatic system and their roles in maintaining homeostasis.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>56. I can develop and use a model to compare and contrast the vessels of</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td></td>
</tr>
<tr>
<td>Have student research information related to the structure and function of blood and lymphatic vessels (diameter, wall thickness,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| Table of Contents | 6/10/2021 3:00 PM | 30 | Page |</p>
<table>
<thead>
<tr>
<th>the cardiovascular and lymphatic systems.</th>
<th>amount of smooth muscle, etc.) and organize it into a data table. Use constructed data table to compare and contrast the two types of blood vessels.</th>
</tr>
</thead>
<tbody>
<tr>
<td>57. I can explain how the structure and functions of the innate and adaptive immune responses operate to maintain homeostasis.</td>
<td>☒  ☐  ☐</td>
</tr>
<tr>
<td>58. I can describe the causes and effects of HIV and other diseases of the lymphatic systems and how they disrupt homeostasis.</td>
<td>☐  ☐  ☒</td>
</tr>
</tbody>
</table>

**Key Vocabulary (Academic)**

- Use [hyperlink](#) to visit master vocabulary list.

**Instructional Strategies**

- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students’ paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

**Assessment Strategies**

- Open ended questions that get students writing or talking
- Reflect on a lesson – what was learned?
- Response cards/white boards
• Four corners activity
• Think-pair-share
• Socratic seminars
• 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
• Journal reflections
• Analogy prompt (have students relate a topic to something else and why)

Technology Resources
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http://turnitin.com/en_us/

Quarter 3 project

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
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<th>STANDARDS</th>
<th>LAB/ACTIVITIES/RESOURCES</th>
<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
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<td>P S T</td>
<td>AZ AP</td>
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<td></td>
<td>□ □ □</td>
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</tr>
</tbody>
</table>
# Unit Plan 9: The Respiratory System

## Scaled Learning Targets

### AZ Standards:
HS.LI1U1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

### Essential Standard:
A & P U 09 E1: Explain the role of the respiratory system in maintaining homeostasis.

### Essential Questions
- How does the respiratory system help maintain homeostasis?

### Enduring Understanding
- The respiratory system's primary functions are eliminating CO₂ from the body and taking in O₂.

### SEP's
- Developing and using models

### CCC's
- Cause and effect
- Structure and function
- Stability and change

## Storyline PHENOMENON:

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
<th>STANDARDS</th>
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<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>S</td>
<td>T</td>
<td>AZ</td>
</tr>
<tr>
<td>59. I can explain the structure and function of the organs of the respiratory system and their roles in maintaining homeostasis.</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>60. I can explain the pattern of gas exchange and how this helps regulate homeostasis.</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>61. I can explain how the structures and functions of the respiratory system assist in maintaining homeostasis.</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>62. I can explain how stability and change influence the breathing process including volume, pressure, and muscles used and the effect each has on homeostasis.</td>
<td>□ ☒ ☐</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63. I can describe the causes and effects of emphysema and other respiratory disorders and how they disrupt homeostasis.</td>
<td>□ □ ☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64. I can describe the causes and effects of high-altitude sickness.</td>
<td>□ □ ☒</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key Vocabulary (Academic)**

Use [hyperlink](#) to visit master vocabulary list.

**Instructional Strategies**
- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students' paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
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- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

**Assessment Strategies**
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- Reflect on a lesson – what was learned?
- Exit tickets
- Summaries
- Response cards/white boards
<table>
<thead>
<tr>
<th>CURRICULUM GUIDE: ANATOMY &amp; PHYSIOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Four corners activity</td>
</tr>
<tr>
<td>• Think-pair-share</td>
</tr>
<tr>
<td>• Socratic seminars</td>
</tr>
<tr>
<td>• 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)</td>
</tr>
<tr>
<td>• Journal reflections</td>
</tr>
<tr>
<td>• Analogy prompt (have students relate a topic to something else and why)</td>
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</tbody>
</table>

**Technology Resources**
- Edpuzzle.com, Quizlet.com, Kahoot.it,
- http://library.collaborizedclassroom.com/#!
- https://www.weebly.com/
## Unit Plan 10: The Digestive System

### Scaled Learning Targets

**AZ Standards:**
HS.L1U1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

**Essential Standard:**
A & P U 10 E1: Explain how the structures of the alimentary canal fit their function.  
A & P U 10 E2: Explain the role of the accessory organs in digestion.

**Essential Questions**
How are nutrients processed in the body?

**Enduring Understanding**
The digestive system is a continuous, muscular passageway that is important for absorbing nutrients into the body.

**SEP’s**
Developing and using models  
Constructing explanations (for science) and designing solutions (for engineering)

**CCC’s**
Cause and effect  
Energy and matter  
Structure and function

### Storyline
**PHENOMENON:**

### LEARNING TARGET

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
<th>STANDARDS</th>
<th>3-DIMENSIONAL RESOURCES</th>
<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>65. I can explain how the structures of the alimentary canal fit their function, assist in peristalsis, and help maintain homeostasis.</td>
<td>☒</td>
<td>☐</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66. I can explain the structure and function of the accessory organs of the digestive system and how they contribute to maintaining homeostasis.</td>
<td>☐</td>
<td>☒</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67. I can construct and use a model to trace the pathway of food through the alimentary canal.</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td></td>
</tr>
</tbody>
</table>
68. I can describe the catabolism and food sources of macromolecules. □ □ ☒

69. I can explain how celiac disease and other homeostatic imbalances of the digestive system disrupt homeostasis and construct explanations and design solutions to treat them. □ □ ☒

Key Vocabulary (Academic)

Unit 10 The Digestive System (Content)

Use [hyperlink](http://example.com) to visit master vocabulary list.

**Instructional Strategies**
- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students’ paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

**Assessment Strategies**
- Open ended questions that get students writing or talking
- Reflect on a lesson – what was learned?
- Exit tickets
- Summaries
- Response cards/white boards
- Four corners activity
- Think-pair-share
- Socratic seminars
- 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
- Journal reflections
- Analogy prompt (have students relate a topic to something else and why)

**Technology Resources**
- Edpuzzle.com
- Quizlet.com
- Kahoot.it
- http://library.collaborizeclassroom.com/
- https://www.weebly.com/
# Unit Plan 11: The Urinary System

## Scaled Learning Targets

**AZ Standards:**
HS.L1U.2.0 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

**Essential Standard:**
A & P U 11 E1: Describe the structure and function of the urinary system.

### Essential Questions
- How does the kidney play a role in urine formation and water balance?
- How do the organs of the urinary system work together to eliminate waste?

### Enduring Understanding
- The urinary system is a group of organs in the body that filter out excess fluid and other substances from the bloodstream.

### CCC’s
- Cause and effect
- Systems and system models
- Structure and function

### Storyline Phenomenon:

<table>
<thead>
<tr>
<th>LEARNING TARGET</th>
<th>PRIORITY</th>
<th>STANDARD</th>
<th>3-DIMENSIONAL RESOURCES</th>
<th>ASSMT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>S</td>
<td>T</td>
<td>AZ</td>
</tr>
<tr>
<td>70. I can explain how the structures and functions of the urinary system help maintain homeostasis.</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>71. I can use a model to explain the process of urine formation and regulation in the nephron and how this helps maintain homeostasis.</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>Provide students with an image/video of urine formation within the nephron. For each of the three parts of urine formation, provide students with multiple choice questions regarding the sequence of urine formation. After all multiple choice questions have been answered,</td>
</tr>
</tbody>
</table>
### Key Vocabulary (Academic)

- Unit 11: The Urinary System (Content)

Use [hyperlink](#) to visit master vocabulary list.

### Instructional Strategies

- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students’ paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
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- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

### Assessment Strategies

- Open ended questions that get students writing or talking
- Reflect on a lesson – what was learned?
- Exit tickets
- Summaries
- Response cards/white boards
- Four corners activity
- Think-pair-share

#### 72. I can describe the causes and effects of diabetes insipidus, kidney stones and other homeostatic imbalances of the urinary system and how they disrupt homeostasis.

- Students use their responses as an outline to summarize the process of urine formation.
- Socratic seminars
- 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
- Journal reflections
- Analogy prompt (have students relate a topic to something else and why)

**Technology Resources**

Edpuzzle.com, Quizlet.com, Kahoot.it,
http://library.collaborizeclassroom.com/#!
https://www.weebly.com/
http://turnitin.com/en_us/
Unit Plan 12: The Reproductive System

Scaled Learning Targets

AZ Standards:
HS.L1U1.20 I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

Essential Standard:
A & P U 12 E1: Explain how the structure of reproductive organs fits their role in producing offspring.

Essential Questions
How is the human body designed for reproduction?

Enduring Understanding
The reproductive system consists of organs and hormones needed for the continuation of human life.

SEP’s
Analyzing and interpreting data
Obtaining, evaluating, and communicating information

CCC’s
Patterns
Cause and effect
Structure and function

Storyline
PHENOMENON:

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<td>73. I can explain how the structure of male and female reproductive organs fit their role in producing offspring and the role they play in homeostasis.</td>
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<td>74. I can explain the patterns created by reproductive hormones in the body, including the female reproductive cycle and their roles in maintaining homeostasis.</td>
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<td>75. I can explain the cause and effect of fertilization.</td>
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### CURRICULUM GUIDE: ANATOMY & PHYSIOLOGY

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<td>76. I can explain the causes and effects of male and female infertility.</td>
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<td>77. I can describe the patterns and stages and major events of embryonic development.</td>
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<td>78. I can describe the structure, function, and efficacy of various types of contraceptives.</td>
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<td>79. I can describe the causes and effects of various STIs and how they disrupt homeostasis.</td>
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#### Key Vocabulary (Academic)

Use [hyperlink](#) to visit master vocabulary list.

#### Instructional Strategies
- Given a list of prefix and suffix root words, give complex sample writing and have students use prefix and suffix words to paraphrase in simpler but still accurate terms.
- Compare and contrast students’ paraphrasing from previous activity.
- Perform a Close Read activity related to the unit of study.
- Flashcards - illustrated or paraphrased.
- Read and analyze a case study.
- Translate words to create a visual product, model, or drawing.
- Provide articles on different treatment options and have students compare and contrast.
- Research topics related to the unit of study, e.g., fad diets, pacemakers, HIV, etc.
- Analyze self-generated data, e.g., heart rate, blood pressure, diet, exercise routine, etc.
- Provide sample tables/graphs and scientific articles/journals and have students determine meaning.
- Write a description of a sport using directional terms.
- Create a product (pamphlet, presentation, video etc.) that encourages the audience to pursue a particular medical career.
- Design your own disease; write out symptoms, diagnosis, and treatment, using correct medical terminology.
- Describe homeostatic imbalances, causes and treatments of a case study.
- Write an experimental summary based upon original or provided findings.
- Write an argument to support one type of treatment over another, citing evidence from several sources.
- Write a song using vocabulary in context related to the unit of study.
- Create a product (pamphlet, poster, etc.) regarding a disease to encourage the audience to donate to an awareness organization.
- Form analogies using unit vocabulary that relate to their own lives.
- Sequence a pathway in the unit of study (draw, label, arrows, model, written, etc.)

#### Assessment Strategies
- Open ended questions that get students writing or talking
- Reflect on a lesson – what was learned?
- Exit tickets
- Summaries
CURRICULUM GUIDE: ANATOMY & PHYSIOLOGY

- Response cards/white boards
- Four corners activity
- Think-pair-share
- Socratic seminars
- 3-2-1 (three things learned in lesson, two things they want to know more about, one question they have)
- Journal reflections
- Analogy prompt (have students relate a topic to something else and why)

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Quarter 4 project

Essential Standard:

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<th>LAB/ACTIVITIES/RESOURCES</th>
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# ASSESSMENT BLUEPRINT – SEMESTER 1

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<td>I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.</td>
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This standard will be tied to all questions on the Pre/Post and 1st semester final CRT’s. It will also be measured on the 1st and 3rd quarter PBA’s.

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<td>2</td>
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<td>I can explain the relationship between the structure and function of the integument and accessory structures in maintaining homeostasis.</td>
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## CURRICULUM GUIDE: ANATOMY & PHYSIOLOGY

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<td>I can use models to construct explanations as to how the skeletal system maintains blood and mineral homeostasis.</td>
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<td>4</td>
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<td>I can explain how the structures and functions of the cardiovascular system help regulate homeostasis.</td>
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<td>5</td>
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<td>I can explain the structure and function of a neuron and how this helps maintain homeostasis.</td>
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### ASSESSMENT BLUEPRINT – SEMESTER 1-2

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<td>6</td>
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<td>I can explain the cause and effect of hormone level regulation and their role in positive and negative feedback mechanisms.</td>
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<td>7</td>
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<td>I can explain the pattern of blood flow while tracing the path of blood through the pulmonary circuit, heart (including valves), and systemic circuit and explain how it assists in maintaining homeostasis.</td>
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<td>8</td>
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<td>I can explain how the structure and functions of the innate and adaptive immune responses operate to maintain homeostasis.</td>
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## Complete Vocabulary List

### Unit 1: The Human Body and Organization

#### Morphemes

| a. append-     | h. meta-     | o. —stasis   | standing still |
| to hang something | change      | p. super-    | above         |
| b. cardi-  | i. nas-      | q. —tomy     | cutting       |
| heart     | nose         | r. endo-     | within        |
| c. cerebr- | j. orb-      | s. hyper-    | above         |
| brain     | circle       | t. hypo-     | below         |
| d. cran-  | k. pariet-   | u. inter-    | between       |
| helmet    | wall         |              |               |
| e. dors-  | l. pelv-     |              |               |
| back      | basin        |              |               |
| f. homeo- | m. peri-     |              |               |
| same      | around       |              |               |
| g. -ology | n. pleur-    |              |               |
| the study of | rib         |              |               |

#### Suggested Vocabulary

1) Anatomy  
The study of body structures and their relationships to each other

2) Physiology  
How the body and its parts function

3) Organelle  
A specialized structure within a cell

4) Tissue  
Similar cells working together to perform the same function

5) Organ  
Two or more tissues working together to perform the same function

6) Anatomical position  
Standing straight, feet parallel and arms hanging at the sides with the palms facing forward

7) Superior  
Toward the head or upper part of a structure

8) Inferior  
Away from the head end or toward the lower part of a structure

9) Anterior (ventral)
Toward or at the font of the body
10) Posterior (dorsal)
   Toward or at the backside of the body
11) Medial
   Toward or at the midline of the body
12) Lateral
   Away from the midline of the body
13) Proximal
   Close to the origin of the body part or the point of attachment of a limb to the body
14) Distal
   Farther from the origin of the body part or the point of attachment of a limb to the body
15) Superficial
   Toward or at the body surface
16) Deep
   Away from the body surface; more internal
17) Sagittal
   Cuts body into 2 halves (assuming bilateral symmetry)
18) Coronal
   Divides the body into dorsal and ventral parts
19) Transverse
   Divides the body into superior and inferior parts
20) Cranial cavity
   Contains the brain
21) Spinal cavity
   Contains the spinal cord
22) Thoracic cavity
   Contains the pleural and pericardial cavities
23) Pleural cavity
   Contains the lungs
24) Pericardial cavity
   Contains the heart
25) Abdominal cavity
   Contains digestive organs, spleen, and kidneys
26) Pelvic cavity
   Contains the bladder and reproductive organs
27) Abdominopelvic cavity
Contains the abdominal and pelvic cavities

28) Integumentary system
Skin, hair, and fingernails. It waterproofs, cushions, and protects the body. It produces vitamin D and helps regulate body temperature.

29) Skeletal system
Bones, cartilages, and joints. It supports the body, provides a framework for movement, protects structures, forms blood, and stores minerals

30) Muscular system
Skeletal muscles, tendons, and ligaments. It causes movement and helps regulate body temperature.

31) Nervous system
Brain, spinal cord, nerves, and sensory receptors. It cause fast acting body control and coordination and maintains homeostasis by responding to external and internal stimuli

32) Homeostasis
Maintenance of internal conditions within a narrow range

33) Endocrine system
Endocrine glands and hormones. It controls growth and development and maintains homeostasis through slow and prolonged change.

34) Cardiovascular system
Heart and blood vessels. It delivers oxygen, nutrients, hormones, and other substances to cells. Picks up wastes such as carbon dioxide from cells, and facilitates movement of defense proteins and immune system cells

35) Lymphatic system
Lymphatic vessels, lymph nodes, and lymphoid organs. It returns fluid leaked from blood vessels to the cardiovascular system. It cleanses blood and houses immune cells.

36) Digestive system
Oral cavity, esophagus, stomach, small and large intestines, rectum, and numerous accessory organs. It breaks down food and delivers resulting nutrients to cells. It reabsorbs water and expels waste.

37) Urinary system
Kidneys, ureters, bladder, and urethra. It filters blood. It maintains water and salt homeostasis, blood pressure homeostasis, and pH homeostasis.

38) Reproductive system
Males: testes, scrotum, penis, and other accessory glands. Females: ovaries, uterine tubes, uterus, and vagina. It produces offspring.

39) Negative feedback
A mechanism where a stimulus causes the production of a product that reduces the stimulus

40) Positive feedback
A mechanism where a stimulus causes the production of a product that increases the stimulus until the original cause of the stimulus is gone

41) Receptor
A type of sensor that monitors and responds to changes in a variable. Changes in variables are called stimuli.

42) Control center
Something that determines the level (set point) of a variable in homeostasis (it is often the brain)
43) **Effector**
   Responds to and modifies the stimulus

44) **Set point**
   The physiological value around which the normal range fluctuates

45) **Stimulus**
   Any external phenomenon that has an influence on a system

46) **Insulin**
   Hormone secreted to lower blood sugar

47) **Glucagon**
   Hormone secreted to raise blood sugar

48) **Glucose**
   Blood sugar

49) **Afferent**
   A signal pathway that leads from a stimulus to a control center

50) **Efferent**
   A signal pathway that leads from a control center to the source of a stimulus

51) **Pleural cavity (formed by the pleura)**
   The space within the serous membrane that contains the lungs

52) **Pericardial cavity (formed by the pericardium)**
   The space within the serous membrane that contains the heart

53) **Peritoneal Cavity (formed by the peritoneum)**
   Mucus membranes The space within the serous membrane that contains the abdominal cavity

Be able to identify the following terms

54) **Cephalic**
66) **Umbilical**

55) **Frontal**
67) **Pelvic**

56) **Orbital**
68) **Inguinal**

57) **Nasal**
69) **Pubic**

58) **Buccal**
70) **Acromial**

59) **Oral**
71) **Deltoid**

60) **Mental**
72) **Brachial**

61) **Cervical**
73) **Antecubital**

62) **Thoracic**
74) **Carpal**

63) **Sternal**
75) **Manus**

64) **Axillary**
76) **Digital**

65) **Abdominal**
77) **Coxal**

78) **Femoral**
79) **Patellar**
80) **Crural**
81) **Fibular**
82) **Pedal**
83) **Tarsal**
84) **Olecranal**
85) **Popliteal**
86) **Sural**
87) **Calcaneal**
88) **Plantar**
89) **Occipital**
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Unit 2 The Integumentary System

Morphemes

a. adip-fat
b. alb-white
c. cut-skin
d. derm-skin
e. epi-
f. follic-small bag
g. hol-entire, whole
h. kerat-horn
i. melan-black
j. por-passage, channel
k. seb-grease
l. squam-scale
m. strat-layer

Suggested Vocabulary

98) Basement membrane
A thin fibrous extracellular matrix that “glues” the epithelium to the connective tissue beneath

99) Simple squamous epithelium
Single layer of flat cells found lining blood vessels, portions of kidney tubules, lining of cornea, and alveoli of lungs. It is specialized for diffusion, filtration, and secretion

100) Stratified squamous epithelium
Multiple layers of flat cells found on superficial layers of epidermis, lining of mouth, throat, esophagus, rectum, and vagina. They are specialized for protection.

101) Simple cuboidal epithelium
Single layer of cube shaped found in glands, ducts, portions of kidney tubules, and portions of thyroid glands. They are specialized for secretion and absorption.

102) Stratified cuboidal epithelium
Multiple layers of cube shaped cells found rarely lining some ducts of glands such as sweat glands. They are specialized for protection.

103) Simple columnar epithelium
Single layer of column shaped cells found lining the stomach, intestines, gall bladder, uterine tubes, and collecting ducts of kidneys. They are specialized for secretion and absorption.

104) Stratified columnar epithelium
Multiple layers of column shaped cells found in parts of the pharynx, epiglottis, anus, mammary glands, salivary gland ducts, and urethra

105) Pseudostratified ciliated columnar epithelium
Single layer of column shaped cells found lining the nasal cavity, trachea, bronchi, and portions of male reproductive tract. They are specialized for secretion and moving substances along.

106) Stratified transitional epithelium

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Multiple layers of cells that transition from cuboidal to squamous found in the urinary bladder, renal pelvis, and ureters. They are specialized for stretching.

107) Glandular epithelium
   Epithelia with specialized cells for secretion

108) Gland
   Collections of epithelial cells or cells derived from epithelial cells specialized for secretion. They can be single cells, tissues, or organs

109) Goblet cell
   A modified simple columnar epithelial cell. They are single celled glands that secrete mucus and are found wherever mucus membranes are.

110) Extracellular matrix
   A non-living gel-like substance secreted by connective tissues that binds tissues together. It is composed of polysaccharides that trap water, ground substance that contains adhesive proteins, and fibrous proteins such as collagen.

111) Collagen
   The most abundant protein. It is a fibrous protein that is the main component of most connective tissues.

112) Fibroblast
   Cells responsible for maintaining the extracellular matrix and producing the fibers and ground substance

113) Areolar connective tissue
   It is the most common. It protects and binds organs.

114) Adipose connective tissue
   It insulates, cushions, protects, and stores energy

115) Reticular connective tissue
   Common in lymph nodes, spleen, and bone marrow. It forms the internal framework of an organ

116) Dense irregular connective tissue
   Composed mostly of collagen fibers formed from fibroblasts arranged in a random network. The dermis, submucosa of digestive tract, and some fascia is composed of this tissue.

117) Cutaneous membranes
   It is comprised of the epidermis (stratified squamous epithelium) and the dermis (dense irregular connective tissue). It protects underlying tissues and organs from desiccation and pathogens.

118) Parietal
   Attached to or relating to a body wall

119) Visceral
   Relating to organs, especially abdominal organs

120) Serous membranes
   A double membrane that surrounds body cavities. It is composed of simple squamous epithelia with loose areolar tissue beneath. Both layers secrete fluid into the cavity between the layers. The fluid allows organs to slide past each other reducing friction with the cavity walls and other organs.

121) Mucus Membrane
Most composed of stratified squamous or simple columnar epithelia (depending on type) resting on loose connective tissue. It lines all cavities that are exposed to air. Keep cavities moist, protect against abrasion, and many are specialized for secretion and absorption.

122) Synovial membranes
Composed of loose areolar tissue and secrete lubricating synovial fluid, found on the inside of the fibrous capsules surrounding joints, bursa sacs, and tendon sheaths. Reduce friction and cushion organs during muscle activity.

123) Meninges
3 membranes composed of different tissue types that surround, protect, and nourish the brain and spinal cord

124) Epidermis
Many layers of mostly stratified squamous epithelia superficial to the dermis.

125) Dermis
Composed mostly of dense irregular connective tissue and houses many of the organs of the integumentary system

126) Keratin
A structural protein that protects the epidermal cells from damage

127) Keratinocyte
Compose 90% of epidermis and specialized for producing keratin

128) Stratum basale
The deepest layer of the epidermis. It produces all of the other layers of the epidermis and contains melanocytes and Merkel cells

129) Melanin
A brown to black pigment that colors skin, hair, and eyes. It protects skin from damaging UV radiation by absorbing these wavelengths of light

130) Accessory structures
Organs, appendages, or structures derived from the epidermis or dermis

131) Subcutaneous layer (hypodermis)
Fatty region deep to the dermis

132) Hypothalamus
Part of the brain that helps maintain homeostasis

133) Melanocyte
A cell found mostly in the stratum basale that produces melanin

134) Epidermal dendritic cell
A type of white blood cell of the immune system that alerts other immune system components when a pathogen is present

135) Merkel cell
Mechanoreceptor cells (cells that respond to touch) that stimulate sensory neurons

136) Meissner’s corpuscle
A neuron with a mechanosensitive end embedded in the superficial end of the dermis. It is responsible for sensing light touch.

137) Pacinian corpuscle
A neuron with a mechanosensitive end embedded in the deep end of the dermis. It is responsible for sensing vibrations and deep pressure.
138) Sebaceous gland
   An oil producing gland found all over the body except for the palms of the hand and soles of the feet. They produce sebum mixed with whole cells. This keeps the skin moist, prevents hair from becoming brittle, and contains antibacterial compounds.

139) Exocrine gland
   A gland that secretes its product via a duct onto the surface of epithelial tissue

140) Sudoriferous gland
   A sweat gland

141) Eccrine sweat gland
   A sudoriferous gland that secretes mostly watery sweat with salts and ammonia compounds. They are located throughout the skin and cool the body. It is acidic, so it suppresses bacterial growth.

142) Apocrine sweat gland
   A sudoriferous gland that secretes viscous milky sweat with proteins, fatty acids, and pheromone-like compounds. They are located in axillary (arm pit) and genital regions, perineum, and areola. These secretions enter hair follicles. These secretions and the bacteria that eat them give each person a unique smell.

143) Vitamin D
   A fat-soluble vitamin derived from cholesterol that requires UV radiation for its synthesis. It is essential for proper absorption of calcium.

144) Cancer
   Uncontrolled cell growth

145) Metastasis
   Movement of cancerous cells from one part of the body to others

146) Mutation
   A change in the nucleotide sequence of DNA
Unit 3 The Skeletal System

Morphemes

a. chondr-
cartilage

b. acetabul-
vinegar cup

c. ax-
axis

d. –blast
bud, a growing organism

e. canal-
channel

f. carp-
wrist

g. -clast
break

h. clav-
bar

i. condyl-
knob

j. corac-
crow’s beak

k. cribr-

l. crist-
crest

m. fove-
pit

n. glen-
joint socket

o. hyal-
resemblance to glass

p. inter-
among, between

q. intra-
inside

r. lamell-
thin plate

s. meat-
passage

t. odont-
-tooth

u. os-
bone

v. poie-
make, produce

w. anul-
ing

x. arth-
joint

y. burs-
bag, purse

z. glen-
joint socket

aa. labr-
lip

bb. ov-
egg-like

cc. sutur-
sewing

dd. syn-
with, together

ee. syndesm-
band, ligament

Suggested Vocabulary

147) Chondrocyte
A cell that has become embedded in the matrix of collagen that it produced

148) Lacuna
A cavity within cartilage or bone that houses chondrocytes or osteocytes

149) Hyaline cartilage
Glassy, whitish appearance composed mostly of collagen. Forms trachea, covers articulating ends of bones, the epiphyseal plate, and attaches the ribs to the sternum

150) Compact bone
Composed of packed, parallel osteons and found on the outsides of bone

151) Spongy bone
Composed of trabeculae and found on the insides of bone
152) Ossification
   Bone formation
153) Diaphysis
   The shaft of long bone
154) Periosteum
   The membrane that surrounds the exterior of bone except the articular ends of long bone. It is composed of dense irregular connective tissue, contains progenitor cells that differentiate into osteoblasts and chondroblasts (allowing for growth of the diameter of bone), and provides blood supply to the marrow
155) Epiphysis
   The ends of long bone (proximal and distal)
156) Articular cartilage
   Hyaline cartilage of the epiphyses of long bone that reduces friction at the joints
157) Epiphyseal plate
   A cartilaginous, immobile (synarthrotic) joint composed of hyaline cartilage. It is the point were long bone grows longer
158) Endosteum
   The inner membrane of long bone composed of vascular and connective tissue. It produces osteoblasts and osteoclasts and has hematopoietic cells as well
159) Medulla
   The cavity of long bone
160) Red marrow
   Mostly hematopoietic tissue. Where red blood cells, platelets, and white blood cells are produced
161) Yellow marrow
   Mostly adipose tissue
162) Osteon
   The structural and functional unit of compact bone
163) Osteocyte
   A bone cell in a lacuna embedded in a calcified, rigid matrix
164) Lamella
   Concentric layers of osteocytes
165) Central canal
   Also called Haversian canals. The central, longitudinal cavity of an osteon that contains blood vessels and nerves
166) Perforating canal
   Also called Volkmann’s canal. Canals running at right angles to the diaphysis that contain blood vessels and nerves
167) Canaliculi
   Tiny canals formed by projections of osteocytes that allow osteocytes to connect to each other via gap junctions and share nutrients derived from the central and perforating canals
168) Hematopoiesis (erythropoiesis)
   Blood cell formation
169) Mineral
   Inorganic nutrient needed for growth and health
170) Menstrual cycle
   Monthly ovulation in a woman
171) Estrogen
   Female sex hormone
172) Bone density
   An indirect way to measure bone strength
173) Osteoblast
   A bone-building cell
174) Osteoclast
   A bone-dissolving cell
175) Calcium (Ca²⁺)
   A mineral needed for bone formation and muscle contraction
176) Calcitonin
   A hormone of the thyroid gland that reduces blood calcium by inhibiting osteoclast activity, and inhibiting calcium and phosphate absorption by the kidneys.
177) Parathyroid hormone
   This hormone causes an increase in blood calcium by increasing osteoclast activity, and increasing calcium and phosphate absorption by the kidneys.
178) Endochondral ossification
   Bones developing from cartilage models where a cartilage “bone” is gradually replaced by bone tissue
179) Intramembranous ossification
   Flat bones such as the skull bones and scapula forming within the dermis
180) Hematoma
   A blood filled swelling (a bruise)
181) Long bone
   Long; exm. femur
182) Short
   Cube-like; exm. carpals
183) Flat
   Thin and curved; exm. Frontal bone
184) Irregular
   Complex shape; exm. vertebrae
185) Process
   Any bony prominence
186) Trochanter
   Very large, blunt, irregularly shaped process
187) Tuberosity
   Large, rounded projections
188) Tubercle
   Small, rounded projection or process
189) Epicondyle
   Raised area above the condyle
190) Crest
   Narrow prominent ridge of bone
191) Line
   Narrow ridge of bone
192) Styloid process
   Slender, pointed process
193) Facet
   Smooth, nearly flat articular surface
194) Condyle
   Rounded protuberance forming an articulation point with another bone
195) Ramus
   Arm-like bar of bone
196) Fissure
   Narrow, slit-like opening
197) Foramen
   Round or oval opening
198) Meatus
   Canal or tunnel-like passageway
199) Fossa
   Shallow, basin-like depression
200) Sinus
   Cavity within a bone filled with air and lined with a mucus membrane

Be able to identify the following terms

201) Frontal bone
202) Frontal sinuses
203) Parietal bones
204) Temporal bones
205) External acoustic meatus
206) Mastoid process
207) Occipital bone
208) Foramen magnum
209) Occipital condyle
210) Inferior nuchal line
211) Superior nuchal line
212) Sphenoid bone
213) Sella turcica
214) Pterygoid process
215) Sphenoidal sinuses
216) Ethmoid bone
217) Cribriform plate
218) Ethmoidal sinuses
219) Maxilla
220) Maxillary sinuses
221) Palatine processes
222) Zygomatic bones
223) Lacrimal bones
224) Mandible
225) Coronoid process of mandible
226) Condylar process of mandible
227) Ramus of mandible
228) Hyoid bone
229) Spinous process
230) Transverse process
231) Vertebral foramen
232) Facet
233) Cervical vertebrae

234) Thoracic vertebrae
235) Lumbar vertebrae
236) Sacrum
237) Coccyx
238) Ligamentum nuchae
239) Sternum
240) Manubrium
241) Xiphoid process
242) Clavicle
243) Scapula
244) Glenoid cavity
245) Coracoid process
246) Acromion
247) Scapular spine
248) Subscapular fossa
249) Infraspinous fossa
250) Humerus
251) Medial epicondyle of humerus
252) Lateral epicondyle of humerus
253) Ulna
254) Olecranon
255) Radius
256) Radial styloid process
257) Carpals
258) Scaphoid
259) Lunate
260) Triquetrum
261) Pisiform
262) Trapezius
263) Trapezoid

264) Capitate
265) Hamate
266) Metacarpals
267) Phalanges of hand
268) Coxa
269) Ilium
270) Iliac crest
271) Ischium
272) Pubis
273) Acetabulum
274) Femur
275) Greater trochanter
276) Lesser trochanter
277) Patella
278) Tibia
279) Medial malleolus
280) Fibula
281) Lateral malleolus
282) Tarsals
283) Talus
284) Calcaneus
285) Navicular
286) Cuboid
287) Lateral cuneiform
288) Intermediate cuneiform
289) Medial cuneiform
290) Metatarsals
291) Phalanges of the foot

292) Bursa
   A sac filled with synovial fluid surrounded by a synovial membrane the reduces friction
293) Dense regular connective tissue
   Composed of parallel rows of mostly collagen fibers laid down by rows of fibroblasts. It forms tendons and ligaments.
294) Ligament
Dense regular connective tissue that attaches bone to bone
295) Fibrocartilage
   Has a high compression capacity. It forms the vertebral disks, pubic symphysis, menisci, and where tendons attach to bone
296) Elastic cartilage
   Has the greatest density of chondrocytes. Collagen and protein fibers composed of elastin allow it to stretch. It is found in the outer ear and the epiglottis.
297) Synarthrotic
   A joint with no movement
298) Amphiarthrotic
   A joint with minimal movement
299) Diarthrotic
   A freely moveable joint
300) Suture joint
   Fibrous, synarthrotic joints of skull bones
301) Syndesmosis joint
   Fibrous, amphiarthrotic joints
302) Gomphosis joint
   Fibrous, synarthrotic joints of the teeth and facial bones
303) Synchondrosis joint
   Cartilaginous, synarthrotic joint composed of hyaline cartilage
304) Symphysis
   Cartilaginous, amphiarthrotic joint
305) Plane
   Synovial, diarthrotic flattened joints that allow bones to slide past each other
306) Hinge
   Synovial, diarthrotic joints that allow movement in a single plane
307) Pivot
   Synovial, diarthrotic joints that allow for rotation
308) Condylar
   Synovial, diarthrotic joints with an oval surface articulating with a depression surface that allows for angular motion
309) Saddle
   Synovial, diarthrotic joints with biconcave articulating surfaces that allows for circumduction
310) Ball-and-socket
   Synovial, diarthrotic joints that allow for circumduction
311) Bursa
   A fibrous sac with a synovial membrane that reduces friction at some synovial joints
312) Arthritis  
Inflammation of the joints  
313) Retinaculum  
A band of connective tissue that stabilizes tendons

Be able to identify joint movements and joint types

<table>
<thead>
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</tbody>
</table>
Unit 4 The Muscular System

Morphemes

a. calat-
something inserted
b. erg-
work
c. fasc-
bundle
d. -gram
something written
e. hyper-
over, more
f. inter-
between
g. iso-
equal
h. laten-
hidden
i. myo-
muscle
j. reticul-
a net
k. sarco-
flesh
l. stria-
groove

m. syn-
together
n. tetan-
stiff
o. –tonic
stretched
p. –troph
well fed
q. voluntar-
of one's free will

Suggested Vocabulary

328) Intercalated disc
connect cardiac muscle fibers. Composed of three types of cell junctions: a special type of tight junction, desmosomes, and gap junctions

329) Sarcolemma
The plasma membrane of a muscle fiber

330) Muscle fiber
Muscle cell

331) Endomysium
Loose reticular connective tissue that fills the space around muscle fibers. It contains neurons, blood and lymph vessels

332) Fascicle
Many muscle fibers wrapped in perimysium

333) Perimysium
Connective tissue surrounding fascicles containing nerves and blood vessels

334) Epimysium
Dense irregular connective tissue surrounding many fascicles. It is continuous with the endomysium

335) Aponeurosis
A tendon that is a sheet of dense regular connective tissue. It connects muscle to bone or other muscles.

336) Tendon
dense regular connective tissue that joins muscle to bone

337) Fascia
Dense irregular connective tissue that attaches, stabilizes, encloses, and separates muscles and other internal organs
338) Myosin
   A family of motor proteins that move along actin thin filaments by hydrolyzing ATP

339) Actin
   A cytoskeletal fibrous protein that resists compression and is one of the key fibers involved in muscle contraction

340) Tropomyosin
   A fibrous protein that spirals around actin filament in muscle. It covers actin binding sites for myosin

341) Troponin
   A protein that changes shape when bound to calcium, which induces tropomyosin to roll away from actin binding sites

342) Sarcomere
   The contractile unit of a muscle fiber (cell)

343) H zone
   The portion of the relaxed sarcomere with no actin. It contains the M line

344) M line
   The middle or a sarcomere that has poorly understood proteins that stabilize myosin

345) A Band
   The portion of the sarcomere that contain the H zone and actin filaments overlapping myosin filaments

346) I Band
   The portion of the relaxed sarcomere that has action filaments and no myosin filaments. It contains the Z disc and it forms the proximal portion of one sarcomere and the distal portion of another.

347) Z disc
   Hundreds of proteins forming a complex anchoring structure for actin and myosin

348) Neuron
   A cell of the nervous system specialized for conducting action potentials

349) Action potential
   The rapid depolarization and repolarization of a bit of cell membrane

350) Axon
   The portion of a neuron that conducts action potentials away from the cell body and to another neuron, muscle, or gland

351) Neuromuscular junction
   The point where an axon terminal forms a synapsis with the sarcolemma of a muscle fiber

352) Synapsis
   The point where a neuron almost touches another neuron, muscle fiber, or gland

353) Voltage-gated ion channel
   A channel protein that opens in response to an increase or decrease in membrane potential allowing a specific ion into or out of the cell

354) Neurotransmitter
   A chemical signal that propagates an action potential across the synaptic cleft

355) Synaptic cleft
The gap between 2 cells forming a synapsis

356) Acetylcholine
   The neurotransmitter of neuromuscular junctions

357) Motor neuron
   A neuron whose cell body is located in the spinal cord and its axon extends out to an effector organ (usually a muscle or gland)

358) Nerve
   A bundle of axons in the peripheral nervous system

359) Sarcoplasmic reticulum
   An organelle of a muscle fiber specialized for secretion and absorption of calcium ions

360) Anaerobic
   Without oxygen

361) Aerobic
   With oxygen

362) Synergist
   A muscle whose action assists the desired motion and neutralizes undesired motion at the joint

363) Isotonic contraction
   The tension increases causing muscle length to change

364) Concentric contraction
   An isotonic contraction where the force generated by the muscle exceeds that of the load causing the muscle to shorten

365) Eccentric contraction
   An isotonic contraction where the force generated by the load exceeds that of the muscle causing the muscle to lengthen

366) Isometric contraction
   The muscle length remains the same because the force generated by the muscle is equal to the force generated by the load

367) Origin
   Where a muscle starts. It typically remains fixed during contraction.

368) Insertion
   Where a muscle ends. It’s the point that moves during contraction.

369) Fulcrum
   The point where a lever pivots

370) Prime mover
   A muscle whose action directly brings about the desired movement (also called the agonist

371) Antagonist
   A muscle whose action is opposite that of the prime mover. It’s action helps to make movement smooth

372) Twitch
   A single, brief, jerky contraction of a muscle fiber

373) Tetanus
Complete, maximal tension of a muscle fiber
374) Plasma
    Liquid component of the blood
375) Core temperature
    Internal body temperature, approximately 37 C
376) Veins
    Vessels carrying blood back to the heart
377) Venous
    Having to do with the veins
378) Salivate
    To produce saliva in the mouth

Be able to identify the following terms

**Muscles of facial expression and mastication**

379) Buccinator
380) Orbicularis oris
381) Depressor anguli oris
382) Levator labii superioris
383) Zygomaticus (major and minor)
384) Orbicularis oculi
385) Epicranius (occipitofrontalis)
386) Platysma
387) Masseter
388) Temporalis
389) Lateral pterygoid
390) Medial pterygoid

**Muscles that move the head and pectoral girdle**

391) Sternocleidomastoid
392) Levator scapulae
393) Pectoralis minor
394) Rhomboid major and minor

395) Serratus anterior
396) Subclavius
397) Trapezius

**Muscles that move the vertebral column**

398) Splenius capitis
399) Splenius cervicis
400) Spinalis cervicis
401) Spinalis thoracis
402) Longissimus capitis
403) Longissimus cervicis
404) Longissimus thoracis
405) Iliocostalis cervicis
406) Iliocostalis thoracis
407) Iliocostalis lumborum
408) Semispinalis capitis
409) Semispinalis cervicis
410) Semispinalis thoracis
411) Multifidus
412) Rotatores

413) Scalenes (anterior, medial, and posterior)
414) External oblique
415) Internal oblique
416) Transversus abdominis
417) Rectus abdominis

**Muscles that move the arm and forearm**

418) Deltoid
419) Supraspinatus
420) Infraspinatus
421) Teres minor
422) Teres major
423) Coracobrachialis
424) Pectoralis major
425) Latissimus dorsi
426) Triceps brachii
427) Biceps brachii
428) Brachialis
429) Brachioradialis
430) Pronator quadratus
431) Pronator teres  
432) Supinator  
**Muscles that move the hand and fingers**  
433) Flexor carpi radialis  
434) Flexor carpi ulnaris  
435) Palmaris longus  
436) Flexor digitorum superficialis  
437) Flexor digitorum profundus  
438) Flexor pollicis longus  
439) Extensor carpi radialis longus  
440) Extensor carpi radialis brevis  
441) Extensor digitorum  
442) Extensor pollicis longus  
**Muscles that move the thigh**  
443) Gluteus maximus  
444) Gluteus medius  
445) Gluteus minimus  
446) Tensor fasciae latae  
447) Obturator internus  
448) Obturator externus  
449) Piriformis  
450) Gemellus (superior and inferior)  
451) Quadratus femoris  
452) Adductor brevis  
453) Adductor magnus  
454) Pectineus  
455) Gracilis  
456) Iliacus  
457) Psoas major  
**Muscles that move the leg**  
458) Biceps femoris  
459) Semitendinosus  
460) Semimembranosus  
461) Sartorius  
462) Popliteus  
463) Rectus femoris  
464) Vastus intermedius  
465) Vastus lateralis  
466) Vastus medialis  
**Muscles that move the foot**  
467) Tibialis anterior  
468) Fibularis tertius  
469) Extensor digitorum longus  
470) Extensor hallucis longus  
471) Gastrocnemius  
472) Fibularis longus  
473) Fibularis brevis  
474) Soleus  
475) Tibialis posterior  
476) Flexor digitorum longus  
477) Flexor hallucis longus
Unit 5 The Nervous System

Morphemes

a. astr-star-like
b. ax-axle
c. bi-two
d. dendr-tree
e. ependym-tunic
f. -glia-glue
g. -lemm-rind or peel
h. moto-

i. multi-many
j. neur-nerve
k. oligo-few
l. peri-all around
m. saltator-dancer
n. sens-feeling
o. syn-together
p. uni-one
q. cephal-head
r. chiasm-cross
s. flacc-flabby
t. funi-small cord or fiber
u. gangli-swelling

Suggested Vocabulary

478) Neuron
A nerve cell that is electrically excitable

479) (Nervous) impulse
Signal transmitted by a neuron

480) Sensation
A signal received by the central nervous system

481) Axon
The portion of a neuron that conducts action potentials away from the cell body and to another neuron, muscle, or gland

482) Dendrite
The portion of a neuron that receives signals from other neurons

483) Synapse
The point where a neuron almost touches another neuron, muscle fiber, or gland

484) Neurotransmitter
Chemical used by a neuron to signal another cell

485) Synaptic cleft
The gap between 2 cells forming a synapsis

486) Action potential
The rapid depolarization and repolarization of a bit of cell membrane

487) Sodium-potassium pump
   A transmembrane enzyme that pumps sodium and potassium ions in opposite directions against their concentration gradients using ATP. It pumps 3 sodium ions out of the cell for every 2 potassium ions in, which creates a negative voltage on the inside of the cell.

488) Electricity
   the presence and flow of electric charge

489) Myelin sheath
   Fatty white substance that surrounds the axon of some nerve cells, forming an electrically insulating layer

490) Ligand-gated ion channel
   A channel protein that opens or closes in response to a neurotransmitter

491) Dopamine
   A neurotransmitter necessary for fine motor movement, decision making, and reward

492) Limbic system
   A collection of brain organs involved in emotion, motivation, memory, and olfaction

493) Cerebral cortex
   The outer layer of neural tissue of the cerebrum of the brain. It is responsible for the integration of complex sensory and neural functions and the initiation and coordination of voluntary activity

494) Sensory cortex
   The part of the cerebral cortex that processes information from sensory neurons

495) Motor cortex
   The part of the cerebral cortex that plans, controls, and executes voluntary movements

496) Prefrontal cortex
   The executive center of the brain. It is responsible for higher cognitive functions like planning, distinguishing right from wrong, determining what is socially appropriate, decision-making, and producing insights

497) White matter
   Myelinated nerve fibers of the central nervous system

498) Gray matter
   Unmyelinated nerve fibers and cell bodies of the central nervous system

499) Gyrus
   Ridge

500) Sulcus
   Groove

501) Fissure
   A deep groove

502) Frontal lobe
   Contains the motor cortex. Anterior to the motor cortex is Broca’s area, which is typically in the left hemisphere. Generally responsible for
503) Broca’s area
People that suffer from strokes in this area know what they want to say, but cannot form intelligible speech

504) Parietal lobe
Contains the somatosensory cortex and may include part of Wernicke’s area. Responsible for the integration of different sensory types, including mechanoreception and proprioception

505) Proprioception
The sense of where body parts are and the amount of effort being given to move

506) Temporal lobe
Contains the primary auditory cortex, olfactory cortex, and most, if not all of Wernicke’s area. In general, it is responsible for emotional associations, language comprehension, and forming memories.

507) Wernicke’s area
Generally in the left hemisphere, it is involved with understanding language

508) Occipital lobe
Contains the primary visual cortex and most of the visual processing centers of the brain

509) Corpus callosum
A huge neural track the connects the 2 hemispheres allowing the 2 hemispheres to “talk” to each other

510) Basal ganglia
A collection of brain organs of the cerebrum involved in regulating movement by integrating sensory inputs with movement

511) Hippocampus
Consolidates short term memory to long term memory and spatial memory needed for navigation

512) Thalamus
Relays sensory impulses to the cerebral cortex and impulses from the from the motor cortex to lower motor centers, and is involved in memory

513) Hypothalamus
Regulates body temperature, food intake, osmotic balance, and thirst (think homeostasis). Regulates the pituitary gland and produces the hormones oxytocin and antidiuretic hormone

514) Limbic system
Composed of several organs. Mediates emotional response and is involved in memory processing

515) Midbrain
Contains visual and auditory reflex centers and connects the pons with the diencephalon

516) Pons
Relays information from the cerebrum to the cerebellum and helps control respiration

517) Medulla oblongata
Relays sensory impulses from skin and proprioceptors and controls involuntary things like heart rate, respiration rate, and vomiting

518) Cerebellum
Integrates information from proprioceptors and visual pathways and communicates with cerebral motor cortex to maintain balance and posture

519) Ganglion
   A bundle of neuron cell bodies

520) Somatic nervous system
   It is under voluntary control; Cell bodies originate in the motor cortex; Effector organs are muscles; Neurotransmitter is acetylcholine; It controls voluntary muscle movement

521) Autonomic nervous system
   the part of the nervous system responsible for control of the bodily functions not consciously directed, such as breathing, the heartbeat, and digestive processes

522) Parasympathetic division of the autonomic nervous system
   It is under involuntary control; Cell bodies originate in the brain stem and the sacral level of the spinal cord; Mostly affects organs of digestion; Preganglionic axons are long and use acetylcholine as a neurotransmitter; Postganglionic neurons are short and use acetylcholine as a neurotransmitter; Think rest and digest

523) Sympathetic division of the autonomic nervous system
   It is under involuntary control; Cell bodies originate in the thoracic and lumbar levels of the spinal cord; Mostly affects organs of digestion and some endocrine glands; Preganglionic axons are short and use acetylcholine as a neurotransmitter; Postganglionic neurons are long and use norepinephrine as a neurotransmitter; Think action and concentration and/or fight and flight

524) Central nervous system
   The brain and spinal cord. It is responsible for integrating and controlling all actions and physiological functions

525) Afferent neuron
   A sensory neuron of the peripheral nervous system that brings sensory information to the central nervous system

526) Efferent neuron
   A motor neuron of the peripheral nervous system. It brings information from the central nervous system to organs.

527) Interneuron
   A neuron that transmits signals from one neuron to another

528) Dura mater
   One of the meninges. The tough most superficial double membrane that connects to the skull.

529) Arachnoid mater
   One of the meninges. Villi from it allow cerebrospinal fluid to enter the blood stream.

530) Pia mater
   One of the meninges. It follows every fold of the cerebellum.

531) Neuroglia
   Cells that support, insulate, and protect neurons (also called glia cells)

532) Astrocytes
Anchor neurons to blood supply, regulate the permeability of capillaries (and therefore regulate what the brain is exposed to), and regulate the chemical environment of neurons

533) Microglia
   Phagocytic cells that clear out debris and protect the CNS from bacteria and other pathogens

534) Ependymal
   They line the cavities of the CNS and their cilia facilitate circulation of cerebrospinal fluid

535) Cerebrospinal fluid
   Cushions the brain, makes the brain more buoyant, and facilitates the removal of wastes

536) Oligodendrocytes
   Produce the myelin sheaths of neurons within the central nervous system

537) Autoimmune disease
   Inappropriate immune cell attacking of normal, healthy tissue

538) Mechanosensitive channel
   A membrane channel that opens in response to mechanical stress
Unit 6 The Endocrine System

**Morphemes**

a. cort-  
   bark, rind

b. -crin  
   to secrete

c. diuret-  
   to pass urine

d. endo-  
   inside

e. exo-  
   outside

f. horm-  
   impetus, impulse

g. hyper-  
   above

h. hypo-  
   below

i. lact-  
   milk

j. med-  
   middle

k. para-  
   beside

l. toc-  
   birth

m. -tropic  
   influencing

n. vas-  
   vessel

**Suggested Vocabulary**

539) Secondary messenger  
   A molecule within the cell that transfers a signal from a receptor protein to a target molecule

540) Adenylyl cyclase  
   A membrane protein activated by a G protein that converts ATP into cAMP, which is a secondary messenger

541) Cyclic adenosine monophosphate (cAMP)  
   It is a secondary messenger involved in many signal transduction pathways

542) Adrenocorticotropic Hormone (ACTH)  
   Promotes production and release of cortisol by adrenal cortex

543) Oxytocin (OT)  
   Hormone produced by the hypothalamus and released by the posterior pituitary gland, initiates contraction of uterus

544) Human growth hormone (hGH)  
   Also called somatotropin. It is a hormone of the anterior pituitary gland that causes target cells to produce IGFs (insulin-like growth factors). IGFs cause cell division, glucose uptake, and protein synthesis. It promotes growth, development, and other anabolic activities.

545) Melanocyte Stimulating Hormone  
   Promotes production of melanin for skin coloration

546) Melatonin  
   Produced by pineal gland, regulates circadian rhythms

547) Prolactin (PRL)  
   Promotes lactation postpartum

548) Testosterone  
   The hormone produced by the testes responsible for male secondary sexual characteristics, growth, and prevention of osteoporosis

549) Estrogen  
   The hormone produced by the ovaries responsible for female secondary sexual characteristics, female reproductive cycle, growth, and prevention of osteoporosis.
550) Thyroid gland
   An endocrine gland that produces the hormones triiodothyronine (T3) and thyroxine (T4). These hormones regulate growth and development. In general, T3 and T4 increase metabolic rate.

551) Hormone
   A chemical signal produced by endocrine organs that cause cellular change and therefore regulate physiological function.

552) Peptide
   This term typically refers to a short sequence of amino acids.

553) Steroid hormone
   A lipid hormone derived from cholesterol. There are 2 classes: 1) corticoids, and 2) sex hormones.

554) Anterior pituitary
   A portion of what is called the master control gland because its hormones regulate many other endocrine glands. It produces tropic hormones (hormones that regulate the secretion of other hormones) as well as LH, FSH, MSH, hGH, and prolactin.

555) Posterior pituitary
   A portion of what is called the master control gland because its hormones regulate many other endocrine glands. It stores and secretes antidiuretic hormone (ADH) and oxytocin.

556) Antidiuretic hormone (ADH)
   A hormone produced by the hypothalamus and released by the posterior pituitary gland. It causes the retention of water and therefore increases blood volume (also called vasopressin or arginine vasopressin (AVP)).

557) Erythropoietin (EPO)
   Hormone that promotes blood cell formation.

558) Pineal gland
   An endocrine gland located in the center of the brain next to the 2 halves of the thalamus. It produces the hormone melatonin which regulates the wake/sleep circadian cycle.

559) Retina
   The layer of cells at the back of the eye that has photosensitive cells.

560) Adrenal cortex
   The outer covering of the adrenal gland. It contains 3 layers of glandular epithelia. It produces mineralocorticoids (aldosterone), glucocorticoids (cortisol and cortisone), and sex hormones.

561) Adrenal medulla
   The center of the adrenal gland. It is composed of neural tissue that produces norepinephrine and epinephrine.

562) Aldosterone
   A mineralocorticoid hormone that helps regulate blood volume and therefore blood pressure by causing the reabsorption of Na+ and K+ from filtrate in the nephrons of kidneys. Water follows the Na+ and K+ out of the nephrons into lymphatic vessels.

563) Cortisone and cortisol
   These are glucocorticoids that increase glucose levels by causing the metabolism of fats and proteins. They also decrease inflammation and pain, and suppress the immune system.

564) Epinephrine
   Adrenaline. A hormone that produces the flight or fight response.
565) Norepinephrine
Noradrenaline. A neurotransmitter of the sympathetic nervous system and a hormone produced by the adrenal medulla that causes the fight of flight response.

566) Pancreas
An endocrine gland producing several important hormones, including insulin, glucagon, somatostatin, and pancreatic polypeptide, all of which circulate in the blood. It is also a digestive organ, secreting bicarbonate to neutralize acidity of chyme moving in from the stomach, as well as digestive enzymes that assist digestion and absorption of nutrients in the small intestine. These enzymes help to further break down the carbohydrates, proteins, and lipids in the chyme.

567) Liver
An accessory digestive gland, produces bile, an alkaline compound which helps breakdown fat. It also stores glycogen. It detoxifies various metabolites, synthesizes proteins, and produces biochemicals necessary for digestion.

568) Insulin
A hormone secreted by the pancreas that causes cells to take up glucose

569) Glucagon
A hormone secreted by the pancreas that causes the liver to breakdown glycogen which releases glucose into the blood stream

570) Type I diabetes
An autoimmune disease where the white blood cells attack and kill the beta cells of the pancreas

571) Type II diabetes
A disease where the cells become resistant to the hormone insulin

572) GnRH (gonadotropin-releasing hormone)
A hormone released by the hypothalamus causing the anterior pituitary to release LH and FSH

573) LH (luteinizing hormone)
A hormone released by the anterior pituitary. In women, it causes ovulation and development of the corpus luteum. In men, it causes Leydig cells of the testes to produce testosterone.

574) FSH (follicle stimulating hormone)
A hormone released by the anterior pituitary. In women it causes the ovarian follicle to grow. In men, it causes Sertoli cells of the testes to produce inhibin, and work synergistically with testosterone to cause sperm maturation.

575) Inhibin
A hormone produced by Sertoli cells of the testes that inhibits secretion of LH and FSH from the anterior pituitary gland

576) Estrogen
the primary female sex hormone. It is responsible for the development and regulation of the female reproductive system and secondary sex characteristics

577) Progesterone
A hormone involved in the menstrual cycle, pregnancy, and embryogenesis of humans and other species
Unit 7 The Cardiovascular System

Morphemes

a. agglutin-glue together
b. bil-bile
c. crit to separate
d. embol-stopper
e. eryth-red
f. hema-blood
g. hemo-blood
h. hepa-liver
i. leuko-white
j. lys to break up
k. macro-
l. -osis abnormal condition
m. phag-to eat
n. -poie make, produce
o. poly-many
p. -stasis halt, make stand
q. thromb-clot
r. angio-vessel
s. ather-porridge
t. brady-slow
u. diastol-dilation
v. edem-swelling
w. -gram something written
x. lun-moon
y. myo-muscle
z. papill-nipple
aa. phleb-vein
bb. scler-hard
cc. syn-together
dd. systol-contraction
ee. tachy-rapid

Suggested Vocabulary

578) Platelet
Cell fragments that are essential for blood clotting and tissue repair. They produce clotting factors and growth factors

579) Growth factors
Proteins that cause cells to replicate

580) Blood plasma
The extracellular matrix of blood. It a liquid with dissolved proteins, electrolytes, glucose, hormones, and other substances

581) Superior vena cava
Delivers oxygen poor blood from the head, arms, and upper body to the right atrium

582) Inferior vena cava
Delivers oxygen poor blood from the lower body to the right atrium

583) Right atrium
Pumps oxygen poor blood from the superior and inferior venae cavae into the right ventricle through the tricuspid valve

584) Tricuspid valve
   Prevents backflow of blood from the right ventricle to the right atrium

585) Right ventricle
   Pumps oxygen poor blood from the right atrium through the pulmonary valve to the pulmonary arteries

586) Pulmonary valve
   Prevents backflow of blood from the pulmonary arteries into right ventricle

587) Pulmonary arteries
   Carry oxygen poor blood from the right ventricle to the lungs

588) Pulmonary veins
   Carry oxygen rich blood from the lungs to the left atrium

589) Left atrium
   Pumps oxygen rich blood from the pulmonary veins into the left ventricle through the mitral valve

590) Mitral valve
   Prevents backflow of blood from the left ventricle into the left atrium

591) Left ventricle
   Pumps oxygen rich blood from the left atrium to the aorta through the aortic valve

592) Aortic valve
   Prevents backflow of blood from the aorta into the left ventricle

593) Aorta
   Carries oxygen rich blood from the left ventricle to various other arteries

594) Pulmonary circuit
   Oxygen poor blood is carried by arteries from the heart to the lungs, and oxygen rich blood is carried by veins from the lungs to the heart

595) Systemic circuit
   Oxygen rich blood is carried by arteries from the heart to all the cells of the body, and oxygen poor blood is carried by veins from the cells of the body to the heart

596) Sinoatrial node
   The pacemaker of the heart. It generates an action potential that begins the cardiac cycle causing the atria to contract simultaneously.

597) Atroventricular node
   It slows the action potential generated by the sinoatrial node and then conducts the action potential to the ventricles via the interventricular septum

598) Interventricular septum
   The muscular wall separating the left and right ventricles. It allows action potentials from the atroventricular node to propagate to the apex of the heart without stimulating ventricular contraction.

599) Purkinje fibers
Nerves that conduct action potentials from the atrioventricular septum all over the ventricles causing simultaneous contraction of the ventricle

600) P wave
Caused by the depolarization of the atria

601) PR segment
Caused by the atrioventricular node slowing the action potential generated by the sinoatrial node, which allows the atria to empty completely

602) QRS wave
Caused by the depolarization of the ventricles. It masks the repolarization of the atria

603) ST segment and T wave
Caused by the repolarization of the ventricles

604) Artery
A blood vessel with thick walls muscular walls that conveys blood away from the heart

605) Vein
A blood vessel with thin muscular walls that conveys blood to the heart

606) Blood pressure
The force per area of blood against vessel walls in millimeters of mercury

607) Sphygmomanometer
Blood pressure cuff

608) Stethoscope
Tool for listening to body sounds

609) Myocardium
Cardiac muscle

Be able to identify the following

610) Aorta
611) Common carotid artery
612) Common jugular
613) Brachiocephalic artery
614) Brachiocephalic vein
615) Subclavian artery
616) Subclavian vein
617) Axillary artery
618) Axillary vein
619) Brachial artery
620) Brachial vein
621) Radial artery
622) Radial vein
623) Ulnar artery
624) Ulnar vein
625) Abdominal aorta
626) Iliac artery
627) Iliac vein
628) Femoral artery
629) Femoral vein
630) Popliteal artery
631) Popliteal vein
632) Anterior tibial artery
633) Anterior tibial vein
634) Hepatic artery
635) Hepatic vein
636) Renal artery
637) Renal vein
638) Systolic pressure
   The maximum pressure on major arteries of the systemic circuit caused by ventricular contraction
639) Diastolic pressure
   The minimum pressure on major arteries of the systemic circuit caused by ventricular relaxation
640) Sphincter
   a circular muscle that normally maintains constriction of a body passage or orifice and which relaxes as required by normal physiological functioning
641) Hydrostatic pressure
   The pressure exerted by a fluid
642) Osmotic pressure
   The pressure that must be applied to a solution to prevent the passage into it of solvent when 2 solutions are separated by a membrane permeable only to the solvent.
643) Interstitial fluid
   Fluid that fills the spaces between most of the cells of the body and provides a substantial portion of the liquid environment of the body. Its composition is similar to lymph.
644) Vasocostriction
   Narrowing the diameter of a blood vessel
645) Vasodilation
   Increasing the diameter of a blood vessel
Unit 8 The Lymphatic System and Immune Systems

Morphemes

a. adeno-
   gland
b. auto-
   self
c. -gen
   become, be produced
d. humor-
   moisture, fluid
e. immun-
   free, exempt
f. inflamm-
   to set on fire
g. nod-
   knot
h. patho-
   disease
i. tox-
   poison

Suggested Vocabulary

646) Thymus
   An endocrine gland and a lymphatic organ. It is the site of T cell maturation and T cell self tolerance testing.

647) Spleen
   An organ that filters and recycles blood. It is also a red blood cell reservoir. It is effectively a very large lymph node holding about half of the phagocytic cells of the lymphatic system.

648) Lymph node
   A kidney shaped organ of the lymphatic system that filters foreign particles, cancer cells, and pathogens from lymphatic fluid. It does this by housing large quantities of immune cells.

649) Lymphocyte
   Type of white blood cell

650) Innate immune response
   A nonspecific immune response, meaning the immune response is dependent on traits common to a class of pathogen (bacteria, virus, fungus, etc.)

651) Macrophage
   A large generalized cell eater. They produce cytokines that activate other immune system cells

652) Cytokine
   A type of molecule (there are many kinds of cytokines). Some are used by immune system cells to “talk” to each other.

653) Chemotaxis
   The movement of an organism towards or away from a chemical stimulus

654) Complement
   A collection of a few dozen proteins that circulate in an inactive form. A cascade of activations occurs because of activation by the presence of a pathogen. They are part of the innate response and cause cell lysis.

655) Adaptive immunity
   Learned immunity from specific pathogens that is remembered potentially for life. It has a humoral and a cell mediated component.

656) Humoral immunity
   Antibody production and all of the responses antibodies cause. For example, toxin neutralization and complement activation.
657) Antigen
   Anything that stimulates the immune system (usually a protein or a part of a protein from a pathogen)
658) Antigen receptor molecule
   A membrane protein of T cells and B cells that “recognizes” specific antigens. Every time a T cell or B cell is made, the variable region of it is randomly changed.
659) Helper T cell
   A leukocyte made in bone marrow that matures in the thymus. They produce cytokines that activate cytotoxic T cells (cell mediated immune system) and B cells (humoral immune system).
660) Cytotoxic T cell
   A leukocyte made in bone marrow that matures in the thymus. They produce perforin and granzymes that kill cells infected by pathogens
661) B cell
   A lymphocyte that is produced and matures in the bone marrow. They differentiate into antibody producing cells.
662) Plasma cell
   A B cell that has specialized to make one type of antibody
663) Antibody
   A protein produced by plasma cells (differentiated B cells). They are often called immunoglobulin proteins (Ig). They recognize and bind to different antigens and neutralize them.
664) Apoptosis
   Programmed cell death
665) Self-tolerance
   Failure to mount an immune response to the antigens of your own body’s cells
666) Immunologically competent cell
   A lymphocyte that could participate in cell-mediated immunity, or produce functional antibodies
667) Primary immune response
   The first exposure to an antigen. The immune system must learn what types of white blood cells and antibodies to make.
668) Secondary immune response
   Additional exposures to an antigen. The immune system already has the necessary white blood cells and antibodies to fight the infection.
669) Autoimmune disease
   A disorder caused by the immune system mistakenly attacks one of your own cell types
Unit 9 The Respiratory System

Morphemes

a. alveol-
   small
b. bronch-
   windpipe
c. carcin-
   spreading sore
d. carin-
   keel-like
e. cric-
   ring
f. epi-
   upon, after, in addition
g. exhal-
   to breathe out
h. hem-
   blood
i. inhal-
   to breathe in
j. phren-
   diaphragm
k. tuber-
   swelling

Suggested Vocabulary

670) Nasal Cavity
The cavity behind the nose and above the roof of the mouth that filters air and moves mucous and inhaled contaminants outward and away from the lungs.

671) Trachea
The main tubule that forms the respiratory system from the pharynx to the lungs

672) Larynx
The voice box; passageway for air moving from pharynx to trachea; contains vocal cords

673) Bronchi
The passages that branch from the trachea and direct air into the lungs

674) Lungs
The two spongy organs, located in the thoracic cavity enclosed by the diaphragm and rib cage, responsible for respiration

675) Bronchioles
Progressively smaller tubular branches of the airways that lead from the trachea to the lungs

676) Alveoli
Tiny sacs of lung tissue specialized for the movement of gases between air and blood

677) Diaphragm
Muscle separating the chest and abdomen. Contracts to pull air into the lungs, Relaxes to push air out of the lungs

678) Pharynx
Throat; including the nasopharynx, oropharynx, and laryngopharynx.

679) Epiglottis
Lid-like piece of cartilage that covers the larynx, preventing food from entering the larynx and trachea during swallowing.

680) Breathing
The passing or able to pass air in and out of the lungs normally

681) Respiration
The metabolic processes whereby certain organisms obtain energy from organic molecules

682) Carbon dioxide (CO₂)
   Waste product of cellular metabolism

683) pH
   Measurement of acidity

684) Surfactant
   A fatty molecule on the respiratory membranes

685) Vital capacity
   Total volume of air exchanged from forced inhalation and forced exhalation.

686) Tidal volume
   Normal breathing volume

687) Inspiratory reserve
   Air inhaled beyond tidal amount

688) Expiratory reserve
   Air exhaled beyond tidal amount

689) Asthma
   Airway obstruction caused by spasms of bronchi, excess mucous production and inflammation of bronchi

690) Apnea
   No Breathing

691) Dyspnea
   Difficult or labored breathing

692) Surfactant
   Lipid material in alveoli that prevents the lung from collapsing

693) Pneumonia
   Bacterial infection of the lung

694) Pneumothorax
   Collapsed Lung

695) Pulmonary Embolism
   blood clot in the lung

696) Tuberculosis
   Infectious disease of the lungs caused by the tubercle bacillus
Unit 10 The Digestive System

Morphemes

a. aliment-
food
b. cari-
decay
c. cec-
blindness
d. chym-
juice
e. dedidu-
failing off
f. frenul-
bridle, restraint
g. gastr-

h. hepat-
liver
i. hiat-
opening
j. lingu-
tongue
k. peri-
around
l. pyl-

gatekeeper, door
m. rect-
straight
n. sorpt-
to soak up
o. vill-
hairy
p. bas-
base
q. calor-
heat
r. lip-
fat
s. –mete
measure

Suggested Vocabulary

697) Peristalsis
Involuntary wave-like contractions of layers of involuntary muscles lining cavities

698) Segmentation
Somewhat random contraction and relaxation of smooth muscle that results in mixing

699) Alimentary canal
The whole passage along which food passes through the body from mouth to anus

700) Mucosa
The mucus membrane of the alimentary canal with many goblet cells. It is where nutrients are absorbed.

701) Submucosa
The layer of the alimentary canal that contains lymphatic vessels, lymph tissue, blood vessels, and nerve endings. Absorbed nutrients enter circulation from here.

702) Muscularis externa
The muscle layer of the alimentary canal made up of an inner circular layer and an outer longitudinal layer of smooth muscle. It is responsible for peristalsis.

703) Serosa
The visceral layer of the peritoneum that forms the alimentary canal. It attaches and secures most of the small intestine and large intestine to the parietal peritoneum.

704) Mesentery
Two visceral layers of the peritoneum sandwiching blood vessels, lymphatic vessels, and nerves. It suspends and attaches the small intestines (except most of the duodenum), stomach, and portions of the large intestine to the parietal peritoneum.

705) Uvula
A fleshy mass that dangles from the soft palate. It aids in closing off the nasal passage during swallowing. It also produces saliva that lubricates the throat.

706) Esophagus
The portion of the alimentary canal that runs from the pharynx through the diaphragm, to the stomach.

707) Rugae
Folds in the lining of the stomach that allow it to expand when we eat

708) Plicae circulares
The folds in the walls of the small intestine

709) Villi
The finger-like projections or folds of the mucosa of the small intestine

710) Salivary glands
Produce a fluid that causes food to clump aiding in the formation of a bolus, and other components.

711) Lesser omentum
Mesentary that extends from the liver to the lesser curvature (medial side) of the stomach

712) Greater omentum
An apron of mesentary that extends from the greater curvature of the stomach (the lateral side) all along the anterior abdominal cavity. It is specialize for fat storage.

713) Bolus
A roundish mass of food formed by chewing and the tongue

714) Mucin
A glycoprotein that is the main component of mucus

715) Trypsin
Enzyme that breaks down protein in the small intestine

716) Amylase
An enzyme that breaks down starch into maltose, which is a disaccharide composed of two glucose monomers.

717) Amylose
A type of starch

718) Lysozyme
An enzyme that inhibits bacterial growth

719) Gastrin
Causes parietal cells to release HCl (hydrochloric acid).

720) Pepsinogen
An inactive protein digesting enzyme produced by chief cells of the stomach that becomes pepsin in acidic conditions
721) Pepsin
An enzyme produced by chief cells of the stomach that breaks down proteins into smaller peptides

722) Gastric juice
Digestive enzymes and HCl produced by gastric glands

723) Chyme
An acidic, thick mixture of food and gastric juice

724) Protease
Enzymes such as trypsin, chymotrypsin, carboxypeptidase, and others that break down proteins into smaller peptides and amino acids

725) Lipase
An enzyme produced by the pancreas that breaks down lipids

726) Nuclease
An enzyme that breaks down nucleic acids

727) Secretin
A hormone produced by the duodenum that causes the liver to secrete bile and the pancreas to secrete bicarbonate into the duodenum

728) Cholecystokinin (CCK)
A hormone produced by the duodenum that causes the gall bladder to release bile and the pancreas to secrete digestive enzymes

729) Bile
A mixture of salts, cholesterol, and pigments (mostly bilirubin from red blood cell recycling) that emulsifies fats

730) Hepatic portal system
A network of capillaries in the intestines connected to the liver by a vein. It also the liver to detoxify and process substances absorbed during digestion.

731) Micelle (in digestion)
Fatty acids or fat soluble vitamins (A, D, E, K) encased in bile salts. Their formation allows these insoluble molecules to dissolve in the lumen of the intestines and be absorbed into the endothelial cells of the mucosa.

732) Chylomicron
Lipoprotein particles that consist of triglycerides, phospholipids, cholesterol, and proteins. They transport dietary lipids from the intestines to other locations in the body.

733) Cellulose
A carbohydrate that is the main fibrous component of plant cell membranes. It is composed of extremely long chains of glucose.
Unit 11: The Urinary System

Morphemes

- a. af- to
  - b. calyc small cup
  - c. cort- covering
  - d. cyst- bladder
  - e. detrus- to force away
  - f. glom- little ball
  - g. jucta- near to
  - h. mict- to pass urine
  - i. neph- pertaining to the kidney
  - j. papill- nipple
  - k. prox- nearest
  - l. ren- kidney
  - m. trigon- triangular shape
  - n. vesic- bladder
  - o. edem- swelling
  - p. -emia a blood condition
  - q. extra- outside
  - r. im- or in- not
  - s. intra- within
  - t. neutr- neither one nor the other
  - u. -osis a state of
  - v. -uria an urine condition

Suggested Vocabulary

734) Hydration
  Maintaining adequate water in the body tissues

735) Solute
  Substance dissolved in liquid

736) Kidneys
  Excretory organs responsible for filtering blood

737) Ureter
  The long narrow tube that carries urine from the kidney to the urinary bladder

738) Urinary Bladder
  A muscular membrane-lined sac located in the anterior part of the pelvic cavity and used to hold urine

739) Urethra
  The tube that urine is transported from the bladder to the outside of the body

740) Renal cortex
  Outer layer of the kidney

741) Renal Medulla
  Inner part of the kidney

742) Nephron

Table of Contents
the microscopic structural and functional unit of the kidney. It is composed of a renal corpuscle and a renal tubule. The renal corpuscle consists of a tuft of capillaries called a glomerulus and an encompassing Bowman's capsule.

743) Glomerulus
A cluster of capillaries around the end of a kidney tubule, where waste products are filtered from the blood.

744) Filtrate
The water and dissolved substances such as glucose, minerals, and urea from blood that enters the tubule of the nephron from the glomerulus of the nephron.

745) Cystitis
Inflammation of the mucous membrane of the urinary bladder.

746) Dialysis
The separation of smaller molecules from larger molecules in a solution by selective diffusion through a semipermeable membrane.

747) Dysuria
Painful urination.

748) Hematuria
Blood in the urine.

749) Incontinence
Loss of self-control of urine.

750) Renal Calculi
Kidney stones.

751) Polyuria
Excessive urination.

752) Urinalysis
The chemical analysis of urine.

753) Uremia
Toxic condition where blood retains urinary waste products.

754) Chronic Renal Failure
Gradual loss of function of the nephrons.
Unit 12: The Reproductive System
Morphemes

a. andr-
man
b. contra-
against
c. ejacul-
to shoot forth
d. fimb-
fringe
e. follic-
small bag
f. -genesis
origin
g. gubern-
to steer, to guide
h. labi-
lip
i. mamm-
breast
j. mast-
breast

k. mens-
month
l. mons-
an eminence
m. oo-
egg
n. prim-
first
o. puber-
adult
p. zon-
belt
q. allant-
sausage
r. chorio-
skin
s. cleav-
to divide
t. ect-
outside
u. lanug-
down
v. mes-
middle
w. morul-
mulberry
x. nat-
to be born
y. ne-
new, young
z. post-
after
aa. pre-
before
bb. sen-
old
cc. umbel-
navel
Suggested Vocabulary

755) Inhibin
   A hormone that inhibits FSH production and secretion

756) Testes
   It produces both sperm and androgens, primarily testosterone

757) Epididymis
   It is a highly coiled tube that connects a testicle to a vas deferens in the male reproductive system.

758) Seminiferous tubule
   Located within the testes, and are the specific location of meiosis, and the subsequent creation of male gametes

759) Vas deferens
   They transport sperm from the epididymis to the ejaculatory ducts

760) Leydig cells
   Produce several androgens including testosterone in the presence of luteinizing hormone causing spermatogenesis

761) Sertoli cells
   A "nurse" cell of the testicles that is part of a seminiferous tubule and helps in the process of spermatogenesis

762) Ovary
   The organ that produces ova (eggs) singular is ovum. It produces hormones involved with development of female secondary sexual characteristics and regulation of the menstrual cycle

763) Ovarian follicle
   A collection of cells that support, protect, and nourish egg cells and are involved in regulating the menstrual cycle by secreting hormones such as estrogen

764) Corpus luteum
   A temporary gland that forms from leftover follicular tissue. It produces progesterone and estrogen to prevent more follicles from maturing and to get the uterus ready for implantation of embryo (pregnancy)

765) Fallopian tube
   A tube line with ciliated epithelia leading from the ovaries to the uterus

766) Endometrium
   The inner epithelial layer, along with its mucous membrane, of the mammalian uterus. It has a basal layer and a functional layer; the functional layer thickens and then is sloughed during the menstrual cycle

767) Menstruation
   The loss of blood and tissue as the endometrium is shed by the uterus approximately every 28 days.

768) Ovulation
   The release of an ovum from the ovary.

769) Penis
   The male reproductive structure containing the urethra that introduces semen into the vagina during intercourse.
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770) Placenta
Location of umbilical cord connection to the uterus, site of nutrient exchange.

771) Pregnancy
The time from fertilization of an ovum to the birth of the newborn.

772) Prostate gland
Produces prostate fluid that is important to the health of the sperm.

773) Scrotum
A sac that serves as a container for the testes.

774) Semen
Fluid containing sperm and secretions from male reproductive glands.

775) Seminal vesicles
They secrete a fluid that nourishes the sperm into the vas deferens.

776) Sperm
The male sex cell.

777) Spermatic cord
The cord-like collection of structures that include the vas deferens, arteries, veins, nerves, and lymph vessels.

778) Spermatogenesis
Formation of mature sperm.

779) Uterus
The site of implantation and development of the fertilized egg.

780) Vagina
A muscular tube which extends from the cervix of the uterus to the outside of the body (birth canal)

781) Ejaculation
The impulse of forcing seminal fluid from the male urethra.

782) Fertilization
The fusion of an ovum and sperm to produce a zygote.

783) Zygote
Fertilized egg

784) Embryo
Developing human for the first 8 weeks after fertilization

785) Fetus:
From 9 weeks after fertilization until birth

786) Neonatal
Newborn baby
## Scaled Learning Targets

### Unit 1 The Human Body and Organization

<table>
<thead>
<tr>
<th>A &amp; P U 01 T1</th>
<th>I can construct an explanation as to how anatomy (structure) relates to physiology (function).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can construct an explanation of how anatomy relates to physiology using AT LEAST SIX body parts/organs/organ systems as examples.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can construct an explanation of how anatomy relates to physiology using AT LEAST FOUR body parts/organs/organ systems as examples.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can construct an explanation of how anatomy relates to physiology using AT LEAST TWO body parts/organs/organ systems as examples.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can construct an explanation of how anatomy relates to physiology.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 01 T2</th>
<th>I can develop a model of how directional terms relate to regions of the body.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can use a model so show how all essential directional terms relate to regions of the body AND which of the terms can be paired with an opposite definition.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can use a model to show how all essential directional terms relate to regions of the body.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can use a model to show how some essential directional terms relate to regions of the body.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can use a model of the body to show how common, non-scientific directional terms relate to regions of the body.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 01 T3</th>
<th>I can develop a model of how planes relate to regions of the body.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can use a model to show how all essential planes relate to regions of the body AND list what organs/systems should be observable.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can use a model to show how all essential planes relate to regions of the body.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can use a model to show how some essential planes relate to regions of the body.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can use a model to show how regions of the body could be cut.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 01 T4</th>
<th>I can develop and use a model to explain primary body cavities and their organs.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can develop and use a model to explain primary body cavities and their organs AND explain the secondary cavities/subdivisions.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can develop and use a model to explain all primary body cavities and their organs.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can develop and use a model to explain some primary body cavities and their organs.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can develop and use a model to explain where some of the organs are located.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 01 S1</th>
<th>I can obtain, evaluate, and communicate information for the purposes of describing and relating homeostasis of the major body systems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can obtain, evaluate, and communicate information for the purposes of describing and relating homeostasis of all the major body systems AND describe homeostatic imbalances for several systems.</td>
<td>I can obtain, evaluate, and communicate information for the purposes of describing and relating homeostasis of all the major body systems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 01 P1</th>
<th>I can ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can ask appropriate questions and/or make appropriate predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can ask appropriate questions and/or make appropriate predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

#### Unit 2 The Integumentary System

<table>
<thead>
<tr>
<th>A &amp; P U 02 S1</th>
<th>I can explain the structure and function of epithelial tissues and how they relate to homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can explain the structure and function of epithelial tissues and how they relate to homeostasis for all of the essential tissues AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can explain the structure and function of epithelial tissues and how they relate to homeostasis for all of the essential tissues.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 02 S2</th>
<th>I can explain the structure and function of connective tissue and how they relate to homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can explain the structure and function of connective tissue and how they relate to homeostasis for all of the essential tissues. AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can explain the structure and function of connective tissue and how they relate to homeostasis for all of the essential tissues.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 02 T1</th>
<th>I can explain how the structure of membranes fits their function.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can explain how the structure of membranes fits their function.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can give limited explanations of how the structure of membranes fits their function.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain how the structure or the function of membranes.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td></td>
</tr>
<tr>
<td>I can explain how the structure of membranes fits their function AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 02 S3</th>
<th>I can explain how the structures of the epidermal layers fit their function and how they relate to homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can explain how all of the structures of the epidermal layers fit their function and how they relate to homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can explain how all of the structures of the epidermal layers fit their function and how they relate to homeostasis.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain how most of the structures of the epidermal layers fit their function and how they relate to homeostasis.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain how some of the structures of the epidermal layers fit their function and how they relate to homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

### A & P U 02 S4
I can explain the structures and functions of the dermal organs and how they relate to homeostasis.

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can explain all of the structures and functions of the dermal organs and how they relate to homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can explain all of the structures and functions of the dermal organs and how they relate to homeostasis.</td>
<td>I can explain most of the structures and functions of the dermal organs and how they relate to homeostasis.</td>
<td>I can explain some of the structures and functions of the dermal organs and how they relate to homeostasis.</td>
</tr>
</tbody>
</table>

### A & P U 02 P1
I can explain the relationship between the structure and function of the integument and accessory structures in maintaining homeostasis.

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can explain all of the relationship between the structure and function of the integument and accessory structures in maintaining homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can explain all of the relationship between the structure and function of the integument and accessory structures in maintaining homeostasis.</td>
<td>I can explain most of the relationship between the structure and function of the integument and accessory structures in maintaining homeostasis.</td>
<td>I can explain some of the relationship between the structure and function of the integument and accessory structures in maintaining homeostasis.</td>
</tr>
</tbody>
</table>
# Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 02 T2</th>
<th>I can explain the homeostatic response as a result of damage to the integument and accessory structures caused by burns, wounds, and cancer of the skin.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can explain all of the homeostatic response as a result of damage to the integument and accessory structures caused by burns, wounds, and cancer of the skin AND describe specific examples of those conditions.</td>
<td>I can explain all of the homeostatic response as a result of damage to the integument and accessory structures caused by burns, wounds, and cancer of the skin.</td>
</tr>
</tbody>
</table>

## Unit 3 The Skeletal System

<table>
<thead>
<tr>
<th>A &amp; P U 03 S1</th>
<th>I can explain the structure and function of compact and spongy bone and how they help maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can explain all of the essential structures and functions of compact and spongy bone and how they help maintain homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can explain all of the essential structures and functions of compact and spongy bone and how they help maintain homeostasis.</td>
</tr>
</tbody>
</table>
# Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 03 P1</th>
<th>I can use models to construct explanations as to how the skeletal system maintains blood and mineral homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can use models to construct detailed explanations as to how the skeletal system maintains blood and mineral homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can use models to construct detailed explanations as to how the skeletal system maintains blood and mineral homeostasis.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can use models to construct somewhat detailed explanations as to how the skeletal system maintains blood and mineral homeostasis.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can use models to construct very generalized explanations as to how the skeletal system maintains blood and mineral homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 03 S2</th>
<th>I can develop a model for the healing process of bone following a fracture and explain how it helps maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can develop a model for all of the healing process of bone following a fracture and explain how it helps maintain homeostasis AND describe disruptions to healing process.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can develop a model for all of the healing process of bone following a fracture and explain how it helps maintain homeostasis.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can develop a model for most of the healing process of bone following a fracture and explain how it helps maintain homeostasis.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can develop a model for all some of the healing process of bone following a fracture and explain how it helps maintain homeostasis.</td>
</tr>
</tbody>
</table>
# Scaled Learning Targets

## A & P U 03 T1
I can obtain, evaluate, and communicate information for the purpose of classifying bones into the four major types: long, short, flat, and irregular.

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can obtain, evaluate, and communicate information for the purpose of classifying all bones into the four major types: long, short, flat, and irregular AND discuss differences in embryological origin of each.</td>
<td>I can obtain, evaluate, and communicate information for the purpose of classifying all bones into the four major types: long, short, flat, and irregular.</td>
<td>I can obtain, evaluate, and communicate information for the purpose of classifying most bones into the four major types: long, short, flat, and irregular.</td>
<td>I can obtain, evaluate, and communicate information for the purpose of classifying some bones into the four major types: long, short, flat, and irregular.</td>
</tr>
</tbody>
</table>

## A & P U 03 S3
I can explain the structures and function of the axial and appendicular skeletal systems and how they help maintain to homeostasis.

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can explain all of the essential structures and functions of the axial and appendicular skeletal systems and how they help maintain to homeostasis AND describe how specific diseases or disorders affect the axial skeleton.</td>
<td>I can explain all of the essential structures and functions of the axial and appendicular skeletal systems and how they help maintain to homeostasis.</td>
<td>I can explain most of the essential structures and functions of the axial and appendicular skeletal systems and how they help maintain to homeostasis.</td>
<td>I can explain some of the essential structures and functions of the axial and appendicular skeletal systems and how they help maintain to homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 03 T2</th>
<th>I can explain the structure and function of a synovial joint.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can explain all of the structures and functions of a synovial joint AND describe how specific diseases or disorders affect the appendicular skeleton.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can explain all of the structures and functions of a synovial joint.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can explain most of the structures and functions of a synovial joint.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td>I can explain some of the structures and functions of a synovial joint.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 03 T3</th>
<th>I can use a model to construct an explanation for the range of motion of the different joints.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can use a model to construct an explanation for the range of motion of all of the different joint types AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can use a model to construct an explanation for the range of motion in all of the different joint types.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can use a model to construct an explanation for the range of motion in most of the different joint types.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td>I can use a model to construct an explanation for the range of motion in some of the different joint types.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 03 T4</th>
<th>I can use a model to explain how the structure of bones in the skeletal system facilitates the function of movement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can use a model to explain in great detail how the structure of bones in the skeletal system facilitates movement.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can use a model to explain in moderate detail how the structure of bones in the skeletal system facilitates movement.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can use a model to explain in little detail how the structure of bones in the skeletal system facilitates movement.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 03 T5</th>
<th>I can explain the causes and effects of osteoporosis and other diseases of the skeletal system and how they disrupt homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can explain all of the essential causes and effects of osteoporosis and other diseases of the skeletal system and how they disrupt homeostasis.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can explain most of the essential causes and effects of osteoporosis and other diseases of the skeletal system and how they disrupt homeostasis.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can explain some of the essential causes and effects of osteoporosis and other diseases of the skeletal system and how they disrupt homeostasis.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td></td>
</tr>
</tbody>
</table>
# Scaled Learning Targets

## Unit 4 The Muscular System

<table>
<thead>
<tr>
<th>A &amp; P U 04 S1</th>
<th>I can compare and contrast the structures and functions of skeletal, cardiac, and smooth muscle and explain how they help maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can compare and contrast all of the essential structures and functions of skeletal, cardiac, and smooth muscle and explain how they help maintain homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can compare and contrast all of the essential structures and functions of skeletal, cardiac, and smooth muscle and explain how they help maintain homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 04 S2</th>
<th>I can develop and use a model to describe the gross anatomy of a muscle and explain why this is significant in maintaining homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can develop and use a model to describe the gross anatomy of a muscle and explain why this is significant in maintaining homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can develop and use a model to describe the gross anatomy of a muscle and explain why this is significant in maintaining homeostasis.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 04 S3</th>
<th>I can explain how the structure of a muscle fiber allows for contraction and explain why this is significant for maintaining homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can explain all of the essentials of how the structure of a muscle fiber allows for contraction and explain why this is significant for maintaining homeostasis.</td>
<td>I can explain all of the essentials of how the structure of a muscle fiber allows for contraction and explain why this is significant for maintaining homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 04 S4</th>
<th>I can construct explanations as to how the nervous system controls muscle contraction and explain why this is significant for maintaining homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can construct very detailed explanations as to how the nervous system controls muscle contraction and explain why this is significant for maintaining homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can construct very detailed explanations as to how the nervous system controls muscle contraction and explain why this is significant for maintaining homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 04 T1</th>
<th>I can use a model to compare and contrast anaerobic and aerobic respiration as they relate to muscle activity.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can use a model to compare and contrast all essential elements of anaerobic and aerobic respiration as they relate to muscle activity AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can use a model to compare and contrast all essential elements of anaerobic and aerobic respiration as they relate to muscle activity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 04 T2</th>
<th>I can develop a model to describe muscle contraction types.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can develop a model to describe all essential muscle contraction types AND tell which ones are the important and why.</td>
<td>I can develop a model to describe all essential muscle contraction types.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 04 T</th>
<th>I can develop and use a model to help explain how joints and muscle attachment points result in different lever types.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can develop and use a model to help explain how joints and muscle attachment points result in all of the different lever types AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can develop and use a model to help explain how joints and muscle attachment points result in most of the different lever types.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can develop and use a model to help explain how joints and muscle attachment points result in some of the different lever types.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can develop and use a model to help explain how joints and muscle attachment points result in different lever types.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 04 S5</th>
<th>I can explain how the muscular system causes movement and how this relates to homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can explain how the muscular system causes movement and how this relates to homeostasis.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can explain how the muscular system causes movement and how this relates to homeostasis at the microscopic level.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain how the muscular system causes movement and how this relates to homeostasis at the macroscopic level.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain how the muscular system causes shivering or how that relates to homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 04 P1</th>
<th>I can explain how the structures and functions of the muscular system help regulate homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can explain three ways the structures and functions of the muscular system help regulate homeostasis AND what other body systems are involved with each homeostatic mechanism.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can explain three ways the structures and functions of the muscular system help regulate homeostasis.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain two ways the structures and functions of the muscular system help regulate homeostasis.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain one way the structures and functions of the muscular system help regulate homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 04 T4</th>
<th>I can explain the structure and function of the skeletal muscles of the body.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can explain the structure and function of the skeletal muscles of the body at the microscopic level AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can explain the structure and function of the skeletal muscles of the body at the microscopic level.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain the structure and function of the skeletal muscles of the body at the macroscopic level.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain the structure or function of the skeletal muscles of the body at the macroscopic level.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 04 T5</th>
<th>I can describe muscular dystrophy and other diseases of the muscular system and how they disrupt homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can describe muscular dystrophy and two other diseases of the muscular system and how they disrupt homeostasis AND describe how they result from homeostatic imbalances.</td>
<td>I can describe muscular dystrophy and two other diseases of the muscular system and how they disrupt homeostasis.</td>
</tr>
</tbody>
</table>

---

### Unit 5 The Nervous System

<table>
<thead>
<tr>
<th>A &amp; P U 05 P1</th>
<th>I can explain the structure and function of a neuron and how this helps maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can explain all of the essential structures and functions of a neuron and how it helps maintain homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can explain all of the essential structures and functions of a neuron and how it helps maintain homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 05 S1</th>
<th>I can develop and use a model to compare and contrast how action potentials are propagated along myelinated and unmyelinated axons and how this helps maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can develop and use a model to compare and contrast how action potentials are propagated along myelinated and unmyelinated axons AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can develop and use a model to compare and contrast how action potentials are propagated along myelinated and unmyelinated axons and how this helps maintain homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 05 S2</th>
<th>I can use a model to explain how neurons communicate and how this helps maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can use a model to explain most essential elements of how neurons communicate and how this helps maintain homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can use a model to explain all essential elements of how neurons communicate and how this helps maintain homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 05 S3</th>
<th>I can describe the structure and function of the cerebrum, diencephalon, and brain stem and their roles in maintaining homeostasis.</th>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I can describe the structure and function of the cerebrum, diencephalon, and brain stem and their roles in maintaining homeostasis.</td>
<td>I can describe the structure and function of two of these: cerebrum, diencephalon, or brain stem and their roles in maintaining homeostasis.</td>
<td>I can describe the structure and function of one of these: cerebrum, diencephalon, or brain stem and its roles in maintaining homeostasis.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 05 T1</th>
<th>I can develop and use a model to illustrate the structures and divisions of the nervous system.</th>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I can develop and use a model to illustrate all of the essential structures and divisions of the nervous system AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can develop and use a model to illustrate all of the essential structures and divisions of the nervous system.</td>
<td>I can develop and use a model to illustrate most of the essential structures and divisions of the nervous system.</td>
<td>I can develop and use a model to illustrate some of the essential structures and divisions of the nervous system.</td>
<td></td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

### A & P U 05 S4
I can ask questions and observe patterns to describe a reflex arc and explain the stimulus involved and explain their significance in maintaining homeostasis.

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can ask very detailed questions and observe patterns to describe a reflex arc AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can ask very detailed questions and observe patterns to describe a reflex arc and explain the stimulus involved and explain their significance in maintaining homeostasis.</td>
<td>I can ask somewhat detailed questions and observe patterns to describe a reflex arc and explain the stimulus involved and explain their significance in maintaining homeostasis.</td>
<td>I can ask questions or observe patterns to describe a reflex arc.</td>
</tr>
</tbody>
</table>

### A & P U 05 S5
I can describe the structures that protect the brain (cranial bones, meninges, CSF, blood brain barrier) and how they maintain homeostasis.

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can describe all of the essential structures that protect the brain (cranial bones, meninges, CSF, blood brain barrier) and how they maintain homeostasis AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
<td>I can describe all of the essential structures that protect the brain (cranial bones, meninges, CSF, blood brain barrier) and how they maintain homeostasis.</td>
<td>I can describe most of the essential structures that protect the brain (cranial bones, meninges, CSF, blood brain barrier) and how they maintain homeostasis.</td>
<td>I can describe some of the essential structures that protect the brain (cranial bones, meninges, CSF, blood brain barrier) and how they maintain homeostasis.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 05 T2</th>
<th>I can explain the causes and effects of multiple sclerosis and other diseases of the nervous system and how they disrupt homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can explain the causes and effects of multiple sclerosis and two other diseases of the nervous system and how they disrupt homeostasis.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can explain the causes and effects of multiple sclerosis and two other diseases of the nervous system and how they disrupt homeostasis.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can explain the causes and effects of multiple sclerosis and one other diseases of the nervous system and how they disrupt homeostasis.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td>I can explain the causes and effects of multiple sclerosis and how it disrupts homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 05 T3</th>
<th>I can describe the structure and function of the organs of the special senses.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can describe the structure and function of all of the organs of the special senses AND describe how specific diseases or disorders result from homeostatic imbalances.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can describe the structure and function of all of the organs of the special senses.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can describe the structure and function of most of the organs of the special senses.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td>I can describe the structure and function of some of the organs of the special senses.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

### Unit 6 The Endocrine System

<table>
<thead>
<tr>
<th>A &amp; P U 06 T1</th>
<th>I can use a model to compare and contrast direct gene activation and the second messenger system.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can use a model to compare and contrast direct gene activation and the second messenger system.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can use a model to compare and contrast direct gene activation and the second messenger system.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain what the direct gene activation and second messenger system are.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain what either the direct gene activation system or the second messenger system is.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 06 S1</th>
<th>I can observe patterns and obtain, evaluate, and communicate information to help explain the role of the endocrine system in regards to homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can observe patterns and obtain, evaluate, and communicate information to help explain the role of the endocrine system in regards to homeostasis AND identify if the examples illustrate positive or negative feedback.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can observe patterns and obtain, evaluate, and communicate information to help explain the role of the endocrine system in regards to homeostasis.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can observe patterns and obtain, evaluate, and communicate information to help explain the role of the endocrine system in regards to two different examples of homeostasis.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can observe patterns and obtain, evaluate, and communicate information to help explain the role of the endocrine system in regards to one example of homeostasis.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 06 P1</th>
<th>I can explain the cause and effect of hormone level regulation and their role in positive and negative feedback mechanisms.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can explain the cause and effect of hormone level regulation and their role in positive and negative feedback mechanisms by citing four different examples.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can explain the cause and effect of hormone level regulation and their role in positive and negative feedback mechanisms by citing three different examples.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain the cause and effect of hormone level regulation and their role in positive and negative feedback mechanisms by citing two different examples.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain the cause and effect of hormone level regulation and their role in positive and negative feedback mechanisms by citing one example.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 06 T2</th>
<th>I can the causes and effects of diabetes and other endocrine disorders and how they disrupt homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can the causes and effects of diabetes and other endocrine disorders and how they disrupt homeostasis AND describe how they result from homeostatic imbalances.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can the causes and effects of diabetes and other endocrine disorders and how they disrupt homeostasis.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain the causes and effects of diabetes and one other disease of the endocrine system and how they disrupt homeostasis.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain the causes and effects of diabetes and how it disrupts homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

### Unit 7 The Cardiovascular System

<table>
<thead>
<tr>
<th>A &amp; P U 07 T1</th>
<th>I can analyze and interpret data regarding the components of a hematocrit to help explain the functions of each.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can analyze and interpret data regarding the components of a hematocrit to help explain the functions of each.</td>
</tr>
<tr>
<td>I can analyze and interpret data regarding the components of a hematocrit to help explain the functions of each AND determine when each component is within an acceptable percentage of the hematocrit.</td>
<td>I can analyze and interpret data regarding the components of a hematocrit to help explain the functions of each.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 07 T2</th>
<th>I can identify and describe the structures of the heart and their functions.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can identify and describe the structures of the heart, their functions, AND how they work together to pump blood.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 07 P1</th>
<th>I can explain the pattern of blood flow while tracing the path of blood through the pulmonary circuit, heart (including valves), and systemic circuit and explain how it assists in maintaining homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can explain the pattern of blood flow while tracing the path of blood through the pulmonary circuit, heart (including valves), and systemic circuit and explain how it assists in maintaining homeostasis.</td>
<td>I can explain the pattern of blood flow while tracing the path of blood through the pulmonary circuit, heart (including valves), and systemic circuit and explain how it assists in maintaining homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 07 S1</th>
<th>I can analyze and interpret data to help explain the electrical sequence of heart contraction and resulting ECG and explain its’ relationship to homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can analyze and interpret data to help explain the electrical sequence of heart contraction and resulting ECG, explain its’ relationship to homeostasis, AND be able to explain how irregular heart patterns can be detected.</td>
<td>I can analyze and interpret data to help explain the electrical sequence of heart contraction and resulting ECG and explain its’ relationship to homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 07 S2</th>
<th>I can use a model to compare and contrast the three main types of blood vessels: arteries, capillaries, and veins and how their anatomy relates to homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can use a model to compare and contrast the three main types of blood vessels: arteries, capillaries, and veins and how their anatomy relates to homeostasis.</td>
<td>I can use a model to compare and contrast the three main types of blood vessels: arteries, capillaries, and veins and how their anatomy relates to homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 07 T3</th>
<th>I can obtain, evaluate, and communicate information to describe the blood pressure measurements and how it helps maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can obtain, evaluate, and communicate information to describe the blood pressure measurements, explain how blood pressure helps maintain homeostasis, AND identify and describe factors that influence blood pressure both positively and negatively.</td>
<td>I can obtain, evaluate, and communicate information to describe the blood pressure measurements and how it helps maintain homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 07 T4</th>
<th>I can explain the causes and effects of myocardial infarction and other disorders of the heart and how they disrupt homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can explain the causes and effects of myocardial infarction and other disorders of the heart and how they disrupt homeostasis AND describe how they result from homeostatic imbalances.</td>
<td>I can explain the causes and effects of myocardial infarction and other disorders of the heart and how they disrupt homeostasis.</td>
</tr>
</tbody>
</table>

### Unit 8 The Lymphatic and Immune Systems

<table>
<thead>
<tr>
<th>A &amp; P U 08 S1</th>
<th>I can identify the structure and function of the cells, glands and vessels of the lymphatic system and their roles in maintaining homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can identify the structure and function of the cells, glands and vessels of the lymphatic system, their roles in maintaining homeostasis AND predict consequences of homeostatic imbalances.</td>
<td>I can identify the structure and function of the cells, glands and vessels of the lymphatic system and their roles in maintaining homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 08 T1</th>
<th>I can develop and use a model to compare and contrast the vessels of the cardiovascular and lymphatic systems.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can develop and use a model to compare and contrast the vessels of the cardiovascular and lymphatic systems AND explain how both are necessary for homeostasis.</td>
<td>I can develop and use a model to compare and contrast the vessels of the cardiovascular and lymphatic systems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 08 P1</th>
<th>I can explain how the structure and functions of the innate and adaptive immune responses operate to maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can develop and use a model to explain how the structure and functions of the innate and adaptive immune responses operate to maintain homeostasis.</td>
<td>I can explain how the structure and functions of the innate and adaptive immune responses operate to maintain homeostasis.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 08 T2</th>
<th>I can describe the causes and effects of HIV and other diseases of the lymphatic systems and how they disrupt homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can describe the causes and effects of HIV and two other diseases of the lymphatic systems and how they disrupt homeostasis AND discuss ways to increase public awareness of bloodborne pathogens.</td>
<td>I can describe the causes and effects of HIV and two other diseases of the lymphatic systems and how they disrupt homeostasis.</td>
</tr>
</tbody>
</table>

### Unit 9 The Respiratory System

<table>
<thead>
<tr>
<th>A &amp; P U 09 S1</th>
<th>I can explain the structure and function of the organs of the respiratory system and their roles in maintaining homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can develop and use a model to help explain the structure and function of the organs of the respiratory system and their roles in maintaining homeostasis.</td>
<td>I can explain the structure and function of the organs of the respiratory system and their roles in maintaining homeostasis.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 09 S2</th>
<th>I can explain the pattern of gas exchange and how this helps regulate homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can develop and use a model to explain the pattern of gas exchange and how this helps regulate homeostasis.</td>
<td>I can explain the pattern of gas exchange and how this helps regulate homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 09 P1</th>
<th>I can explain how the structures and functions of the respiratory system assist in maintaining homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can explain how the structures and functions of the respiratory system must work together in maintaining homeostasis.</td>
<td>I can explain how the structures and functions of the respiratory system assist in maintaining homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 09 S3</th>
<th>I can explain how stability and change influence the breathing process including volume, pressure, and muscles used and the effect each has on homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can explain how stability and change influence the breathing process including volume, pressure, and muscles used and the effect each has on homeostasis AND explain the impact this has on other organ systems.</td>
<td>I can explain how stability and change influence the breathing process including volume, pressure, and muscles used and the effect each has on homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 09 T1</th>
<th>I can describe the causes and effects of emphysema and other respiratory disorders and how they disrupt homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can describe the causes and effects of emphysema and three other respiratory disorders and how they disrupt homeostasis.</td>
<td>I can describe the causes and effects of emphysema and two other respiratory disorders and how they disrupt homeostasis.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 09 T2</th>
<th>I can describe the causes and effects of high-altitude sickness.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can describe the causes and effects of high-altitude sickness AND explain prevention and treatment.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can describe the causes and effects of high-altitude sickness.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can describe the causes or effects of high-altitude sickness.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td>I can describe high-altitude sickness.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 10 P1</th>
<th>I can explain how the structures of the alimentary canal fit their function and assist in peristalsis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can explain how the structures of the alimentary canal fit their function, rely on the other function of the organs that come before it in the alimentary canal, and assist in peristalsis.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can explain how the structures of the alimentary canal fit their function and assist in peristalsis.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can explain the function of the structures of the alimentary canal and how they assist in peristalsis.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td>I can explain the function of the structures of the alimentary canal.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

### Unit 10 The Digestive System

<table>
<thead>
<tr>
<th>A &amp; P U 10 S1</th>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can explain the structure and function of the accessory organs of the digestive system and how they contribute to maintaining homeostasis.</td>
<td>I can explain the structure and function of the accessory organs of the digestive system and how they contribute to maintaining homeostasis.</td>
<td>I can explain functions of the accessory organs of the digestive system and how they contribute to maintaining homeostasis.</td>
<td>I can explain functions of the accessory organs of the digestive system.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 10 T1</th>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can construct and use a model to trace the pathway of food through the alimentary canal.</td>
<td>I can construct and use a model to trace the pathway of food through the alimentary canal.</td>
<td>I can use a model to trace the pathway of food through the alimentary canal.</td>
<td>I can use a model to identify the components of the alimentary canal.</td>
<td></td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

**A & P U 10 T2**  
I can describe the catabolism and food sources of macromolecules.

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can describe the catabolism and food sources of macromolecules as well as the enzymes used in catabolism and the substrates each acts upon.</td>
<td>I can describe the catabolism and food sources of macromolecules.</td>
<td>I can describe the catabolism and two food sources for each type of macromolecule.</td>
<td>I can identify one food source of each macromolecule.</td>
</tr>
</tbody>
</table>

**A & P U 10 T3**  
I can explain how celiac disease and other homeostatic imbalances of the digestive system disrupt homeostasis and construct explanations and design solutions to treat them.

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can explain how celiac disease and other homeostatic imbalances of the digestive system disrupt homeostasis, the causes of them, and construct explanations and design solutions to treat them.</td>
<td>I can explain how celiac disease and other homeostatic imbalances of the digestive system disrupt homeostasis and construct explanations and design solutions to treat them.</td>
<td>I can explain how celiac disease and one other homeostatic imbalance of the digestive system disrupt homeostasis and construct explanations and design solutions to treat them.</td>
<td>I can explain how celiac disease disrupts homeostasis and design a solution to treat it.</td>
</tr>
</tbody>
</table>
## Scaled Learning Targets

### Unit 11 The Urinary System

<table>
<thead>
<tr>
<th>A &amp; P U 11 P1</th>
<th>I can explain how the structures and functions of the urinary system help maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can explain how the structures and functions of the urinary system help maintain homeostasis.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can explain how the structures and functions of the urinary system help maintain homeostasis.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain how functions of the urinary system help maintain homeostasis.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain functions of the urinary system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 11 S1</th>
<th>I can use a model to explain the process of urine formation and regulation in the nephron and how this helps maintain homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td>I can use a model to explain the process of urine formation and regulation in the nephron and how this helps maintain homeostasis.</td>
</tr>
<tr>
<td><strong>Demonstrates Mastery 3</strong></td>
<td>I can explain the process of urine formation and regulation in the nephron and how this helps maintain homeostasis.</td>
</tr>
<tr>
<td><strong>Approaching Mastery 2</strong></td>
<td>I can explain the process of urine formation and regulation in the nephron and how this helps maintain homeostasis.</td>
</tr>
<tr>
<td><strong>Developing Foundational Skills 1</strong></td>
<td>I can explain the process of urine formation and regulation in the nephron.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 11 T1</th>
<th>I can describe the causes and effects of diabetes insipidus, kidney stones, and other homeostatic imbalances of the urinary system and how they disrupt homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can describe the causes and effects of diabetes insipidus, kidney stones, and other homeostatic imbalances of the urinary system, how they disrupt homeostasis, AND describe how they result from homeostatic imbalances.</td>
<td>I can describe the causes and effects of diabetes insipidus, kidney stones, and other homeostatic imbalances of the urinary system and how they disrupt homeostasis.</td>
</tr>
</tbody>
</table>

### Unit 12 The Reproductive System

<table>
<thead>
<tr>
<th>A &amp; P U 12 P1</th>
<th>I can explain how the structure of male and female reproductive organs fit their role in producing offspring and the role they play in homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can explain how the structure of male and female reproductive organs fit their role in producing offspring, the role they play in homeostasis, and how they function with other organ systems of the body.</td>
<td>I can explain how the structure of male and female reproductive organs fit their role in producing offspring and the role they play in homeostasis.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 12 S1</th>
<th>I can explain the patterns created by reproductive hormones in the body, including the female reproductive cycle and their roles in maintaining homeostasis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can explain the patterns created by reproductive hormones in the body, including the female reproductive cycle, their roles in maintaining homeostasis, and explain the consequences of abnormal hormone levels.</td>
<td>I can explain the patterns created by reproductive hormones in the body, including the female reproductive cycle and their roles in maintaining homeostasis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 12 T1</th>
<th>I can explain the cause and effect of fertilization.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
</tr>
<tr>
<td>I can explain where and when fertilization occurs and the cause and effect of it.</td>
<td>I can explain the cause and effect of fertilization.</td>
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</table>
# Scaled Learning Targets

<table>
<thead>
<tr>
<th>Score Level</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can explain the causes and effects of male and female infertility as well as treatment options that are available.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can explain the causes and effects of male and female infertility.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can explain what male and female infertility is and the result of it.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td>I can explain what male and female infertility is.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Score Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Mastery 4</td>
<td>I can describe the patterns and stages and major events of embryonic development along with major milestones of embryonic development.</td>
</tr>
<tr>
<td>Demonstrates Mastery 3</td>
<td>I can describe the patterns and stages and major events of embryonic development.</td>
</tr>
<tr>
<td>Approaching Mastery 2</td>
<td>I can identify stages and major events of embryonic development.</td>
</tr>
<tr>
<td>Developing Foundational Skills 1</td>
<td>I can identify stages of embryonic development.</td>
</tr>
</tbody>
</table>
### Scaled Learning Targets

<table>
<thead>
<tr>
<th>A &amp; P U 12 T4</th>
<th>I can describe the structure, function, and efficacy of various types of contraceptives.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can obtain, evaluate, and communicate necessary information to describe the structure, function, and efficacy of various types of contraceptives.</td>
<td>I can describe the structure, function, and efficacy of various types of contraceptives.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A &amp; P U 12 T5</th>
<th>I can describe the causes and effects of various STI's and how they disrupt homeostasis.</th>
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</thead>
<tbody>
<tr>
<td><strong>Exceeds Mastery 4</strong></td>
<td><strong>Demonstrates Mastery 3</strong></td>
</tr>
<tr>
<td>I can describe the causes and effects of various STI's, how they disrupt homeostasis, AND describe how they result from homeostatic imbalances.</td>
<td>I can describe the causes and effects of various STI's and how they disrupt homeostasis.</td>
</tr>
</tbody>
</table>
## 5E Storyline and Conceptual Flow

### Unit 1 The Human Body and Organization

**Guiding Question for Sequence** - Ask questions and/or make predictions based on observations and evidence to demonstrate how cellular organization, structure, and function allow organisms to maintain homeostasis.

### Instructional Sequence # ____ Big Idea for Sequence # ____:

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using CI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engage</strong></td>
<td>Anchor Phenomenon: All organ systems work synergistically to maintain homeostasis within the human body. Guiding Question: Everything that has a specific purpose has a specific structure. What are some things you can think of that are built specifically to carry out a function? Can you relate multiple items that have specific shapes with different functions, but work together to carry out a common goal?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Explore</strong></td>
<td>Anchor Phenomenon: All organ systems work synergistically to maintain homeostasis within the human body. Guiding Question: Everything that has a specific purpose has a specific structure. What evidence or explanation can you provide to show that the structure of a body part enables it to perform its specific function?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 5E Storyline and Conceptual Flow

<table>
<thead>
<tr>
<th><strong>Explain</strong></th>
<th>Anchor Phenomenon: All organ systems work synergistically to maintain homeostasis within the human body.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guiding Question:</strong></td>
<td>Having previously discussed how all things have a specific anatomy that accommodates for a specific physiology, we should be made aware that there are 11 organ systems within the body. All have a collection of different organs that provide different functions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Elaborate</strong></th>
<th>Anchor Phenomenon: All organ systems work synergistically to maintain homeostasis within the human body.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guiding Question:</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Evaluate</strong></th>
<th>Anchor Phenomenon: All organ systems work synergistically to maintain homeostasis within the human body.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guiding Question:</strong></td>
<td></td>
</tr>
</tbody>
</table>
# 5E Storyline and Conceptual Flow

## Unit 2 The Integumentary System

### Guiding Question for Sequence # ___:

### Instructional Sequence Unit 2 Big Idea for Sequence # ___:

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using CI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Engage| Anchor Phenomenon: Fingernail regrowth  
Guiding Question: How do living things repair injuries, such as what was observed with the fingernail regrowth? | 1. Use the “Nail Regeneration Observation Worksheet” in conjunction with the time lapse video. 
2. Have students create a KWL chart after completion of the worksheet. | -Asking questions 
-Constructing explanations | Prepared lessons to accompany the conceptual flow: Fingernail regrowth time lapse video:  
[https://www.youtube.com/watch?v=UxN_b5a_Yz0](https://www.youtube.com/watch?v=UxN_b5a_Yz0)  
Nail Regeneration Observation Worksheet |
| Explore| Anchor Phenomenon: Fingernail regrowth  
Guiding Question: How do the components of the integument work together to repair nails? | 1. Have students study an image of the integument. 
Ask students to circle the different parts of the image that they think contribute to the healing of the fingernail. 
With a shoulder partner or in groups, have students compare responses. Also, have students explain to one another why they circled each of the components. 
2. Have students create pairings of terms in the integument based on a functional relationship in the healing of the fingernail. Also have students explain how the two | -Asking questions 
-Constructing explanations | Prepared lessons to accompany the conceptual flow:  
Analyzing Components of the Integument  
Additional resources:  
Page 123 in textbook |

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**6/10/2021 3:00 PM**
## 5E Storyline and Conceptual Flow

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using CI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>components of the integument might work together to aid in the healing process of the damaged fingernail. For example, capillaries and the integument (the blood supply provides nutrients to the cells of the integument, which allows the integument to stay alive and reproduce, leading to the formation of a new nail). “This will be a challenge for students, they will not understand the actual function of many of these terms. The point is to get them to think about the structure of the integument and possible functions and relations of the different parts.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Explain**

- Anchoring Phenomenon: Fingernail regrowth
  - Guiding Question: How do the components of the integument work together to repair nails?

1. Provide students with a lesson over the different types of epithelial tissues AND the structure of stratified squamous epithelium (including melanocytes/melanin and the process of keratinization). Students use the information from the lesson to create foldable or complete a graphic organizer.

2. Revisit the activity from the Explore stage where students paired words together and explained how the functioned to help nails regrow. Have

- Asking questions
- Constructing explanations

**Prepared lessons to accompany the conceptual flow:**
To teach the epithelial tissues, use your preferred format of presentation for this information. Examples to consider would be 1) Students read for information (consider different reading strategies, such as jigsaw or reciprocal teaching) 2) students watch a video for information 3) Teacher-led discussion. Regardless of the direction you go, students should be able to complete the following assignment: Epithelial Tissues

Use your preferred format of presentation for the layers of the epidermis, along with melanocytes/melanin and the process of keratinization. Regardless of your style...
## 5E Storyline and Conceptual Flow

<table>
<thead>
<tr>
<th>5Es</th>
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<th>Conceptual Flow Using CI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Engage       | Anchoring Phenomenon: Fingernail regrowth  
Guiding question: How do skin cancers differ? | Look at pictures of skin cancer, have students list observations (size, location, coloration)  
Provide students the names of the types of images | of delivery, students should be able to complete the following assignment: Changes within the Epidermis  
**Additional Resources:** Pages 88 to 92 of the textbook contain information related to the epithelial tissues. [https://opentextbc.ca/anatomyandphysiology/chapter/4-2-epithelial-tissue/](https://opentextbc.ca/anatomyandphysiology/chapter/4-2-epithelial-tissue/)  
Bozeman Science video [https://www.youtube.com/watch?v=z5VnOS9Ke3q](https://www.youtube.com/watch?v=z5VnOS9Ke3q)  
**Additional Resources:** Prepared lessons to accompany the conceptual flow; Different Types of Skin Cancer  
**Additional Resources:** Pages 126-127 in text | |
| Explore      | Anchor Phenomenon: Fingernail regrowth  
Guiding Question: | Students explore the five layers of the epidermis, melanocytes, melanin, and keratinization.  
Provide students with named examples of the different types of skin cancer and have students relate these to what they understand about the five epidermal layers.  
Have students complete a KWL chart. | -Asking questions  
-Using models  
-Constructing explanations | **Additional Resources:** Five layers of the epidermis Page 115 in text |
### 5E Storyline and Conceptual Flow

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using CI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Explain | Anchor Phenomenon: Fingernail regrowth  
Guiding Question: | Students will learn about the lifecycle of the cells within the epidermis, the process of keratinization, and the role of melanocytes/melanin.  
Have students revise their model of fingernail regrowth (three sketch sequence) | -Asking questions  
- Constructing explanations  
- Using models |  |
| Engage  | Anchor Phenomenon: Fingernail regrowth  
Guiding question: | Acne, bedsores, and goosebumps, sweating can be used to introduce students to accessory organs. | -Asking questions  
- Constructing explanations  
- Using models | Additional Resources:  
Homeostatic imbalance 4.2 on page 118  
Homeostatic imbalance 4.4 on page 119 |
| Explore | Anchor Phenomenon: Fingernail regrowth  
Guiding question: | Introduce and explore acne, bedsores, goosebumps, and sweating.  
Students can complete a research activity on these items.  
Complete a KWL chart. | -Asking questions  
- Constructing explanations  
- Using models | |
| Explain | Anchor Phenomenon: Fingernail regrowth  
Guiding question: | Provide direct instruction for the dermal organs (accessory structures) of the integumentary system (include blood vessels).  
Have students revise their model of fingernail regrowth (three sketch sequence) | | |
## 5E Storyline and Conceptual Flow

<table>
<thead>
<tr>
<th>5Es</th>
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<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Guiding Question: How does the rate of fingernail growth rely upon the state of the integument?</td>
<td>Have Students answer this question: Using page 129 in your book choose the three most important systems in your body that contribute to your nails growing. Rank them 1-3, 1 being the most important and 3 being the least important and explain how you came up with your decision.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluate</td>
<td>Anchor Phenomenon: Fingernail regrowth</td>
<td>Options: Provide students with a three-column data table that includes the components of the integumentary system. In the table, students are to provide information relative to the function of each component of the integumentary system and how each contributes (or not) to the regrowth of a fingernail.</td>
<td>-Developing and using models -Constructing explanations -Evaluate and communicate information -Analyze and interpret data</td>
<td></td>
</tr>
</tbody>
</table>
Honors Anatomy and Physiology
Nail Regeneration Observation Worksheet

How does the integumentary system restore a damaged nail?

**Directions:** This handout will be used before, during, and after the viewing of a time lapsed video of a damaged nail going through the healing process.

**Before video:**
Procedure: First, answer the question. Second, discuss your list/response with a shoulder partner or small group. Third, revise your list as you feel necessary.

1. We have all experienced a cut in our integument (skin). As we all know, simple cuts will go through a healing process. Make a list of some things you understand about things that happen when your integument undergoes the healing process.

**During video:**
Visit the following link to access the video [https://www.youtube.com/watch?v=UxN_b5a_Yz0](https://www.youtube.com/watch?v=UxN_b5a_Yz0) As you watch the video (and it does go quickly, be sure to pause or re-watch the clip several times) make a list of observations made during the process of the regeneration of a nail.
After video:
1. Discuss your list/response with a shoulder partner or small group. Revise your list above as you feel necessary.

2. In the boxes below, sketch a sequence of images that illustrate the changes occurring in the regeneration of a fingernail. Include as much detail as you can and label as many components as you can.

   ![Diagram of fingernail regeneration](image)

   **Beginning**   **Middle**   **End**

3. Certainly, there are things happening in the regeneration of the fingernail that are currently not understood. Make a list of questions below that, when answered, may help us better understand everything that is happening within the integument to restore the fingernail. Feel free to use any of the following sentence starters: What happens..., How does..., Why do... Be prepared to contribute some of your questions to the group discussion that will follow.
Honors Anatomy and Physiology
Analyzing Components of the Integument

**Directions:** The three images below are all of different elements of the integumentary system. Each image will have parts that overlap with the other two. Use this understanding to complete the tasks below the images.

**Figure 1:** The integument.

**Figure 2:** The layers of the epidermis.
Figure 3: Components of nails.

Task 1: Functions of the components of the integumentary system.

Directions: Look closely through the components identified in each of the three images above. As you do, think about what the function of each might be. How might each item relate, if at all, to the regeneration of a nail? Circle the components in the images above that might contribute to the regeneration of a nail. List these components in the space provided below along with an explanation as to how they might contribute to the regeneration of a nail.
Task 2: Relating Components of the Integumentary System

Directions: Revisit the three images above and the words you had circled. Many of these components work hand-in-hand with other components of the integument to help regenerate nails. Your task is, to the best of your ability, pair words listed in the images above together. The words that you pair together should work together, in some form, to help regenerate nails. You are welcome to use terms more than one time.
Honors Anatomy and Physiology
Epithelial Tissues

Part 1: Characteristics of Epithelial tissue

Directions: Below is a list of the different characteristics of epithelial tissues. Your task is to provide an explanation of each AND the significance of each characteristic (as it relates to epithelial tissue).

1. Spacing of epithelial cells –

2. Apical surface –

3. Basement membrane –

4. Avascular –

5. Mitotic rates –

Part 2: Simple vs. Stratified Epithelium

Directions: Compare and contrast simple and stratified epithelial tissues.

<table>
<thead>
<tr>
<th>Simple Epithelial Tissues</th>
<th>Simple AND Stratified Epithelial Tissues</th>
<th>Stratified Epithelial Tissues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>
Part 3: Epithelial Tissue Classification Chart

**Directions:** Complete the information in the chart for each type of epithelial tissue covered in class (simple and stratified squamous, simple and stratified cuboidal, simple and stratified columnar, pseudostratified, and transitional). You will notice that the classifications of tissues are randomized (not necessarily in the sequence they were covered with you in class). For each row, a clue has been provided about the tissue. Your task, using the provided clue, is to determine which type of epithelial tissue belongs to each row and fill in all of the boxes related to it. In the final column, you are to draw a sketch of the specific type of epithelial tissue described in that row.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Function</th>
<th>Location</th>
<th>Sketch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single layer of cells, although it appears to have many layers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single layer of flattened cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple layers of cube-shaped cells</td>
<td></td>
<td>Has the ability to stretch; also provides protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Description</td>
<td>Function</td>
<td>Location</td>
<td>Sketch</td>
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<tr>
<td>------------------------------------------------</td>
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</tr>
<tr>
<td>Single-layer of cube shaped cells, often occurring in a ring</td>
<td></td>
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</tr>
<tr>
<td>Multiple layers of cells; bottom layers tend to be boxy, upper layers are flattened</td>
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<td></td>
</tr>
<tr>
<td>Single layer of elongated cells</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Multiple layers of cube shaped cells, often occurring in a ring</td>
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</tbody>
</table>
### Part 4: Epithelial Tissue Review

**Directions:** The term descriptor bank below contains information relevant to epithelial tissues. Your task is to organize the terms descriptors into groups of three to five based on something they all have in common. After you have grouped your terms descriptors, you will have to explain why they have been grouped together. You may use each term descriptor in as many different lists as you choose, or not even use them at all. Group 1 below is an example of a completed group and explanation.

**Terms/Descriptors Bank**

<table>
<thead>
<tr>
<th>Flattened cells</th>
<th>Protection</th>
<th>Single layer</th>
<th>Basement membrane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudostratified</td>
<td>Rings</td>
<td>Transitional</td>
<td>Secretion</td>
</tr>
<tr>
<td>Elongated</td>
<td>Squamous</td>
<td>Cube shaped</td>
<td>Simple</td>
</tr>
<tr>
<td>Stratified</td>
<td>Apical surface</td>
<td>Epithelial tissue</td>
<td>Cuboidal</td>
</tr>
<tr>
<td>Avascular</td>
<td>Multiple layers</td>
<td>Columnar</td>
<td>Avascular</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group 1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. basement membrane</td>
</tr>
<tr>
<td>2. apical surface</td>
</tr>
<tr>
<td>3. avascular</td>
</tr>
<tr>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
</tr>
</tbody>
</table>

These are grouped together because: **These are characteristics of epithelial tissues**

<table>
<thead>
<tr>
<th>Group 2:</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
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<tr>
<td>2.</td>
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<td>3.</td>
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<td>5.</td>
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</tbody>
</table>

These are grouped together because: 

<table>
<thead>
<tr>
<th>Group 3:</th>
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<tbody>
<tr>
<td>1.</td>
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<td>3.</td>
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<td>5.</td>
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</table>

These are grouped together because: 

<table>
<thead>
<tr>
<th>Group 4:</th>
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<tbody>
<tr>
<td>1.</td>
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<td>4.</td>
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<tr>
<td>5.</td>
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</tbody>
</table>

These are grouped together because: 

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Honors Anatomy and Physiology
Changes within the Epidermis

Directions: Draw a sequence of 4 to 6 pictures that illustrate changes observed in the stratified squamous epithelium of the epidermis. In your images, label the key components (the layers of the epidermis, melanocytes/melanin, and keratin). Your sequence of drawings should illustrate each of the following processes: 1) the development of new cells of the stratum basale and what happens to existing cells within the epidermis as this occurs 2) the changes observed in the epidermis as skin is exposed to sunlight 3) the process of keratinization. Each image should also include a caption, explaining the changes in each of the processes observed.

<table>
<thead>
<tr>
<th>Image 1</th>
<th>Image 2</th>
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<tbody>
<tr>
<td>Description of what is being illustrated in your image:</td>
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<td>Image 3</td>
<td>Image 4</td>
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<td>Description of what is being illustrated in your image:</td>
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<th>Image 5</th>
<th>Image 6</th>
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<td>Description of what is being illustrated in your image:</td>
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</table>
Honors Anatomy and Physiology

Different Types of Skin Cancer

What are some differences you see between these types of cancer?

This Photo by Unknown Author is licensed under CC BY
What layers of the skin are affected by melanoma?

[Image: This Photo by Unknown Author is licensed under CC BY-ND](https://www.skincancer.org/skin-cancer-information/melanoma/the-stages-of-melanoma/)
What layers of the skin are affected by basal cell carcinoma?

This Photo by Unknown Author is licensed under CC BY-ND

https://www.skincancer.org/skin-cancer-information/basal-cell-carcinoma/
What layers of the skin are affected by squamous cell carcinoma?

This Photo by Unknown Author is licensed under CC BY-ND

https://www.skincancer.org/skin-cancer-information/squamous-cell-carcinoma/
### Unit 3 The Skeletal System

**Unit:** Skeletal system  
**Guiding Question for Sequence # ___:**  
**Instructional Sequence Unit 3 Big Idea for Sequence # ___:**

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Engage| Anchor Phenomenon: Muay Thai – How can a human kick hard objects and not break their bones? [https://www.youtube.com/watch?v=Wd3mAOq99A8](https://www.youtube.com/watch?v=Wd3mAOq99A8)  
Guiding Question: How is this person’s leg so different from ours that he can kick and bend metal? | -Compact and spongy bone  
-Structure and function | -Asking questions  
-Constructing explanations |                                      |
| Explore| Anchor Phenomenon: Muay Thai – How can a human kick hard objects and not break their bones?  
Guiding Question: How does the anatomy of a bone relate to its’ strength? | -Compact and spongy bone  
-Structure and function | -Asking questions  
-Constructing explanations |                                      |
| Explain| Anchor Phenomenon: Muay Thai – How can a human kick hard objects and not break their bones?  
Guiding Question: How does the anatomy of a bone relate to its’ strength? | -Compact and spongy bone  
-Structure and function  
-Cause and effect | -Asking questions  
-Developing and using models |                                      |
| Explore| Anchor Phenomenon: Muay Thai – How can a human kick hard objects and not break their bones?  
Guiding Question: How is it that one persons’ bones can be stronger than another persons'? | -Bone remodeling  
-Structure and function  
-Patterns | -Asking questions  
-Using models  
-Constructing explanations |                                      |
| Explain| Anchor Phenomenon: Muay Thai – How can a human kick hard objects and not break their bones?  
Guiding Question: How is it that one persons’ bones can be stronger than another persons'? | -Bone remodeling  
-Structure and function  
-Patterns  
-Energy and matter  
-Stability and change  
-Cause and effect | - Developing and using models  
-Constructing explanations |                                      |
## Unit 4 The Muscular System

**Unit: Muscular system**

**Guiding Question for Sequence # ____:**
**Instructional Sequence Unit 4Big Idea for Sequence # ____:**

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<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
<th>SEP</th>
<th>Resources</th>
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<tbody>
<tr>
<td><strong>Engage</strong></td>
<td>Anchor Phenomenon:</td>
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<tr>
<td></td>
<td>Guiding Question: How does muscle mass impact homeostasis?</td>
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<tr>
<td><strong>Explore</strong></td>
<td>Anchor Phenomenon:</td>
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<tr>
<td></td>
<td>Guiding Question:</td>
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<tr>
<td>Explain</td>
<td>Anchor Phenomenon:</td>
<td>Guiding Question:</td>
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<tr>
<td>Elaborate</td>
<td>Anchor Phenomenon:</td>
<td>Guiding Question:</td>
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<tr>
<td>Evaluate</td>
<td>Anchor Phenomenon:</td>
<td>Guiding Question:</td>
<td></td>
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</table>

**Unit 5 The Nervous System**

**Unit: Nervous system Guiding Question for Sequence # ___:**

**Instructional Sequence Unit 5 Big Idea for Sequence # ___:**

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage</td>
<td>Anchor Phenomenon: Multiple sclerosis</td>
<td>-Neuron -Structure and function</td>
<td>-Asking questions -Constructing explanations</td>
<td></td>
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<tr>
<td></td>
<td>Guiding Question: How do parts of your body, such as nerves, transition from functioning normally to abnormally?</td>
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<tr>
<td>Explore</td>
<td>Anchor Phenomenon: Multiple sclerosis</td>
<td>-Neuron -Structure and function</td>
<td>-Asking questions -Constructing explanations -Developing and using models</td>
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<tr>
<td></td>
<td>Guiding Question: How does the anatomy of a neuron enable it to perform its function?</td>
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<td>5Es</td>
<td>Storyline Using Anchor Phenomena</td>
<td>Conceptual Flow Using DCI and CCC</td>
<td>SEP</td>
<td>Resources</td>
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<tr>
<td><strong>Explain</strong></td>
<td>Anchor Phenomenon: Multiple sclerosis</td>
<td>-Nerve fields</td>
<td>-Asking questions</td>
<td>-Asking questions</td>
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<tr>
<td></td>
<td>Guiding Question: How does the structure and function of neurons contribute to our sense of touch?</td>
<td>-Structure and function</td>
<td>-Constructing explanations</td>
<td>-Constructing explanations</td>
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<td></td>
<td>-Developing and using models</td>
<td>-Developing and using models</td>
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<td></td>
<td></td>
<td>-Obtain, evaluate, communicate information</td>
<td>-Obtain, evaluate, communicate information</td>
</tr>
<tr>
<td><strong>Elaborate</strong></td>
<td>Anchor Phenomenon: Multiple sclerosis</td>
<td>-Propagation of action potentials</td>
<td>-Asking questions</td>
<td>-Asking questions</td>
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<tr>
<td></td>
<td>Guiding Question: Neurons relay sensory information from your body to your brain through a series of neurons connected by synapses. Pain medications can disrupt the transmission of these signals. How are these signals disrupted?</td>
<td>-Structure and function</td>
<td>-Constructing explanations</td>
<td>-Constructing explanations</td>
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<tr>
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<td></td>
<td>-Stability and change</td>
<td>-Developing and using models</td>
<td>-Developing and using models</td>
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<tr>
<td></td>
<td></td>
<td>-Cause and effect</td>
<td>-Obtain, evaluate, communicate information</td>
<td>-Obtain, evaluate, communicate information</td>
</tr>
<tr>
<td><strong>Evaluate</strong></td>
<td>Anchor Phenomenon: Multiple sclerosis</td>
<td>-Propagation of action potentials</td>
<td>-Asking questions</td>
<td>-Asking questions</td>
</tr>
<tr>
<td></td>
<td>Guiding Question: Considering the structure and function of the different parts of the neuron and the signs and symptoms of M.S., what changes would you expect to see in the neurons of people diagnosed with the disorder?</td>
<td>-Structure and function</td>
<td>-Constructing explanations</td>
<td>-Constructing explanations</td>
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<tr>
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<td></td>
<td>-Stability and change</td>
<td>-Developing and using models</td>
<td>-Developing and using models</td>
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<tr>
<td></td>
<td></td>
<td>-Cause and effect</td>
<td>-Obtain, evaluate, communicate information</td>
<td>-Obtain, evaluate, communicate information</td>
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<td></td>
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<td>-Analyzing and interpreting data</td>
<td>-Analyzing and interpreting data</td>
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</tbody>
</table>
### Unit 6 The Endocrine System

**Unit:** Endocrine system  
**Guiding Question for Sequence # ____:**  
**Instructional Sequence Unit 6**  
**Big Idea for Sequence # ____:**

<table>
<thead>
<tr>
<th>5Es</th>
<th>storyline</th>
<th>Conceptual Flow</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Engage | Anchor Phenomenon: Gigantism  
Guiding Question: The endocrine system, like the nervous system, has a lot of influence and control of how our bodies operate. In what ways would life be different if the operations of our bodies changed? | -Glands and hormones  
-Structure and function | -Asking questions  
-Constructing explanations | |
| Explore | Anchor Phenomenon: Gigantism  
Guiding Question: How do hormones alter how our bodies function? | -Glands and hormones  
-Structure and function  
-Cause and effect | -Asking questions  
-Constructing explanations  
-Developing models | |
| Explain | Anchor Phenomenon: Gigantism  
Guiding Question: How does the presence or absence of a specific hormone impact the function of our body? | -Glands and hormones  
-Structure and function  
-Cause and effect | -Asking questions  
-Constructing explanations  
-Developing models | |
| Elaborate | Anchor Phenomenon: Gigantism  
Guiding Question: Based on our understanding of hormones, what are the pros and cons of hormone supplements? | -Glands and hormones  
-Structure and function  
-Cause and effect  
-Stability and change | -Asking questions  
-Constructing explanations  
-Developing models  
-Obtain, evaluate, and communicate data  
-Analyze and interpret data | |
| Evaluate | Anchor Phenomenon: Gigantism  
Guiding Question: Can endocrine disorders be treated? How would you combat these disorders? | -Glands and hormones  
-Structure and function  
-Cause and effect  
-Stability and change | -Asking questions  
-Constructing explanations  
-Developing models  
-Obtain, evaluate, and communicate data  
-Analyze and interpret data | |
## Unit 7 The Cardiovascular System

**Unit:** Cardiovascular system  
**Guiding Question for Sequence # ___:**  
**Instructional Sequence Unit 7**  
**Big Idea for Sequence # ___:**

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
</table>
| **Engage** | Anchor Phenomenon: Teen lives without heart for 118 days  
Guiding Question: In what ways does scientific inquiry and innovations benefit humans in regards to our well-being? | - Structures and functions of the cardiovascular system  
- Structure and function | - Asking questions  
- Constructing explanations | |
| **Explore** | Anchor Phenomenon: Teen lives without heart for 118 days  
Guiding Question: What organs are included in the cardiovascular system and why do we need them? | - Structures and functions of the cardiovascular system  
- Structure and function  
- Cause and effect | - Asking questions  
- Constructing explanations  
- Developing models | |
| **Explain** | Anchor Phenomenon: Teen lives without heart for 118 days  
Guiding Question: How do the organs of the cardiovascular system work synergistically? | - Structures and functions of the cardiovascular system  
- Structure and function  
- Cause and effect | - Asking questions  
- Constructing explanations  
- Developing models | |
| **Explore** | Anchor Phenomenon: Teen lives without heart for 118 days  
Guiding Question: How does the heart operate to receive and pump blood? | - ECG and the heartbeat  
- Structure and function  
- Cause and effect | - Asking questions  
- Constructing explanations  
- Developing models | |
| **Explain** | Anchor Phenomenon: Teen lives without heart for 118 days  
Guiding Question: How does the heart operate to receive and pump blood? | - ECG and the heartbeat  
- Structure and function  
- Cause and effect | - Asking questions  
- Constructing explanations  
- Developing models | |
<table>
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<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore</td>
<td>Anchor Phenomenon: Teen lives without heart for 118 days</td>
<td>- Blood vessels</td>
<td>- Asking questions</td>
<td>- Constructing explanations</td>
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<tr>
<td></td>
<td>Guiding Question: How do the different types of blood vessels compare and contrast?</td>
<td>- Structure and function</td>
<td>- Constructing explanations</td>
<td>- Developing models</td>
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<td></td>
<td>- Cause and effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain</td>
<td>Anchor Phenomenon: Teen lives without heart for 118 days</td>
<td>- Blood vessels</td>
<td>- Asking questions</td>
<td>- Constructing explanations</td>
</tr>
<tr>
<td></td>
<td>Guiding Question: What is the sequence of blood flow through the body and why is this sequence significant?</td>
<td>- Structure and function</td>
<td>- Constructing explanations</td>
<td>- Developing models</td>
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<td></td>
<td>- Cause and effect</td>
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<td>- Stability and change</td>
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<tr>
<td>Elaborate</td>
<td>Anchor Phenomenon: Teen lives without heart for 118 days</td>
<td>- Heartbeat and blood path</td>
<td>- Asking questions</td>
<td>- Constructing explanations</td>
</tr>
<tr>
<td></td>
<td>Guiding Question: How do prosthetics assist in the homeostatic balance controlled by the cardiovascular system?</td>
<td>- Structure and function</td>
<td>- Developing models</td>
<td>- Developing models</td>
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<td>- Cause and effect</td>
<td>- Obtain, evaluate, and communicate data</td>
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<td>- Stability and change</td>
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<tr>
<td>Evaluate</td>
<td>Anchor Phenomenon: Teen lives without heart for 118 days</td>
<td>- Heartbeat and blood path</td>
<td>- Asking questions</td>
<td>- Constructing explanations</td>
</tr>
<tr>
<td></td>
<td>Guiding Question: How can prosthetics within the cardiovascular system be improved?</td>
<td>- Structure and function</td>
<td>- Developing models</td>
<td>- Developing models</td>
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</table>
# Unit 8 The Lymphatic and Immune Systems

**Unit:** Lymphatic and immune system  
**Guiding Question for Sequence # ____:**  
**Instructional Sequence Unit 8 Big Idea for Sequence # ____:**

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
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<th>Resources</th>
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<td>Explore</td>
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<td>Guiding Question:</td>
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</table>
Unit 9 The Respiratory System

**Guiding Question for Sequence # ____:**

**Big Idea for Sequence # ____:**

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<th>5Es</th>
<th>storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
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<td>Guiding Question:</td>
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<td>Guiding Question:</td>
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</table>
## Unit 10 The Digestive System

**Unit: Digestive system**

**Guiding Question for Sequence # ____:**  
**Instructional Sequence Unit 10**

**Big Idea for Sequence # ____:**

<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
</table>
| **Engage** | Anchor Phenomenon: The Keto diet and other fad diets – are they safe?  
Guiding Question: What dictates whether a persons’ diet is “healthy” or “nutritious”? | -Digestive organs  
-Structure and function | -Asking questions  
-Developing explanations | |
| **Explore** | Anchor Phenomenon: The Keto diet and other fad diets – are they safe?  
Guiding Question: How do chemical and mechanical digestion compare and contrast? | -Chemical and mechanical digestion  
-Structure and function  
-Cause and effect | -Developing and using models  
-Obtaining, evaluating, and communicating information | |
| **Explain** | Anchor Phenomenon: The Keto diet and other fad diets – are they safe?  
Guiding Question: How do chemical and mechanical digestion impact the amount of energy we obtain from the foods we eat? | -Chemical and mechanical digestion  
-Energy and matter  
-Cause and effect | -Developing and using models  
-Asking questions  
-Constructing explanations | |
| **Explore** | Anchor Phenomenon: The Keto diet and other fad diets – are they safe?  
Guiding Question: How does the anatomy of the different digestive organs fit their physiology? | -Digestive organs  
-Structure and function | -Asking questions  
-Constructing explanations | |
<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
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</thead>
<tbody>
<tr>
<td>Explain</td>
<td><strong>Anchor Phenomenon:</strong> The Keto diet and other fad diets – are they safe?</td>
<td>-Digestive organs</td>
<td>-Developing and using models</td>
<td>-Asking questions</td>
</tr>
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<td></td>
<td><strong>Guiding Question:</strong> How do the digestive organs work together to carry out the processes of chemical and mechanical digestion?</td>
<td>-Structure and function</td>
<td>-Asking questions</td>
<td>-Constructing explanations</td>
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<td>-Energy and matter</td>
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<td></td>
<td></td>
<td>-Cause and effect</td>
<td>-Obtaining, evaluating, and communicating information</td>
<td>-Analyzing and interpreting data</td>
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<tr>
<td>Elaborate</td>
<td><strong>Anchor Phenomenon:</strong> The Keto diet and other fad diets – are they safe?</td>
<td>-Chemical and mechanical digestion</td>
<td>-Asking questions</td>
<td>-Constructing explanations</td>
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<tr>
<td></td>
<td><strong>Guiding Question:</strong> How might a persons’ diet influence the physiology of chemical and mechanical digestion?</td>
<td>-Cause and effect</td>
<td>-Developing and using models</td>
<td>-Obtaining, evaluating, and communicating information</td>
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<td>-Structure and function</td>
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<td>-Stability and change</td>
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<tr>
<td>Evaluate</td>
<td><strong>Anchor Phenomenon:</strong> The Keto diet and other fad diets – are they safe?</td>
<td>-Digestive organs</td>
<td>-Developing and using models</td>
<td>-Asking questions</td>
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<tr>
<td></td>
<td><strong>Guiding Question:</strong> What things should be considered before beginning a fad diet?</td>
<td>-Chemical and mechanical digestion</td>
<td>-Asking questions</td>
<td>-Constructing explanations</td>
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<td></td>
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<td>-Cause and effect</td>
<td>-Developing and using models</td>
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<td>-Stability and change</td>
<td>-Obtaining, evaluating, and communicating information</td>
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# Unit 11 The Urinary System

**Guiding Question for Sequence # ____:**  
**Instructional Sequence Unit 11**

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<tr>
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<th>Storyline Using Anchor Phenomena</th>
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<th>Resources</th>
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<td>Guiding Question:</td>
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<td>Explore</td>
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<td>Guiding Question:</td>
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<td>Explain</td>
<td>Anchor Phenomenon:</td>
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<td>Guiding Question:</td>
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<td>Elaborate</td>
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<td>Guiding Question:</td>
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<td>Evaluate</td>
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<td>Guiding Question:</td>
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## Unit 12 The Reproductive System

**Unit:** Reproductive system  
**Guiding Question for Sequence # ___:**  
**Instructional Sequence Unit 12**  
**Big Idea for Sequence # ___:**

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<tr>
<th>5Es</th>
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<th>Conceptual Flow Using DCI and CCC</th>
<th>SEP</th>
<th>Resources</th>
</tr>
</thead>
</table>
| **Engage** | Anchor Phenomenon: Diethylstilbestrol and other synthetic hormones that affect reproductive organs — are they something that should be taken?  
Guiding Question: Diethylstilbestrol at one time was considered safe and prescribed to pregnant women for a span of more than 40 years. Considering this example, how would you determine if a medication of synthetic hormones were safe or not? | -Male and female reproductive organs (structure and function)  
-Structure and function | -Asking questions  
-Constructing explanations | |
| **Explore** | Anchor Phenomenon: Diethylstilbestrol and other synthetic hormones that affect reproductive organs — are they something that should be taken?  
Guiding Question: How are spermatogenesis and oogenesis similar and different? | -Spermatogenesis and oogenesis  
-Structure and function  
-Cause and effect | -Asking questions  
-Constructing explanations  
-Using models | |
| **Explain** | Anchor Phenomenon: Diethylstilbestrol and other synthetic hormones that affect reproductive organs — are they something that should be taken?  
Guiding Question: How would the addition or removal of hormones affect the reproductive processes? | -Male and female reproductive organs  
-Spermatogenesis and oogenesis  
-Structure and function  
-Cause and effect  
-Stability and change | -Asking questions  
-Constructing explanations  
-Developing and using models | |
<table>
<thead>
<tr>
<th>5Es</th>
<th>Storyline Using Anchor Phenomena</th>
<th>Conceptual Flow Using DCI and CCC</th>
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<th>Resources</th>
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</thead>
<tbody>
<tr>
<td><strong>Explore</strong></td>
<td>Anchor Phenomenon: Diethylstilbestrol and other synthetic hormones that affect reproductive organs – are they something that should be taken?</td>
<td>-Female reproductive cycle &lt;br&gt;-Structure and function &lt;br&gt;-Cause and effect</td>
<td>-Asking questions &lt;br&gt;-Constructing explanations &lt;br&gt;-Using models</td>
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<tr>
<td></td>
<td>Guiding Question: What patterns exist with regards to hormones that regulate the female reproductive cycle?</td>
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<tr>
<td><strong>Explain</strong></td>
<td>Anchor Phenomenon: Diethylstilbestrol and other synthetic hormones that affect reproductive organs – are they something that should be taken?</td>
<td>-Female reproductive cycle &lt;br&gt;-Structure and function &lt;br&gt;-Cause and effect &lt;br&gt;-Stability and change</td>
<td>-Asking questions &lt;br&gt;-Constructing explanations &lt;br&gt;-Developing and using models</td>
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<td>Guiding Question: How would the addition or removal of hormones affect the reproductive processes?</td>
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<td><strong>Elaborate</strong></td>
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<td>-Female reproductive cycle &lt;br&gt;-Structure and function &lt;br&gt;-Cause and effect &lt;br&gt;-Stability and change &lt;br&gt;-Patterns</td>
<td>-Asking questions &lt;br&gt;-Constructing explanations &lt;br&gt;-Developing and using models &lt;br&gt;-Obtain, evaluate, and communicate information &lt;br&gt;-analyze and interpret data</td>
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<td>Guiding Question: How would the addition or removal of hormones affect the reproductive processes?</td>
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<td><strong>Evaluate</strong></td>
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<td>-Asking questions &lt;br&gt;-Constructing explanations &lt;br&gt;-Developing and using models &lt;br&gt;-Obtain, evaluate, and communicate information &lt;br&gt;-analyze and interpret data</td>
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<td>Guiding Question: Diethylstilbestrol at one time was considered safe and prescribed to pregnant women for</td>
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<td>a span of more than 40 years. Considering this example, how would you determine if a medication of synthetic hormones were safe or not?</td>
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Sample Labs and Activities

Unit 1 The Human Body and Organization

Organ System Presidential Campaign - Homeostasis

Name: _______________________________ Per.: ______

Honors Anatomy and Physiology

Guiding question: How do different organ systems function synergistically to maintain homeostasis?

Science and Engineering Practices:
1. Constructing explanations.
2. Developing and using models.
3. Engaging in argument from evidence.

Organ System Presidential Campaign

Introduction: We recently spoke of organ systems being a collection of different organs that work together to help maintain homeostasis within the body. Within each organ system, each organ takes on a unique responsibility in accomplishing that goal. In addition, the function of one organ system impacts the function of each of the other organ systems’ ability to maintain homeostasis to some capacity.

Purpose: To investigate the different forms of homeostasis maintained by the organ systems, the role of each organ in that organ system, and how one organ system impacts the function of other organ systems.

Directions: You will be assigned one organ system within the body. Follow the guide below in your quest to answer the guiding question.
### Integumentary System

<table>
<thead>
<tr>
<th>Organs in the integumentary system:</th>
<th>Function of the organ:</th>
<th>How does this organ contribute to maintaining homeostasis?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td></td>
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<tr>
<td>Hair</td>
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<tr>
<td>Nails</td>
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<tr>
<td>Sweat (sudoriferous) glands</td>
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<tr>
<td>Sebaceous glands</td>
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</tbody>
</table>
Question: In what way(s) does the integumentary system maintain homeostasis in the body?

Part II: Presidential Nominee

Question: Of the organs you researched, which organ seems to have the largest impact on maintaining homeostasis? Explain your reasoning. This organ will be the organ you designate as your presidential nominee.
Part III: Vice President
The integumentary system’s ability to maintain homeostasis is dependent on the following organ systems. Identify how each of the following organ systems maintain homeostasis in the body and how the integumentary system would suffer in its’ ability to maintain homeostasis without it.

**Cardiovascular System**

<table>
<thead>
<tr>
<th>How does the cardiovascular system help maintain homeostasis in the body (thinking relative to the integumentary system)?</th>
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<tbody>
<tr>
<td>How might the loss of the cardiovascular system disrupt the integumentary systems’ ability to maintain homeostasis?</td>
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</tbody>
</table>

**Nervous System**

<table>
<thead>
<tr>
<th>How does the nervous system help maintain homeostasis in the body (thinking relative to the integumentary system)?</th>
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<tbody>
<tr>
<td>How might the loss of the nervous system disrupt the integumentary systems’ ability to maintain homeostasis?</td>
</tr>
</tbody>
</table>
Question: Which organ system, the cardiovascular or nervous, do you think would have the largest impact on the integumentary systems’ ability to maintain homeostasis? Explain your reasoning. This organ system will be the Vice President in your presidential campaign.

Part IV: Illustration of Interconnectedness
On a separate sheet of paper (or on a computer if you are digitally inclined), construct a model (picture, diagram, flow chart, bubble map, etc.) that illustrates the homeostatic relationship between the integumentary system and your chosen Vice President running mate. If you have a taste for the arts, this could even be completed through a song, dance, or video.
## Scaled Learning Targets (Rubric)

### Science and Engineering Practice 1: Constructing explanations

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author identifies the function(s) of each organ AND how each organ impacts the integumentary systems ability to maintain homeostasis.</td>
<td>Author identifies how each organ impacts the integumentary systems ability to maintain homeostasis.</td>
<td>Author identifies how MOST of the organs impact the integumentary systems ability to maintain homeostasis.</td>
<td>Author discusses the organs, but how the organs impact the integumentary systems ability to maintain homeostasis is not explained.</td>
</tr>
</tbody>
</table>

### Science and Engineering Practice 2: Developing and using models

<table>
<thead>
<tr>
<th>Exceeds Mastery 4</th>
<th>Demonstrates Mastery 3</th>
<th>Approaching Mastery 2</th>
<th>Developing Foundational Skills 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model illustrates how the function of the “vice president” impacts the integumentary systems ability to maintain homeostasis in multiple ways.</td>
<td>Model illustrates how the function of the “vice president” impacts the integumentary systems ability to maintain homeostasis.</td>
<td>Model illustrates how the function of the “vice president” impacts the integumentary systems ability to function, but not in regards to homeostasis.</td>
<td>Model is present but connections between the “vice president” and the integumentary system are incorrectly illustrated.</td>
</tr>
<tr>
<td>Exceeds Mastery 4</td>
<td>Demonstrates Mastery 3</td>
<td>Approaching Mastery 2</td>
<td>Developing Foundational Skills 1</td>
</tr>
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</tr>
<tr>
<td>The selection of the “president” (organ from the integumentary system) and the “vice president” (cardiovascular or nervous system) is explained using collected information AND includes a written explanation as to why the other options for the president and vice president are not as good of a choice.</td>
<td>The selection of the “president” (organ from the integumentary system) and the “vice president” (cardiovascular or nervous system) is explained using collected information.</td>
<td>The selection of the “president” (organ from the integumentary system) and the “vice president” (cardiovascular or nervous system) is explained, but does not base explanation on information contained within the collection charts (from section II and III).</td>
<td>The selection of the “president” (organ from the integumentary system) and the “vice president” (cardiovascular or nervous system) is provided, but not explained.</td>
</tr>
</tbody>
</table>
Unit 3 The Skeletal System
Explaining Blood and Mineral Homeostasis

Name: ________________________ Per: ___

Honors Anatomy and Physiology
Explaining Blood and Mineral Homeostasis

Science and Engineering Practices:
1. Developing and using models
2. Analyzing and interpreting data

Cross-Cutting Concept:
1. Cause and effect

Directions: Use the reading and the illustration below to answer the questions that follow.

Blood calcium levels are regulated using the negative feedback loop and is regulated using the hormones calcitonin and PTH. When blood Ca\(^{2+}\) levels rise above the set point of 10 mg/100 mL, the thyroid gland releases calcitonin into the blood. As a result of calcitonin being in the blood, the excess Ca\(^{2+}\) will be deposited on the bones of the skeleton. This causes blood Ca\(^{2+}\) levels to decrease back to the set point. In opposition, when blood Ca\(^{2+}\) levels fall below the set point, the parathyroid hormone releases the hormone PTH into the blood. As a result, Ca\(^{2+}\) is released from the bones of the skeleton back into the blood, causing blood Ca\(^{2+}\) to increase back to the set point. This is illustrated in the image below.

1. Draw a graph that illustrates how blood Ca\(^{2+}\) changes over the course of time (rising above or falling below the set point). In your graph, be sure to
   a. Label the set point and identify its’ value.
   b. Indicate when calcitonin would be introduced to the blood and why.
   c. Indicate when PTH would be introduced to the blood and why.
2. Recall the homeostatic mechanism: it consists of a sensor, control center, and effector that function to control a regulated variable. Based on the reading and image above, identify what represents each of the following AND how you know:
   a. Sensor(s) – 

   b. Effector(s) – 

   c. Regulated variable(s) – 

3. Bone density is dynamic: it can increase or decrease based on how physically active an individual is. The same two hormones discussed above play a role in this process of bone remodeling. Draw a cycle/illustration, similar to the one provided above, that illustrates what this would look like. Hint: Consider what you now know about PTH and calcitonin, and physical activity and bone density. You do NOT need to include a set point value for bone density, as this value is unique to each person.
4. Red bone marrow within the skeletal system also plays a critical role in the homeostatic regulation of the amount of oxygen within the blood. When the amount of oxygen in the blood drops below the set point, the liver and kidneys release a hormone known as erythropoietin into the bloodstream. Erythropoietin will travel to the red bone marrow, causing the red bone marrow to produce more red blood cells (red blood cells carry oxygen, so if there are more red blood cells, then there will be more oxygen in the blood). This causes blood oxygen levels to return back to the set point. When this happens, the liver and kidneys will stop releasing erythropoietin.

Draw a flow chart diagram/cycle that illustrates this process. Your diagram/cycle must include the following components:
- erythropoietin
- blood oxygen levels
- red blood cells
- bloodstream
- red bone marrow
Upper Limb Lab

TEACHER NOTE – This activity requires the use of a disarticulated skeleton. It is best done if you have 3 or 4 of each of the bones required for each section and skeletal arms that are kept together. To use this document as is, you would need to label the bones at your site.

Name:_____________________________  Per:_____

Anatomy and Physiology
Upper Limb Lab Exercise

Directions: This lab will operate on a rotation. Complete each lab section as you move through the different stations.

Station: Scapula
Task 1: Labeling
Directions: Identify each part of the scapula below using the numbers on the bone.
1) 
2) 
3) 

Task 2: Determining the anterior and posterior view.
Directions: You will find one side of the scapula labeled “A” and the other side “B”. In the space provided below, identify which side is the anterior side and which side is the posterior side. What clues on the scapula help you determine this?
Side “A” = ____________________________
Side “B” = ____________________________

Explain how the bone markings helped you determine this.
______________________________________________________________________________________

Task 3: Differentiating a left scapula from a right scapula.
Directions: We have two scapulae, one for our left arm and one for our right arm. Is this scapula a right or left scapula? What clues on the bone help you determine this?
Left or right? __________________________

Explain how the bone markings helped you determine this.
______________________________________________________________________________________
Station: Humerus
Task 1: Labeling
Directions: Identify each part of the humerus below using the numbers on the bone.
1)  
2)  
3)  
4)  
5)  

Task 2: Determining the anterior and posterior view.
Directions: You will find one side of the humerus labeled “A” and the other side “B”. In the space provided below, identify which side is the anterior side and which side is the posterior side. What clues on the humerus help you determine this?
Side “A” = ____________________________
Side “B” = ____________________________
Explain how the bone markings helped you determine this.
_________________________________________________________________________________

Task 3: Determining the medial side and the lateral side.
Directions: One side of the humerus is labeled “X” and the other “Y”. Which side is the lateral side and which is the medial side? What clues on the humerus help you determine this?
Side “X” = ____________________________
Side “Y” = ____________________________
Explain how the bone markings helped you determine this.
_________________________________________________________________________________

Task 4: Differentiating a left humerus from a right humerus.
Directions: We have two humerus bones, one for our left arm and one for our right arm. Is this bone a right or left humerus? What clues on the bone help you determine this?
Left or right? ____________________________
Explain how the bone markings helped you determine this.
_________________________________________________________________________________

Station: Ulna
Task 1: Labeling
Directions: Identify each part of the ulna below using the numbers on the bone.
1)  
2)  
3)  

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Task 2: Determining the anterior and posterior view.
Directions: You will find one side of the ulna labeled “A” and the other side “B”. In the space provided below, identify which side is the anterior side and which side is the posterior side. What clues on the ulna help you determine this?
Side “A” = ____________________________
Side “B” = ____________________________
Explain how the bone markings helped you determine this.

Station: Articulations
Directions: Read the passage below. Then complete the associated tasks.

Articulations occur in the body at any place two bones meet (these are also known as joints). In some instances, the articulations are movable and in others immovable (like in sutures of the skull). The two articulations of the upper limb we will be focusing on are both moveable in nature. The first articulation to be discussed occurs between the head of the humerus and the Glenoid cavity of the scapula. Looking at these bones, you will notice and perhaps feel that parts of the humerus surrounding the head have a roughened texture to them as does the acromial process of the scapula. These roughened areas allow for additional grip to help the periosteum attach tendons and ligaments (it would be rather difficult to attach a ligament or tendon to part of a bone that is smooth, like the body of the scapula).

The second articulation we will be looking at occurs between the distal end of the humerus and the proximal end of the ulna; specifically the trochlea of the humerus and the troclear notch of the ulna. It is also important to take note of the role the olecranon fossa plays during the extension of the arm.

Task 1: Understanding the articulation that occurs between the head of the humerus and the Glenoid cavity of the scapula.
Directions: Complete each of the following below and answer any questions provided.

1) Using the model of the scapula and the humerus (NOT the entire arm that is put together) place the head of the humerus inside the Glenoid cavity of the scapula. Move the humerus around while keeping the head of the humerus in contact with the Glenoid cavity. This type of articulation is known as a ball and socket joint.
   a. Describe the direction(s) the humerus is able to rotate in (this range of motion is a characteristic of a ball and socket joint).

   b. Explain why a ball and socket joint is a fitting name for this type of articulation.

   c. Identify at least one other location in our body where a ball and socket joint can be found.
d. The articulation between the head of the humerus and the Glenoid cavity is one of the easiest places in the body to suffer a **dislocated bone** (a bone that is knocked out of place). Examine the head of the humerus and the Glenoid cavity and make a claim as to why this particular joint is so easy to dislocate. Explain your reasoning.

e. Having read the introductory section above and completed sections a, b, c and d, write a summary of this articulation. Summary should include the key terminology tied to this articulation and be a minimum of five sentences in length.

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**Task 2:** Understanding the articulation that occurs between the **distal end of the humerus** and the **proximal end of the ulna**.

Directions: Complete each of the following below and answer any questions provided.
Using the model of the arm that is assembled, observe the articulation between the humerus and the ulna. You will best be able to understand this articulation if you slide the ulna up tight against the humerus (it slides on the little metal bar).

1. Extend and contract the ulna. Take notice of how it rotates on the humerus. Explain the interaction between the **trochlear notch** of the ulna and the **trochlea** of the humerus.

2. Extend and contract the ulna. As you do so, take note of the interaction between the **olecranon process** of the ulna and the **olecranon fossa** of the humerus. Explain this interaction.

3. The articulation between the humerus and the ulna is called a **hinge joint**.
   a. Explain the range of motion these types of joints have.
   
   b. Explain why the term “hinge joint” is fitting for this type of articulation.
   
   c. Identify at least one other location in our body where a hinge joint can be found.

4. Having read the introductory section above and completed sections 1, 2, and 3, write a summary of this articulation. Summary should include the key terminology tied to this articulation and be a minimum of five sentences in length.

   __________________________________________________________
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Unit 12 Reproductive System
Hormone and Menstrual Cycle Activity
SEP: Analyzing and interpreting data
CCC: Cause and effect

A major difference between male and female reproduction is that, beginning at menarche and lasting until menopause, females have monthly cycles. Cycles are interrupted when a woman is pregnant or intensively lactating. The human menstrual cycle lasts about 28 days, and involves several different hormones. The purpose of the cycle is that, in mammals, the uterus must be prepared to accept and nourish the fertilized egg, and the sperm and egg must meet at the appropriate time so that the growing embryo is welcomed to a cushy environment. Growth and release of the egg and preparation of the uterus for pregnancy require a complex dance of hormones. These include follicle stimulating hormone (FSH), luteinizing hormone (LH), estrogen, progesterone, and human chorionic gonadotropin (hCG). These will be discussed in this section.

Before birth, a female ovary contains immature egg cells called oocytes, which are in a dormant state until puberty. A layer of cells surrounds each oocyte and the entire structure is called a primordial follicle. Primordial follicles begin to mature when they are acted upon by follicle stimulating hormone (FSH) from the anterior pituitary. FSH is not secreted until the pituitary has been stimulated by gonadotropin-releasing hormone (GnRH) from the hypothalamus.

Each month several follicles begin to develop but usually only one reaches maturity. During their development, follicles produce estrogen, which causes thickening of the uterine lining in preparation for pregnancy, should fertilization occur. Eventually, one follicle emerges as a mature, Graafian follicle and it will release an egg at ovulation. Ovulation occurs at mid-cycle, in response to a surge in luteinizing hormone (LH), another hormone of the anterior pituitary. LH levels increase in response to estrogen levels. Following ovulation, the remnant of the follicle, called the corpus luteum (CL), produces progesterone, another hormone that prepares and maintains the uterus to receive a fertilized egg.

If the egg is not fertilized, the corpus luteum regresses, levels of progesterone and estrogen decline, the hypothalamus produces GnRH and FSH, and a new cycle begins. When estrogen and progesterone decline, the uterine lining is shed during menstruation. If fertilization occurs, the developing conceptus produces chorionic gonadotropins (e.g., hCG), which maintains the corpus luteum. As pregnancy progresses, the placenta produces progesterone to maintain the uterus for successful pregnancy.

Graphing the Menstrual Cycle

In this part of the lab you will create a graph of relative hormone levels; this will help you determine which hormone is most important during each part of the menstrual cycle. The menstrual cycle is a cyclic series of changes in the uterine lining that correspond with changes in the ovary. We will base our time line on a 28-day cycle, but the cycle is highly variable and in some women it is not a consistent length from one month to another. Since it is a cycle, we can begin with any phase. However, it is customary to call the first day of menstruation Day 1 of the menstrual cycle, because menstruation is visible and easy to document. During menstruation, the thickened lining of the uterus breaks down because there is no fertilized egg present. Dead cells of the uterine lining, blood, and mucus are released through the vagina. Menstruation lasts approximately 5 days. The second stage of the menstrual cycle is the follicular stage. During this time the egg completes the maturation process. This is the most variable part of the cycle in terms of length; it extends from the last day of menstruation to ovulation. The third phase of the cycle is the shortest. This is ovulation. It occurs around day 14 in a 28-day cycle. The final stage of the cycle is the luteal stage, when the corpus luteum
is present. It lasts 13-15 days and is the least variable in length. This means that no matter how long the cycle, menstruation occurs about 14 days after ovulation.

Procedure

We will make a graph of hormone trends in the menstrual cycle.

1. Use the figure below for your work. Label the X axis “days” and label the Y axis “hormone level.” Break the Y axis into five parts. Assume a 28-day cycle. Along the X axis number from 1 to 28 (or label day 7, day 14, day 21, and day 28). Day 14 is in the middle, and is marked for you.

2. Title your graph “Hormone Variations During the Menstrual Cycle.”
   You will plot levels of estrogen, progesterone, FSH, and LH. You will be marking hormone trends on this graph, not be actually plotting data. (What is the difference?)

3. We will begin by graphing changes in estrogen level in the 28-day cycle. Use a green pencil to show estrogen levels on your graph. Start your line about one fifth of the way up your Y axis. Estrogen increases very gradually until it is almost four times the original amount around day 13. It then levels out at twice the original amount until just prior to menstruation when it decreases to the original level.

   Increasing estrogen levels causes the pituitary to decrease production of FSH so that a second follicle does not complete maturation. In addition, estrogen is responsible for the thickening of the uterine lining. Increasing estrogen also causes a surge in LH.

4. Next, use a blue pencil to draw a line on your graph to indicate FSH levels during the cycle. FSH levels begin about half as high as estrogen. FSH levels increase to stimulate the development of the follicle. Beginning on day 1 of the cycle, FSH levels steadily increase until the middle of the cycle. It will peak about half-way up your Y axis and then steadily decrease to the starting level at the beginning of menstruation.

   **Graph Title:** ________________________________
5. Next, use a yellow pencil to draw a line on your graph indicating LH levels during the cycle. LH levels begin at about the same levels as FSH, but increase only slightly from the first day until around day 11. After day 11, LH levels increase rapidly and peak around day 13 at approximately four times the original level. Within two days, it returns to the original level and remains there throughout the remainder of the cycle.

6. Finally, use a red pencil plot a line on your graph indicating progesterone levels during the cycle. Begin about the same as FSH and LH and remain at that level until the middle of the cycle. At about mid-cycle progesterone levels slowly begin to increase over the next four days reaching about eight times the original level, then it slowly decreasing to the original levels at the end of the cycle.

7. In the space below the X axis of your graph, label the four phases of the menstrual cycle:
   - Menstruation
   - Follicular Stage
   - Ovulation
   - Luteal Stage

Answer the Following Questions:

1. The changing hormone levels also cause the endometrium of the uterus to change in thickness. On which day of the menstrual cycle would it reach maximum thickness? Explain your answer based on how this would help to make sure pregnancy occurs if fertilization occurs.

2. What is the function of each of the following hormones: FSH, LH, estrogen, and progesterone?

3. On what days of the menstrual cycle does each hormone reach its peak? (Answer for all four hormones).
4. Why aren’t all four hormones found at their highest levels at the same time?

5. What would happen if fertilization occurred but the CL was not maintained beyond day 28 of the cycle?

6. Feedback occurs when the effect produced by a hormone causes the level of that hormone to change further. What are two examples of feedback described in this lab?