

# Human Anatomy and Physiology Summer Assignment

2024-2025

Mrs. Lamphron

Welcome to Human Anatomy and Physiology!!

The following assignment is due the **first day of classes**. This will count for a ***test grade***. On the back of this sheet you will find the instructions on how to get the online textbook.

- You should use this textbook to complete the assignment listed below.
  - You will be held to the terminology in the textbook. Please do NOT look up anything on the internet.

## **The assignment:**

- **On the outline provided:**
    - Fill in the outline
      - Be specific and add details whenever possible
    - Note the section number(s)/page numbers you find the information from in the left margin of the outline. This will help you get back to the correct page when needed.
- If you would like to sign out a hard copy of the text or the summer assignment (printed) please contact Mrs. Lamphron before 6/24/24. Copies will also be available again in September.

We will have a test during the first two weeks of school on the information in the first outline packet.

Please e-mail me ([slamphron@clarenceschools.org](mailto:slamphron@clarenceschools.org)) if you have any issues or questions.

Have a great summer and I look forward to seeing you with your completed outline the first day of school!!

-Mrs. Lamphron

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## How to access your course

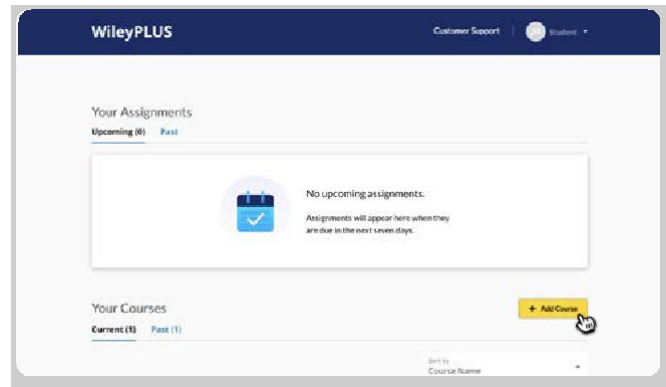
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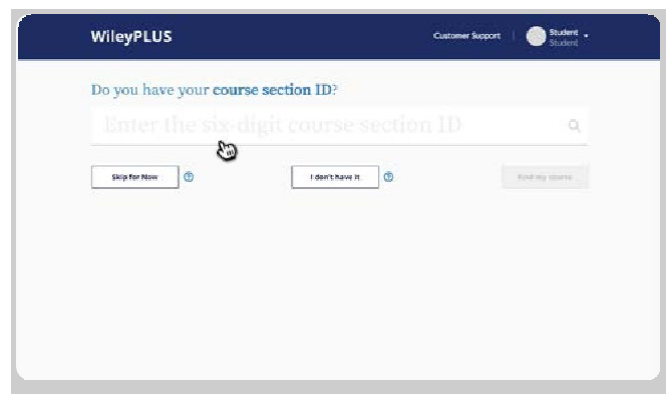
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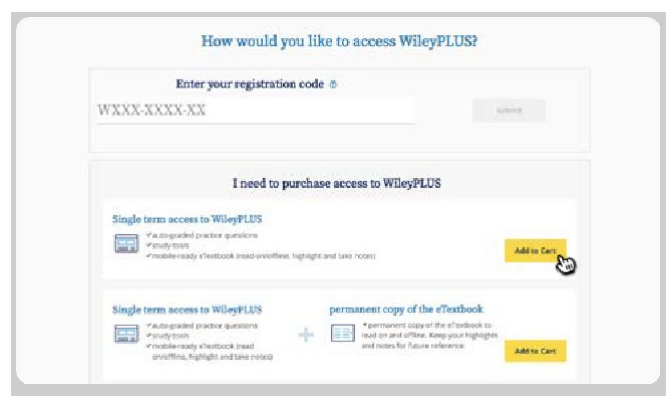
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### Register and access

3

- Already purchased? Just enter your registration code.
- Haven't purchased? Choose a purchase option or start a free trial.
- Access your course and start learning!



I. Definitions

Anatomy

Physiology

II. Branches of Anatomy and Physiology

A.

Branch of Anatomy	Study of
Histology	
Gross Anatomy	
Pathological Anatomy	

Branch of Physiology	Study of
Molecular Physiology	
Exercise Physiology	
Pathophysiology	

B. \_\_\_\_\_ of a part of the body often reflects its \_\_\_\_\_.

III. Levels of Structural Organization and Body Systems

A. Chemical Level

1. atoms

a. examples:

2. molecules

b. examples:

B. Cellular level

1. cells

a. examples:

C. Tissue level

1. tissues

a. examples (give at least two with details about each tissue):

## D. Organ level

## 1. organ

a. example: Stomach (give the types of tissues and their functions that make up this organ)

## E. System level

## 1. system

a. example: Digestive System (give function of this system and organs and their functions that make up this system)

## F. Organismal level

## 1. organism

## G. Systems of the Human Body

<b>System Name</b>	<b>Components</b>	<b>Functions</b>
Integumentary		
Skeletal		
Muscular		
Nervous		
Endocrine		
Cardiovascular		

System Name	Components	Functions
Lymphoid (Lymphatic) and Immunity		
Respiratory		
Digestive		
Urinary		
Reproductive		

#### H. Noninvasive Diagnostic Techniques

##### 1. Noninvasive diagnostic technique

- a. inspection
- b. palpation
- c. auscultation
- d. percussion

#### IV. Characteristics of the Living Human Organism

##### A. Life processes of the human body

- a. metabolism
- b. responsiveness
- c. movement
- d. growth
- e. differentiation

f. reproduction

B. When any one of the life process ceases to occur properly,

C. Clinically, loss of heartbeat,

D. Autopsy

## V. Homeostasis

### A. Homeostasis

### B. Homeostasis and body fluids

1. An important part of maintaining homeostasis is maintaining the

a. intracellular fluid (ICF)/cytosol

b. extracellular fluid (ECF)

1. interstitial fluid

2. blood plasma

3. lymph plasma

4. cerebrospinal fluid

5. synovial fluid

### C. Control of homeostasis

1. Feedback Systems

a. feedback system/feedback loop

1. controlled condition/variable

a. examples

2. stimulus

b. Three basic components

1. receptor

a. afferent pathway

b. input

2. control center

a. set point

b. output

c. efferent pathway

3. effector

a. response

2. Negative feedback systems

a. a negative feedback system

1. example: regulation of blood pressure

a. blood pressure

b. what happens when blood pressure increases because the heart is beating faster/harder (from the textbook)

3. Positive feedback systems

a. positive feedback system

1. how different from negative feedback

2. example: normal childbirth (from the textbook)

3. If the action of a positive feedback system is not stopped, it can “\_\_\_\_\_” and may even produce \_\_\_\_\_ - \_\_\_\_\_ conditions in the body. The action of a negative feedback system, by contrast, \_\_\_\_\_ and then \_\_\_\_\_ as the controlled condition returns to its \_\_\_\_\_. Usually, \_\_\_\_\_ feedback systems reinforce conditions that \_\_\_\_\_ happen very often, and \_\_\_\_\_ feedback systems regulate conditions in the body that remain \_\_\_\_\_ over \_\_\_\_\_ periods.

#### D. Homeostatic Imbalances

1. disorder
2. disease
  - a. local
  - b. systemic
3. symptoms
4. signs
5. epidemiology
6. pharmacology
7. Diagnosis of disease
  - a. diagnosis
  - b. factors that go into a diagnosis

#### VI. Basic Anatomical Terminology

##### A. Body Positions

1. anatomical position
  - a. position the body is in
  - b. why do scientists and health-care professionals use this?
2. prone
3. supine



## B. Regional Names

Region	Information about Region
Head	
Neck	
Trunk	
Upper limbs	
Lower limbs	

## C. Planes and sections

## 1. planes

## a.

Plane	Meaning
Sagittal plane	
Midsagittal/median plane	
Midline	
Para sagittal plane	
Frontal/coronal plane	
Transverse plane	
Oblique plane	

## 2. Sections

## 3. It is important to know the plane of the section so you can

## a. For example: three different sections of the brain provide

## D. Directional Terms

## 1. used to describe

2.

Directional Term	Definition
Superior (cephalic/cranial)	
Inferior (caudal)	
Anterior (ventral)	
Posterior (dorsal)	
Medial	
Lateral	
Intermediate	
Ipsilateral	
Contralateral	
Proximal	
Distal	
Superficial (external)	
Deep (internal)	

## E. Body Cavities

1. what they are

2.

Cavity	Comments
Cranial cavity	
Vertebral canal	
Thoracic cavity	
Pleural cavity	

Cavity	Comments
Pericardial cavity	
Mediastinum	
Abdominopelvic cavity	
Abdominal cavity	
Pelvic cavity	

### 3. Thoracic and Abdominal Cavity Membranes

#### a. membrane

##### 1. serous membrane

a. parietal layer

b. visceral layer

c, serous fluid

d. examples:

1. pleura

a. visceral pleura

b. parietal pleura

c. pleural cavity

2. pericardium

a. visceral pericardium

b. parietal pericardium

c. pericardial cavity

3. peritoneum

a. visceral peritoneum

b. parietal peritoneum

c. peritoneal cavity

\*\* retroperitoneal

## VI. Aging and Homeostasis

A. aging

B. what aging produces –

1. examples:

## VII. Medical Imaging

A. medical imaging refers to

B. Various types of medical imaging allow

C. Common medical imaging procedures

Name	Procedure	Comments/Details
Radiography/X-ray		

Name	Procedure	Comments/Details
Magnetic Resonance Imaging (MRI)		
Computed Tomography (CT)		
Ultrasound scanning		
Coronary (cardiac) computed tomography angiography (CCTA) scan		

Name	Procedure	Comments/Details
Positron emission tomography (PET)		
Endoscopy		
Radionuclide scanning		

The Chemical Level of Organization

Chemistry and Homeostasis:

I. **How Matter is Organized**

a. Chemical Elements

Chemical Element	% of Total body Mass	Significance
Oxygen		
Carbon		
Hydrogen		
Nitrogen		
Calcium		
Phosphorus		
Potassium		
Sulfur		
Sodium		
Chlorine		
Magnesium		
Iron		

b. Structure of Atoms (include sketch)

c. Atomic Number and Mass Number

d. Radioactive isotopes

i. Harmful and Beneficial Effects of Radiation

e. Atomic Mass

## f. Ions, Molecules, and Compounds

## i. Free radicals and Antioxidants

**II. Chemical Bonds**

a. Ionic Bonds

b. Covalent Bonds

c. Hydrogen Bonds

**III. Chemical Reactions & Forms of Energy**

a. Energy Transfer in Chemical reactions

Activation Energy (include sketch)

Catalysts (include sketch)

b. Types of chemical reactions

Synthesis reactions (include sketch)

Decomposition reactions (include sketch)

**IV. Inorganic Compounds and solutions**

Inorganic Compounds

Organic Compounds

a. Water

i. Water as a solvent



- ii. Water in Chemical Reactions
  - iii. Thermal Properties of Water
  - iv. Water as a lubricant
- b. Solutions Colloids, and suspensions
- i. Mixture
  - ii. Colloid
  - iii. Suspension
  - iv. Concentration
  - v. Mole
- c. Inorganic Acids, Bases, and Salts
- d. Acid-Base Balance: The concept of pH- (include sketch)
- e. Maintaining pH: Buffer Systems
- i. Alkalosis
  - ii. Buffer systems

**V. Overview of Organic Compounds**

- a. Carbon skeleton
- b. Macromolecules

c. Polymers

d. Monomers

## VI. Carbohydrates

a. Monosaccharides and Disaccharides (include sketch)

b. Polysaccharides (include sketch)

i. Artificial Sweeteners

## VII. Lipids

Types of lipids in the body

Type	Summary of Function
Fatty Acids	
Triglycerides	
Phospholipids	
Steroids	
Eicosanoids	
Other	

i. Fats in health and Disease

## VIII. Proteins

### a. Amino Acids and Polypeptides

#### Functions of Proteins

Type of Protein	Function
Structural	
Regulatory	
Contractile	
Immunological	
Transport	
Catalytic	

### b. Fibrous Protein

### c. Globular Protein

### d. Enzymes

#### i. Three important Properties of enzymes

## IX. Nucleic Acids

### a. DNA vs RNA

#### i. DNA Fingerprinting

## X. Adenosine Triphosphate

The Cellular Level of Organization

Cells and Homeostasis

I. **Parts of a Cell**

- a. Plasma membrane
- b. Cytoplasm
- c. Nucleus

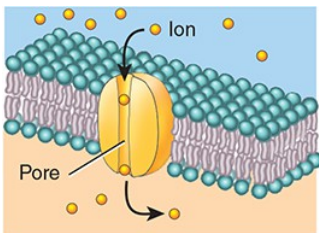
II. **The Plasma Membrane**

- a. Structure of the Plasma Membrane
  - i. The lipid Bilayer

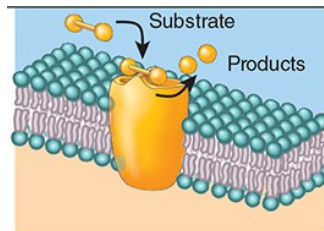
a. Function

b. Amphipathic

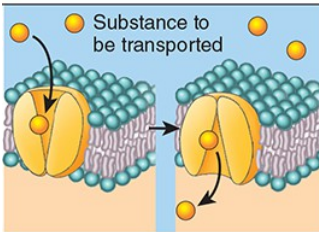
b. Functions of Membrane Proteins



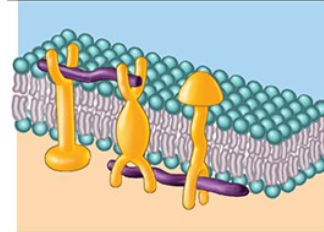
**Ion channel (integral)**



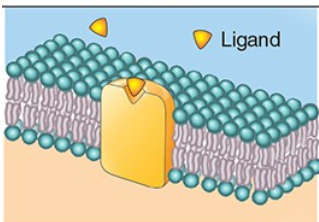
**Enzyme (integral and peripheral)**



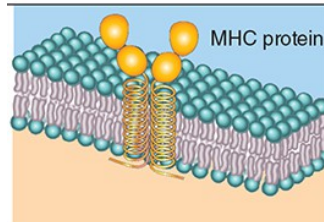
**Carrier (integral)**



**Linker (integral and peripheral)**



**Receptor (integral)**



**Cell identity marker (glycoprotein)**

c. Membrane Fluidity

- d. Membrane Permeability
  
- e. Gradients Across the Plasma Membrane
  - i. Concentration Gradient
  
  - ii. Electrical gradient
  
  - iii. Electrochemical gradient

### III. **Transport across the Plasma Membrane**

- a. Passive processes
  - i. Channel-Mediated Facilitated Diffusion
  
  - ii. Carrier-Mediated Facilitated Diffusion
  
  - iii. Aquaporins
  
  - iv. Hydrostatic pressure
  
  - v. Osmotic pressure
  
  - vi. Hypotonic solution
  
  - vii. Hemolysis
  
  - viii. Hypertonic solution
  
  - ix. Medical uses of Isotonic, Hypertonic, and Hypotonic Solutions

## b. Active Process

i. Sodium-Potassium pump

ii. Digitalis &  $\text{Ca}^{2+}$ 

iii. Viruses and Receptor-Mediated Endocytosis

## Transport of Materials into an out of Cells

Transport Process	Description	Substances Transported
<b>PASSIVE PROCESSES</b>		
Diffusion Simple Diffusion		
Facilitated Diffusion		
Osmosis		
<b>ACTIVE PROCESSES</b>		
Active Transport		
Primary Active Transport		
Secondary active transport		

Transport in Vesicles		
Endocytosis		
Receptor-Mediated endocytosis		
Phagocytosis		
Bulk-Phase endocytosis		
Exocytosis		
Transcytosis		

#### IV. Cytoplasm

- a. Cytosol
- b. cytoskeleton
- c. Microfilaments
- d. Intermediate Filaments
- e. Microtubules

## V. Nucleus

### i. Genomics

#### Organelles: Cell Parts and Their Functions

Part	Description	Functions
PLASMA MEMBRANE		
CYTOPLASM		
Cytosol		
Organelles		
Centrosome		
Cilia and Flagella		
Ribosome		
Endoplasmic Reticulum		
Golgi Complex		
Lysosome		
Mitochondrion		
Nucleus		



**VI. Protein Synthesis**

- i. Proteome
  
- ii. Gene Expression
  
- a. Transcription
  - i. 1.
  
  - ii. 2.
  
  - iii. 3.
  
- b. Translation
  
- c. Recombinant DNA

**VII. Cell Division**

- a. Somatic Cell Division
  - i. Mitotic Phase
  
  - ii. Mitotic Spindle and Cancer
  
  - iii. Cyclin-dependent protein kinases
  
  - iv. Apoptosis vs. Necrosis

## b. Reproductive Cell Division

## i. Meiosis

1. Crossing-over
2. Genetic recombination

## Comparison Between Mitosis and Meiosis

Point of Comparison	Mitosis	Meiosis
Cell Type		
Number of Divisions		
Stages		
Copy DNA?		
Tetrads?		
Number of cells		
Number of Chromosomes per cell		

VIII. Cellular DiversityIX. Aging and Cells

- a. Telomeres
- b. Free Radicals and Antioxidants

a. Disorders: Homeostatic Imbalances

i. Cancer

ii. Types

1. Carcinomas
2. Melanomas
3. Sarcoma
4. Osteogenic sarcoma
5. Leukemia
6. Lymphoma

iii. Growth and spread

1. Angiogenesis

iv. Causes

1. Carcinogens
2. Oncogenes
3. Oncogenic Viruses

v. Carcinogenesis

vi. Treatment of Cancer

I. Types of Tissues

A. Tissue

B. Four basic tissue types

Tissue Type	Information
Epithelial	
Connective	
Muscular	
Nervous	

C. biopsy

II. Cell Junctions

A. Cell junctions

B. Types

1. tight junction

2. adhering junctions

a. contain \_\_\_\_\_, a dense layer of proteins

b. adhering junctions help epithelial cells

## 3. desmosomes

a. contain \_\_\_\_\_ and have

b. common among cells that make up the

c. prevent epidermal cells from

## 4. hemidesmosomes

a. resemble

b. anchor cells not to

## 5. gap junctions

a. membrane proteins called \_\_\_\_\_ form tiny

b. the plasma membranes of gap junctions

c. ions and small molecules can

d. transfer of nutrients

e. allow the cells in a tissue to

f. enable \_\_\_\_\_ or \_\_\_\_\_ impulses to

## III. Comparison Between Epithelial and Connective Tissues

	Epithelial tissue	Connective tissue
Number of cells in relation to the extracellular matrix *extracellular matrix –		
Amount of blood vessels		

#### IV. Epithelial Tissue/Epithelium

##### A. features

1. consists of cells arranged in
  
2. because the cells are \_\_\_\_\_ packed and are

##### 3. general types

- a. surface epithelium (covering and lining epithelium)
  
  
- b. glandular epithelium

##### 4. structure

###### a. apical (free) surface

1. may contain

###### b. lateral surfaces

###### c. basal surface

###### d. basement membrane

1. found between an

2. is a thin

3. basal lamina

4. reticular lamina

##### 5. functions

- a. attaching to and

- b. form a surface along which

- c. restrict passage of

d. participate in

5. avascular

a. exchange of substances between an epithelial cell and

6. repeatedly subjected to physical and

a. high rate of

7. classification of surface epithelium

a. arrangement of cells in layers

1. simple epithelium

a. absorption

b. secretion

2. pseudostratified epithelium

3. stratified epithelium

b. cell shapes

1. squamous cells

2. cuboidal cells

3. columnar cells

4. transitional cells

## 8. Surface Epithelium

Name	Description	Location	Function
Simple squamous epithelium			
Simple cuboidal epithelium			
Nonciliated simple columnar epithelium			
Ciliated simple columnar epithelium			



Name	Description	Location	Function
Nonciliated pseudostratified columnar epithelium			
Ciliated pseudostratified columnar epithelium			
Stratified squamous epithelium			

Name	Description	Location	Function
Stratified cuboidal epithelium			
Stratified columnar epithelium			
Urothelium (transitional epithelium)			

a. Papanicolaou (Pap) test

## 9. Glandular Epithelium

a. function

b. gland

c.

Name	Description	Location	Function
Endocrine glands			
Exocrine glands			

d. secretions of endocrine glands

e. exocrine glands secrete their products

## V. Connective Tissue

### A. Background

1. connective tissue is
2. functions

### B. General features

1. consists of
  - a. extracellular matrix
    1. consists of
    2. structure determines much of the tissue's
      - a. examples
        1. cartilage
        2. bone

### C. Connective tissue cells

1. word endings
  - a. -blast
    1. examples
      - a. fibroblasts
      - b. chondroblasts
      - c. osteoblasts
    2. retain the capacity for cell
    3. once the extracellular matrix is produced, the immature cells
  - b. -cyte
    1. examples
      - a. fibrocytes
      - b.
      - c.

2. mature cells have reduced capacities for

2. connective tissue cells vary according to the

a. fibroblasts

b. macrophages

c. plasmocytes (plasma cells)

d. mast cells (mastocytes)

e. adipocytes

f. leukocytes (white blood cells)

D. Connective tissue extracellular matrix

1. each type of connective tissue has unique properties,

2. consists of two major components

a. ground substance

1. component of a connective tissue between

2. may be fluid,

3. it supports cells, binds

4. it plays an active role in how

5. hyaluronic acid

6. chondroitin sulfate

## b. fibers

1. embedded in the

2. collagen fibers

a. very strong and

b. often occur in \_\_\_\_\_ - bundles which adds great

c. collagen

d. found in most types of

e. sprain

3. elastic fibers

a. smaller in

b. consists of molecules of the protein

c. strong but can be \_\_\_\_\_ up to \_\_\_\_\_ of their relaxed length without  
\_\_\_\_\_.

d. elasticity

e. plentiful in

4. reticular fibers

a. consists of

b. provide support for

c. much \_\_\_\_\_ than collagen fibers and form \_\_\_\_\_.

d. provide \_\_\_\_\_ and \_\_\_\_\_.

e. plentiful in

1. stroma –

d. help form the

E. Classification of connective tissue

1. Embryonic connective tissue

a. description

b. location

c. function

2. mucoid (mucous) connective tissue

a. description

b. location

c. function

3. Mature connective tissue

a. loose connective tissue – fibers are

Name	Description	Location	Function
Areolar connective tissue			
Adipose connective tissue			

Name	Description	Location	Function
Reticular connective tissue			

b. dense connective tissue – contains \_\_\_\_\_ fibers which are

Name	Description	Location	Function
Dense regular connective tissue			
Dense irregular connective tissue			
Elastic connective tissue			



## c. cartilage

1. consists of a
2. can endure considerably more
3. strength is due to
4. resilience
5. few \_\_\_\_\_ and large
6. does not have any \_\_\_\_\_ or \_\_\_\_\_ in its
  - a. angiogenesis factor
7. chondrocytes
8. cartilage lacunae
9. perichondrium
10. resists tension (\_\_\_\_\_),
11. precursor to \_\_\_\_\_ forming almost the entire
  - a. persists after birth
    1. as the
    2. as the
12. metabolically, cartilage is a
  - a. when injured or inflamed,

Name	Description	Location	Function
Hyaline cartilage			
Fibrous cartilage			
Elastic cartilage			

## d. Bone

1. skeletal system made up of
2. functions of skeletal system
3. bone is made up of
4. compact bone
  - a. osteon

- b. bone lamellae
    - 1. responsible for the
  - c. bone lacunae
  - d. bone canaliculi
  - e. osteonic canal
5. spongy bone
- a. lacks
    - 1. spaces between are filled with
  - b. bone trabeculae
    - 1. spaces between are filled with
6. Information
- a. description
    - 1. compact bone
    - 2. spongy bone
  - b. location
  - c. function
- e. Blood tissue
- 1. has a \_\_\_\_\_ extracellular matrix called
    - a. blood plasma
      - 1. formed elements
        - a. red blood cells (erythrocytes)
        - b. white blood cells (leukocytes)
        - c. platelets (thrombocytes)
  - 2. information
    - a. description

b. location

c. function

f. lymph plasma (lymph)

1. the liquid connective tissue that flows

2. consists of

3. composition

a. leaving lymph nodes

b. from small intestine

## VI. Membranes

### A. Background

1. membranes

2. Types

a. epithelial

b. synovial

### B. Epithelial Membranes

1. Mucous membranes/mucosa

a. line

c. consist of

1. epithelial layer is an important \_\_\_\_\_ because it is a

a. goblet cells secrete \_\_\_\_\_ which prevents the cavities from \_\_\_\_\_

\_\_\_\_\_ and \_\_\_\_\_ particles in the \_\_\_\_\_ passageways and

\_\_\_\_\_ food as it moves through the \_\_\_\_\_ canal.

b. the epithelial layer also secretes \_\_\_\_\_ needed for digestion and is the site of

\_\_\_\_\_ and fluid \_\_\_\_\_ in the gastrointestinal tract.

2. connective tissue layer

a. lamina propria

1. supports the

2. also holds

3. oxygen and nutrients

2. Serous membranes/serosa

a. lines a body cavity that

b. consist of

1. parietal layer

2. visceral layer

3. serous fluid

3. Cutaneous membrane/skin

a. covers

1. epidermis

2. dermis

C. Synovial membrane

1. line cavities of

2. do not open to the \_\_\_\_\_ and lack an \_\_\_\_\_.

3. Composed of

a. synoviocytes

b. synovial fluid

VII. Muscular Tissue

A. Background

1. consists of

2. produces body

3. Three types

a. skeletal muscle tissue

1. description

2. location

3. function

- b. cardiac muscle tissue

1. description

2. location

3. function

- c. smooth muscle tissue

1. description

2. location

3. function

## VIII. Nervous Tissue

### A. Background

1. consists of

- a. neurons/nerve cells

1. nerve action potentials/nerve impulses

2. basic parts

- a. cell body

- b. dendrites

- c. axon

- b. neuroglia

B. description

C. location

D. function

## IX. Excitable Cells

A. \_\_\_\_\_ and \_\_\_\_\_ are considered  
\_\_\_\_\_ because they exhibit

1. electrical excitability

a. when occurs in a neuron

b. when occurs in a muscle fiber

## X. Tissue Repair: Restoring Homeostasis

### A. Tissue repair

1. in epithelial cells

a. stem cells

2. in connective tissue

a. bone

b. cartilage

3. in muscular tissue

4. in nervous tissue

B. tissue regeneration vs fibrosis

C. granulation tissue

D. wound dehiscence

1. what it is

2. can occur if/contributing factors

E. three factors that affect tissue repair

1. nutrition

2. blood circulation

3. age (use section 4.11 to take notes)