

Unit 1: The Human Body

Morphemes

- | | | |
|----------------------|----------------------------|-----------------------------|
| 1) -tomy
To cut | 6) homeo-
same | 11) patho-
disease |
| 2) ana-
Apart | 7) -stasis
Not changing | 12) -gen
Produce |
| 3) physio-
Nature | 8) endo-
within | 13) super-
Over or above |
| 4) -logy
Study of | 9) cardio-
heart | 14) inter-
within |
| 5) a-
apart | 10) vaso-
vessel | |

1. How does the organization of the human body reveal the relationship between structure and function?

- 15) Anatomy
The study of body structures and their relationships to each other
- 16) Physiology
How the body and its parts function
- 17) Organelles
A specialized structure within a cell
- 18) Tissue
Similar cells working together to perform the same function
- 19) Organ
Two or more tissues working together to perform the same function
- 20) Integumentary system
Skin, hair, and fingernails. It waterproofs, cushions, and protects the body. It produces vitamin D and helps regulate body temperature.
- 21) Pathogen
Disease causing organism or particle
- 22) Skeletal system
Bones, cartilages, and joints. It supports the body, provides a framework for movement, protects structures, forms blood, and stores minerals
- 23) Muscular system
Skeletal muscles, tendons, and ligaments. It causes movement and helps regulate body temperature.
- 24) 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
- 25) Homeostasis
Maintenance of internal conditions within a narrow range
- 26) Endocrine system
Endocrine glands and hormones. It controls growth and development and maintains homeostasis through slow and prolonged change.

- 27) 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
- 28) 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.
- 29) 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.
- 30) Urinary system
Kidneys, ureters, bladder, and urethra. It filters blood. It maintains water and salt homeostasis, blood pressure homeostasis, and pH homeostasis.
- 31) Reproductive system
Males: testes, scrotum, penis, and other accessory glands. Females: ovaries, uterine tubes, uterus, and vagina. It produces offspring.

2. Why does anatomy and physiology need a special language?

- 32) Anatomical position
Standing straight, feet parallel and arms hanging at the sides with the palms facing forward
- 33) Superior
Toward the head or upper part of a structure
- 34) Inferior
Away from the head end or toward the lower part of a structure
- 35) Anterior (ventral)
Toward or at the front of the body
- 36) Posterior (dorsal)
Toward or at the backside of the body
- 37) Medial
Toward or at the midline of the body
- 38) Lateral
Away from the midline of the body
- 39) Proximal
Close to the origin of the body part or the point of attachment of a limb to the body
- 40) Distal
Farther from the origin of the body part or the point of attachment of a limb to the body
- 41) Superficial
Toward or at the body surface
- 42) Deep
Away from the body surface; more internal

3. How does your body maintain homeostasis?

- 43) Negative feedback
A mechanism where a stimulus causes the production of a product that reduces the stimulus
- 44) 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
- 45) Receptor
A type of sensor that monitors and responds to changes in a variable. Changes in variables are called stimuli.

- 46) Control center
Something that determines the level (set point) of a variable in homeostasis (it is often the brain)
- 47) Effector
Responds to and modifies the stimulus
- 48) Afferent
A signal pathway that leads from a stimulus to a control center
- 49) Efferent
A signal pathway that leads from a control center to the source of a stimulus

Be able to identify the following terms

- | | | |
|---------------|-----------------|----------------|
| 50) Cephalic | 65) Pubic | 80) Olecranal |
| 51) Frontal | 66) Acromial | 81) Popliteal |
| 52) Orbital | 67) Deltoid | 82) Sural |
| 53) Nasal | 68) Brachial | 83) Calcaneal |
| 54) Buccal | 69) Antecubital | 84) Plantar |
| 55) Oral | 70) Carpal | 85) Occipital |
| 56) Mental | 71) Manus | 86) Scapular |
| 57) Cervical | 72) Digital | 87) Vertebral |
| 58) Thoracic | 73) Coxal | 88) Lumbar |
| 59) Sternal | 74) Femoral | 89) Sacral |
| 60) Axillary | 75) Patellar | 90) Gluteal |
| 61) Abdominal | 76) Crural | 91) Sagittal |
| 62) Umbilical | 77) Fibular | 92) Coronal |
| 63) Pelvic | 78) Pedal | 93) Transverse |
| 64) Inguinal | 79) Tarsal | |

Unit 2: Biochemistry

Morphemes

- 94) –kinesis
Movement or motion
- 95) hydro-
Water
- 96) –lysis
Decomposition or break down
- 97) meta-
Occurring later, situated behind, or change
- 98) poly-
Many
- 99) –mer
Part
- 100) de-
Remove or do the opposite
- 101) di-
Twice, double, or two
- 102) –in
Protein (sometimes)
- 103) phil-
Loving, having an affinity for

104) –phobe
Fearing, or averse to

4. What is the relationship between energy and matter?

105) Emergent property

Properties of a system that arise due to complexity and cannot be attributed to the properties of the parts of the system (one of the unifying themes in biology)

106) Energy

The ability to make a change

107) Kinetic energy

Energy of motion

108) Heat

A measure of the movement of energy from one place to another

109) Potential energy

Stored energy due to location or position

110) Chemical energy

Potential energy associated with the covalent bonds that hold atoms and molecules together

111) Covalent bond

Sharing one or more pairs of electrons

112) Molecule

2 or more atoms covalently bonded together

113) Ion

A charged atom or compound

114) Hydrogen bond

An intermolecular force that holds two molecules together. It results from unequal electron sharing between a hydrogen atom and another atom it is covalently bonded to

5. How does ATP power cellular work?

115) Energy coupling

Use of a chemical reaction that releases energy to drive a chemical reaction that absorbs energy using ATP and a phosphorylated intermediate

116) ATP

The molecule used by all life for processes that require energy

117) Hydrolysis

A chemical reaction that consumes one water molecule and breaks up one molecule into two releasing energy

6. What is the relationship between metabolism and homeostasis?

118) Metabolism

All of the chemical reactions that sustain an organism

119) Catabolism

Breaking down complex molecules into smaller ones releasing energy

120) Anabolism

Building up complex molecules from smaller ones consuming energy

121) Metabolic rate

The amount of energy an organism uses per unit of time

7. How do the major molecules of life form, and what do they do?

122) Polymer

A molecule composed of many identical or similar molecules called

- 123) Dehydration reaction
A chemical reaction that results in two molecules joining together and producing a water molecule as a byproduct. Requires energy.
- 124) Carbohydrate
One or more saccharide (sugar) molecules covalently bonded together. They have many functions including being a source for free energy storage.
- 125) Disaccharide
A carbohydrate composed of 2 monosaccharides
- 126) Polysaccharide
A carbohydrate composed of many monosaccharides
- 127) Starch
A polymer of glucose that plants make to stockpile extra glucose
- 128) Glycogen
Short term storage molecule for glucose found in animals
- 129) Lipid
A diverse group of macromolecules that are NOT polymers. They are *insoluble in water* and include waxes, triglycerides, steroids, and phospholipids
- 130) Phospholipids
Form cell membranes
- 131) Cholesterol
A lipid that is an essential plasma membrane component that regulates the viscosity of the membrane; it is also a building block for steroid hormones and fat-soluble vitamins.
- 132) Protein
One or more polypeptides folded up into a specific shape
- 133) Amino acid
The subunit of proteins
- 134) Denaturation
Usually refers to the disruption in the folding of a protein
- 135) Enzyme
A protein that speeds up reactions without being used up in the reaction
- 136) Active site
The substrate binding region of the enzyme
- 137) Gene
The unit of heredity
- 138) DNA
A nucleic acid that holds the information for making proteins

8. Why does life as we know it depend on water?

- 139) Temperature
The average kinetic energy of a volume of matter
- 140) calorie (c)
The amount of heat required to raise the temperature of 1 gram of water 1°C
- 141) Heat capacity
The amount of heat necessary to change the temperature of a substance
- 142) Solvent
A liquid that other substances dissolve in
- 143) Solute
A substance that dissolves in a solvent
- 144) Solution
A liquid with evenly distributed solute dissolved in a solvent

145) Hydrophilic

A substance that is attracted to water because it is polar, and dissolves well in water.

146) Hydrophobic

A substance that repels water because it is mostly nonpolar and does not dissolve well in water.

9. What causes pH change?

147) Acid

A molecule that gives up hydrogen ions in a solution

148) Base

A molecule that gives up hydroxide ions in a solution or a molecule that takes hydrogen ions out of solution

149) pH

The concentration of hydrogen ions in a solution

150) Buffer

A molecule that resists pH changes because it can take up excess H^+ or OH^-

Be able to identify the following terms

151) Monosaccharide

156) Saturated fatty acid

161) Nucleotide

152) Disaccharide

157) Unsaturated fatty acid

162) DNA

153) Polysaccharide

158) Cholesterol

163) Gene

154) Phospholipid

159) Amino acid

155) Triglyceride

160) Protein

Unit 3 Cell Homeostasis

Morphemes

164) iso-

Equal

165) hyper-

Over, above

166) hypo-

Below, under

167) co-

Together, jointly

168) trans-

Across, beyond

169) exo-

Outside, external

170) glyco-

Relating to sugar

10. Why is the plasma membrane referred to as a fluid mosaic?

171) Plasma membrane

Composed mainly of a phospholipid bilayer with a hydrophilic exterior and a hydrophobic interior

11. How do substances that are permeable to the plasma membrane get into and out of cells?

172) Selective permeability

Allowing some substances to pass through and preventing others from passing

173) Passive transport

Movement of substances into and out of a cell without using energy

- 174) Diffusion
The random movement of substances from an area of high concentration to an area of low concentration
- 175) Facilitated diffusion
Passive transport of molecules that are polar or relatively large that require a channel protein or a carrier protein
- 176) Channel proteins
A type of transport protein that provides a pore in the plasma membrane allowing specific substances in or out
- 177) Aquaporins
Channel proteins specific for water molecules
- 178) Carrier proteins
A type of transport protein that changes shape in the presence of a specific substance in such a way that the substance is shuttled across the membrane
- 179) Osmosis
The diffusion of water across the plasma membrane
- 180) Isotonic
A solution with the same concentration of solutes as the cell's fluid
- 181) Hypertonic
A solution with a higher concentration of solute than the cell's fluid
- 182) Hypotonic
A solution with a lower concentration of solute than the cell's fluid

12. How do impermeable substances get into and out of cells?

- 183) Ion channel
A channel protein that transports ions
- 184) Gated channel
A channel protein that opens up in response to a signal such as an electrical stimulus
- 185) Active transport
Transport of products that requires energy (ATP)
- 186) Voltage
A difference in charge (it measures electrical potential energy)
- 187) Membrane potential
The voltage across the plasma membrane (-50 to -200 millivolts (mV))
- 188) Cotransport
The movement of a substance against its concentration gradient via a transport protein that utilizes another substance going down its concentration gradient
- 189) Exocytosis
The active transport of cellular products out of the cell by formation of a vesicle that fuses with the plasma membrane
- 190) Endocytosis
The active transport of substances into the cell by the plasma membrane extending around the object forming a vesicle
- 191) Phagocytosis
Cell "eating" a vesicle forms around large particles, viruses, and bacteria
- 192) Ligand
A substance that binds to a receptor site of another substance
- 193) Receptor-mediated endocytosis
Endocytosis of specific substances that bind to receptors

- 194) Lysosomes
An organelle with powerful hydrolytic enzymes that digest food particles, bacteria, viruses, and worn out organelles

13. How do cells “talk” to each other?

- 195) Glycoprotein
Proteins with oligosaccharides attached (oligo- means few or short). They have many functions including cell recognition and cell-to-cell signaling.
- 196) Transmembrane protein
A protein that extends through the plasma membrane. They are involved in signal transduction and have other functions as well.
- 197) Signal transduction
Converting an external chemical message into an internal cellular action
- 198) G-protein
A protein that is associated with another membrane protein or loosely bound to the plasma membrane. They help convert external messages into a cellular response, by phosphorylating another molecule in a signal transduction pathway

14. How does the endomembrane system regulate protein and other cell product traffic?

- 199) mRNA
Ribonucleic acid that is a copy of a gene
- 200) Transcription
Converting the code of a gene into an mRNA molecule
- 201) Translation
Converting the code of an mRNA molecule into a protein
- 202) Endomembrane system
The nuclear envelope, endoplasmic reticulum, Golgi apparatus, lysosomes, various vesicles and vacuoles, and the plasma membrane. It synthesizes molecules and transports them, and detoxifies poisons.
- 203) Vesicle
A small membrane bound sac
- 204) Ribosomes
Organelles composed of rRNA and proteins. They synthesize proteins.
- 205) Endoplasmic reticulum
An organelle responsible for synthesizing the plasma membrane of the cell and synthesizing various other molecules
- 206) Golgi Apparatus
A series of unconnected flattened sacs resulting from the fusion of numerous vesicles from the endoplasmic reticulum. It modifies proteins, sorts products of the endoplasmic reticulum, and produces the lysosomes.

Be able to identify the following terms

- | | | |
|--------------------|----------------------------|----------------------|
| 207) Transcription | 209) Endoplasmic reticulum | 211) Golgi apparatus |
| 208) Translation | 210) Ribosome | 212) Vesical |

Unit 4 Skin and Body Membranes

Morphemes

213) cyto- cell	217) –blast Partially differentiated stem cell that usually only produces one type of cell	221) osteo- bone
214) –plasm Material forms cells or tissues	218) blasto- Budding or germination	222) pleuro- Side, or rib
215) –some body	219) adipo- Fat or fatty tissue	223) peri- around
216) pseudo- false	220) chondrio- cartilage	224) epi- On, over, or after
		225) eryth- red

15. Why doesn't my skin tear apart when someone pulls me from my forearm?

- 226) Tight junction
Stitch adjacent cells together forming water tight junctions
- 227) Desmosome
Rivet-like connections between adjacent cells that have fibrous proteins that extend through the cell connecting to fibrous proteins of others binding cells together giving tissues tension resistance
- 228) Gap junction
Composed of proteins that form a pore connecting the cytoplasm of adjacent cells. This allows adjacent cell to share nutrients and information

16. How are organs protected?

- 229) Cytoskeleton
Proteins within cells that resist tensional and compressive forces. They suspend organelles, reorganize to allow cells to change shape and move, and provide tracks for motor proteins to move vesicles, cilia, and flagella.
- 230) Actin
A cytoskeletal fibrous protein that resists compression and is one of the key fibers involved in muscle contraction
- 231) Microtubule
A cytoskeletal protein that resists tension and provides tracks to guide the delivery of vesicles
- 232) Motor protein
A protein that "walks" along microtubule tracks by changing from one shape back to another shape. This shape change from one to another is caused by the addition of ATP and then the hydrolysis of ATP.
- 233) Cilia
Tiny hair-like extensions of the plasma membrane involved in cell movement or moving substances by cells
- 234) Microvilli
Tiny extensions of the plasma membrane containing cytoplasm
- 235) Differentiation
A cell becoming more specialized
- 236) Stem cell
A cell that is not completely differentiated and capable of producing more identical cells that differentiate into a specific cell type
- 237) Basement membrane
A thin fibrous extracellular matrix that "glues" the epithelium to the connective tissue beneath

- 238) Simple squamous epithelia
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
- 239) Stratified squamous epithelia
Multiple layers of flat cells found on superficial layers of epidermis, lining of mouth, throat, esophagus, rectum, and vagina. They are specialized for protection.
- 240) Simple cuboidal epithelia
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.
- 241) Stratified cuboidal epithelia
Multiple layers of cube shaped cells found rarely lining some ducts of glands such as sweat glands. They are specialized for protection.
- 242) Simple columnar epithelia
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.
- 243) Stratified columnar epithelia
Multiple layers of column shaped cells found in parts of the pharynx, epiglottis, anus, mammary glands, salivary gland ducts, and urethra
- 244) Pseudostratified ciliated columnar epithelia
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.
- 245) Stratified transitional epithelia
Multiple layers of cells that transition from cuboidal to squamous found un urinary bladder, renal pelvis, and ureters. They are specialized for stretching.
- 246) Glandular epithelia
Epithelia with specialized cells for secretion
- 247) Gland
Collections of epithelial cells or cells derived from epithelial cells specialized for secretion. They can be single cells, tissues, or organs
- 248) Goblet cell
A modified simple columnar epithelial cell. They are single celled glands that secrete mucus and are found wherever mucus membranes are.
- 249) 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.
- 250) Collagen
The most abundant protein. It is a fibrous protein that is the main component of most connective tissues.
- 251) Fibroblast
Cells responsible for maintaining the extracellular matrix and producing the fibers and ground substance
- 252) Areolar connective tissue
It is the most common. It protects, and binds organs.
- 253) Adipose connective tissue
It insulates, cushions, protects, and stores energy
- 254) Reticular connective tissue
Common in lymph nodes, spleen, and bone marrow. It forms the internal framework of an organ
- 255) Dense regular connective tissue
Composed of parallel rows of mostly collagen fibers laid down by rows of fibroblasts. It forms tendons and ligaments.

- 256) 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.
- 257) Chondrocyte
A cell that has become embedded in the matrix of collagen that it produced
- 258) Lacuna
A cavity within cartilage or bone that houses chondrocytes or osteocytes
- 259) 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
- 260) Fibrocartilage
Has a high compression capacity. It forms the vertebral disks, pubic symphysis, menisci, and where tendons attach to bone
- 261) 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.

17. How are organs and organ systems organized?

- 262) 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.
- 263) Parietal
Attached to or relating to a body wall
- 264) Visceral
Relating to organs, especially abdominal organs
- 265) 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.
- 266) Pleural cavity (formed by the pleura)
The space within the serous membrane that contains the lungs
- 267) Pericardial cavity (formed by the pericardium)
The space within the serous membrane that contains the heart
- 268) Peritoneal Cavity (formed by the peritoneum)
The space within the serous membrane that contains the abdominal cavity
- 269) Mucus membranes
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.
- 270) 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.
- 271) Meninges
3 membranes composed of different tissue types that surround, protect, and nourish the brain and spinal cord

18. How do the structures of the integumentary system determine its function?

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

- 273) Dermis
Composed mostly of dense irregular connective tissue and houses many of the organs of the integumentary system
- 274) Keratin
A structural protein that protects the epidermal cells from damage
- 275) Keratinocyte
Compose 90% of epidermis and specialized for producing keratin
- 276) Stratum basale
The deepest layer of the epidermis. It produces all of the other layers of the epidermis and contains melanocytes and Merkel cells
- 277) 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
- 278) Melanocyte
A cell found mostly in the stratum basale that produces melanin
- 279) Epidermal dendritic cell
A type of white blood cell of the immune system that alerts other immune system components when a pathogen is present
- 280) Merkel cell
Mechanoreceptor cells (cells that respond to touch) that stimulate sensory neurons
- 281) Meissner's corpuscle
A neuron with a mechanosensitive end embedded in the superficial end of the dermis. It is responsible for sensing light touch.
- 282) 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.
- 283) 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.
- 284) Exocrine gland
A gland that secretes its product via a duct onto the surface of epithelial tissue
- 285) Sudoriferous gland
A sweat gland
- 286) 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.
- 287) 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. Their secretions enter hair follicles. These secretions and the bacteria that eat them give each person a unique smell.
- 288) Acclimation
Adjustments to changing environmental conditions by upregulating or down regulating genes. This occurs within an organism in days to weeks and does not change the genes of the individual.
- 289) Adaptation
Becoming better able to survive in a particular environment. It involves changes to genes in a population and occurs over thousands of generations. It is caused by evolution by natural selection.

- 290) Antibiotic
Something that kills bacteria
- 291) Microbe
A microscopic organism. Usually refers to pathogenic bacteria, protozoa, or fungi, but it also refers to other single-celled and multicellular organisms
- 292) Virus
A nonliving pathogenic particle. They are composed of DNA or RNA and a protein cover.
- 293) Vitamin D
A fat-soluble vitamin derived from cholesterol that requires UV radiation for its synthesis. It is essential for proper absorption of calcium

19. How does injury and cancer affect function and homeostasis of the integumentary system?

- 294) Hemoglobin
A protein with iron atoms that bind oxygen
- 295) Erythrocyte
A red blood cell. They are very small, short lived cells packed with hemoglobin, lacking a nucleus and most other organelles, and specialized for carrying oxygen
- 296) Capillary
The smallest blood vessels and lymph vessels composed of simple squamous epithelia. Specialized for allowing nutrient and waste exchange between cells and the circulatory system by diffusion and osmosis
- 297) Mast cell
One of the white blood cells that causes inflammation. It has an important role in allergic responses and, tissue repair, and fighting multicellular parasites
- 298) Histamine
A molecule produced by mast cells and basophil cells that causes inflammation by increasing the permeability of capillaries
- 299) Platelet
Cell fragments that are essential for blood clotting and tissue repair. They produce clotting factors and growth factors
- 300) Growth factors
Proteins that cause cells to replicate
- 301) Blood plasma
The extracellular matrix of blood. It's a liquid with dissolved proteins, electrolytes, glucose, hormones, and other substances
- 302) Cancer
Uncontrolled cell growth
- 303) Metastasis
Movement of cancerous cells from one part of the body to others
- 304) Mutation
A change in the nucleotide sequence of DNA

Be able to identify the following terms

- | | | |
|------------------------------------|------------------------------------|---|
| 305) Simple squamous epithelia | 308) Stratified cuboidal epithelia | 311) Pseudostratified columnar ciliated epithelia |
| 306) Stratified squamous epithelia | 309) Simple columnar epithelia | 312) Transitional epithelia |
| 307) Simple cuboidal epithelia | 310) Stratified columnar epithelia | 313) Goblet cell |

- | | | |
|--------------------------------------|--|---------------------------|
| 314) Areolar connective tissue | 318) Dense irregular connective tissue | 325) Stratum basale |
| 315) Adipose connective tissue | 319) Hyaline cartilage | 326) Stratum spinosum |
| 316) Reticular connective tissue | 320) Fibrocartilage | 327) Stratum granulosum |
| 317) Dense regular connective tissue | 321) Elastic cartilage | 328) Stratum corneum |
| | 322) Peritoneum | 329) Sebaceous gland |
| | 323) Pericardium | 330) Eccrine sweat gland |
| | 324) Pleura | 331) Apocrine sweat gland |

Unit 5 The Skeletal System

Morphemes

- | | | |
|-----------------------------------|-----------------------|----------------------|
| 332) –poiesis
production | 336) ossi-
bone | 340) dors-
back |
| 333) troch-
Wheel or round | 337) para-
around | 341) infra-
below |
| 334) –cle
Little one | 338) ab-
away, off | 342) sub-
below |
| 335) –oid
Resembling an object | 339) ad-
toward | |

20. What are the functions of the axial and appendicular skeleton systems?

- 343) Compact bone
Composed of packed, parallel osteons and found on the outsides of bone
- 344) Spongy bone
Composed of trabeculae and found on the insides of bone
- 345) Hematopoiesis
Blood cell formation
- 346) Ligament
Dense regular connective tissue that attaches bone to bone
- 347) Process
Any bony prominence
- 348) Trochanter
Very large, blunt, irregularly shaped process
- 349) Tuberosity
Large, rounded projections
- 350) Tubercle
Small, rounded projection or process
- 351) Epicondyle
Raised area above the condyle
- 352) Crest
Narrow prominent ridge of bone
- 353) Line
Narrow ridge of bone
- 354) Styloid process
Slender, pointed process
- 355) Facet
Smooth, nearly flat articular surface

- 356) Condyle
Rounded protuberance forming an articulation point with another bone
- 357) Ramus
Arm-like bar of bone
- 358) Fissure
Narrow, slit-like opening
- 359) Foramen
Round or oval opening
- 360) Meatus
Canal or tunnel-like passageway
- 361) Fossa
Shallow, basin-like depression
- 362) Sinus
Cavity within a bone filled with air and lined with a mucus membrane

21. How are compact and spongy bone similar and different?

- 363) Ossification
Bone formation
- 364) Diaphysis
The shaft of long bone
- 365) 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
- 366) Epiphysis
The ends of long bone (proximal and distal)
- 367) Articular cartilage
Hyaline cartilage of the epiphyses of long bone that reduces friction at the joints
- 368) Epiphyseal plate
A cartilaginous, immobile (synarthrotic) joint composed of hyaline cartilage. It is the point where long bone grows longer
- 369) Endosteum
The inner membrane of long bone composed of vascular and connective tissue. It produces osteoblasts and osteoclasts and has hematopoietic cells as well
- 370) Medulla
The cavity of long bone
- 371) Red marrow
Mostly hematopoietic tissue. Where red blood cells, platelets, and white blood cells are produced
- 372) Yellow marrow
Mostly adipose tissue
- 373) Osteon
The structural and functional unit of compact bone
- 374) Osteocyte
A bone cell in a lacuna embedded in a calcified, rigid matrix
- 375) Lamella
Concentric layers of osteocytes
- 376) Central canal
Also called Haversian canals. The central, longitudinal cavity of an osteon that contains blood vessels and nerves

- 377) Perforating canal
Also called Volkmann's canal. Canals running at right angles to the diaphysis that contain blood vessels and nerves
- 378) 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

22. How does bone form and how is bone formation regulated?

- 379) Endochondral ossification
Bones developing from cartilage models where a cartilage "bone" is gradually replaced by bone tissue
- 380) Intramembranous ossification
Flat bones such as the skull bones and scapula forming within the dermis
- 381) 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 has many functions. In general, it promotes growth, development, and other anabolic activities.
- 382) Testosterone
The hormone produced by the testes responsible for male secondary sexual characteristics, growth, and prevention of osteoporosis
- 383) Estrogen
The hormone produced by the ovaries responsible for female secondary sexual characteristics, female reproductive cycle, growth, and prevention of osteoporosis,
- 384) 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.
- 385) Calcitonin
A hormone of the thyroid gland that reduces blood calcium by inhibiting osteoclast activity, and inhibiting calcium and phosphate absorption by the kidneys.
- 386) Parathyroid hormone
This hormone causes an increase in blood calcium by increasing osteoclast activity, and increasing calcium and phosphate absorption by the kidneys.
- 387) Hematoma
A blood filled swelling (a bruise)

23. How does the skeleton move?

Be able to identify joint movements and joint types

- | | | |
|--|---------------------|-----------------|
| 388) Flexion | 394) Adduction | 400) Pronation |
| 389) Extension | 395) Dorsiflexion | 401) Opposition |
| 390) Hyperextension | 396) Plantarflexion | |
| 391) Rotation | 397) Inversion | |
| 392) Circumduction | 398) Eversion | |
| 393) Abduction | 399) Supination | |
| 402) Synarthrotic
A joint with no movement | | |
| 403) Amphiarthrotic
A joint with minimal movement | | |
| 404) Diarthrotic
A freely moveable joint | | |

- 405) Suture joint
Fibrous, synarthrotic joints of skull bones
- 406) Syndesmosis joint
Fibrous, amphiarthrotic joints
- 407) Gomphosis joint
Fibrous, synarthrotic joints of the teeth and facial bones
- 408) Synchronosis joint
Cartilaginous, synarthrotic joint composed of hyaline cartilage
- 409) Symphysis
Cartilaginous, amphiarthrotic joint
- 410) Plane
Synovial, diarthrotic flattened joints that allow bones to slide past each other
- 411) Hinge
Synovial, diarthrotic joints that allow movement in a single plane
- 412) Pivot
Synovial, diarthrotic joints that allow for rotation
- 413) Condylar
Synovial, diarthrotic joints with an oval surface articulating with a depression surface that allows for angular motion
- 414) Saddle
Synovial, diarthrotic joints with biconcave articulating surfaces that allows for circumduction
- 415) Ball-and-socket
Synovial, diarthrotic joints that allow for circumduction
- 416) Bursa
A fibrous sac with a synovial membrane that reduces friction at some synovial joints
- 417) Arthritis
Inflammation of the joints
- 418) Retinaculum
A band of connective tissue that stabilizes tendons

Be able to identify the following terms

24. What are the bones and landmarks of the skull?

- | | | |
|-------------------------------|---------------------------|-----------------------------------|
| 419) Frontal bone | 429) Superior nuchal line | 440) Zygomatic bones |
| 420) Frontal sinuses | 430) Sphenoid bone | 441) Lacrimal bones |
| 421) Parietal bones | 431) Sella turcica | 442) Mandible |
| 422) Temporal bones | 432) Pterygoid process | 443) Coronoid process of mandible |
| 423) External acoustic meatus | 433) Sphenoidal sinuses | 444) Condylar process of mandible |
| 424) Mastoid process | 434) Ethmoid bone | 445) Ramus of mandible |
| 425) Occipital bone | 435) Cribriform plate | 446) Hyoid bone |
| 426) Foramen magnum | 436) Ethmoidal sinuses | |
| 427) Occipital condyle | 437) Maxilla | |
| 428) Inferior nuchal line | 438) Maxillary sinuses | |
| | 439) Palatine processes | |

25. What are the bones and landmarks of the vertebral column and thoracic cage?

- | | | |
|-------------------------|------------------------|-------------------------|
| 447) Spinous process | 449) Vertebral foramen | 451) Cervical vertebrae |
| 448) Transverse process | 450) Facet | 452) Thoracic vertebrae |

- | | | |
|-----------------------|------------------------|----------------------|
| 453) Lumbar vertebrae | 456) Ligamentum nuchae | 459) Xiphoid process |
| 454) Sacrum | 457) Sternum | |
| 455) Coccyx | 458) Manubrium | |

26. What are the bones and land marks of the pectoral girdle, arm, and hand?

- | | | |
|-----------------------------------|------------------------------------|------------------------|
| 460) Clavicle | 470) Lateral epicondyle of humerus | 480) Trapezius |
| 461) Scapula | | 481) Trapezoid |
| 462) Glenoid cavity | 471) Ulna | 482) Capitate |
| 463) Coracoid process | 472) Olecranon | 483) Hamate |
| 464) Acromion | 473) Radius | 484) Metacarpals |
| 465) Scapular spine | 474) Radial styloid process | 485) Phalanges of hand |
| 466) Subscapular fossa | 475) Carpals | |
| 467) Infraspinous fossa | 476) Scaphoid | |
| 468) Humerus | 477) Lunate | |
| 469) Medial epicondyle of humerus | 478) Triquetrum | |
| | 479) Pisiform | |

27. What are the bones and land marks of the pelvic girdle, leg, and foot?

- | | | |
|-------------------------|------------------------|-----------------------------|
| 486) Coxa | 495) Patella | 504) Cuboid |
| 487) Ilium | 496) Tibia | 505) Lateral cuneiform |
| 488) Iliac crest | 497) Medial malleolus | 506) Intermediate cuneiform |
| 489) Ischium | 498) Fibula | 507) Medial cuneiform |
| 490) Pubis | 499) Lateral malleolus | 508) Metatarsals |
| 491) Acetabulum | 500) Tarsals | 509) Phalanges of the foot |
| 492) Femur | 501) Talus | |
| 493) Greater trochanter | 502) Calcaneus | |
| 494) Lesser trochanter | 503) Navicular | |

Unit 6 The Muscular System

Morphemes

- | | | |
|----------------------|--------------------------------------|----------------------------|
| 510) myo-
Muscle | 513) –tonos
tension | 516) trop-
turn, change |
| 511) mys-
Muscle | 514) auto-
self | |
| 512) sarco-
flesh | 515) syn-
united; acting together | |

28. How does the structure of muscle tissue relate to its function?

- 517) Sarcolemma
The plasma membrane of a muscle fiber
- 518) Muscle fiber
Muscle cell
- 519) Endomysium
Loose reticular connective tissue that fills the space around muscle fibers. It contains neurons, blood and lymph vessels
- 520) Fascicle
Many muscle fibers wrapped in perimysium

- 521) Perimysium
Connective tissue surrounding fascicles containing nerves and blood vessels
- 522) Epimysium
Dense irregular connective tissue surrounding many fascicles. It is continuous with the endomysium
- 523) Aponeurosis
A tendon that is a sheet of dense regular connective tissue. It connects muscle to bone or other muscles.
- 524) Tendon
Dense regular connective tissue that joins muscle to bone
- 525) Fascia
Dense irregular connective tissue that attaches, stabilizes, encloses, and separates muscles and other internal organs
- 526) Peristalsis
Involuntary wave-like contractions of layers of involuntary muscles lining cavities
- 527) 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
- 528) Intercalated disc
connect cardiac muscle fibers. Composed of three types of cell junctions: a special type of tight junction, desmosomes, and gap junctions

29. How does the structure of muscle cells relate to their function?

- 529) Myosin
A family of motor proteins that move along actin thin filaments by hydrolyzing ATP
- 530) Sarcomere
The contractile unit of a muscle fiber (cell)
- 531) H zone
The portion of the relaxed sarcomere with no actin. It contains the M line
- 532) M line
The middle of a sarcomere that has poorly understood proteins that stabilize myosin
- 533) A Band
The portion of the sarcomere that contain the H zone and actin filaments overlapping myosin filaments
- 534) I Band
The portion of the relaxed sarcomere that has actin 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.
- 535) Z disc
Hundreds of proteins forming a complex anchoring structure for actin and myosin

30. How does the nervous system control muscle contraction?

- 536) Neuron
A cell of the nervous system specialized for conducting action potentials
- 537) Action potential
The rapid depolarization and repolarization of a bit of cell membrane
- 538) Axon
The portion of a neuron that conducts action potentials away from the cell body and to another neuron, muscle, or gland
- 539) Neuromuscular junction
The point where an axon terminal forms a synapsis with the sarcolemma of a muscle fiber
- 540) Synapsis
The point where a neuron almost touches another neuron, muscle fiber, or gland

- 541) 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
- 542) Neurotransmitter
A chemical signal that propagates an action potential across the synaptic cleft
- 543) Synaptic cleft
The gap between 2 cells forming a synapsis
- 544) Acetylcholine
The neurotransmitter of neuromuscular junctions
- 545) Acetylcholinesterase
An enzyme that digests acetylcholine
- 546) Motor neuron
A neuron who's cell body is located in the spinal cord and its axon extends out to an effector organ (usually a muscle or gland)
- 547) Nerve
A bundle of axons in the peripheral nervous system

31. How does a muscle fiber contract?

- 548) Sarcoplasmic reticulum
An organelle of a muscle fiber specialized for secretion and absorption of calcium ions
- 549) Tropomyosin
A fibrous protein that spirals around actin filament in muscle. It covers actin binding sites for myosin
- 550) Troponin
A protein that changes shape when bound to calcium, which induces tropomyosin to roll away from actin binding sites

32. Where does the energy for cross bridge formation come from?

- 551) Anaerobic
Without oxygen
- 552) Aerobic
With oxygen
- 553) Substrate level phosphorylation
Generation of ATP by the transfer of a phosphate group from another molecule
- 554) Glycolysis
Splitting glucose into 2 pyruvate molecules and deriving 2 net ATP molecules via substrate level phosphorylation

33. How do muscles move bone?

- 555) Origin
Where a muscle starts from. It typically remains fixed during contraction.
- 556) Insertion
Where a muscle ends. It's the point that moves during contraction.
- 557) Fulcrum
The point where a lever pivots
- 558) Prime mover
A muscle who's action directly brings about the desired movement (also called the agonist)
- 559) Antagonist
A muscle who's action is opposite that of the prime mover. It's action helps to make movement smooth
- 560) Synergist
A muscle who's action assists the desired motion and neutralizes undesired motion at the joint

- 561) Isotonic contraction
The tension increases causing muscle length to change
- 562) Concentric contraction
An isotonic contraction where the force generated by the muscle exceeds that of the load causing the muscle to shorten
- 563) Eccentric contraction
An isotonic contraction where the force generated by the load exceeds that of the muscle causing the muscle to lengthen
- 564) Isometric contraction
The muscle length remains the same because the force generated by the muscle is equal to the force generated by the load
- 565) Twitch
A single, brief, jerky contraction of a muscle fiber
- 566) Tetanus
Complete, maximal tension of a muscle fiber

Be able to identify the following terms

34. What are the muscles of facial expression and mastication?

- | | | |
|-------------------------------|-------------------------------------|------------------------|
| 567) Buccinator | 571) Zygomaticus (major and minor) | 574) Platysma |
| 568) Orbicularis oris | 572) Orbicularis oculi | 575) Masseter |
| 569) Depressor anguli oris | 573) Epicranius (occipitofrontalis) | 576) Temporalis |
| 570) Levator labii superioris | | 577) Lateral pterygoid |
| | | 578) Medial pterygoid |

35. What are the muscles that move the head and pectoral girdle?

- | | | |
|--------------------------|-------------------------------|----------------|
| 579) Sternocleidomastoid | 582) Rhomboid major and minor | 585) Trapezius |
| 580) Levator scapulae | 583) Serratus anterior | |
| 581) Pectoralis minor | 584) Subclavius | |

36. What are the muscles that move the vertebral column?

- | | | |
|----------------------------|----------------------------|---|
| 586) Splenius capitis | 594) Iliocostalis thoracis | 601) Scalenes (anterior, medial, and posterior) |
| 587) Splenius cervicis | 595) Iliocostalis lumborum | 602) External oblique |
| 588) Spinalis cervicis | 596) Semispinalis capitis | 603) Internal oblique |
| 589) Spinalis thoracis | 597) Semispinalis cervicis | 604) Transversus abdominis |
| 590) Longissimus capitis | 598) Semispinalis thoracis | 605) Rectus abdominis |
| 591) Longissimus cervicis | 599) Multifidus | |
| 592) Longissimus thoracis | 600) Rotatores | |
| 593) Iliocostalis cervicis | | |

37. What are the muscles that move the arm and forearm?

- | | | |
|--------------------|-----------------------|----------------------|
| 606) Deltoid | 610) Teres major | 614) Triceps brachii |
| 607) Supraspinatus | 611) Coracobrachialis | 615) Biceps brachii |
| 608) Infraspinatus | 612) Pectoralis major | 616) Brachialis |
| 609) Teres minor | 613) Latissimus dorsi | 617) Brachioradialis |

618) Pronator quadratus 620) Supinator

619) Pronator teres

38. What are the muscles that move the hand and fingers?

621) Flexor carpi radialis

622) Flexor carpi ulnaris

623) Palmaris longus

624) Flexor digitorum
superficialis

625) Flexor digitorum
profundus

626) Flexor pollicis longus

627) Extensor carpi radialis
longus

628) Extensor carpi radialis
brevis

629) Extensor digitorum

630) Extensor pollicis longus

39. What are the muscles that move the thigh?

631) Gluteus maximus

632) Gluteus medius

633) Gluteus minimus

634) Tensor fasciae latae

635) Obturator internus

636) Obturator externus

637) Piriformis

638) Gemellus (superior and
inferior)

639) Quadratus femoris

640) Adductor brevis

641) Adductor magnus

642) Pectineus

643) Gracilis

644) Iliacus

645) Psoas major

40. What are the muscles that move the leg?

646) Biceps femoris

647) Semitendinosus

648) Semimembranosus

649) Sartorius

650) Popliteus

651) Rectus femoris

652) Vastus intermedius

653) Vastus lateralis

654) Vastus medialis

41. What are the muscles that move the foot?

655) Tibialis anterior

656) Fibularis tertius

657) Extensor digitorum
longus

658) Extensor hallucis
longus

659) Gastrocnemius

660) Fibularis longus

661) Fibularis brevis

662) Soleus

663) Tibialis posterior

664) Flexor digitorum longus

665) Flexor hallucis longus

Unit 7 The Nervous System

Morphemes

666) dendro-
Tree

667) astro-
Star

668) glia
Glue

669) base
Bottom

670) arachnoid
resembling a spider's
web

42. How do neurons "talk" to each other?

671) 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.

- 672) Electricity
the presence and flow of electric charge
- 673) Dendrite
The portion of a neuron that receives signals from other neurons
- 674) Myelin sheath
Fatty white substance that surrounds the axon of some nerve cells, forming an electrically insulating layer
- 675) Autoimmune disease
Inappropriate immune cell attacking of normal, healthy tissue
- 676) Ligand-gated ion channel
An channel protein that opens or closes in response to a neurotransmitter
- 677) Dopamine
A neurotransmitter necessary for fine motor movement, decision making, and reward
- 678) Limbic system
A collection of brain organs involved in emotion, motivation, memory, and olfaction

43. How does the brain handle complex and simple tasks?

- 679) Central nervous system
The brain and spinal cord. It is responsible for integrating and controlling all actions and physiological functions
- 680) Afferent neuron
A sensory neuron of the peripheral nervous system that brings sensory information to the central nervous system
- 681) Efferent neuron
A motor neuron of the peripheral nervous system. It brings information from the central nervous system to organs.
- 682) Interneuron
A neuron that transmits signals from one neuron to another
- 683) 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
- 684) Mechanosensitive channel
A membrane channel that opens in response to mechanical stress
- 685) Sensory cortex
The part of the cerebral cortex that processes information from sensory neurons
- 686) Motor cortex
The part of the cerebral cortex that controls and executes voluntary movements
- 687) 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

44. How does the structure of the central nervous system (CNS) fit its function?

- 688) Neuroglia
Cells that support, insulate, and protect neurons (also called glia cells)
- 689) 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
- 690) Microglia
Phagocytic cells that clear out debris and protect the CNS from bacteria and other pathogens

- 691) Ependymal
They line the cavities of the CNS and their cilia facilitate circulation of cerebrospinal fluid
- 692) Cerebrospinal fluid
Cushions the brain, makes the brain more buoyant, and facilitates the removal of wastes
- 693) Oligodendrocytes
Produce the myelin sheaths of neurons within the central nervous system
- 694) White matter
Myelinated nerve fibers of the central nervous system
- 695) Gray matter
Unmyelinated nerve fibers and cell bodies of the central nervous system
- 696) Gyrus
Ridge
- 697) Sulcus
Groove
- 698) Fissure
A deep groove
- 699) 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
- 700) Broca's area
People that suffer from strokes in this area know what they want to say, but cannot form intelligible speech
- 701) 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
- 702) Proprioception
The sense of where body parts are and the amount of effort being given to move
- 703) 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.
- 704) Wernicke's area
Generally in the left hemisphere, it is involved with understanding language
- 705) Occipital lobe
Contains the primary visual cortex and most of the visual processing centers of the brain
- 706) Corpus callosum
A huge neural track that connects the 2 hemispheres allowing the 2 hemispheres to "talk" to each other
- 707) Basal ganglia
A collection of brain organs of the cerebrum involved in regulating movement by integrating sensory inputs with movement
- 708) Hippocampus
Consolidates short term memory to long term memory and spatial memory needed for navigation
- 709) Thalamus
Relays sensory impulses to the cerebral cortex and impulses from the motor cortex to lower motor centers, and is involved in memory
- 710) Hypothalamus
Regulates body temperature, food intake, osmotic balance, and thirst (think homeostasis). Regulates the pituitary gland and produces the hormones oxytocin and antidiuretic hormone
- 711) Limbic system
Composed of several organs. Mediates emotional response and is involved in memory processing

- 712) Midbrain
Contains visual and auditory reflex centers and connects the pons with the diencephalon
- 713) Pons
Relays information from the cerebrum to the cerebellum and helps control respiration
- 714) Medulla oblongata
Relays sensory impulses from skin and proprioceptors and controls involuntary things like heart rate, respiration rate, and vomiting
- 715) Cerebellum
Integrates information from proprioceptors and visual pathways and communicates with cerebral motor cortex to maintain balance and posture
- 716) Dura mater
One of the meninges. The tough most superficial double membrane that connects to the skull.
- 717) Arachnoid mater
One of the meninges. Villi from it allow cerebrospinal fluid to enter the blood stream.
- 718) Pia mater
One of the meninges. It follows every fold of the cerebellum.

45. Why is nicotine so addictive?

- 719) Ganglion
A bundle of neuron cell bodies
- 720) 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
- 721) 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
- 722) 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)

Be able to identify the following terms

- | | | |
|------------------------|--------------------|------------------------|
| 723) Frontal lobe | 729) Basal ganglia | 735) Medulla oblongata |
| 724) Prefrontal cortex | 730) Hippocampus | 736) Cerebellum |
| 725) Parietal lobe | 731) Thalamus | |
| 726) Temporal lobe | 732) Hypothalamus | |
| 727) Occipital lobe | 733) Midbrain | |
| 728) Corpus callosum | 734) Pons | |

Unit 8 The Endocrine System

Morphemes

- 737) -ase
Often indicates a type of enzyme
- 738) Ante-
Before or in front of

- 739) Post-
After or behind
- 740) Anti-
Opposite, opposing, against, destroying

46. How does the endocrine system coordinate and direct cell activity?

- 741) Hormone
A chemical signal produced by endocrine organs that cause cellular change and therefore regulate physiological function
- 742) Peptide
This term typically refers to a short sequence of amino acids
- 743) Steroid hormone
A lipid hormone derived from cholesterol. There are 2 classes: 1) corticoids, and 2) sex hormones
- 744) Secondary messenger
A molecule within the cell that transfers a signal from a receptor protein to a target molecule
- 745) Adenylyl cyclase
A membrane protein activated by a G protein that converts ATP into cAMP, which is a secondary messenger
- 746) Cyclic adenosine monophosphate (cAMP)
It is a secondary messenger involved in many signal transduction pathways

47. Why do people pee a lot when they drink beer?

- 747) 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.
- 748) 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
- 749) Antidiuretic hormone
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)
- 750) Mole
 6.02×10^{23} particles of something (it's like a dozen, only it's a ridiculously large number)
- 751) Molarity
A measure of concentration. The number of moles of a solute per liter of solution.
- 752) Osmolarity
A measure of concentration. It accounts for the total number of solute particles in a solution.

48. Why do West Coast teams hate playing East Coast teams at 1pm (especially in the playoffs)?

- 753) Circadian rhythm
A biological process that shows an approximately 24-hour cycle
- 754) 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
- 755) Retina
The layer of cells at the back of the eye that has photosensitive cells

49. How does the structure of the adrenal cortex and adrenal medulla effect their role in the stress response?

756) 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.

757) Adrenal medulla

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

758) Nephron

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.

759) Glomerulus

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

760) 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

761) Aldosterone

A mineralcorticoid 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.

762) 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.

50. How does the fight or flight response provide evidence for common ancestry among mammals?

763) Epinephrine

Adrenaline. A hormone that produces the flight or fight response.

764) Norepinephrine

Noradrenaline. A neurotransmitter of the sympathetic nervous system and a hormone produced by the adrenal medulla that causes the fight of flight response.

51. How does type II diabetes affect blood glucose homeostasis?

765) Pancreas

It is 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 the 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.

766) Liver

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

767) Insulin

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

768) Glucagon

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

- 769) Type I diabetes
an autoimmune disease where the white blood cells attack and kill the beta cells of the pancreas
- 770) Type II diabetes
a disease where the cells become resistant to the hormone insulin

52. How is spermatogenesis controlled?

- 771) Testes
It produces both sperm and androgens, primarily testosterone
- 772) Epididymis
It is a highly coiled tube that connects a testicle to a vas deferens in the male reproductive system.
- 773) Seminiferous tubule
located within the testes, and are the specific location of meiosis, and the subsequent creation of male gametes
- 774) vas deferens
they transport sperm from the epididymis to the ejaculatory ducts
- 775) Leydig cells
Produce several androgens including testosterone in the presence of luteinizing hormone causing spermatogenesis
- 776) Sertoli cells
a "nurse" cell of the testicles that is part of a seminiferous tubule and helps in the process of spermatogenesis
- 777) GnRH (gonadotropin-releasing hormone)
A hormone released by the hypothalamus causing the anterior pituitary to release LH and FSH
- 778) 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.
- 779) 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.
- 780) Inhibin
A hormone produced by Sertoli cells of the testes that inhibits secretion of LH and FSH from the anterior pituitary gland

53. How does "the pill" prevent pregnancy?

- 781) 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
- 782) 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
- 783) 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)
- 784) Fallopian tube
A tube lined with ciliated epithelia leading from the ovaries to the uterus
- 785) 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

- 786) Estrogen
the primary female sex hormone. It is responsible for the development and regulation of the female reproductive system and secondary sex characteristics
- 787) Progesterone
A hormone involved in the menstrual cycle, pregnancy, and embryogenesis of humans and other species

Be able to identify the following terms

- | | | |
|--------------------------------|---------------------------------|-----------------|
| 788) Hormone (first messenger) | 793) cAMP (secondary messenger) | 799) Kidney |
| 789) Receptor protein | 794) Protein kinase | 800) Nephron |
| 790) G protein | 795) Cellular response | 801) Glomerulus |
| 791) Adenylyl cyclase | 796) Pituitary gland | 802) Pancreas |
| 792) ATP | 797) Pineal gland | 803) Liver |
| | 798) Adrenal gland | |

Unit 9 The Cardiovascular System

Morphemes

- | | |
|------------------|------------------------------|
| 804) Pulmon-lung | Sinus |
| 805) Sino | 806) -ule
Something small |

54. How does the structure of the heart contribute to its efficiency?

- 807) Superior vena cava
Delivers oxygen poor blood from the head, arms, and upper body to the right atrium
- 808) Inferior vena cava
Delivers oxygen poor blood from the lower body to the right atrium
- 809) Right atrium
Pumps oxygen poor blood from the superior and inferior venae cavae into the right ventricle through the tricuspid valve
- 810) Tricuspid valve
Prevents backflow of blood from the right ventricle to the right atrium
- 811) Right ventricle
Pumps oxygen poor blood from the right atrium through the pulmonary valve to the pulmonary arteries
- 812) Pulmonary valve
Prevents backflow of blood from the pulmonary arteries into right ventricle
- 813) Pulmonary arteries
Carry oxygen poor blood from the right ventricle to the lungs
- 814) Pulmonary veins
Carry oxygen rich blood from the lungs to the left atrium
- 815) Left atrium
Pumps oxygen rich blood from the pulmonary veins into the left ventricle through the mitral valve
- 816) Mitral valve
Prevents backflow of blood from the left ventricle into the left atrium
- 817) Left ventricle
Pumps oxygen rich blood from the left atrium to the aorta through the aortic valve
- 818) Aortic valve
Prevents backflow of blood from the aorta into the left ventricle

- 819) Aorta
Carries oxygen rich blood from the left ventricle to various other arteries
- 820) 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
- 821) 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

55. How do EKGs illustrate how a heart functions?

- 822) Sinoatrial node
The pacemaker of the heart. It generates an action potential that begins the cardiac cycle causing the atria to contract simultaneously.
- 823) Atrioventricular node
It slows the action potential generated by the sinoatrial node and then conducts the action potential to the ventricles via the interventricular septum
- 824) Interventricular septum
The muscular wall separating the left and right ventricles. It allows action potentials from the atrioventricular node to propagate to the apex of the heart without stimulating ventricular contraction.
- 825) Purkinje fibers
Nerves that conduct action potentials from the atrioventricular septum all over the ventricles causing simultaneous contraction of the ventricles
- 826) P wave
Caused by the depolarization of the atria
- 827) PR segment
Atrial contraction. The atrioventricular node slows the action potential generated by the sinoatrial node, which allows the atria to empty completely.
- 828) QRS wave
Caused by the depolarization of the ventricles. It masks the repolarization of the atria.
- 829) ST segment
Ventricular contraction
- 830) T wave
Caused by the repolarization of the ventricles

56. What causes blood pressure and how does it affect capillary exchange?

- 831) Artery
A blood vessel with thick walls muscular walls that conveys blood away from the heart
- 832) Systolic pressure
The maximum pressure on major arteries of the systemic circuit caused by ventricular contraction
- 833) Diastolic pressure
The minimum pressure on major arteries of the systemic circuit caused by ventricular relaxation
- 834) Vein
A blood vessel with thin muscular walls that conveys blood to the heart
- 835) Sphincter
a circular muscle that normally maintains constriction of a body passage or orifice and which relaxes as required by normal physiological functioning
- 836) Hydrostatic pressure
The pressure exerted by a fluid

- 837) 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.
- 838) 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.
- 839) Vasoconstriction
Narrowing the diameter of a blood vessel
- 840) Vasodilation
Increasing the diameter of a blood vessel

Be able to identify the following terms

- | | | |
|---|--|------------------------------|
| 841) Superior vena cava | 848) Pulmonary veins (carry oxygen rich blood) | 856) Interventricular septum |
| 842) Inferior vena cava | 849) Left atrium | 857) Purkinje fibers |
| 843) Right atrium | 850) Mitral valve | 858) P wave |
| 844) Tricuspid valve | 851) Left ventricle | 859) PR segment |
| 845) Right ventricle | 852) Aortic valve | 860) QRS wave |
| 846) Pulmonary valve | 853) Aorta | 861) ST segment |
| 847) Pulmonary arteries (carry oxygen poor blood) | 854) Sinoatrial node | 862) T wave |
| | 855) Atrioventricular node | |

Unit 10 The Lymphatic System

Morphemes

- | | | |
|----------------------------------|--|----------------------|
| 863) Pro-
Before | Motion or orientation towards or away from | Bodily fluids |
| 864) Karyo-
Nucleus or kernel | 866) Eu-
Easily formed | 868) Macro-
Large |
| 865) -taxis | 867) Humor- | |

57. How does the complexity of the human immune response compare to that of other types of organisms?

- 869) Prokaryote
A single-celled organism with no membrane bound organelles and a single, circular DNA molecule. All are also called bacteria.
- 870) Eukaryote
An organism composed of one or more cells that have membrane bound organelles and have multiple, linear DNA molecules organized into structures called chromosomes.
- 871) 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.)
- 872) PAMP
Pathogen associated molecular pattern. These are molecular patterns found in pathogens that are not found in the organism. They can be proteins, lipoproteins, glycoproteins, DNA, and RNA
- 873) PRR
Pattern recognition receptor. These are molecules that bind to PAMPs and trigger an immune response

874) DAMP

Damage associated molecular pattern. Any molecule that tells the organism that cells have been killed. They are often ATP and DNA, but they can be any molecule that typically is not found outside of the cell.

58. How is the human immune system structured?

875) Thymus

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

876) 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.

877) 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.

878) Adaptive immunity

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

879) Humoral immunity

Antibody production and all or the responses antibodies cause. For example, toxin neutralization and complement activation.

59. How does the innate immune system protect against pathogens?

880) Macrophage

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

881) Cytokine

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

882) Chemotaxis

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

883) Antigen

Anything that stimulates the immune system (usually a protein or a part of a protein from a pathogen)

884) 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.

60. How does the cell mediated immune system protect against pathogens?

885) 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.

886) 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).

887) 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

61. How does the humoral adaptive immune system protect against pathogens?

- 888) B cell
A lymphocyte that is produced and matures in the bone marrow. They differentiate into antibody producing cells.
- 889) Plasma cell
A B cell that has specialized to make one type of antibody
- 890) 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.

62. How do white blood cells know not to attack your own cells?

- 891) Apoptosis
Programmed cell death
- 892) Self-tolerance
Failure to mount an immune response to the antigens of your own body's cells
- 893) Immunologically competent cell
A lymphocyte that could participate in cell-mediated immunity, or produce functional antibodies
- 894) Autoimmune disease
A disorder caused by the immune system mistakenly attacks one of your own cell types

63. How do vaccines work?

- 895) Primary immune response
The first exposure to an antigen. The immune system has to learn what types of white blood cells and antibodies to make.
- 896) Secondary immune response
Additional exposures to an antigen. The immune system already has the necessary white blood cells and antibodies to fight the infection.

Be able to identify the following terms

- | | | |
|-----------------------|--|---------------|
| 897) Thymus | 902) B cell | 906) Antibody |
| 898) Spleen | 903) Plasma cell | |
| 899) Lymph node | 904) TCR (T cell receptor) | |
| 900) Helper T cell | 905) MHC molecule (major histocompatibility) | |
| 901) Cytotoxic T cell | | |

Unit 11 The Digestive System

Morphemes

- | | | |
|----------------------|---------------------------|----------------------|
| 907) Mesos
Middle | 908) Enteron
Intestine | 909) Hepat-
Liver |
|----------------------|---------------------------|----------------------|

64. How is the digestive system structured and controlled?

- 910) Alimentary canal
the whole passage along which food passes through the body from mouth to anus
- 911) Mucosa
The mucus membrane of the alimentary canal with many goblet cells. It is where nutrients are absorbed.
- 912) Submucosa

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

913) 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.

914) 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.

915) 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.

65. Why are humans prone to choking on their food?

916) Bolus

A roundish mass of food formed by chewing and the tongue

917) Salivary glands

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

918) Mucin

A glycoprotein that is the main component of mucus

919) Amylase

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

920) Amylose

A type of starch

921) Lysozyme

An enzyme that inhibits bacterial growth

922) 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.

923) Pharynx

The common passageway of food and air

924) Epiglottis

Elastic cartilage covered by a mucus membrane attached to the entrance of the larynx. It closes off the larynx during swallowing, preventing food and water from entering the trachea.

925) Esophagus

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

926) Larynx

The hollow muscular organ forming an air passage to the lungs and holding the vocal cords in humans and other mammals; the voice box.

927) Trachea

A large membranous tube reinforced by rings of cartilage, extending from the larynx to the bronchial tubes and conveying air to and from the lungs

66. How does the structure of the stomach fit its function?

928) Gastrin

Causes parietal cells to release HCl (hydrochloric acid).

929) Pepsinogen

An inactive protein digesting enzyme produced by chief cells of the stomach that becomes pepsin in acidic conditions

- 930) Pepsin
An enzyme produced by chief cells of the stomach that breaks down proteins into smaller peptides
- 931) Gastric juice
Digestive enzymes and HCl produced by gastric glands
- 932) Chyme
An acidic, thick mixture of food and gastric juice
- 933) Rugae
Folds in the lining of the stomach that allow it to expand when we eat
- 934) Lesser omentum
Mesentery that extends from the liver to the lesser curvature (medial side) of the stomach
- 935) Greater omentum
An apron of mesentery that extends from the greater curvature of the stomach (the lateral side) all along the anterior abdominal cavity. It is specialized for fat storage.

67. Where and how does the vast majority of digestion occur?

- 936) Oligosaccharide
A carbohydrate composed of a 3 to 10 monosaccharides
- 937) Protease
Enzymes such as trypsin, chymotrypsin, carboxypeptidase, and others that break down proteins into smaller peptides and amino acids
- 938) Lipase
An enzyme produced by the pancreas that breaks down lipids
- 939) Nuclease
An enzyme that breaks down nucleic acids
- 940) Secretin
A hormone produced by the duodenum that causes the liver to secrete bile and the pancreas to secrete bicarbonate into the duodenum
- 941) Cholecystokinin (CCK)
A hormone produced by the duodenum that causes the gall bladder to release bile and the pancreas to secrete digestive enzymes
- 942) Segmentation
Somewhat random contraction and relaxation of smooth muscle that results in mixing
- 943) Bile
A mixture of salts, cholesterol, and pigments (mostly bilirubin from red blood cell recycling) that emulsifies fats
- 944) 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.

68. How does the structure of the small intestine fit its function?

- 945) Plicae circulares
The folds in the walls of the small intestine
- 946) Villi
The finger-like projections or folds of the mucosa of the small intestine

69. How are nutrients absorbed?

- 947) 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.

948) Chylomicron

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

70. How does the structure of the large intestine fit its function?

949) Cellulose

A carbohydrate that is the main fibrous component of plant cell membranes. It is composed of extremely long chains of glucose.

Be able to identify the following terms

950) Salivary glands

951) Hard palate

952) Soft palate

953) Uvula

954) Pharynx

955) Epiglottis

956) Larynx

957) Trachea

958) Esophagus

959) Stomach

960) Lesser omentum

961) Greater omentum

962) Pancreas

963) Liver

964) Gall bladder

965) Duodenum

966) Jejunum

967) Ileum

968) Cecum

969) Appendix

970) Large intestine

971) Rectum