

Introductory Concepts

Multiple choice: Choose the single best answer

1. Anatomy deals with the
 - a. function of the body.
 - b. chemistry of the body.
 - c. structure of the body.
 - d. microbiology of the body.
2. Studying the names and locations of skeletal muscles would be an example of studying
 - a. biochemistry.
 - b. physiology.
 - c. anatomy.
 - d. neurology.
3. In the organizational scheme of the body, the smallest structures that are considered alive are the
 - a. atoms.
 - b. organelles.
 - c. organs.
 - d. cells.
4. Cells contain _____ that perform specific functions inside the cell.
 - a. molecules
 - b. organelles
 - c. tissues
 - d. organs
5. Which of the following lists is in the order of decreasing levels of complexity?
 - a. atoms → molecules → organelles → cells → tissues → organs
 - b. molecules → cells → organelles → organs → tissues
 - c. organ system → organs → tissues → cells → organelles
 - d. organs → tissues → organelles → cells → molecules
6. _____ are formed by a group of cells that perform a similar function.
 - a. Organelles
 - b. Organ Systems
 - c. Molecules
 - d. Tissues
7. A group of skin cells is an example of a(n)
 - a. organelle.
 - b. tissue.
 - c. organ.
 - d. cell.
8. Homeostasis is defined as the
 - a. ability to maintain a low body weight throughout life.
 - b. maintenance of a constant room temperature.
 - c. capability of the body to maintain a relatively constant internal environment.
 - d. digestion of food compounds as soon as they are eaten.
9. The heart is an example of a(n)
 - a. organelle.
 - b. tissue.
 - c. organ.
 - d. cell.
10. When the body shivers due to cold, the negative feedback mechanism will
 - a. increase the shivers when a normal body temperature is restored.
 - b. stop the shivers when a normal body temperature is restored.
 - c. turn off the temperature sensors when a normal body temperature is restored.
 - d. body temperature is not controlled by a negative feedback mechanism.
11. In a homeostatic mechanism, the _____ carries out the response necessary to restore homeostasis.
 - a. receptor.
 - b. control center.
 - c. effector.
 - d. sensory neuron.
12. Physiology deals with the
 - a. functions of the body.
 - b. chemistry of the body.
 - c. structures of the body.
 - d. microbiology of the body.
13. A ribosome is an example of a(n)
 - a. organelle.
 - b. tissue.
 - c. organ.
 - d. cell.

14. The increasing strength of uterine contractions during the birth of a child is an example of
- homeostasis.
 - positive feedback.
 - negative feedback.
 - life.
15. After eating, your blood glucose levels rise. The pancreas releases insulin which causes the cells to take in glucose and, as a result, your blood glucose levels drop. Based on a negative feedback mechanism, the pancreas would
- increase insulin secretion.
 - decrease insulin secretion.
 - add more glucose to the blood.
 - remove glucose from the blood.

Fill-in-the-blank: Complete the following statements. The answer may be a single word or a phrase.

- Physiology is the study of the _____ of a living organism.
- The level of insulin will rise after eating but will soon drop to normal levels when blood glucose levels return to normal. This is an example of _____.
- When the blood begins to clot, the chemical reactions involved in the process will continue until the clot is completed. This is an example of _____.
- The study of the structure of a living organism is _____.
- _____ is the relatively constant state maintained by the body.
- Blood vessels will dilate in an attempt to release body heat and they will constrict in an effort to retain body heat. This is done to try to maintain the correct body temperature. This is an example of _____.

Matching

Abdominopelvic regions

Match the following abdominopelvic regions with the correct description.

- | | |
|------------------|--------------|
| A. epigastric | D. iliac |
| B. hypochondriac | E. umbilical |
| C. hypogastric | F. lumbar |
- The _____ region in the center of the abdomen just below the diaphragm.
 - The _____ region is on either side of the hypogastric region.
 - The _____ region in the center of the abdominopelvic region at the level of the pelvis.
 - The _____ region is on either side of the umbilical region.
 - The _____ region is on either side of the epigastric region.
 - The _____ region in the center of the abdomen that surrounds the navel.

Directional terminology

Match the following terms with the correct description. More than one term may be a correct match.

- | | |
|-------------|----------------|
| A. superior | G. inferior |
| B. dorsal | H. superficial |
| C. distal | I. posterior |
| D. medial | J. deep |
| E. proximal | K. ventral |
| F. anterior | L. lateral |
- nearest to point of origin
 - towards head, upper, above
 - towards belly, anterior
 - farthest away from surface
 - towards midline
 - towards back, posterior
 - towards feet, lower, below
 - towards side
 - front, in front of
 - farthest from point of origin
 - near surface
 - back, in back of

Basic Chemistry

Multiple choice: Choose the single best answer

- Atoms of the same element that contain the same number of protons, but different numbers of neutrons are called
 - ions.
 - isomers.
 - isotopes.
 - bonds.
- A chemical bond formed by the sharing of electrons between two atoms is called a(n)
 - ionic bond.
 - hydrogen bond.
 - covalent bond.
 - none of the above.
- The electrons in the covalent bonds of water are not equally shared between oxygen and hydrogen. As a result, the water molecule has two distinct ends, each with a partial electrical charge. Because of this imbalance in charges, water is said to be
 - liquid.
 - solvent.
 - neutral.
 - polar.
- Hydrochloric acid is labeled an acid because it
 - is a proton donor
 - it has a pH below 7.0
 - it releases hydrogen ions.
 - all of the above are correct.
- As the pH of a solution increases the hydrogen ion concentration
 - increases.
 - decreases.
 - stays the same.
 - is unknown.
- The most important monosaccharide in the body is
 - fructose.
 - galactose.
 - glucose.
 - sucrose.
- Proteins are made up of a long chain of
 - glucose molecules.
 - fats.
 - nucleotides.
 - amino acids.
- Which of the following compounds would not be classified as a lipid?
 - triglyceride
 - steroid
 - cholesterol
 - polysaccharide
- _____ refers to all the chemical reactions that occur in the cells of the body.
 - Anabolism
 - Metabolism
 - Catabolism
 - ATP
- Adenosine triphosphate (ATP)
 - is a polysaccharide.
 - provides enzymes for metabolism.
 - is the form of energy that cells use.
 - has a double helical structure.
- The negatively charged small subatomic particles that move around the nucleus of an atom are the _____.
 - protons
 - neutrons
 - quarks
 - electrons
- _____ bonds hold together the sodium and chloride ions in table salt.
 - Hydrogen
 - Ionic
 - Polar covalent
 - Nonpolar covalent
- A solution with a pH of 7.4 is
 - acidic.
 - alkaline.
 - neutral.
 - normal.
- Glycogen is a storage form of sugar and is a _____.
 - monosaccharide
 - disaccharide
 - trisaccharide
 - polysaccharide

15. _____ is the molecule which contains the genetic information necessary to regulate cells.
- | | |
|--------------------------------|---------------------------------|
| a. Ribonucleic acid (RNA) | c. Protein |
| b. Deoxyribonucleic acid (DNA) | d. Adenosine triphosphate (ATP) |

Fill-in-the-Blanks: Complete the following statements. The answer may be a single word or a phrase.

- The functions of DNA are _____.
- When a protein denatures, it _____.
- Cholesterol is used to synthesize _____.
- Phospholipids are important in _____.
- Protein function is determined by _____.
- A saturated fatty acid _____.
- Peptide bonds are _____.
- Lipids are soluble in _____.
- The functions of RNA are _____.
- Three examples of polysaccharides are _____, _____, and _____.
- The building blocks of proteins are _____.
- Four groups of organic substances in cells are _____, _____, _____ and _____.
- Buffers are _____.
- Two major types of nucleic acids are _____ and _____.
- A hydrogen bond is _____.
- The part of a phospholipid molecule that is insoluble in water is _____.
- A(n) _____ bond is formed by atoms sharing electrons.
- An important example of a polar molecule is _____.
- The building blocks of nucleic acids are _____.
- An important steroid found in all body cells is _____.
- A covalent bond forms when _____.
- Three examples of lipids are _____, _____, and _____.
- Three examples of monosaccharides are _____, _____ and _____.
- Acids are _____.
- If an atom gains an electron, it becomes _____ charged.
- A(n) _____ bond forms between polar compounds.
- The part of a phospholipid molecule that is soluble in water is the _____.
- The pH scale is _____.
- Isotopes are _____.
- Several amino acids bonded together will produce a _____.
- Lipids are insoluble in _____.
- Bases are _____.
- An ionic bond forms when _____.
- If an atom loses an electron, it becomes _____ charged.
- Ions are _____.

Matching

Macromolecules

Match the following terms to the correct descriptions. Terms may be used more than once and some descriptions may match more than one term.

- | | | |
|------------------|----------------|--------------------|
| A. Amino acids | D. Fatty acids | G. Monosaccharides |
| B. Carbohydrates | E. Glycerol | H. Proteins |
| C. Lipids (fats) | F. Nucleotides | |

- _____ is/are building blocks of carbohydrates.
- _____ is/are building blocks of fat.

3. _____ is/are building blocks of protein.
4. _____ is/are building blocks of nucleic acids.
5. _____ are the most important fuel source for body cells.
6. _____ is/are not soluble in water.
7. _____ is/are used to insulate the body and are found in cell membranes.
8. Cholesterol is included in the group of macromolecules known as _____.
9. Hemoglobin and enzymes are included in the group of macromolecules known as _____.
10. _____ is/are soluble in water.

Chemical Terms

Match the correct term with the correct description.

- | | |
|---------------------------|----------------|
| A. hydrogen bond | G. substrate |
| B. covalent bond | H. product |
| C. ionic bond | I. active site |
| D. polar covalent bond | J. pH |
| E. nonpolar covalent bond | K. acid |
| F. enzyme | L. base |

1. an attraction that occurs between atoms that have opposite charges
2. a measurement of the hydrogen ion concentration of a solution
3. a connection that occurs due to the equal sharing of electrons between two atoms
4. a protein that works as a biological catalyst
5. an attraction that occurs between polar molecules
6. the compounds that are the result of an enzymatic reaction
7. a compound that can donate a hydrogen ion to a solution
8. the compound or molecule that binds to the active site of an enzyme
9. a connection that occurs due to the unequal sharing of electrons between two atoms
10. a compound that can bind or accept a hydrogen ion
11. a connections that occurs due to the sharing of electrons between two atoms
12. the area of an enzyme where the substrate attaches

True or False

1. An atom that gains more electrons than it has protons becomes a negatively charged ion called a cation.
2. In ionic bonds the electrons are shared between atoms.
3. An acid is defined as a molecule that can release protons (H^+) into a solution; and is therefore, a "proton donor."
4. Starch is a polysaccharide of glucose that is stored in plants.
5. Dehydration synthesis is the use of water to split larger compounds into smaller compounds (digestion).
6. Lipid molecules are characterized by being insoluble in nonpolar solvents, such as water.
7. Phospholipid molecules contain both polar and nonpolar sections, which contribute to the hydrophilic and hydrophobic properties, respectively, of these molecules.
8. Cholesterol is the precursor or raw material used by the body for the synthesis of steroid hormones such as testosterone, estrogen, progesterone, and hydrocortisone.
9. No other type of molecule in the body serves a wider variety of functions as those served by the proteins.
10. Fat is the body's primary energy source.

Cell Structure and Function

Multiple choice: Choose the single best answer

- Some substances can pass through the plasma membrane and some cannot. As a result, the membrane is called _____.
 - permeable
 - selectively permeable
 - impermeable
 - penetrable
- All of the following are components of the plasma membrane except
 - lipids.
 - proteins.
 - carbohydrates.
 - nucleic acids.
- Enzymes associated with protein synthesis would be found in the _____.
 - mitochondria
 - ribosomes
 - lysosomes
 - Golgi bodies
- Vesicles that can be transported out of the cell are produced by the _____.
 - ribosomes
 - smooth endoplasmic reticulum
 - Golgi apparatus
 - rough endoplasmic reticulum
- Cell structures that can move fluids and mucus over or along the surface of the cells are the _____.
 - cilia
 - flagella
 - microvilli
 - basal bodies
- Particles moving down a concentration gradient describes
 - active transport.
 - diffusion.
 - osmosis.
 - filtration.
- When cells are placed in a hypotonic solution, the cells will tend to
 - rupture.
 - increase in permeability.
 - shrink.
 - lose water.
- The process that produces cells with half the number of chromosomes as the original cell is
 - mitosis.
 - meiosis.
 - cytokinesis.
 - prophase
- The genetic material of the cell can be found in the _____.
 - rough endoplasmic reticulum
 - ribosomes
 - Golgi bodies
 - nucleus
- DNA in nondividing cells exists as
 - chromosomes.
 - chromatin.
 - nucleotides.
 - ribonucleic acid.
- The fluid mosaic model is a theory that describes the structure of the
 - microtubules.
 - chromosome.
 - plasma membrane.
 - gametes.
- The most abundant lipid molecules in the plasma membrane are the
 - glycolipids.
 - phospholipids
 - cholesterol.
 - triglycerides.
- The diffusion of _____ across a selectively permeable membrane is osmosis.
 - water
 - sugar
 - sodium
 - oxygen
- When red blood cells are placed in a hypertonic solution, the cells will
 - gain water and swell.
 - lose water and shrink.
 - neither gain nor lose water.
 - gain sodium and swell.
- The movement of oxygen from the air sacs of the lungs into the bloodstream is the result of
 - diffusion.
 - osmosis.
 - active transport.
 - facilitated diffusion.

16. The sodium-potassium pump
- actively moves potassium into the cells.
 - actively moves sodium into the cells.
 - passively moves potassium out of the cells.
 - passively moves sodium into the cells.
17. The Krebs' cycle
- takes place in the mitochondria.
 - requires the presence of oxygen.
 - does not use oxygen in its reactions.
 - all of the above are true.
18. The _____ is surrounded by a double membrane with cristae on the inner membrane.
- nucleus
 - mitochondrion
 - endoplasmic reticulum
 - Golgi apparatus
19. Muscle fibers require a large amount of ATP to function so they contain numerous _____.
- nuclei
 - glucose molecules
 - mitochondria
 - ribosomes
20. The information for the formation of a protein is copied from DNA to messenger RNA during _____.
- transcription
 - replication
 - translation
 - translocation
21. _____ is the ultimate form of energy produced during cellular respiration.
- Adenosine diphosphate (ADP)
 - Triglyceride
 - Creatine phosphate (CP)
 - Adenosine triphosphate (ATP)
22. Cellular respiration requires _____ to produce energy.
- carbohydrates
 - protein
 - glucose
 - glucose and oxygen
 - oxygen
23. Translation requires
- messenger RNA (mRNA)
 - ribosomal RNA (rRNA)
 - transfer RNA (tRNA)
 - all of the above
24. Enzymes are
- specific.
 - regulated.
 - proteins.
 - All of the above are true.
 - biological catalysts.
25. Factors that regulated enzyme function by binding to another site on the enzyme other than the active site are called _____,
- allosteric effectors
 - regulating effectors
 - antagonistic effectors
 - none of the above

Fill-in-the-Blanks: Complete the following statements. The answer may be a single word or a phrase.

- Under anaerobic conditions, pyruvate forms _____.
- Energy is _____.
- Each enzyme is _____, acting only on a particular molecule which is called its _____.
- Movement against a concentration gradient is _____.
- Mitochondria function to _____.
- The plasma membrane is mainly composed of _____.
- The plasma membrane is called selectively permeable because _____.
- If a cell is losing water to its environment, the environment must be _____.
- Channels in the plasma membrane are composed of _____.
- The cell organelle that is involved in making adenosine triphosphate is the _____.
- The Golgi apparatus functions to _____.
- The electron transport chain is located in _____.
- The products of cellular respiration are _____, _____ and _____.

14. If a cell is gaining water from its environment, the environment must be _____.
15. Lysosomes function to _____.
16. Vesicles are formed by _____.
17. All but 2 ATPs are formed in the cell by _____.
18. Oxygen acts as the _____ at the end of the electron transport chain.
19. The third phosphate of ATP is attached by a _____.
20. Active sites are _____.
21. In anabolism, larger molecules are _____.
22. Movement with or down a concentration gradient is _____.
23. The nucleus is enclosed by _____.
24. The nucleolus is the site of _____.
25. Aerobic reactions are different than anaerobic reactions in that _____.
26. Glycolysis is referred to as the _____ phase of respiration.
27. Without enough ATP, cells _____.
28. In catabolism, larger molecules are _____.
29. Facilitated diffusion requires a _____.
30. Substances diffuse _____ a concentration gradient.
31. Whether passive transport occurs by osmosis, simple diffusion or facilitated diffusion, it always involves a movement of particles from a region of _____ concentration to a region of _____ concentration.
32. Glycolysis occurs in _____.
33. The function of the endoplasmic reticulum is _____.
34. Control of substances entering and the leaving the cell is a major function of the _____.
35. If liquid is taken in through endocytosis, this process is called _____.
36. The _____ contains various kinds of enzymes capable of breaking down all of the main components of the cell.
37. Finger-like projections that can be found on cells in the small intestine and increase surface area are the _____.
38. _____ are cell connections where membrane channels of adjacent plasma membranes adhere to each other.
39. _____ means that the membrane only allows certain things to pass into or out of a cell.
40. Plasma membranes are composed of ___ layers of molecules called _____.
41. The model of the cell membrane is often described as being a _____.
42. _____ is the random movement of particles resulting in their movement from a region of greater concentration to one of lesser concentration.
43. Passive transport means that the cell does not have to use _____ to move these substances into or out of the cell.
44. If a cell must transport something from a region of lesser concentration to a region of greater concentration, the cell must use _____ to create this movement.
45. _____ is the process by which a cell uses the plasma membrane to surround and take in large particles.
46. The reverse of endocytosis by which cells rid themselves of wastes or expel useful substances needed elsewhere is _____.

True or False

1. White blood cells can help protect the body from invading microorganisms by the process of pinocytosis.
2. During aerobic respiration the oxygen we breathe in is converted into the carbon dioxide we breathe out.
3. Glycolysis requires the presence of oxygen to take place.
4. Oxygen is the final electron acceptor of the electron transport chain.
5. The number of mitochondria in a cell is not related to the amount of energy it needs.
6. Heart muscle cells are joined by gap junctions to facilitate the movement of electrical impulses.
7. The plasma membrane can be described as a double layer of phospholipid molecules.
8. For osmosis to occur, a selectively permeable membrane must be present.
9. Active transport processes that utilize pumps do not use cellular energy but rely on concentration gradients.

10. A selectively permeable membrane is needed for diffusion to occur.
11. Red blood cells placed in a hypertonic solution may be destroyed because the blood cells will lyse.
12. One of the advantages of active transport is that it can move materials against a concentration gradient.
13. The sodium-potassium pump is an example of a passive transport process.

Tissues

Multiple choice: Choose the single best answer

- The tissue that lines and covers the body is _____.
 - epithelial
 - connective
 - nervous
 - muscle
- The tissue that is thin enough to allow diffusion is _____.
 - simple cuboidal epithelium.
 - simple squamous epithelium.
 - areolar connective tissue.
 - hyaline cartilage.
- The epithelial tissue in the urinary bladder that allows it to stretch without tearing is _____.
 - stratified squamous
 - simple cuboidal
 - simple columnar
 - transitional
- The intercellular material surrounding connective tissue cells is _____.
 - ground substance.
 - matrix.
 - lamella.
 - stroma.
- Tissue that stores energy, acts as insulation, and protects some organs is _____ tissue.
 - muscle
 - nervous
 - adipose
 - bone
- Tissue that is avascular and as a result is slow to heal is _____.
 - bone.
 - cartilage.
 - epithelial.
 - adipose.
- The cell responsible to the formation of cartilage is the _____.
 - fibroblast.
 - chondroblast.
 - osteoblast.
 - megablast.
- Blood is classified as a(n) _____ tissue.
 - nervous
 - epithelial
 - muscle
 - connective
- Contractility is a property of _____ tissue.
 - muscle
 - nervous
 - epithelial
 - connective
- Conductivity is a property of _____ tissue.
 - muscle
 - nervous
 - epithelial
 - connective

Fill-in-the-Blanks: Complete the following statements. The answer may be a single word or a phrase.

- _____ muscle is involuntary and forms the walls of hollow organs.
- The basic cells of nervous tissue are _____.
- Epithelium formed from several layers of flattened cells is _____.
- The tissue that forms the cushions between the vertebrae in the spinal cord is _____.
- The three types of fiber produced by fibroblasts are _____, _____, and _____.
- Exocrine glands secrete their products into _____.
- Smooth muscle tissue is located _____.
- _____ muscle is involuntary striated tissue.
- Cartilage cells are called _____.
- Cartilage lacks _____.
- Three types of cartilage are _____, _____ and _____.
- The most common type of cartilage is _____.
- Adipose tissue functions to _____.
- Connective tissue functions to _____.
- Matrix refers to _____.
- Endocrine glands secrete their products into _____.

17. Epithelial tissue functions include _____.
18. Simple squamous epithelium consists of _____.
19. Cells that contract and relax are found in the _____ tissue.
20. Epithelium formed from a single layer of cells that are about as tall as they are wide is _____.
21. _____ muscle is voluntary striated tissue.
22. Hard connective tissue that has a mineralized matrix is _____.
23. The lining of the digestive, respiratory, and reproductive tracts is a _____ membrane.
24. The support cells of the nervous system are _____.

True or False

1. Epithelial tissue is moderately vascular, which results in very little blood loss when cuts occur.
2. Connective tissue is characterized by large amounts of intercellular matrix and few cells.
3. Bone-destroying cells are called osteoblasts.
4. Hyaline cartilage is the most prevalent type of cartilage.
5. Adipose tissue is a type of connective tissue.
6. Osteoblasts are specialized cells that build bone tissue.
7. Skeletal muscle tissue is striated and voluntary.
8. Basic characteristics of the nervous system are excitation and conduction.
9. Muscle tissue has a basement membrane.
10. Blood is epithelial tissue.

Skin

Multiple choice: Choose the single best answer

1. The layer of the epidermis that contains melanocytes is the
 - a. stratum basale.
 - b. stratum lucidum.
 - c. stratum spinosum.
 - d. stratum corneum.
 - e. stratum granulosum
2. Most body odor is the result of bacterial metabolism of the secretions produced by _____ glands.
 - a. apocrine sweat
 - b. ceruminous
 - c. merocrine sweat
 - d. sebaceous
 - e. eccrine sweat
3. The fibrous protein that is responsible for the strength and water resistance of the skin surface is
 - a. keratohyalin.
 - b. eleidin.
 - c. collagen.
 - d. elastin.
 - e. keratin.
4. The layer of the skin that provides protection against bacteria as well as chemical and mechanical injuries is the
 - a. epidermis.
 - b. dermis.
 - c. sebum layer.
 - d. subcutaneous layer.
5. When the body temperature rises above normal
 - a. blood flow to the skin decreases.
 - b. melanocyte activity increases
 - c. vasoconstriction occurs
 - d. blood flow to the skin increases.
 - e. sweat gland activity decreases.
6. The macrophages found in the epidermis are the
 - a. Squamous cells.
 - b. Merkel cells.
 - c. basal cells.
 - d. Langerhans cells.
 - e. melanocytes.
7. _____ glands discharge an oily secretion into hair follicles.
 - a. Apocrine sweat
 - b. Merocrine sweat
 - c. Mammary
 - d. Ceruminous
 - e. Sebaceous
8. Functions of the integumentary system include all of the following except
 - a. maintenance of body temperature.
 - b. synthesis of vitamin C.
 - c. excretion of salts and wastes.
 - d. protection of underlying tissue.
9. The _____ are the most abundant cells in the epidermis.
 - a. Langerhans cells
 - b. keratinocytes
 - c. melanocytes
 - d. adipocytes
 - e. Merkel cells
10. Contraction of the arrector pili muscles cause
 - a. "goose bumps".
 - b. sweat to be released from sweat glands.
 - c. hair to be shed.
 - d. the skin to change color.
11. The _____ contains the cells that undergoing mitosis.
 - a. stratum granulosum.
 - b. stratum corneum.
 - c. stratum spinosum.
 - d. stratum lucidum.
 - e. stratum basale

12. Protective functions of the skin include all of the following except protection
 - a. of the joints.
 - b. against infections.
 - c. against harmful chemicals.
 - d. against water loss.
13. Hair follicles and fingernails originate in the _____ but are actually derived from _____ tissue.
 - a. subcutaneous layer; connective
 - b. dermis; subcutaneous
 - c. dermis; epidermal
 - d. epidermis; dermal
14. Most of the body heat is produced by
 - a. the hypothalamus.
 - b. the blood vessels.
 - c. contraction of skeletal muscles.
 - d. contraction of cardiac muscle.
15. Usually a decrease in the amount of oxygen in the blood will result in _____ of the skin.
 - a. cyanosis
 - b. jaundice
 - c. paleness
 - d. flushing

Fill-in-the-Blanks: Complete the following statements. The answer may be a single word or a phrase.

1. When blood oxygen concentration is low, hemoglobin is _____ and the skin appears _____.
2. Ceruminous glands of the _____ secrete _____.
3. The primary type of cell found in the epidermis is the _____.
4. As dermal blood vessels dilate, blood flow to the skin _____, and _____ escapes to the _____.
5. Skin reddens because _____.
6. The skin participates in homeostasis of body temperature by _____ and _____.
7. Sebum is _____.
8. The most numerous sweat glands are _____.
9. Keratinization is _____.
10. Melanin provides _____ by absorbing _____.
11. The two distinct layers of skin are _____ and _____.
12. The outer layer of skin is called _____ and is composed of _____.
13. The deep layer of skin is called _____ and is composed of _____.
14. A reddish color to the skin as the result of vasodilation is _____.
15. The subcutaneous layer is beneath _____.
16. The finger-like projections from the dermis into the epidermis that are responsible for fingerprints are called _____.
17. The subcutaneous layer is contains _____.
18. The epidermis lacks _____.
19. The oil substance on skin is produced by _____.
20. The presence of excessive bilirubin in the blood causes _____.

True or False

1. The skin is able to synthesize vitamin D when exposure to sunlight.
2. Keratin is the skin pigment that protects it against ultraviolet light.
3. Both the epidermis and the dermis are continually shed and regenerated.
4. The epidermis contains sensory receptors.
5. The skin color is basically determined by the amount of melanin in the skin.
6. The sebaceous gland produces a waxy secretion in the external ear canal.
7. The most numerous and widespread sweat glands in the body are the apocrine sweat glands.
8. The blood vessels in the skin dilate when the body needs to conserve heat to maintain the body temperature.
9. Second-degree burns are less severe than first-degree burns and are not as painful.
10. The amount of blood flow through the skin can influence skin color.

Bone Structure & Function

Multiple choice: Choose the single best answer

1. Secondary ossification centers occur in the _____.
 - a. medullary cavity of the diaphysis.
 - b. dermis of the skin.
 - c. surface of the epiphyses.
 - d. outer surface of the diaphysis.
 - e. center of the epiphyses.
2. Which of the following statements are true?
 - a. When blood calcium levels are low, parathyroid hormone secretion increases.
 - b. When blood calcium levels are low, parathyroid hormone secretion decreases.
 - c. When blood calcium levels are low, calcitonin secretion increases.
 - d. When blood calcium levels are high, calcitonin hormone secretion decreases.
3. The narrow passageways that contain cytoplasmic extensions of osteocytes are
 - a. lacunae.
 - b. lamellae.
 - c. matrices.
 - d. marrow cavities.
 - e. canaliculi.
4. The medullary cavities of bones contain _____.
 - a. cartilages.
 - b. osteons.
 - c. osseous tissue.
 - d. periosteum.
 - e. bone marrow.
5. _____ produce the components of the bone matrix.
 - a. Osteoclasts
 - b. Osteocytes
 - c. Osteoblasts
 - d. Chondrocytes
6. The presence of an epiphyseal line indicates
 - a. that bone growth is just beginning.
 - b. nothing. The presence of an epiphyseal line does not indicate any particular event.
 - c. that the growth in bone diameter is just beginning.
 - d. the bone is fractured at that location.
 - e. that bone growth has ended.
7. _____ are large, multinucleated cells that can dissolve the bone matrix.
 - a. Osteoclasts
 - b. Chondrocytes
 - c. Osteocytes
 - d. Osteoblasts
8. The central canal or Haversian canal contains
 - a. osteocytes.
 - b. lacunae.
 - c. concentric lamellae.
 - d. blood vessels.
 - e. bone marrow.
9. All of the following bones were formed by intramembranous ossification except the
 - a. lower jaw.
 - b. scapula.
 - c. frontal bone.
 - d. clavicle.
 - e. both c and d.
10. Decreased levels of calcium ion in the blood stimulate the secretion of
 - a. testosterone.
 - b. thyroid hormone.
 - c. calcitonin.
 - d. parathyroid hormone.
 - e. growth hormone.
11. A lack of weight bearing exercise could
 - a. cause bones to store more calcium.
 - b. result in thin and brittle bones.
 - c. increase the length of a bone.
 - d. cause bones to become thicker.
 - e. have no effect on a bone.

12. The lining of the medullary cavity is the
 - a. perimysium.
 - b. perichondrium.
 - c. periosteum.
 - d. endosteum.
13. Calcium and phosphate absorption requires
 - a. vitamin D.
 - b. vitamin A.
 - c. vitamin C.
 - d. protein.
14. The functions of the skeletal system do not include
 - a. support .
 - b. strength.
 - c. mineral storage.
 - d. hematopoiesis.
15. The functional unit of compact bone is the
 - a. spongy (cancellous) bone.
 - b. osseous matrix.
 - c. Haversian system or osteon.
 - d. trabeculae.
16. Hematopoietic tissue is found in the _____ of the bone.
 - a. periosteum
 - b. bone marrow
 - c. endosteum
 - d. trabeculae
17. The most common salt in bone matrix is _____.
 - a. calcium
 - b. hydroxyapatite
 - c. phosphate
 - d. magnesium
18. The fibrous connective tissue that forms the outer covering of bone is the _____.
 - a. endosteum
 - b. epiosteum
 - c. periosteum
 - d. cortical layer
19. The surface of the epiphysis is composed of _____ and the interior is composed of _____.
 - a. compact bone; spongy (cancellous) bone
 - b. compact bone; hyaline cartilage
 - c. spongy (cancellous) bone; compact bone
 - d. hyaline cartilage; spongy (cancellous) bone
20. Articular cartilage covers the end of the
 - a. diaphysis.
 - b. epiphysis.
 - c. endosteum.
 - d. periosteum.
21. The diaphysis and the epiphysis in growing bone meet at the
 - a. endosteum.
 - b. periosteum.
 - c. medullary cavity.
 - d. epiphyseal plate.
22. Bones are flexible because of _____ in the matrix.
 - a. ligaments
 - b. hydroxyapatite
 - c. collagen fibers
 - d. elastic fibers

Fill-in-the-Blanks: Complete the following statements. The answer may be a single word or a phrase.

1. The medullary cavity is lined with a connective tissue membrane called the _____.
2. The diaphysis is composed of _____ bone.
3. Hematopoiesis is _____.
4. The body requires calcium for _____.
5. Cancellous bone consists of interconnecting spikes or plates of bone called _____.
6. The osteocytes are located within spaces called _____.
7. Osteogenesis is _____.
8. Bones form by replacing _____ or _____.
9. Cellular processes of osteocytes pass through the _____.
10. The extracellular matrix of bone is composed of _____ and _____.
11. Osteocytes function to _____.
12. Each central canal contains _____.
13. Articular cartilage is located _____.
14. The function of osteoblasts is _____.

15. Bone remodeling involves the removal of old bone by _____ and the deposition of new bone by _____.
16. Endochondral bones originate in _____.
17. The epiphyses are mainly composed of _____ bone.
18. The functions of bone include _____, _____, _____, and _____.
19. The tough fibrous connective tissue that covers bone is the _____.
20. When bone growth stops, the _____ is replaced by bone.
21. The primary ossification center forms in the _____.
22. The main purpose of the epiphyseal plate is _____.
23. The two types of bone are _____ and _____.
24. Bones are the major reservoir for _____.
25. In adults, the medullary cavity of the diaphysis contains _____.

True or False

1. Bone tissue consists mostly of cells, dispersed in a limited amount of matrix.
2. The hardness of bone is related to its two major mineral components, calcium and iron.
3. Haversian systems or osteons are found only in compact bone.
4. Osteoclasts are nondividing osteoblasts that have become surrounded by matrix and lie within lacunae.
5. Most of the skeleton in an embryo is cartilage.
6. Primary ossification centers arise in the epiphyses of long bones.
7. The presence of an epiphyseal plate on an X-ray of a person's shoulder area indicates that growth has probably stopped.
8. Weight bearing exercise can actually cause an increase in the mass and strength of bone.

Matching:

Bone Structures

Match the following bone structures with the correct description.

- | | |
|------------------------------|---------------|
| A. lacunae | D. trabeculae |
| B. Haversian (central) canal | E. lamellae |
| C. canaliculi | |
1. little canals that allow communication between bone cells
 2. concentric rings around the Haversian (central) canal of compact bone
 3. cavities where osteocytes are found
 4. contains blood vessels in living bone
 5. spicules or spikes of cancellous (spongy) bone

Cartilage

Match the following types of cartilage with the correct description. Answers may be used more than once.

- | |
|----------------------|
| A. hyaline cartilage |
| B. elastic cartilage |
| C. fibrocartilage |
1. makes up the intervertebral disks
 2. gives form to the external ear
 3. covers the articular surfaces of bones
 4. the strongest form of cartilage
 5. the most abundant type of cartilage
 6. forms the epiglottis

Muscle Tissue Structure & Function

Multiple choice: Choose the single best answer

1. The sarcoplasmic reticulum stores
 - a. myoglobin.
 - b. glycogen.
 - c. adenosine triphosphate.
 - d. calcium ions.
 - e. creatine phosphate.
2. Myosin can bind to the active sites on actin when
 - a. myosin binds to tropomyosin.
 - b. calcium binds to tropomyosin.
 - c. calcium binds to troponin.
 - d. creatine binds to troponin.
 - e. actin binds to troponin.
3. All of the following are true of skeletal muscles except
 - a. skeletal muscles are responsible for posture.
 - b. skeletal muscles are responsible for the heart contractions.
 - c. the contractions of skeletal muscles pull on the bones of the skeleton and result in movement.
 - d. skeletal muscle contractions help maintain body temperature.
4. Acetylcholine is contained in vesicles in the _____.
 - a. synaptic knob
 - b. neuromuscular junction
 - c. transverse tubules
 - d. sarcoplasmic reticulum
5. When transverse tubules carry the action potential into the muscle fiber the sarcoplasmic reticulum releases
 - a. acetylcholine.
 - b. calcium.
 - c. creatine.
 - d. ATP.
 - e. glycogen.
6. Functions of the skeletal muscle include
 - a. maintaining body temperature.
 - b. producing movement.
 - c. maintaining posture.
 - d. all of the above.
7. The plasma membrane of the skeletal muscle is also known as the _____.
 - a. sarcolemma
 - b. sarcomere
 - c. sarcoplasm
 - d. sarcoma
8. When muscle fibers are at rest the tropomyosin molecule is held in place by _____.
 - a. creatine phosphate
 - b. actin
 - c. troponin
 - d. calcium
 - e. glycogen
9. When myosin heads attach to the active sites on actin all of the following occur except
 - a. actin is pulled towards the center of the sarcomere
 - b. actin is pushed away from the center of the sarcomere
 - c. the sarcomere contracts
 - d. ATP is used
10. A muscle fiber must be stimulated by a neuron at the
 - a. neuromuscular junction.
 - b. sarcomere.
 - c. synaptic knob.
 - d. dendrite.
 - e. tendon.
11. The space between the neuron and the muscle is the
 - a. synaptic cleft.
 - b. motor end plate.
 - c. synaptic knob.
 - d. motor unit.
12. The connective tissue that attaches a skeletal muscle to a bone is the _____.
 - a. tendon
 - b. ligament
 - c. myofilament
 - d. epimysium
 - e. fascicle

13. Muscles contain creatine phosphate which acts as a(n)
- neurotransmitter.
 - glycogen replacement.
 - oxygen source.
 - energy reserve to replenish ATP.
 - energy source for contractions.
14. Standing and holding a shopping bag full of groceries down at your side would cause _____ contractions in your arm muscles.
- tetanic
 - isometric
 - treppic
 - isotonic
 - concentric
15. Myoglobin
- produces an action potential.
 - is a protein involved in the production of ATP.
 - binds oxygen in muscle fibers.
 - binds glycogen in muscle fibers.
16. Oxygen debt occurs when there is not enough oxygen to complete the breakdown of pyruvate. As a result, the muscle fibers convert pyruvate into
- glycogen.
 - lactic acid.
 - glucose.
 - acetyl CoA.
17. When insufficient oxygen is available to completely breakdown glucose by cellular respiration muscle fibers must use anaerobic _____ to produce 2 ATP molecules for each glucose molecule.
- hydrolysis.
 - oxidative phosphorylation.
 - citric acid cycle.
 - glycolysis.
18. Muscle tone refers to a
- well conditioned muscle.
 - sustained partial contraction.
 - state of maximum contraction.
 - well defined muscle
19. The sliding filament theory refers to
- myosin sliding across the top of actin molecules.
 - nervous system stimulation of muscle contraction.
 - actin sliding across the top of myosin molecules.
 - calcium allows tropomyosin to slide across actin.
20. If a sarcomere was stretched so the thick and thin myofilaments no longer overlap
- maximal muscle contraction can occur.
 - no muscle contraction can occur.
 - the muscle will contract but not at a maximum.
 - calcium could not bind to tropomyosin.

Fill-in-the-Blanks: Complete the following statements. The answer may be a single word or a phrase.

- An insertion of a muscle is _____.
- An isometric contraction is _____.
- The function of creatine phosphate is _____.
- Typically a muscle stores glucose in the form of _____.
- Synaptic vesicles in the neuron store _____.
- Thin myofilaments are composed of _____.
- A myosin cross-bridge attaches to actin in order to _____.
- _____ is the neurotransmitter that motor neurons use to control skeletal muscle.
- The sarcoplasmic reticulum has a high concentration of _____.
- Prior to a muscle contraction calcium ions bind to _____.
- According to the sliding filament model, when _____ the sarcomere shortens.
- Actin has a binding site to which _____ can attach.
- A neuromuscular junction is _____.

14. A synaptic cleft separates _____.
15. A muscle cell is also known as a _____.
16. Thick myofilaments are composed of _____.
17. Myoglobin stores _____ in muscle tissue.
18. An extension of connective tissue beyond the muscle that attaches it to the bone is the _____.
19. Under anaerobic conditions, glycolysis breaks down glucose into _____ and converts it to _____.
20. The origin of a muscle is _____.
21. An isotonic contraction is _____.
22. The purpose of transverse tubules is _____.
23. The movement of the tropomyosin molecule exposes _____, allowing _____.
24. The plasma membrane of the muscle cell is the _____.
25. A maximal sustained muscle contraction is called _____.

True or False

1. When a muscle contracts, the bone that does not move is the bone of insertion.
2. Tendons are continuous with the layer of connective tissue called the epimysium.
3. Maintenance of posture is related to muscle tone.
4. Myofibrils contain several sarcomeres lined up end to end.
5. A muscle fiber is the same thing as a muscle.
6. The cross-bridges or heads that participate in muscle contractions are found on the myosin molecule.
7. Muscle contractions are explained by the sliding filament theory.
8. Muscle fibers use creatine phosphate instead of ATP for energy.
9. Hemoglobin stores oxygen in the muscle fiber.
10. When a muscle is at rest, troponin covers the active sites on the actin molecules.
11. Myosin filaments interact with tropomyosin filaments during muscle contraction.
12. The thin myofilament contains myosin, tropomyosin and troponin, while the thick myofilament contains actin.
13. Damage to the sarcolemma after death results in rigor mortis.

Events of the Muscle Cell Contraction

Number the following statements in the proper sequence to describe the contraction mechanism in a skeletal muscle cell.

- _____ Calcium binds to troponin.
- _____ Acetylcholine is released into the neuromuscular junction by the synaptic knob.
- _____ The sarcoplasmic reticulum to release calcium ions.
- _____ Myosin heads interacts with actin molecules.
- _____ The muscle fiber relaxes and lengthens.
- _____ Acetylcholine diffuses across the neuromuscular junction.

- _____ The calcium ion concentration at the myofilaments increases.
- _____ Acetylcholine binds to receptors on the sarcolemma.
- _____ Depolarization occurs and an action potential is generated.
- _____ Calcium is actively reabsorbed into the sarcoplasmic reticulum.
- _____ The T-tubules carry the impulse deep into the cell.
- _____ The sarcomere shortens causing the muscle fiber to shorten.