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| **1** | **Instructor’s Resource Material for**  **Organization of the Body** |

ANSWER KEYS

Answers to Quick Check Questions

1. Science develops new principles by using detailed observations and vigorous tests, or experiments, to analyze each idea or hypothesis until a reasonable conclusion can be made. As more testing is done, eliminating outside influences or biases and ensuring consistent results, scientists begin to have more confidence in the principle and then call it a *theory* or *law.*
2. *Anatomy* is the study of the structure of an organism and the relationships of its parts. *Physiology* is the scientific study of the body functions of the living organism and its parts.
3. Physiology can be divided into (1) the type of organism involved, (2) the organizational level studied, and (3) a specific, or systemic, function being studied.
4. The study of the body that focuses on groups of organs that have a common function is called *systemic anatomy*.
5. An *eponym* is a term that is based on a person’s name.
6. Autopoiesis defines life; organisms are self-organizing or self-maintaining, and nonliving structures are not.
7. *Metabolism* is the sum of all physical and chemical reactions in the body. Each characteristic of life is related to these reactions.
8. The seven levels of organization are chemical, organelle, cellular, tissue, organ, system, and organism.
9. Answers may include any of the following: mitochondria, Golgi apparatus, nucleus, ribosome, endoplasmic reticulum, vacuole, and lysosome.
10. The four major tissue types are epithelial, connective, muscular, and nerve.
11. The 11 major organ systems are integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive.
12. In the *anatomical position,* the body is in an erect, or standing, posture with the arms at the sides and palms turned forward. The head and feet are also pointing forward. This position is a reference position that gives meaning to the directional terms used to describe the body parts and regions.
13. The two major subdivisions of the body as a whole are axial and appendicular.
14. The two major body cavities and their subdivisions are (1) *ventral cavity* (thoracic and abdominopelvic cavities) and (2) *dorsal cavity* (cranial and spinal cavities).
15. The nine abdominopelvic regions are right hypochondriac, epigastric, left hypochondriac, right lumbar, umbilical, left lumbar, right iliac, hypogastric, and left iliac. The four abdominal quadrants are right upper, left upper, right lower, and left lower.
16. *Superior* is toward the head or upper or above; *inferior:* toward the feet or lower or below; *anterior* is front or “in front of;” *posterior* is back or “in back of;” *medial* is toward the midline of the body; *lateral* is toward the side of the body; *dorsal* is toward the back; and *ventral* is toward the belly.
17. Anatomical left is opposite of your left as you face the structure.
18. The rosette is used as a compass similar to those used on geographical maps. Rather than being labeled, N, S, E, and W, the anatomical rosette is labeled with abbreviated anatomical directions.
19. The three major planes used to divide the body into parts are the sagittal, coronal (frontal), and transverse planes. A sagittal plane is any lengthwise plane running from front to back and top to bottom, dividing the body or any of its parts into right and left sides. A coronal (or frontal) plane is any lengthwise plane running from side to side and top to bottom, dividing the body or any of its parts into anterior and posterior portions. A transverse plane is any crosswise plan that divides the body or any of its parts into upper and lower parts.
20. “Complementarity of structure and function” refers to the fact that anatomical structures seem “designed” (size, shape, form, or placement) to efficiently perform specific functions.
21. DNA “directs” the differentiation of specialized cells during development so that they can effectively contribute to a specific function. For example, in the lungs, the cilia, which cover the exposed surface of cells that form the tissues lining the respiratory passageways, help trap and eliminate inhaled contaminants.

Answers to Case Study Questions (p. 19)

1. **b:** The abdominopelvic cavity can be divided into quarters, or quadrants. Health care professionals commonly refer to these quadrants as a standard way to describe the location of pain or an injury on a patient.
2. **c:** The liver is a large organ that fills the majority of the right upper quadrant. A stab wound to this area will most likely affect the liver.
3. **c:** Proximal means closer to the trunk. So, the part of the lower extremity proximal to the knee would be the thigh region, also referred to as the *femoral region.* If the contusion is “just proximal” to the knee, it is just above the knee.
4. **c:** The proximal part of the upper extremity is referred to as the *brachial region*—the arm, which is where the humerus bone is located. (You’ll also find the brachial nerve and the brachial artery in this area.)

Answers to Review Questions (p. 22)

1. *Anatomy* is the study of the body’s structure and the relationship of its parts. *Physiology* is the study of functions of the living organism and its parts.
2. *Chemical level*: Atoms, molecules, and macromolecules that make up the body. The text uses cytoplasm as an example of the chemical level.

*Organelle level*: Collections of molecules organized in such a way that they can perform an individual function. Mitochondria, Golgi apparatus, endoplasmic reticulum, or any other organelles are examples.

*Cellular level*: Cells are the smallest units that possess and exhibit the basic characteristics of living matter. Each cell is surrounded by a membrane and contains a single nucleus surrounded by cytoplasm. The cytoplasm contains numerous organelles. Muscle, bone, nerve, or any other cells are examples.

*Tissue level*: An organization of many similar cells specialized to perform a certain function. Epithelial, muscle, connective, and nervous tissues are examples.

*Organ level*: An organization of several different tissues arranged so that together they can perform a specialized function. Lung, heart, brain, or any other organs are examples.

*System level*: Varying numbers and kinds of organs arranged so that together they can perform complex functions for the body. Integumentary, skeletal, muscular, or any other organ systems are examples.

*Organism level*: An integrated assemblage of interactive structures able to survive and flourish. Human beings or any other organisms are examples.

1. *Integumentary system*: The primary function is protection. Other functions include regulating body temperature, synthesizing chemicals, and acting as a sense organ.

*Skeletal system*: The primary function is to support the body. Other functions include protection, allowance for movement, mineral storage, and blood cell formation.

*Muscular system*: The primary function is movement of the body. Muscles also generate heat for the body.

*Nervous system*: The primary functions are communication, integration, and control of body functions.

*Endocrine system*: The primary functions are also communication, integration, and control of body functions but in a slower, longer-lasting form than the nervous system provides.

*Cardiovascular system*: The primary function is the transport of substances to various parts of the body.

*Lymphatic/immune system*: The primary function of the lymphatic system is the movement of tissue fluid and large molecules back to general circulation. The primary function of the immune system is conferring protection and resistance to disease.

*Respiratory system*: The primary function is the exchange of oxygen for carbon dioxide.

*Digestive system*: The primary function is the digestion of food, absorption of food, and elimination of undigested residue.

*Urinary system*: The primary function is to clean the blood of waste products. Other functions are to maintain the electrolyte, water, and acid-base balance of the body.

*Reproductive system*: The primary function is to ensure the survival of the genetic code and the species.

1. *Anatomical position* is a position in which the body is standing erect with arms at the side, palms forward, and the head and feet pointing forward. This is the reference position that gives meaning to the directional terms used to describe the body parts and regions.
2. *Bilateral symmetry* means that the right and left sides of the body are mirror images of each other, and only one plane can divide the body into left and right sides. *Ipsilateral* refers to a body part on the same side of the body. *Contralateral* refers to a body part on the opposite side of the body.
3. *Somatotype* is used to describe a particular category of body build or physique. The three major somatotype categories are endomorph, mesomorph, and ectomorph. Endomorphs are more round shaped, mesomorphs are more muscular, and ectomorphs are more lean and linear.
4. *Anterior:* The front or in front of

*Distal:* Away from or farthest from the trunk or point of origin of a body part

*Sagittal plane:* A lengthwise plane running from front to back, dividing the body into right and left sides

*Medial:* Toward the midline of the body

*Dorsal:* Toward the back

*Coronal plane:* A lengthwise plane running from side to side, dividing the body into anterior and posterior sections

*Organ:* Several different kinds of tissues arranged so that together they can perform a special function

*Parietal peritoneum:* The membrane lining the inside of the abdominal cavity

*Superior:* Toward the head or above

*Tissue:* A group of similar cells specialized to perform a certain function

1. The mediastinum is located in the midpoint of the thoracic cavity between the right and left pleural cavities.
2. The principle of complementarity of structure and function states that each structure has a particular size, shape, form, or placement in the body that makes it especially efficient at performing a unique, specialized activity.

Answers to Critical Thinking Questions (p. 22)

1. Digestion is the process by which complex food particles are broken down into simpler substances. Through the circulatory system, these substances (nutrients) are transported from one body part to another. Growth occurs as a result of these nutrients increasing the size or number of cells.
2. An endomorph with a waist-to-hip ratio of 1:2 would be predisposed to heart disease, stroke, high blood pressure, and diabetes.
3. The abdominopelvic regions included in the x-ray would be right iliac, right lumbar, right hypochondriac, epigastric, left hypochondriac, and umbilical region. The more correct answer would include all nine regions.
4. From the largest to the smallest, the urinary bladder can be placed in the following cavities: ventral cavity, abdominopelvic cavity, and pelvic cavity.