**Chapter 1:**

* 1. *Introduction 1.*

1. Briefly describe the early development of knowledge about the human body. (p. 2)

*1.2 Anatomy and Physiology*

2. Distinguish between anatomy and physiology. (p. 3)

3. Explain the relationship between the form and function of body parts. (p. 3)

*1.3 Levels of Organization*

4. List the levels of organization within the human body and describe the characteristics of each. (p. 3)

*1.4 Characteristics of Life*

5. List and describe ten characteristics of life. (p. 4)

6. Define metabolism and give examples. (p. 4)

*1.5 Maintenance of Life*

7. List and describe five requirements of organisms. (p. 5)

8. Define homeostasis, and explain its importance. (p. 5)

9. Describe a general physiological control system. (p. 6)

10. Explain the control of body temperature. (p. 7) 11. Describe a homeostatic mechanism that helps regulate blood pressure. (p. 7)

*1.6 Organization of the Human Body*

12. Explain the difference between the axial and appendicular portions of the body. (p. 8)

13. Identify the cavities within the axial portion of the body. (p. 8)

14. Define viscera. (p. 8)

15. Describe the mediastinum and its contents. (p. 8)

16. List the cavities of the head and the contents of each cavity. (p. 8)

17. Name the body cavity that houses each of the following organs: (p. 8)

a. Stomach b. Heart c. Brain d. Liver e. Trachea f. Rectum g. Spinal cord h. Esophagus i. Spleen j. Urinary bladder

18. Distinguish between a parietal and a visceral membrane. (p. 10)

19. Name the major organ systems, and describe the general functions of each. (p. 12)

20. List the major organs that compose each organ system. (p. 12)

*1.7 Anatomical Terminology*

21. Write complete sentences using each of the following terms to correctly describe the relative locations of specific body parts: (p. 14)

a. Superior b. Inferior c. Anterior d. Posterior e. Medial f. Lateral g. Proximal h. Distal i. Superficial j. Peripheral k. Deep

22. Sketch the outline of a human body, and use lines to indicate each of the following sections: (p. 15)

a. Sagittal b. Transverse c. Coronal

23. Sketch the abdominal area, and indicate the locations of the following regions: (p. 16)

a. Epigastric b. Umbilical c. Hypogastric d. Hypochondriac e. Lumbar f. Iliac a. Acromial b. Antebrachial c. Axillary d. Buccal e. Celiac f. Coxal g. Crural h. Femoral i. Genital j. Gluteal k. Inguinal l. Mental m. Occipital n. Orbital o. Otic p. Palmar q. Pectoral r. Pedal s. Plantar t. Popliteal u. Sacral v. Tarsal w. Umbilical x. Vertebral

**Chapter 2:**

*2.1 Introduction*

1. Define chemistry. (p. 31)

*2.2 Structure of Matter*

2. Define matter. (p. 31)

3. Explain the relationship between elements and atoms. (p. 31)

4. List the four most abundant elements in the human body. (p. 31)

5. Describe the parts of an atom and where they are found within the atom. (p. 32)

6. Explain why a complete atom is electrically neutral. (p. 32)

7. Define atomic number, atomic weight, and isotope. (p. 32)

8. Explain how electrons are distributed within the electron shells of an atom. (p. 33)

9. An ionic bond forms when (p. 35)

a. atoms share electrons.

b. positively-charged and negatively-charged parts of polar covalent molecules attract. c. ions with opposite electrical charges attract.

d. two atoms exchange protons.

e. an element has two types of isotopes.

10. Explain the relationship between molecules and compounds. (p. 36)

11. Show the difference between a molecular formula and a structural formula. (p. 37)

12. The formula C6H12O6 means. (p. 37)

13. Three major types of chemical reactions are \_\_\_\_\_\_ ,\_\_\_\_\_\_\_\_\_ , and \_\_\_\_\_\_\_\_\_\_\_. (p. 37)

14. Explain what a reversible reaction is. (p. 38)

15. Define catalyst. (p. 38)

16. Define acid and base. (p. 38)

17. Explain what pH measures, and describe the pH scale. (p. 39)

18. Define buffer. (p. 39)

*2.3 Chemical Constituents of Cells*

19. Distinguish between electrolytes and nonelectrolytes. (p. 39)

20. Distinguish between inorganic and organic substances. (p. 39)

21. Describe the roles water and oxygen play in the human body. (p. 40)

22. List several ions in body fluids. (p. 40)

23. Describe the general characteristics of carbohydrates. (p. 41)

24. Distinguish between simple sugars and complex carbohydrates. (p. 41)

25. Describe the general characteristics of lipids, and list the three main kinds of lipids. (p. 41)

26. A triglyceride molecule consists of (p. 41)

a cholesterol and 3 fatty acids.

b. 3 monosaccharides.

c. 3 amino acids.

d. 3 glycerols and 1 fatty acid.

e. 3 fatty acids and 1 glycerol.

27. Explain the difference between saturated and unsaturated fats. (p. 42)

28. A hydrophilic molecule dissolves in (p. 42)

29. List at least three functions of proteins. (p. 43)

30. Describe four levels of protein structure. (p. 44)

31. Explain how protein molecules may denature. (p. 44)

32. Describe the structure of nucleic acids. (p. 46)

33. Explain the major functions of nucleic acids. (p. 46)

**Chapter 3**

1. An adult human body consists of about cells. (p. 51)

a. 2 billion

b. 50 billion

c. 75 trillion

d. 8 quadrillion

2. Define cell. (p. 51)

3. Discuss how cells differ from one another. (p. 51)

*3.2 Composite Cell*

4. The three major parts of a cell are . (p. 52)

a. the nucleus, the nucleolus, and the nuclear envelope

b. the nucleus, cytoplasm, and the cell membrane

c. a nerve cell, an epithelial cell, and a muscle cell

d. endoplasmic reticulum, Golgi apparatus, and ribosomes

e. cytoplasm, organelles, and chromatin

5. Explain the general function of organelles. (p. 53)

6. Define selectively permeable. (p. 53)

7. Describe the structure of a cell membrane and explain how this structural organization provides the membrane’s function. (p. 53)

8. List three functions of membrane proteins. (p. 54)

9. Match the following structures with their definitions

A. Sacs that contain enzymes that catalyze a variety of specific biochemical reactions

B. Structures on which protein synthesis occurs

C. Structures that house the reactions that release energy from nutrients

D. A network of microfilaments and microtubules that supports and shapes a cell

E. A structure that modifies, packages, and exports glycoproteins

F. Membrane-bounded sacs

G. A network of membranous channels and sacs where lipids and proteins are synthesized

H. Hair-like structures that extend from certain cell surfaces and wave about

(1) Golgi apparatus

(2) mitochondria

(3) peroxisomes

(4) cilia

(5) endoplasmic reticulum

(6) cytoskeleton

(7) vesicles

(8) ribosomes

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12. Match the transport mechanisms on the left with their descriptions on the right. (pp. 61–66)

A. The cell membrane engulfs a particle or substance, drawing it into the cell in a vesicle

B. Movement down the concentration gradient with a carrier protein, without energy input

C. Movement down the concentration gradient without a carrier protein or energy input

D. A particle or substance leaves a cell in a vesicle that merges with the cell membrane

E. Movement against the concentration gradient with energy input

F. Hydrostatic pressure forces substances through membranes

(1) diffusion

(2) facilitated diffusion

(3) filtration

(4) active transport

(5) endocytosis

(6) exocytosis

13. Define osmosis. (p. 63)

14. Distinguish between hypertonic, hypotonic, and isotonic solutions. (p. 63)

15. Explain how phagocytosis differs from receptor-mediated endocytosis. (p. 65)

*3.4 The Cell Cycle*

16. Explain why it is important for the cell cycle to be highly regulated. (p. 67)

17. Distinguish between interphase and mitosis. (p. 67)

18. The period of the cell cycle when DNA replicates is\_\_\_\_\_\_\_. (p. 68)

a. G1 phase

b. G2 phase

c. S phase

d. prophase

e. telophase

19. Explain how meiosis differs from mitosis. (p. 68)

20. \_\_\_\_\_\_\_\_\_\_\_occur simultaneously. (p. 68)

a. G1 phase and G2 phase

b. Interphase and mitosis

c. Cytokinesis and telophase

d. Prophase and metaphase

e. Meiosis and mitotic metaphase

21. Describe the events of mitosis in sequence. (p. 68)

22. Define differentiation. (p. 70)

23. A stem cell \_\_\_\_\_\_\_\_ . (p. 70)

a. undergoes apoptosis

b. self-renews

c. is differentiated

d. gives rise to only fully differentiated daughter cells

e. forms from a progenitor cell

24. Describe the steps of apoptosis. (p. 72)

**Chapter 4:**

*4.1 Introduction*

1. Explain the relationship between genes and cellular metabolism. (p. 77)

2. Explain why enzymes are important in the body. (p. 77)

*4.2 Metabolic Reactions*

3. Distinguish between catabolism and anabolism. (p. 77)

4. Distinguish between dehydration synthesis and hydrolysis. (p. 77)

*4.3 Control of Metabolic Reactions*

5. Describe how an enzyme interacts with its substrate. (p. 79)

6. Define active site. (p. 79)

7. The process of changing the shape of an enzyme to the point where it loses function is called\_\_\_\_\_\_\_ . (p. 80)

8. Define cofactor. (p. 80)

*4.4 Energy for Metabolic Reactions*

9. Explain how the oxidation of molecules inside cells differs from the burning of substances outside cells. (p. 80)

10. Explain the importance of ATP, and the relationship of ATP to ADP. (p. 80)

11. Distinguish between anaerobic and aerobic phases of cellular respiration. (p. 82)

12. Match the parts of cellular respiration on the left to the associated activities on the right. (p. 82)

A. Glucose molecules are broken down into pyruvic acid

B. Carrier molecules and enzymes extract energy and store it as ATP, releasing water and heat

C. Pyruvic acid molecules enter mitochondria, where CO2 and high-energy electrons are released

(1) electron transport chain

(2) glycolysis

(3) citric acid cycle

13. Identify the final acceptor of the electrons released in the reactions of cellular respiration. (p. 82)

*4.5 Metabolic Pathways*

14. Define metabolic pathway. (p. 82)

15. Explain how one enzyme can control the rate of a metabolic pathway. (p. 82)

16. Identify the cellular respiration pathway where glucose, fats, and proteins commonly enter. (p. 82)

*4.6 DNA (Deoxyribonucleic Acid)*

17. Identify the part of a DNA molecule that encodes information. (p. 84) 18. Distinguish between a gene and a genome. (p. 84)

18. Distinguish between a gene and a genome. (p. 84)

19. DNA information provides instructions for the cell to\_\_\_\_\_\_. (p. 84)

a. manufacture carbohydrate molecules

b. extract energy

c. manufacture RNA from amino acids

d. synthesize protein molecules.

20. Explain why DNA replication is essential. (p. 84)

21. Describe the events of DNA replication. (p. 84)

*4.7 Protein Synthesis*

22. If a strand of DNA has the sequence A T G C G A T C C G C then the sequence of an mRNA molecule transcribed from it is\_\_\_\_\_\_\_ . (p. 86)

23. Distinguish between transcription and translation. (p. 86)

24. Describe the function of a ribosome in protein synthesis. (p. 87)

25. Calculate the number of amino acids that a DNA sequence of 27 nucleotides encodes. (p. 87)

26. Define gene expression. (p. 88)

**Chapter 5:**

1. Which of the following is a major tissue type in the body? (p. 95)

a. epithelial

b. nervous

c. muscle

d. connective

e. all of the above

2. Indicate where each major type of tissue can be found in the body. (p. 95)

*5.2 Epithelial Tissues*

3. A general characteristic of epithelial tissues is that\_\_\_\_\_\_\_ . (p. 95)

a. numerous blood vessels are present

b. cells are spaced apart

c. cells readily divide

d. there is much extracellular matrix between cells

4. Explain how the structure of epithelial tissues provides for the functions of epithelial tissues. (p. 95)

5. Match the epithelial tissue on the left to an organ in which the tissue is found. (pp. 96–101)

(1) simple squamous epithelium

(2) simple cuboidal epithelium

(3) simple columnar epithelium

(4) pseudostratified columnar epithelium

(5) stratified squamous epithelium

(6) stratified cuboidal epithelium

(7) stratified columnar epithelium

(8) transitional epithelium

(9) glandular epithelium

A. lining of intestines

B. lining of ducts of mammary glands

C. lining of urinary bladder

D. salivary glands

E. air sacs of lungs

F. respiratory passages

G. ductus deferens

H. lining of kidney tubules

I. outer layer of skin

6. Distinguish between exocrine and endocrine glands. (p. 101)

7. A gland that secretes substances out of cells by exocytosis is a(n) . (p. 101)

a. merocrine gland

b. apocrine gland

c. holocrine gland

8. Define extracellular matrix. (p. 102)

9. Describe three major types of connective tissue cells. (p. 102)

10. Distinguish between collagen and elastin. (p. 104)

11. Compare and contrast the different types of loose connective tissue. (p. 105)

12. Define dense connective tissue. (p. 106)

13. Explain why injured dense connective tissue and cartilage are usually slow to heal. (p. 106)

14. Name the types of cartilages and describe their differences and similarities. (p. 106)

15. Describe how bone cells are organized in bone tissue. (p. 108)

16. The fluid extracellular matrix of blood is called\_\_\_\_\_\_\_ . (p. 109)

a. white blood cells

b. red blood cells

c. platelets

d. plasma

e. bone marrow

*5.4 Types of Membranes*

17. Identify the locations of four types of membranes in the body and indicate the types of tissues making up each membrane. (p. 110)

*5.5 Muscle Tissues*

18. Compare and contrast skeletal, smooth, and cardiac muscle tissues. (p. 110)

*5.6 Nervous Tissues*

19. Distinguish between neurons and neuroglial cells with respect to their functions. (p. 111)