

*Essentials of Human Anatomy and Physiology, 11e, (Marieb)*  
**Chapter 3 Cells and Tissues**

3.1 Multiple Choice Part I Questions

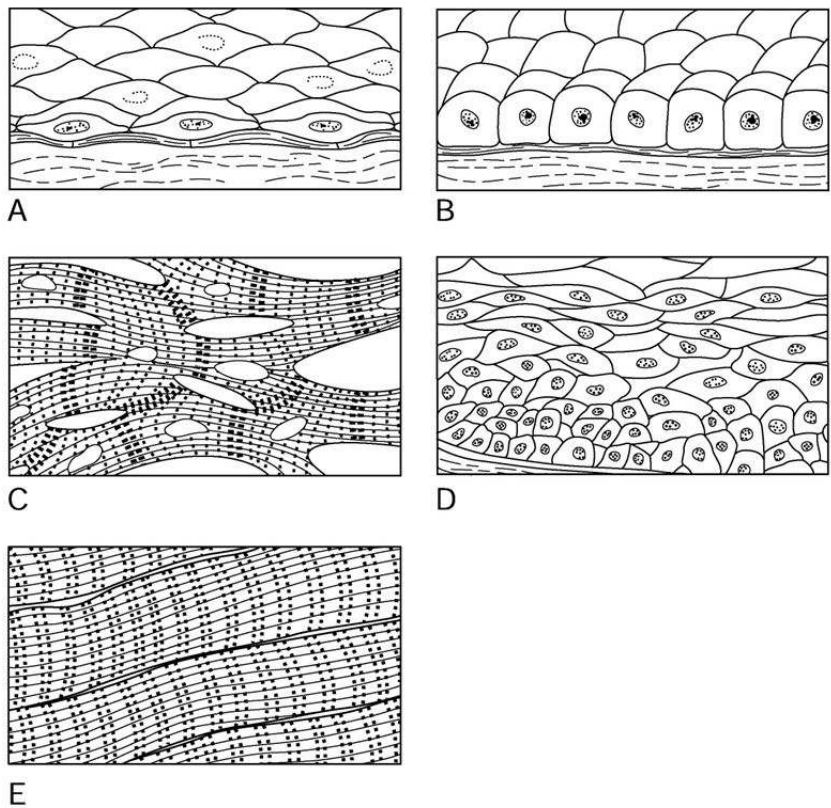


Figure 3.1

Using Figure 3.1, match the following:

1) The illustration of simple cuboidal epithelium is \_\_\_\_\_.

- A) Label A
- B) Label B
- C) Label C
- D) Label D
- E) Label E

Answer: B

Page Ref: 113-114

Bloom's: 1) Knowledge

2) The illustration of skeletal muscle tissue is \_\_\_\_\_.

- A) Label A
- B) Label B
- C) Label C
- D) Label D
- E) Label E

Answer: E

Page Ref: 121-122

Bloom's: 1) Knowledge

3) The illustration of stratified squamous epithelium is \_\_\_\_\_.

- A) Label A
- B) Label B
- C) Label C
- D) Label D
- E) Label E

Answer: D

Page Ref: 115

Bloom's: 1) Knowledge

4) The illustration of simple squamous epithelium is \_\_\_\_\_.

- A) Label A
- B) Label B
- C) Label C
- D) Label D
- E) Label E

Answer: A

Page Ref: 114

Bloom's: 1) Knowledge

5) The illustration of cardiac muscle tissue is \_\_\_\_\_.

- A) Label A
- B) Label B
- C) Label C
- D) Label D
- E) Label E

Answer: C

Page Ref: 122

Bloom's: 1) Knowledge

6) Cellular material located outside the nucleus yet inside the plasma membrane is the \_\_\_\_\_.

- A) nucleolus
- B) cytoplasm
- C) interstitial fluid
- D) extracellular fluid

Answer: B

Page Ref: 88, 90-115

Bloom's: 1) Knowledge

7) The specialized cellular compartments within the cytosol of the cell are collectively called \_\_\_\_\_.

- A) organelles
- B) cilia
- C) flagella
- D) microvilli

Answer: A

Page Ref: 91

Bloom's: 1) Knowledge

8) \_\_\_\_\_, a type of cell junction, anchor adjacent cells together and prevent cells from being pulled apart.

- A) Tight junctions
- B) Gap junctions
- C) Desmosomes
- D) Cytoplasm

Answer: C

Page Ref: 90

Bloom's: 1) Knowledge

9) The phospholipid tails are \_\_\_\_\_, which make the plasma membrane impermeable to water.

- A) water-loving
- B) hydrophilic
- C) polar
- D) hydrophobic

Answer: D

Page Ref: 89

Bloom's: 1) Knowledge

10) The organelle responsible for making the majority of ATP in a cell is the \_\_\_\_\_.

- A) Golgi apparatus
- B) mitochondrion
- C) rough endoplasmic reticulum
- D) lysosome

Answer: B

Page Ref: 91

Bloom's: 1) Knowledge

11) The membrane connections that prevent the leaking of fluid between cells are called \_\_\_\_\_.

- A) gap junctions
- B) tight junctions
- C) desmosomes
- D) microvilli

Answer: B

Page Ref: 90

Bloom's: 1) Knowledge

12) The \_\_\_\_\_ is a network of proteins that forms an internal framework for the cell.

- A) mitochondrion
- B) cytoskeleton
- C) rough endoplasmic reticulum
- D) Golgi apparatus

Answer: B

Page Ref: 94

Bloom's: 1) Knowledge

13) The passive process that involves the movement of water through aquaporins is \_\_\_\_\_.

- A) facilitated diffusion
- B) endocytosis
- C) solute pumping
- D) osmosis

Answer: D

Page Ref: 101

Bloom's: 1) Knowledge

14) The nucleoplasm and cytosol make up the \_\_\_\_\_ fluid.

- A) interstitial
- B) intracellular
- C) extracellular
- D) nuclear

Answer: B

Page Ref: 100

Bloom's: 1) Knowledge

15) The movement of substances through the cell membrane against their concentration gradient is a type of \_\_\_\_\_ process.

- A) active
- B) passive
- C) diffusion
- D) filtration

Answer: A

Page Ref: 102

Bloom's: 1) Knowledge

16) The nucleotides of DNA join in a complementary way in which adenine pairs with \_\_\_\_\_ while cytosine pairs with \_\_\_\_\_.

- A) adenine; cytosine
- B) uracil; guanine
- C) thymine; guanine
- D) guanine; thymine

Answer: C

Page Ref: 106

Bloom's: 1) Knowledge

17) In cell division, the term that refers to division of the cytoplasm is \_\_\_\_\_.

- A) mitosis
- B) interphase
- C) cytokinesis
- D) meiosis

Answer: C

Page Ref: 106

Bloom's: 1) Knowledge

18) The period of the cell cycle when the cell grows and performs its metabolic activities is \_\_\_\_\_.

- A) anaphase
- B) interphase
- C) metaphase
- D) telophase

Answer: B

Page Ref: 105

Bloom's: 1) Knowledge

19) The purpose of \_\_\_\_\_ is to produce two genetically identical cells.

- A) interphase
- B) cell division
- C) DNA replication
- D) protein synthesis

Answer: B

Page Ref: 106

Bloom's: 1) Knowledge

20) The DNA segment that carries information for building one protein or polypeptide chain is called a(n) \_\_\_\_\_.

- A) codon
- B) gene
- C) anticodon
- D) amino acid

Answer: B

Page Ref: 109

Bloom's: 1) Knowledge

21) The two steps of protein synthesis, in the correct order, are \_\_\_\_\_ and \_\_\_\_\_.

- A) transcription; translation
- B) replication; mitosis
- C) mitosis; cytokinesis
- D) transcription; replication

Answer: A

Page Ref: 109

Bloom's: 1) Knowledge

22) Groups of cells that are similar in both structure and function are known as \_\_\_\_\_.

- A) organs
- B) organ systems
- C) tissues
- D) atoms

Answer: C

Page Ref: 111

Bloom's: 1) Knowledge

23) Epithelial tissues have one free surface or edge known as the \_\_\_\_\_ surface.

- A) basement
- B) apical
- C) matrix
- D) attached

Answer: B

Page Ref: 112

Bloom's: 1) Knowledge

24) The type of tissue consisting of cells embedded in an extracellular matrix is \_\_\_\_\_ tissue.

- A) epithelial
- B) connective
- C) muscle
- D) nervous

Answer: B

Page Ref: 117

Bloom's: 1) Knowledge

25) \_\_\_\_\_ glands possess ducts that transport secretions onto epithelial surfaces.

- A) Endocrine
- B) Adrenal
- C) Thyroid
- D) Exocrine

Answer: D

Page Ref: 116

Bloom's: 1) Knowledge

26) The type of epithelial tissue found lining organs of the digestive system such as the small intestines is \_\_\_\_\_.

- A) simple columnar
- B) simple cuboidal
- C) pseudostratified columnar
- D) simple squamous

Answer: A

Page Ref: 114

Bloom's: 1) Knowledge

27) The cell type found in nervous tissue is the \_\_\_\_\_.

- A) fibroblast
- B) osteocyte
- C) neuron
- D) chondrocyte

Answer: C

Page Ref: 123

Bloom's: 1) Knowledge

28) \_\_\_\_\_ tissue is commonly called fat.

- A) Adipose
- B) Bone
- C) Reticular
- D) Dense fibrous

Answer: A

Page Ref: 121

Bloom's: 1) Knowledge

29) \_\_\_\_\_ muscle tissue has no visible striations and has spindle-shaped cells.

- A) Smooth
- B) Cardiac
- C) Skeletal
- D) Dense regular

Answer: A

Page Ref: 123

Bloom's: 1) Knowledge

30) Many layers of flattened cells should be termed \_\_\_\_\_ epithelial tissue.

- A) stratified columnar
- B) stratified squamous
- C) pseudostratified columnar
- D) simple squamous

Answer: B

Page Ref: 116

Bloom's: 1) Knowledge

31)

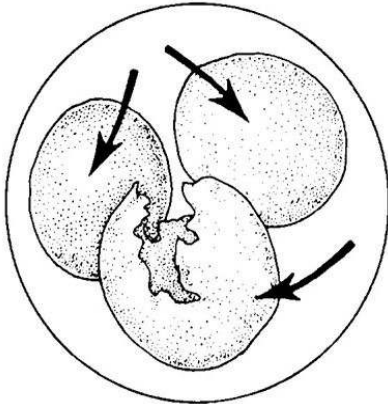


Figure 3.2

The cell shown in Figure 3.2 has been placed into a(n) \_\_\_\_\_ solution.

- A) hypertonic
- B) hypotonic
- C) isotonic
- D) equilibrium

Answer: B

Page Ref: 108

Bloom's: 3) Application



### 3.2 Multiple Choice Part II Questions

1) The structural and functional unit of all living things is the \_\_\_\_\_.

- A) nucleus
- B) element
- C) cytoplasm
- D) cell
- E) organelle

Answer: D

Page Ref: 86

Bloom's: 1) Knowledge

2) Which of the following statements is NOT part of the cell theory?

- A) The biochemical activities of cells depends on the number of their subcellular structures.
- B) The human body is composed of 50 to 100 trillion cells.
- C) Cells are the basic structural and functional unit of living organisms.
- D) The activity of an organism depends on its collective cellular activities.
- E) The continuity of life has a cellular basis.

Answer: B

Page Ref: 87

Bloom's: 1) Knowledge

3) What is the arrangement of the phospholipids as a substance passes through the plasma membrane?

- A) phospholipid head, phospholipid tails, phospholipid head, phospholipid tails
- B) phospholipid head, phospholipid head, phospholipid tails, phospholipid tails
- C) phospholipid head, phospholipid tails, phospholipid tails, phospholipid head
- D) phospholipid tail, phospholipid head, phospholipid tail
- E) phospholipid tails, phospholipid head, phospholipid head, phospholipid tails

Answer: C

Page Ref: 89

Bloom's: 1) Knowledge

4) Which of the following is NOT a structural component of the nucleus?

- A) nuclear envelope
- B) nucleolus
- C) Golgi apparatus
- D) chromatin
- E) nuclear pores

Answer: C

Page Ref: 88

Bloom's: 1) Knowledge

5) Nutrients and ions can pass directly from cell to cell through special membrane junctions known as \_\_\_\_\_.

- A) desmosomes
- B) gap junctions
- C) inclusions
- D) microvilli
- E) tight junctions

Answer: B

Page Ref: 90

Bloom's: 1) Knowledge

6) The three major components of the cytoplasm are the \_\_\_\_\_.

- A) cytosol, organelles, and inclusions
- B) cytosol, inclusions, and nucleoli
- C) cytosol, organelles, and nucleoli
- D) organelles, inclusions, and nucleoli
- E) organelles, inclusions, and ribosomes

Answer: A

Page Ref: 91

Bloom's: 1) Knowledge

7) Which of the following is NOT considered a cytoplasmic organelle?

- A) mitochondrion
- B) Golgi apparatus
- C) flagellum
- D) rough endoplasmic reticulum
- E) peroxisome

Answer: C

Page Ref: 95

Bloom's: 1) Knowledge

8) The preparation of secretory vesicles for export from the cell is the responsibility of the \_\_\_\_\_.

- A) mitochondrion
- B) Golgi apparatus
- C) cytoskeleton
- D) peroxisome
- E) smooth endoplasmic reticulum

Answer: B

Page Ref: 92

Bloom's: 1) Knowledge

9) The organelle that contains enzymes produced by ribosomes and packaged by the Golgi apparatus is the \_\_\_\_\_.

- A) Golgi apparatus
- B) lysosome
- C) peroxisome
- D) ribosome
- E) rough endoplasmic reticulum

Answer: B

Page Ref: 94

Bloom's: 1) Knowledge

10) The movement of fluid through the cell membrane from a high pressure area to a lower pressure area is called \_\_\_\_\_.

- A) active transport
- B) bulk transport
- C) osmosis
- D) diffusion
- E) filtration

Answer: E

Page Ref: 102

Bloom's: 1) Knowledge

11) Passive processes that move substances across membranes \_\_\_\_\_.

- A) utilize ATP
- B) employ protein pumps
- C) transport substances against their concentration gradients
- D) require no ATP
- E) include exocytosis and endocytosis

Answer: D

Page Ref: 100

Bloom's: 2) Comprehension

12) Osmosis transports water across membranes using \_\_\_\_\_.

- A) ATP
- B) solute pumping
- C) aquaporins
- D) sodium-potassium pump
- E) vesicles

Answer: C

Page Ref: 101

Bloom's: 2) Comprehension

13) What assists the movement of substances by facilitated diffusion?

- A) ATP
- B) protein carrier or channel
- C) lysosomes
- D) aquaporins
- E) solute pumps

Answer: B

Page Ref: 101

Bloom's: 2) Comprehension

14) What is required for diffusion to occur?

- A) protein carrier or channel
- B) concentration gradient
- C) ATP
- D) solute pump
- E) ribosomes

Answer: B

Page Ref: 100-101

Bloom's: 4) Analysis

15) Two types of endocytosis are \_\_\_\_\_.

- A) cellular secretion and solute pumping
- B) solute pumping and active transport
- C) active transport and phagocytosis
- D) phagocytosis and pinocytosis
- E) pinocytosis and passive transport

Answer: D

Page Ref: 103

Bloom's: 1) Knowledge

16) A solution that contains fewer solutes than the cell is \_\_\_\_\_.

- A) hypotonic
- B) hypertonic
- C) intravenous
- D) isotonic
- E) Ringer's lactate

Answer: A

Page Ref: 108

Bloom's: 2) Comprehension

17) Which of the following substances must travel across a membrane via facilitated diffusion?

- A) carbon dioxide
- B) water
- C) oxygen
- D) fat-soluble vitamins
- E) glucose

Answer: E

Page Ref: 101

Bloom's: 2) Comprehension

18) Which of the following processes require the use of protein carrier molecules?

- A) facilitated diffusion and solute pumping
- B) facilitated diffusion and vesicular transport
- C) vesicular transport and osmosis
- D) osmosis and filtration
- E) filtration and exocytosis

Answer: A

Page Ref: 101-103

Bloom's: 2) Comprehension

19) A cell is isotonic to its 4% dextrose solution. When moved to a 6% dextrose solution, that cell will \_\_\_\_\_.

- A) shrink
- B) plump
- C) bloat
- D) rupture
- E) lyse

Answer: A

Page Ref: 108

Bloom's: 3) Application

20) The portion of the cell's life cycle that does NOT involve cell division is known as \_\_\_\_\_.

- A) interphase
- B) mitosis
- C) metaphase
- D) prophase
- E) cytokinesis

Answer: A

Page Ref: 105

Bloom's: 1) Knowledge

21) The molecule that carries an amino acid to the ribosome for incorporation into a protein is \_\_\_\_\_.

- A) ATP
- B) messenger RNA (mRNA)
- C) ribosomal RNA (rRNA)
- D) DNA
- E) transfer RNA (tRNA)

Answer: E

Page Ref: 109

Bloom's: 1) Knowledge

22) The correct order of phases of the mitosis is \_\_\_\_\_.

- A) prophase, interphase, metaphase, anaphase, telophase
- B) prophase, anaphase, telophase, metaphase
- C) metaphase, anaphase, prophase, telophase
- D) telophase, metaphase, anaphase, prophase
- E) prophase, metaphase, anaphase, telophase

Answer: E

Page Ref: 106-107

Bloom's: 1) Knowledge

23) The process of transcription \_\_\_\_\_.

- A) produces ATP from glucose and oxygen
- B) transfers information from DNA into mRNA
- C) occurs in the cytoplasm of the cell
- D) creates proteins from mRNA
- E) translates nucleic acids into amino acids

Answer: B

Page Ref: 109

Bloom's: 1) Knowledge

24) Sequences of three bases found in messenger RNA (mRNA) are called \_\_\_\_\_.

- A) anticodons
- B) deoxyribose sugars
- C) codons
- D) ribosomes
- E) amino acids

Answer: C

Page Ref: 109

Bloom's: 1) Knowledge

25) The two major phases of protein synthesis are \_\_\_\_\_.

- A) transcription and replication
- B) mitosis and interphase
- C) replication and translation
- D) transcription and translation
- E) synthesis and cytokinesis

Answer: D

Page Ref: 109

Bloom's: 1) Knowledge

26) Which of the following represents a segment of RNA?

- A) AUGUCA
- B) ATGCTA
- C) TGCGTT
- D) CTGTGG
- E) GTCATA

Answer: A

Page Ref: 109, 111

Bloom's: 2) Comprehension

27) DNA replication takes place during \_\_\_\_\_.

- A) interphase
- B) prophase
- C) metaphase
- D) anaphase
- E) telophase

Answer: A

Page Ref: 105

Bloom's: 1) Knowledge

28) During transcription, which base pairs with adenine of DNA in the newly formed molecule of RNA?

- A) thymine
- B) adenine
- C) uracil
- D) cytosine
- E) guanine

Answer: C

Page Ref: 105-106

Bloom's: 1) Knowledge

29) If the sequence of nitrogenous bases in one strand of DNA is GTA-GCA, the sequence of bases on its complementary DNA strand would be \_\_\_\_\_.

- A) CAU-CGU
- B) CAT-CGT
- C) GAU-GCU
- D) GAT-GCT
- E) ACG-ATT

Answer: B

Page Ref: 106

Bloom's: 2) Comprehension

30) A tissue constructed of a single layer of flattened cells is known as \_\_\_\_\_.

- A) simple squamous epithelium
- B) simple columnar epithelium
- C) simple cuboidal epithelium
- D) stratified squamous epithelium
- E) transitional epithelium

Answer: A

Page Ref: 112

Bloom's: 2) Comprehension

31) Which type of tissue conducts electrochemical impulses?

- A) epithelial tissue
- B) muscle tissue
- C) nervous tissue
- D) connective tissue
- E) dense tissue

Answer: C

Page Ref: 123-124

Bloom's: 1) Knowledge

32) Which of the following is NOT classified as a connective tissue?

- A) bone
- B) cartilage
- C) blood
- D) skeletal muscle
- E) adipose

Answer: D

Page Ref: 117

Bloom's: 3) Application



33) Which type of tissue is situated in the lining of the urinary bladder and urethra where stretching occurs?

- A) simple cuboidal epithelium
- B) stratified squamous epithelium
- C) simple squamous epithelium
- D) pseudostratified columnar epithelium
- E) transitional epithelium

Answer: E

Page Ref: 113, 115, 116

Bloom's: 1) Knowledge

34) The tissue that is usually well vascularized and has an extensive extracellular matrix is called \_\_\_\_\_.

- A) epithelial tissue
- B) connective tissue
- C) nervous tissue
- D) muscle tissue
- E) brain tissue

Answer: B

Page Ref: 117

Bloom's: 1) Knowledge

35) Which of the following epithelial tissues is composed of many layers of cells?

- A) pseudostratified columnar epithelium
- B) simple squamous epithelium
- C) simple columnar epithelium
- D) simple cuboidal epithelium
- E) stratified squamous epithelium

Answer: E

Page Ref: 116

Bloom's: 1) Knowledge

36) Bone is best described as \_\_\_\_\_.

- A) dense connective tissue
- B) epithelial tissue
- C) adipose tissue
- D) areolar tissue
- E) osseous tissue

Answer: E

Page Ref: 117

Bloom's: 1) Knowledge

37) Identify the type of connective tissue that is found in lymph nodes, the spleen, and bone marrow.

- A) adipose tissue
- B) dense connective tissue
- C) areolar tissue
- D) reticular connective tissue
- E) osseous tissue

Answer: D

Page Ref: 120, 121

Bloom's: 1) Knowledge

38) Glands, such as the thyroid, that secrete their products directly into the blood rather than through ducts are classified as \_\_\_\_\_.

- A) exocrine
- B) endocrine
- C) sebaceous
- D) ceruminous
- E) sudoriferous

Answer: B

Page Ref: 116

Bloom's: 1) Knowledge

39) Which of these characteristics best describes cardiac muscle tissue?

- A) movement is involuntary and cells possess striations
- B) attached to the skeleton
- C) movement is voluntary and cells possess striations
- D) single nucleus and spindle-shaped cells
- E) multinucleate and long, cylindrical cells

Answer: A

Page Ref: 123

Bloom's: 1) Knowledge

40) The type of muscle found in the walls of hollow organs, such as the stomach, and in the walls of blood vessels is \_\_\_\_\_.

- A) cardiac muscle
- B) skeletal muscle
- C) smooth muscle
- D) both smooth muscle and skeletal muscle
- E) both cardiac muscle and skeletal muscle

Answer: C

Page Ref: 123

Bloom's: 1) Knowledge

41) The presence of chondrocytes indicates that a tissue is \_\_\_\_\_.

- A) adipose
- B) cartilage
- C) bone
- D) blood
- E) areolar

Answer: B

Page Ref: 117

Bloom's: 2) Comprehension

42) Damaged tissues that are repaired by the same kind of cells experience a replacement process known as \_\_\_\_\_.

- A) inflammation
- B) regeneration
- C) fibrosis
- D) scarring
- E) clotting

Answer: B

Page Ref: 125

Bloom's: 1) Knowledge

43) Intercalated discs found in cardiac muscle tissue are \_\_\_\_\_.

- A) tight junctions
- B) phagocytes
- C) gap junctions
- D) signet ring cells
- E) desmosomes

Answer: C

Page Ref: 123

Bloom's: 1) Knowledge

44) Jacinda tore her Achilles (calcaneal) tendon during a recent track meet. She has injured \_\_\_\_\_.

- A) muscle tissue
- B) loose connective tissue
- C) epithelial tissue
- D) dense connective tissue
- E) nervous tissue

Answer: D

Page Ref: 120

Bloom's: 3) Application

45) Looking into a microscope, you notice cells swimming, propelled by a long tail. What cell structure must these cells have in order to be mobile?

- A) ribosomes
- B) smooth ER
- C) flagella
- D) peroxisomes
- E) cytoplasm

Answer: C

Page Ref: 95

Bloom's: 3) Application

46) Which of the following tissues is constructed of many collagen fibers?

- A) blood
- B) scar tissue
- C) transitional epithelium
- D) pseudostratified columnar epithelium
- E) simple cuboidal epithelium

Answer: B

Page Ref: 125

Bloom's: 1) Knowledge

47) Which type of connective tissue is avascular?

- A) adipose
- B) bone
- C) cartilage
- D) areolar
- E) reticular

Answer: C

Page Ref: 117

Bloom's: 1) Knowledge

48) A cancer drug interferes with the development of mitotic spindle fibers during cell division. Which phase is directly affected?

- A) prophase
- B) telophase
- C) anaphase
- D) metaphase
- E) interphase

Answer: A

Page Ref: 106

Bloom's: 3) Application

49) Neurons and neuroglia are components of \_\_\_\_\_.

- A) epithelial tissue
- B) connective tissue
- C) nervous tissue
- D) muscle tissue
- E) granulation tissue

Answer: C

Page Ref: 123-124

Bloom's: 1) Knowledge

50) Which tissue performs peristalsis to move substances, such as food, through the hollow organs of the body?

- A) skeletal muscle tissue
- B) transitional epithelium
- C) cardiac muscle tissue
- D) nervous tissue
- E) smooth muscle tissue

Answer: E

Page Ref: 123

Bloom's: 2) Comprehension

51)

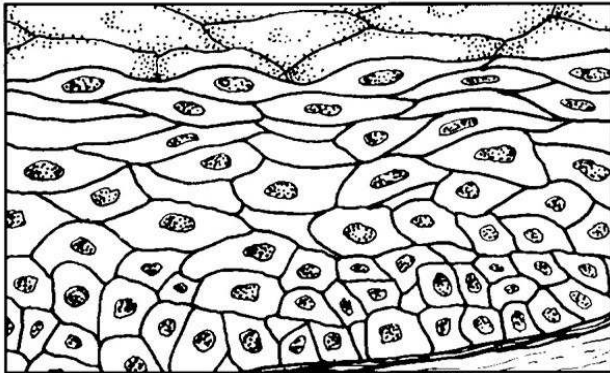


Figure 3.3

The tissue shown in Figure 3.3 most likely \_\_\_\_\_.

- A) contracts to produce movement
- B) transmits electrochemical impulses
- C) covers and lines body surfaces
- D) stores fat
- E) contains a matrix

Answer: C

Page Ref: 98, 112, 115

Bloom's: 2) Comprehension

### 3.3 True/False Questions

1) Chromatin and chromosomes are both composed of DNA.

Answer: TRUE

Page Ref: 88

Bloom's: 1) Knowledge

2) Phospholipid tails are hydrophilic and are attracted to water.

Answer: FALSE

Page Ref: 89

Bloom's: 1) Knowledge

3) Protein synthesis occurs on lysosomes in the cell.

Answer: FALSE

Page Ref: 91

Bloom's: 1) Knowledge

4) The process of facilitated diffusion requires energy.

Answer: FALSE

Page Ref: 100-101

Bloom's: 1) Knowledge

5) Osmosis is the process of water moving down the concentration gradient.

Answer: TRUE

Page Ref: 101

Bloom's: 1) Knowledge

6) Peroxisomes detoxify harmful or poisonous substances, such as alcohol.

Answer: TRUE

Page Ref: 94

Bloom's: 1) Knowledge

7) Sperm are the only cells in the human body to possess cilia.

Answer: FALSE

Page Ref: 95

Bloom's: 1) Knowledge

8) Mitotic spindles guide the separation of chromosomes during mitosis.

Answer: TRUE

Page Ref: 106

Bloom's: 1) Knowledge

9) Anaphase is the stage of cell division when the cleavage furrow first appears.

Answer: TRUE

Page Ref: 107

Bloom's: 1) Knowledge

10) Cytokinesis is the division of the cytoplasm, whereas mitosis is the division of the nucleus.

Answer: TRUE

Page Ref: 106

Bloom's: 1) Knowledge

11) Translation is the stage of protein synthesis during which a complementary mRNA molecule is synthesized from a DNA template.

Answer: FALSE

Page Ref: 109

Bloom's: 1) Knowledge

12) Stratified epithelium consists of one layer of epithelial cells.

Answer: FALSE

Page Ref: 112

Bloom's: 1) Knowledge

13) Epithelial tissues are often well vascularized and contain an extracellular matrix.

Answer: FALSE

Page Ref: 112

Bloom's: 2) Comprehension

14) The matrix of hyaline cartilage consists of abundant collagen fibers hidden in a rubbery matrix.

Answer: TRUE

Page Ref: 117

Bloom's: 1) Knowledge

15) Muscle tissue is located in the brain, spinal cord, and nerves.

Answer: FALSE

Page Ref: 123, 124

Bloom's: 1) Knowledge

### 3.4 Matching Questions

*Match the following:*

- A) site of protein synthesis
- B) synthesizes cholesterol and fat
- C) cylindrical structures made of tubulin proteins
- D) cellular extensions that move substances along the cell surface
- E) internal framework composed of a network of protein structures
- F) packages substances for release from cell
- G) site of ATP synthesis
- H) genetic control center of the cell
- I) increases surface area of plasma membrane for absorption
- J) site of intracellular digestion

1) Cilia

Page Ref: 95

Bloom's: 1) Knowledge

2) Mitochondria

Page Ref: 91

Bloom's: 1) Knowledge

3) Ribosomes

Page Ref: 91

Bloom's: 1) Knowledge

4) Microtubules

Page Ref: 94

Bloom's: 1) Knowledge

5) Cytoskeleton

Page Ref: 94

Bloom's: 1) Knowledge

6) Golgi apparatus

Page Ref: 92

Bloom's: 1) Knowledge

7) Nucleus

Page Ref: 88

Bloom's: 1) Knowledge

8) Microvilli

Page Ref: 95

Bloom's: 1) Knowledge



9) Smooth ER

Page Ref: 92

Bloom's: 1) Knowledge

10) Lysosomes

Page Ref: 94

Bloom's: 1) Knowledge

Answers: 1) D 2) G 3) A 4) C 5) E 6) F 7) H 8) I 9) B 10) J

*Match the following:*

- A) prophase
- B) anaphase
- C) metaphase
- D) telophase

11) Cytokinesis is completed

Page Ref: 107

Bloom's: 1) Knowledge

12) Centrioles separate and move toward opposite sides of the cell

Page Ref: 107

Bloom's: 1) Knowledge

13) Chromosomes cluster and align at the center of the spindle

Page Ref: 106-107

Bloom's: 1) Knowledge

14) Nucleoli appear in each daughter cell

Page Ref: 107

Bloom's: 1) Knowledge

15) Chromosomes separate and move to opposite ends of the cell

Page Ref: 107

Bloom's: 1) Knowledge

16) Chromosomes align at the metaphase plate

Page Ref: 106-107

Bloom's: 1) Knowledge

17) Spindle breaks down and disappears

Page Ref: 107

Bloom's: 1) Knowledge

18) Nuclear envelope and nucleoli break down and disappear

Page Ref: 106

Bloom's: 1) Knowledge

19) Cleavage furrow squeezes the cell into two parts

Page Ref: 107

Bloom's: 1) Knowledge

Answers: 11) D 12) A 13) C 14) D 15) B 16) C 17) D 18) A 19) D

*Match the following:*

- A) Solute pumping
- B) Osmosis
- C) Endocytosis
- D) Diffusion

20) Type of active transport in which sodium and potassium are pumped across a membrane using ATP

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Bloom's: 1) Knowledge

21) Type of passive process in which water is moved through aquaporins

Page Ref: 101

Bloom's: 1) Knowledge

22) Type of passive process in which molecules move across the plasma membrane down a concentration gradient

Page Ref: 100-101

Bloom's: 1) Knowledge

23) Type of active process in which the cell engulfs extracellular substances by phagocytosis or pinocytosis

Page Ref: 103-104

Bloom's: 1) Knowledge

Answers: 20) A 21) B 22) D 23) C

*Match the following:*

- A) connective tissue
- B) nervous tissue
- C) muscle tissue
- D) epithelial tissue

24) Type of tissue that has an apical surface and a basement membrane

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Bloom's: 1) Knowledge

25) Type of tissue that consists of living cells surrounded by an extracellular matrix

Page Ref: 117

Bloom's: 1) Knowledge

26) Type of tissue that is specialized to contract and produce movement

Page Ref: 121

Bloom's: 1) Knowledge

27) Type of tissue that can be *simple* or *stratified*

Page Ref: 112

Bloom's: 1) Knowledge

28) Type of tissue that is found in the brain and spinal cord

Page Ref: 123

Bloom's: 1) Knowledge

29) Type of tissue that can be described as *voluntary* or *involuntary*

Page Ref: 121, 123

Bloom's: 1) Knowledge

30) Type of tissue that contains collagen, elastic, or reticular fibers

Page Ref: 117

Bloom's: 1) Knowledge

31) Type of tissue that is common in glands and their ducts

Page Ref: 113, 116

Bloom's: 1) Knowledge

32) Type of tissue that supports, protects, and binds tissues together

Page Ref: 117

Bloom's: 1) Knowledge

33) Type of tissue that can be classified as loose or dense

Page Ref: 117

Bloom's: 1) Knowledge

34) Type of tissue whose two functional characteristics are *irritability* and *conductivity*

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Bloom's: 1) Knowledge

Answers: 24) D 25) A 26) C 27) D 28) B 29) C 30) A 31) D 32) A 33) A 34) B

### 3.5 Essay Questions

1) Drinking too much water over a short period of time can disrupt the electrolyte balance in the body (called water intoxication or hypotonic hydration). Explain how cells respond to an environment with less solutes than their intracellular fluid.

Answer: This solution is hypotonic to the cells since it contains less solutes than the body's cells. In these solutions, cells rapidly swell and fill with water in an attempt to reach equilibrium. Cells may also burst, or lyse.

Page Ref: 108

Bloom's: 3) Application

2) List the three main regions of the cells in the human body. Describe the main functions of each region.

Answer:

1. Nucleus. The nucleus is the control center of the cell and houses the genetic material of the cell called DNA. DNA also has the instructions for building proteins.

2. Plasma membrane. The plasma membrane is a barrier around the cell's contents and separates it from the surrounding environment. Most of the proteins embedded in the plasma membrane function in the transport of substances across the membrane.

3. Cytoplasm. The cytoplasm is a semi-fluid medium that includes the cytosol, organelles, and inclusions. Each organelle performs a specific function for the cell.

Page Ref: 87-89

Bloom's: 2) Comprehension

3) Explain the difference between filtration and osmosis.

Answer: Filtration is the process by which water and solutes are forced through a membrane by fluid (hydrostatic pressure). Hydrostatic pressure is exerted by the blood. By contrast, osmosis is a type of diffusion in which water moves across a membrane through aquaporins. During osmosis, water moves down its concentration gradient to achieve equilibrium.

Page Ref: 100-102

Bloom's: 2) Comprehension

4) Distinguish between the roles of the ribosome, found freely floating in the cytoplasm, and the ribosomes found attached to membranes, such as the rough endoplasmic reticulum (ER).

Answer: Ribosomes function in protein synthesis. Freely floating ribosomes make proteins for use in the cytoplasm of a cell while ribosomes attached to the rough endoplasmic reticulum (ER) make proteins that are transported out of the cell. Proteins travel through the membranes of the rough ER in preparation for export in transport vesicles released by the Golgi apparatus.

Page Ref: 91

Bloom's: 4) Analysis

5) List the three different types of RNA and identify their functions.

Answer:

1. Messenger RNA (mRNA) carries the "message" containing instructions for protein synthesis from the DNA in the nucleus to the ribosomes in the cytoplasm.
2. Ribosomal RNA (rRNA) forms part of the "ribosomal" structure and helps coordinate the protein building process.
3. Transfer RNA (tRNA) transports an amino acid to the ribosomal site and recognizes the mRNA codons.

Page Ref: 109

Bloom's: 1) Knowledge

6) Discuss the three steps in protein synthesis.

Answer:

1. Uncoiling of DNA—the DNA segment or gene that specifies one polypeptide or protein uncoils.
2. Transcription (DNA-directed synthesis of mRNA)—one strand of DNA acts as a template for the synthesis of the complementary mRNA molecule, and there is a transfer of information from the DNA's base sequence (cod.) into the complementary base sequence of mRNA (codon).
3. Translation (RNA-directed synthesis of a polypeptide or protein) involves five steps. First, mRNA leaves the nucleus and attaches to ribosomes. Second, tRNA (anticodon) transports an amino acid to the mRNA strand and recognizes a mRNA molecule (codon). Third, the codon and the anticodon bind. Fourth, the ribosome moves the mRNA strand along as each codon is read sequentially. Finally, as each amino acid is bound to the next by a polypeptide bond, its tRNA is released. The polypeptide or protein chain is released when the termination (stop) codon is read.

Page Ref: 109

Bloom's: 2) Comprehension

7) Discuss the four stages of mitosis.

Answer:

1. Prophase—chromatin threads coil and shorten so that visible bar-like bodies, called chromosomes, appear. Each chromosome is made up of two strands, called chromatids, which are held together by a centromere. Additionally, the centrioles separate and move toward opposite sides of the cell, directing the assembly of the mitotic spindle (composed of microtubules) between them as they move.
2. Metaphase—the chromosomes cluster and align in the center of the spindle, midway between the centrioles, forming a straight line of chromosomes.
3. Anaphase—the centromeres split and the chromosomes move slowly apart toward opposite ends of the cell. A cleavage furrow appears over the midline of the spindle and eventually pinches the cytoplasmic mass into two parts in a process called cytokinesis.
4. Telophase—the chromosomes reach opposite ends of the cell and their movement ends, and they then uncoil and become chromatin again. A nuclear membrane then forms around each chromatin mass, the spindle breaks down and disappears, and nucleoli re-appear in each of the daughter nuclei. Finally, cytokinesis produces two separate daughter cells.

Page Ref: 106-107

Bloom's: 2) Comprehension

8) A fat-soluble vitamin, vitamin A, is moving down its concentration gradient into a cell. What type of membrane transport is responsible for its movement? Describe this process.

Answer: Vitamin A is moving via simple diffusion, a type of passive transport. Passive transport requires no energy input from the cell. Vitamin A is moving from an area where it is more concentrated to an area where it is less concentrated. This vitamin is moving without assistance through the plasma membrane.

Page Ref: 101

Bloom's: 3) Application

9) Some cancer drugs, such as vincristine, interfere with the creation of mitotic spindle fibers of a cell. Explain how this drug affects mitosis.

Answer: The mitotic spindle is formed during prophase by centrioles. This spindle guides the movement of chromosomes later as mitosis progresses. By late prophase, the spindle has attached to the centromere of each chromosome. Without the creation of the spindle fibers, chromosomes cannot successfully be separated as mitosis progresses through anaphase.

Page Ref: 106-107

Bloom's: 4) Analysis

10) Stranded on an island, you have two sources of water to drink: salty ocean water and contaminated fresh water. Explain your choice of drinking water and indicate why your selection is the best choice.

Answer: The contaminated fresh water is the better choice to drink, because this water is hypotonic to our cells. Our cells will become rehydrated and bloat with the fluid when we drink. The salty ocean water is hypertonic to our cells and will cause our cells to dehydrate and shrivel as water leaves the cell.

Page Ref: 108

Bloom's: 2) Comprehension

11) Describe the naming scheme for epithelial tissues.

Answer: Epithelial tissues are named based on two features: the number of cell layers and the predominant cell shape. If the epithelial tissue has one layer, it is called a simple tissue. Two or more layers qualifies the tissue as stratified. Cells can be flat in shape (squamous), cube-shaped (cuboidal), or brick-shaped (columnar). The viewer should look toward the apical surface for the most mature cells in the tissue for the cell shape. When naming the epithelial tissue, place the number of cell layers first (such as simple) followed by the cell shape (such as squamous).

Page Ref: 112

Bloom's: 1) Knowledge