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

3.1 Multiple Choice Part I Questions

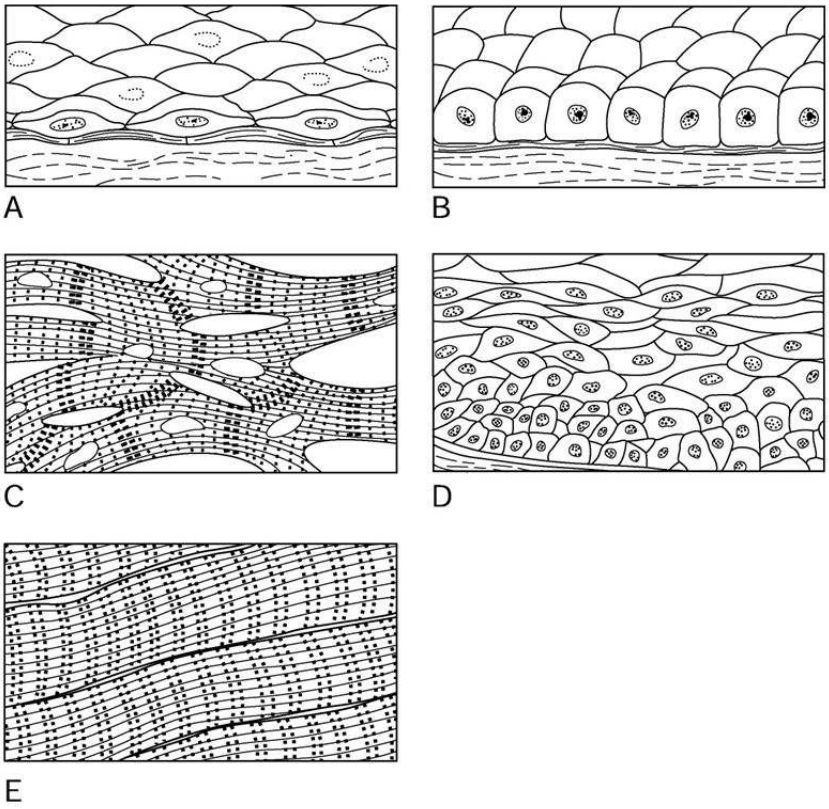

Figure 3.1

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)

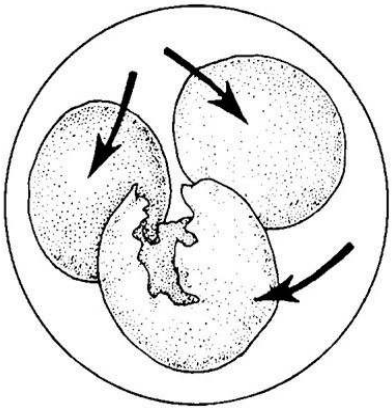

Figure 3.2

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)

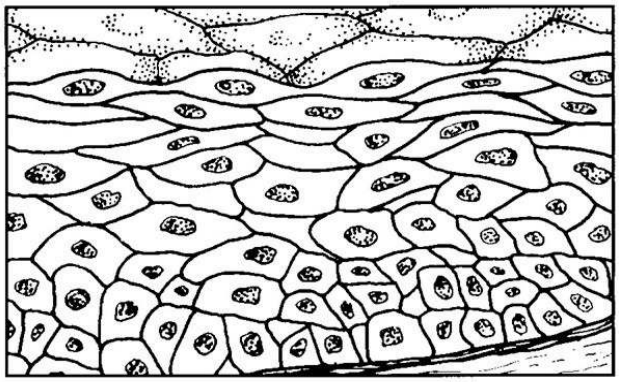

Figure 3.3

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
Page Ref: 102
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
Page Ref: 112
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*
Page Ref: 123
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.Einto 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