

Fundamentals of Anatomy & Physiology, 8e (Martini)

Chapter 3 The Cellular Level of Organization

Multiple Choice Questions

- 1) The smallest living unit within the human body is
- A) a protein.
 - B) the cell.
 - C) a tissue.
 - D) an organ.
 - E) an organ system.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 2) The watery component of the cytoplasm is called
- A) cytosol.
 - B) protoplasm.
 - C) extracellular fluid.
 - D) interstitial fluid.
 - E) a colloidal gel.

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 3) Which of the following terms is **not** used to define the structure that separates the contents of a human cell from its surrounding medium?
- A) cell wall
 - B) cell membrane
 - C) plasma membrane
 - D) plasmalemma
 - E) both A and D

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 4) Functions of the plasmalemma include all of the following, **except**
- A) separation of the cytoplasm from the extracellular fluid.
 - B) regulation of exchange of materials with the extracellular environment.
 - C) sensitivity to chemical changes in the extracellular fluid.
 - D) thermal insulation.
 - E) structural support.

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

5) The plasma membrane is composed of

- A) a bilayer of proteins.
- B) a bilayer of phospholipids.
- C) carbohydrate molecules.
- D) carbohydrates and proteins.
- E) carbohydrates and lipids.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

6) Which of the following is **not** a function of membrane proteins?

- A) bind to ligands
- B) regulate the passage of ions
- C) act as carrier molecules for various solutes
- D) act as anchors or stabilizers for the cell membrane
- E) cell nutrient

Answer: E

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

7) Functions of the glycocalyx include

- A) lubricating and protecting the cell membrane.
- B) identifying the cell for the immune system.
- C) binding extracellular compounds.
- D) all of the above
- E) B and C only

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

8) Each of the following is an example of a nonmembranous organelle, **except**

- A) lysosomes.
- B) cilia.
- C) centrioles.
- D) ribosomes.
- E) cytoskeleton.

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

9) Components of the cytoskeleton may include all of the following, **except**

- A) microfilaments.
- B) intermediate filaments.
- C) microsomes.
- D) microtubules.
- E) thick filaments.

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

10) Tubulin is to microtubules as actin is to

- A) ribosomes.
- B) microfilaments.
- C) intermediate filaments.
- D) flagella.
- E) microvilli.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

11) Which of the following cytoskeleton components moves the chromosomes during cell division?

- A) microfilaments
- B) intermediate filaments
- C) thick filaments
- D) microtubules
- E) basal bodies

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

12) Most of the ATP required to power cellular operations is produced in the

- A) cytoplasm.
- B) endoplasmic reticulum.
- C) nucleus.
- D) mitochondria.
- E) cilia.

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

13) In the mitochondrion, folds are to cristae as the contained fluid is to

- A) actin.
- B) microvilli.
- C) cytosol.
- D) basal body.
- E) matrix.

Answer: E

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

14) The components of ribosomes are formed within

- A) the endoplasmic reticulum.
- B) Golgi complexes.
- C) lysosomes.
- D) mitochondria.
- E) nucleoli.

Answer: E

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

15) Synthesis of lipids and glycogen takes place at the

- A) ribosomes.
- B) rough ER.
- C) smooth ER.
- D) Golgi apparatus.
- E) mitochondria.

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

16) Which of the following consists of a network of intracellular membranes with attached ribosomes?

- A) rough endoplasmic reticulum
- B) smooth endoplasmic reticulum
- C) mitochondria
- D) nucleoli
- E) Golgi apparatus

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

17) Renewal or modification of the cell membrane is a function of the

- A) microtubules.
- B) mitochondria.
- C) rough endoplasmic reticulum.
- D) ribosomes.
- E) Golgi apparatus.

Answer: E

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

18) Organelles that absorb and neutralize drugs and toxins are

- A) lysosomes.
- B) peroxisomes.
- C) endocytic vesicles.
- D) nuclei
- E) toxosomes.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

19) When activated, lysosomes function in

- A) formation of new cell membranes.
- B) synthesis of proteins.
- C) digestion of foreign material.
- D) synthesis of lipids.
- E) cell division.

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

20) Most of a cell's DNA is located in its

- A) ribosomes.
- B) lysosomes.
- C) Golgi apparatus.
- D) nucleus.
- E) nucleolus.

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

21) The control center for cellular operations is the

- A) nucleus.
- B) mitochondria.
- C) Golgi apparatus.
- D) endoplasmic reticulum.
- E) ribosome.

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

22) The complex structures of DNA and protein found in the cell nucleus are

- A) nucleoplasm.
- B) chromosomes.
- C) histones.
- D) nucleases.
- E) mitochondria.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

23) mRNA is needed to synthesize _____ in the cytoplasm.

- A) carbohydrates
- B) lipids
- C) proteins
- D) phospholipids
- E) all of the above

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

24) The triplet codes needed to specify a specific polypeptide chain are found in the

- A) cytoplasm.
- B) gene.
- C) codon.
- D) anticodon.
- E) polypeptide itself.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

25) As each codon arrives at the active site of a ribosome, it attracts another molecule containing the anticodon.

This molecule is called

- A) DNA.
- B) mRNA.
- C) rRNA.
- D) tRNA.
- E) RER.

Answer: D

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

26) The process of protein formation directed by mRNA is called

- A) replication.
- B) transcription.
- C) translation.
- D) mitosis.
- E) auscultation.

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

27) The process of forming mRNA is called

- A) replication.
- B) transcription.
- C) translation.
- D) ribolation.
- E) auscultation.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

28) The movement of oxygen from an area of high concentration to an area of low concentration is an example of

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

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

29) Diffusion of a substance across the cell membrane is influenced by all of the following, **except**

- A) hydrolysis of ATP.
- B) the presence of the membrane channels.
- C) the charge on the ion.
- D) concentration gradient.
- E) lipid solubility.

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

30) Water molecules and small ions enter a cell through

- A) channels formed by integral proteins.
- B) peripheral proteins.
- C) lipid channels.
- D) peripheral carbohydrates.
- E) defects in the lipid layer of the membrane.

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

31) A solution that contains a lower osmotic pressure than the cytoplasm of a cell is called

- A) merotonic.
- B) hypertonic.
- C) isotonic.
- D) hypotonic.
- E) homotonic.

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

32) "Spikes" form on a blood cell when it is placed in a(n) _____ solution.

- A) isotonic
- B) hypertonic
- C) hypotonic
- D) merotonic
- E) homotonic

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

33) The process by which molecules such as glucose are moved into cells along their concentration gradient with the help of membrane-bound carrier proteins is called

- A) osmosis.
- B) facilitated diffusion.
- C) active transport.
- D) endocytosis.
- E) exocytosis.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

34) Facilitated diffusion differs from ordinary diffusion in that

- A) facilitated diffusion consumes no ATP.
- B) facilitated diffusion moves molecules from an area of higher concentration to lower concentration.
- C) the rate of molecular movement is limited by the number of available carrier molecules.
- D) facilitated diffusion never eliminates the concentration gradient.
- E) the rate of molecular movement is not limited by the number of available carrier molecules.

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 35) A process that requires cellular energy to move a substance against its concentration gradient is called
- A) active transport.
 - B) passive transport.
 - C) facilitated transport.
 - D) osmosis.
 - E) diffusion.

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 36) The intake of small membrane vesicles from the extracellular fluid is called
- A) osmosis.
 - B) active transport.
 - C) facilitated transport.
 - D) endocytosis.
 - E) an ion exchange pump.

Answer: D

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

- 37) The principal cations in our body fluids are _____ and _____.
- A) sodium; potassium
 - B) calcium; magnesium
 - C) sodium; calcium
 - D) chloride; bicarbonate
 - E) sodium; chloride

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 38) In order to maintain cellular homeostasis, an exchange pump ejects _____ ions from the cell and imports _____ ions.
- A) potassium; calcium
 - B) sodium; calcium
 - C) potassium; sodium
 - D) sodium; potassium
 - E) calcium; sodium

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 39) Which of the following about a cell's resting transmembrane potential is **false**?
- A) inside slightly more positive than outside
 - B) inside slightly more negative than outside
 - C) depends on separation of + and — charges
 - D) represents potential energy
 - E) controls muscular contraction and nervous signaling

Answer: A

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

- 40) The potential difference across the cell membrane is due to the separation of
- A) carbohydrate molecules.
 - B) water molecules.
 - C) cations and anions.
 - D) acids and bases.
 - E) phospholipids and proteins.

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 41) Changes in the transmembrane potential of a cell are involved in
- A) movement.
 - B) thought.
 - C) glandular secretion.
 - D) all of the above
 - E) A and B only

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 42) The stage in a cell's life cycle in which the cell performs its normal functions and prepares for division is called
- A) prophase.
 - B) metaphase.
 - C) interphase.
 - D) telophase.
 - E) anaphase.

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 43) A cell duplicates its chromosomes during the _____ phase.
- A) G₀
 - B) G₁
 - C) G₂
 - D) G_m
 - E) S

Answer: E

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 44) During mitosis, chromatids separate into daughter chromosomes during
- A) prophase.
 - B) metaphase.
 - C) interphase.
 - D) telophase.
 - E) anaphase.

Answer: E

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 45) During this phase of cell division, the chromosomes uncoil, the nuclear membrane forms, and cytokinesis occurs.
- A) anaphase
 - B) prophase
 - C) interphase
 - D) telophase
 - E) metaphase

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 46) As genes are functionally eliminated, the cell becomes limited in the range of proteins it can make. This specialization process is termed
- A) adaptation.
 - B) differentiation.
 - C) structural integration.
 - D) cellular activation.
 - E) apoptosis.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 47) All of the following membrane transport mechanisms are passive processes, **except**
- A) diffusion.
 - B) facilitated diffusion.
 - C) vesicular transport.
 - D) osmosis.
 - E) all of the above

Answer: C

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

- 48) The plasmalemma includes
- A) integral proteins.
 - B) glycolipids.
 - C) phospholipids.
 - D) all of the above
 - E) A and C only

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 49) The genetically programmed death of cells is called
- A) differentiation.
 - B) replication.
 - C) apoptosis.
 - D) metastasis.
 - E) mitosis.

Answer: C

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

50) Osmotic pressure

- A) forces water to move toward the higher solute concentration.
- B) forces water to move across a semipermeable membrane.
- C) can be opposed by hydrostatic pressure.
- D) all of the above
- E) A and C only

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

51) Membrane proteins perform which of the following functions?

- A) anchoring
- B) receptors
- C) recognition
- D) enzymes
- E) all of the above

Answer: E

Diff: 1

Skill: Level 2 Questions: Reviewing Concepts

52) Which of the following about cytoplasm is **false**?

- A) extracellular fluid contains more protein
- B) the material that fills a cell
- C) semi-rigid texture
- D) includes cytoskeleton
- E) includes cytosol

Answer: A

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

53) Many proteins in the cytosol are _____ that accelerate metabolic reactions.

- A) carbohydrates
- B) enzymes
- C) lipids
- D) messengers
- E) ions

Answer: B

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

54) Extracellular fluid serves as

- A) a storage area.
- B) a reserve area.
- C) a component of the phospholipid bilayer.
- D) a transport medium.
- E) a transport medium with large storage capacity.

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

55) Microfilaments

- A) anchor the cytoskeleton to membrane proteins
- B) control the consistency of cytoplasm
- C) with myosin, produce cell movement
- D) all of the above
- E) B and C only

Answer: D

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

56) Tubulin is

- A) a carbohydrate that assembles into filamentous tubes (microtubules).
- B) a lipid that assembles into filamentous tubes (microtubules).
- C) a protein that assembles into filamentous tubes (microtubules).
- D) a protein that forms the tubular portion of the cytosol.
- E) a lipid that forms the ER.

Answer: C

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

57) These molecular motors carry materials in opposite directions along microtubules.

- A) kinesin and myosin
- B) actin and myosin
- C) dynein and myosin
- D) dynein and actin
- E) dynein and kinesin

Answer: E

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

58) Endocytosis is

- A) a method for transporting substances into the cell.
- B) a method for metabolizing within the cytosol.
- C) a form of anabolism.
- D) a viral infection.
- E) a method for packaging secretions.

Answer: A

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

59) Peroxisomes

- A) contain enzymes that break down hydrogen peroxide.
- B) absorb and break down fatty acids, generating hydrogen peroxide in the process.
- C) is another name for lysosomes.
- D) both A and B
- E) none of the above

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

- 60) Some cells contain large numbers of mitochondria while others have relatively few or none. This suggests that
- A) cells with large numbers of mitochondria are short-lived.
 - B) cells with large numbers of mitochondria have a high energy demand.
 - C) cells with small numbers of mitochondria have a large ATP supply.
 - D) cells with large numbers of mitochondria have a low energy demand.
 - E) some cells are older than others.

Answer: B

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

- 61) A mature red blood cell lacks a nucleus. Thus, it
- A) can repair itself readily.
 - B) is malformed.
 - C) can only divide once more.
 - D) will be a long-lived cell.
 - E) cannot make new proteins and will be worn out within a few months.

Answer: E

Diff: 2

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

- 62) Histones are found in
- A) nucleosomes.
 - B) proteasomes.
 - C) lysosomes.
 - D) vesicles.
 - E) endosomes.

Answer: A

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

- 63) Chromosomes consist of _____ and _____.
- A) RNA; carbohydrates
 - B) DNA; lipids
 - C) DNA; proteins
 - D) water; RNA
 - E) RNA; proteins

Answer: C

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

- 64) Which organelle is most prominent in cells that make large amounts of protein?
- A) nucleus
 - B) nucleolus
 - C) chromosome
 - D) proteasome
 - E) mitochondria

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

65) Messenger RNA is vital to the cell because

- A) mRNA can leave the nucleus.
- B) mRNA cannot leave the nucleus.
- C) DNA can leave the nucleus.
- D) DNA cannot leave the nucleus.
- E) both A and D

Answer: E

Diff: 3

Skill: Level 2 Questions: Reviewing Concepts

66) The functional units of DNA that contain the instructions for making one or more proteins are

- A) chromosomes.
- B) genes.
- C) ribosomes.
- D) codons.
- E) RNA.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

67) Specific proteins are manufactured through the interaction of _____ and _____.

- A) multiple enzymes; three types of RNA
- B) multiple enzymes; two types of RNA
- C) multiple carbohydrates; three types of DNA
- D) multiple proteins; three types of DNA
- E) multiple enzymes; three types of DNA

Answer: A

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

68) Which of these transport processes always requires metabolic energy?

- A) diffusion
- B) carrier-mediated transport
- C) vesicular transport
- D) freely permeable
- E) impermeable

Answer: C

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

69) The skin swells and puckers during a long bath. This suggests that bath water is a(n) _____ fluid.

- A) isotonic
- B) hypotonic
- C) hypertonic
- D) diffusion
- E) toxic

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

70) Red blood cell shrinkage is to _____ as cell bursting is to _____.

- A) crenation; hemolysis
- B) lysis; crenation
- C) hypotonic; isotonic
- D) isotonic; hypotonic
- E) isotonic; hypertonic

Answer: A

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

71) Two types of vesicular transport include

- A) endocytosis and retrocytosis.
- B) endocytosis and exocytosis.
- C) exocytosis and retrocytosis.
- D) pinocytosis and active transport.
- E) passive diffusion and active diffusion.

Answer: B

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

72) A defense cell engulfing a bacterium illustrates

- A) pinocytosis.
- B) endocytosis.
- C) exocytosis.
- D) phagocytosis.
- E) receptor-mediated endocytosis.

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

73) During mitosis, two daughter cells form, each of which has

- A) a different number of chromosomes than the original cell.
- B) twice as many chromosomes as the original cell.
- C) the same number of chromosomes as the original cell.
- D) a lesser number of chromosomes than the original cell.
- E) half as many chromosomes as the original cell.

Answer: C

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

74) A unit in messenger RNA consisting of a set of three consecutive nucleotides is termed a(n)

- A) amino acid.
- B) tRNA.
- C) anticodon.
- D) codon.
- E) gene.

Answer: D

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

75) An impermeable carbohydrate that is often administered to patients suffering blood loss is

- A) saline solution.
- B) salt solution.
- C) glucose.
- D) isotonic saline.
- E) dextran.

Answer: E

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

76) An alternate term for *tumor* is

- A) neoplasm.
- B) cytoplasm.
- C) benign malignancy.
- D) primary metastasis.
- E) nucleoplasm.

Answer: A

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

77) What is the first part of the cell that is affected when the pH of extracellular fluid changes?

- A) nucleus
- B) nucleolus
- C) the cytosol
- D) plasmalemma
- E) cytoskeleton

Answer: D

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

78) Which form of endoplasmic reticulum modifies and packages newly synthesized proteins?

- A) ribosomal endoplasmic reticulum
- B) proteosomes reticulum
- C) raised endoplasmic reticulum
- D) smooth endoplasmic reticulum
- E) rough endoplasmic reticulum

Answer: E

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

79) Which of the following statements about the Golgi apparatus is **false**?

- A) receives transport vesicles from the RER
- B) sends transport vesicles to the RER
- C) produces lysosomes
- D) supplies new membrane components
- E) produces secretory vesicles

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

80) Which phase of the cell cycle has the most variable duration?

- A) S phase
- B) G₀ phase
- C) G₁ phase
- D) G₂ phase
- E) V phase

Answer: B

Diff: 1

Skill: Level 2 Questions: Reviewing Concepts

81) Microtubules have which of the following functions?

- A) They form structural components of organelles.
- B) They move chromosomes during cell division.
- C) They provide a mechanism for changing the cell shape.
- D) Molecular motors move along them.
- E) all of the above

Answer: E

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

82) The endoplasmic reticulum is responsible for

- A) drug and toxin neutralization.
- B) lipid synthesis.
- C) protein synthesis.
- D) all of the above
- E) both A and C

Answer: D

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

83) A substance containing atoms of different elements that are bonded together is called a(n)

- A) molecule.
- B) compound.
- C) mixture.
- D) isotope.
- E) solution.

Answer: B

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

84) Special catalytic molecules called _____ control chemical reactions in the human body.

- A) enzymes
- B) cytozymes
- C) DNA
- D) ribosomes
- E) cytochromes

Answer: A

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

85) All organic compounds in the human body contain all of the following elements, **except**

- A) hydrogen.
- B) oxygen.
- C) carbon.
- D) calcium.
- E) both A and D

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

86) Which of the following is **not** a function of protein?

- A) support
- B) transport
- C) metabolic regulation
- D) storage of genetic information
- E) movement

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

87) Which of following properties of the cytoskeleton is **false**?

- A) supports organelles
- B) controls cell shape
- C) provides cell strength
- D) made of cytobones
- E) moves organelles

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

88) Which of following properties of microtubules is **true**?

- A) made of myosin
- B) made of actin
- C) found only in the terminal web
- D) another term for microfilaments
- E) interact with dynein and kinesin

Answer: E

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

89) Hemolysis may occur when a blood cell is placed into

- A) isotonic solution.
- B) hypertonic solution.
- C) hypotonic solution.
- D) merotonic solution.
- E) homotonic solution.

Answer: C

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

90) If a cell lacked the enzyme DNA polymerase, it could not

- A) form protein.
- B) form complementary sequences of DNA.
- C) link segments of DNA together.
- D) form spindle fibers.
- E) form a new nuclear membrane during telophase.

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

91) Compared to the extracellular fluid, cytosol contains

- A) a higher concentration of potassium ions.
- B) a lower concentration of dissolved proteins.
- C) almost no glycogen.
- D) a higher concentration of amino acids.
- E) almost no lipids.

Answer: A

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

92) Microfilaments

- A) are usually composed of myosin.
- B) are hollow, filamentous structures.
- C) anchor the cytoskeleton to integral proteins of the cell membrane.
- D) interact with filaments composed of tubulin to produce muscle contractions.
- E) are found in the cytoplasm radiating away from the centrosome.

Answer: C

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

93) If an animal cell lacked centrioles, it would not be able to

- A) move.
- B) synthesize proteins.
- C) produce DNA.
- D) metabolize sugars.
- E) form the mitotic spindle.

Answer: E

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

94) Each of the following statements concerning mitochondria is true, **except** one. Identify the exception.

- A) The cristae increase the inner surface area of the organelle.
- B) The matrix contains metabolic enzymes involved in energy production.
- C) Respiratory enzymes are attached to the surface of the cristae.
- D) The mitochondria contain no DNA.
- E) The mitochondria produce most of a cell's ATP.

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

95) Each of the following is a function of smooth endoplasmic reticulum, **except**

- A) storage and release of calcium ions.
- B) modification of protein.
- C) synthesis of steroid hormones.
- D) synthesis of triglycerides.
- E) detoxification of drugs.

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

96) The following is a list of the steps involved in the process of secretion by the Golgi apparatus.

1. Material moves from cisterna to cisterna by means of transfer vesicles.
2. Exocytosis.
3. Products from RER are packaged into transport vesicles.
4. Secretory vesicles are formed at the maturing face.
5. Vesicles arrive at the forming face.
6. Enzymes modify arriving proteins and glycoproteins.

The proper order for these is

- A) 5, 6, 1, 4, 2, 3.
- B) 2, 3, 5, 6, 1, 4.
- C) 4, 3, 1, 6, 5, 2.
- D) 3, 5, 6, 1, 4, 2.
- E) 1, 3, 6, 4, 2, 5.

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

97) Imagine two rigid chambers separated by a rigid membrane that is freely permeable to water but impermeable to glucose. Side 1 contains a 10 percent glucose solution and side 2 contains pure water. At equilibrium, what will be the situation?

- A) Water will continue to move from side 1 to side 2.
- B) Water will continue to move from side 2 to side 1.
- C) The hydrostatic pressure will be higher in side 1.
- D) The hydrostatic pressure will be higher in side 2.
- E) No way to tell what the situation will be.

Answer: C

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

98) If the amount of chloride ion in blood plasma increases, which of the following would **initially** occur?

- A) The blood osmotic pressure will increase.
- B) The blood osmotic pressure will decrease.
- C) The blood osmotic pressure will stay the same.
- D) The blood hydrostatic pressure will increase.
- E) The blood hydrostatic pressure will decrease.

Answer: A

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

- 99) If the concentration of sodium chloride in the interstitial fluid surrounding cells decreases and the concentration of other solutes remains constant,
- A) the cells will shrink.
 - B) the cells will swell.
 - C) the fluid outside of the cells will become isotonic.
 - D) the fluid outside of the cells will become hypertonic.
 - E) the cells will not change.

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

- 100) Assume that the transport of a particular amino acid across the plasmalemma is observed (1) to occur only down its concentration gradient and (2) to slow when a similar amino acid is added to the extracellular fluid. The movement of the amino acid through the membrane is most likely by
- A) osmosis.
 - B) diffusion.
 - C) facilitated diffusion.
 - D) active transport.
 - E) pinocytosis.

Answer: C

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

- 101) Generally, cells with a very brief interphase and lacking a G₀ phase
- A) are stem cells.
 - B) do not exhibit cytokinesis.
 - C) have brief life spans.
 - D) are reproductive cells.
 - E) lack the enzyme DNA polymerase.

Answer: A

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

- 102) There is a direct correlation between the potency of a general anesthetic such as ether and its ability to
- A) dissolve in water.
 - B) dissolve in lipids.
 - C) bind to proteins.
 - D) interact with carbohydrates.
 - E) bind to DNA.

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

- 103) Cancer cells
- A) are indistinguishable from normal body cells.
 - B) have a slow mitotic rate.
 - C) may exhibit metastasis.
 - D) do not form neoplasms.
 - E) generally form benign tumors.

Answer: C

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

104) The mRNA sequence that is complementary to the sequence ATC on DNA is

- A) ATC.
- B) TAG.
- C) UAG.
- D) AUG.
- E) AUC.

Answer: C

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

105) The anticodon for the triplet UCA is

- A) AGU.
- B) AGC.
- C) TCA.
- D) TGT.
- E) AGT.

Answer: A

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

106) Before the mRNA transcribed from a gene can be used to translate into a protein, it must be

- A) edited to remove introns.
- B) edited to remove exons.
- C) transported into the cytoplasm.
- D) both A and C
- E) both B and C

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

107) Microscopic analysis of a tissue sample indicates that it contains abundant myosin and actin filaments. This tissue is probably formed from

- A) nerve cells.
- B) reproductive cells.
- C) bone cells.
- D) muscle cells.
- E) liver cells.

Answer: D

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

108) Examination of a sample of glandular cells reveals an extensive network of smooth endoplasmic reticulum. Which of the following is the likeliest product of these cells?

- A) digestive enzymes
- B) steroid hormones
- C) protein hormones
- D) transport proteins
- E) antibodies

Answer: B

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

- 109) Breathing faster and deeper eliminates more carbon dioxide from the body than normal breathing. Under these circumstances
- A) more carbon dioxide will diffuse out of the blood.
 - B) more carbon dioxide will diffuse into the blood.
 - C) less carbon dioxide will diffuse out of the blood.
 - D) less carbon dioxide will diffuse into the blood.
 - E) the amount of carbon dioxide diffusion will remain unchanged.

Answer: A

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

- 110) A membrane transport process is found experimentally to have a saturation limit. Which of the following is a possible property of the process?
- A) energy-dependent
 - B) carrier-mediated
 - C) cotransport
 - D) active transport
 - E) all of the above

Answer: E

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

- 111) In a series of measurements of resting transmembrane potentials, the following values were recorded. Which one is likeliest to be an error?
- A) -10 mV
 - B) -20 mV
 - C) -40 mV
 - D) -70 mV
 - E) $+100$ mV

Answer: E

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

- 112) Mitosis is to somatic cells as meiosis is to
- A) visceral cells.
 - B) reproductive cells.
 - C) plant cells.
 - D) sensory cells.
 - E) stem cells.

Answer: B

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

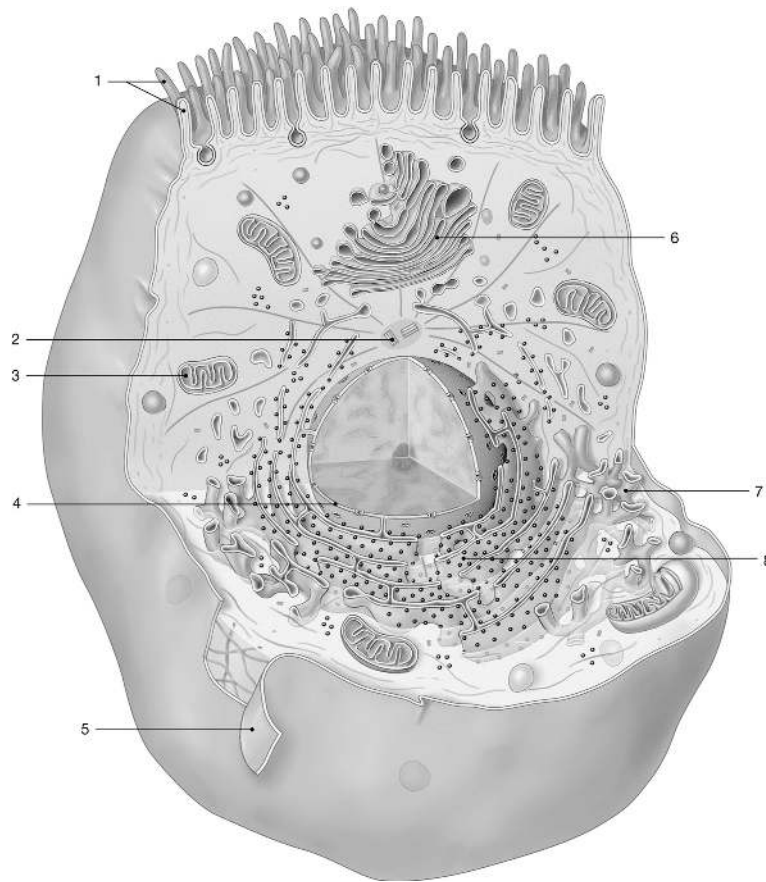


Figure 3-1 The Anatomy of a Representative Cell

Use Figure 3-1 to answer the following question(s):

113) Which structure organizes the mitotic spindle during cell division?

- A) 1
- B) 2
- C) 3
- D) 5
- E) 6

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

114) Synthesis of carbohydrates and lipids occurs in the structure labeled

- A) 4.
- B) 5.
- C) 6.
- D) 7.
- E) 8.

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

115) Which structure produces ATP for the cell?

- A) 1
- B) 2
- C) 3
- D) 5
- E) 6

Answer: C

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

116) Which organelle renews the cell membrane and modifies and packages proteins for secretion?

- A) 4
- B) 5
- C) 6
- D) 7
- E) 8

Answer: E

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

117) The structure labeled "1" permits the cell to

- A) attach to neighboring cells.
- B) produce more cells.
- C) increase surface area for increased membrane transport.
- D) swim in extracellular fluid.
- E) trap bacteria.

Answer: C

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

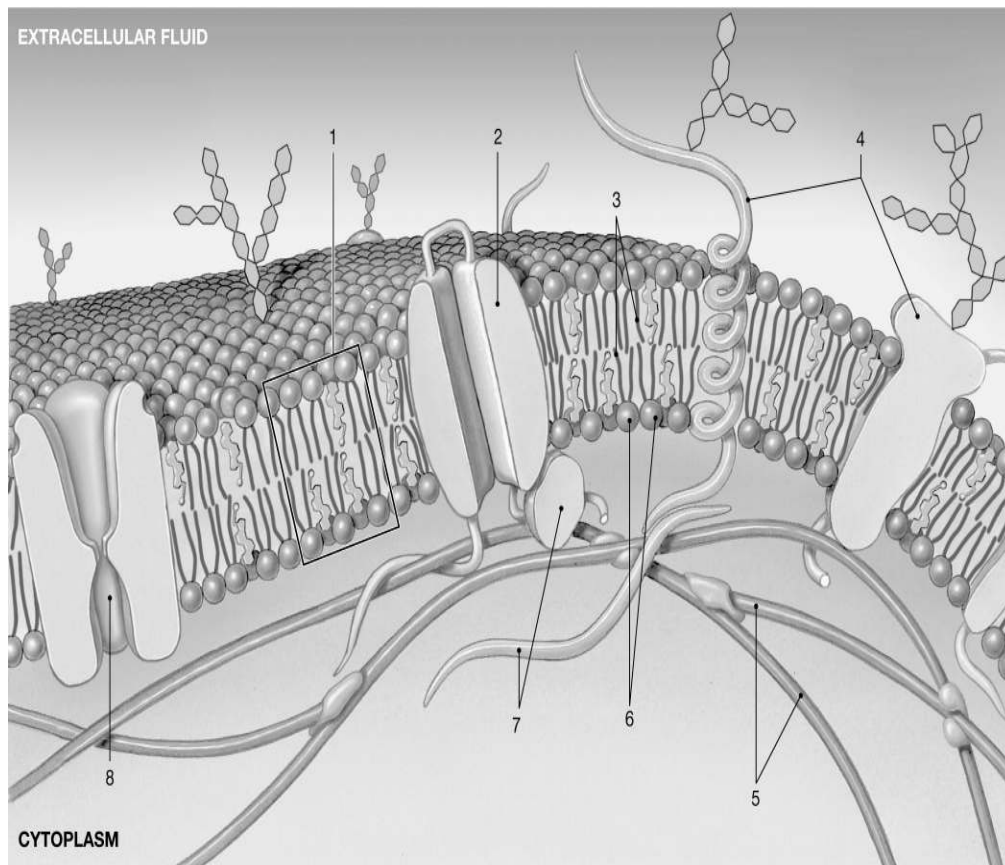


Figure 3-2 The Plasmalemma

Use Figure 3-2 to answer the following question(s):

118) Which structure is water most likely to pass through?

- A) 1
- B) 2
- C) 3
- D) 4
- E) 8

Answer: B

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

119) Which structure has a "gate" to control transport?

- A) 1
- B) 2
- C) 4
- D) 7
- E) 8

Answer: E

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

120) Microfilaments are labeled

- A) 1.
- B) 2.
- C) 3.
- D) 5.
- E) 6.

Answer: D

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

121) Lipid molecules pass into the cell through the structure labeled

- A) 1.
- B) 2.
- C) 3.
- D) 5.
- E) 6.

Answer: A

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

122) What part of the plasmalemma is hydrophobic?

- A) 1
- B) 2
- C) 3
- D) 4
- E) 6

Answer: C

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

Short Answer Questions

1) The cytoplasm contains the fluid _____ and the suspended _____.

Answer: cytosol; organelles

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

2) Masses of insoluble material that are sometimes found in cytosol are known as _____.

Answer: inclusions

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

3) _____ cells are all of the cells of the body except the reproductive cells (sperm and oocytes).

Answer: Somatic

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

4) The endoplasmic reticulum is an example of a(n) _____ organelle.

Answer: membranous

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

5) The extracellular fluid in most tissues is called the _____ fluid.

Answer: interstitial

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

6) Cilia and flagella contain 9 pairs of _____ surrounding a central pair.

Answer: microtubules

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

7) Ribosomes are composed of protein and _____.

Answer: rRNA

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

8) The nucleus is surrounded by the _____.

Answer: nuclear envelope

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

9) Transfer of mRNA from the nucleus to the cytosol occurs through _____.

Answer: nuclear pores

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

10) A molecule of _____ contains all the codons needed to produce a particular polypeptide.

Answer: mRNA

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

11) The enzyme _____ is required for the synthesis of mRNA.

Answer: RNA polymerase

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

12) Amino acids are transferred to the ribosome to be incorporated into a growing polypeptide chain by _____.

Answer: tRNA

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

13) During the synthesis of proteins, amino acids are assembled in the proper sequence because each tRNA molecule that brings them to the ribosome has a(n) _____ that binds to a complementary codon in the mRNA.

Answer: anticodon

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

14) The start of each gene begins with a _____ segment.

Answer: promoter

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

15) A(n) _____ is a series of ribosomes attached to the same mRNA.

Answer: polyribosome or polysome

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

16) _____ are permanent alterations in a cell's DNA that affect the nucleotide sequence of one or more genes.

Answer: Mutations

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

17) A point mutation involves a change in _____.

Answer: a single nucleotide

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

18) In cells that are not dividing, chromosomes uncoil to form a tangle of fine fibers known as _____.

Answer: chromatin

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

19) _____ channels can open or close to regulate the passage of materials through the cell membrane.

Answer: Gated

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

20) The _____ of a membrane indicates how easy it is for substances to cross.

Answer: permeability

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

21) Cell membranes are said to be _____ because they allow some substances to pass but not others.

Answer: selectively permeable

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

22) Membrane-bound proteins that use metabolic energy to move ions across the plasmalemma are called _____.

Answer: ion pumps

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

23) In _____ one substance is transported into the cell, and another is transported out.

Answer: countertransport or antiport

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

24) Receptor molecules on the surface of cells bind specific molecules called, in general, _____.

Answer: ligands

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

25) Whenever positive and negative ions have been separated, a(n) _____ will be produced.

Answer: potential difference

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

26) The potential difference across the cell membrane is known as the _____.

Answer: transmembrane potential

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

27) The transmembrane potential in an undisturbed cell is called its _____.

Answer: resting membrane potential

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

28) Nuclear division of somatic cells is known as _____.

Answer: mitosis

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

29) _____ is the process of duplicating chromosomes prior to cell division.

Answer: Replication

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

30) Special cells called _____ maintain tissues by unending cycles of cell division.

Answer: stem cells

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

31) The proper distribution of a cell's genetic material to two daughter cells is accomplished by the process of _____.

Answer: mitosis

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

32) The physical process by which a single animal cell separates into two cells is called _____.

Answer: cytokinesis

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

33) The process by which cells become specialized is called _____.

Answer: differentiation

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

34) A(n) _____ is a mutant of a regulatory gene that causes cancer.

Answer: oncogene

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

35) _____ refers to identifying an individual on the basis of repetitive nucleotide sequences in his or her DNA.

Answer: DNA fingerprinting

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

36) A malignant neoplasm is often called a(n) _____.

Answer: cancer

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

37) Write out the term for tRNA.

Answer: transfer ribonucleic acid or transfer RNA

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

38) Write out the term for mRNA.

Answer: messenger ribonucleic acid or messenger RNA

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

39) Write out the term for rRNA.

Answer: ribosomal ribonucleic acid or ribosomal RNA

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

40) A change in a nucleotide sequence of a gene is termed a(n) _____.

Answer: mutation

Diff: 1

Skill: Level 1 Questions: Reviewing Facts and Terms

41) _____ are responsible for identifying and digesting damaged or denatured proteins.

Answer: Proteasomes

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

42) The _____ typically consists of five or six flattened membranous discs called cisternae.

Answer: Golgi apparatus

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

43) Recognition keeps the immune response from attacking _____, while still enabling it to recognize and destroy invading pathogens.

Answer: self

Diff: 2

Skill: Level 1 Questions: Reviewing Facts and Terms

Essay Questions

1) When a person receives intravenous fluids to help build up blood volume, why is it important for the fluid to be isotonic?

Answer: Intravenous fluids must be isotonic to prevent the cells from losing or gaining water. If the solution were hypertonic, the cells of the body would lose water, shrink, and possibly be harmed. On the other hand, the introduction of hypotonic fluid would cause the cells to swell and tissues to rupture.

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

2) Intravenous injection of KCl could be fatal. Why?

Answer: Increasing the amount of potassium ion in the extracellular fluid would result in more potassium (+ charges) entering the cell, leading to a resting potential that was more positive. This would disturb the resting transmembrane potential, upsetting muscle contraction (heart and skeletal muscles).

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

3) How would an inhibitor of the sodium-potassium exchange pump affect the resting potential?

Answer: The maintenance of a proper resting potential requires the sodium-potassium exchange pump, an active transport process. Without the pump, the cell would not be able to pump the sodium ion (+ charge) out and so the membrane potential would become more positive.

Diff: 1

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

4) Define osmosis.

Answer: Osmosis is the transfer of water across a semipermeable membrane due to a difference in concentration of impermeable solute.

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

5) A) What are the similarities between facilitated diffusion and active transport? B) What are the differences?

Answer: A) Both processes use carrier proteins and exhibit saturation. B) Facilitated diffusion is driven by a concentration gradient, does not consume ATP, and so is "passive," whereas active transport is active, consumes ATP, and move a substance up its concentration gradient.

Diff: 3

Skill: Level 2 Questions: Reviewing Concepts

6) What role does the sodium-potassium exchange pump play in stabilizing the resting membrane potential?

Answer: By ejecting sodium ions from the cytosol and absorbing potassium ions from the extracellular fluid, the sodium-potassium pump maintains the K concentration gradient that leads to a negative resting membrane potential.

Diff: 2

Skill: Level 2 Questions: Reviewing Concepts

7) Differentiate between transcription and translation.

Answer: In transcription, RNA polymerase uses the nucleotide sequence on DNA to construct a complementary strand of mRNA. In translation, ribosomes use information carried by the mRNA strand and tRNA to synthesize the corresponding polypeptide.

Diff: 3

Skill: Level 2 Questions: Reviewing Concepts

8) During kidney dialysis, a person's blood is passed through a bath that contains several ions and molecules. The blood is separated from the dialysis fluid by a membrane that allows water, small ions, and small molecules to pass, but does not allow large proteins or blood cells to pass. What should the composition of dialysis fluid be for it to remove urea (a small molecule) without changing the blood volume (removing water from the blood)?

Answer: For the dialysis fluid to remove urea without removing water, it should not contain urea. Because urea is a small molecule, it will diffuse through the dialysis membrane from an area of high concentration (the blood) to an area of low concentration (the dialysis fluid). To prevent an associated osmotic water movement, the dialysis fluid should have an osmotic concentration similar to that of blood plasma, but with higher concentrations of solutes such as bicarbonate ions or glucose. As urea diffuses into the dialysis fluid, glucose and bicarbonate diffuse into the blood; as a result, the solute concentrations remain in balance and no osmotic water movement occurs.

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications

- 9) Which organelles are involved in membrane flow? Trace the route of a single integral membrane protein from formation to incorporation into the plasma membrane.

Answer: All membranous organelles are involved in membrane flow. Those most directly associated are the ER, Golgi apparatus, secretory vesicles, and plasma membrane. A membrane protein would be synthesized in the RER, then flow through the cisternae to a transport vesicle. There the protein will be moved to the forming face of the Golgi apparatus, where it will slowly travel upward toward the maturing face, usually becoming modified along the way. Once reaching the maturing face of the Golgi apparatus, the protein would be embedded in the membrane of a secretory vesicle and transported to the plasma membrane. There the vesicle will fuse with the membrane, inserting the protein in the cell membrane.

Diff: 3

Skill: Level 3 Questions: Critical Thinking & Clinical Applications