Student Name _____

chapter 3 Cells

Answer Key: Textbook page references are provided as a guide for answering these questions. A complete answer key was provided for your instructor.

OBJECTIVES

1. Label a diagram of the main parts of a typical cell, and do the following:
   - Explain the role of the nucleus.
   - Describe the functions of the main organelles of the cell.
   - Identify the components of the cell membrane.
2. Do the following regarding transport mechanisms:
   - Describe the active and passive movements of substances across a cell membrane.
   - Define tonicity and compare isotonic, hypotonic, and hypertonic solutions.
3. Describe the phases of the cell cycle, including mitosis.
4. Explain what is meant by cell differentiation.
5. Explain the processes and consequences of uncontrolled and disorganized cell growth and apoptosis.

Part I: Mastering the Basics

MATCHING

Parts of a Typical Cell

Directions: Match the following terms to the most appropriate definition by writing the correct letter in the space provided. Some terms may be used more than once. See text, pp. 30-35.

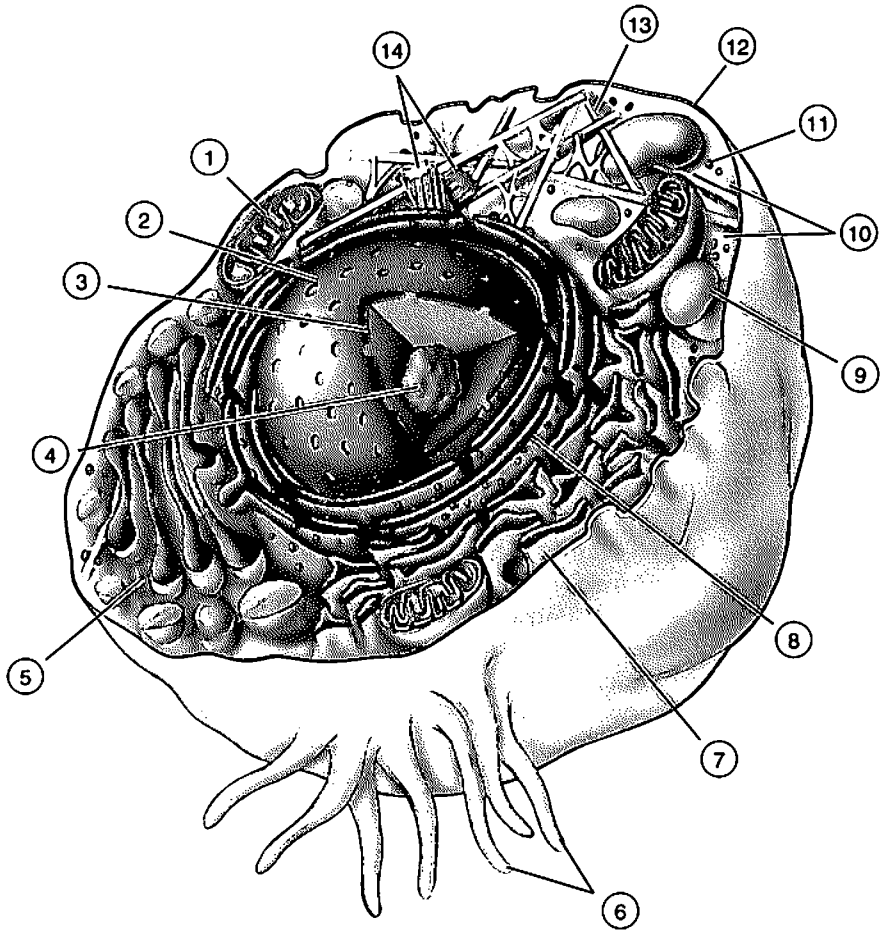
A. mitochondria
B. nucleus
C. microtubules
D. cilia
E. ribosomes
F. lysosomes
G. flagellum
H. centrioles
I. nuclear membrane
J. cytoplasm
K. Golgi apparatus
L. rough endoplasmic reticulum (RER)
M. smooth endoplasmic reticulum (SER)
N. cell membrane
O. cytosol

1. _____ Control center of the cell; contains most of the DNA
2. _____ Slipper-shaped organelles that produce most of the energy (ATP)
3. _____ Puts the finishing touches on the protein and packages it for export from the cell
4. _____ Structure that separates the nucleus from the cytoplasm
5. _____ Sandpaper-like structure dotted with ribosomes; concerned with protein synthesis
6. _____ Long hairlike projection on the external surface of the cell membrane, such as the tail of the sperm
7. _____ Consists of the cytosol and the organelles
8. _____ Selectively permeable structure that separates intracellular material from extracellular material
9. _____ Short hairlike projections on the outer surface of the cell
10. _____ Digestive organelles that "clean house" within the cell
11. _____ Organelles that help maintain the shape of the cell and assist the cell with movement
12. _____ Gel-like part of the cytoplasm
13. _____ Organelles that either are bound to the endoplasmic reticulum or are free in the cytoplasm; concerned with protein synthesis
14. _____ Type of endoplasmic reticulum concerned with the synthesis of lipids and steroids; does not contain ribosomes
15. _____ Rod-shaped structures that play a key role in cellular reproduction
16. _____ Called the power plants of the cells

READ THE DIAGRAM

The Typical Cell

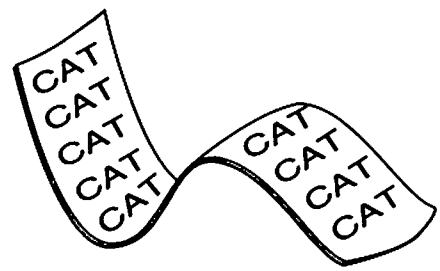
Directions: Refer to the diagram and fill in the numbers in the spaces below. See text, pp. 30-35.



1. _____ Slipper-shaped organelles that produce ATP; called the power plants of the cell
2. _____ Puts the finishing touches on the protein and packages it for export from the cell
3. _____ Sandpaper-like structure dotted with ribosomes; concerned with protein synthesis
4. _____ Selectively permeable structure that separates intracellular material from extracellular material
5. _____ Short hairlike projections on the outer surface of the cell
6. _____ Digestive organelles that "clean house" within the cell
7. _____ Organelles that maintain the shape of the cell and assist the cell with movement
8. _____ Gel-like substance inside the cell but outside the nucleus
9. _____ Type of endoplasmic reticulum concerned with the synthesis of lipids and steroids; does not contain ribosomes
10. _____ Rod-shaped structures that play a key role in cellular reproduction

BODY TOON

Hint: Enzyme Activity



Answer: catalyst (cat-a-list)

MATCHING

Transport Mechanisms

Directions: Match the following terms to the most appropriate definition by writing the correct letter in the space provided. Some terms may be used more than once. See text, pp. 36-41.

A. osmosis
B. diffusion
C. facilitated diffusion
D. phagocytosis
E. exocytosis
F. active transport pump
G. pinocytosis
H. filtration

1. _____ Most commonly used transport mechanism

2. _____ Transport mechanism in which water diffuses from an area where there is more water to an area where there is less water; solute cannot diffuse

3. _____ A pressure gradient is the driving force for this type of transport.

4. _____ Transport mechanism that engulfs a solid particle by the cell membrane; a type of endocytosis

5. _____ Transport mechanism that requires an input of energy to move molecules from an area of lower concentration to an area of higher concentration

6. _____ Movement of a substance from an area of higher concentration to an area of lower concentration

7. _____ Passive transport mechanism in which glucose is helped across the cell membrane by a helper molecule

8. _____ Intake of liquid droplets by the cell membrane; also called *cellular drinking*

9. _____ Example of this transport mechanism is the swelling of a blood clot as water is pulled into the clot.

10. _____ Describes this type of transport mechanism: the blood pressure pushes water and dissolved solute out of the capillaries into the tissue spaces

11. _____ A lysosome eats or ingests a bacterium

12. _____ A protein-containing vesicle within a cell fuses with the cell membrane and ejects the protein.

13. _____ Transport mechanism needed to move additional potassium into the cell if the intracellular concentration of potassium is higher than the extracellular concentration of potassium

MATCHING

Tonicity

Directions: Match the following terms to the most appropriate definition by writing the correct letter in the space provided. Some terms may be used more than once. See text, pp. 39-40.

A. isotonic
B. hypotonic
C. hemolysis
D. hypertonic
E. crenation

1. _____ Shrinking of red blood cells

2. _____ Bursting of red blood cells

3. _____ Solution that is more dilute than the inside of the cell

4. _____ Solution with the same concentration as the solution to which it is compared

5. _____ Solution that is more concentrated than inside of the cell

6. _____ Solution that causes crenation of a red blood cell

7. _____ Solution that causes the red blood cell to swell and burst

8. _____ Normal saline

9. _____ Describes a 10% dextrose solution relative to plasma if a 5% dextrose solution is isotonic to plasma

10. _____ Describes pure water relative to plasma

MATCHING

Cell Division

Directions: Match the following terms to the most appropriate definition by writing the correct letter in the space provided. See text, pp. 41-43.

A. cell cycle
B. cancer
C. mitosis
D. metastasis
E. interphase
F. meiosis
G. G_0
H. stem cell

1. _____ M phase of the cell cycle
2. _____ Ability of cancer cells to spread to distant sites
3. _____ Consists of two phases, interphase and mitosis
4. _____ Cell that can specialize into another type, such as blood cell, nerve cell, muscle cell
5. _____ Type of cell division involved in the body's growth and repair
6. _____ Cells stop cycling when they enter this phase.
7. _____ Includes G_1, S, G_2, and M
8. _____ Undifferentiated or unspecialized cell
9. _____ Replication of DNA occurs during this phase of the cell cycle
10. _____ Type of cell division that occurs in sex cells
11. _____ A drug is labeled cell cycle M phase–specific; affects this phase of the cell cycle
12. _____ Phases: prophase, metaphase, anaphase, and telophase
13. _____ Malignant neoplasm

SIMILARS AND DISSIMILARS

Directions: Circle the word in each group that is least similar to the others. Indicate the similarity of the three words on the line below each question.

1. nucleus mitochondria melanoma lysosomes

_____

2. Golgi ATP nucleus endoplasmic reticulum

_____

3. cilia hairlike flagellum sandpaper-like

_____

4. ATP mitochondria diffusion energy

_____

5. smooth cell cycle endoplasmic reticulum rough

_____

6. diffusion filtration active transport pump osmosis

_____

7. endocytosis pinocytosis filtration phagocytosis

_____

8. G_1 phase G_2 phase M phase S phase

_____

9. prophase interphase metaphase anaphase

_____

10. hypertonic isotonic filtration hypotonic

_____

11. mitochondrion protein synthesis cristae power plant

_____

12. power plant RER protein synthesis amino acids

_____

13. nucleus ribosomes DNA control center

_____

14. ribosome cell membrane lipid bilayer plasma membrane

15. pressure gradient ATP filtration passive

Part II: Putting It All Together

MULTIPLE CHOICE

Directions: Choose the correct answer.

1. Which of the following is least characteristic of facilitated diffusion?
   a. passive transport
   b. "helper" molecule
   c. solute diffuses down its concentration gradient
   d. pumps solute from an area of lower concentration to an area of higher concentration

2. What is the process that uses energy to move a solute from an area of lower concentration to an area of higher concentration?
   a. diffusion
   b. facilitated diffusion
   c. osmosis
   d. active transport pump

3. Which of the following are located on the cell membrane?
   a. cilia and mitochondria
   b. microvilli and cilia
   c. flagellum and centrioles
   d. Golgi apparatus and RER

4. Perfume the skunk does "his thing." Which of the following words best indicates why you quickly become aware of Perfume's presence?
   a. diffusion
   b. Na/K pump
   c. active transport
   d. osmosis

5. Differentiation is
   a. a type of cell division.
   b. the process that refers to the specialization of cells.
   c. a type of passive transport.
   d. a form of active transport.

6. Which of the following best describes the cell membrane?
   a. nonselective
   b. selectively permeable
   c. impermeable
   d. exclusively lipid-soluble

7. Ribosomes are
   a. only found attached to the endoplasmic reticulum.
   b. located within the nucleus.
   c. concerned with protein synthesis.
   d. the power plants of the cell.

8. Which of the following terms is most related to the mitochondrion?
   a. mucus-secreting
   b. mRNA, tRNA
   c. protein synthesis
   d. energy-producing

9. Which of the following is most related to lysosomes?
   a. protein synthesis
   b. DNA
   c. bound and free
   d. "housecleaning"

10. Prophase, metaphase, anaphase, and telophase
    a. are stages of mitosis.
    b. are the resting phases of the cell cycle.
    c. occur during G_0 of the cell cycle.
    d. are transport mechanisms.

11. Interphase and mitosis
    a. refer to the resting phase of the cell cycle.
    b. are two phases of the cell cycle.
    c. do not include prophase, metaphase, anaphase, or telophase.
    d. are characteristic only of stem cells.

12. G_1, S, and G_2
    a. are stages of mitosis.
    b. occur during interphase.
    c. occur only in stem cells.
    d. occur only in cancerous cells.

13. The ribosome-containing membranous structure
    a. is called the rough endoplasmic reticulum.
    b. is concerned with protein synthesis.
    c. forms intracellular channels that guide the movement of protein.
    d. All of the above are true.

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14. Which of the following is a true statement?
    a. The cell membrane is semipermeable, meaning that it allows only for the diffusion of water.
    b. The cytoplasm contains the cytosol and organelles.
    c. Most ATP is made in the nucleus.
    d. The Golgi apparatus is classified as smooth and rough.

15. What is the underlying cause of the cellular effects of aging?
    a. increased numbers of organelles
    b. damage to DNA
    c. increased rate of cellular mitosis
    d. cellular shrinking

CASE STUDY

While performing breast self-examination, J.S. discovered a lump in the right upper quadrant of her left breast. She immediately contacted her physician and a biopsy was scheduled. The pathology report indicated a benign neoplasm.

1. Which of the following is most characteristic of a benign neoplasm?
    a. metastatic
    b. well-differentiated cells
    c. malignant
    d. crablike

2. Which of the following words refers to the lump?
    a. biopsy
    b. metastasis
    c. Pap smear
    d. neoplasm

Part III: Challenge Yourself!

GROUPS AND PUZZLE

1. Which group is incorrect?
    a. passive transport mechanisms: osmosis, diffusion, Na/K pump
    b. organelles: mitochondria, lysosomes, ribosomes
    c. transport mechanisms: diffusion, osmosis, filtration
    d. stages of mitosis: prophase, anaphase, metaphase, telophase

2. Which group is incorrect?
    a. organelles: mitochondria, lysosomes, ribosomes
    b. types of ribosomes: free, bound (fixed)
    c. concentrations: isotonic, hypertonic, hypotonic
    d. active transport mechanisms: facilitated diffusion, osmosis, pinocytosis

3. Which group is incorrect?
    a. types of endoplasmic reticulum: rough and smooth
    b. types of endocytosis: pinocytosis, osmosis
    c. organelles: centrioles, microtubules, Golgi apparatus
    d. passive transport mechanisms: diffusion, osmosis, facilitated diffusion

PUZZLE

Hint: How to Get a Cell Mate

Directions: Perform the following functions on the Sequence of Words below. When all the functions have been performed, you are left with a word or words related to the hint. Record your answer below.

Functions: Remove the following:

1. Control center of the cell
2. Hairlike structures (two) on the surface of the cell membrane
3. Passive transport mechanisms (four)
4. Types of endoplasmic reticulum (two)
5. "Power plants" of the cell
6. Organelle that puts the finishing touches on a protein and then packages the protein for export
7. Cellular eating and cellular drinking
8. Phases of mitosis (four)
9. Process of cellular specialization

Sequence of Words

ROUGHMETAPHASEDIFFERENTIATION
OSMOSISCILIAGOLGIAPPARATUSANAPH
ASEPINOCYTOSISFLAGELLUMNUCLE
USMITOCHONDRIATELOPHASEMITOSISFA
CILITATEDDIFFUSIONDIFFUSION
PHAGOCYTOSISPROPHASEFILTRA
TIONSMOOTH

Answer: _____