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Chapter 02
Cytology - The Study of Cells

Multiple Choice Questions

1. Cells of the small intestine and kidney tubule have a "brush border" composed of _____, which are cell extensions that increase surface area.
A. plicae
B. rugae
C. flagella
D. microvilli
E. cilia

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.2d Describe the structure and function of microvilli, cilia, flagella, and cell junctions.
Section: 2.02
Topic: Organelles

2. Which microscope type would be most useful if a person wanted to see the detailed structure of organelles in a cell?
A. Transmission electron microscope
B. Scanning electron microscope
C. Light microscope
D. Fluorescence microscope
E. Compound microscope

Bloom's Level: 3. Apply
Gradable: automatic
Learning Outcome: 2.1b Discuss the way that developments in microscopy have changed our view of cell structure.
Section: 2.01

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3. Which term would you use to describe a cell that is thin, flat, and scaly, such as those found on the surface layer (epidermis) of the skin?
A. Columnar
B. Cuboidal
C. Squamous
D. Fusiform
E. Stellate

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.1d Identify cell shapes from their descriptive terms.
Section: 2.01

4. How does the relationship between surface area and volume impact how large a cell can be?
A. Volume is proportional to the cube of the diameter of the cell, so if diameter increases, volume will increase much faster than surface area, limiting exchange of wastes and nutrients.
B. Volume and surface area both increase the same amount if the diameter of the cell increases.
C. Surface area increases proportionately more than volume as the diameter of the cell increases and, therefore, exchange of wastes and nutrients is more efficient in a large cell.
D. If the diameter of the cell doubles, the volume of the cell will increase by a factor of four.
E. If the diameter of the cell doubles, the volume of the cell will also double.

Bloom's Level: 3. Apply
Gradable: automatic
Learning Outcome: 2.1e State the size range of human cells and explain why cell size is limited.
Section: 2.01

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5. The genetically unique carbohydrate coat that enables the cell to identify "self " from "non-self " is the _____.
A. cytoskeleton
B. plasma membrane
C. glycocalyx
D. basement membrane
E. serosa

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C07.02 Describe how carbohydrates are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2b Explain the functions of the lipid, protein, and carbohydrate components of the plasma membrane.
Section: 2.02
Topic: Membrane structure and function
Topic: Organelles

6. Which process would stop if a person ingested a poison that interfered with ATP production?
A. Simple diffusion
B. Osmosis
C. Filtration
D. Active transport
E. Facilitated diffusion

Bloom's Level: 3. Apply
Gradable: automatic
HAPS Objective: C08.01c Discuss the energy requirements and, if applicable, the sources of energy for each process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

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7. Which statement concerning transmembrane proteins in the plasma membrane is *false*?
A. They extend all the way through the plasma membrane.
B. Some have carbohydrate chains and help form the glycocalyx.
C. They are more abundant than the phospholipids.
D. They may serve as channels that allow certain solutes to enter and leave the cell.
E. They may be carriers that transport substances from one side of the plasma membrane to the other.

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C07.03 Describe how proteins are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2b Explain the functions of the lipid, protein, and carbohydrate components of the plasma membrane.
Section: 2.02
Topic: Membrane structure and function

8. Which of the following is *not* true of phospholipids?
A. They consist of a phosphate-containing head and two fatty acid tails.
B. They comprise the majority of lipids in the plasma membrane.
C. The fatty acid tails are hydrophilic.
D. The phosphate-containing heads are hydrophilic.
E. The heads of the phospholipids face towards the extracellular fluid.

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C07.01 Describe how lipids are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2a Describe the structure of the plasma membrane.
Section: 2.02
Topic: Membrane structure and function

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9. Which molecules form the basis for the lipid bilayer structure of the plasma membrane?
A. Cholesterol
B. Glycolipids
C. Transmembrane proteins
D. Phospholipids
E. Glycoproteins

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C07.01 Describe how lipids are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2a Describe the structure of the plasma membrane.
Section: 2.02
Topic: Membrane structure and function

10. White blood cells engulf bacteria by means of _____.
A. phagocytosis
B. pinocytosis
C. active transport
D. facilitated diffusion
E. exocytosis

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C08.01a State the type of material moving in each of the membrane transport process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

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11. How would you characterize the sodium-potassium (Na^+–K^+) pump?
A. Vesicular transport
B. Phagocytosis
C. Active transport
D. Facilitated diffusion
E. Receptor-mediated endocytosis

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C08.01d Give examples of each membrane transport process in the human body - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

12. Which organelle is enclosed with two membranes and has cristae extending inward from the inner membrane?
A. Endoplasmic reticulum
B. Nucleus
C. Lysosome
D. Golgi complex
E. Mitochondrion

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02b Describe the structure of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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13. Specialized pancreatic cells produce insulin. How do you think the cells secrete this product so that it can be used throughout the body?
A. Phagocytosis
B. Pinocytosis
C. Endocytosis
D. Exocytosis
E. Osmosis

Bloom's Level: 3. Apply
Gradable: automatic
HAPS Objective: C08.01d Give examples of each membrane transport process in the human body - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

14. In which phase of the cell cycle is DNA replicated?
A. G_1
B. G_2
C. S
D. anaphase
E. telophase

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C12.01a Describe the events that take place in each stage of generalized cell cycle, including interphase and the stages of mitosis.
HAPS Topic: Module C12 Somatic cell division.
Learning Outcome: 2.4a Describe the life cycle of a cell.
Section: 2.04
Topic: Somatic cell division

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15. During mitosis, what is the function of the mitotic spindle?
A. It separates the chromatids at the centromere.
B. It pulls together the replicated chromosomal strands.
C. It re-forms the nuclear envelope.
D. It separates the cytoplasm to the new daughter cells.
E. It separates the two halves of the DNA double helix.

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C12.01a Describe the events that take place in each stage of generalized cell cycle, including interphase and the stages of mitosis.
HAPS Topic: Module C12 Somatic cell division.
Learning Outcome: 2.4b Name the stages of mitosis and describe the events that occur in each one.
Section: 2.04
Topic: Somatic cell division

16. Which of the following structures contains an axoneme?
A. Mitochondrion
B. Microvillus
C. Intermediate filament
D. Cilium
E. Desmosome

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02b Describe the structure of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.2d Describe the structure and function of microvilli, cilia, flagella, and cell junctions.
Section: 2.02
Topic: Organelles

17. Which of the following statements about the modern cell theory is *incorrect*?
A. The cell is the smallest unit of life.
B. All cells arise from other cells.
C. All cells are enclosed in a cell wall.
D. The cells of all species are fundamentally similar in that they all have DNA as the hereditary material.
E. All functions of the body result from cellular activity.

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Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.1a State some tenets of the cell theory.
Section: 2.01

18. Which measurement would be most logical to describe the size of a cell?
A. 1–2 mm
B. 10 um
C. 2 cm
D. 5–10 nm
E. 1 dm

Bloom's Level: 4. Analyze
Gradable: automatic
Learning Outcome: 2.1e State the size range of human cells and explain why cell size is limited.
Section: 2.01

19. Materials that are to be discharged from a cell via exocytosis are packaged by which organelle?
A. Lysosome
B. Endoplasmic reticulum
C. Mitochondrion
D. Ribosome
E. Golgi complex

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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20. Where in the cell are amino acids assembled into proteins?
A. Endoplasmic reticulum
B. Ribosome
C. Nucleus
D. Golgi complex
E. Mitochondrion

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

21. Which of the following cells has a flagellum?
A. A cell lining the respiratory tract
B. A spermatozoon
C. A cell specialized for absorption, such as an epithelial cell of the small intestine
D. A cell lining the uterine tube
E. A neuron

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02a For each different type of organelle associated with human cells, identify the organelle.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

22. What is the function of cholesterol in the plasma membrane?
A. To maintain rigidity of the plasma membrane
B. To make the membrane more resistant to freezing
C. To form receptor molecules
D. To increase the fluidity of the membrane
E. To restrict the entry of most molecules

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C07.01 Describe how lipids are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2b Explain the functions of the lipid, protein, and carbohydrate components of the plasma membrane.
Section: 2.02
Topic: Membrane structure and function

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23. After phospholipids, what are the next most abundant lipids in the plasma membrane?
A. Triglycerides
B. Glycolipids
C. Saturated fats
D. Cholesterol
E. Steroids

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C07.01 Describe how lipids are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2b Explain the functions of the lipid, protein, and carbohydrate components of the plasma membrane.
Section: 2.02
Topic: Membrane structure and function

24. The glycocalyx serves all of the following functions *except:*
A. distinguishing the body's own cells from foreign cells.
B. protecting the membrane from physical and chemical injury.
C. determining blood transfusion compatibility.
D. helping to bind a sperm to an egg.
E. absorbing energy into the cell.

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C07.02 Describe how carbohydrates are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2b Explain the functions of the lipid, protein, and carbohydrate components of the plasma membrane.
Section: 2.02
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25. An individual with widespread blistering of the skin and oral mucosa due to a misguided attack of desmosomes by their own antibodies is likely suffering from which of the following disorders?
A. Diabetes mellitus
B. Multiple sclerosis
C. Situs inversus
D. Pemphigus vulgaris
E. Neoplasm

Bloom's Level: 3. Apply
Gradable: automatic
HAPS Objective: C15.02 Predict the types of problems that would occur if the cells could not maintain homeostasis due to abnormalities in organelle function, transport processes, protein synthesis, or the cell cycle.
HAPS Topic: Module C15 Predictions related to homeostatic imbalance, including disease states and disorders.
Learning Outcome: 2.2d Describe the structure and function of microvilli, cilia, flagella, and cell junctions.
Section: 2.02

26. What are cytoskeletal microfilaments composed of?
A. Keratin
B. Cholesterol
C. Actin
D. Glycoproteins
E. Phospholipids

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C06.01 Identify the three main parts of a cell, and list the general functions of each.
HAPS Topic: Module C06 Intracellular organization of nucleus and cytoplasm.
Learning Outcome: 2.3a Describe the cytoskeleton and its functions.
Section: 2.03
Topic: Intracellular organization

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27. The rough endoplasmic reticulum performs which of the following functions?
A. ATP synthesis
B. Protein synthesis
C. DNA synthesis
D. Active transport
E. Polysaccharide hydrolysis

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

28. Which organelle is most active in apoptosis (programmed cell death)?
A. Mitochondrion
B. Endoplasmic reticulum
C. Lysosome
D. Nucleus

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

29. Muscle cells contain numerous _____ because of their high demand for ATP.
A. mitochondria
B. endoplasmic reticula
C. lysosomes
D. nuclei
E. Golgi complexes

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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30. Which process is *not* used to move substances out of a cell?
A. Exocytosis
B. Phagocytosis
C. Active transport
D. Simple diffusion
E. Facilitated diffusion

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C08.01b Describe the mechanism by which movement of material occurs in each membrane transport process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

31. Some of the peripheral microtubules of a cilium continue into the cell as a short _____.
A. basal body
B. terminal web
C. microfilament
D. axoneme
E. centrosome

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02b Describe the structure of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.2d Describe the structure and function of microvilli, cilia, flagella, and cell junctions.
Section: 2.02
Topic: Organelles

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32. Why is the nucleus considered to be the control center of cellular activity?
A. It contains DNA.
B. It has nuclear pores.
C. It contains ribosomes.
D. It has a nuclear envelope.
E. It has a nucleolus.

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

33. Where do lysosomes originate?
A. Golgi complex
B. Plasma membrane
C. Nucleus
D. Phospholipids
E. Smooth endoplasmic reticulum

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02a For each different type of organelle associated with human cells, identify the organelle.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

34. Which of the following is found within a cytoplasmic inclusion?
A. Golgi complex
B. Lysosome
C. Microtubule
D. Glycogen
E. Mitochondrion

Bloom's Level: 2. Understand
Gradable: automatic
Learning Outcome: 2.3c Give some examples of cell inclusions and explain how inclusions differ from organelles.
Section: 2.03
Topic: Intracellular organization

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35. Which of the following is *true* of tight junctions?
A. They are formed by connexons.
B. They seal off intercellular space and prevent substances from passing between cells.
C. They contain channels of diffusion of solutes from one cell to the next.
D. They are patches that are formed when J-shaped proteins protrude toward the plasma membrane from the cytoskeleton.
E. They are patch-like connections that are abundant in the epidermis and serve to keep cells from pulling apart.

Bloom's Level: 2. Understand
Gradable: automatic
Learning Outcome: 2.2d Describe the structure and function of microvilli, cilia, flagella, and cell junctions.
Section: 2.02

36. Which type of intercellular connection facilitates the passage of electrical signals between cardiocytes and enables a coordinated heart beat?
A. Tight junctions
B. Desmosomes
C. Gap junctions
D. Tuxedo junctions
E. J junctions

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.2d Describe the structure and function of microvilli, cilia, flagella, and cell junctions.
Section: 2.02

37. Which organelle has its own DNA independent of nuclear DNA?
A. Golgi complex
B. Lysosome
C. Ribosome
D. Peroxisome
E. Mitochondrion

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02b Describe the structure of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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38. Which of the following is *not* a function of the Golgi complex?
A. Synthesis of carbohydrates
B. Synthesis of lysosomes
C. Packaging of proteins for export from the cell
D. DNA replication
E. Addition of carbohydrates to certain proteins

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

39. Which of the following is *not* a component of the cytoskeleton?
A. Microfilaments
B. Microtubules
C. Actin
D. Intermediate filaments
E. Cilia

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C06.01 Identify the three main parts of a cell, and list the general functions of each.
HAPS Topic: Module C06 Intracellular organization of nucleus and cytoplasm.
Learning Outcome: 2.3a Describe the cytoskeleton and its functions.
Section: 2.03
Topic: Intracellular organization

40. The transmission electron microscope (TEM) can magnify images up to how many times?
A. 200x
B. 1,200x
C. 300,000x
D. 600,000x
E. 1,000,000x

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.1b Discuss the way that developments in microscopy have changed our view of cell structure.
Section: 2.01

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41. What is the function of peroxisomes?
A. To produce ATP
B. To package vesicles
C. To break down proteins and phospholipids
D. To detoxify various drugs in the liver
E. To synthesize lipids

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

42. Where in the body would you expect to find cells that have an abundance of smooth endoplasmic reticulum?
A. The ovaries
B. The brain
C. The lining of the stomach
D. The surface of the skin
E. The bone marrow

Bloom's Level: 3. Apply
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
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43. In mitosis, which structure anchors the spindle fibers to the chromosome?
A. Centromere
B. Kinetochore
C. Chromatid
D. Aster
E. Mitotic spindle

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C12.01a Describe the events that take place in each stage of generalized cell cycle, including interphase and the stages of mitosis.
HAPS Topic: Module C12 Somatic cell division.
Learning Outcome: 2.4b Name the stages of mitosis and describe the events that occur in each one.
Section: 2.04
Topic: Somatic cell division

44. The endocytotic process by which tiny packets of fluid are brought into the cell is called _____.
A. facilitated diffusion
B. osmosis
C. pinocytosis
D. phagocytosis
E. exocytosis

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C08.01b Describe the mechanism by which movement of material occurs in each membrane transport process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
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Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
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45. Which of the following would *not* be affected by the absence of microtubules?
A. Cell division
B. Cell movement
C. The arrangement of organelles
D. DNA replication
E. Movement of molecules within the cell

Bloom's Level: 3. Apply
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3a Describe the cytoskeleton and its functions.
Section: 2.03
Topic: Intracellular organization
Topic: Organelles

46. Separation of the cytoplasm during cell division is called _____.
A. telophase
B. anaphase
C. metaphase
D. cytokinesis
E. mitosis

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C12.02 Distinguish between mitosis and cytokinesis.
HAPS Topic: Module C12 Somatic cell division.
Learning Outcome: 2.4a Describe the life cycle of a cell.
Section: 2.04
Topic: Somatic cell division

47. What are pluripotent stem cells?
A. Cells that are able to develop only into one mature cell type.
B. Cells found only in the bone marrow that can differentiate into any kind of blood cell.
C. Cells found only in adult tissue that replace cells that have died or become damaged.
D. Cells from pre-embryos that can develop into any type of embryonic or adult cell.
E. Very strong cells that can assume the function of any cell type in the body.

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.4c Discuss the types and clinical uses of stem cells.
Section: 2.04

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48. Which of the following is a clear gel, with no visible structure of its own, in which the organelles are embedded?
A. Nucleoplasm
B. Cytoplasm
C. Cytosol
D. Ectoplasm
E. Protoplasm

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C06.02 Explain how cytoplasm and cytosol are different.
HAPS Topic: Module C06 Intracellular organization of nucleus and cytoplasm.
Learning Outcome: 2.1c Outline the major structural components of a cell.
Section: 2.01
Topic: Intracellular organization

49. Which function would stop immediately if the ribosomes of a cell were destroyed?
A. ATP synthesis
B. DNA replication
C. Protein synthesis
D. Osmosis
E. Active transport

Bloom's Level: 4. Analyze
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

50. Which of the following is *true* of inclusions?
A. They are enclosed in a unit membrane.
B. They are essential for cell survival.
C. An example of an inclusion is a mitochondrion.
D. They are never enclosed in a unit membrane.
E. They are one component of the cytoskeleton.

Bloom's Level: 2. Understand
Gradable: automatic
Learning Outcome: 2.3c Give some examples of cell inclusions and explain how inclusions differ from organelles.
Section: 2.03
Topic: Intracellular organization

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Fill in the Blank Questions

51. The phase of the cell cycle in which proteins are synthesized, growth occurs, and regular cellular tasks are carried out is the _____ phase.
G1 *or*
first gap

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C12.01a Describe the events that take place in each stage of generalized cell cycle, including interphase and the stages of mitosis.
HAPS Topic: Module C12 Somatic cell division.
Learning Outcome: 2.4b Name the stages of mitosis and describe the events that occur in each one.
Section: 2.04
Topic: Somatic cell division

52. The organelle that synthesizes carbohydrates, sorts and packages proteins, and synthesizes lysosomes is the _____ _____.
Golgi complex *or*
Golgi apparatus

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

53. Most ATP production occurs in the _____ (organelle) of the cell.
mitochondria *or*
mitochondrion

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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54. The _____ endoplasmic reticulum is studded with ribosomes and plays a role in protein synthesis.
rough

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

55. An organelle that synthesizes steroid hormones and is abundant in the ovaries and testes is the _____ endoplasmic reticulum.
smooth

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

56. Membrane-enclosed packets of enzymes that play a role in apoptosis are called _____.
lysosomes

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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57. The _____ (organelle) plays a role in neutralizing free radicals, detoxifying alcohol and other drugs, and breaking fatty acids into 2-carbon molecules.
peroxisome

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

58. The cytoskeleton component composed mainly of the protein actin is a _____.
microfilament

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3a Describe the cytoskeleton and its functions.
Section: 2.03
Topic: Intracellular organization

59. Amino acid chains are assembled into proteins in _____ (organelles).
ribosomes *or*
ribosome

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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60. The process by which particles move from high concentration to low concentration is called _____.
diffusion *or*
simple diffusion

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C08.01b Describe the mechanism by which movement of material occurs in each membrane transport process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

61. The process by which a pressure forces material through a membrane is called _____.
filtration

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C08.01b Describe the mechanism by which movement of material occurs in each membrane transport process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

62. The diffusion of water through a semi-permeable membrane is called _____.
osmosis

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C08.01b Describe the mechanism by which movement of material occurs in each membrane transport process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

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63. _____ diffusion is a process in which carrier proteins ferry substances down their concentration gradient without the use of cellular energy.
Facilitated

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C08.01b Describe the mechanism by which movement of material occurs in each membrane transport process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

64. During _____ of the cell cycle, the chromatids are pulled to opposite sides of the cell.
anaphase

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C12.01a Describe the events that take place in each stage of generalized cell cycle, including interphase and the stages of mitosis.
HAPS Topic: Module C12 Somatic cell division.
Learning Outcome: 2.4b Name the stages of mitosis and describe the events that occur in each one.
Section: 2.04
Topic: Somatic cell division

65. A mass of tissue produced when the rate of cell division exceeds the rate of cell death is known as a _____.
tumor *or*
neoplasm

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C15.02 Predict the types of problems that would occur if the cells could not maintain homeostasis due to abnormalities in organelle function, transport processes, protein synthesis, or the cell cycle.
HAPS Topic: Module C15 Predictions related to homeostatic imbalance, including disease states and disorders.
Learning Outcome: 2.4a Describe the life cycle of a cell.
Section: 2.04
Topic: Somatic cell division

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66. Embryonic stem cells are said to be _____. That is, they have the ability to develop into any type of adult cell.
pluripotent

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.4c Discuss the types and clinical uses of stem cells.
Section: 2.04
Topic: Somatic cell division

67. The study of *cellular* structure and function is called_____.
cytology

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.1a State some tenets of the cell theory.
Section: 2.01

68. White blood cells engulf bacteria through the process of _____.
phagocytosis *or*
endocytosis

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C08.01d Give examples of each membrane transport process in the human body - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

69. Extensions of the plasma membrane that increase surface area for the absorption of nutrients in the small intestine are called _____.
microvilli *or*
brush border

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.2d Describe the structure and function of microvilli, cilia, flagella, and cell junctions.
Section: 2.02
Topic: Organelles

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70. An organelle that contains its own DNA, independent of the nuclear DNA, is the _____.
mitochondrion

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

Check All That Apply Questions

71. Select the three basic components of the cell.
__X__ Plasma membrane
__X__ Cytoplasm
_____ Nucleus
__X__ Nucleoplasm

The plasma membrane, cytoplasm, and nuceloplasm are the three basic components of a cell. The nucleus is classified as an organelle.

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.1c Outline the major structural components of a cell.
Section: 2.01
Topic: Intracellular organization

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Multiple Choice Questions

72. Skeletal muscle cells are long and slender. Therefore, they would be considered _____ in shape.
A. squamous
B. discoid
C. fibrous
D. cuboidal

Bloom's Level: 3. Apply
Gradable: automatic
Learning Outcome: 2.1d Identify cell shapes from their descriptive terms.
Section: 2.01

73. Cells that are thick in the middle and tapered toward the end are called _____ cells.

A. squamous
B. stellate
C. columnar
D. spheroid
E. fusiform

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.1d Identify cell shapes from their descriptive terms.
Section: 2.01

74. Most human cells range from 10 to 15 micrometers in diameter. What limits how large a cell can get?
A. A cell's lifespan
B. Nutrients available in the environment of a cell
C. The relationship between its volume and length
D. The relationship between its length and surface area
E. The relationship between its volume and surface area

Bloom's Level: 2. Understand
Gradable: automatic
Learning Outcome: 2.1e State the size range of human cells and explain why cell size is limited.
Section: 2.01

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75. The fluid outside of a cell is called _____.
A. cytosol
B. intracellular fluid
C. extracellular fluid
D. cytoplasm
E. nucleoplasm

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C06.01 Identify the three main parts of a cell, and list the general functions of each.
HAPS Topic: Module C06 Intracellular organization of nucleus and cytoplasm.
Learning Outcome: 2.1c Outline the major structural components of a cell.
Section: 2.01
Topic: Intracellular organization

76. Which of the following is *not* one of the three basic components of a cell?
A. Cytoplasm
B. Nucleus
C. Plasma membrane
D. Interstitial fluid

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C06.01 Identify the three main parts of a cell, and list the general functions of each.
HAPS Topic: Module C06 Intracellular organization of nucleus and cytoplasm.
Learning Outcome: 2.1c Outline the major structural components of a cell.
Section: 2.01
Topic: Intracellular organization

77. The flat-shaped cells found covering the skin are _____ in shape.
A. cuboidal
B. columnar
C. cylindrical
D. squamous
E. spherical

Bloom's Level: 1. Remember
Gradable: automatic
Learning Outcome: 2.1d Identify cell shapes from their descriptive terms.
Section: 2.01

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78. Most transmembrane proteins have _____ regions facing the intra- and extracellular fluid, and _____ regions embedded in the phospholipid bilayer.
A. hydrophilic; hydrophilic
B. hydrophilic; hydrophobic
C. hydrophobic; hydrophobic
D. hydrophobic; hydrophilic
E. lipophilic; lipophobic

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C07.01 Describe how lipids are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2a Describe the structure of the plasma membrane.
Section: 2.02
Topic: Membrane structure and function

79. The fuzzy coat of carbohydrates on the outer surface of the plasma membrane that functions in cell identification is called the _____.
A. brush border
B. glycocalyx
C. cholesterol coat
D. phospholipid bilayer
E. cell-adhesion molecule

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C09.02b Describe the structure of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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80. Two solutions are separated by a selectively permeable membrane. If solution A has a higher concentration of a nonpermeating solute than solution B, then _____.
A. the solute will pass down its concentration gradient from solution A to B
B. the solute will pass down its concentration gradient from solution B to A
C. water will pass down its concentration gradient from solution A to B
D. water will pass down its concentration gradient from solution B to A
E. neither the solute nor water will diffuse

Bloom's Level: 4. Analyze
Gradable: automatic
HAPS Objective: C08.01b Describe the mechanism by which movement of material occurs in each membrane transport process - simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, and filtration.
HAPS Topic: Module C08 Mechanisms for movement of materials across cell membranes.
Learning Outcome: 2.2c Describe the processes for moving material into and out of a cell.
Section: 2.02
Topic: Mechanisms for movement across cell membranes

81. The term _____ refers to a membrane that allows some things to pass through it, but not others.
A. selectively permeable
B. glycocalyx
C. phospholipid bilayer
D. specificity
E. carrier-mediated

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C07.01 Describe how lipids are distributed in a cell membrane, and explain their functions.
HAPS Topic: Module C07 Membrane structure and function.
Learning Outcome: 2.2a Describe the structure of the plasma membrane.
Section: 2.02
Topic: Membrane structure and function

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82. Which of the following is *not* a membranous organelle?
A. Mitochondria
B. Ribosome
C. Nucleus
D. Endoplasmic reticulum
E. Golgi complex

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02b Describe the structure of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

83. _____ play an important role in cell division, and they are made of _____.
A. Mitochondria; microtubules
B. Ribosomes; intermediate filaments
C. Nucleoli; microfilaments
D. Centrioles; microtubules
E. Inclusions; centrosomes

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02a For each different type of organelle associated with human cells, identify the organelle.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

84. Which of the following organelles is *not* involved in protein synthesis?
A. Smooth ER
B. Rough ER
C. The Golgi complex
D. The nucleus
E. Ribosomes

Bloom's Level: 4. Analyze
Gradable: automatic
HAPS Objective: C09.02c Describe the function of each different type of organelle associated with human cells.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3b List the main organelles of a cell and explain their functions.
Section: 2.03
Topic: Organelles

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85. Which of the following gives a cell structural support, determines the shape of a cell, and directs the movement of substances through a cell?
A. Cholesterol
B. The nucleus
C. The plasma membrane
D. The Golgi complex
E. The cytoskeleton

Bloom's Level: 1. Remember
Gradable: automatic
HAPS Objective: C06.01 Identify the three main parts of a cell, and list the general functions of each.
HAPS Topic: Module C06 Intracellular organization of nucleus and cytoplasm.
Learning Outcome: 2.3a Describe the cytoskeleton and its functions.
Section: 2.03
Topic: Intracellular organization

86. Which of the following is *not* considered an inclusion?
A. Lysosome
B. Fat droplet
C. Glycogen granule
D. Bacterium
E. Dust particle

Bloom's Level: 2. Understand
Gradable: automatic
HAPS Objective: C09.02a For each different type of organelle associated with human cells, identify the organelle.
HAPS Topic: Module C09 Organelles.
Learning Outcome: 2.3c Give some examples of cell inclusions and explain how inclusions differ from organelles.
Section: 2.03
Topic: Organelles

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