Contents

3.1 Introduction to the Cell

Read 3.1 (pp. 142–147).

Exercises

Circle the letter of the best answer.

1. In what organism were cells first discovered?
   - **a.** animals
   - **b.** fungi
   - **c.** humans
   - **d.** plants
2. Which part of the cell directs cellular processes?
   - **a.** membrane
   - **b.** nucleus
   - **c.** organelle
   - **d.** wall
3. What is the function of the cells that make up unicellular organisms?
   - **a.** moving substances
   - **b.** constructing proteins
   - **c.** performing all life processes
   - **d.** interacting with specialized cells
4. Which organisms are made of specialized cells?
   - **a.** bacteria
   - **b.** amoebas
   - **c.** unicellular organisms
   - **d.** multicellular organisms
5. Which organisms have prokaryotic cells?
   - **a.** amoebas
   - **b.** bacteria
   - **c.** humans
   - **d.** plants

6. What is the main material cells use in protein synthesis?
   - **a.** water
   - **b.** protoplasm
   - **c.** amino acids
   - **d.** carbohydrates

7. What is the purpose of metabolism in the cell?
   - **a.** making new cells
   - **b.** transporting molecules
   - **c.** controlling body processes
   - **d.** providing nutrients and energy

8. Which statement is true of all cells?
   - **a.** All cells are eukaryotic.
   - **b.** All cells have the same appearance.
   - **c.** All cells perform the same functions.
   - **d.** All cells are composed of nonliving molecules.

Circle *T* if the statement is true or *F* if it is false.

9. **T F** Specialized cells can perform all the necessary life processes alone.
10. **T F** Cells must expend energy to transport oxygen through the cell membrane.
11. **T F** Many substances can only enter or exit the cell if they are actively transported by the cell.
12. **T F** The materials that form cells originally come from the environment.
13. **T F** Cells are mainly composed of proteins.

Answer these questions.

14. What is the difference between eukaryotic and prokaryotic cells?

15. What are the four basic functions performed by most cells?

16. How do mitosis and meiosis differ in the number and purpose of the cells they produce?

17. What two types of cells are produced in meiosis, and how do they differ from each other?

18. What are three basic characteristics of all cells?

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19. What are the four types of organic compounds found in cells?

_____

20. A student soaks a cell in a special dye that only stains membranes. Viewing the cell under a microscope, he sees the stained outline of the cell, as well as many other stained spheres inside the cell. Is the cell more likely a eukaryotic or prokaryotic cell?

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3.2 Structure of the Cell

Read 3.2 (pp. 148–152).

Exercises

Circle the letter of the correct answer.

1. Which is *not* a major role of proteins in the cell membrane?
   - **a.** represent the cell's identity
   - **b.** transmit messages to the nucleus
   - **c.** serve as receptors for chemical signals
   - **d.** determine the identity of incoming material
   - **e.** control material entering and exiting the cell

2. What are microtubules?
   - **a.** pores that allow gases to flow through the cell
   - **b.** tiny fibers that move materials through the cytoplasm
   - **c.** channels through the cell membrane that allow materials into the cell
   - **d.** openings in the nuclear membrane that let materials enter the nucleus

3. Where is DNA stored within the cell?
   - **a.** nucleus
   - **b.** cytoplasm
   - **c.** cell membrane
   - **d.** all parts of the cell

4. What is the name of the barrier that encloses the nucleus?
   - **a.** cytoskeleton
   - **b.** cell membrane
   - **c.** nuclear envelope
   - **d.** plasma membrane

5. What is the purpose of chromatin?
   - **a.** store DNA in coils so it does not tangle up
   - **b.** copy DNA when the cell needs to make new proteins
   - **c.** provide structure to keep the nucleus from collapsing
   - **d.** open and close pores in the nuclear envelope to allow materials to enter and exit

6. What cellular component carries a copy of the information stored in DNA?
   - **a.** RNA
   - **b.** chromatin
   - **c.** organelles
   - **d.** DNA copies itself.

Circle *T* if the statement is true or *F* if it is false.

7. **T F** The cell membrane is a rigid wall that protects the organelles.
8. **T F** Phospholipid tails are hydrophobic, or repelled by water.
9. **T F** The cell membrane can withstand pressure without breaking.
10. **T F** The cell membrane is made up primarily of proteins.
11. **T F** Proteins do most of the work of the cell membrane.
12. **T F** The cytoskeleton maintains a fixed shape.
13. **T F** The nucleus takes up about half of the space within the cytoplasm.

Answer these questions.

14. What are the basic roles of the cell membrane?

15. Glucose molecules store energy, which is released through cellular respiration to provide energy for cell processes. Cells need glucose, but glucose is a large polar molecule that is repelled by the phospholipids in the cell membrane, so it cannot diffuse through the membrane. How could a glucose molecule enter a cell?

16. What is cytoplasm?

17. What is the cytoskeleton, and what does it do?

18. What is the purpose of the cell nucleus?

Complete this exercise.

19. Draw a close-up diagram of a section of a lipid bilayer membrane. Show the heads and tails of each phospholipid. Label the hydrophilic and hydrophobic portions of the phospholipids.

Review

Circle the letter of the correct answer. 3.1

20. Which does *not* accurately describe all cells?
- **a.** All cells are eukaryotic.
- **b.** All cells come from older cells.
- **c.** All cells are made mostly of water.
- **d.** All cells are composed only of nonliving parts.

21. Which is true of cellular transport?
- **a.** Some substances can freely enter the cell.
- **b.** Cells do not control what substances enter them.
- **c.** Specialized cells do not perform cellular transport.
- **d.** Substances can only enter the cell if they are actively transported.

22. What is the name for cells that lack membrane-bound organelles and nuclei?
- **a.** reproductive cells
- **b.** prokaryotic cells
- **c.** specialized cells
- **d.** unicellular cells

Circle the letter of the cell function that malfunctions to cause each disease. 3.1

23. Cancer occurs when a genetic mutation causes cells to grow and multiply out of control, eventually spreading through the body.
- **a.** cell division
- **b.** cellular transport

24. Cystic fibrosis occurs when a genetic mutation prevents the CFTR protein from fulfilling its normal role of moving salt out of cells. This results in a buildup of thick, sticky mucus inside the body.
- **a.** metabolism
- **b.** cellular transport

25. Hemophilia occurs when a genetic mutation prevents cells from forming healthy clotting factors, the proteins that cause blood to clot.
- **a.** protein synthesis
- **b.** cellular transport

Circle *T* if the statement is true or *F* if it is false. Correct the italicized part of any false statement. 3.1

26. T F Cells use substances from the *environment* to build the biomolecules they are made of.

27. T F Plants are composed of *eukaryotic* cells.

28. T F The characteristics of an organism's *structures and functions* are determined by the organism's cells.

29. T F Cells use *fatty acids* to build proteins.