Section 1: Cell Theory

Study Guide A

Key Concept

Cells are the basic unit of life.

Vocabulary

|  |  |  |
| --- | --- | --- |
| cell theory | organelle | eukaryotic cell |
| cytoplasm | prokaryotic cell |  |

Main Idea: Early studies led to the development of the cell theory.

Match each scientist in the table with the statement listed below that describes what he did to help develop the cell theory.

a. concluded that animals and, in fact, all living things are made of cells.

b. was the first to identify cells and name them.

c. proposed that all cells come from other cells.

d. concluded that plants are made of cells.

e. observed live cells and observed greater detail.

|  |  |
| --- | --- |
| Scientist | Letter of Statement that Completes the Sentence |
| 1. Hooke |  |
| 2. Leeunwenhoek |  |
| 3. Schleiden |  |
| 4. Schwann |  |
| 5. Virchow |  |

Study Guide A continued

Circle the word that best completes the statement about cell theory.

6. The cell theory states that:

i. All organisms are made of organelles / cells.

ii. All existing cells are produced by other living / dead cells.

iii. The atom / cell is the most basic unit of life.

7. Cell theory is one of the great unifying theories of biology / chemistry.

Main idea: Prokaryotic cells lack a nucleus and most internal structures of eukaryotic cells.

8. For each of the following cell characteristics, place a check mark in the appropriate box or boxes to indicate whether it is a characteristic of eukaryotic cells, prokaryotic cells, or both.

|  |  |  |
| --- | --- | --- |
| Characteristic | Eukaryotic cells | Prokaryotic cells |
| Surrounded by a cell membrane |  |  |
| Contains cytoplasm |  |  |
| Contains a nucleus |  |  |
| Contains membrane-bound organelles |  |  |
| Tends to be microscopic in size |  |  |
| Either single-celled or multicellular |  |  |
| Only single-celled |  |  |

Vocabulary Check

Fill in the blank with the word or phrase that best completes the sentence.

9. The jellylike substance that contains dissolved molecular building blocks and, in some types of cells, organelles, is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells have no nucleus.

Section 2: Cell Organelles

Study Guide A

Key Concept

Eukaryotic cells share many similarities.

Vocabulary

|  |  |  |
| --- | --- | --- |
| cytoskeleton | Golgi apparatus | lysosome |
| nucleus | vesicle | centriole |
| endoplasmic reticulum | mitochondrion | cell wall |
| ribosome | vacuole | chloroplast |

Main Idea: Cells have an internal structure.

1. Which of the following is not a function of the cell membrane?

a. It supports and shapes the cell.

b. It assists in cell division.

c. It positions organelles.

d. It provides energy to the cell.

MAIN IDEA: Several organelles are involved in making and processing proteins.

Draw a line to connect each organelle with its function.

|  |  |
| --- | --- |
| 2. nucleus | a. link amino acids together to form proteins |
| 3. endoplasmic reticulum | b. carry certain molecules from place to place in a cell |
| 4. ribosomes | c. processes, sorts, and delivers proteins |
| 5. Golgi apparatus | d. stores most of the genetic information of a cell |
| 6. vesicles | e. helps in the production of proteins and lipids |

Study Guide A continued

MAIN IDEA: Other organelles have various functions.

Draw a line to connect each organelle with its function.

|  |  |
| --- | --- |
| 7. mitochondrion | a. stores materials needed by the cell; may help provide support to plant cells |
| 8. vacuole | b. contains enzymes that break down damaged and worn-out cell parts; defends a cell from invaders |
| 9. lysosome | c. supplies energy to the cell by converting molecules from food into usable energy |
| 10. centriole | d. organizes microtubules to form cilia and flagella for cell motion or the movement of fluids past a cell |

MAIN IDEA: Plant cells have cell walls and chloroplasts.

Circle the word or phrase that best completes the statement.

11. The cell walls in a plant are strong and rigid / flexible and adhere to each other, which helps to support the entire plant.

12. A cell wall and a cell membrane are different. All cells are surrounded by a cell wall / cell membrane that is rigid / flexible and interacts with the environment. Only certain cells have a cell wall / cell membrane, which is rigid / flexible and provides shape and support to cells.

13. Chloroplasts enable plants to convert soil nutrients / solar energy into energy-rich molecules that cells can use.

Vocabulary Check

14. The endoplasmic reticulum is a maze of folded membranes where \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_ are produced.

15. The mitochondrion converts food into \_\_\_\_\_\_\_\_ that is usable by a cell.

Section 3: Cell Membrane

Study Guide A

Key Concept

The cell membrane is a barrier that separates a cell from the external environment.

VOCABULARY

|  |  |
| --- | --- |
| cell membrane | selective permeability |
| phospholipid | receptor |
| fluid mosaic model |  |

MAIN IDEA: Cell membranes are composed of two phospholipid layers.

1. Draw a phospholipid in the box below. Label the three major parts.

2. Place a check mark in the appropriate box to show which parts of a phospholipid are charged, or polar, and which parts are nonpolar.

|  |  |  |
| --- | --- | --- |
| Phospholipid part | Polar (charged) | Nonpolar |
| Phosphate group |  |  |
| Glycerol |  |  |
| Fatty acid tail |  |  |

Study Guide A continued

A cell membrane has other types of molecules embedded in the phospholipid bilayer. Fill in the type of molecule that performs each function indicated in the sentences below.

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ strengthens the cell membrane.

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ help materials cross the membrane and are also part of the cytoskeleton.

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ help identify cell types.

Choose whether the statement is true or false.

6.true / false A membrane is fluid, because the phospholipids in each layer can move from side to side, in and out of the cell, by sliding past each other, and by spinning in circles.

7. true / false A selectively permeable membrane allows all molecules to cross.

MAIN IDEA: Chemical signals are transmitted across the cell membrane.

Ci**r**cle the word or phrase that best completes the statement.

8. A receptor / phospholipid detects a signal molecule and carries out an action in response.

9. A ligand is a molecule that acts as a receptor / signal when it binds to a receptor / signal.

10. A ligand that can cross / cannot cross the cell membrane can bind to an intracellular receptor.

11. A ligand that can cross / cannot cross the cell membrane can send a message to a cell by binding to / taking off a membrane receptor, which then changes shape.

Vocabulary Check

12. The fluid mosaic model describes the arrangement of the \_\_\_\_\_\_\_\_\_\_\_\_ that make up a cell membrane. The model includes both the fluidity of the membrane and the variety of molecules that make up the membrane.

13. Selective \_\_\_\_\_\_\_\_\_\_\_\_\_ means that the cell membrane allows some, but not all, molecules to cross.

Section 4: Diffusion and Osmosis

Study Guide A

KEY CONCEPT

Materials move across membranes because of concentration differences.

VOCABULARY

|  |  |  |
| --- | --- | --- |
| passive transport | osmosis | hypotonic |
| diffusion | isotonic | facilitated diffusion |
| concentration gradient | hypertonic |  |

MAIN IDEA: Diffusion and osmosis are types of passive transport.

1. The difference in the concentration of a substance from one location to another is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. A molecule that diffuses down a concentration gradient goes from an area of \_\_\_\_\_\_\_\_\_\_\_\_ concentration into an area of \_\_\_\_\_\_\_\_\_\_\_\_ concentration.

Complete the following Concept Map about passive transport. Write the letter of each statement listed below in the appropriate box.

a. the natural motion of particles

b. osmosis

c. the movement of molecules down a concentration gradient

d. energy from the cell

e. diffusion

Passive transport

7.

requires no

example

example

3 .

4.

gets energy from



the diffusion

of water

5.

6.





Study Guide A continued

8. The higher the concentration of dissolved particles in a solution, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the concentration of water molecules in that solution.

Suppose you have three solutions with different concentrations of particles. Relative to the concentration of particles in a cell, one solution is isotonic,   
one is hypertonic, and one is hypotonic. Use this information to answer the   
next two questions.

9. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ solution has the highest concentration of particles.

10. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ solution has the highest concentration of water molecules.

MAIN IDEA: Some molecules diffuse through membrane proteins.

Circle the word or phrase that best completes the statement.

11. Simple / Facilitated diffusion occurs across the membrane, but simple / facilitated diffusion occurs through selective transport proteins.

12. In facilitated diffusion, molecules move down a concentration gradient / against a concentration gradient.

Vocabulary Check

Fill in the blank with the word or phrase that best completes the sentence.

13. The difference in the concentration of a substance from one location to another is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

14. People with more energy than most other people are described as hyper.   
A solution with a higher level of solutes than the solution it is being compared to is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

15. The word *facilitate* means “to make easier.” \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ means that the transport protein makes it easier for a molecule that cannot directly cross the cell membrane to enter or exit a cell.

Section 5: Active Transport, Endocytosis, and Exocytosis

Study Guide A

KEY CONCEPT

Cells use energy to transport materials that cannot diffuse across a membrane.

VOCABULARY

|  |  |
| --- | --- |
| active transport | phagocytosis |
| endocytosis | exocytosis |

MAIN IDEA: Proteins can transport materials against a concentration gradient.

For each of the following statements, place a check mark in the appropriate box if it is true for simple diffusion, facilitated diffusion, or active transport. Each statement may be true for one or more of the three types of transportation.

|  |  |  |  |
| --- | --- | --- | --- |
| Statement | Simple Diffusion | Facilitated Diffusion | Active Transport |
| 1. The movement of molecules against a concentration gradient. |  |  |  |
| 2. The movement of molecules down a concentration gradient. |  |  |  |
| 3. The movement of molecules through selective membrane proteins. |  |  |  |

4. All transport proteins span the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Most transport proteins change shape when they \_\_\_\_\_\_\_\_\_\_ to a target molecule or molecules.

5. Active transport proteins have one key distinguishing feature, which is that they use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to move a substance against its concentration gradient.

6. Refer to Figure 5.1 to draw a picture in the box below to represent active transport.

outside inside

Study Guide A continued

7. Most active transport proteins use energy from the breakdown of \_\_\_\_\_\_\_\_\_\_\_.

MAIN IDEA: Endocytosis and exocytosis transport materials across the membrane in vesicles.

Circle the word or phrase that best completes the statement.

8. A cell may transport a substance in lysosomes / vesicles if the substance is too large to cross the membrane.

9. During endocytosis, the vesicle membrane fuses with a lysosome, and the membrane and its contents are broken down by lysosomal enzymes / gradients.

10. Complete the table below to compare and contrast the processes of endocytosis and exocytosis. Place a check mark in the appropriate box to indicate whether it is a characteristic of endocytosis, a characteristic of exocytosis, or a characteristic that both processes have in common.

|  |  |  |  |
| --- | --- | --- | --- |
| Characteristic | Endocytosis | Exocytosis | Both |
| Uses energy |  |  |  |
| Takes substances into a cell |  |  |  |
| Releases substances outside a cell |  |  |  |
| Moves substances in vesicles |  |  |  |

Vocabulary Check

Circle the word or phrase that best completes the statement.

11. Active transport / Phagocytosis is a term that means “cell eating.” It describes a type of endocytosis.

12. The prefix *exo-* means “out of,” and the prefix *endo-* means “taking in.” Therefore, exocytosis / endocytosis is a process that releases substances outside a cell, and exocytosis / endocytosis is a process that takes substances into a cell.

13. Active transport / Facilitated diffusion drives molecules across a membrane against a concentration gradient.