Name _____ Class _____ Date _____

SECTION 4-1 REVIEW

THE HISTORY OF CELL BIOLOGY

VOCABULARY REVIEW Define the following terms.

1. cell _____

_____

2. cell theory _____

_____

MULTIPLE CHOICE Write the correct letter in the blank.

_____ 1. One early piece of evidence supporting the cell theory was the observation that

a. only plants are composed of cells.
b. only animals are composed of cells.
c. cells come from other cells.
d. animal cells come from plant cells.

_____ 2. The scientist who described cells as "many little boxes" was

a. Robert Hooke.
b. Anton van Leeuwenhoek.
c. Theodor Schwann.
d. Rudolf Virchow.

_____ 3. Living and nonliving things are different in that only

a. nonliving things are made of cells.
b. nonliving things are made of atoms.
c. living things are made of cells.
d. living things are made of atoms.

_____ 4. Microscopes were used to study cells beginning in the

a. 16th century.
b. 17th century.
c. 18th century.
d. 19th century.

_____ 5. The advantage of van Leeuwenhoek's microscopes was that

a. they were simple.
b. they had two lenses.
c. the lenses could be moved.
d. the lenses were ground very precisely.

_____ 6. Which of the following was a major event in the history of cell biology?

a. cloning animals
b. growing bone tissue for transplant
c. discovery of cell parts
d. All of the above

_____ 7. A light microscope uses optical lenses to magnify objects by

a. bending light rays.
b. bending electron beams.
c. reflecting beams of light.
d. reflecting beams of electrons.

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SHORT ANSWER **Answer the questions in the space provided.**

1. State the three parts of the cell theory. _____

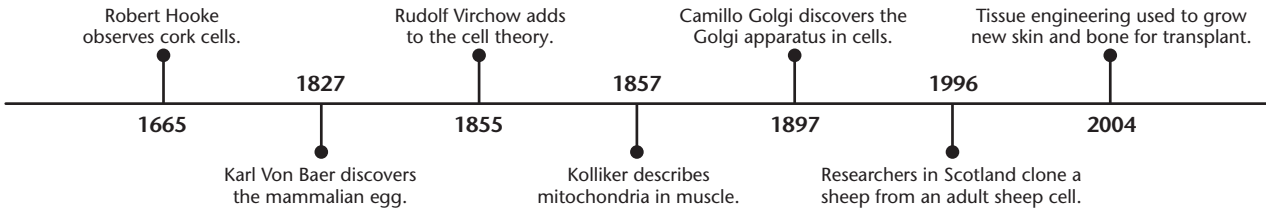
2. Why did it take 150 years for the cell theory to be developed after microscopes were invented?

3. Why did Hooke's cork cells appear to be empty? _____

4. **Critical Thinking** If you read that a new organism had been discovered, what would you know about the organism without examining it in terms of cells?

STRUCTURES AND FUNCTIONS **Use the figure to answer the following questions.**

Timeline—History of Cell Biology



1. Approximately how many years elapsed between the time cells were discovered and the observation of cell parts in muscle cells?

2. When was the third part of the cell theory added? What was the time interval between this event and the discovery of cells?

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SECTION 4-2 REVIEW

INTRODUCTION TO CELLS

VOCABULARY REVIEW Define the following terms.

1. organelle _____

2. nucleus _____

3. eukaryote _____

4. prokaryote _____

MULTIPLE CHOICE Write the correct letter in the blank.

_____ 1. Cells are limited in size by the

a. rate at which substances needed by the cell can enter the cell through its surface.
b. rate at which the cell can manufacture genetic information.
c. amount of material the cell can collect to fill itself.
d. amount of cell membrane the cell can produce.

_____ 2. The diameter of most plant and animal cells is about

a. 0.1 to 0.2 μm. b. 10 to 50 μm. c. 1 to 2 mm. d. 10 to 50 mm.

_____ 3. The characteristic of a nerve cell that relates directly to its function in receiving and transmitting nerve impulses is its

a. long extensions.
b. flat shape.
c. ability to change shape.
d. ability to engulf and destroy bacteria.

_____ 4. One difference between eukaryotic and prokaryotic cells is that only

a. prokaryotic cells are surrounded by a cell membrane.
b. prokaryotic cells have a nucleus.
c. eukaryotic cells have genetic information.
d. eukaryotic cells have membrane-bound organelles.

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SHORT ANSWER **Answer the questions in the space provided.**

1. How is the shape of a skin cell suited to its function? _____

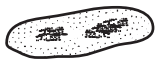
2. How are the organelles of a single cell like the organs of a multicellular organism? _____

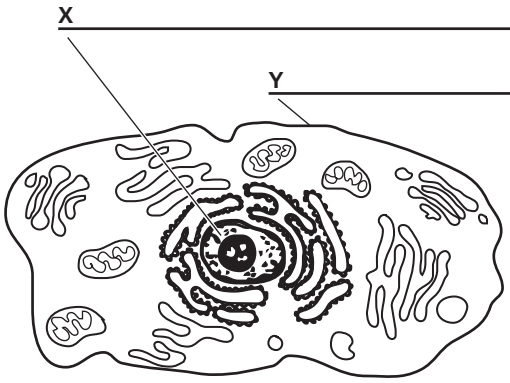
3. Name two features of eukaryotic cells that prokaryotic cells lack. _____

4. **Critical Thinking** When a spherical cell increases in diameter from 2 μm to 20 μm, by what factor does its surface area change? By what factor does its volume change? (The surface area of a sphere $= 4\pi$ radius^2, and the volume of a sphere $= 4/3\pi$ radius^3. Remember that diameter $= 2 \times$ radius.)

STRUCTURES AND FUNCTIONS

1. These figures represent a eukaryotic cell and a prokaryotic cell. In the spaces below the diagrams, indicate which type of cell each diagram represents.





a _____ b _____

2. List two features that formed the basis for your identification of these cells.

3. Identify the structures labeled X and Y. _____

Name _____ Class _____ Date _____

SECTION 4-3 REVIEW

CELL ORGANELLES AND FEATURES

VOCABULARY REVIEW **Distinguish between the terms in each of the following pairs of terms.**

1. nucleoplasm, nuclear envelope _____

_____

2. cytoskeleton, microtubule _____

_____

_____

3. cilia, flagella _____

_____

MULTIPLE CHOICE **Write the correct letter in the blank.**

_____ **1.** The plasma membrane

a. allows all substances to pass into and out of the cell.
b. prevents all substances from passing into and out of the cell.
c. is composed mainly of a protein bilayer.
d. is composed mainly of a lipid bilayer.

_____ **2.** Substances produced in a cell and exported outside of the cell would pass through the

a. endoplasmic reticulum and Golgi apparatus.
b. mitochondria and Golgi apparatus.
c. nucleus and lysosomes.
d. vacuoles and lysosomes.

_____ **3.** Cells that have a high energy requirement generally have many

a. nuclei. **b.** flagella. **c.** mitochondria. **d.** microfilaments.

_____ **4.** Viruses, bacteria, and old organelles that a cell ingests are broken down in

a. ribosomes.
b. lysosomes.
c. the rough endoplasmic reticulum.
d. the smooth endoplasmic reticulum.

_____ **5.** Organelles that are surrounded by two membranes and contain DNA are the

a. nucleus, the endoplasmic reticulum, and lysosomes.
b. nucleus, the endoplasmic reticulum, and chloroplasts.
c. nucleus and mitochondria.
d. endoplasmic reticulum and the Golgi apparatus.

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SHORT ANSWER **Answer the questions in the space provided.**

1. What roles do membrane proteins play in transporting only certain substances into a cell?

_____

_____

2. What are ribosomes made of? _____

_____

What cellular function are they involved in? _____

_____

3. What is the cytoskeleton, and what are three of its major components? _____

_____

4. Describe the structural organization shared by cilia and flagella. _____

_____

5. **Critical Thinking** When lipid is added to a solution of a detergent in water, the detergent breaks up large globules of the lipid into much smaller globules. What effect do you think a detergent would have on the integrity of cells? Explain your answer. _____

_____

_____

STRUCTURES AND FUNCTIONS **This diagram represents a typical animal cell. Label each part of the figure in the spaces provided.**

a. _____

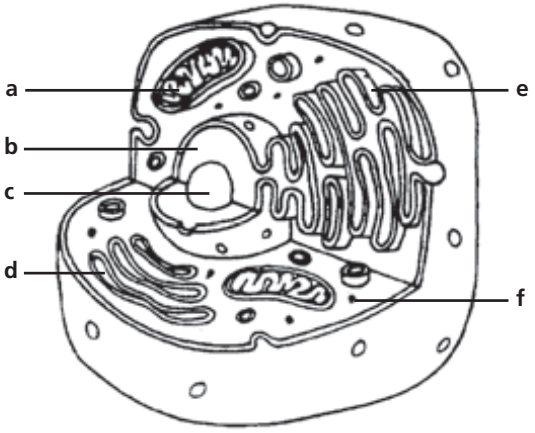
b. _____

c. _____

d. _____

e. _____

f. _____



Name _____ Class _____ Date _____

SECTION 4-4 REVIEW

UNIQUE FEATURES OF PLANT CELLS

VOCABULARY REVIEW Define the following terms.

1. cell wall _____

2. plastid _____

3. thylakoids _____

4. chlorophyll _____

5. central vacuole _____

MULTIPLE CHOICE Write the correct letter in the blank.

_____ 1. Which of the following organelles is found in plant cells but not in animal cells?

a. nucleus
b. chloroplast
c. mitochondrion
d. Golgi apparatus

_____ 2. The end products of photosynthesis include

a. carbon dioxide and water.
b. sugars.
c. carbon dioxide and oxygen.
d. oxygen and water.

_____ 3. A cell that contains a cell wall, chloroplasts, and a central vacuole is a

a. plant cell. **b.** animal cell. **c.** prokaryotic cell. **d.** bacterial cell.

_____ 4. A central vacuole forms from

a. chloroplasts.
b. fusion of amyloplasts.
c. the fusion of smaller vacuoles.
d. the products of photosynthesis.

_____ 5. Thylakoids are located

a. between the two membranes of a chloroplast.
b. outside the outer membrane of a chloroplast.
c. inside the inner membrane of a chloroplast.
d. in chromoplasts.

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SHORT ANSWER **Answer the questions in the space provided.**

1. How are secondary cell walls different from primary cell walls? _____

2. What are plant cell walls made of? _____

   What is the function of cell walls? _____

3. What is the appearance of a plant cell when water is plentiful? _____

4. **Critical Thinking** Bacteria have a region called a nucleoid, in which their genetic material is located. Why, then, are bacteria classified as prokaryotes?

STRUCTURES AND FUNCTIONS **Label each part of the figure in the spaces provided.**

This diagram represents a typical plant cell.