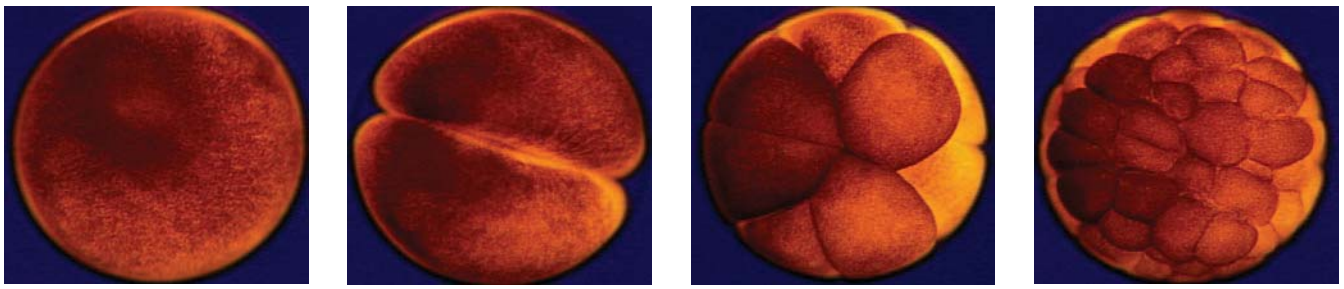
Lesson Self-Check

CAN YOU EXPLAIN IT?

FIGURE 11: All plants and animals begin with a single cell. One cell divides into two, each of which will then divide. This pattern continues until an organism is formed.

Explore Online



Cells have a life cycle made up of periods of rest, growth, and division. When a multicellular organism develops, a single cell divides over and over to produce the trillions of cells that make up the organism. Throughout the organism's lifetime, internal and external signals regulate cell growth and cell division. These factors include physical and chemical signals, as well as limits on cell size.

Explain Refer to the notes in your evidence notebook to construct an explanation for why cells divide instead of simply growing larger. In your explanation, address the following questions.

1. How are the cell cycle and cell division related to the growth, development, and maintenance of the organism?
2. How do different factors influence cell growth and cell division?
3. How has technology influenced our understanding of cells and cell division?

CHECKPOINTS

Check Your Understanding

1. Which of these is *not* a principle of the cell theory?

a. The cell is the basic unit of life.

b. All living things are made of cells.

c. All organisms are made up of many cells.

d. All cells come from other cells.

2. Which term describes the resting phase of the cell cycle?

a. mitosis

b. interphase

c. prophase

d. telophase

3. Which of these best explains how advancements in technology influenced the development of the cell theory?

a. Communication between scientists improved.

b. Microscopes enabled scientists to see cells.

c. Increased knowledge allowed scientists to make predictions.

d. Printing increased the number of books about the cell.

4. In which of these situations would cells most likely receive signals instructing them to enter the M phase of the cell cycle? Select all correct answers.

a. A tissue needs repairing.

b. Cells need to grow larger.

c. More cells are needed to defend the body.

d. Cells need to decrease in number during development.

5. Place these events in the correct order to illustrate the sequence of events in the cell cycle.

a. Mitosis occurs, and one cell divides into two.

b. DNA is replicated to make two copies.

c. Organelles are copied, and the cell grows.

d. Additional growth occurs before the cell divides.

6. Imagine a cell has six sides, each measuring 4 micrometers (μm) in length. Use this information to answer the following questions.

a. What is the surface area of the cell?

b. What is the volume of the cell?

c. What is the surface-area-to-volume ratio for the cell?

d. If this cell grew larger in size, how would the transport of materials across the cell membrane be affected? How does this relate to the cell's ability to maintain homeostasis?

7. Complete this statement using these terms:

growth factors, *cyclins*, *volume*, *surface area*

Different factors regulate cell growth and division. Cells are limited in size because they need a large _____ as compared to their _____. This ensures that materials can move into and out of the cell at adequate rates. The cell cycle is also regulated by external factors such as _____ and internal factors such as _____. These factors work together to make sure the cell enters the appropriate phase of the cell cycle at the correct time.

8. Use an example to explain how apoptosis contributes to the growth and maintenance of an organism.

MAKE YOUR OWN STUDY GUIDE

In your Evidence Notebook, design a study guide that supports the main idea from this lesson:

The cell cycle is a sequence of events in which cells grow and divide. Internal and external factors regulate the cell cycle to ensure that cells grow and divide at appropriate times.

Remember to include the following information in your study guide:

- Use examples that model main ideas.
- Record explanations for the phenomena you investigated.
- Use evidence to support your explanations. Your support can include drawings, data, graphs, laboratory conclusions, and other evidence recorded throughout the lesson.

Consider how models help scientists learn more about cells, the cell cycle, and how cells maintain homeostasis.