

Cell Processes and Energy • Adapted Reading and Study

Cell Division (pages 55–62)

Stage 1: Interphase (page 56)

Key Concept: During interphase, the cell grows, makes a copy of its DNA, and prepares to divide into two cells.

- For living things to grow, their cells must grow and divide over and over. The regular series of growth and division that cells undergo is called the **cell cycle**.
- The cell cycle is divided into three main stages: interphase, mitosis, and cytokinesis.
- **Interphase** is the first stage of the cell cycle. Interphase takes place before the cell divides.
- In the first part of interphase, the cell grows to its full size. The cell also makes all the cell structures and organelles that it needs.
- In the second part of interphase, the cell makes an exact copy of its DNA molecule in a process called **replication**. At the end of DNA replication, the cell has two identical sets of DNA, or genetic material.
- At the end of interphase, the cell makes the structures it will need to divide.

Answer the following questions. Use your textbook and the ideas above.

1. Circle the letter of each sentence that is true about cell growth.
 - a. For living things to grow, their cells must grow and divide.
 - b. After interphase is over, cells grow to their full size.
 - c. Cells divide during interphase.

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- 2.** Read each word in the box. In each sentence below, fill in the correct word or words.

cell cycle	division	interphase	replication
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- a. The regular series of growth and division in a cell is called the _____.
- b. The first stage of the cell cycle is called _____.
- c. When a cell makes an exact copy of its DNA, it is called _____.
3. Is the following sentence true or false? During the first part of interphase, the cell grows to its full size.

Stage 2: Mitosis (pages 57–59)

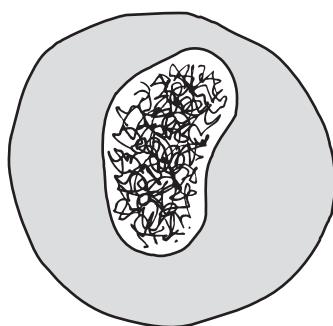
Key Concept: During mitosis, one copy of the DNA is distributed into each of the two daughter cells.

- The second stage of the cell cycle is mitosis. **Mitosis** (my TOH sis) is the stage when the cell's nucleus divides into two new nuclei.
- In mitosis, the threadlike DNA shortens and thickens to form **chromosomes**. Each chromosome is made up of two rods held together. The two rods are made of DNA that are an exact copy of each other.
- During mitosis, the two chromosome rods separate from each other and move to opposite sides of the cell.
- At the end of mitosis, a new nucleus forms around each group of chromosomes, creating two new nuclei. Each new nucleus has one copy of DNA.

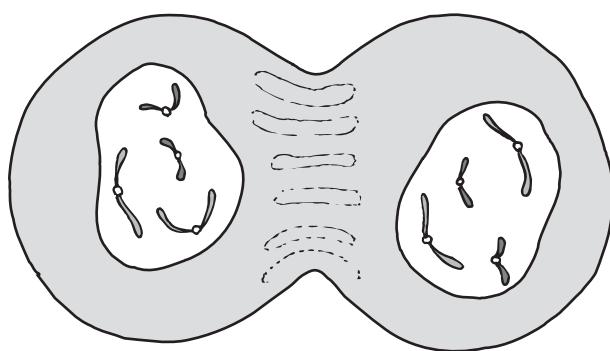
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Answer the following questions. Use your textbook and the ideas on page 27.

4. Look at the two cells below. Circle the letter of the cell that has just finished mitosis.



a.



b.

5. Circle the letter of each sentence that is true about mitosis.

- a. The nucleus of the cell divides into two nuclei.
- b. One copy of DNA is given to each new nuclei.
- c. The chromosomes do not divide.

Stage 3: Cytokinesis (page 60)

Key Concept: During cytokinesis, the cytoplasm divides. The organelles are distributed into each of the two new cells.

- **Cytokinesis** (sy toh kih NEE sis) is the final stage in the cell cycle. In cytokinesis, the cytoplasm divides. The organelles are divided up between the two new cells.
- When cytokinesis is over, two new cells, called daughter cells, have formed. Each daughter cell has the same number of chromosomes as the original parent cell.
- At the end of cytokinesis, each new cell enters interphase. The cell cycle begins again.

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Answer the following questions. Use your textbook and the ideas on page 28.

6. During cytokinesis, the _____ divides.
7. After cytokinesis, each _____ has the same number of chromosomes as the parent cell.

Structure and Replication of DNA

(pages 61–62)

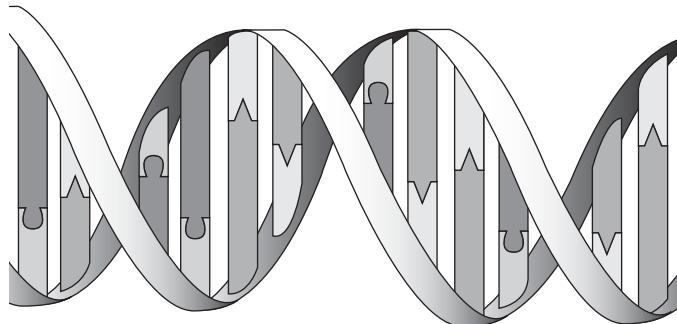
Key Concept: Because of the way in which the nitrogen bases pair with one another, the order of the bases in each new DNA molecule exactly matches the order in the original DNA molecule.

- Remember that DNA replication takes place in interphase. Because the DNA molecule replicates, each new daughter cell has genetic information to direct the cell's activities.
- DNA looks like a twisted ladder. The sides of the ladder are the DNA backbone.
- The rungs of the ladder are made of four nitrogen bases. The bases on one side of the ladder pair up with bases on the other side of the ladder.
- Only certain bases pair with other bases. Adenine (A) pairs only with thymine (T). Guanine (G) pairs only with cytosine (C).
- DNA replication begins when DNA unwinds and separates. DNA separates between the paired bases.
- Nitrogen bases floating in the nucleus pair up with the unpaired bases on each half of the separated DNA. When the new bases attach, two new DNAs are formed. The new DNA is an exact copy of the original DNA.

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Answer the following questions. Use your textbook and the ideas on page 29.

- 8.** The picture shows the structure of DNA. Circle the nitrogen bases.



- 9.** Which nitrogen base pairs up with adenine? Circle the letter of the correct answer.
- a. guanine
 - b. cytosine
 - c. thymine
- 10.** Fill in the flowchart to show what happens during DNA replication.

DNA Replication

The DNA unwinds and a. _____.



Nitrogen bases floating in the nucleus pair up with the unpaired
b. _____ on each half of the separated DNA.



When the new bases attach, two new
c. _____ are formed.