

DNA and Cell Division

Key Words

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|---------------------|---|
| cell cycle: | process by which a cell grows, prepares for division, and divides to form two daughter cells |
| interphase: | part of the cell cycle during which a cell grows and copies its chromosomes |
| chromosomes: | cell structures made of DNA and proteins that contain hereditary information |
| mitosis: | part of the cell cycle during which a parent cell distributes its chromosomes to two daughter cells |

KEY IDEAS

The cell cycle is the continuous process by which cells grow, prepare for division, and divide into two daughter cells. The daughter cells inherit chromosomes from the parent cell. The process of distributing chromosomes during cell division is called mitosis.

If you look at a picture of yourself as a toddler, you'll find that your body has changed dramatically since then. Your height and weight increased as you got older. Did you ever wonder why this happened? You grow partly because the number of cells that make up your body increases.

The Cell Cycle. Even as you read these words, the cells in your body are growing. Materials that flow into the cell cause it to increase in size. As a cell gets larger, substances have more difficulty moving through it. Yet, to function properly, the cell must be able to transport materials throughout itself. Every cell has a size limit, or a point at which it can no longer transport materials throughout itself. When the cell reaches this limit, it divides, forming two new cells. The term **cell cycle** (sehl SY-kuhl) is used to describe the continuous process by which cells grow, prepare for division, and divide into new cells called daughter cells.

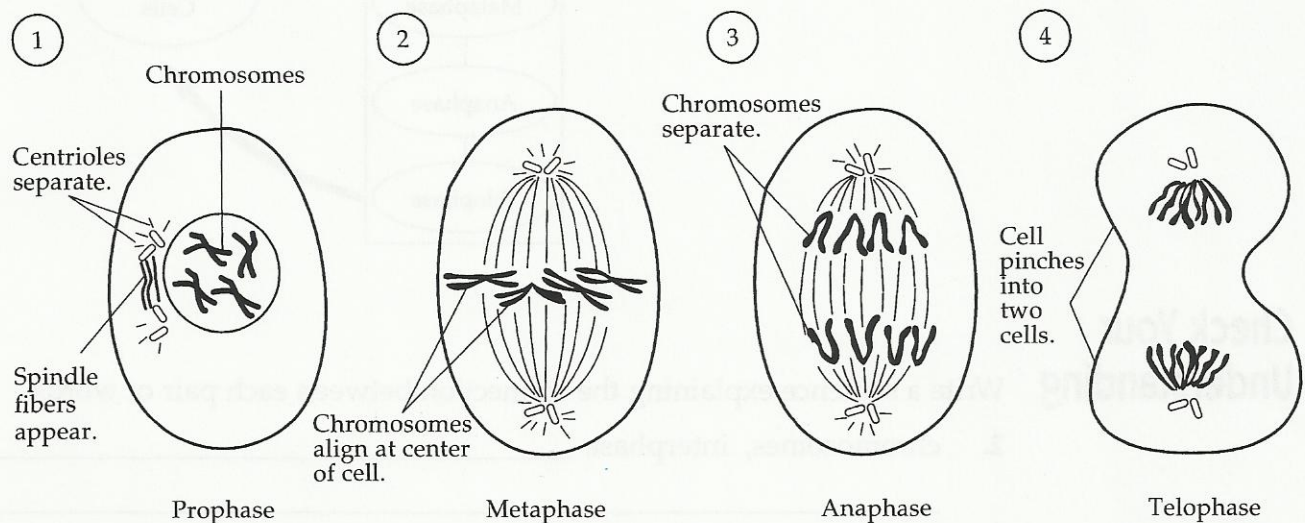
Interphase. The stage of the cell cycle during which the cell grows and copies its chromosomes is called **interphase** (IHN-tuhr-fayz). This is the longest stage of the cell cycle. It is an active time before cell division.

Near the end of interphase, the cell makes a copy of its chromosomes. For example, a cell that contains 12 chromosomes before interphase would contain 24 chromosomes after interphase. **Chromosomes** (KROH-muh-sohmz) are

large, threadlike structures located in the cell nucleus. Chromosomes contain hereditary information that is passed on to new cells. This hereditary information is carried on DNA molecules found inside each chromosome.

Mitosis. When a cell divides, it passes on copies of its DNA to its offspring through mitosis. **Mitosis** (my-TOH-sihs) is the process of the cell cycle in which chromosomes are distributed to two daughter cells. There are four stages of mitosis. Fig. 8-1 shows these stages in animal cells.

Fig. 8-1



Prophase: Organelles called centrioles help to separate the duplicated chromosomes. Two pairs of centrioles are found outside the nucleus in the cytoplasm. The centriole pairs move apart. As they separate, fine threads of protein called spindle fibers form between the centriole pairs. By the end of prophase, the centriole pairs are at opposite ends of the cell. The nuclear membrane disappears. The spindle fibers align between the centriole pairs.

Metaphase: In the second stage of mitosis, the chromosome pairs line up across the center of the cell. Each chromosome pair is attached to a spindle fiber.

Anaphase: During the third stage of mitosis, each chromosome pair separates to form two single chromosomes. The spindle fibers pull one chromosome from each pair to opposite ends of the cell. This forms two sets of single chromosomes.

Telophase: In the last stage of mitosis, a nuclear membrane forms around each set of chromosomes. The spindle fibers disappear. Mitosis ends when the cell membrane begins to pinch the cell in two. This causes the cytoplasm to divide, forming two identical daughter cells.

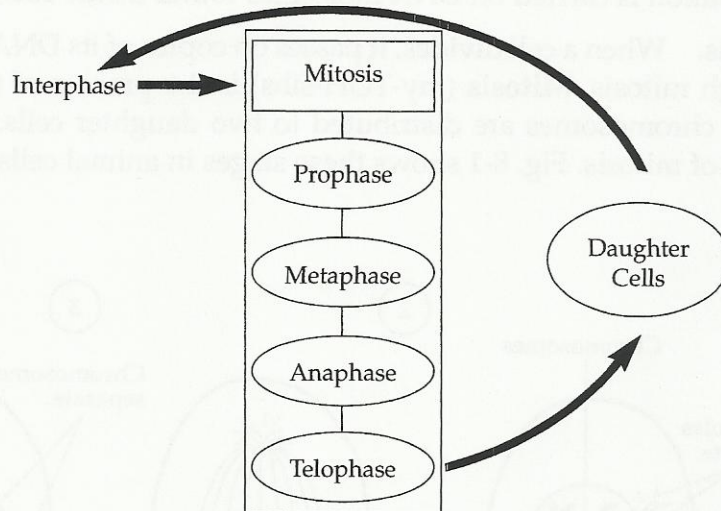


1. How do spindle fibers help distribute chromosomes to daughter cells?

TAKE ANOTHER LOOK

Fig. 8-2 summarizes the cell cycle.

Fig. 8-2



Check Your Understanding

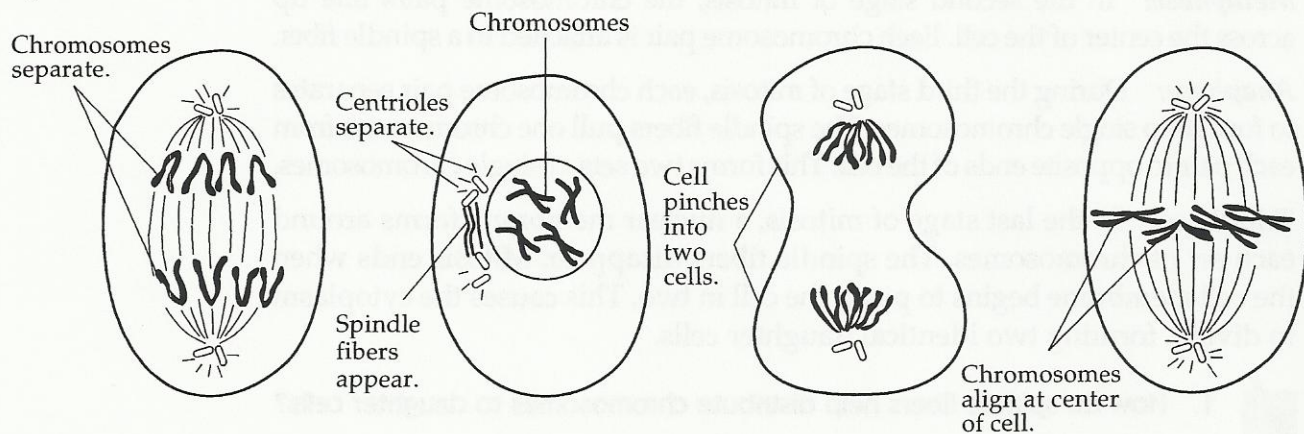
Write a sentence explaining the connection between each pair of words.

2. chromosomes, interphase _____

3. cell cycle, mitosis _____

4. Fig. 8-3 shows each of the four stages of mitosis. On each line, write the name of the stage shown. Then write the letters in the correct order of their occurrence.

Fig. 8-3



(a) _____ (b) _____ (c) _____ (d) _____

(e) Correct order of occurrence: _____



5. What is the cell cycle? _____

6. What causes cells to divide? _____

7. How is hereditary information passed from a parent cell to daughter cells? _____

8. What are the four stages of mitosis? _____

9. What is interphase? _____

10. If a parent cell contains eight chromosomes, how many chromosomes are present after interphase? Why?

