

Lesson Outline for Teaching

Lesson 1: The Cell Cycle and Cell Division

A. The Cell Cycle

1. Most cells in an organism go through a cycle of growth, development, and division called the cell cycle.
4. Because of the cell cycle, organisms grow and develop, replace old or damaged cells, and produce new cells.

B. Phases of the Cell Cycle

1. There are two main phases of the cell cycle—interphase and the mitotic phase.
2. Interphase is the period of growth and development for a cell.
3. During interphase, most cells go through three stages—rapid growth and replication of the organelles; replication of DNA, the genetic information in a cell; and preparation for cell division.
4. During the mitotic phase, a cell reproduces.

C. Length of a Cell Cycle

1. Interphase makes up most of the cell cycle.
2. During interphase, the DNA in the cell is called chromatin.

D. Phases of Interphase

1. Interphase begins with a period of rapid growth—the G₁ stage.
2. During the S stage of interphase, the cell replicates its strands of chromatin.
3. Sister chromatids are the two identical strands of DNA that make up the duplicated chromosome.
4. The sister chromatids are held together by a structure called the centromere.
5. The final stage of interphase—the G₂ stage—is a period of growth and final preparation for mitosis.

E. Organelle Replication

1. Before a cell divides, it makes copies of all its organelles.
2. In mitosis, the nucleus and its contents divide.
3. In cytokinesis, the cytoplasm and its contents divide.
4. Two new daughter cells result from mitosis and cytokinesis.

F. Phases of Mitosis

1. During prophase, duplicated DNA condenses into chromosomes.
2. During metaphase, the chromosomes line up in the middle of the cell.

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3. During anaphase, sister chromatids in each duplicated chromosome separate and are pulled in opposite directions by the spindle fibers.
4. During telophase, chromosomes begin to uncoil, and two new identical nuclei form.

G. Dividing the Cell's Components

1. After mitosis, cytokinesis usually divides a cell's cytoplasm, forming a new cell membrane around each daughter cell.
2. In animal cells, a(n) furrow in the middle of the cells gets deeper until the cell membrane comes together to divide the cell.
3. In plant cells, a(n) cell plate grows outward toward a new cell wall until two new cells form.

H. Results of Cell Division

1. The cell cycle results in two new daughter cells that are genetically identical to each other and to the original cell, which no longer exists.
2. The cell cycle is important for reproduction in some organisms, growth in multicellular organisms, replacement of worn-out or damaged cells, and repair of damaged tissues.

Discussion Question

What happens during mitosis?

During mitosis, the nucleus and its contents divide in two.