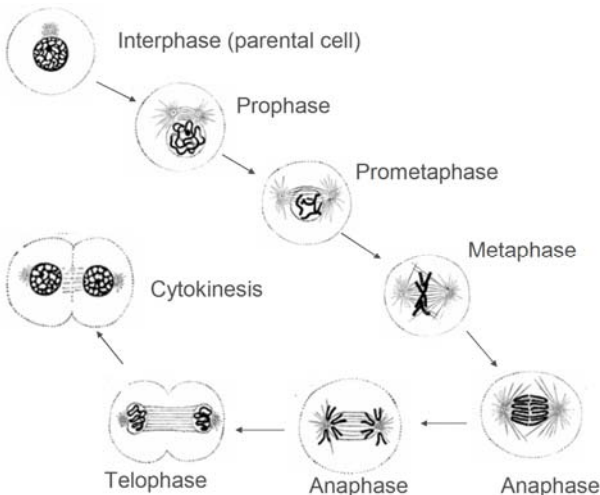


04: Mitosis and Meiosis

Key Terms

- **C Value:** The total amount of DNA in a haploid cell.
- **Cell cycle:** the series of events between one cell division and the next is termed the cell cycle. It normally contains G1, S, G2 and M (mitosis) phases.
- **Cell skeleton:** Composed of microtubules made of tubulin and actin, plays roles in maintaining cell shape, cell motion, intra-cellular transport and cell division –both mitosis and meiosis.
- **Centrosome:** Made of two centrioles, it is the main microtubule organizing center (MTOC) and a regulator of cell-cycle progression.
- **Cytokinesis:** The division of the cytoplasm in a cell, which usually occurs immediately after nuclear division in mitosis.
- **Diploid Number (2N):** The total number of chromosomes present in a somatic cell containing 1 pair of homologous chromosomes.
- **Kinetochores:** The protein structure assembled on the centromere and links the chromosome to microtubules from the mitotic spindle.
- **Meiosis:** The series of events when a cell divides twice while its DNA is replicated only once, resulting in 4 haploid progeny cells –germ cells.
- **Mitosis:** The series of events when a somatic cell is divided into two identical daughter cells. It normally contains prophase, prometaphase, metaphase, anaphase and telophase.
- **Mitotic spindle:** A dynamic protein structure assembled at early mitosis stage, consisting of a bundle of microtubules joined at the ends but spread out in the middle. The function is to pull chromosomes to two opposite poles.
- **Sister chromatid:** Two identical chromatids after chromosome replication that stay together at the early stage of mitosis but separate later.
- **Synapsis:** a pair of homologous chromosomes lines up closely together
- **Tetrad:** A tetrad is composed of four chromatids, 2 sister chromatids from each of the homologous chromosomes

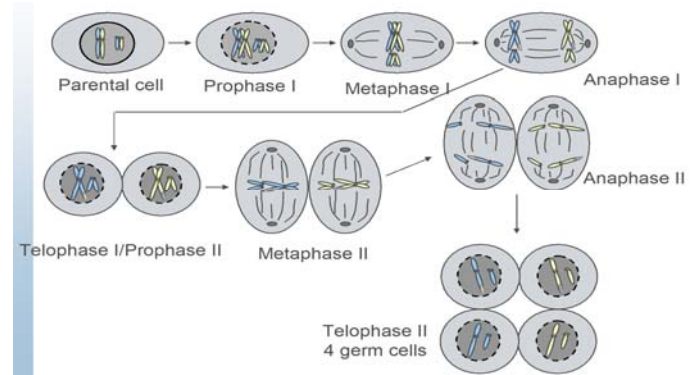
Mitosis



- DNA replicates once and the cell divides once.
- Sister chromosomes separate.
- Resulting daughter cells contain one set of homologous chromosomes each.

Meiosis

- DNA replicates once
- Cell divide twice
- First division results in separation of homologous chromosome.
- Second division results in separation of sister chromosomes.
- Resulting cells contain reduced number of chromosomes (half of the parental cell).



Stages of Mitosis and Meiosis

- **Prophase:**
 - Chromatin condense to form chromosomes
 - Nucleolus disappears
 - Centrosomes are duplicated and begin moving to opposite poles
 - Formation of mitotic spindle
- **Prometaphase (for mitosis only):**
 - The nuclear membrane starts to dissolve
 - Kinetochores formation
 - Microtubules from spindles attach at the kinetochores and the chromosomes begin moving
- **Metaphase:**
 - Chromosomes are aligned on the metaphase plate
- **Anaphase:**
 - The sister chromatids separate at the kinetochores (for mitosis); Homologous chromosome separate (meiosis anaphase I) or sister chromosome separate (meiosis anaphase II)
 - The separated chromosomes move to opposite sides of the cell.
- **Telophase:**
 - New membranes form around the daughter nuclei.
 - The chromosomes disperse and are no longer visible under the light microscope.
 - The spindle disassembles
 - Cytokinesis occurs

The Major Difference

Mitosis:

For somatic cell proliferation

Meiosis:

For germ cell production

How to Use This Cheat Sheet: These are the keys related this topic. Try to read through it carefully twice then rewrite it out on a blank sheet of paper. Review it again before the exams.