

# Cell Life Cycle and Reproduction

The cell cycle (cell-division cycle), is a series of events that take place in a cell leading to its division and duplication. The main phases of the cell cycle are interphase, nuclear division, and cytokinesis. Cell division produces two daughter cells. In cells without a nucleus (prokaryotic), the cell cycle occurs via binary fission.

## Interphase

**Gap1(G1)**- Cells increase in size. The G1checkpointcontrol mechanism ensures that everything is ready for DNA synthesis.

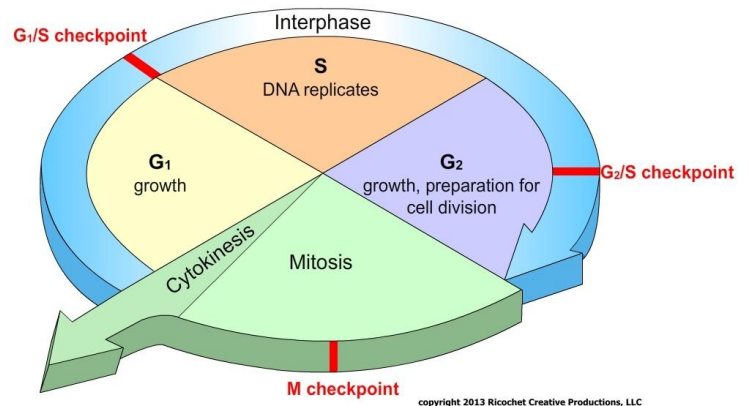
**Synthesis(S)**- DNA replication occurs during this phase.

**DNA Replication** The process in which DNA makes a duplicate copy of itself.

**Semiconservative Replication** The process in which the DNA molecule uncoils and separates into two strands. Each original strand becomes a template on which a new strand is constructed, resulting in two DNA molecules identical to the original DNA molecule.

**Gap 2(G2)**- The cell continues to grow.

The G2checkpointcontrol mechanism ensures that everything is ready to enter the M (mitosis) phase and divide.



**Mitotic(M)** refers to the division of the nucleus. Cell growth stops at this stage and cellular energy is focused on the orderly division into daughter cells. A checkpoint in the middle of mitosis (Metaphase Checkpoint) ensures that the cell is ready to complete cell division. The final event is cytokinesis, in which the cytoplasm divides and the single parent cell splits into two daughter cells.

## Reproduction

Cellular reproduction is a process by which cells duplicate their contents and then divide to yield multiple cells with similar, if not duplicate, contents.

## Mitosis

Mitosis- nuclear division resulting in the production of two somatic cells having the same genetic complement (genetically identical) as the original cell.

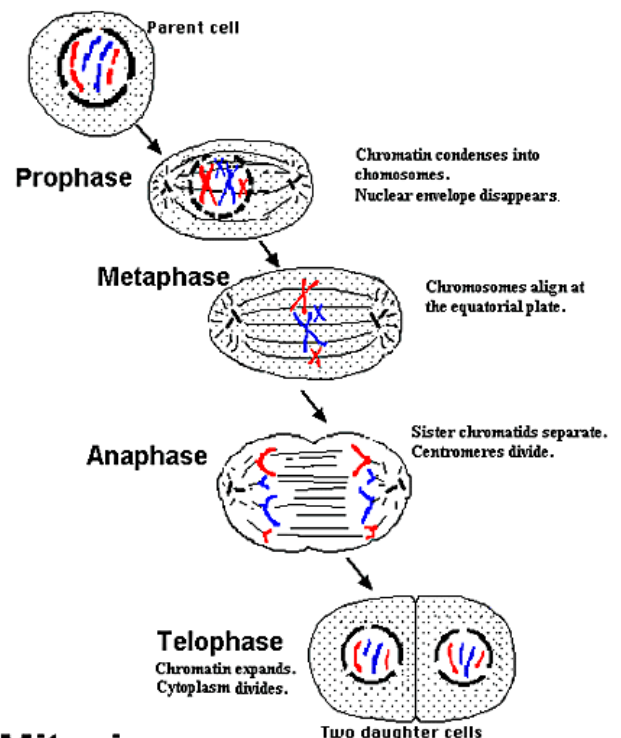
As mitosis begins they condense and become visible under a light microscope. They appear as sister chromatids joined at the centromere. Mitosis is divided into 4 stages.

**Prophase**- nuclear envelope disintegrates and a spindle of microtubules forms. Centrioles may help organize the spindle as in this animal cell. The chromosomes begin to move toward the midplane of the spindle

**Metaphase**- When they are on the midplane with centromeres attached to spindle fibers

**Anaphase**- centromeres separate and the sister chromatids, now termed chromosomes, are pulled toward opposite poles of the spindle.

**Telophase**- a nuclear envelope forms around each set of chromosomes, the spindle disappears and the chromosomes decondense.



# Meiosis

The ultimate goal of the process of meiosis is to reduce the number of chromosomes by half to produce gametes. This must occur prior to sexual reproduction. The final products of meiosis, four daughter cells, each contain one chromatid from each original homologous pair, for a total of two chromosomes.

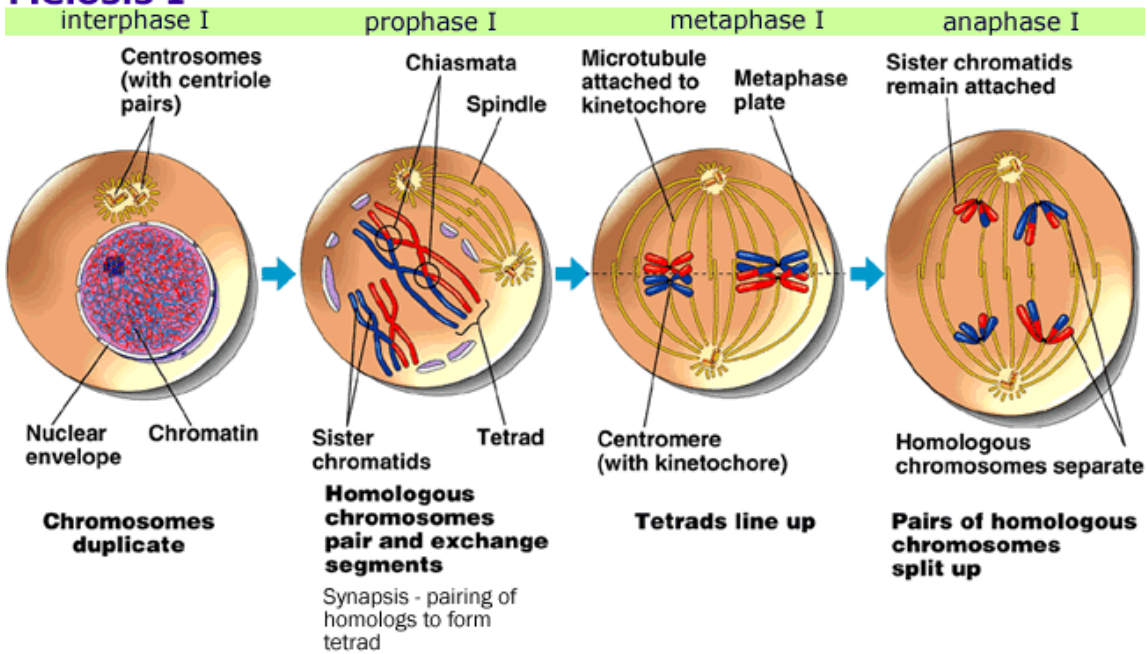
Haploid- (n) one set of chromosomes-half diploid      Diploid- (2n) two sets of chromosomes

Meiosis- A two phase nuclear division that results in the eventual production of gametes with half the normal number of chromosomes.

Gamete - specialized cell (egg or sperm) used in sexual reproduction containing half the normal number of chromosomes of a somatic cell.

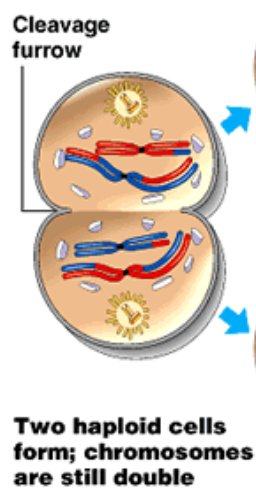
Gene Recombination-A natural process in which a nucleic acid molecule (usually DNA but can be RNA) is broken and then joined to a different molecule; a result of crossing-over.

## Meiosis I



## Meiosis I

telophase & cytokinesis



## Meiosis II

prophase II      metaphase II      anaphase II      telophase II

