Cell Division

1. The Cell Cycle: the regular sequence of growth and division that cells undergo

During the cell cycle, the cell grows, prepares for division, & divides into 2 cells called daughter cells; each of the daughter cells then begins the cell cycle again.

A. Stage 1: Interphase: the stage of the cell cycle that takes place before cell division occurs.

1. The cell grows to its full size and produces structures it needs.
2. The cell makes an exact copy of the DNA in its nucleus in a process called replication. Each daughter cell must have a complete set of DNA; at the end of DNA replication, the cell contains 2 identical sets of DNA.
3. Once the DNA has replicated, preparation for cell division begins; the cell produces structures that it will use to divide into 2 cells. At the end of interphase, the cell is ready to divide.

B. Stage 2: Mitosis: the stage of the cell cycle during which the cell's nucleus divides into 2 new nuclei and 1 copy of the DNA is distributed into each daughter cell.

1. Mitosis is divided into 4 phases:

a. Prophase: thread-like chromatin in the nucleus condenses to form double-rod structures called chromosomes; each chromosome is an exact copy of the other; each identical rod is called a chromatid; two chromatids are held together by a structure called a centromere.

1) Pairs of centrioles move to opposite sides of the nucleus & form spindle fibers between the ends of the cell.
2) The nuclear envelope breaks down.

b. Metaphase:

1) Chromosomes line up across the center of the cell
2) Each chromosome attaches to a spindle fiber at its centromere

c. Anaphase: 1) Centromeres split & the chromatids separate; each becomes a new chromosome.
2) The new chromosomes move to opposite ends of the cell & the cell ends are pushed apart.

d. Telophase:

1) The chromosomes begin to stretch out

2) A new nuclear envelope forms around each region of chromosomes.

B. Stage 3: Cytokinesis: the final stage of the cell cycle, in which the cell's cytoplasm divides, distributing the organelles into each of the 2 new cells;

each new cell has the same number of chromosomes as the original parent cell.

1. Cytokinesis in animal cells: the cell membrane squeezes together in the middle forming 2 cells.

   each daughter cell gets about half the organelles.

2. Cytokinesis in plant cells: a plant's rigid cell wall cannot squeeze; instead a structure called a cell plate forms around the middle of the cell & gradually develops into new cell membranes; new cell walls then form around the cell membranes.