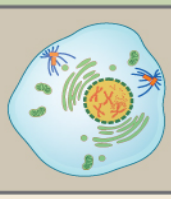
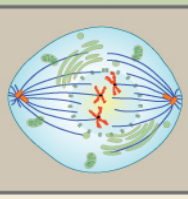
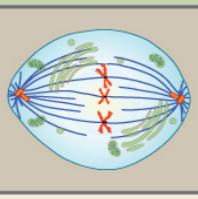
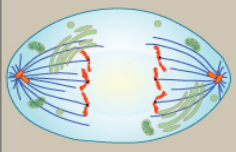
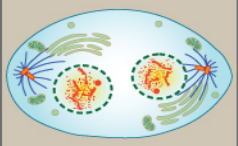
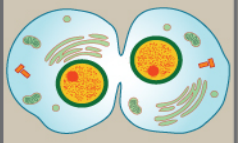
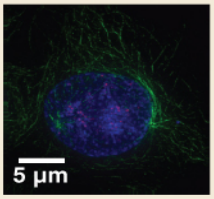
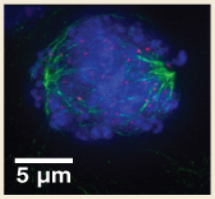
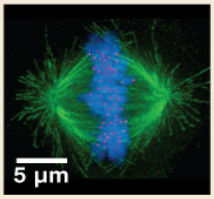
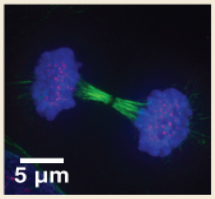
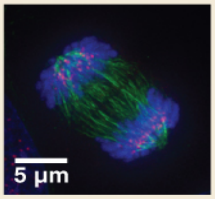
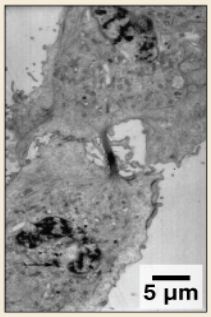
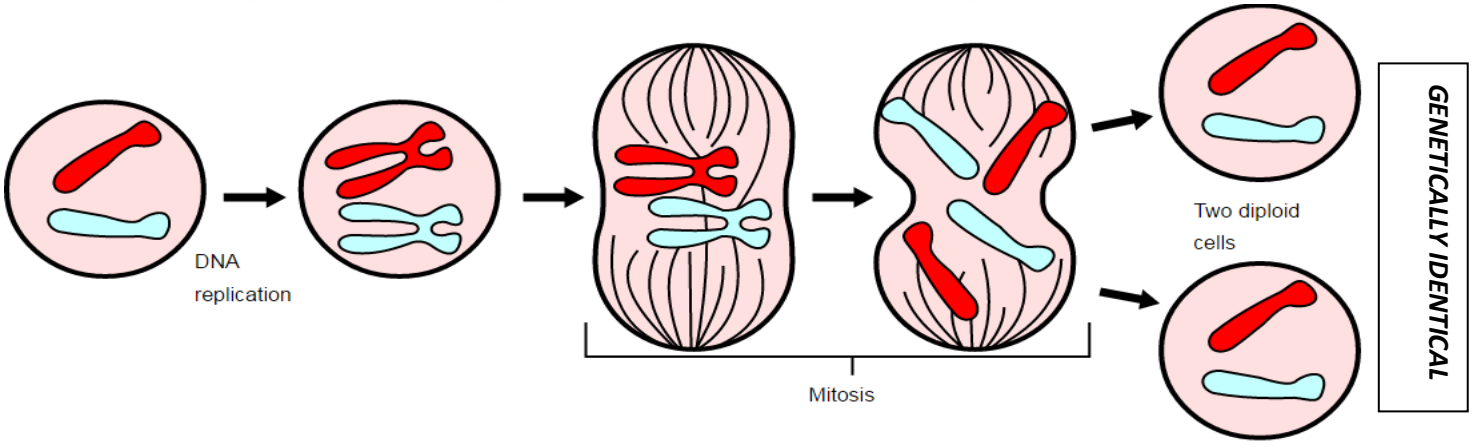
For the audio version of the file, click this link: Cell Division Audio

Cell Division: Mitosis and Meiosis

Mitosis – Division of Somatic Cells

Prophase	Prometaphase	Metaphase	Anaphase	Telophase	Cytokinesis
					
• Chromosomes condense and become visible • Spindle fibers emerge from the centrosomes • Nuclear envelope breaks down • Centrosomes move toward opposite poles	• Chromosomes continue to condense • Kinetochores appear at the centromeres • Mitotic spindle microtubules attach to kinetochores	• Chromosomes are lined up at the metaphase plate • Each sister chromatid is attached to a spindle fiber originating from opposite poles	• Centromeres split in two • Sister chromatids (now called chromosomes) are pulled toward opposite poles • Certain spindle fibers begin to elongate the cell	• Chromosomes arrive at opposite poles and begin to decondense • Nuclear envelope material surrounds each set of chromosomes • The mitotic spindle breaks down • Spindle fibers continue to push poles apart	• Animal cells: a cleavage furrow separates the daughter cells • Plant cells: a cell plate, the precursor to a new cell wall, separates the daughter cells
					

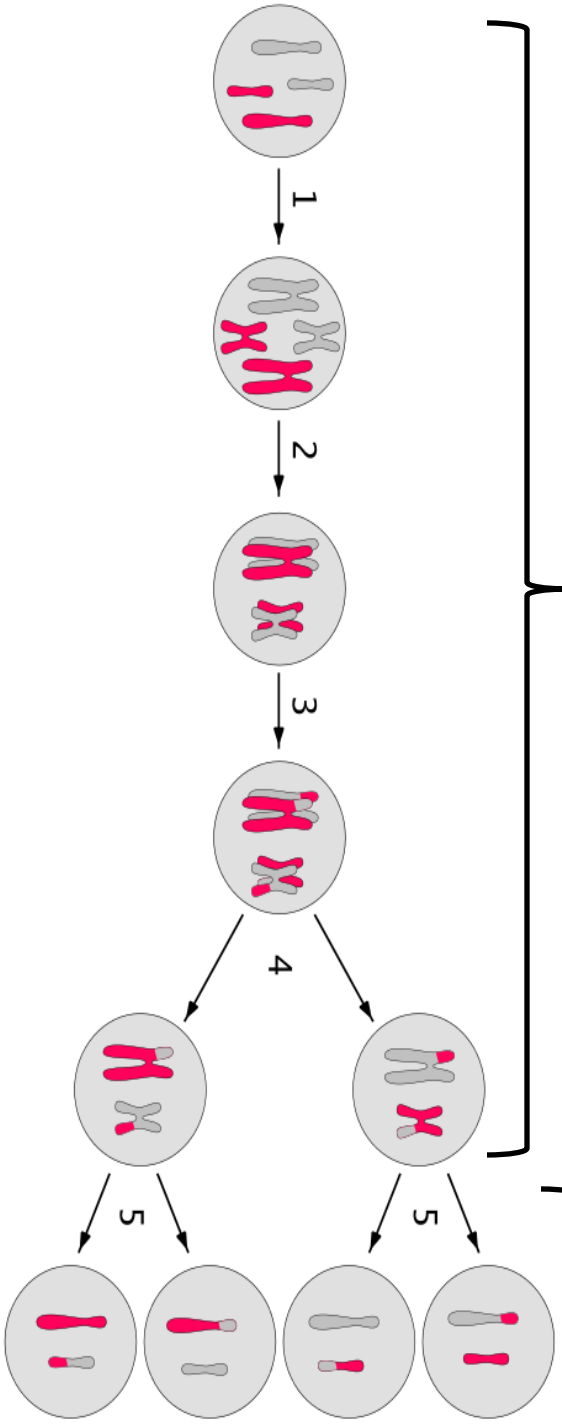


Mitosis is a part of the cell cycle process by which chromosomes (DNA) in a cell nucleus are separated into two *identical* sets of chromosomes, each in its own nucleus and its own cell. All cells involved are always *diploid* – containing two copies of each gene. All cells *except* gametes undergo this process.

Picture Credits: "RNA-http://cnx.org/resources/56725897125195de9e4b9de89c0e2c04/0331_Stages_of%20_Mitosis_and_Cytokinesis.jpg
http://cnx.org/resources/da18ede894aca6eb14c3d53d8e667f22/graphics1.png

Cell Division: Mitosis and Meiosis

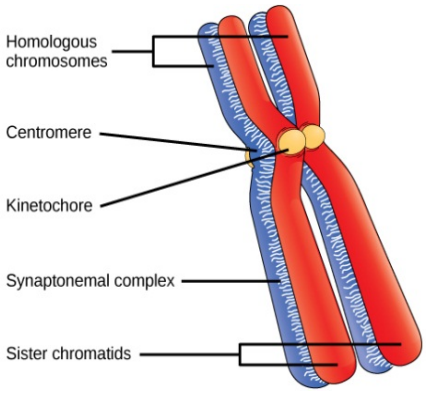
Meiosis – Division of Gamete Cells

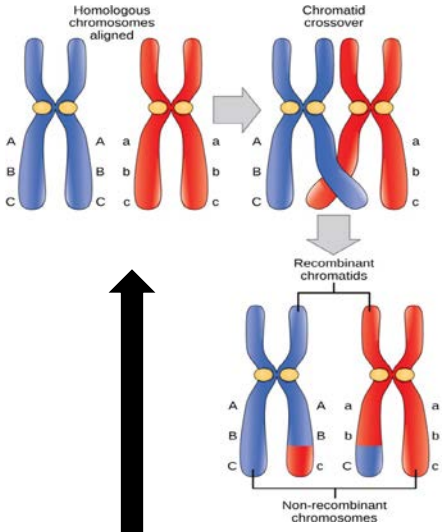


Meiosis I segregates homologous chromosomes, producing two haploid cells (N chromosomes, 23 in humans). Because the ploidy is reduced from diploid (2N) to haploid (N), meiosis I is referred to as a *reductional division*.

Phases are analogous to Mitosis but with chromosomes rather than chromatids.

Phases: P, M, A, T, Cytokinesis





In Prophase I, homologous chromosomes (called tetrads when paired) "cross over". This crossing over exchanges genetic material from one chromosome to another and creates *genetic variation.* All haploid cells are genetically different.

Meiosis II is mechanically, similar to mitosis – separates sister chromatids. Genetic results are different. Daughter cells are *all genetically different*. The end result is production of four haploid cells (23 chromosomes, N in humans) from the two haploid cells.

These haploid cells (sperm and egg) combine to form diploid cells during sexual reproduction → N + N = 2N

Phases: P, M, A, T, Cytokinesis