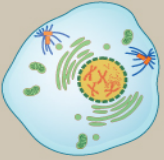
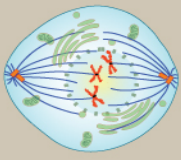
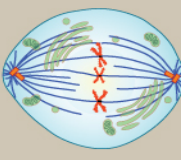
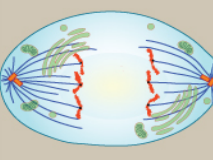
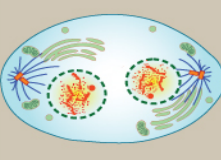
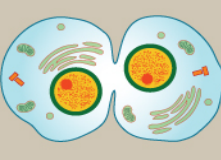
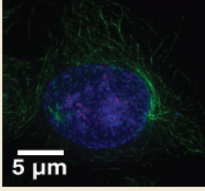
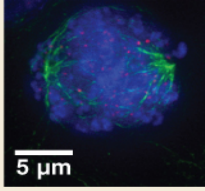
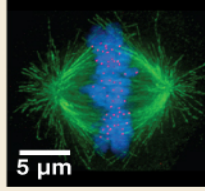
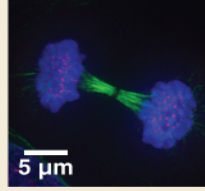
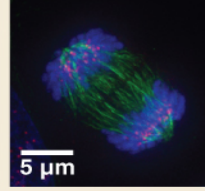
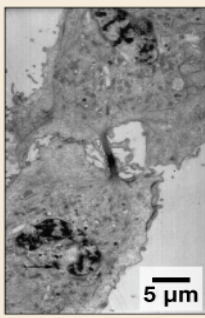
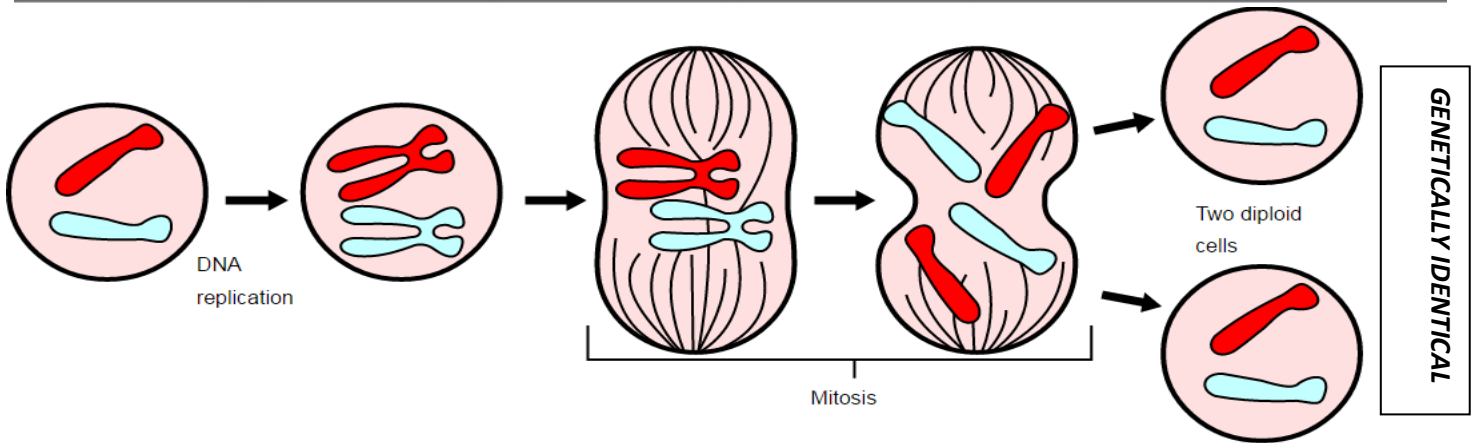


Cell Division: Mitosis and Meiosis

Mitosis – Division of Somatic Cells

Prophase	Prometaphase	Metaphase	Anaphase	Telophase	Cytokinesis
					
<ul style="list-style-type: none"> Chromosomes condense and become visible Spindle fibers emerge from the centrosomes Nuclear envelope breaks down Centrosomes move toward opposite poles 	<ul style="list-style-type: none"> Chromosomes continue to condense Kinetochores appear at the centromeres Mitotic spindle microtubules attach to kinetochores 	<ul style="list-style-type: none"> Chromosomes are lined up at the metaphase plate Each sister chromatid is attached to a spindle fiber originating from opposite poles 	<ul style="list-style-type: none"> Centromeres split in two Sister chromatids (now called chromosomes) are pulled toward opposite poles Certain spindle fibers begin to elongate the cell 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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
					

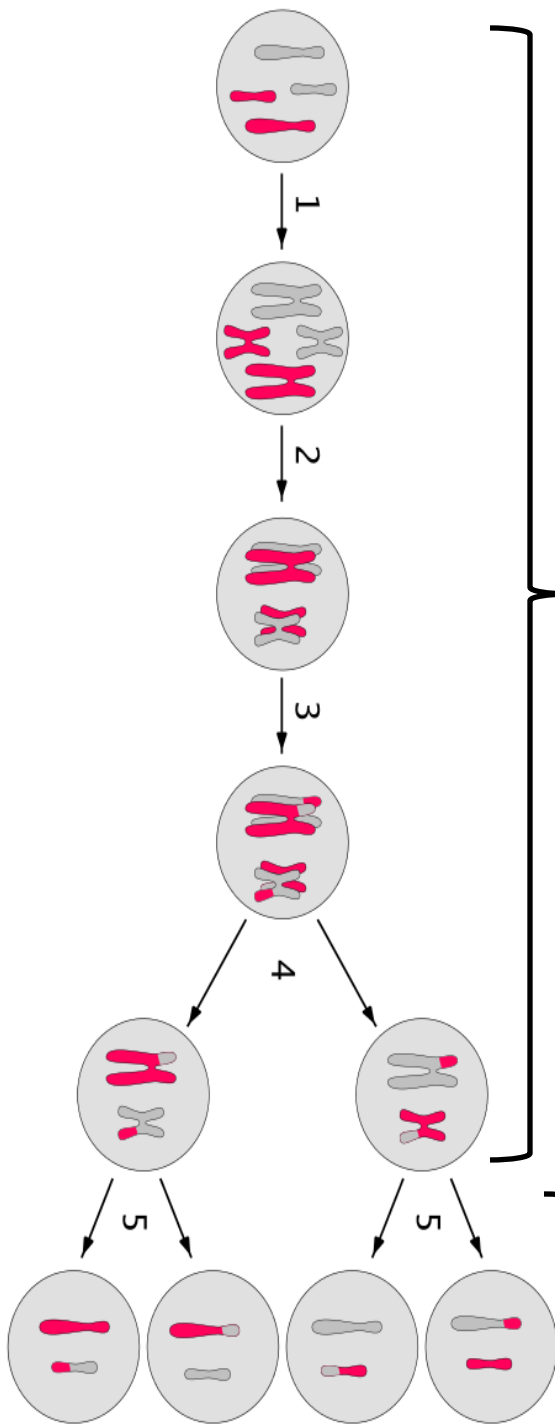


Mitosis is a part of the cell cycle process by which chromosomes (DNA) in a cell nucleus are separated into two *identical* sets of chromosomes, each in its own nucleus and its own cell. All cells involved are always *diploid* – containing two copies of each gene. All cells *except* gametes undergo this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

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Cell Division: Mitosis and Meiosis

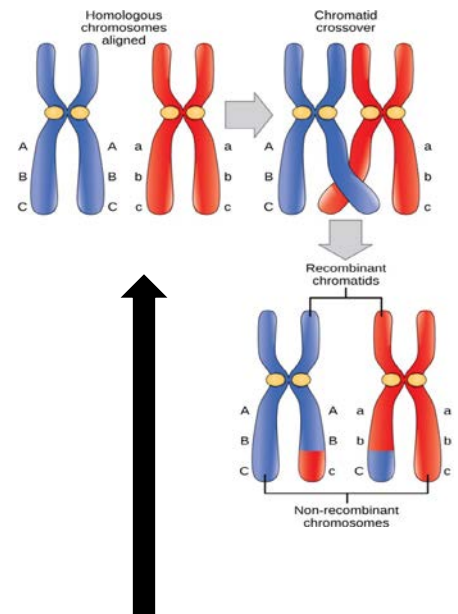
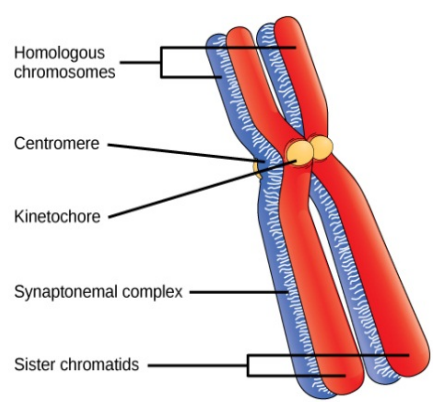
Meiosis – Division of Gamete Cells



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

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