

Concept 9.6

Meiosis increases genetic variation among offspring

Assortments of chromosomes:

The possible combinations of gametes is equal to 2^n , where n is the haploid number.

For human, $n = 23$ so there are 2^{23} , or 8 million possible chromosome combinations.

Crossing Over - the exchange of genetic material between homologous chromosomes.

- occurs during prophase 1 of meiosis
- crossing over adds another source of variation (**genetic recombination**)

Review: Comparisons of Mitosis and Meiosis

Mitosis

- Provides for growth, repair, and asexual reproduction.
- Produces daughter cells that are genetically identical to parent cell.
- Chromosomes only duplicate once during interphase.
- Division occurs in the nucleus followed by cytokinesis, and produces two diploid cells.

Meiosis

- Takes place in specialized cells in sexually reproducing organisms.
- Yields haploid daughter cells with only one set of homologous chromosomes this set consists of one member of each homologous pair.
- Chromosomes only duplicate once during interphase.
- Involves two nuclear divisions, yielding four haploid cells.
- **Meiosis I:**
 - Prophase I** the duplicated homologous chromosomes form tetrads and crossing over occurs.
 - Metaphase I** tetrads (rather than individual doubled chromosomes) are aligned at the center of the cell.
 - Anaphase I** sister chromatids stay together and go to the same pole.
- At the end of meiosis I the chromosome number in each of the two daughter cells is haploid, but consists of two sister chromatids.
- **Meiosis II** is basically identical to mitosis where the sister chromatids separate and produce haploid cells.