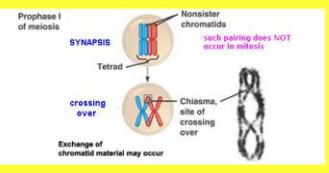


5.1 Meiosis



Prophase I of meiosis

- SYNAPSIS: Non-sister chromatids pair up. *such pairing does NOT occur in mitosis*
- Tetrad: The pair of homologous chromosomes.
- crossing over: Exchange of chromatid material may occur at the chiasma, the site of crossing over.



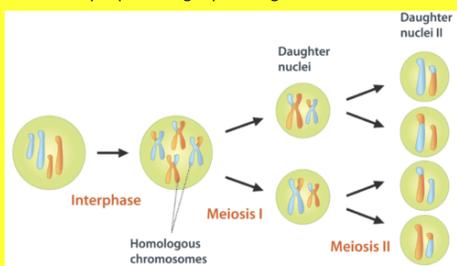
ENDURING UNDERSTANDING

IST-1 Heritable information provides for continuity of life.



IST-1.F Explain how meiosis results in the transmission of chromosomes from one generation to the next.

Meiosis is a process that ensures the formation of haploid gamete cells in sexually reproducing diploid organisms



Homologous Chromosomes

- In a diploid cell, chromosomes occur as pairs (homologues).
- **Homologues**
 - Look alike
 - Have same length and centromere position
 - Have similar banding pattern.
- One homologue originates from the maternal parent and the other from the paternal parent.



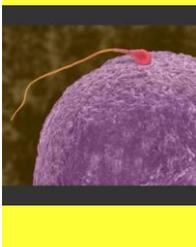
Two Pairs of Homologous Chromosomes

Allele A Allele a

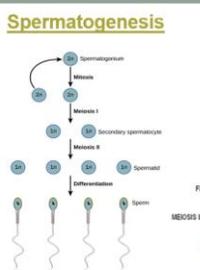
← The arrows point to corresponding genes.

Purpose of Meiosis

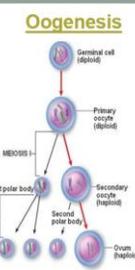
- Meiosis results in daughter cells with half the number of chromosomes of the parent cell.
- Meiosis involves two rounds of a sequential series of steps (meiosis I and meiosis II).



Spermatogenesis



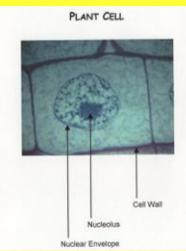
Oogenesis



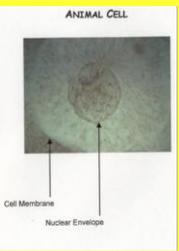
Meiosis I

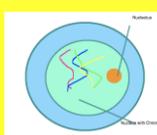
- Interphase I
 - Chromatin replicates.
 - Centrioles replicate (2 Pairs)

PLANT CELL



ANIMAL CELL





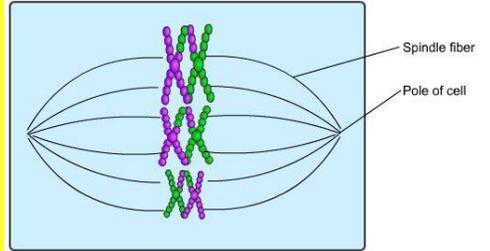

Meiosis I

- Prophase I
 - Nuclear envelope fragments; centrosomes migrate away from each other; and spindle fibers assemble.
 - Chromatin condenses and centrosomes become visible.
 - Homologous chromosomes undergo **synapsis** (pair up) forming tetrads.
 - Homologous chromatids exchange genetic material via a process called "**crossing over**".
 - Homologues are temporarily held together by **chiasma**



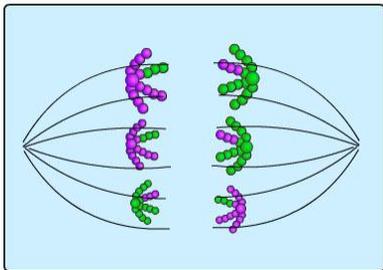
Meiosis I

- Metaphase I
 - Tetrads held together by chiasmata are aligned on the metaphase plate.
 - Fully formed spindle.
 - Kinetochores attach to spindle
 - Maternal and paternal homologues are randomly oriented toward opposite poles.



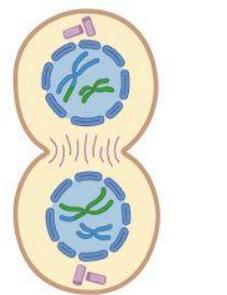
Meiosis I

- Anaphase I
 - The homologues of each tetrad separate and move toward opposite poles.
 - Each chromosome still has two sister chromatids.



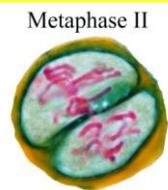
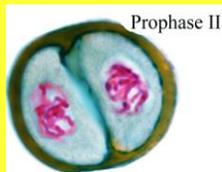
Meiosis I

- Telophase I and Cytokinesis.
 - Cleavage furrows or cell plates form.
 - Forms 2 haploid cells



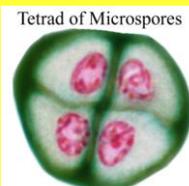
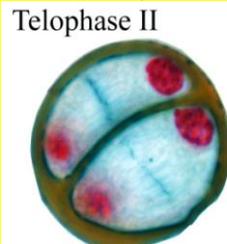
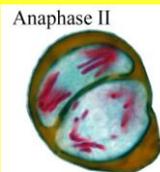
Meiosis II

- Prophase II
 - If cell underwent interkinesis, then nuclei disperse.
 - Spindle forms.
- Metaphase II
 - Haploid number of chromosomes align at metaphase plate.
 - Kinetochores of sister chromatids point to opposite poles.



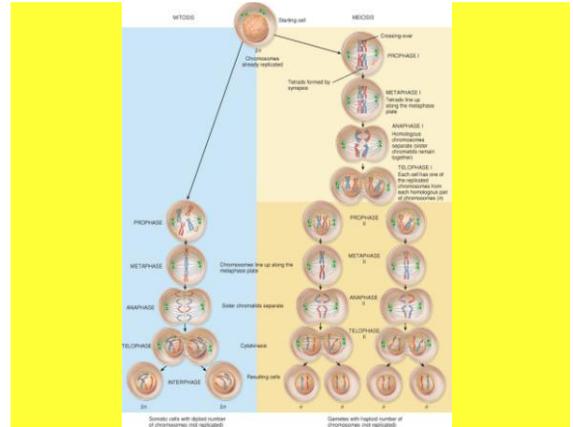
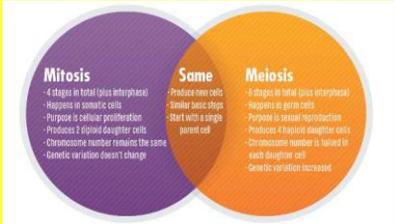
Meiosis II

- Anaphase II
 - Centromeres divide
 - Sister chromatids move toward the poles.
- Telophase II and cytokinesis
 - Nuclei form at opposite poles
 - There are four haploid cells.



IST-1.G Describe similarities and/ or differences between the phases and outcomes of mitosis and meiosis

- Mitosis and meiosis are similar in the way chromosomes segregate but differ in the number of cells produced and the genetic content of the daughter cells.



IST-1.G Describe similarities and/ or differences between the phases and outcomes of mitosis and meiosis

- Remember!!! Mitosis passes a complete genome from the parent cell to daughter cells.

