

MEIOSIS (Production of sex cells or gametes) P.273

Meiosis begins with a body cell or somatic cell that has the diploid ($2n$) number of chromosomes and ends by creating 4 haploid (n) sex cells or gametes.

NON-DIVIDING CELL

INTERPHASE (Only one time at very beginning of cell cycle)

G1: CELL GROWS IN SIZE

CELL ORGANELLES DOUBLE IN #, CENTRIOLES DOUBLE IN #

S: DNA REPLICATION OCCURS FORMING SISTER CHROMATIDS

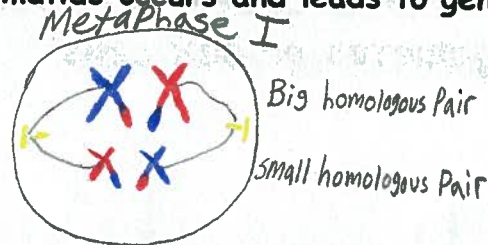
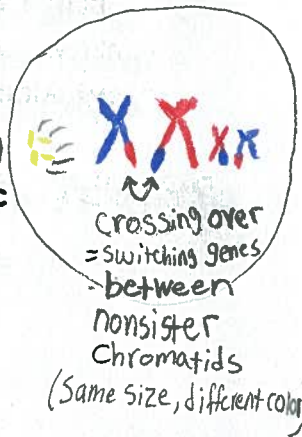
G2: CELL CONTINUES TO GROW IN SIZE AND MAKES FINAL PREPARATIONS FOR DIVISION

MEIOSIS I (1st Division)

PROPHASE I

- centrioles move toward poles
- spindle fibers begin to form
- nuclear envelope fragments, nucleolus disappears (nucleus disappears)
- ★ - homologous chromosomes each having 2 sister chromatids pair up (Synapsis)
- ★ - crossing over between non-sister chromatids occurs and leads to genetic recombination

Prophase I



METAPHASE I

- centrioles are at the poles
- spindle fibers attach to centromeres
- ★ - homologous chromosome pairs line up side-by-side at equator
- ★ - homologous chromosome pairs line up randomly by independent assortment (leads to genetic variety in the sex cells)

Anaphase I

ANAPHASE I



- ★ - homologous chromosomes separate and are pulled to opposite poles by spindle fibers = microtubules

TELOPHASE I

- nuclear envelope reforms and nucleoli appear (nuclei reform at each pole of cell)
- 2 cells with haploid #
- Cytokinesis occurs and splits the cell into two haploid cells
- Centrioles double in #

MEIOSIS II (JUST LIKE MITOSIS!) (2nd Division)

PROPHASE II

- cells have one chromosome from each homologous pair
- centrioles begin to move to poles
- spindle fibers begin to form
- nuclear envelope fragments, nucleolus disappears (nucleus disappears)

METAPHASE II

- centrioles are at the poles
- spindle fibers attach to centromeres of chromosomes
- chromosomes line up at the equator in a straight line

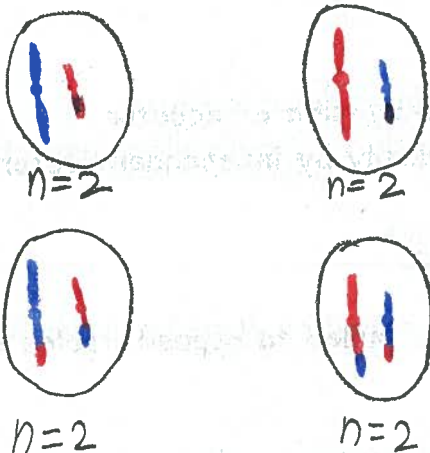
ANAPHASE II

- sister chromatids separate becoming daughter chromosomes that move to poles

TELOPHASE II

- spindle apparatus disappears
- nuclei reform around chromosomes
- cytokinesis occurs

RESULT: 4 HAPLOID CELLS ($n=2$) each with 2 centrioles
= gametes or sex cells



Each sex cell (gamete)
is different and
has 2 chromosomes