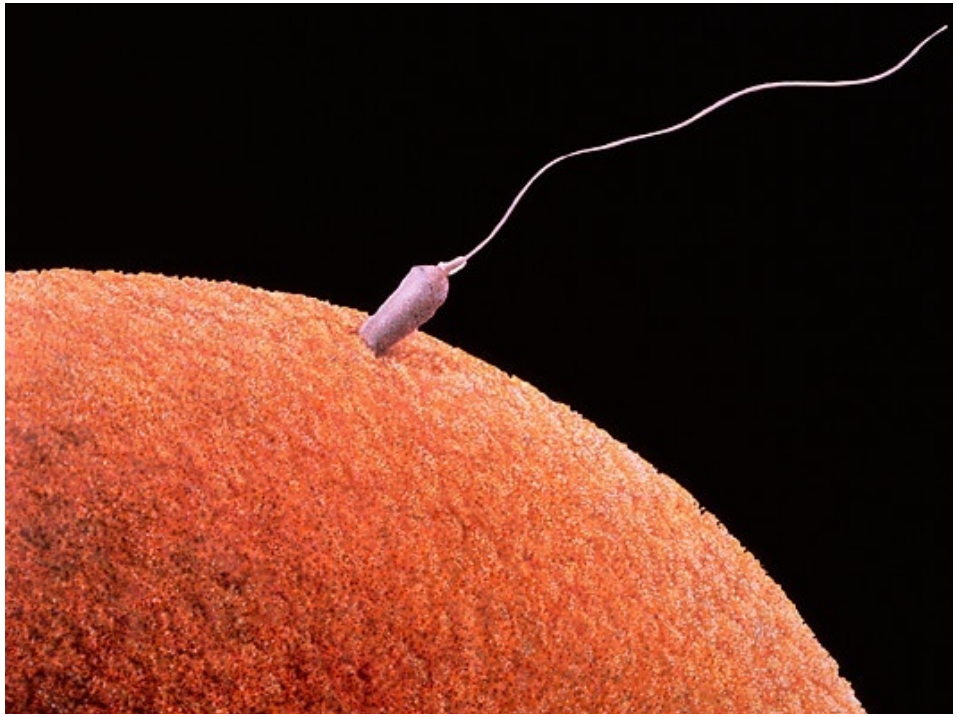
MEIOSIS

Meiosis (key concepts)

- Nuclear division
  - Results in half the DNA as parent
  - Gametes in animals
    - Sperm and egg
- Meiosis produces
  - 4 daughter cells
  - Each different combination of chromosomes

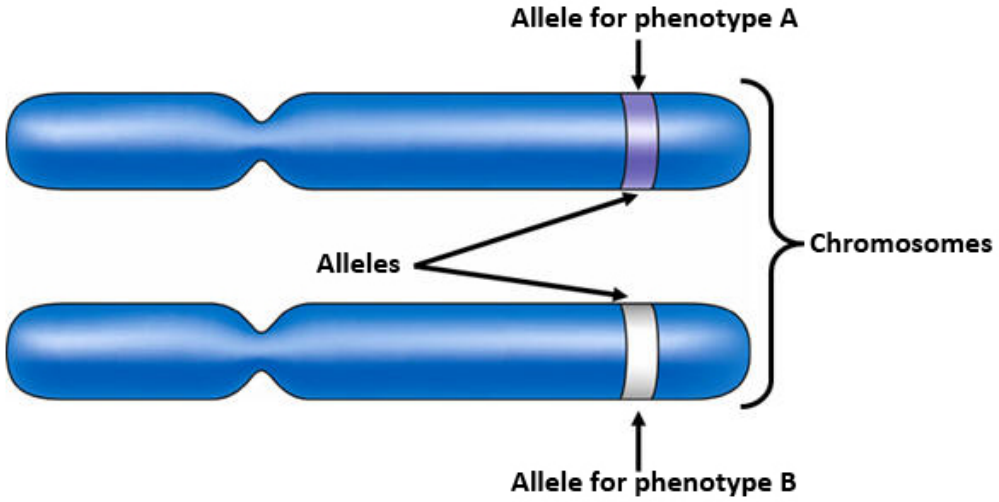


Meiosis (overview)

- Theory
  - More genetically variable offspring of population
    - More able to resist disease or environmental extremes

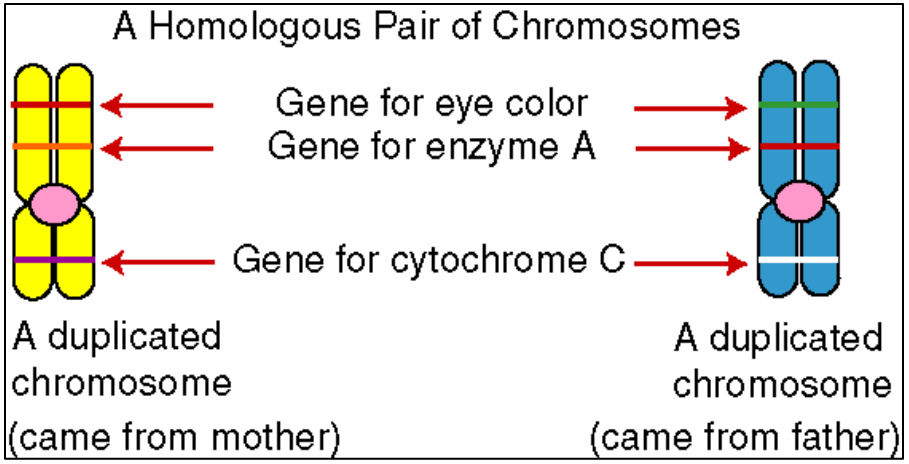
Genes

- = section of DNA that influences one or more hereditary traits in an individual
- Alleles
  - Different version of a specific gene
    - Mother's allele
      - black hair
    - Father's allele
      - blonde hair



Chromosomes role in sex

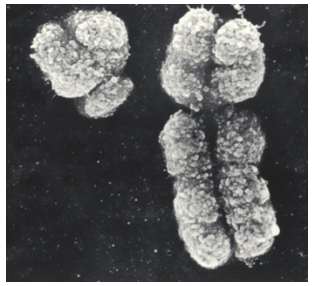
- Humans
  - 46 chromosomes
    - "karyotype"

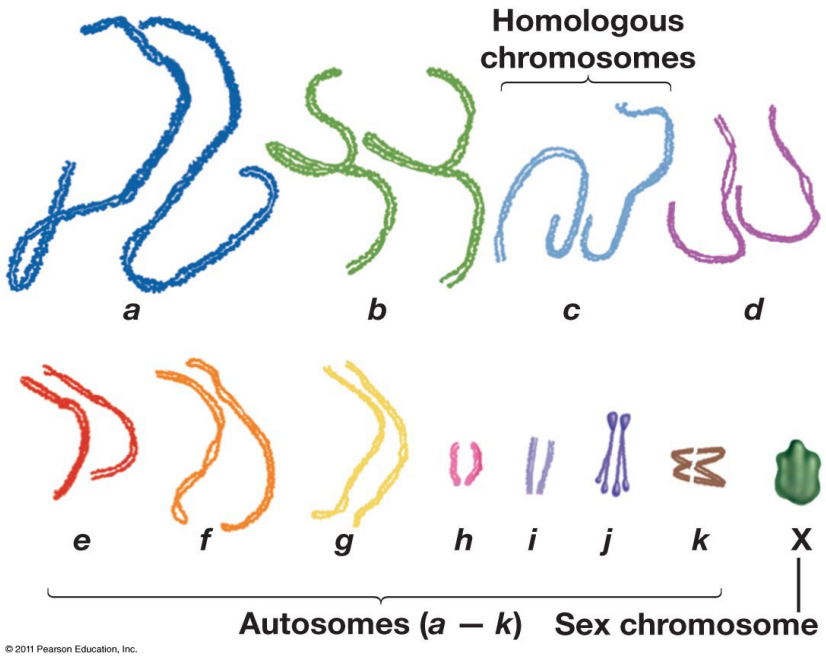


  - Homologous chromosomes
    - Same genes, but possibly different alleles
    - Humans have 23 paired sets of chromosomes
  - Diploid cells
    - 2n=46

Sex cells

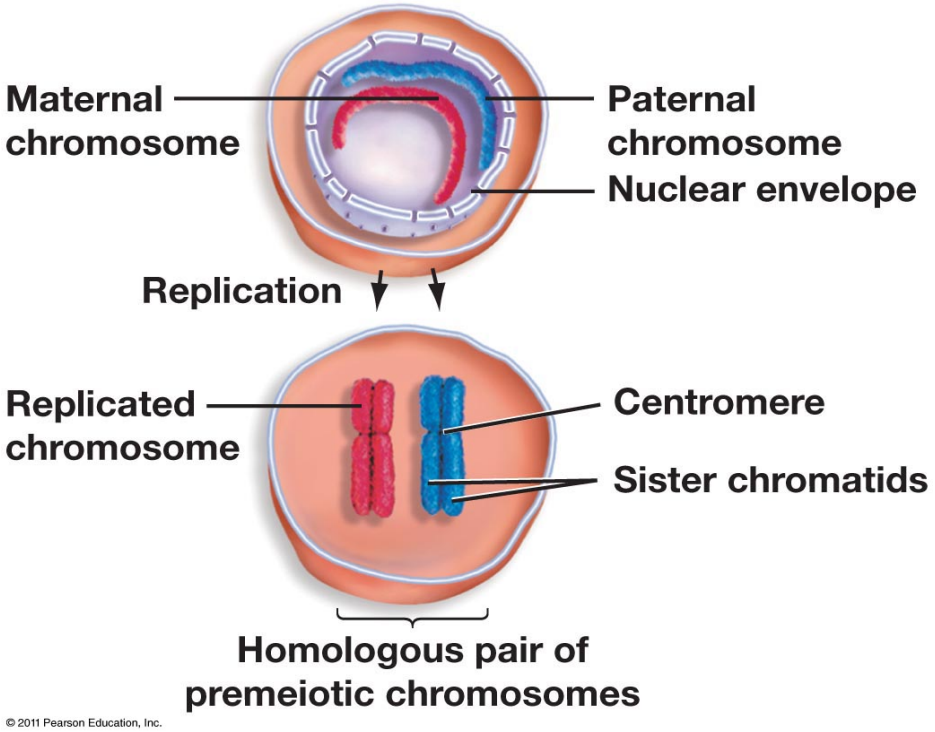
- Gametes
  - One from "mother", one from "father"
- In humans
  - n=23 (haploid)
  - 22 autosomes
    - Non-sex chromosomes
  - 1 sex chromosome
    - X or Y
- X+X=female
- X+Y=male



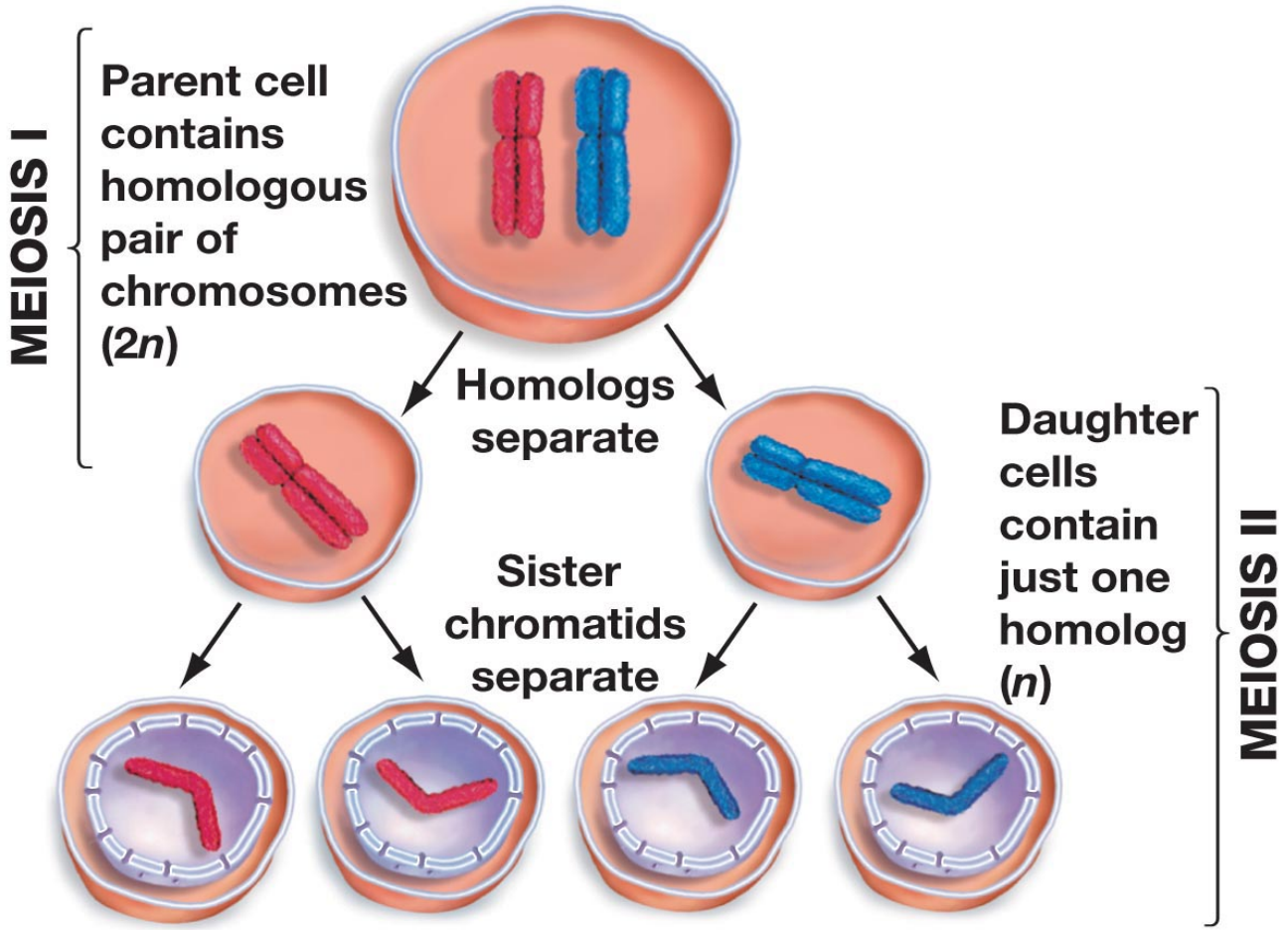


Before Meiosis

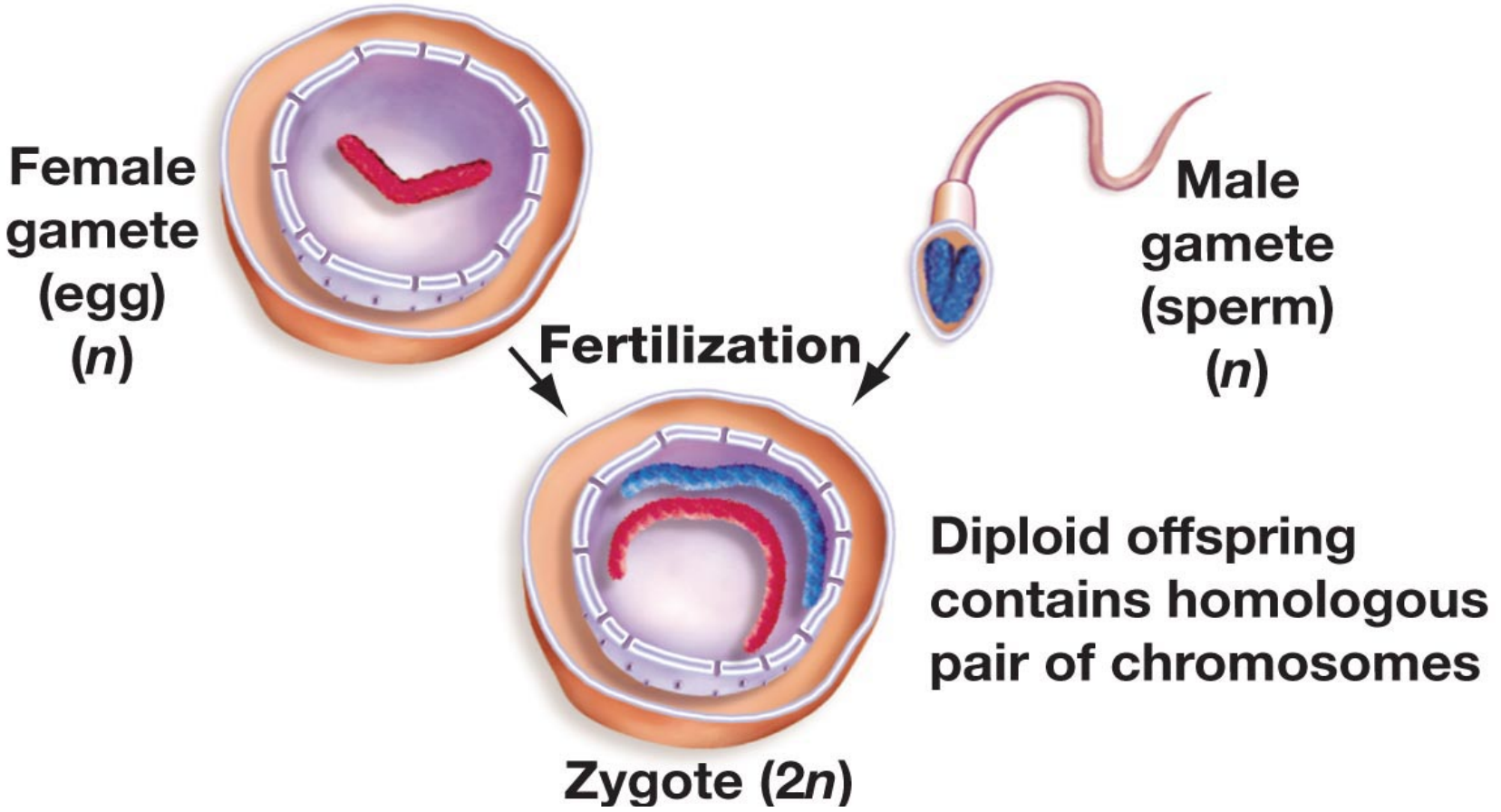
- Each chromosome is replicated
- Producing identical sister chromatids



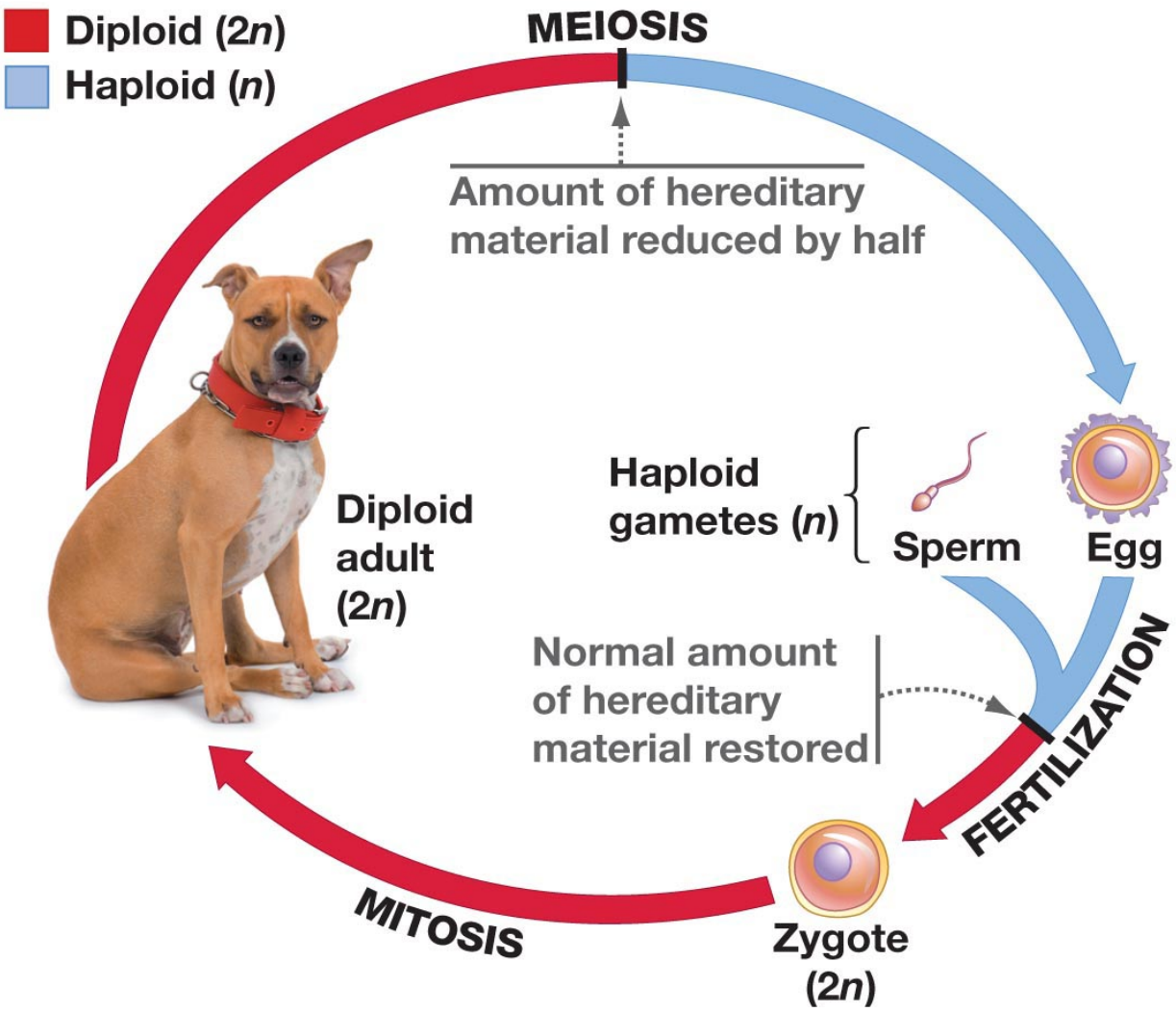
Meiosis is in 2 parts



Fertilization

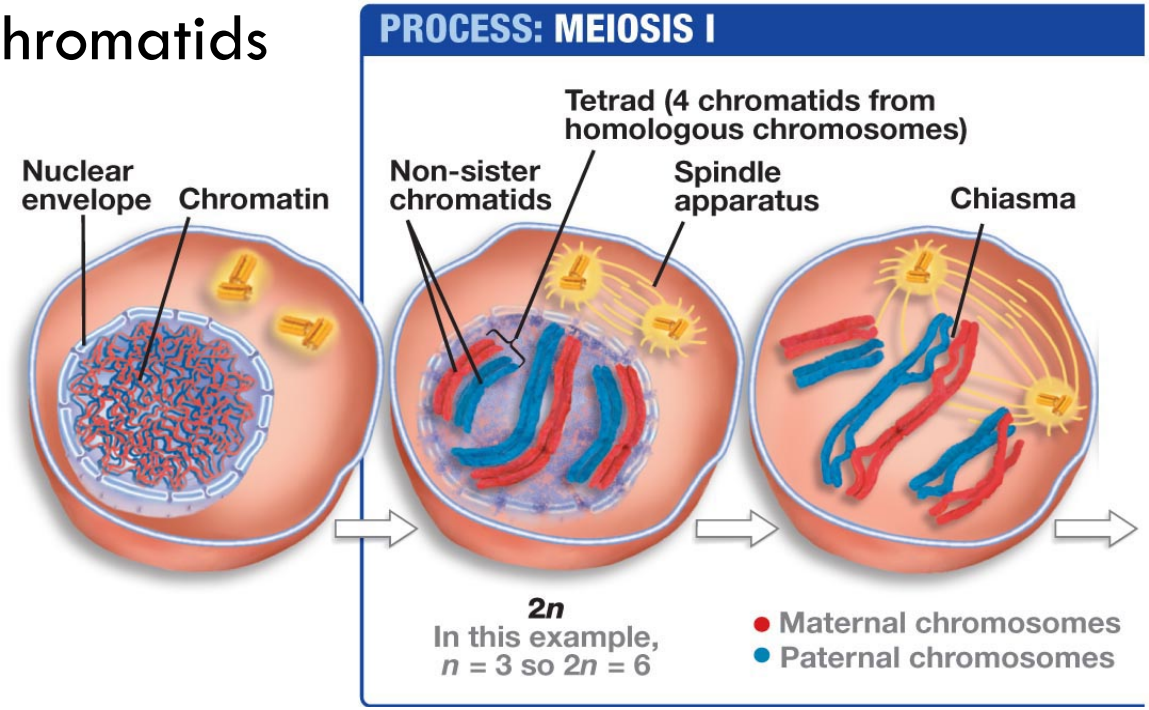


The Cycle of Sex



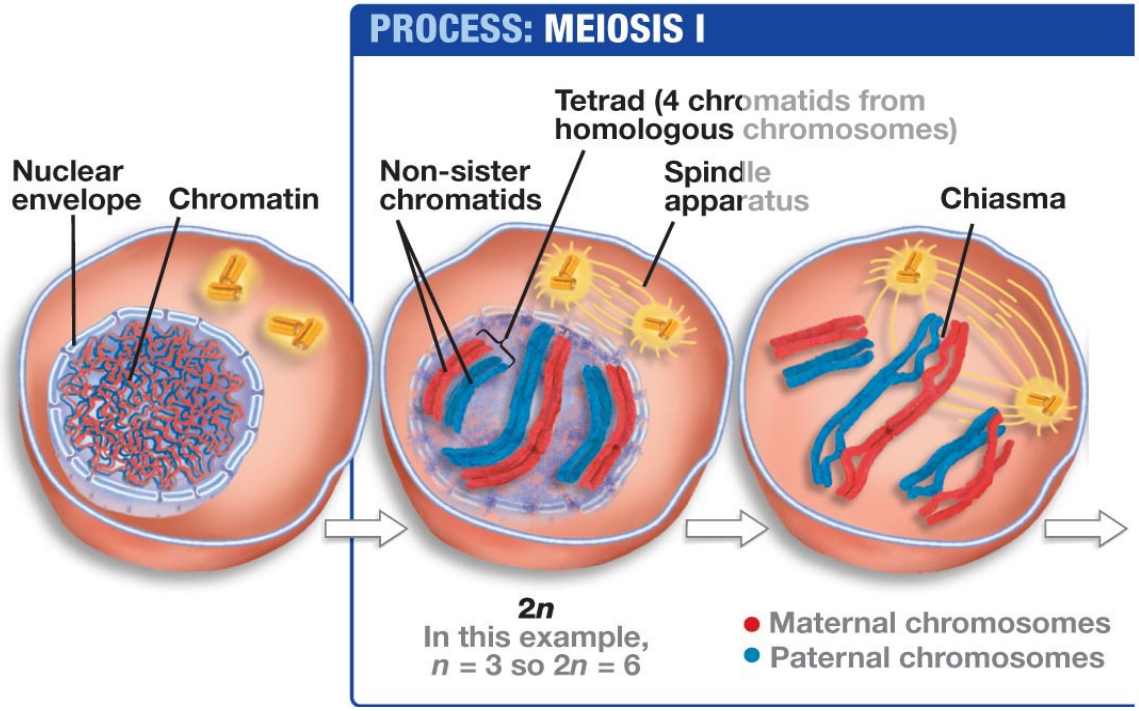
Early Prophase I

- Chromosomes condense; spindle apparatus forms
- Homologous pairs combine into tetrad
  - 2 non-sister chromatids



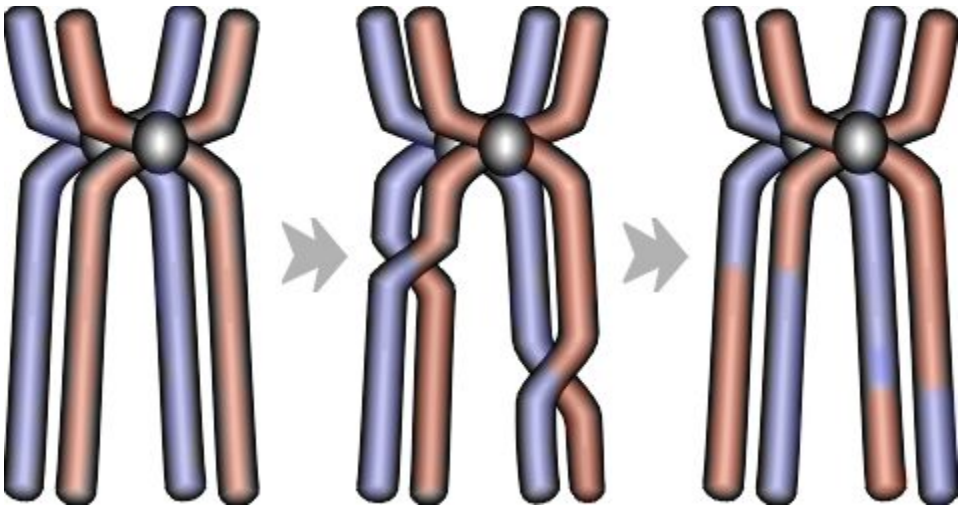
Late Prophase I

- Non-sister chromatids separate
- Crossing over happens



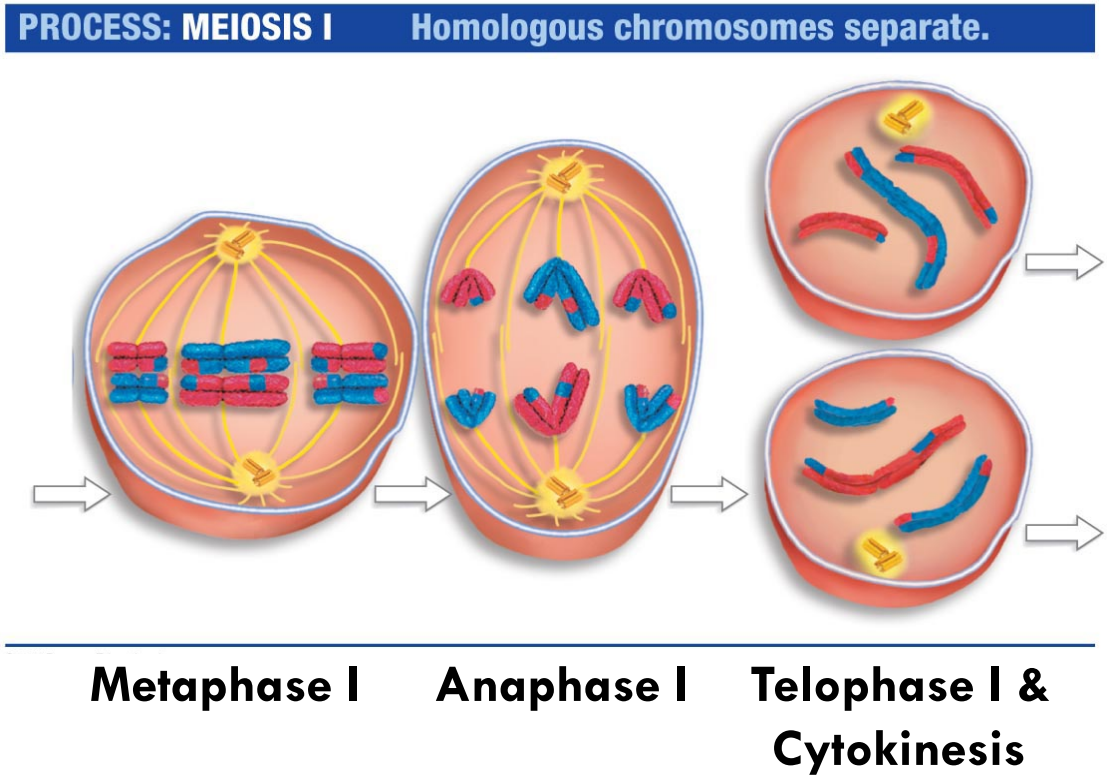
Crossing over

- Individual chromosomes carry genes from both parents via “crossing over”
  - Known as “recombinant chromosomes”
- Late Prophase I



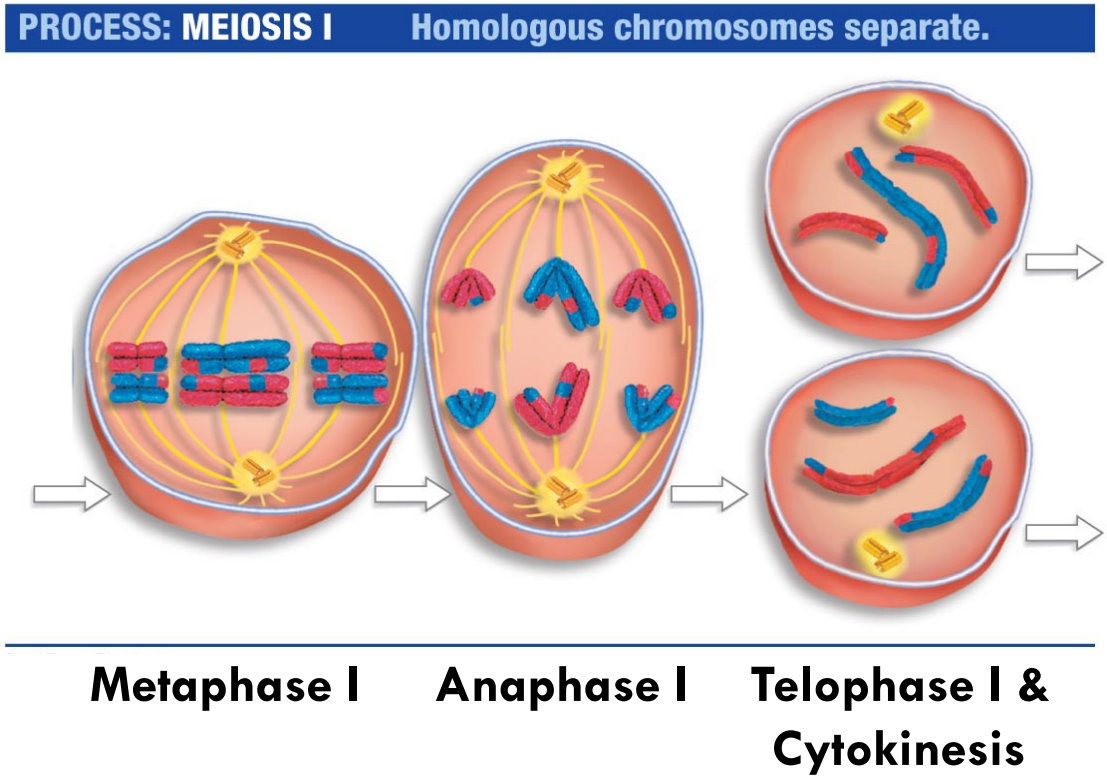
Metaphase I

- Tetrads line up at metaphase plate



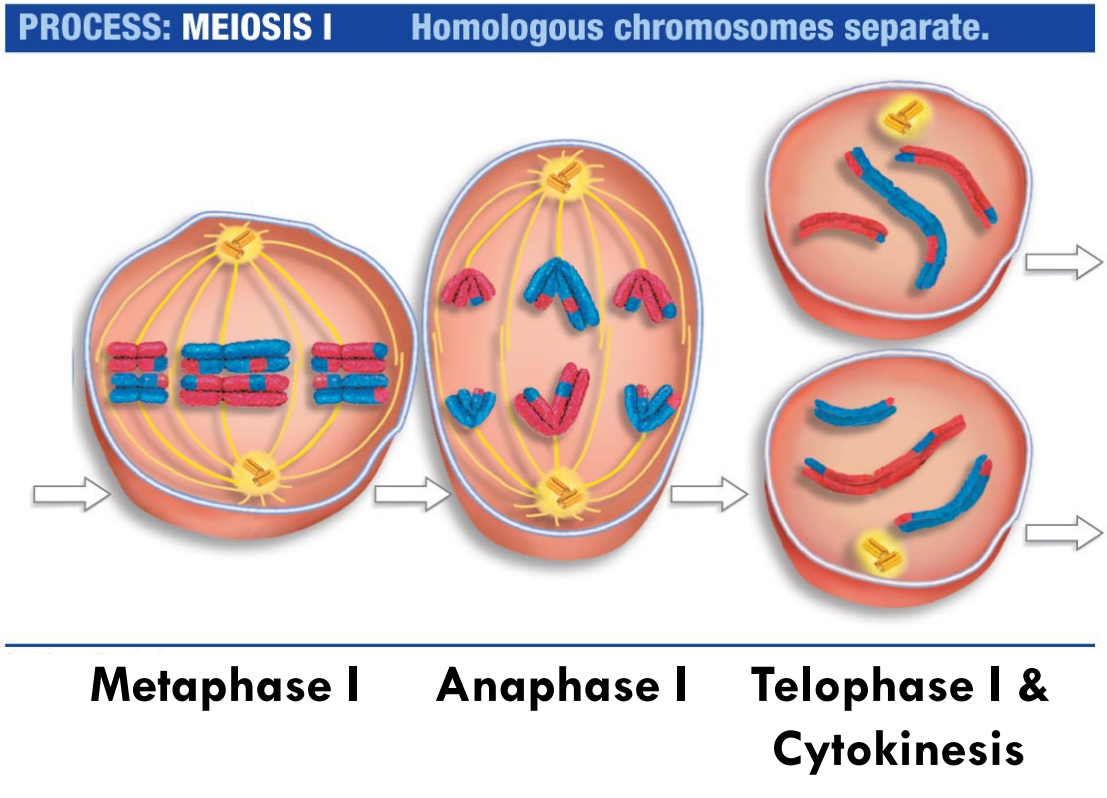
Anaphase I

- Paired homologous chromosomes separate
  - Migrate to opposite ends of cell



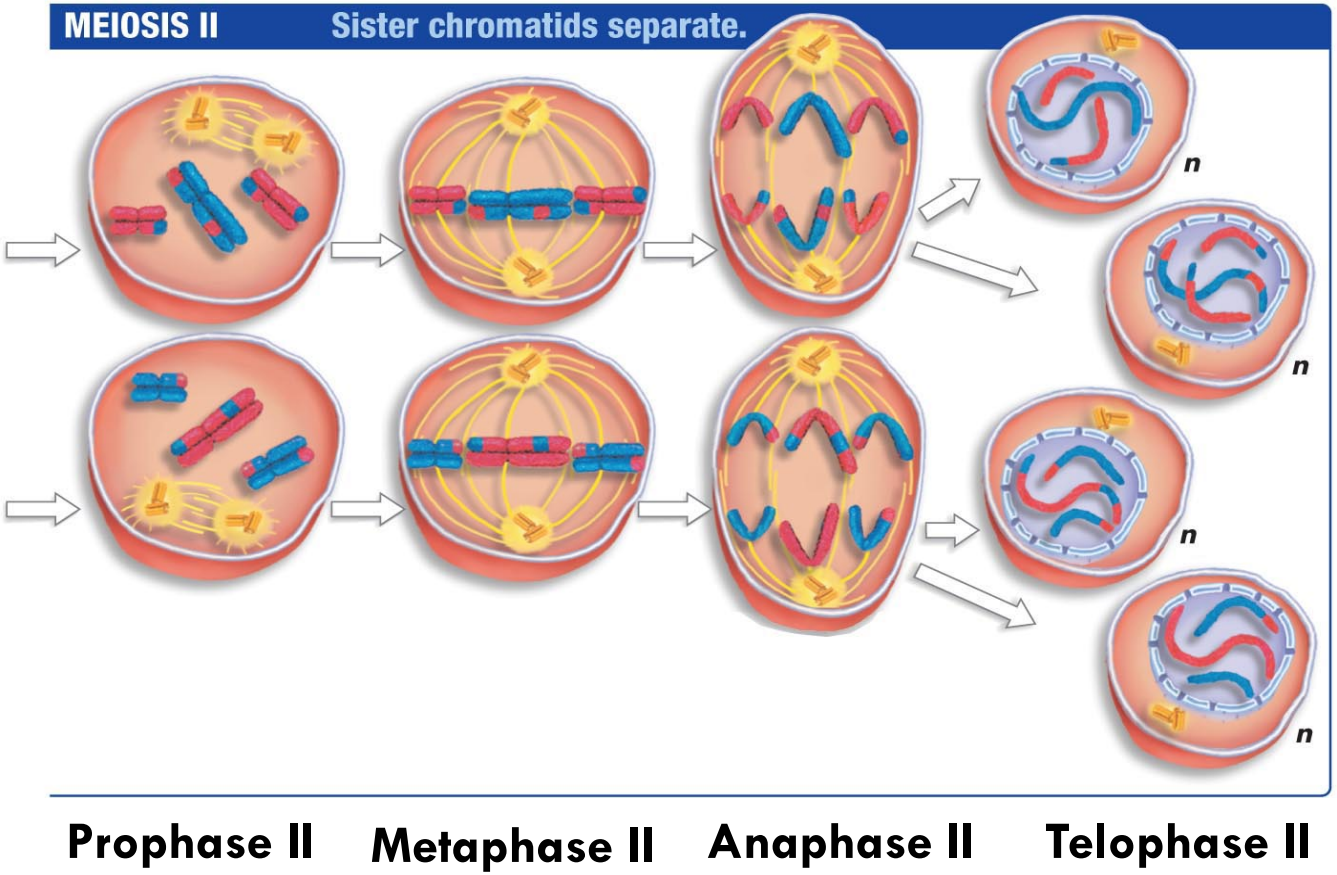
Telophase I & Cytokinesis

- Paired homologous chromosomes keep migrating
- Cell divides



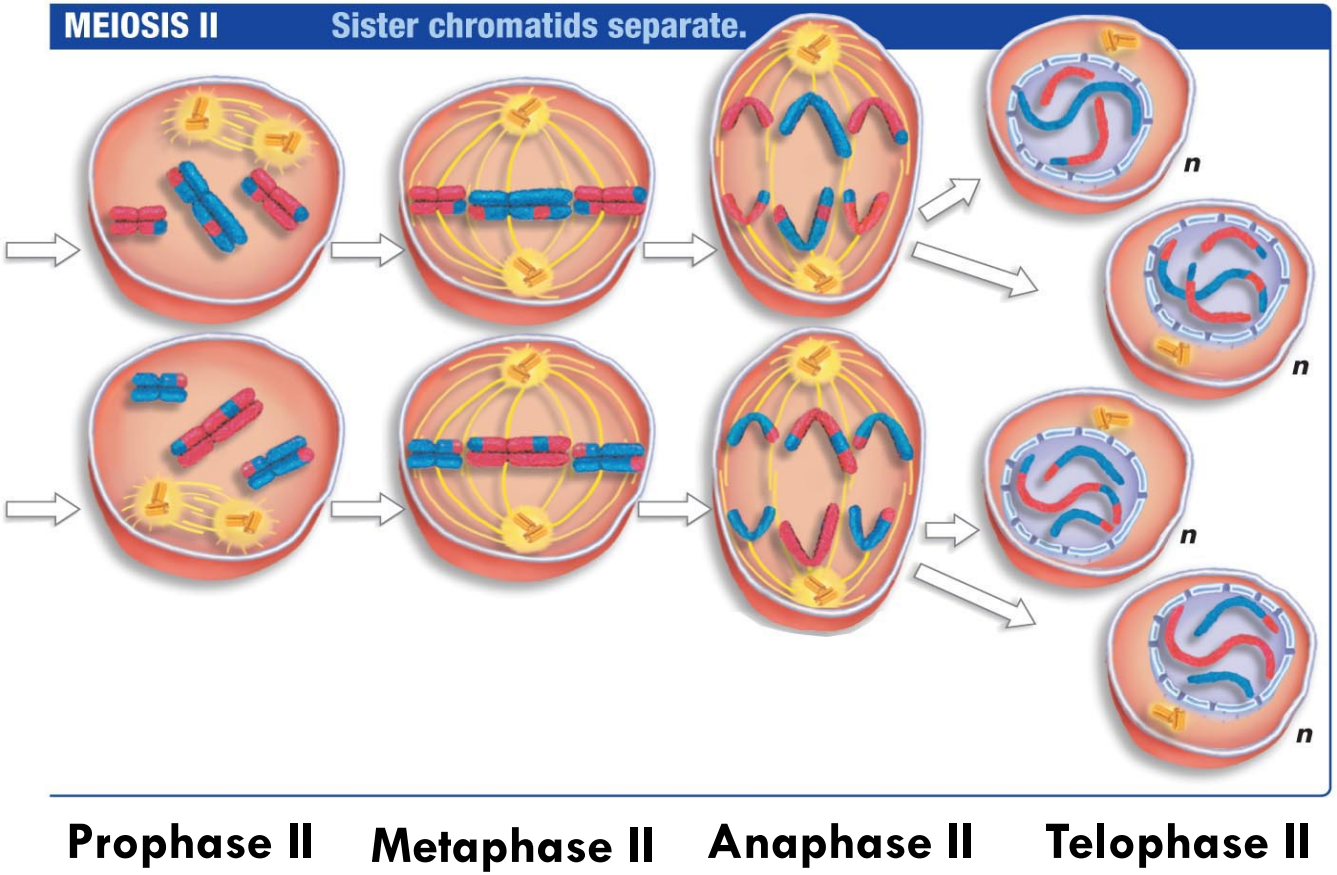
Prophase II

- Spindle fibers attach
  - to centromere of each sister chromatid



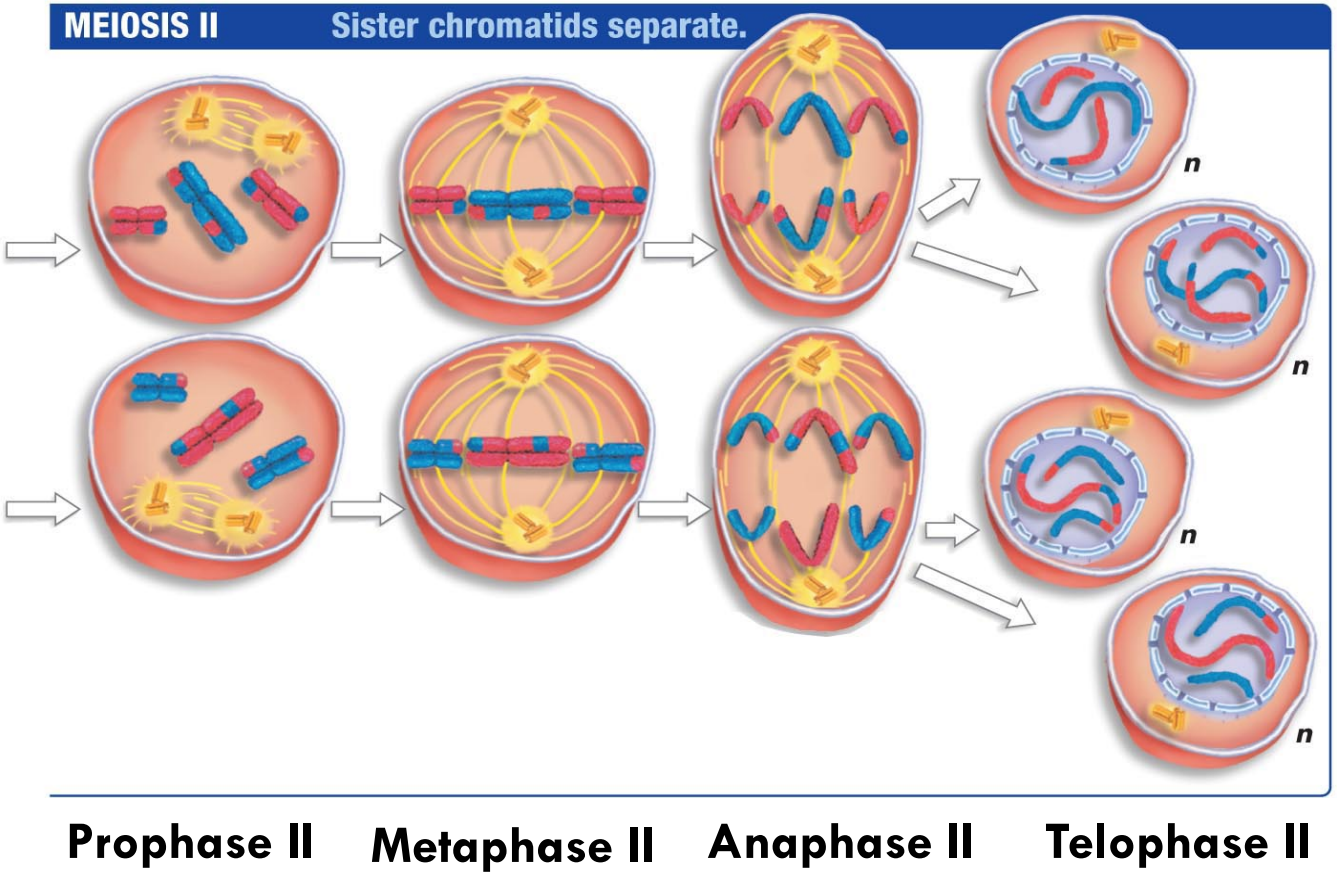
Metaphase II

- Replicated chromosomes line up
  - At metaphase plate



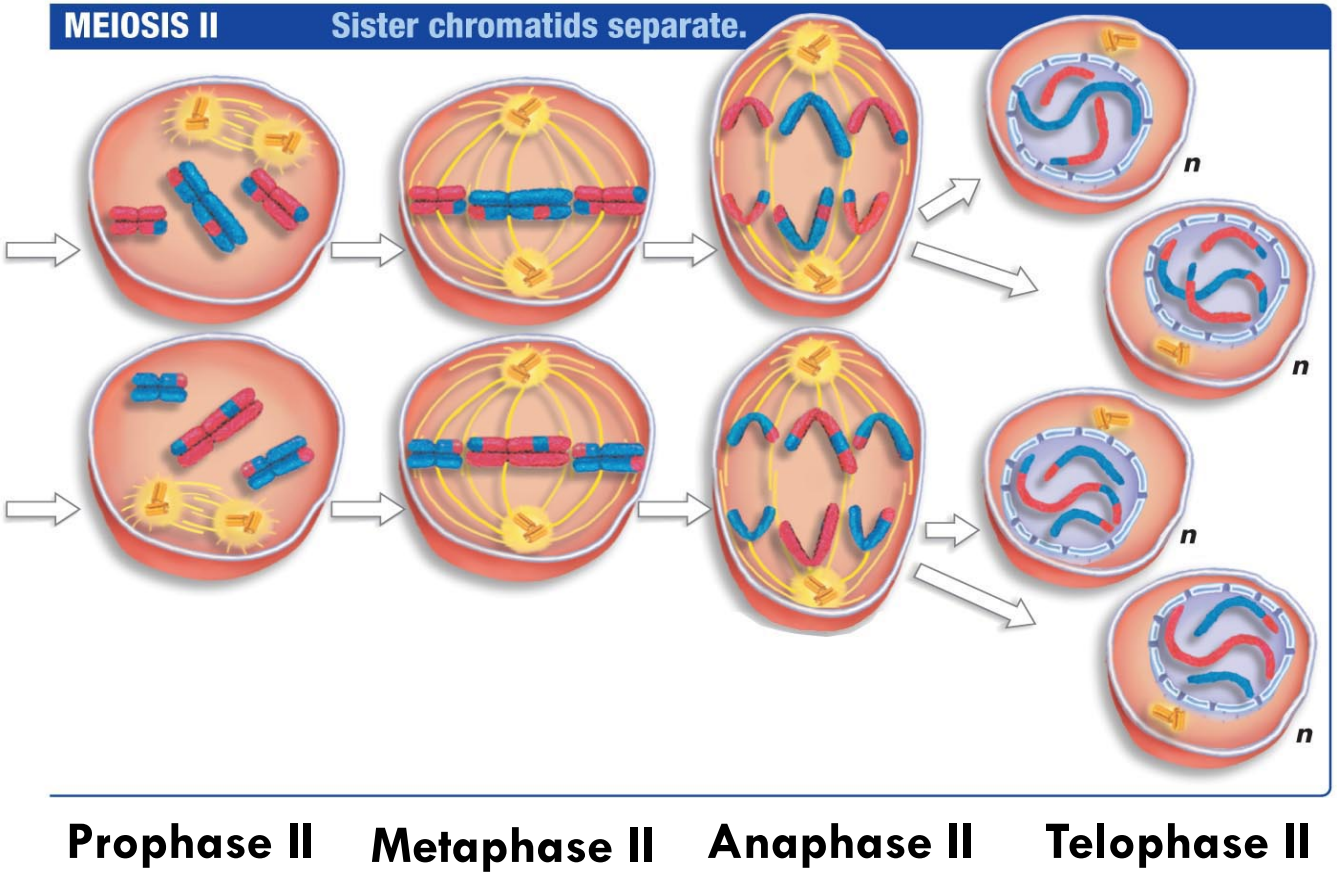
Anaphase II

- Sister chromosomes separate
  - daughter chromosomes move to opposite sides



Telophase II

- Chromosomes arrive at opposite ends
- Nuclear envelope forms around haploids



Mitosis vs. Meiosis

- Meiosis
  - Homologous chromo-somes pair
  - Four daughter cells
    - Half genetic material as parents
- Mitosis
  - Homologous chromo-somes don't pair
  - Two daughter cells
    - Genetically identical to parents