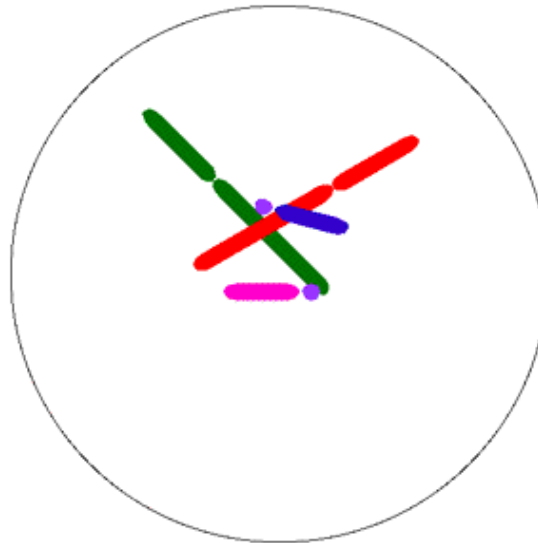


Meiosis

Honors Biology
Facilitator: Mr. Lee
Room 320



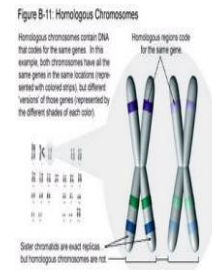
Objectives

- **Contrast the chromosomes number in body cells and gametes**
- **Contrast meiosis and mitosis**

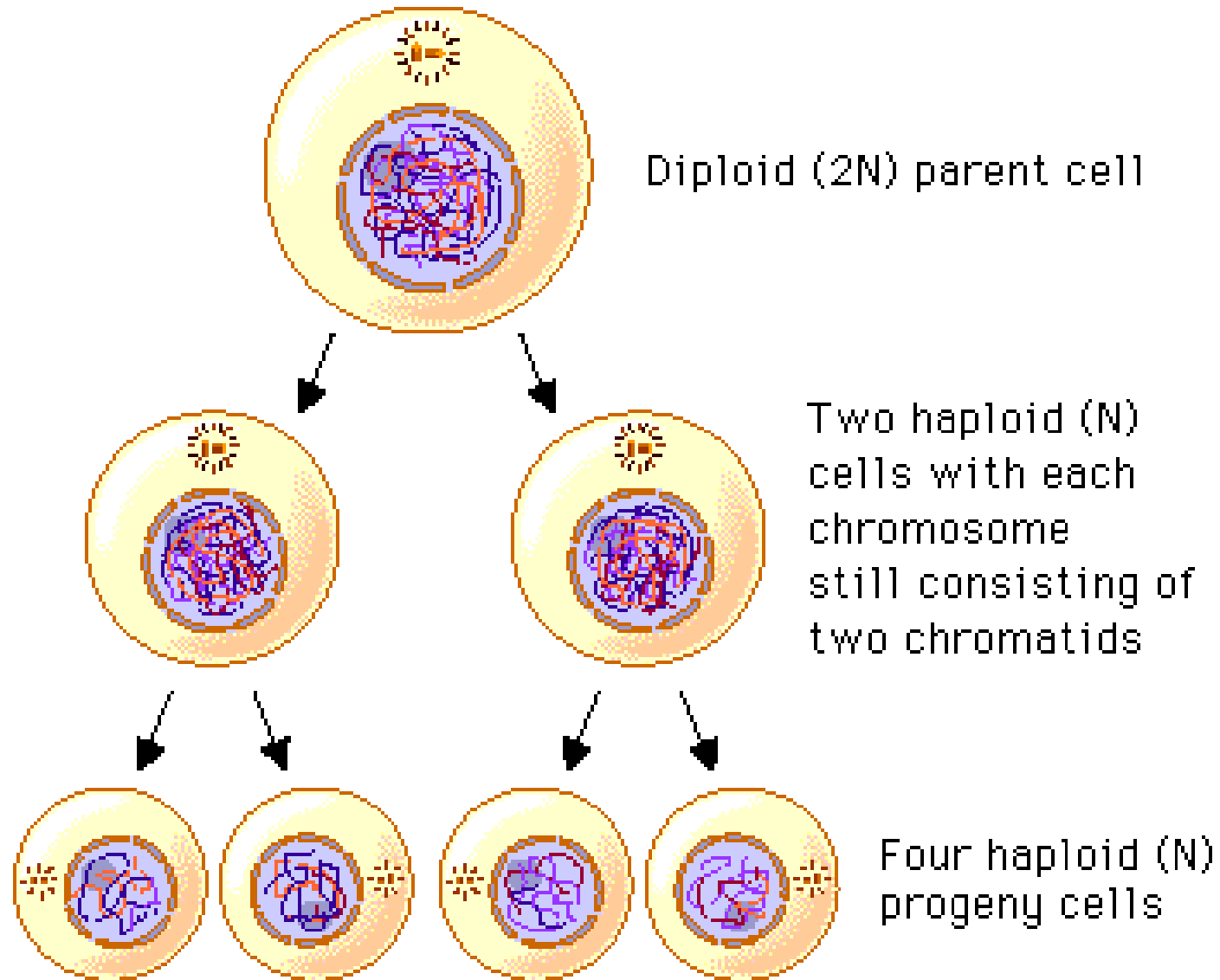


Chromosome Number

- **Homologous chromosomes are sets of matching chromosomes**
 - **One from your Dad**
 - **One from your Mom**
- **Diploid cells (2N) contain both sets of chromosomes (46 in humans)**
- **Haploid cells (1N) only have one set of chromosomes (23 in humans)**



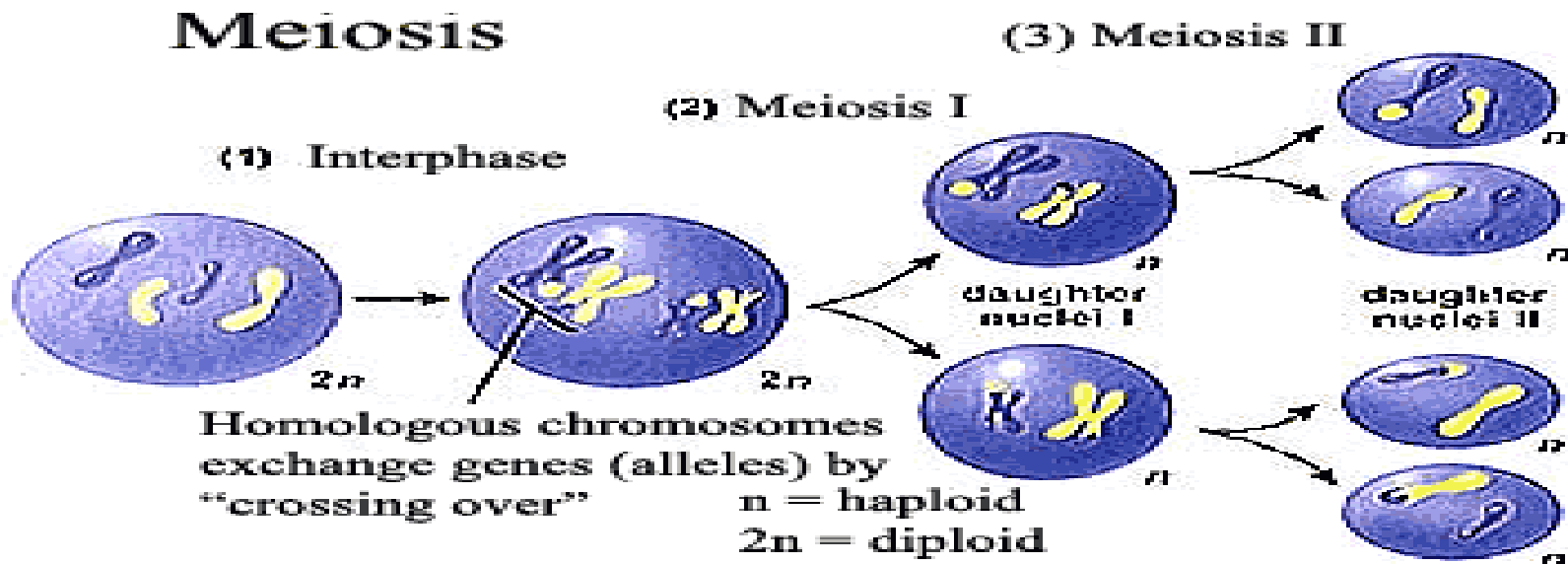
Diploid vs. Haploid



Phases of Meiosis

– **Meiosis is a type of cell division that produces haploid cells (gametes) from diploid cells**

- **Male gamete- sperm**
- **Female gamete- egg**



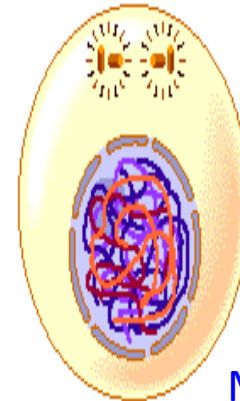
Phases of Meiosis...

- **Meiosis I**

- **Interphase I**
- **Prophase I**
- **Metaphase I**
- **Anaphase I**
- **Telophase I and Cytokinesis**

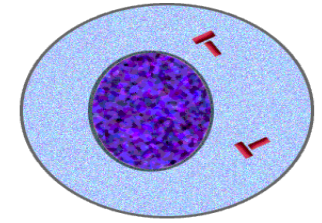
- **Meiosis II**

- **Prophase II**
- **Metaphase II**
- **Anaphase II**
- **Telophase II and Cytokinesis**

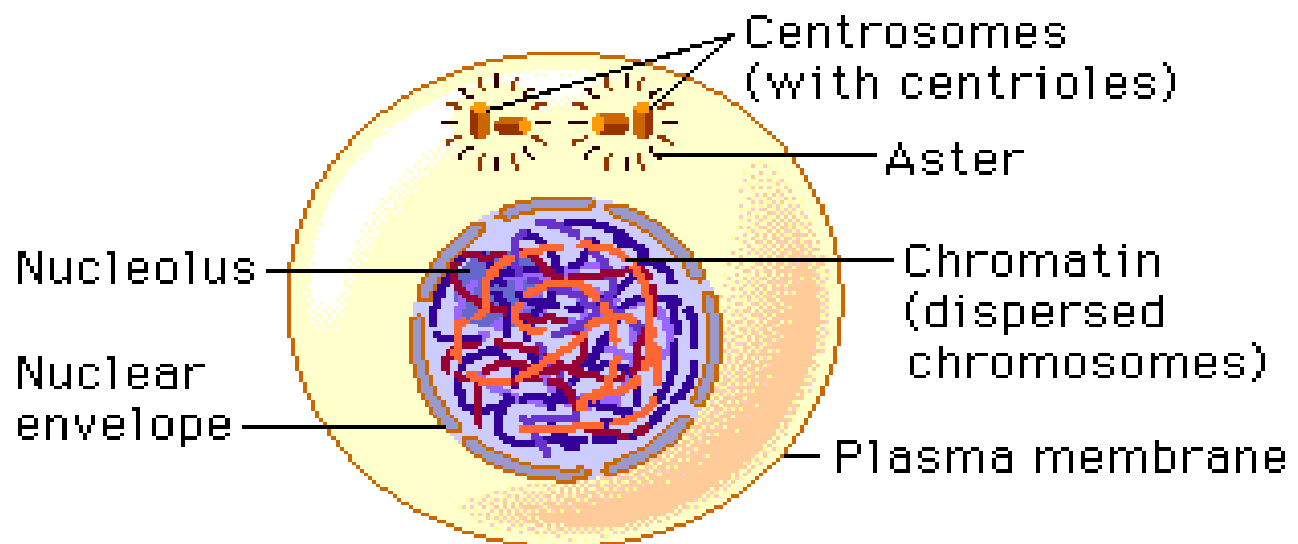


[Meiosis .mov](#)

Interphase I



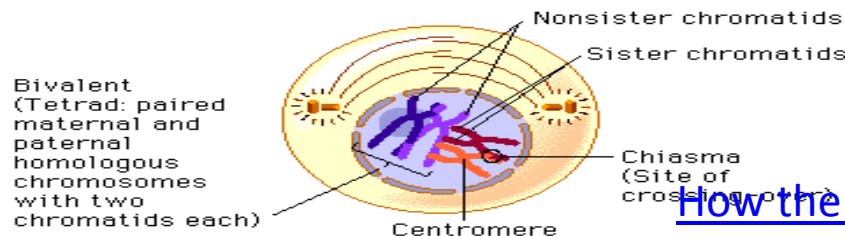
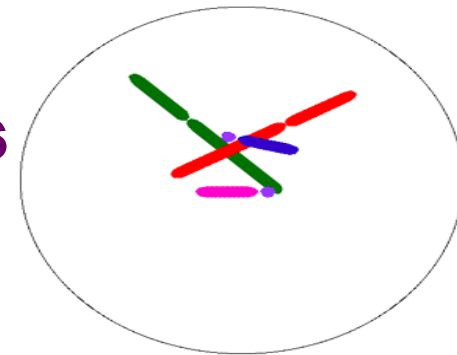
- **Still have G₁ phase, S phase, G₂ phase**
- **Normal cell (diploid) replicates its DNA forming sister chromatids**



Prophase I

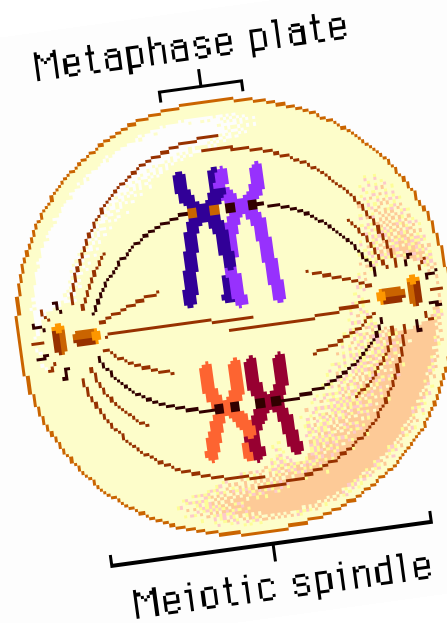


- **DNA coils tightly into chromosomes**
- **Spindle fibers appear**
- **Nucleus/nucleolus disappear**
- **Chromosomes pair into homologue chromosomes forming a Tetrad**
 - » **This pairing is called Synapsis**
 - » **Crossing over takes place, resulting in genetic recombination of alleles**



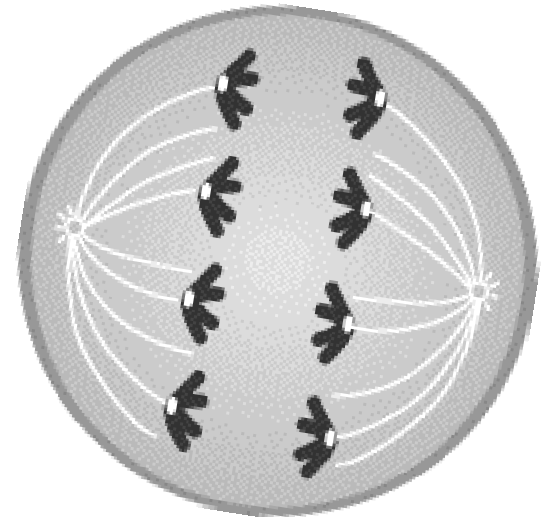
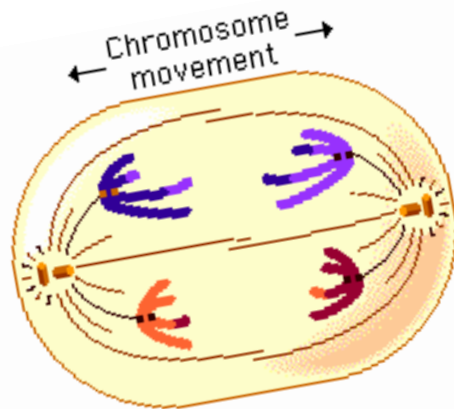
Metaphase I

- Homologues line up in middle
- Spindle fibers attach to the centromere



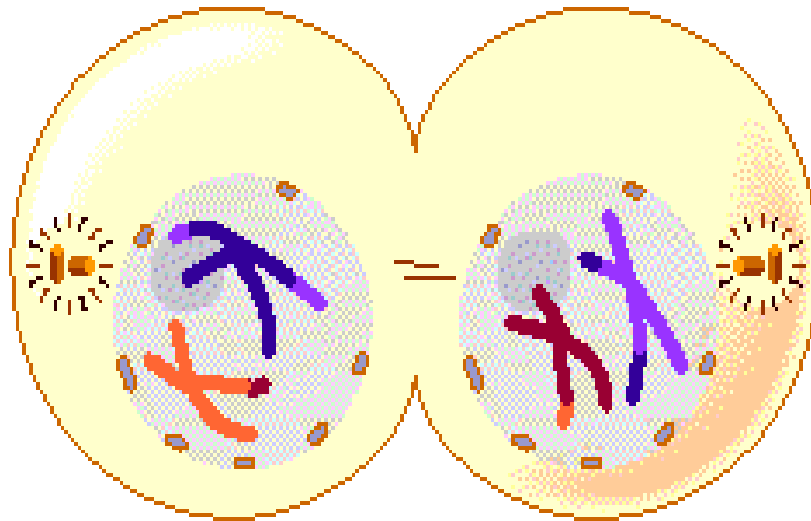
Anaphase I

- **Homologues are randomly pulled to the poles (maternal and paternal chromosomes)**
- **This random separation of the homologues is called independent assortment**



Telophase I & Cytokinesis

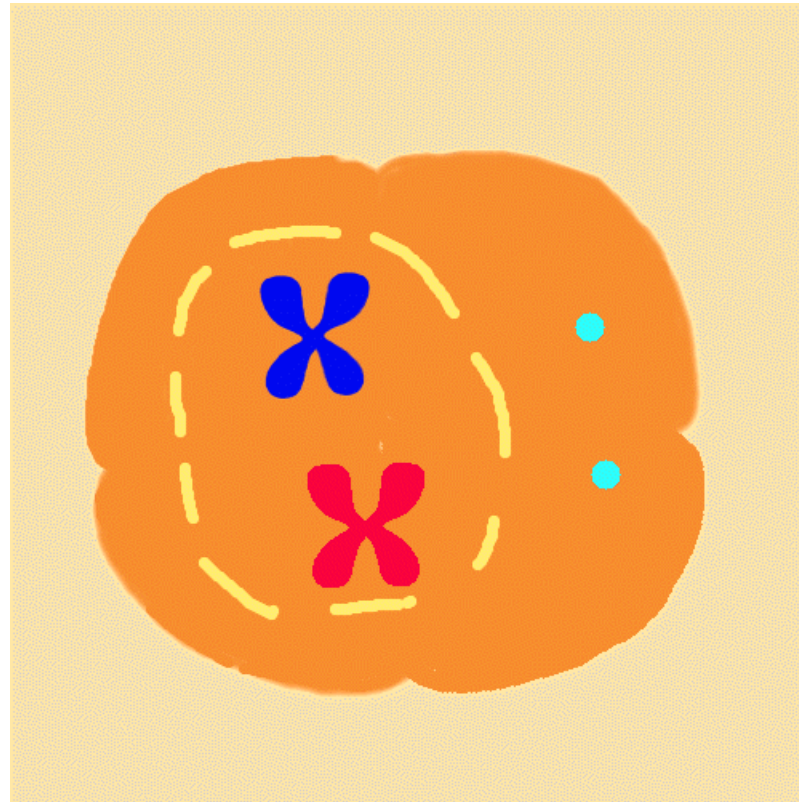
- **Nuclear membrane reforms**
- **Cell separates into Haploids (1N) cells**



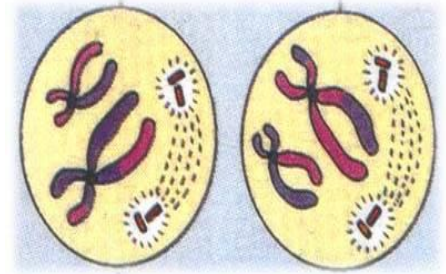
Cleavage
furrow



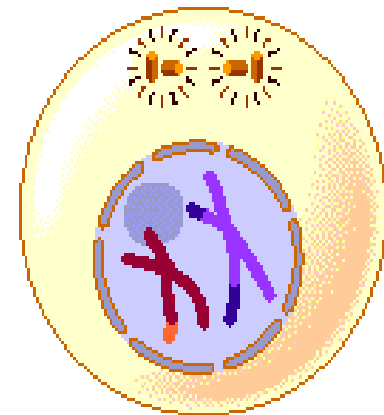
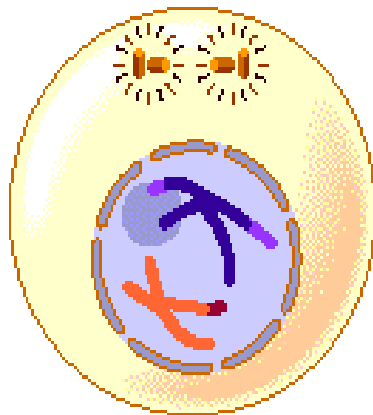
Meiosis II



Prophase II



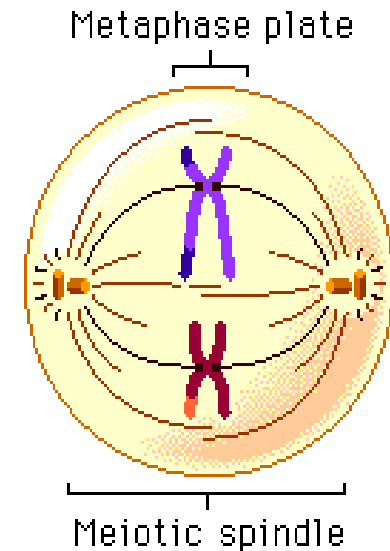
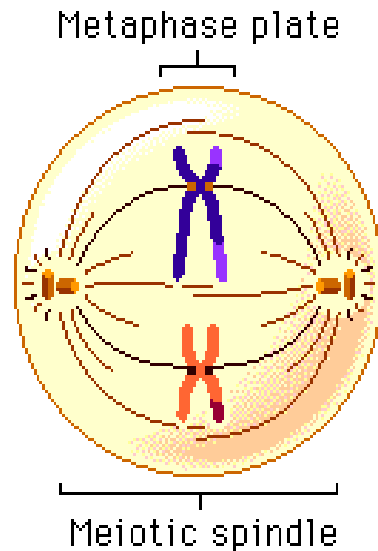
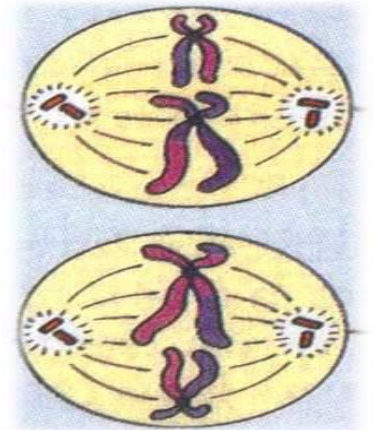
- **No DNA replication**
- **New Centrioles form**
- **Nuclear membrane dissolves**



Metaphase II

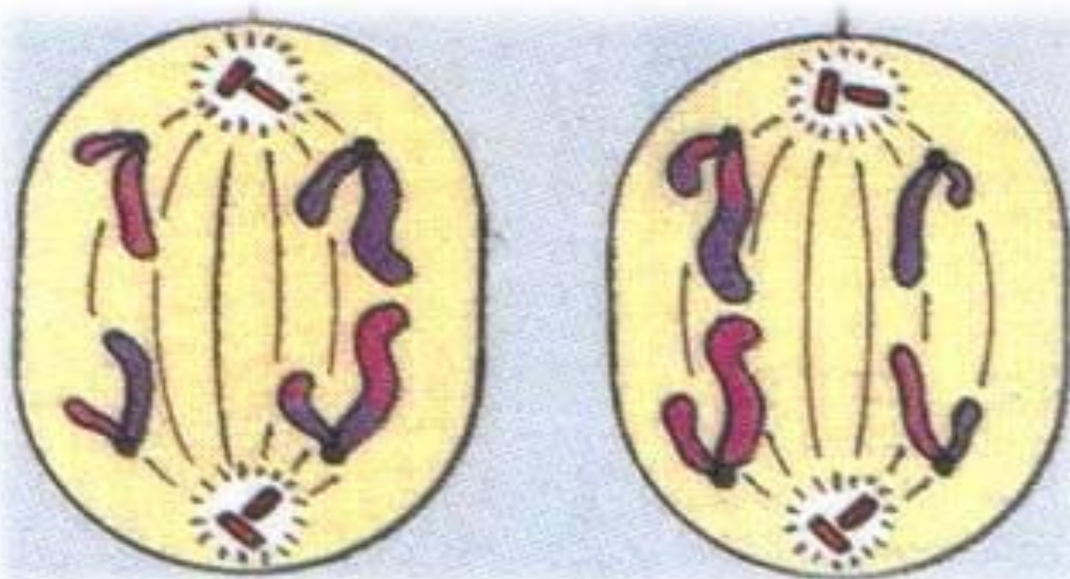
**–Chromosomes line up
middle**

**–Spindle fibers attach to the
centromere**



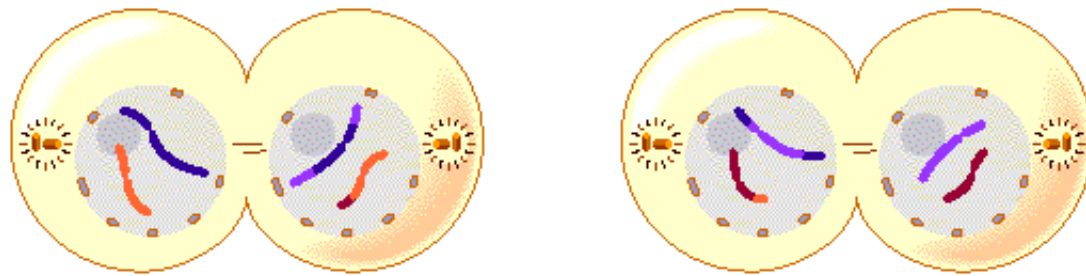
Anaphase II

- **Sister chromatids separate**
- **Move to opposite ends of the cell**



Telophase II & Cytokinesis

- Results in four haploid (1N) daughter cells

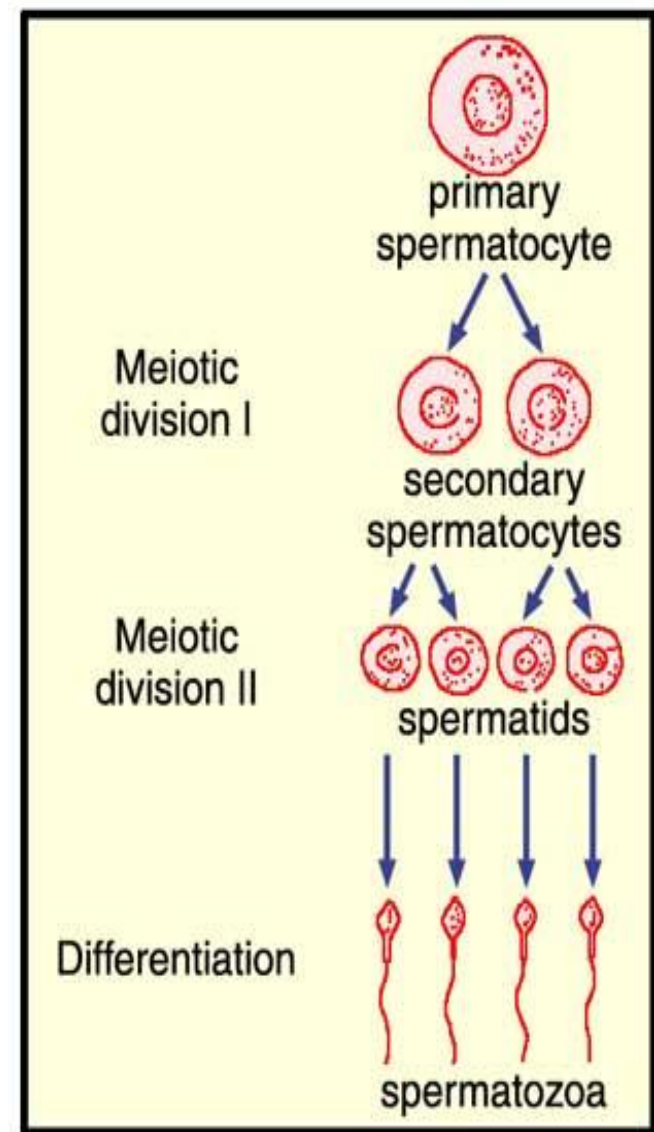


Four haploid daughter cells



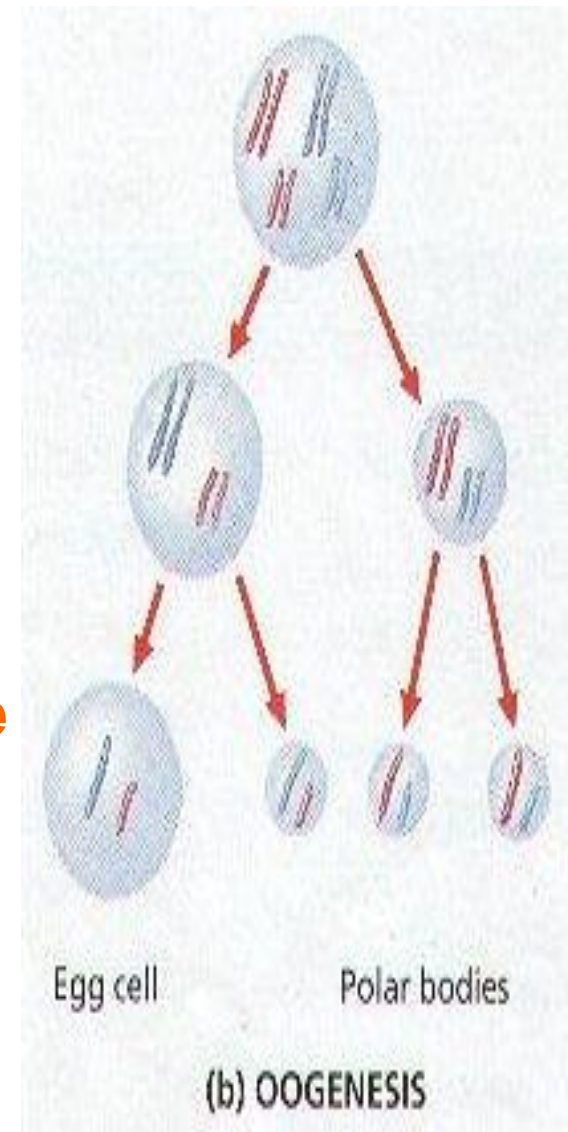
Male Gamete Formation

- **Formation of male gametes is called spermatogenesis**
- **In male animals, the haploid gametes are called sperm**
- **In some plants, pollen contains haploid sperm cells**



Female Gamete Formation

- **Female gametes formation is called Oogenesis**
- **In female animals, normally only one egg is produced**
 - **Three Polar bodies get reabsorbed by the body**
- **In plants, female gamete is called an egg cell**



Comparing Mitosis and Meiosis

- **Mitosis:**

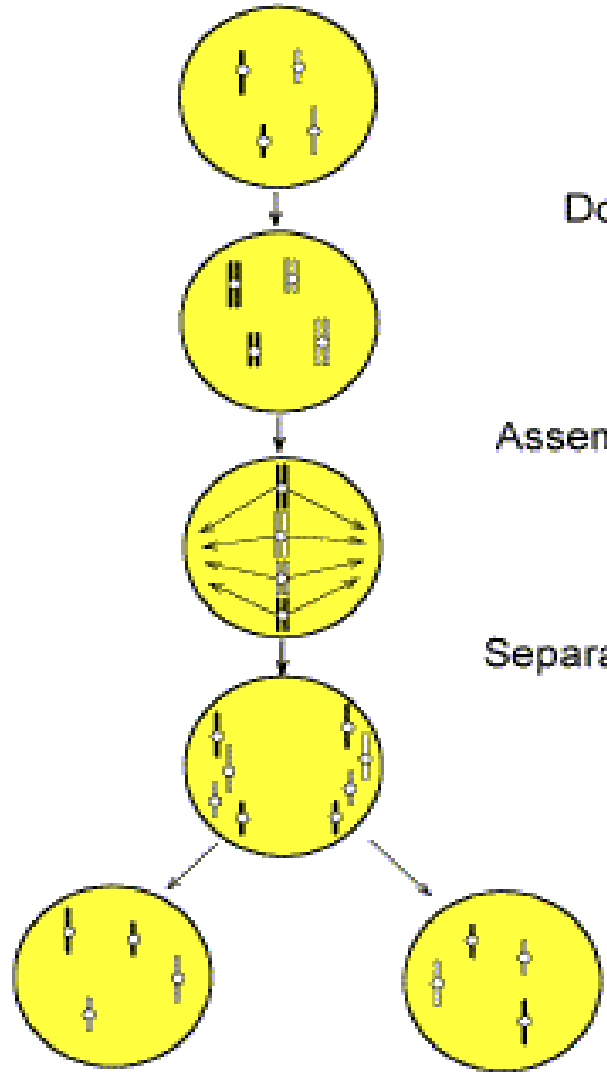
- **Produces two genetically identical diploid cells**
- **Produces cells for growth and cell replacement**
- **Also used in asexual reproduction**

- **Meiosis:**

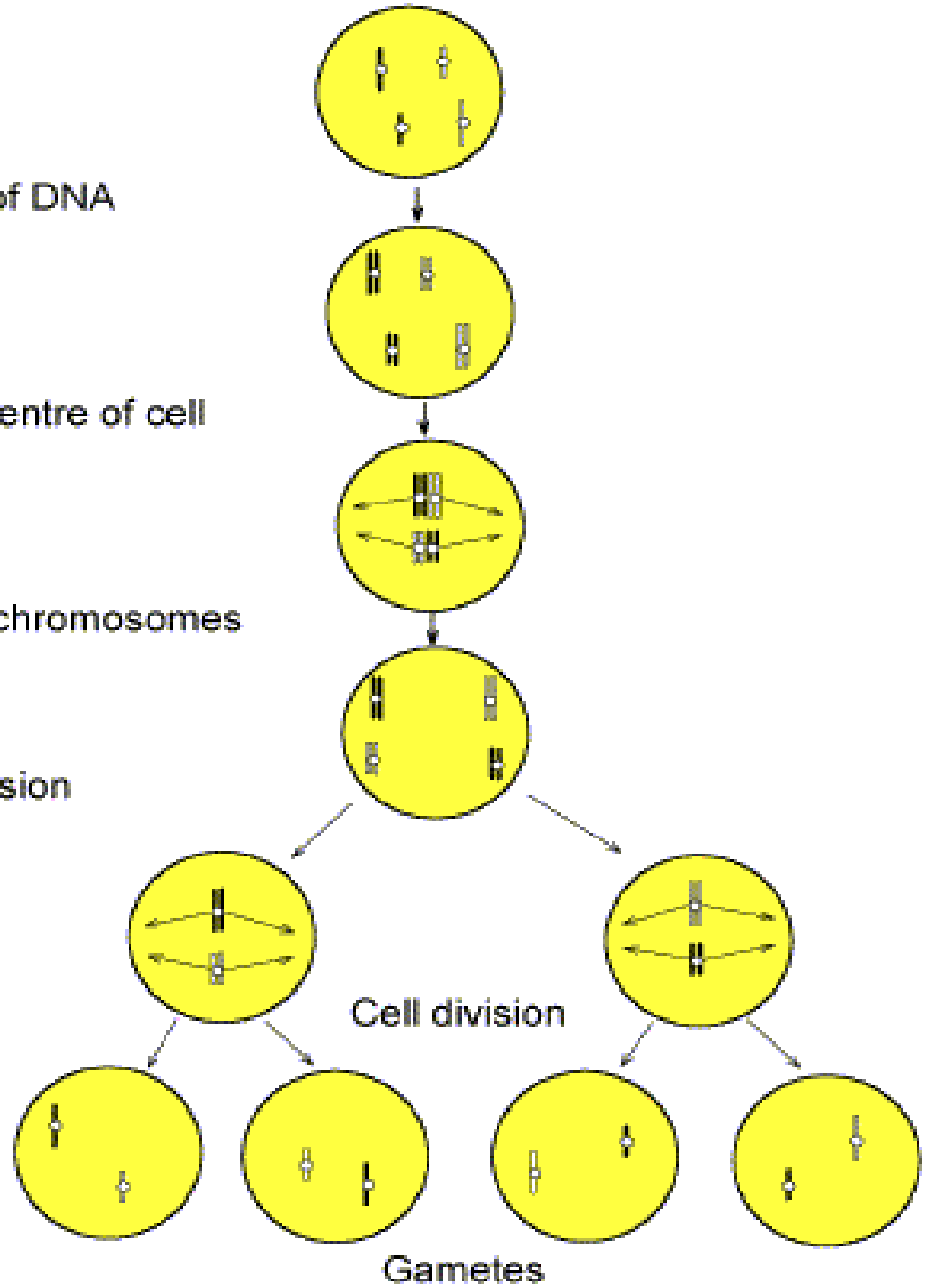
- **Produces four genetically different haploid cells**
- **Produces cells for sexual reproduction (gametes)**



A. Mitosis



B. Meiosis



Doubling of DNA

Assembly in centre of cell

Separation of chromosomes

Cell division

Cell division

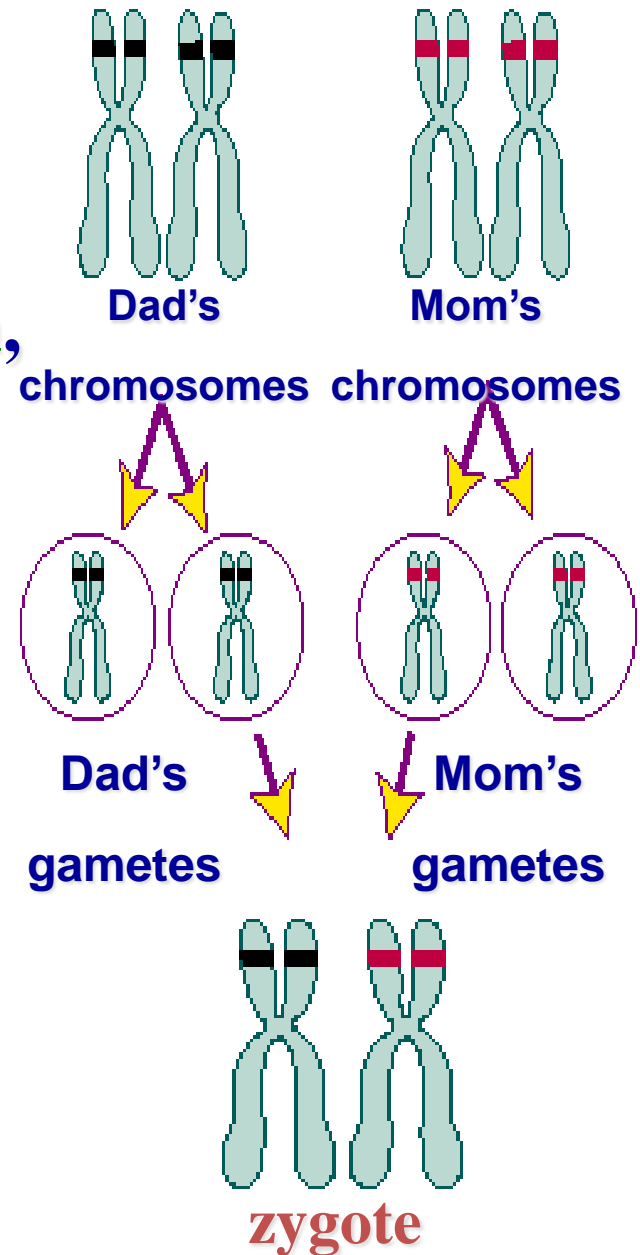
Gametes

Figure 4. Outline of mitosis (A) and meiosis (B)

Maternal chromosomes are white and paternal chromosomes are black. Recombination between homologous chromosomes is not shown.

Sexual Reproduction

- During **sexual reproduction**, **gametes** (sperm or eggs) are produced by each parent
- Gametes contain **half** the number of chromosomes found in most cells
- When gametes unite, the **zygote** then has the **normal** number of chromosomes



Asexual Reproduction

- **Asexual reproduction is the production of genetically identical offspring from one parent**
- **Unicellular organisms:**
 - **Binary fission**
 - **Mitosis**
- **Multicellular organism:**
 - **Budding off**



Review

- **Contrast the chromosomes number in body cells and gametes**
 - **Body cells (diploid cells, $2N$) contain both sets of chromosomes (46 in humans)**
 - **Gametes (haploid cells, $1N$) only have one set of chromosomes (23 in humans)**

Review...

- **Contrast meiosis and mitosis**
 - **Mitosis:**
 - Produces two genetically identical diploid cells
 - Produces cells for growth and cell replacement
 - Also used in asexual reproduction
 - **Meiosis:**
 - Produces four genetically different haploid cells
 - Produces cells for sexual reproduction (gametes)



Learn Long
Live Long