

Section 11-4

Meiosis

I. Chromosome Number

- A) **Diploid Cell (2n)**: contain 2 sets of chromosomes (1 from male & 1 from female)
2n = 46 chromosomes (human)
2n = 8 chromosomes (fruit fly)
- B) **Haploid Cell (n)**: contain 1 set of chromosomes
n = 23 chromosomes (human)
n = 4 chromosomes (fruit fly)
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C. Homologous pair:

- For every male chromosome there is a female chromosome that contains the same genes
 - Found in diploid cells
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Questions:

- 1) A body cell in a human has 46 chromosomes. How many chromosomes does a sex cell (gamete) have?
 - 23

 - 2) A sex cell (gamete) in a fruit fly has 4 chromosomes. How many chromosomes does a body cell have?
 - 8
-

II. Phases of Meiosis

- **How are haploid cells produced from diploid cells?**
 - Through meiosis
 - A) Meiosis: 2 stages (Meiosis I & II)**
Defined: a form of sexual reproduction where the # of chromosomes per cell is cut in half
 - Used for sperm and egg production
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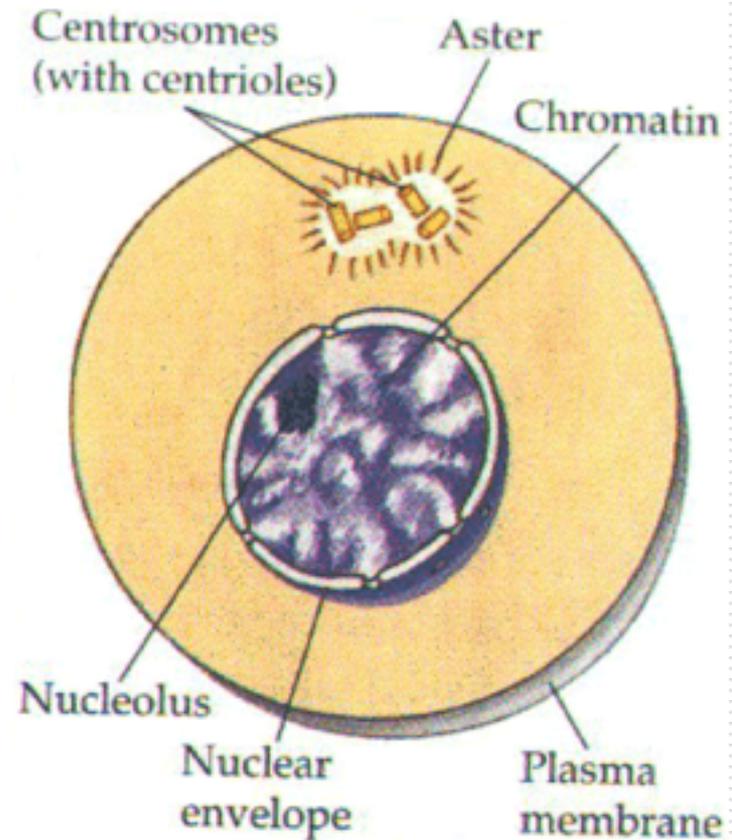
What is the end result of meiosis?

- 4 daughter cells that are genetically different from each other **AND** the parent cell
 - Each cell contains $\frac{1}{2}$ the number of chromosomes as the parent cell
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Meiosis I: 1st Division

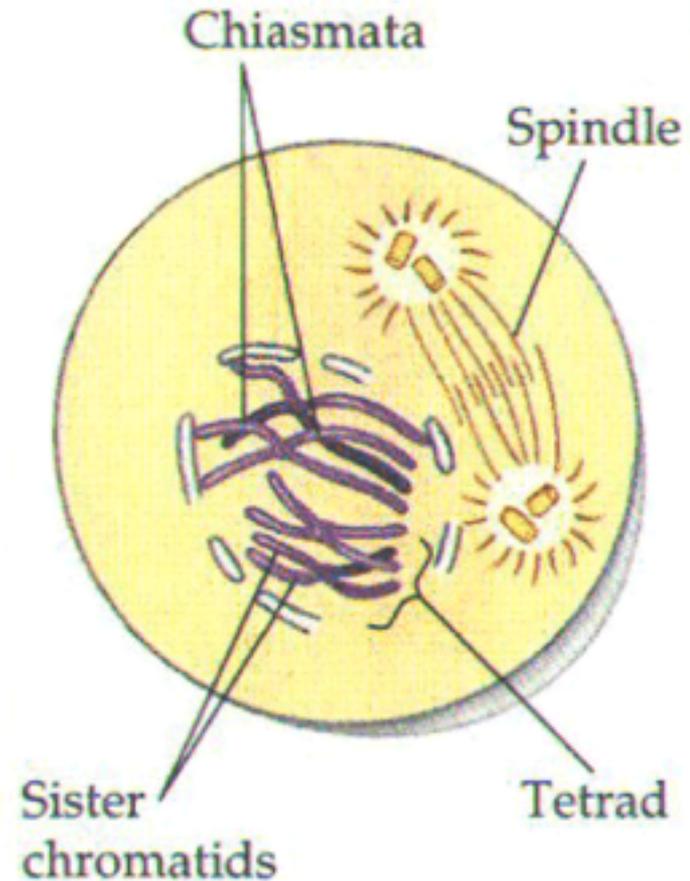
Interphase I:

- Cell growth
- DNA replication
- Preparation for division



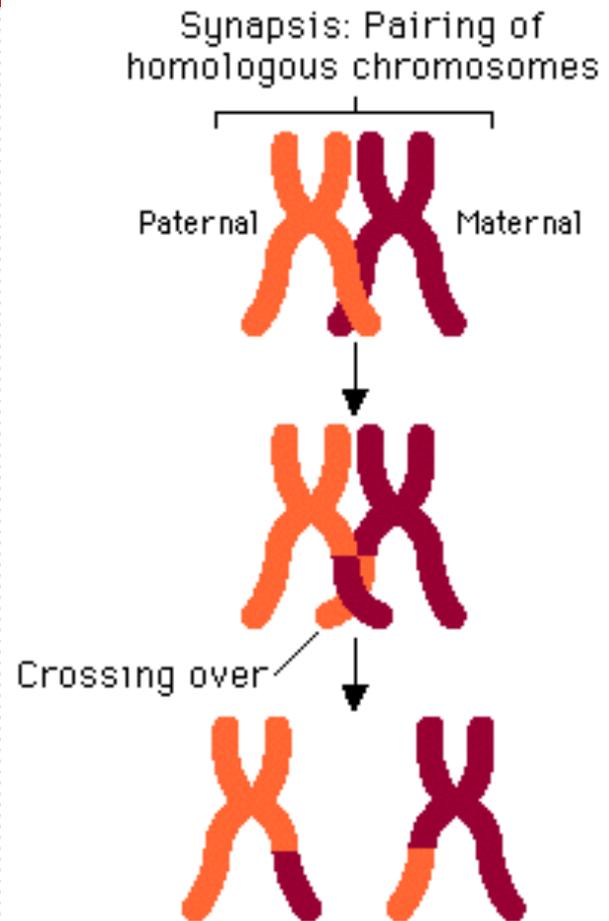
Prophase I

- Homologous chromosomes pair up
- Crossing over occurs



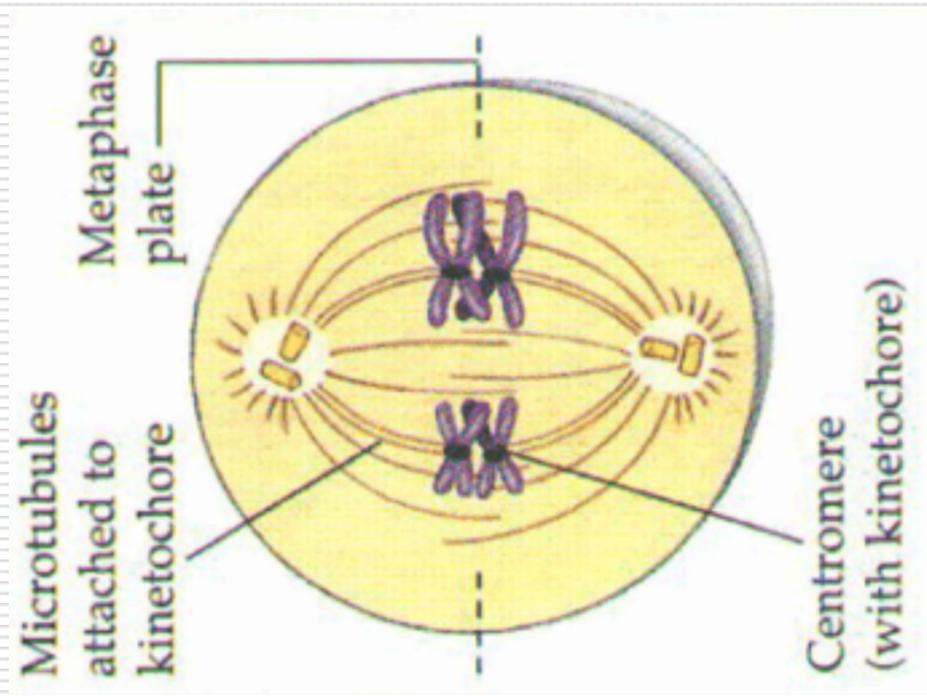
Crossing Over

- Genes are exchanged between chromosomes
- Increases genetic variation



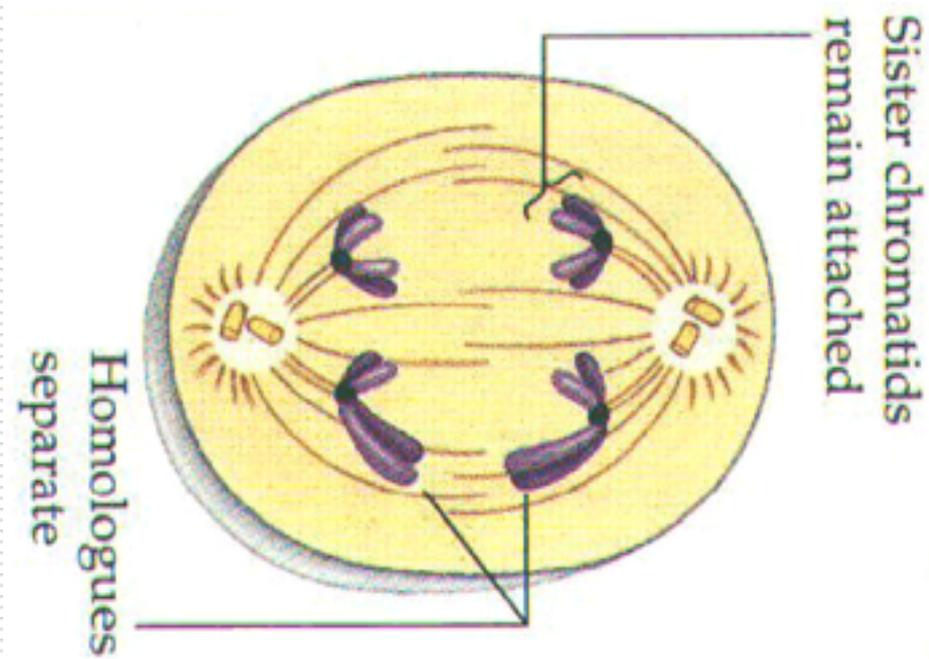
Metaphase I

- Homologous chromosomes line up across the center (side by side)



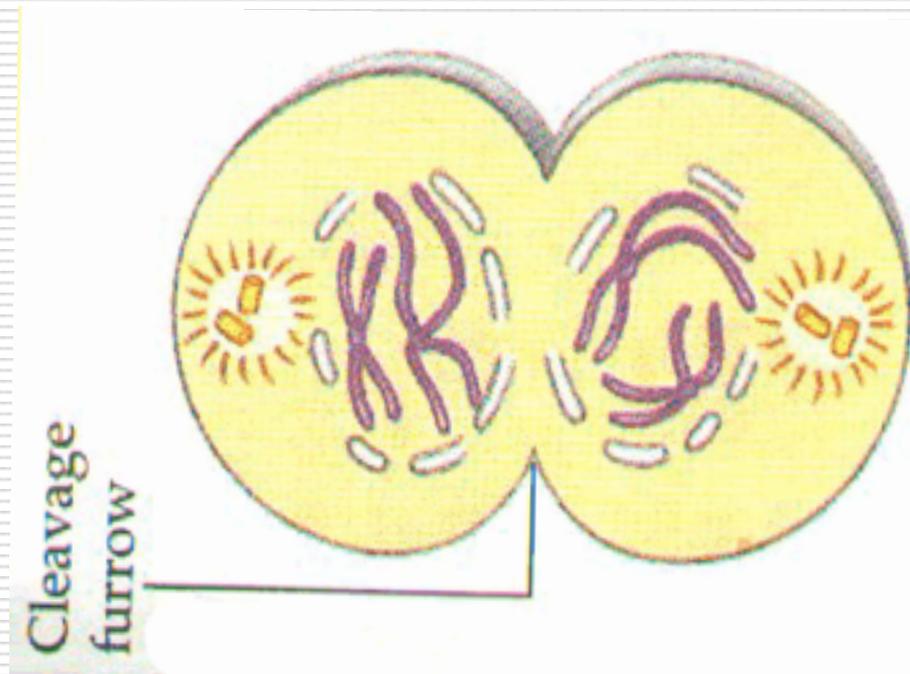
Anaphase I

- Homologous chromosomes separate & move to opposite ends of the cell



Telophase I & Cytokinesis

- 2 new nuclei form
- Cytoplasm splits in half
- Results in 2 haploid daughter cells that immediately enter Prophase II



Meiosis II: 2nd Division

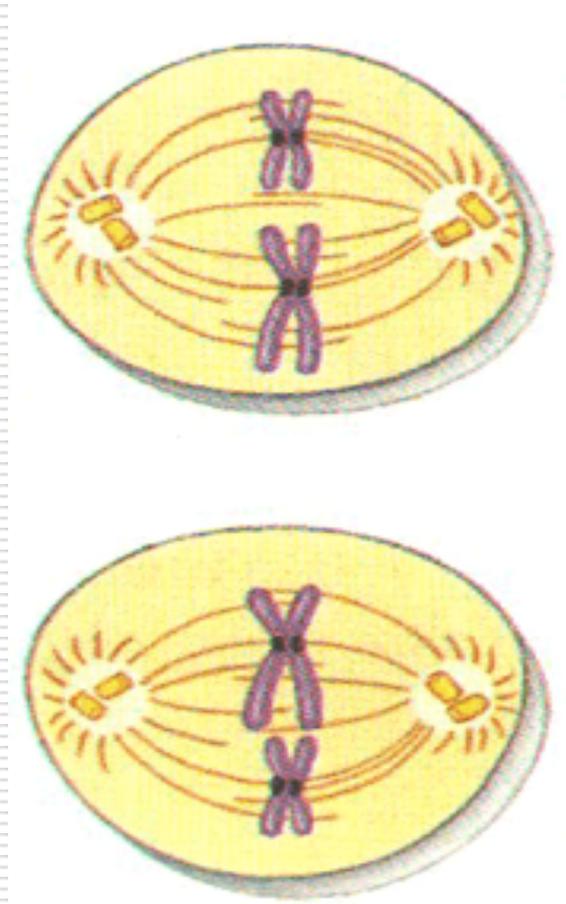
Prophase II:

- Nuclear membrane breaks down
- New set of spindle fibers form



Metaphase II

- Chromosomes line up along the center of the cell (single file)



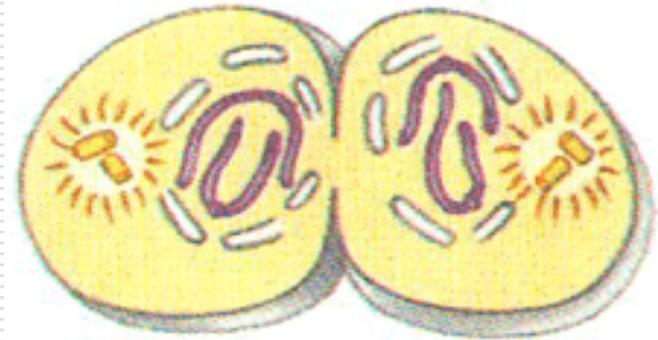
Anaphase II

- Sister chromatids separate & move towards opposite ends of the cell

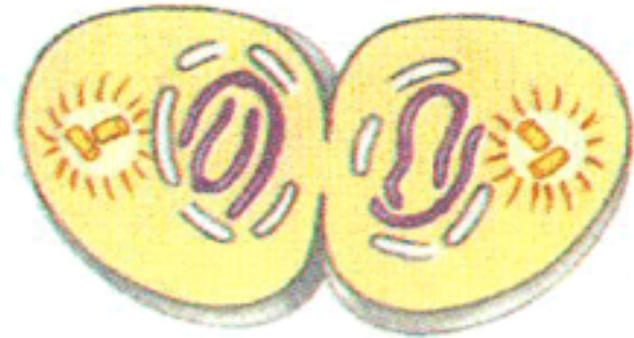


Telophase II & Cytokinesis

- 4 new nuclei form
- Cytoplasm splits in half
- Results in 4 genetically different haploid daughter cells



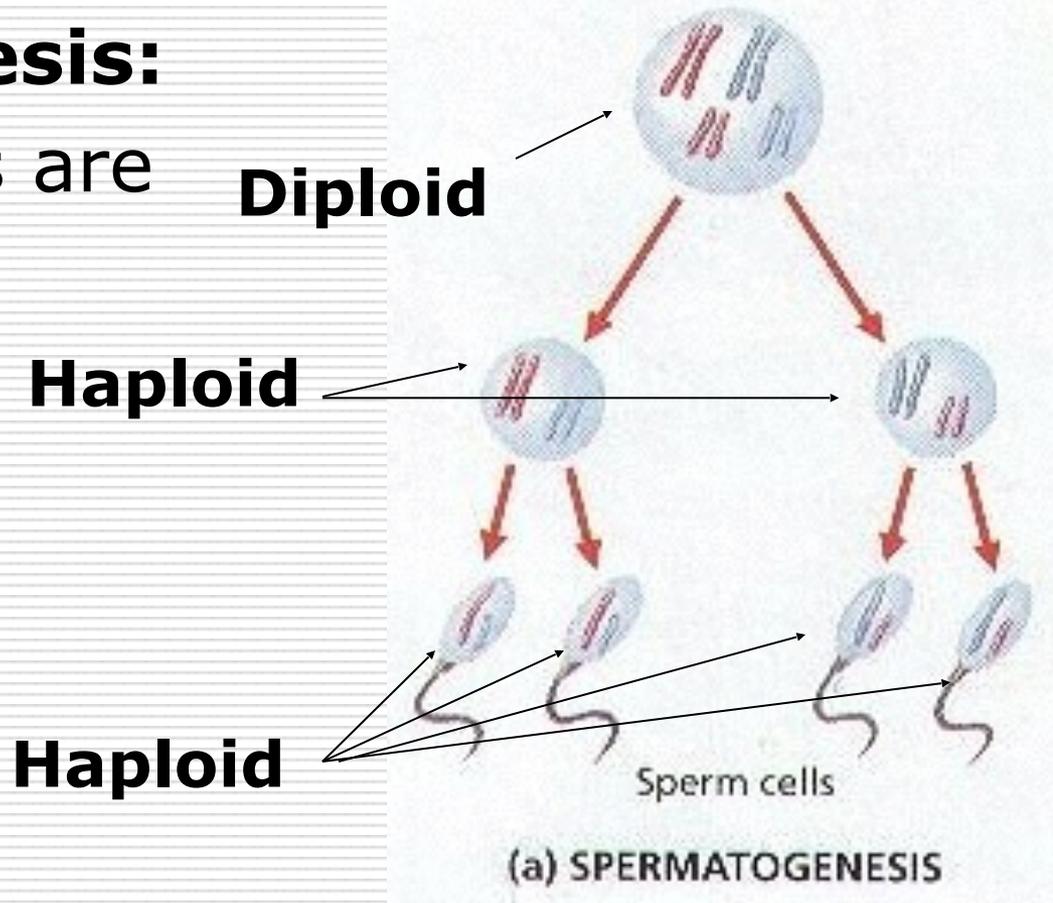
Haploid daughter cells



Gamete Formation

Spermatogenesis:

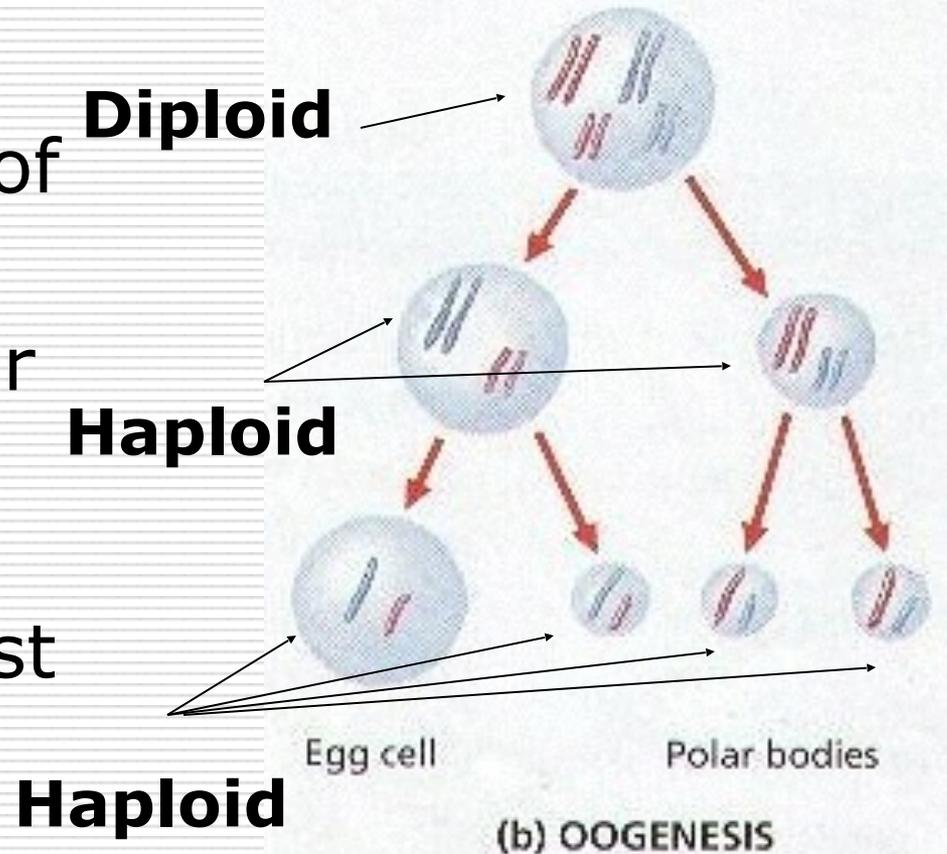
- 4 sperm cells are produced



Gamete Formation

Oogenesis:

- Uneven division of the cytoplasm
- 1 egg and 3 polar bodies are produced
- Egg receives most of the cytoplasm



Mitosis**Meiosis**

| | Mitosis | Meiosis |
|--------------------------------|---------------------------------|----------------------------------|
| Cell Type | Body cell | Sex cells (gametes) |
| Divisions & Results | 1 division 2 identical cells | 2 divisions 4 different cells |
| # of chromosomes | Same as parent cell | ½ as many as the parent cell |
| DNA replication | Once during Interphase | Once during Interphase |
| Homologous chromosomes | Do not pair up | Pair up & separate |

Mitosis

Meiosis

| | | |
|---|-----------------------|---------------------------------|
| Exchange of Genes? | No crossing over | Crossing over during Prophase I |
| Newly formed cells in relation to parent cells | Genetically identical | Genetically different |