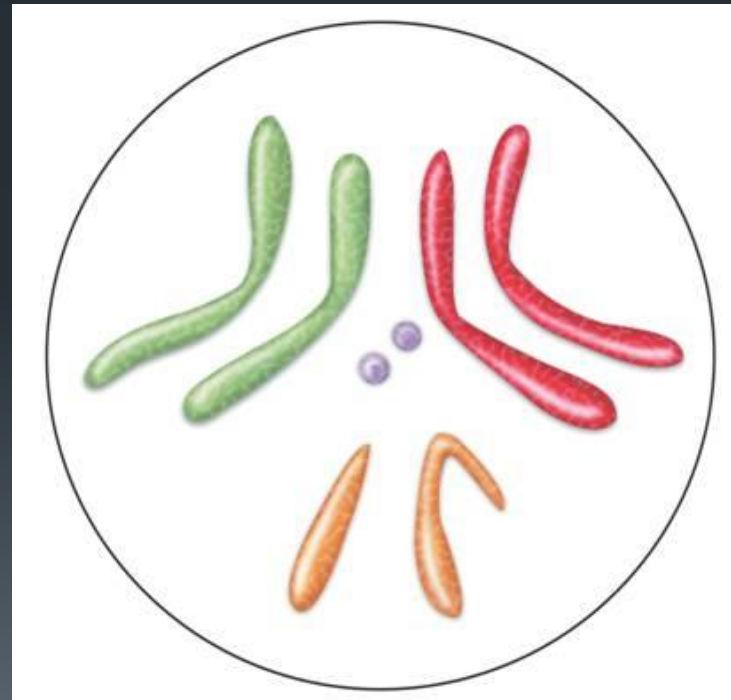
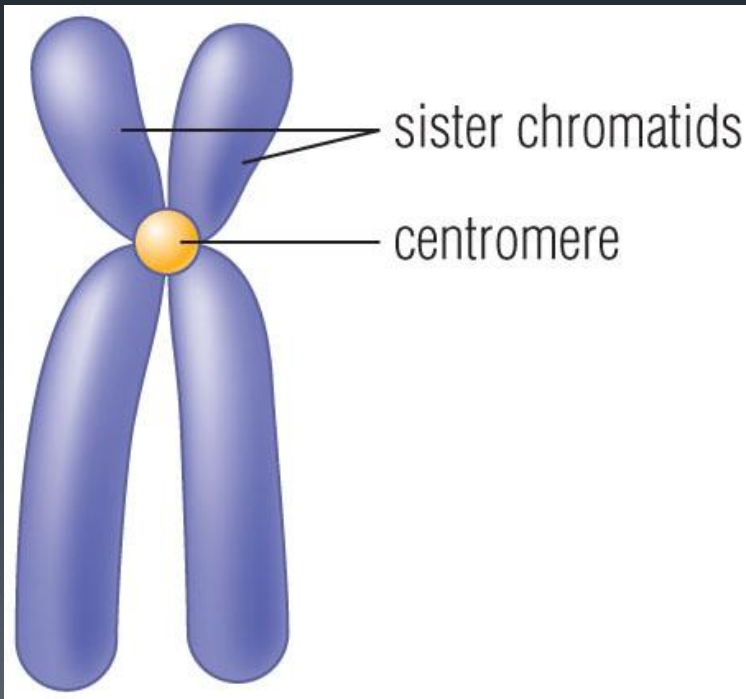


# 11-4 Meiosis



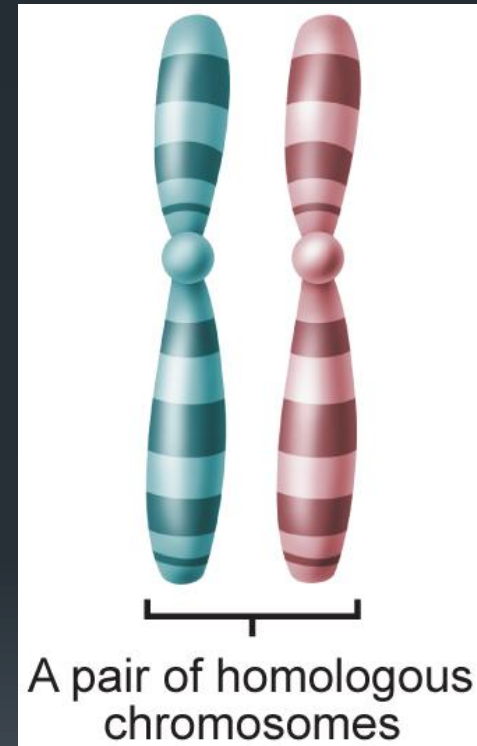
# Chromosomes

- **What are chromosomes?**
  - Located in the nucleus
  - Contain our genetic information.



# Homologous Chromosomes

- Human body cells have 46 chromosomes:
- 23 come from MOM
- 23 come from DAD
- **HOMOLOGOUS CHROMOSOMES:**  
have the same type of information, and are the same size.



# Chromosome Number

- **DIPOID CELLS:** cells that contain **2 sets of homologous chromosomes.**
- the number of chromosomes in a diploid cell is represented by the symbol  $2N$ .
- For humans, the diploid number ( $2N$ ) is 46.



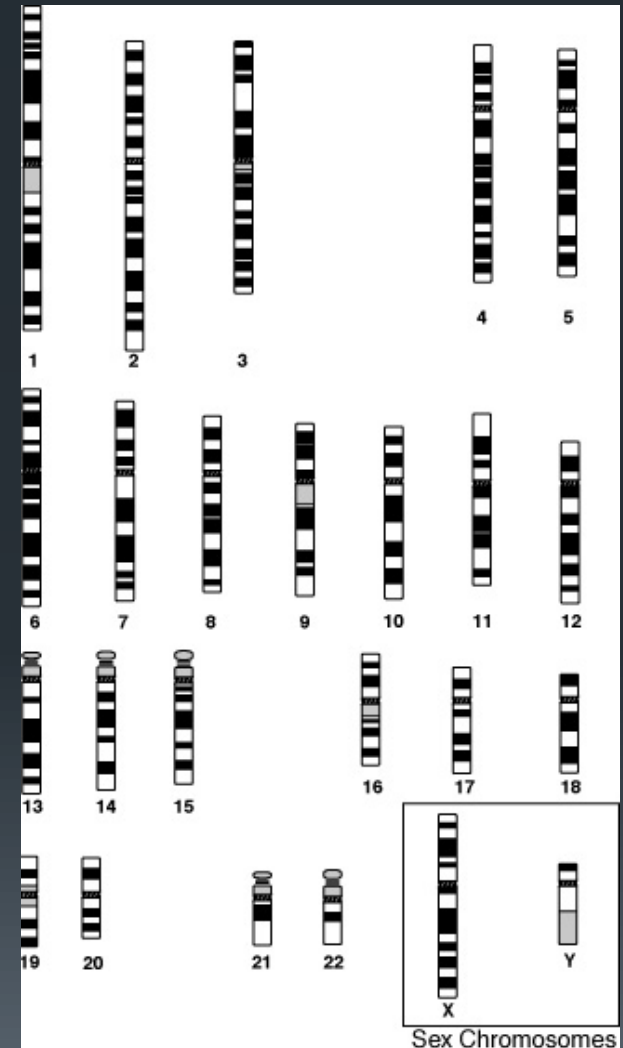
# Chromosome Number

- HAPLOID CELLS: cells that contain only one set of chromosomes.
- the number of chromosomes in a haploid cell is represented by the symbol N.
- For humans, the haploid number (N) is 23.



# Gametes

- Somatic cells = body cells (skin, hair, etc.)
- Gametes = sex cells (egg, sperm).
- Human gametes are **haploid**.
- Egg and sperm cells each contain one set of 23 chromosomes (23N)

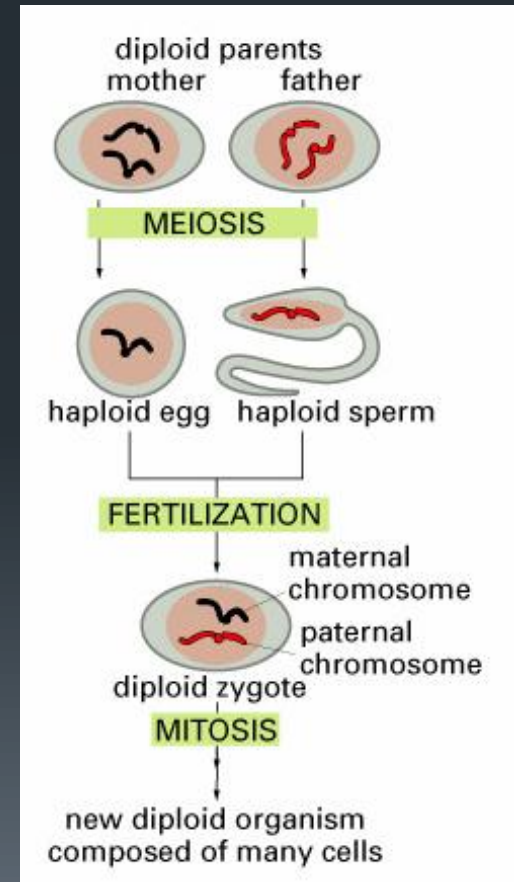
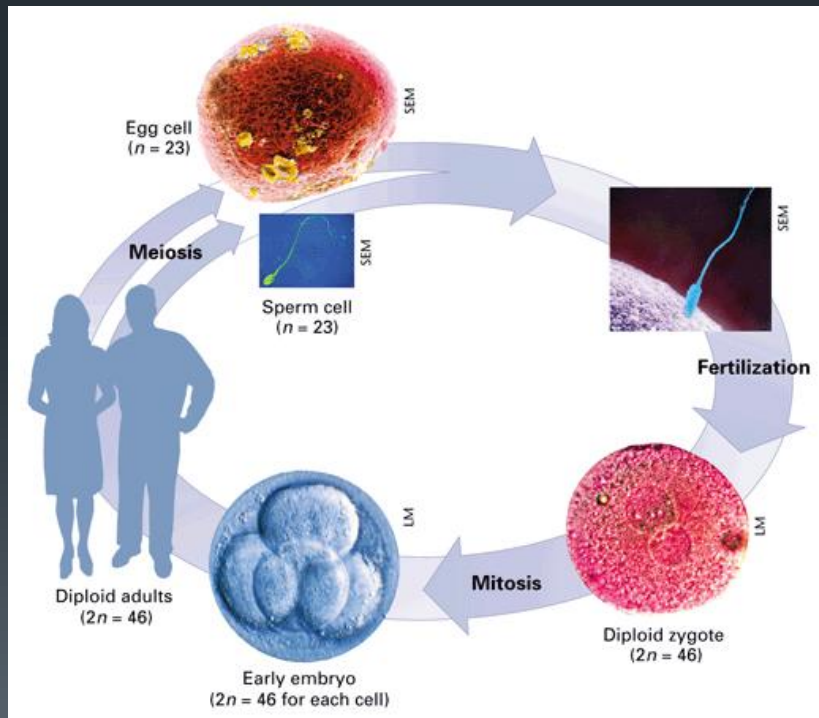


# Fertilization & Diploid Cells

Egg cell + sperm cell → fertilization = zygote

haploid egg cell (N) + haploid sperm cell (N) = DIPLOID (2N)

zygote.



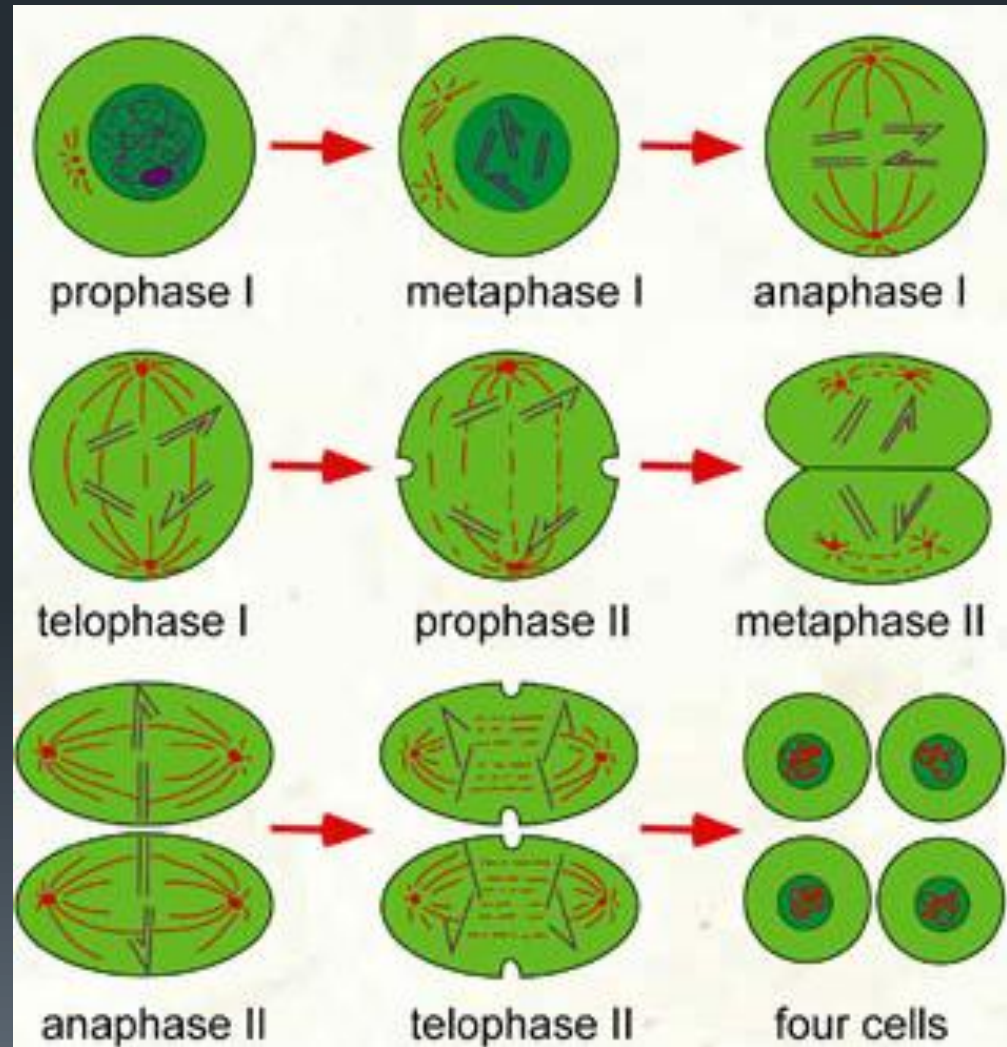
# Phases of Meiosis



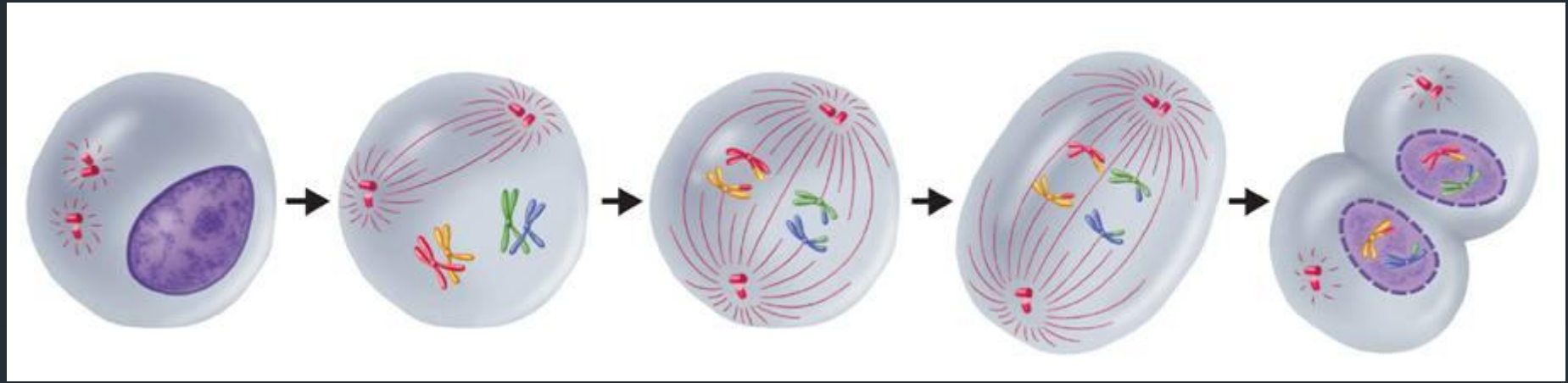


# Phases of Meiosis

- Meiosis involves two divisions:
  1. meiosis I
  2. meiosis II
- By the end of meiosis II, the diploid cell that entered meiosis has become 4 haploid cells.



# Meiosis I



Interphase I

Prophase I

Metaphase I

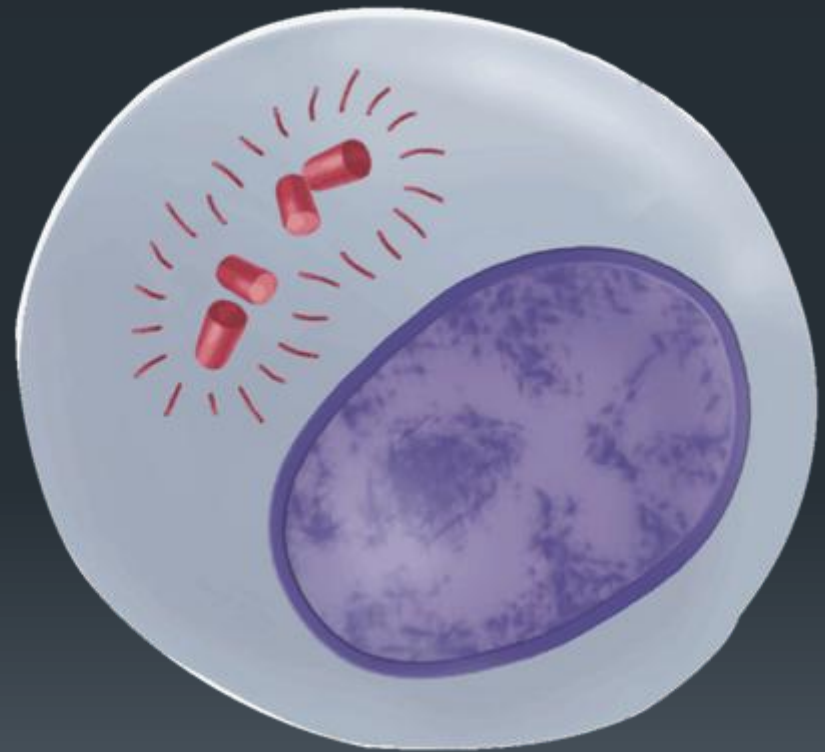
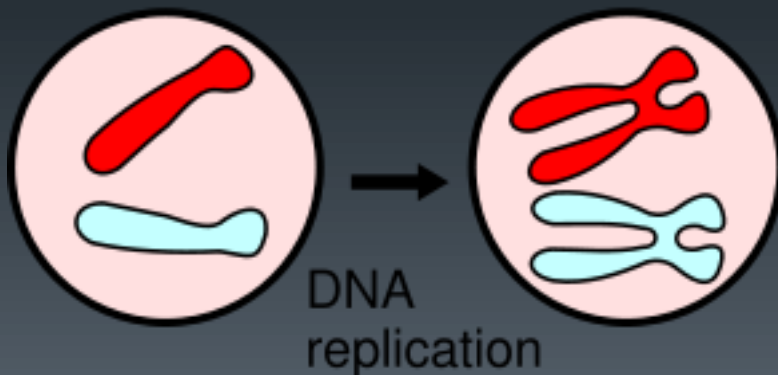
Anaphase I

Telophase I  
and  
Cytokinesis

**Homologous chromosomes are pulled to opposite ends of the cell.**

## Interphase I

- DNA is copied.



# Meiosis I

## Prophase I

- Homologous chromosomes pair up.
- Nuclear membrane disappears.



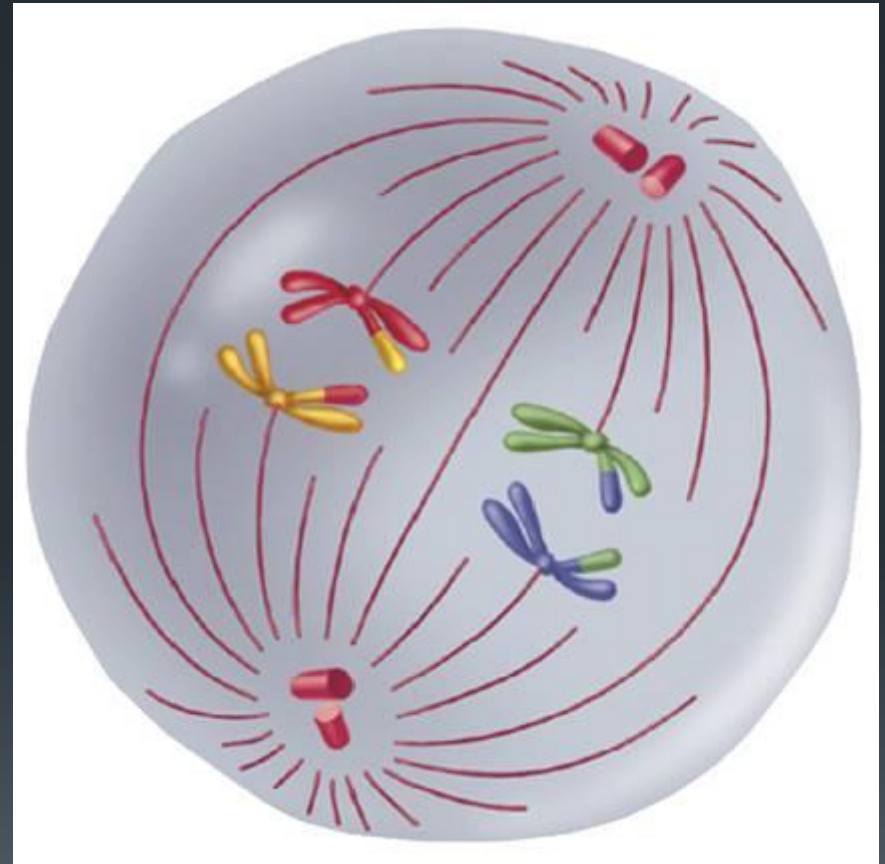
## Prophase I

- Homologous chromosomes exchange information = crossing over.
- Crossing-over produces new mixtures of genes.



## Metaphase I

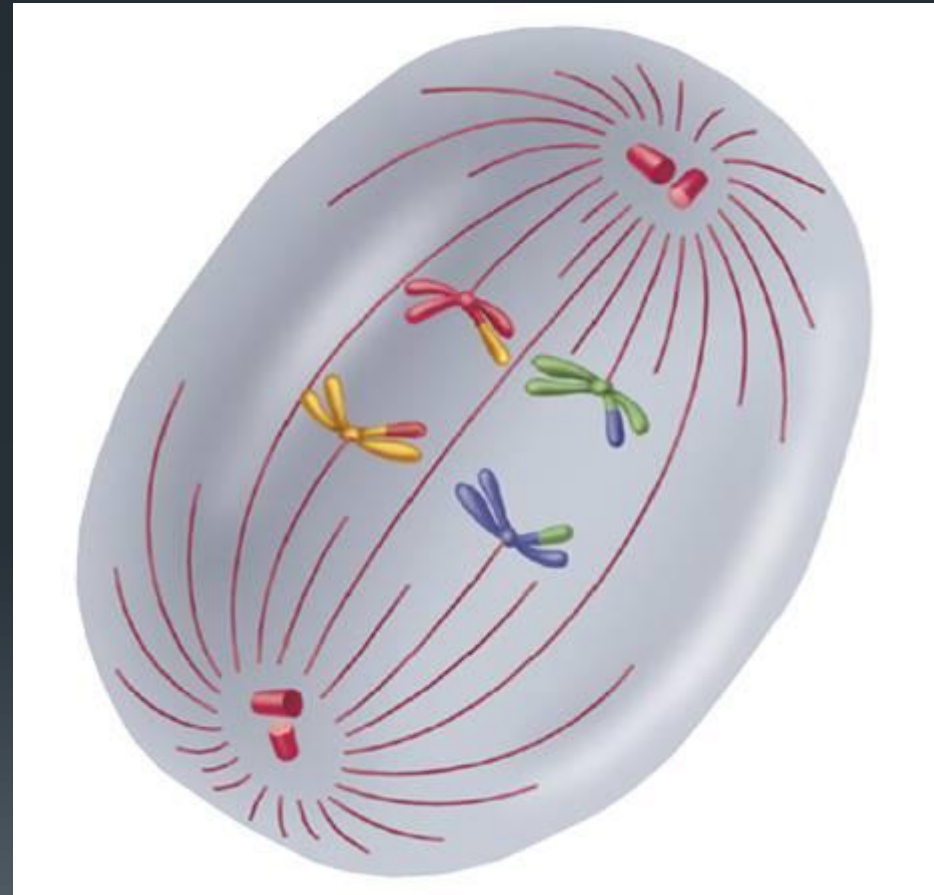
- Homologous chromosomes line up in the middle of the cell.
- Spindle fibers attach to centromeres.





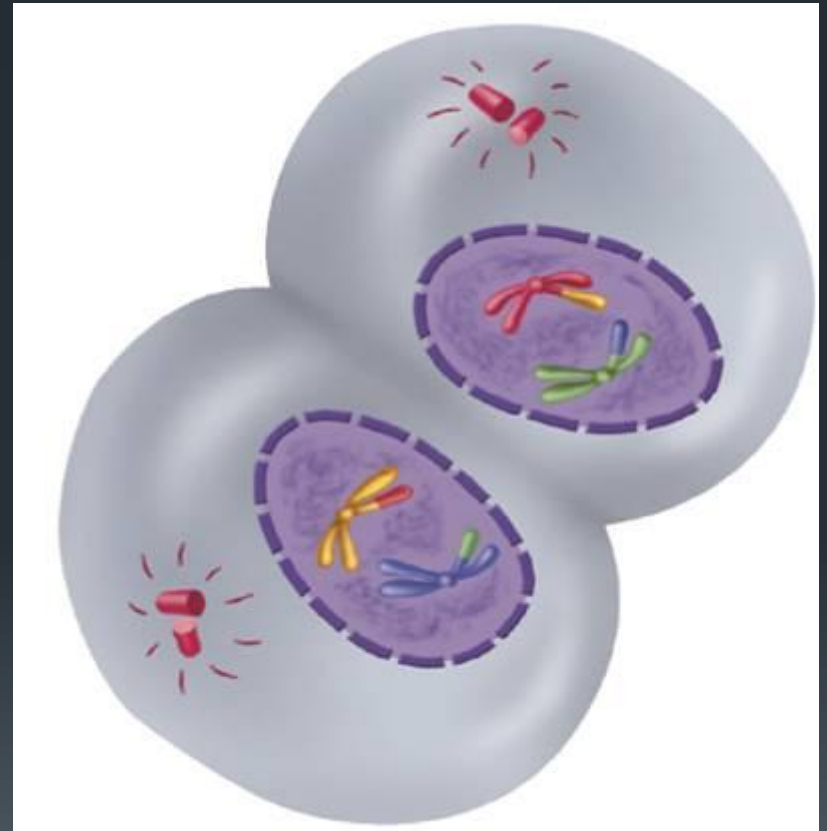
## Anaphase I

- Spindle fibers pull apart the homologous chromosomes to opposite ends of the cell.



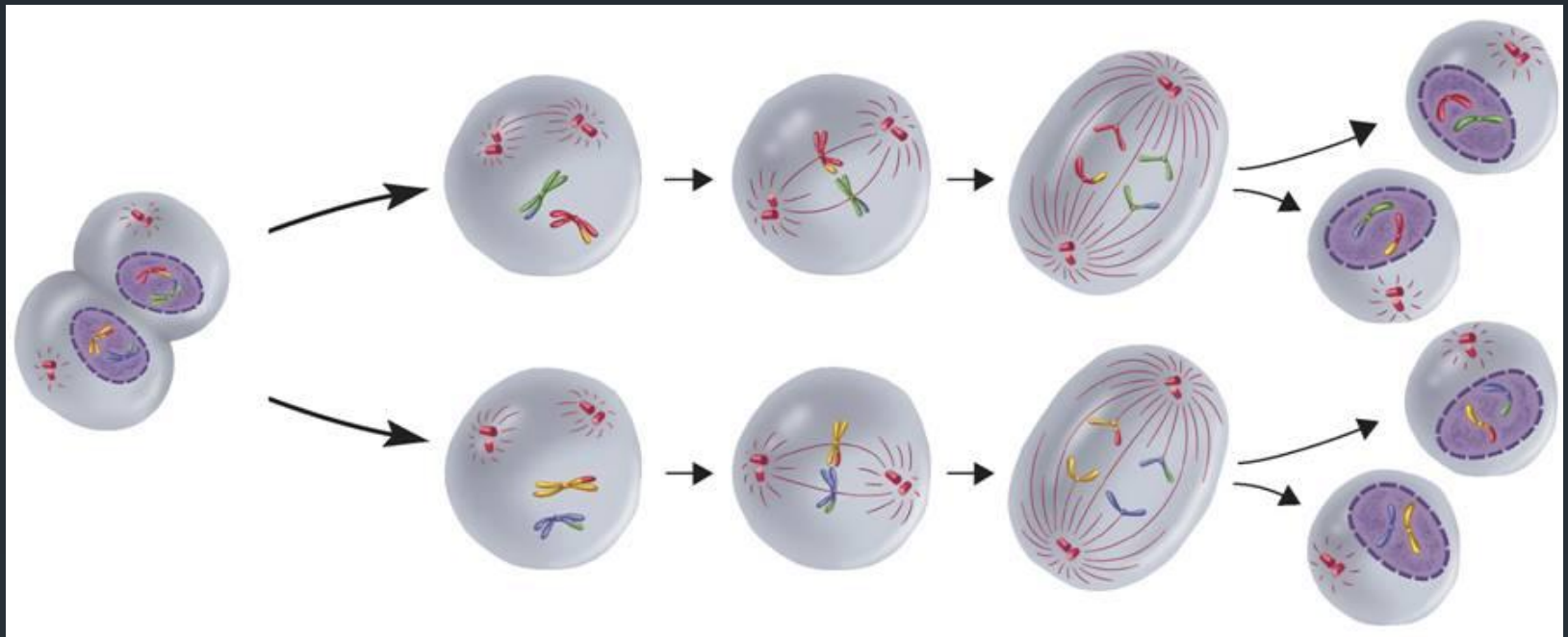
## Telophase I & Cytokinesis

- Nuclear membranes form.
- The cell separates into two cells.
- THESE 2 CELLS ARE NOT IDENTICAL!





# Meiosis II



Interphase I

Prophase II

Metaphase II

Anaphase II

Telophase II &  
Cytokinesis

**The 2 cells from Meiosis I enter another division: Meiosis II. Sister Chromatids are pulled to opposite sides of the cell.**

### Prophase II

- No replication of chromosomes.

### Metaphase II

- The chromosomes line up in the middle of cell.

### Anaphase II

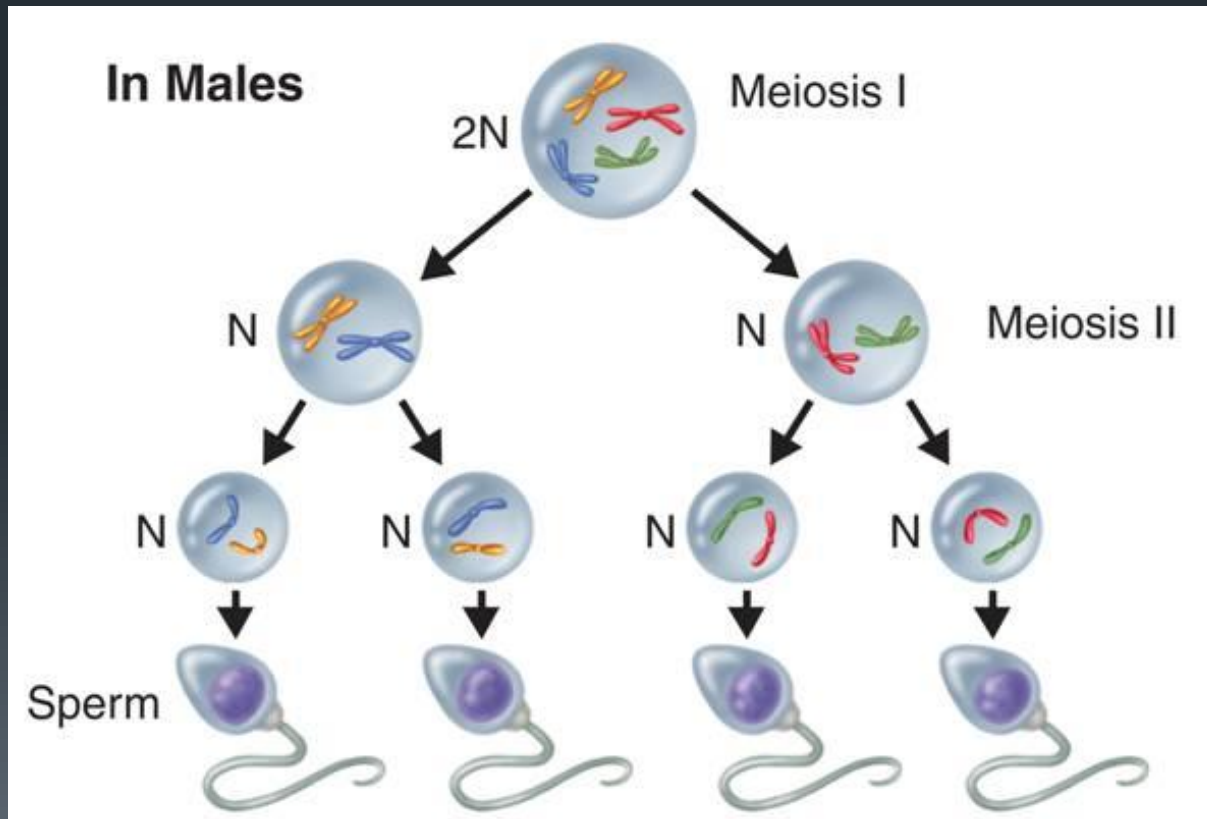
- The sister chromatids separate and move apart to opposite ends of the cell.

### Telophase II & Cytokinesis

- Meiosis II results in four haploid (N) daughter cells.
- Each cell has 23 chromosomes (for a human sex cell)

# Gamete Formation

- In male animals, meiosis results in four equal-sized gametes called sperm.



# Gamete Formation

- In many female animals, only one egg results from meiosis.
- The other three cells, called **polar bodies**, are thought to provide nutrition to the egg.

