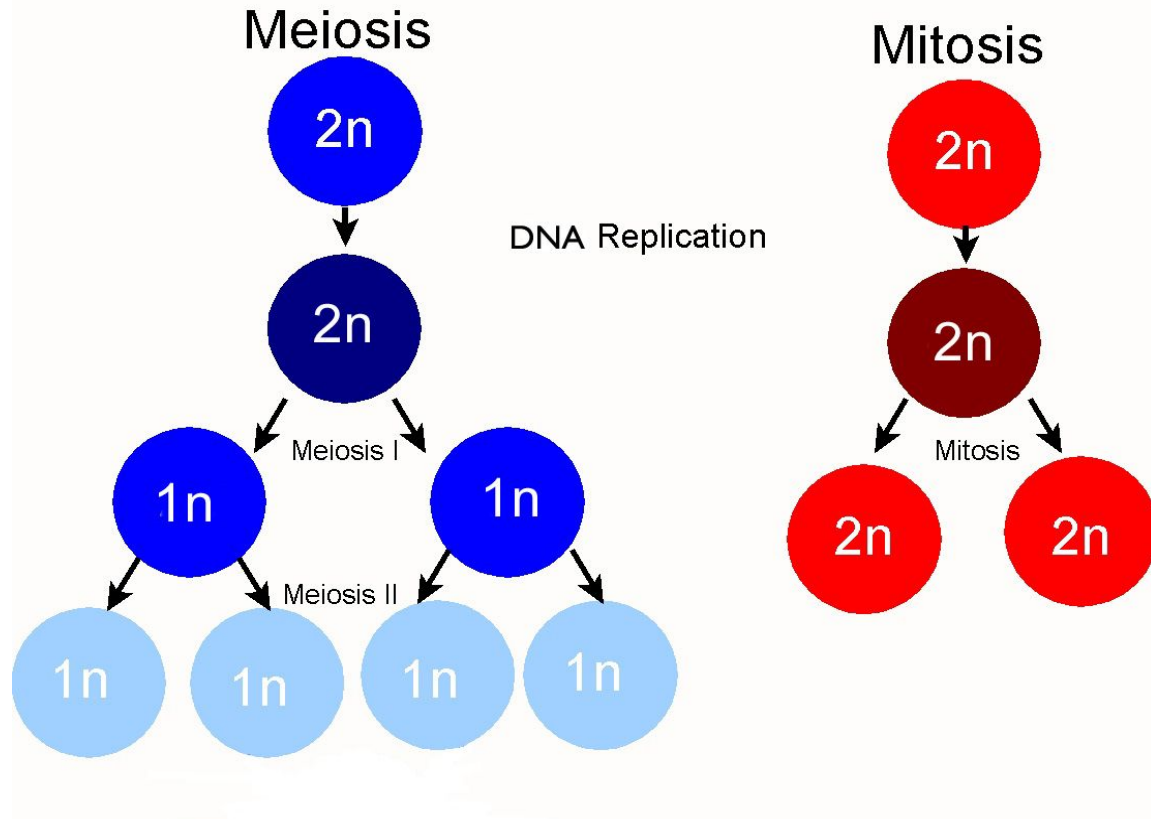
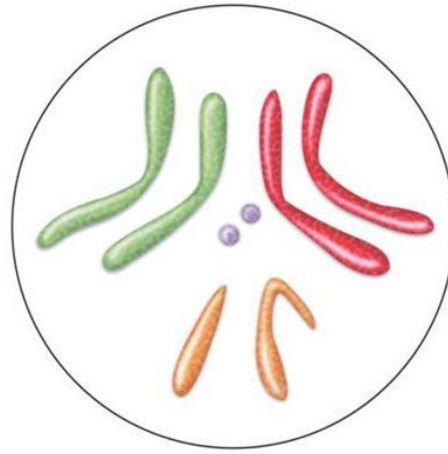


# 11.4 Meiosis

Sex cells do **not** undergo mitosis.

**Meiosis:** a type of cell division that results in 4 daughter cells with half the number of chromosomes.





**Homologous chromosomes:**

paired, have the same structure and position.

$$2N = 8$$

**Diploid:** A cell that contains a homologous set of chromosomes



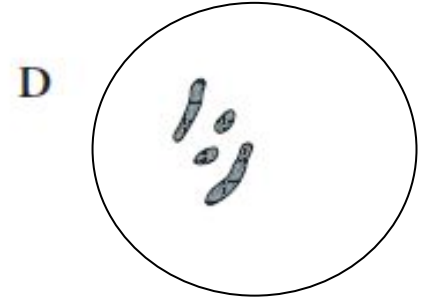
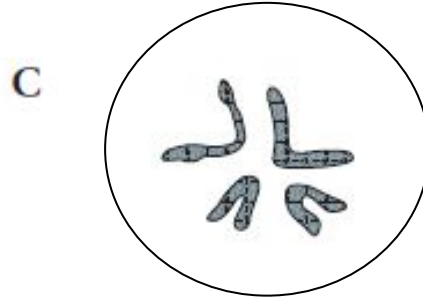
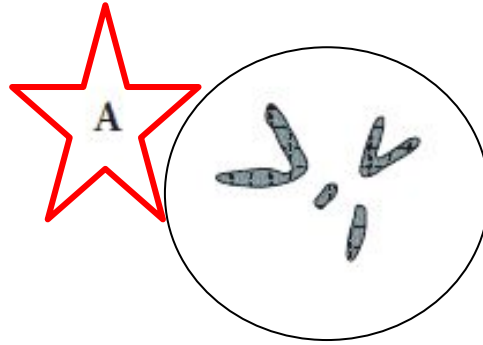
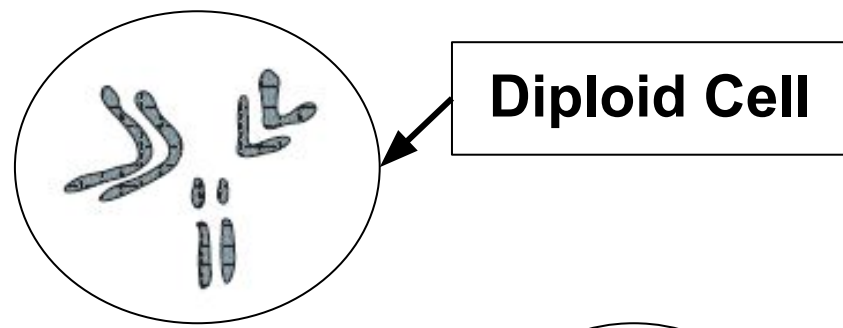
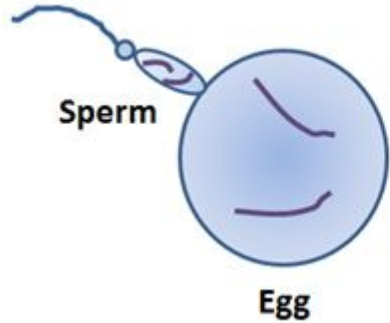
$$N = 4$$

**Haploid:** A gamete (sex cell) which contains only one set of chromosomes

**Gametes**: mature male or female haploid cells

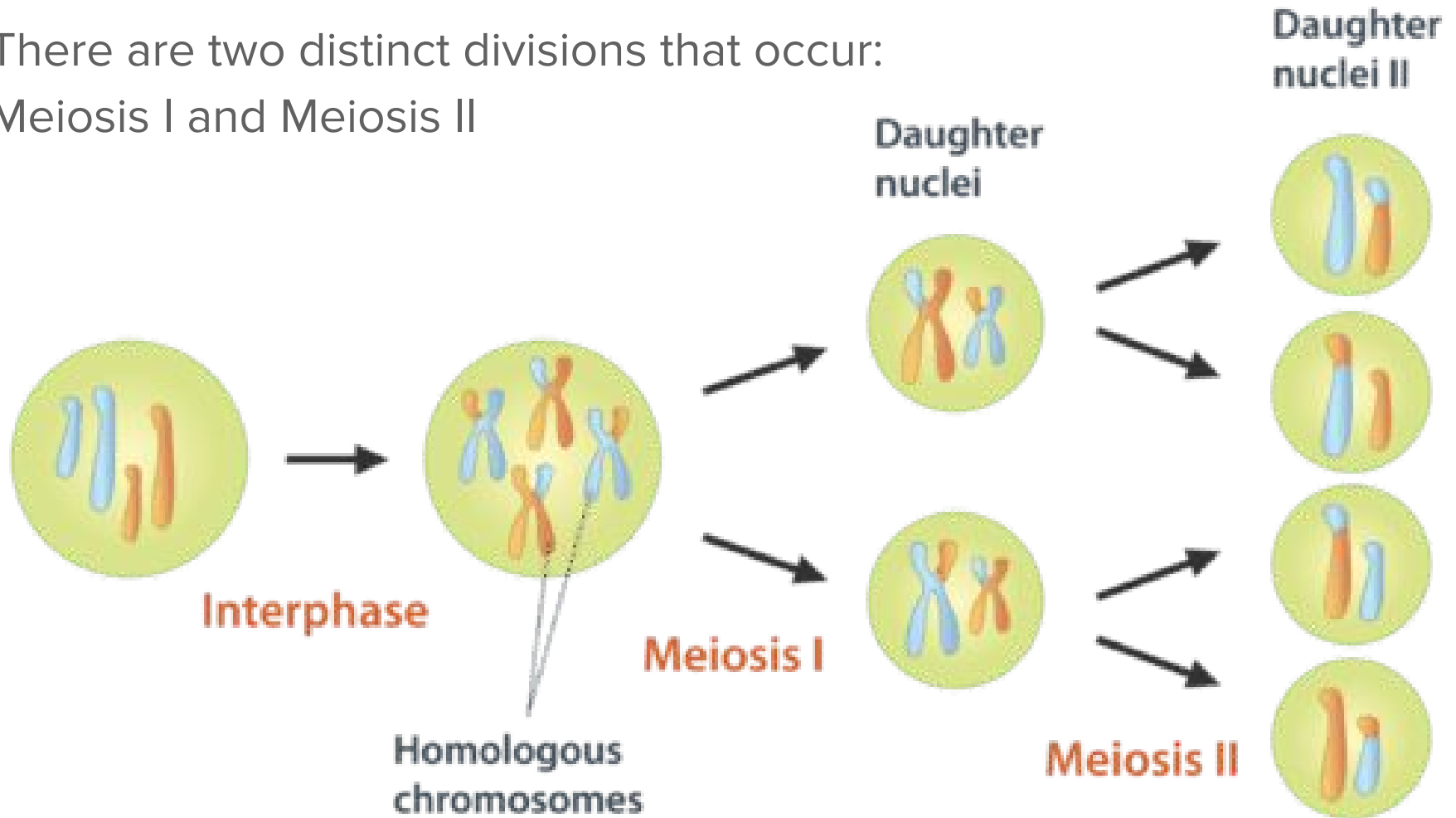
**Sperm**: male gamete

**Egg**: female gamete



Which cell is haploid?

There are two distinct divisions that occur:  
Meiosis I and Meiosis II

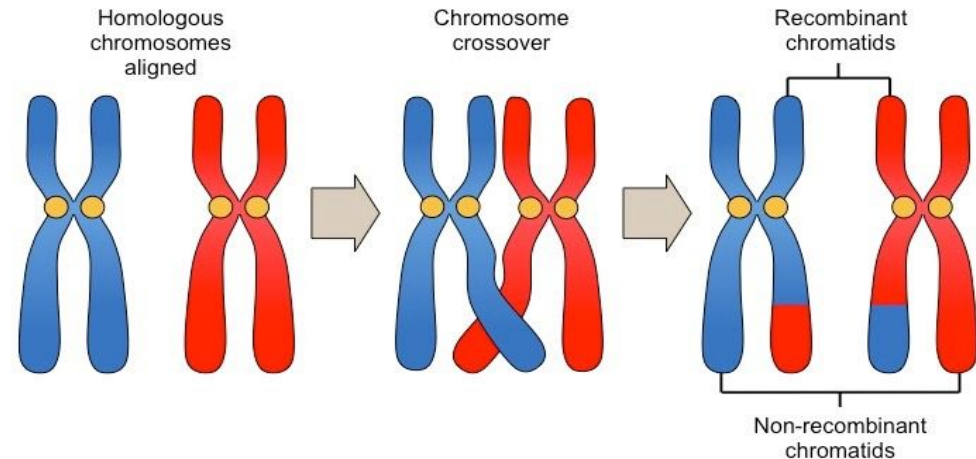
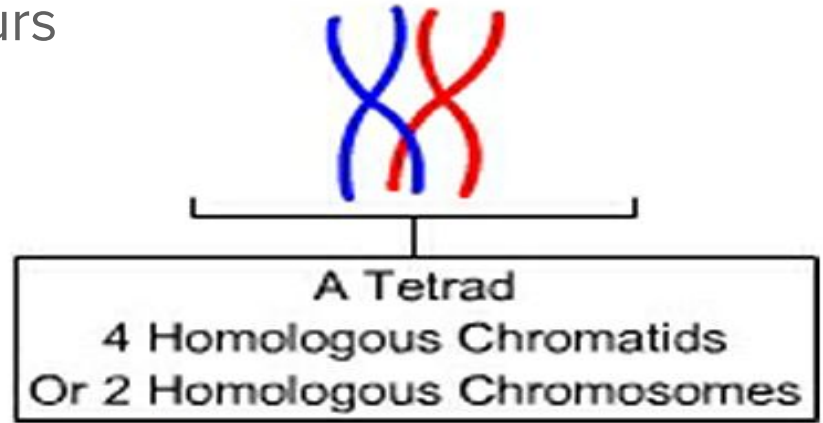


**Meiosis I:** the first cell division occurs

## **Prophase I**

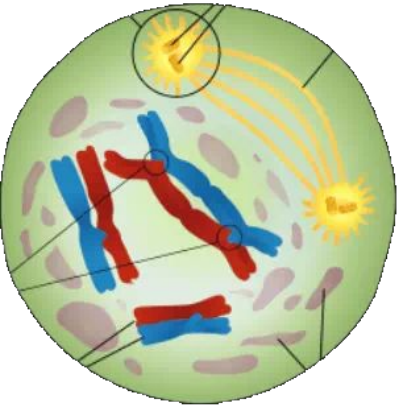
Tetrads form and crossing over occurs.

- **Tetrad:** attached pair of homologous chromosomes
- **Crossing-over:** homologous chromosomes exchange portions of their chromatids, *increases genetic variation!*

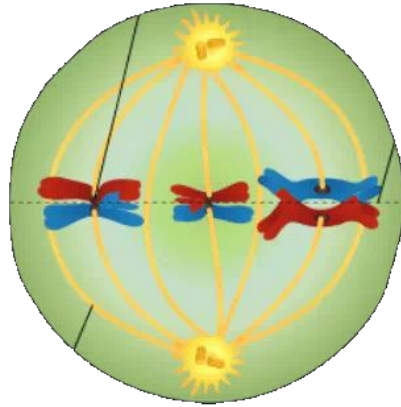


The newly recombined chromatids will continue through Meiosis I

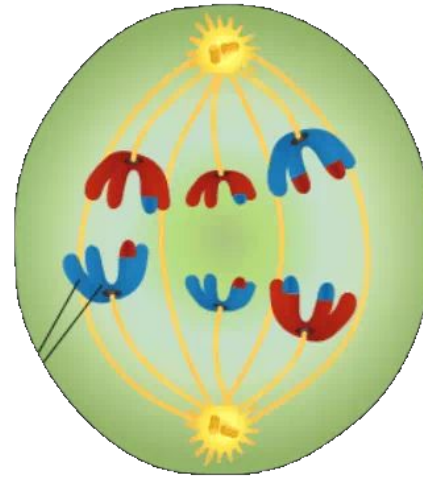
**Prophase I**



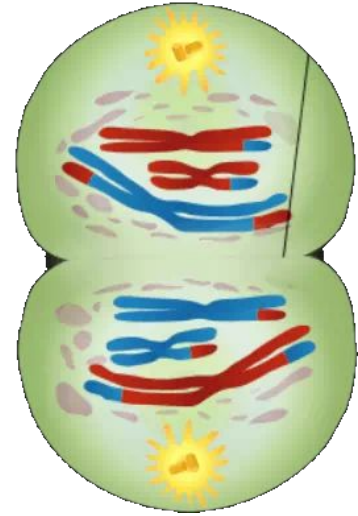
**Metaphase I**



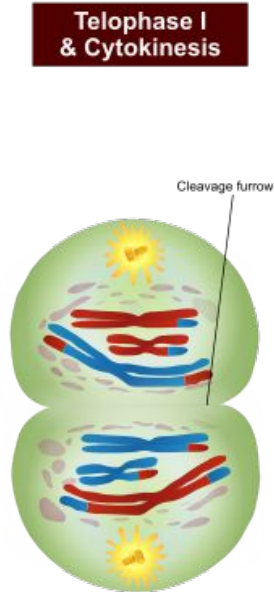
**Anaphase I**



**Telophase I  
& cytokinesis**

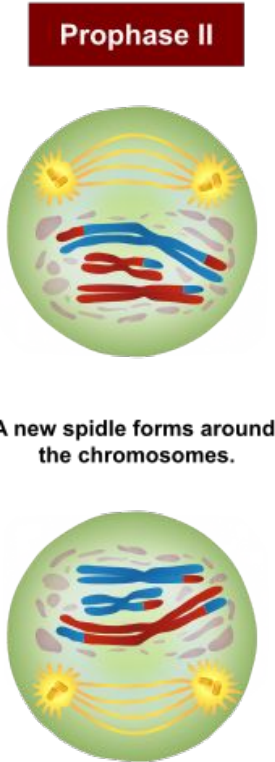


# Meiosis II: Second cell division occurs (without DNA replication), ends with 4 haploid daughter cells.



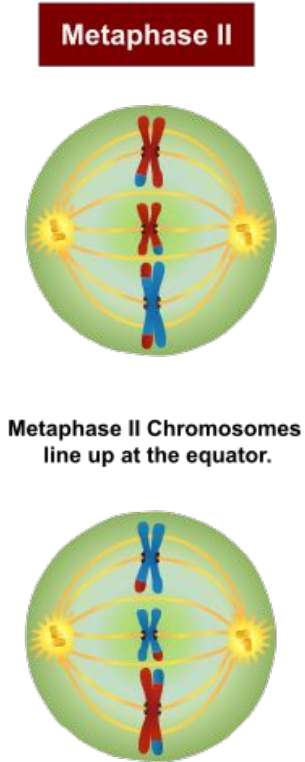
Chromosomes gather at the poles of the cells. The cytoplasm divides.

**Telophase I & Cytokinesis**



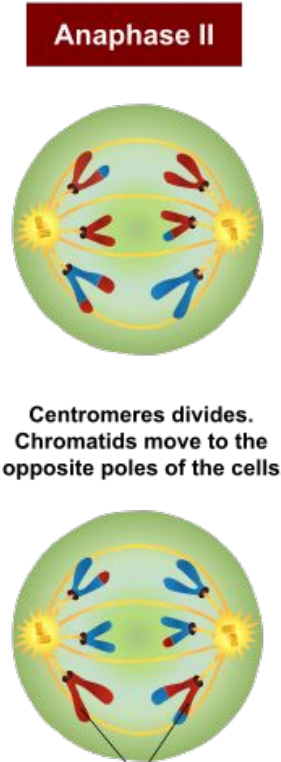
A new spindle forms around the chromosomes.

**Prophase II**



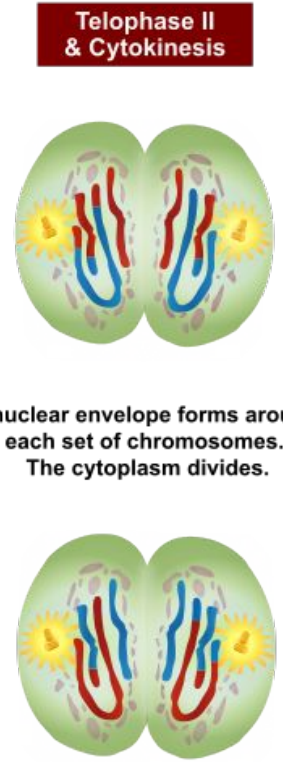
Metaphase II Chromosomes line up at the equator.

**Metaphase II**



Centromeres divide. Chromatids move to the opposite poles of the cells.

**Anaphase II**

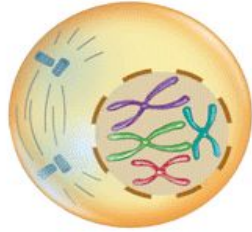


A nuclear envelope forms around each set of chromosomes. The cytoplasm divides.

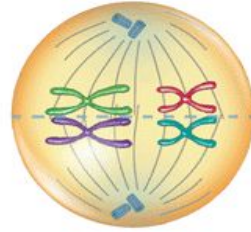
**Telophase II & Cytokinesis**

# Meiosis I

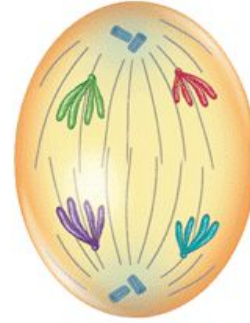
1 Prophase I



2 Metaphase I



3 Anaphase I



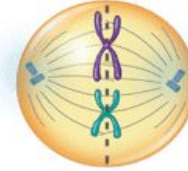
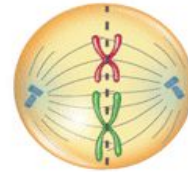
4 Telophase I



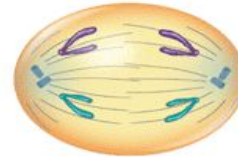
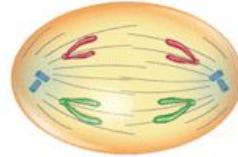
5 Prophase II



6 Metaphase II



7 Anaphase II



8 Telophase II



# Meiosis II

Let's Review!