

## Meiosis

### Chapter 4.3 Guided Notes

## Let's review....

- Mitosis produces two genetically identical daughter cells.
- In sexual reproduction, offspring inherit traits from both parents (the mother and the father).
- Genetic traits are inherited in predictable patterns.

## Meiosis is necessary for sexual reproduction.

- Most human cells (body cells) contain 46 chromosomes (23 pair).
- Any cell that contains the full number of chromosomes (two sets) for a species is a  $2n$  cell, or diploid cell.

## Gametes

- Gametes are cells that contain half the usual number of chromosomes- one chromosome from each pair.
- Gametes are  $1n$  cells, and also called haploid cells. Human gametes contain 23 unpaired chromosomes.
- Gametes are found only in the reproductive organs.
  - An egg is the gamete that forms in a female.
  - A sperm is the gamete that forms in a male.

## Fertilization

- During sexual reproduction, two gametes combine to become a  $2n$  cell that can grow into a new offspring.
- Fertilization is the process that occurs when a sperm and egg combine to form one new cell.
- The egg (23 chromosomes) and the sperm (23 chromosomes) combine to form a new  $2n$  cell with 46 chromosomes.

## Mitosis vs. Meiosis

- Body cells divide by mitosis.
- Each daughter cell formed by mitosis is a standard diploid ( $2n$ ) cell.
- But to produce gametes (which are haploid), a different kind of division is necessary- this is called meiosis.
- Meiosis produces haploid ( $1n$ ) cells. During meiosis, a single cell goes through two cell divisions- meiosis I and meiosis II.
- Meiosis only occurs in the reproductive tissues of an organism.

## Cells divide twice during meiosis.

- Before meiosis begins, chromosomes of the parent cell are copied, so there are now two copies of each chromosome pair- twice as many as usual.
- So, to end up with cells that have half the usual number of chromosomes, there must be two divisions.

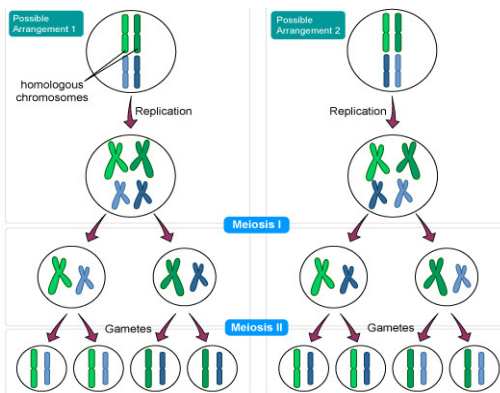
## Meiosis I

- Remember, two chromosomes in a pair are called homologs.
- During meiosis I, the homologs separate and the starting cell divides into two cells.
- One cell contains the two copies of one homolog of each pair, while the other cell contains the two copies of the other homolog of each pair.

## Meiosis II

- During Meiosis II, each of the two cells is divided, producing four haploid cells.
- Each haploid cell has one unpaired set of chromosomes.

## Meiosis I and II: Male vs Female



## Functions of meiosis

- During meiosis, one cell in an organism's reproductive system divides twice to form four  $1n$  cells.
- In males, these gametes become sperm.
- In females, only one of these four new cells becomes an egg.
  - The rest of the cells dissolve back into the organism (or are never produced at all).

## Differences of meiosis and mitosis.

- Meiosis only occurs in reproductive tissues!
- Only cells that are to become gametes go through meiosis. All other cells divide through mitosis.
- A cell that divide by meiosis goes through two cell divisions, but the chromosomes are not copied before the second division. In mitosis, the chromosomes are always copied before division.
- Daughter cells produced by meiosis, which are haploid ( $1n$ ), only contain half the genetic material of the parent cell.
- Daughter cells produced during mitosis, which are diploid ( $2n$ ), contain exactly the same genetic material as the parent.

## Differences of meiosis and mitosis.

