

# Meiosis

## Chromosomes

- **Genes** are parts of your DNA
- **Traits** are things that show (like hair color) from your Genes
- The number of Chromosomes **are the same** throughout your entire body
  - Humans always have **46 chromosomes**, with the exact same sequence throughout your entire body
- **Diploid** is when you have **two** complete sets of chromosomes
  - The majority of the DNA in you is diploid
  - Only sex cells (gametes) are not diploid
  - Each complete set comes half from your mom and half from your dad
- **Haploid** is when you have only **one** complete set of chromosomes
  - An example is **Gametes**
- **Homologous** chromosomes are chromosomes that have the same
  - Length
  - Centromere position
- Sexual vs Asexual reproduction
  - Sexual reproduction
    - Takes two parents
    - Child will not be identical to the parents
    - DNA is unique to themselves
  - Asexual reproduction
    - Takes one parent
    - Child will be identical to the parent in DNA
  - Why?
    - Sexual reproduction allows for favorable DNA to be reproduced quicker
- In humans, two of the chromosomes will be your gender chromosome
  - XX for Female
  - XY for Male
- In order to get sex cells (haploids) we need to undergo **meiosis**
  - Sex cells come **precursor cells (diploids)** to produce haploids
    - Each precursor produces 4 haploids
  - For girls, you are born with a certain amount of precursors
  - For guys, you are constantly making precursor cells
  - The egg will always contain an X chromosome, however, the sperm may contain an X or Y chromosome

# Production of haploid cells

- Meiosis goes through **two rounds** of PMAT
- Goes through Interphase like normal

## PMAT

### Round 1

- Important because it creates new DNA recombinant from the mom and dad's DNA.

#### 1. Prophase 1

1. Nucleus is still there
2. Chromosomes are condensing from the DNA
3. DNA gets **shorter** and **thicker**
4. The Homologous pairs of chromosomes get close to each other and switch portions of DNA
  1. This is called **Synapsis**
  2. This process does not need to be symmetrical across both daughter chromatids
  3. Synapsis is why we have 4 distinct and different gametes in the end

#### 2. Prometaphase 1 (sometimes considered part of the metaphase)

1. Nucleus membrane disappears
2. Formation of microtubules
  1. Attach to the chromosomes (centrometer of it)

#### 3. Metaphase 1 (Middle)

1. Chromosomes line up to the middle of the cell
2. They line up next to each other in homologous pairs down the middle of the cell
3. They will not all line up in the same order, so the random assortment creates a new combination of genes

#### 4. Anaphase 1 (Away)

1. The homologous chromosomes get separated
2. The sister chromatids do not get separated like normal mitosis
3. The chromosomes move away from the center to the edges of the cell

4. The spindles (microtubules) help pull them to the edges

## 5. Telophase 1 (Two)

1. Chromosomes reach the poles
2. Two new neuclei are formed
3. Microtubules disappears

## Round 2

- Round 2 happens **similar to normal mitosis**, except for the cells are already Haploids
- This results in 4 haploid cells from the original single precursor before meiosis

## Fertilization

- Fertilization requires two cells, one from the mom and one from the dad
- Each cell will be haploids
- After fertilization, the resulting cell will be diploid

## Index

Word	Meaning
Genes	A part of your DNA
Traits	Something that physically shows from your DNA
Gamete	A sex cell that does not one set of chromosomes, they are haploids
Diploid	Contains a pair of all chromosomes
Haploid	Contains one of all chromosomes (half of a diploid)
Meiosis	The process of getting from a precursor cell to gametes
Precursor Cells	Cells that are capable of making sex cells through meiosis
Homologous	Matching chromosomes