CHROMOSOMES AND MEIOSIS

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10TH GRADE BIOLOGY

OBJECTIVE

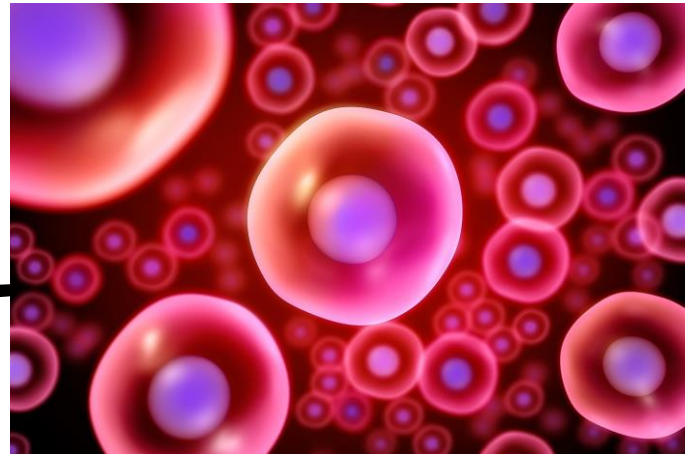
- After this presentation and the videos, students Will explain through diagrams the process of meiosis and compare it to mitosis.

INSTRUCTIONS!

- In your notebook, make a two-column table to keep track of the following vocabulary words

Term	Definition
Somatic cell	
Gamete	
Homologous chromosome	
Autosome	
Sex chromosome	
Sexual reproduction	
Fertilization	
Diploid	
Haploid	
Meiosis	

YOU HAVE BODY CELLS AND GAMETES



- Two major groups of cells
  - **Somatic cells**: body cells that make up most of your body tissues and organs (ex. spleen, heart, skin, etc). DNA in these cells is not passed on to your children.
  - **Gametes**: sex cells-ova or eggs in the female, and spermatozoa, or sperm cells, in the male. DNA in these cells is passed on to your children.

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YOU HAVE BODY CELLS AND GAMETES

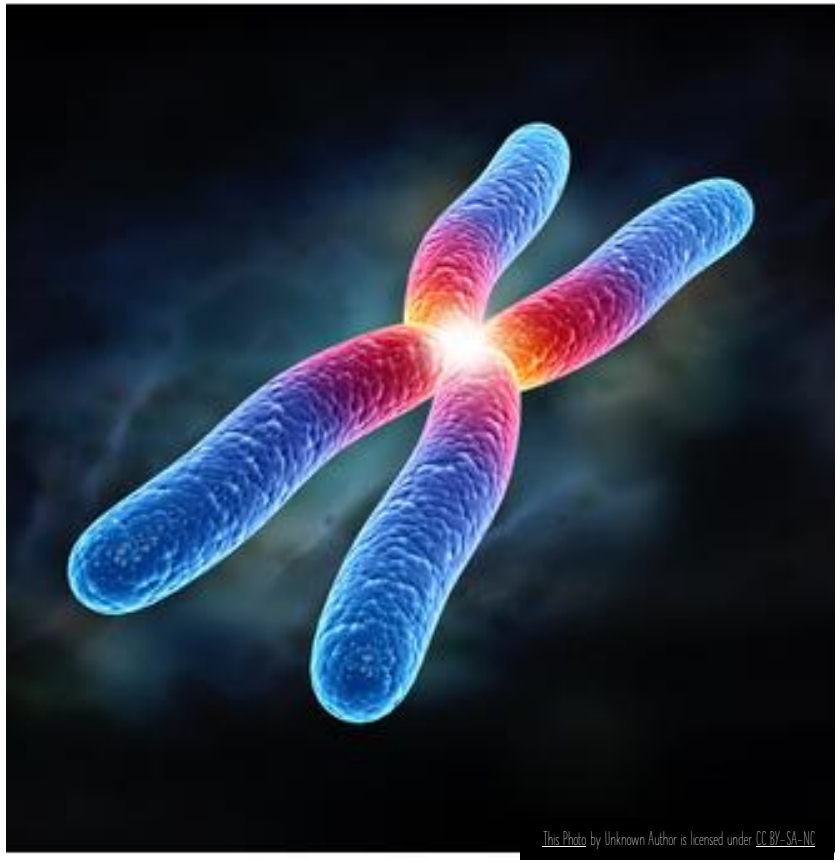
Each of your body cells contains a set of 46 chromosomes, which come in 23 pairs.

These cells are genetically identical to each other unless mutations have ocurred.

Cells within an organism differ from one another because different genes are expressed, not because they have different genes.

YOUR CELLS HAVE AUTOSOMES AND SEX CHROMOSOMES

- Your body cells have 23 pairs of chromosomes for a total of 46 that can be divided in two sets: 23 from your mother and 23 from your father.
- Together, Each pair of chromosomes is reffered to as a homologous pair.
- **Homologous chromosomes** are two chromosomes-one inherited from the mother and one from the father- that have the same lenght and general appereance.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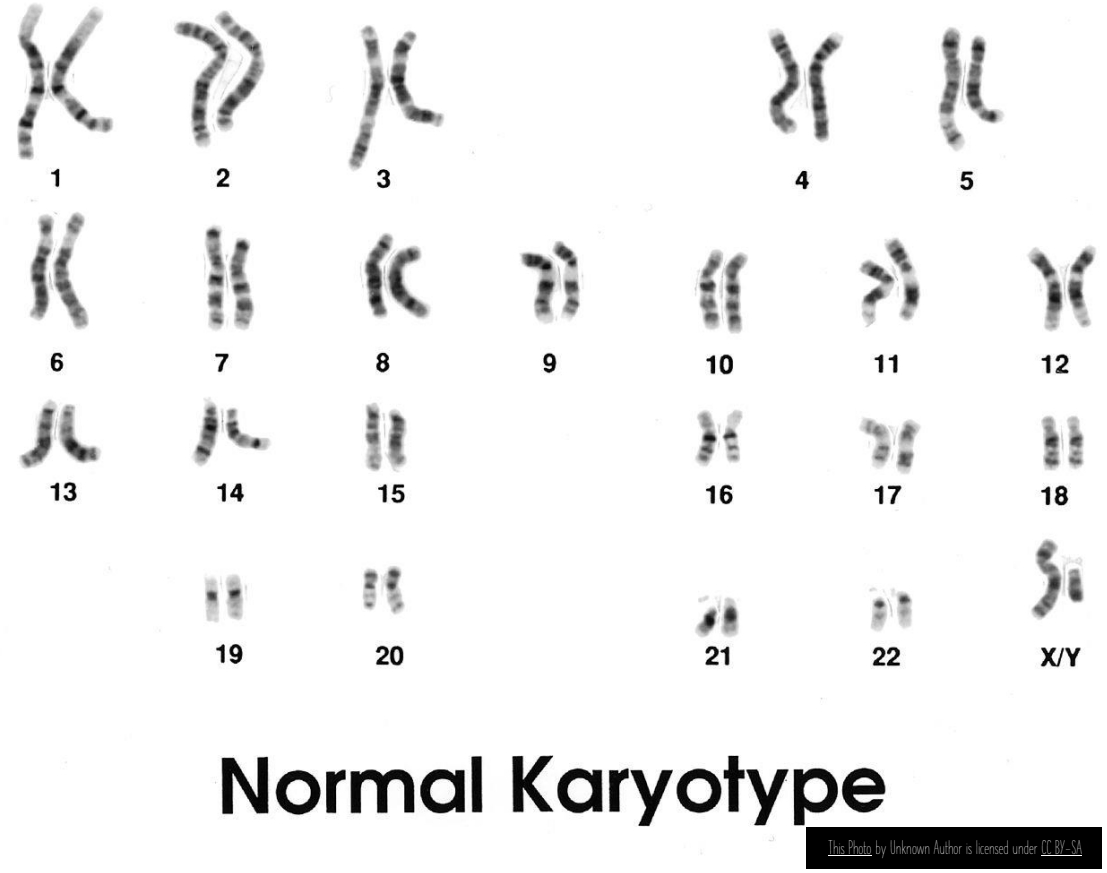
YOUR CELLS HAVE AUTOSOMES AND SEX CHROMOSOMES

- Homologous chromosomes have copies of the same genes, although the two copies may differ.
  - For example: You can have a gene associated to colesterol levels on chromosome 8. It is posible that the copy from your mother is associated with levels, while the other (from your father) is associated with low levels.
- Scientists have assigned a number to each pair of homologous chromosomes, ordered from largest to smallest.



Normal Karyotype

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YOUR CELLS HAVE AUTOSOMES AND SEX CHROMOSOMES

Chromosomes from pair 1 to 22 are **autosomes**: contain genes for characteristics not directly related to the sex of an organism.

The 23rd pair are the **sex chromosomes**: directly control the development of sexual characteristcs.

YOUR CELLS HAVE AUTOSOMES AND SEX CHROMOSOMES

Humans have two different sex chromosomes: X and Y

Sex determination varies in species

In mammals, including humans, an organism's sex is determined by the XY system

- An organism with two X (XX) is a female
- An organism with one X and one Y (XY) is a male

YOUR CELLS HAVE AUTOSOMES AND SEX CHROMOSOMES

- Although the X and Y chromosomes pair with each other they are not homologous.
  - X chromosome is larger and contains numerous genes, including many that are unrelated to sexual characteristics.
  - Y chromosome is smaller and contains genes that direct the development of the testes and other male traits.

female

male

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BODY CELLS ARE DIPLOID; GAMETES ARE HAPLOID

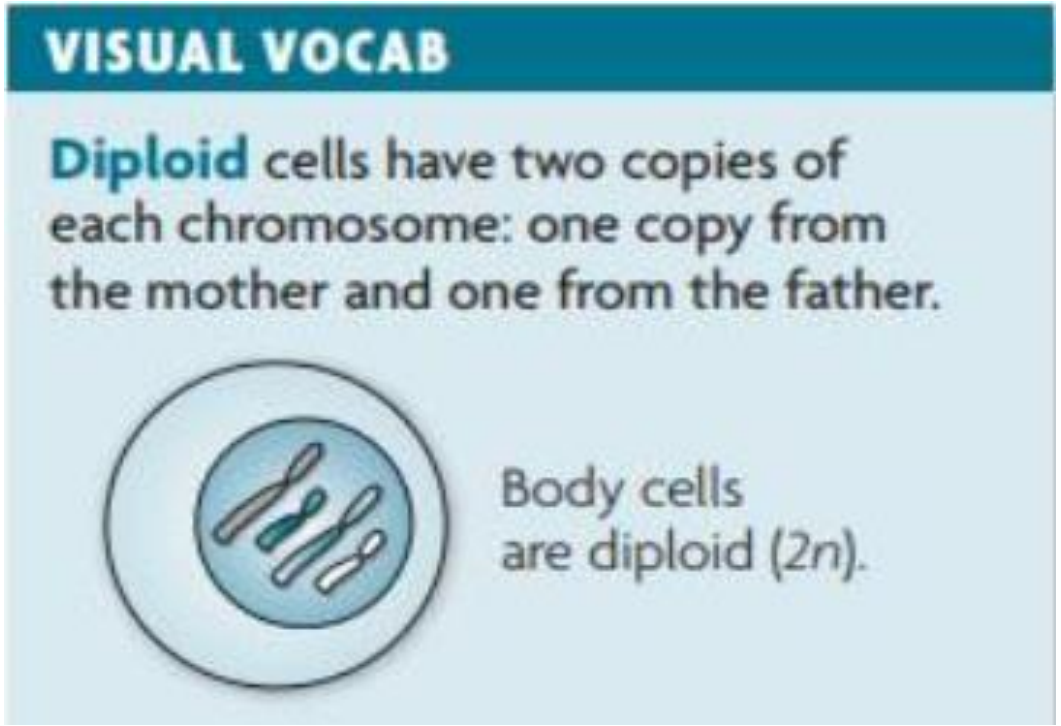
Sexual reproduction involves the fusion of two gametes, resulting in offspring that are a genetic mixture of both parents.

The actuak fusion of an egg and a sperm cell is called **fertilization.**

The nuclei of the egg and sperm cell fuse to form one nucleus.	Both the egg and the sperm cell need only half the usual number of chromosomes-one chromosome from each homologous pair.

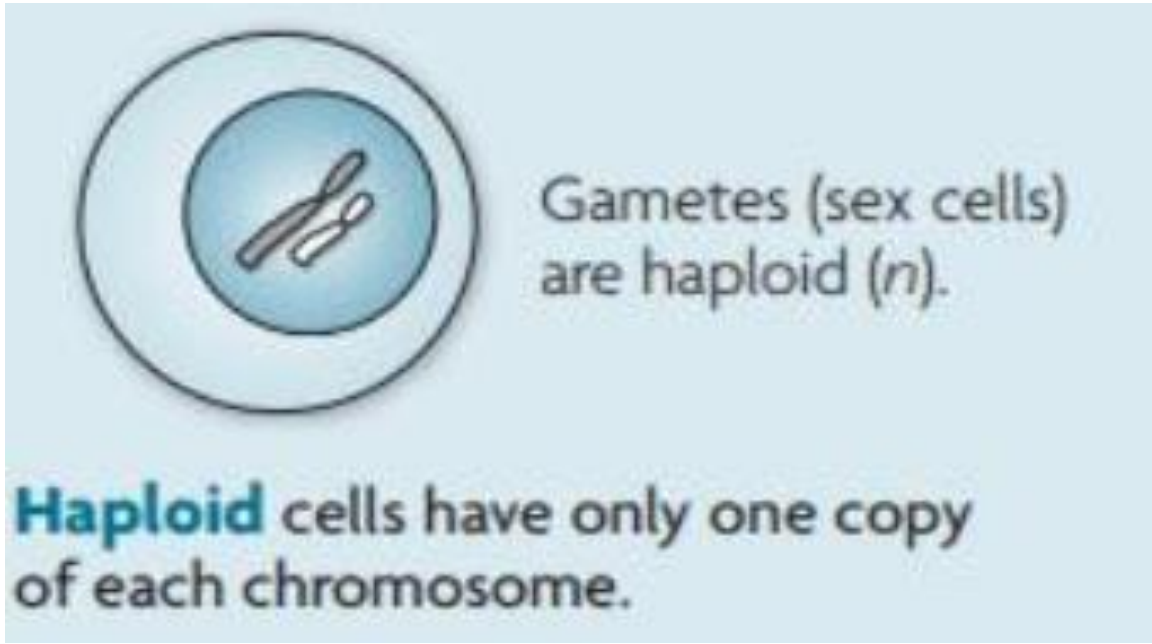
DIPLOID AND HAPLOID CELLS

- Body cells (somatic cells) are **diploid**- means that a cell has two copies of each chromosome: one copy from the mother, and one copy from the father.
  - Diploid cells can be represented as **2n**.
  - In humans the diploid chromosome number is 46.



DIPLOID AND HAPLOID CELLS

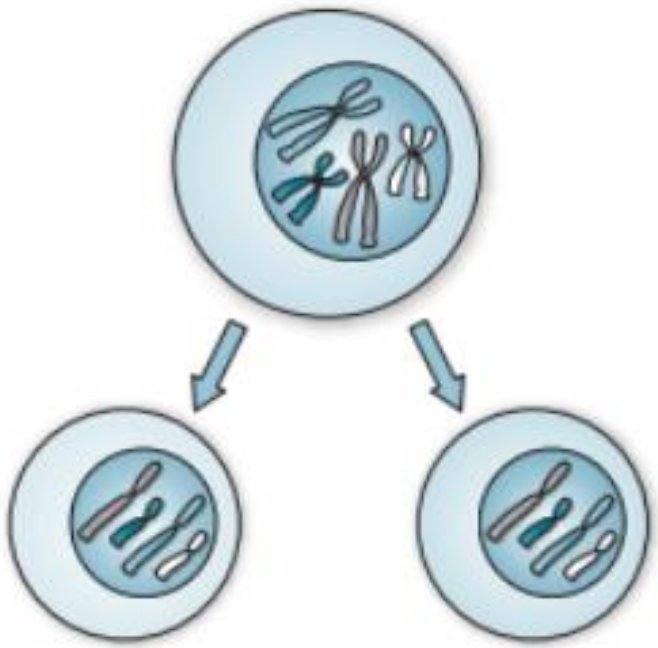
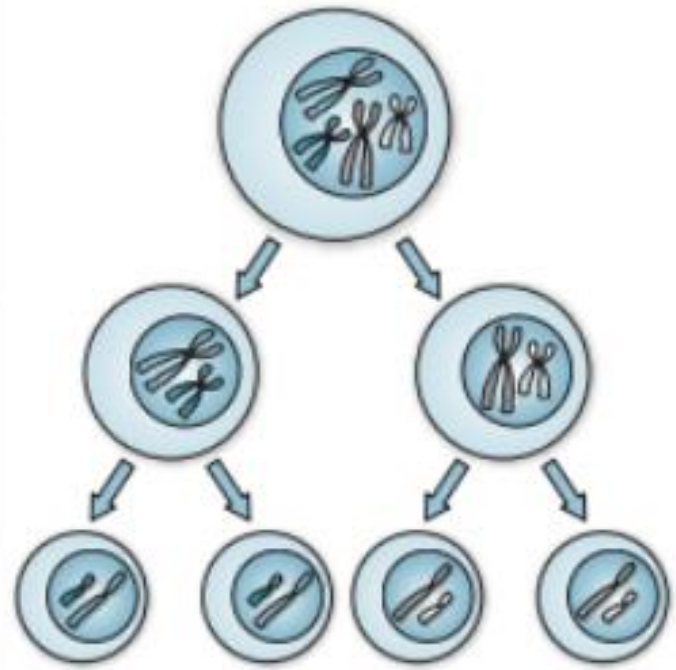
- Gametes are not diploid cells; they are haploid cells, represented as **n.** **Haploid** means that a cell has only one copy of each chromosome.
  - Each human egg or sperm cell has 22 autosomes and 1 sex chromosome
    - Egg- X
    - Sperm- X or Y



MEIOSIS

- Germ cells in your reproductive organs undergo the process of meiosis to form gametes.**Meiosis:** is a form of nuclear división that divides diploid cells into haploid cells (2n → n)
- Is essential for sexual reproduction
- It's called a reductive división because it reduces a cell's chromosome number by half.
  - In cells undergoing meiosis, DNA is copied once, but divided twice.

COMPARING MITOSIS AND MEIOSIS

MITOSIS		MEIOSIS	
	Produces genetically identical cells	Produces genetically unique cells	
	Results in diploid cells	Results in haploid cells	
	Takes place throughout an organism's lifetime	Takes place only at certain times in an organism's life cycle	
	Involved in asexual reproduction	Involved in sexual reproduction	

MEIOSIS IN DETAIL

- Watch the following video: https://www.youtube.com/watch?v=VzDMG7ke69g
- Complete the meiosis practice!! Document: Meiosis practice (pdf) Send picture or scanned pdf to your teacher!! It is worth **30 points.**
- Send a picture to your teacher the vocabulary table written in your notebook (Slide #3 of this presentation)