Catalyst #1

- What are the stages of mitosis, in order?
- In which phase do chromosomes line up at the equator of a cell?
- If a parent cell has 46 chromosomes and it goes through cell division, how many chromosomes will the daughter cells have?

MEIOSIS

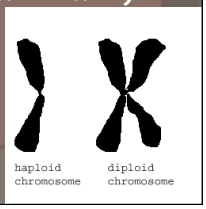
Division of sex cells

MEIOSIS VOCABULARY:

- **Diploid** = a cell containing TWO sets of chromosomes.
  - one set inherited from each parent
  - 2n (number of chromosomes)
  - **body cells** (somatic cells)

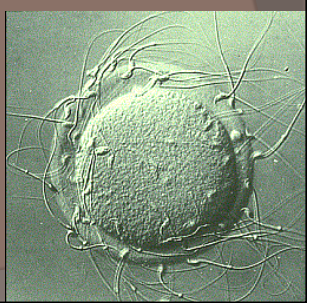
MEIOSIS VOCABULARY:

- **Haploid** = a cell with only ONE set of chromosomes.
  - 1n (number of chromosomes)
  - **sex cells** (gametes)



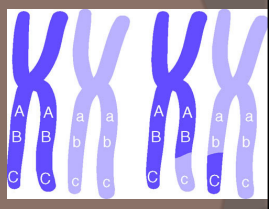
MEIOSIS VOCABULARY:

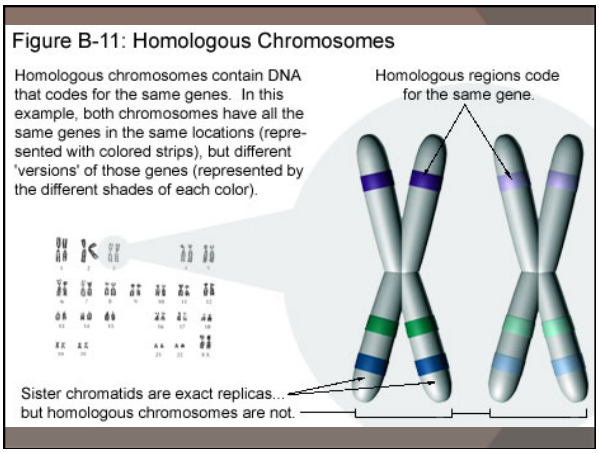
- **Gamete**= sex cells
  - **Sperm** = male gamete
  - **Egg** = female gamete



MEIOSIS VOCABULARY:

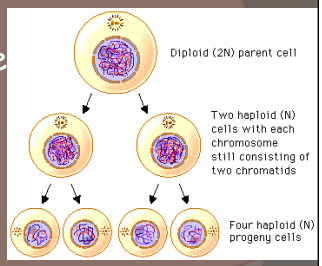
- **Homologous chromosomes** = paired chromosomes that have genes for the same traits arranged in the same order.
  - One homologous chromosome is inherited from the organism's father, the other from the mother.





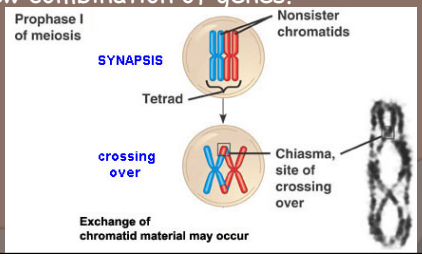
MEIOSIS VOCABULARY:

- **Meiosis** = a two stage type of cell division that results in **gametes** with half the number of chromosome number as the body cells.



MEIOSIS VOCABULARY:

- **Crossing over** = when nonsister chromatids of homologous chromosomes exchange genetic information, results in a new combination of genes.



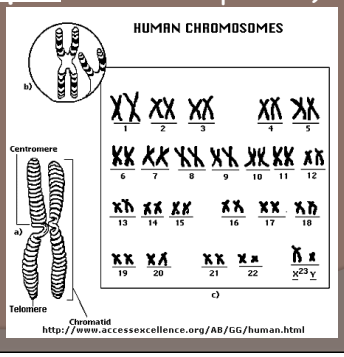
MEIOSIS VOCABULARY:

- **Fertilization** = the process of joining gametes.
- **Zygote** = when sperm (haploid) fertilizes the egg (haploid), the resulting cell is the zygote (diploid).

I. GENES, CHROMOSOMES, AND NUMBERS:

- In humans, each **somatic cell** (any cell other than a sperm or egg, has **46** chromosomes)

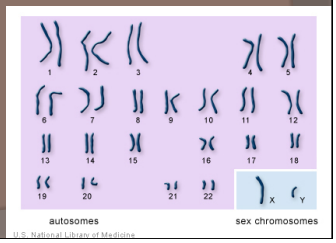
- 46 chromosomes→ **23 pairs** (humans get **1 pair** from each parent)



- **Sex chromosomes**- determine the sex of an individual
  - last pair of chromosomes—23rd pair for humans

XX = **female**

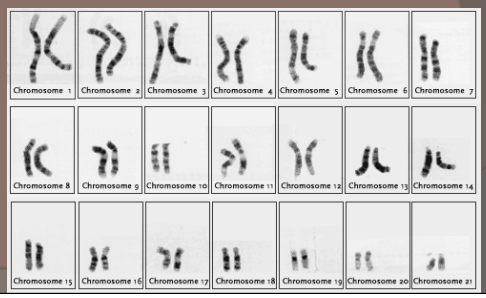
XY = **male**



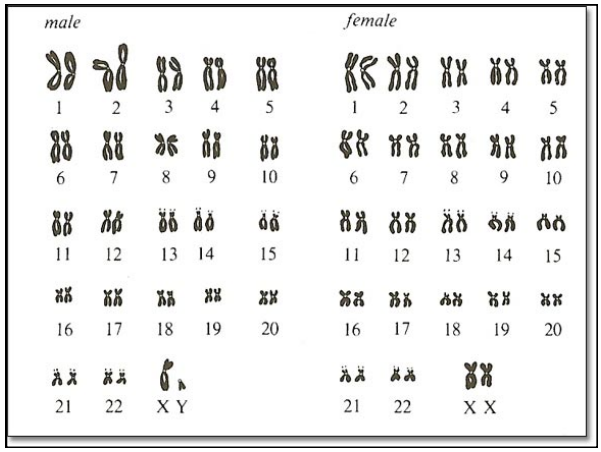
- The **number of chromosomes** for an organism is NOT related to the **complexity** of that organism!!
  - Ex: A dog has 78 body chromosomes and humans have 46 body chromosomes
- A thousand or more genes are lined up on a chromosomes at one time

Diploid & Haploid Numbers

- Each **somatic cell** of an organism contains **paired** chromosomes.

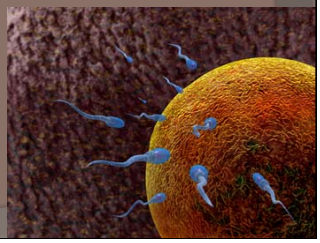


- Half of each pair came from each parent. These cells are said to have 2n chromosomes, or a full set.
  - They are **DIPLOID**
    - Ex: Humans have 46 body chromosomes



- Each **sex cell** of an organism contains only **half of** a chromosome set.
  - These cells are **HAPLOID** and have 1n chromosomes
    - Ex: Humans have 23 chromosomes in their gametes (egg or sperm cell)

- Sex cells will fuse with another sex cell during fertilization to create a **2n organism**.



- So if human sperm and egg both have 23 chromosomes, after fertilization an embryo would have 46 chromosomes!

2 Reasons why Meiosis is significant!!

1. **Meiosis** is another form of cell division that **creates haploid cells** to be used for reproduction

2 Reasons why Meiosis is significant!!

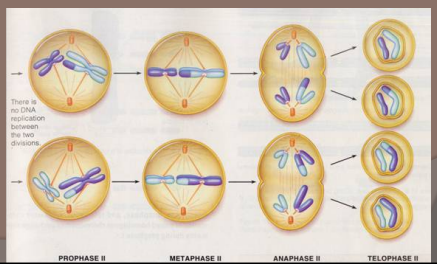
- If mitosis was the only form of cell division, then new offspring would always have **2 times** as many **chromosomes** as their parents.

2 Reasons why Meiosis is significant!!

- Eventually, there would be so many chromosomes, the organism would **not survive** or be severely **mutated**.

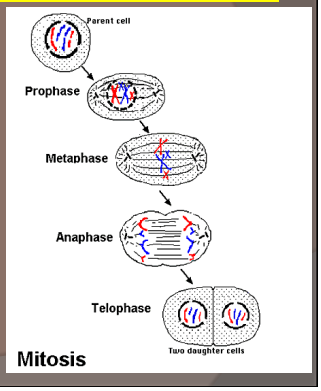
2 Reasons why Meiosis is significant!!

2. Meiosis provides **GENETIC VARIATION**- the reshuffling of genes carried by the individual members of a population.



II. MEIOSIS vs. MITOSIS:

- Remember: **mitosis** = asexual division of diploid body cells



II. MEIOSIS vs. MITOSIS:

	Meiosis	*Mitosis*
Cell type of parent	**diploid**	**diploid**
Number of daughter cells produced	**4**	**2**
Number of cell divisions	**2**	**1**
Genetic relationship of daughter cells to parent cell	**different**	**identical**
Genetic relationship of daughter cells to one another	**different**	**identical**