

# Meiosis

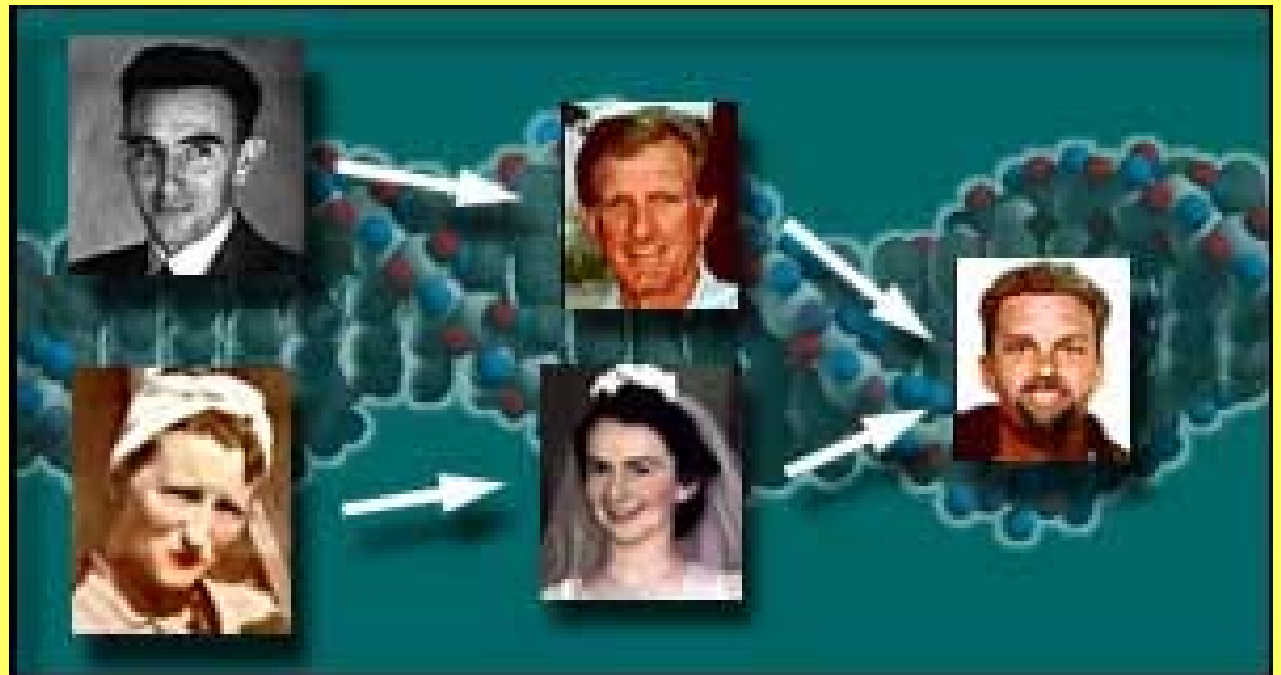
📖 Who discovered the importance of heredity?

❖ *Gregor Mendel*



# Define *heredity*.

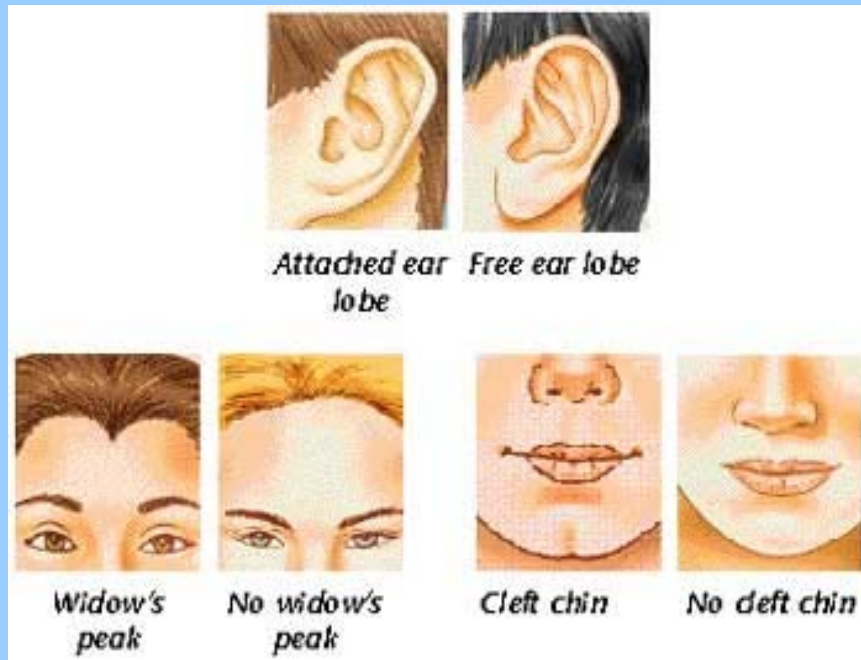
❖ *Heredity* is the passing on of characteristics from parent to offspring.





## Define *traits*.

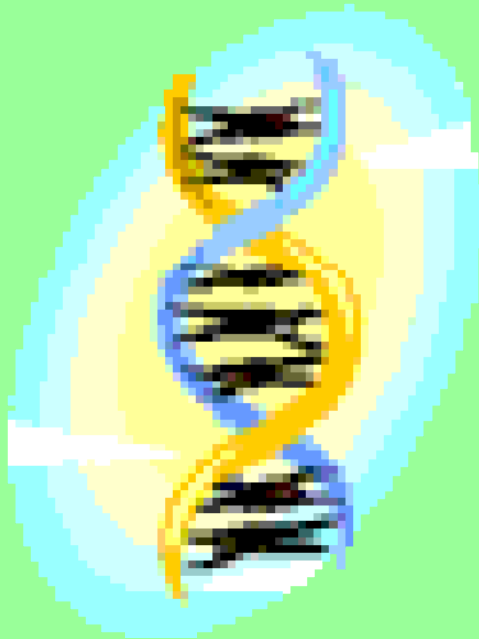
- ❖ *Traits* represent the characteristics that are inherited.





Define *genetics*.

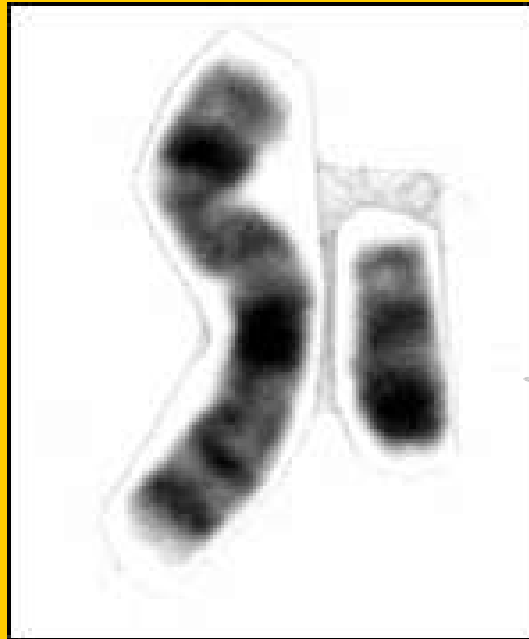
- ❖ *Genetics* is the branch of biology that studies heredity.





## Define *gametes*.

- ❖ *Gametes* are the organism's sex cells
  - ❖ 2 types: sperms (y) and eggs (x)





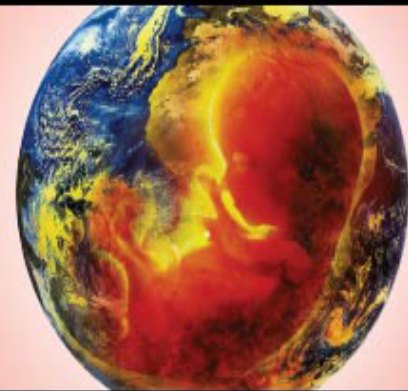
Define *fertilization*.

❖ *Fertilization* is the union of male gametes and female gametes.



❖ Define *zygote*.

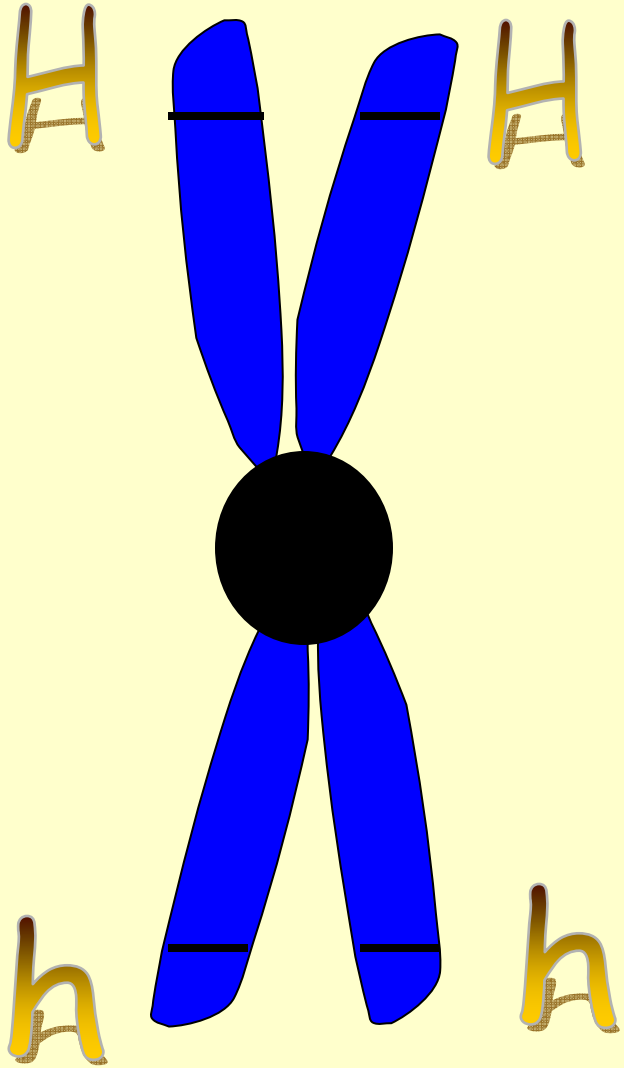
❖ *Zygote* means a fertilized cell known as a "*offspring*".







# Vocabulary

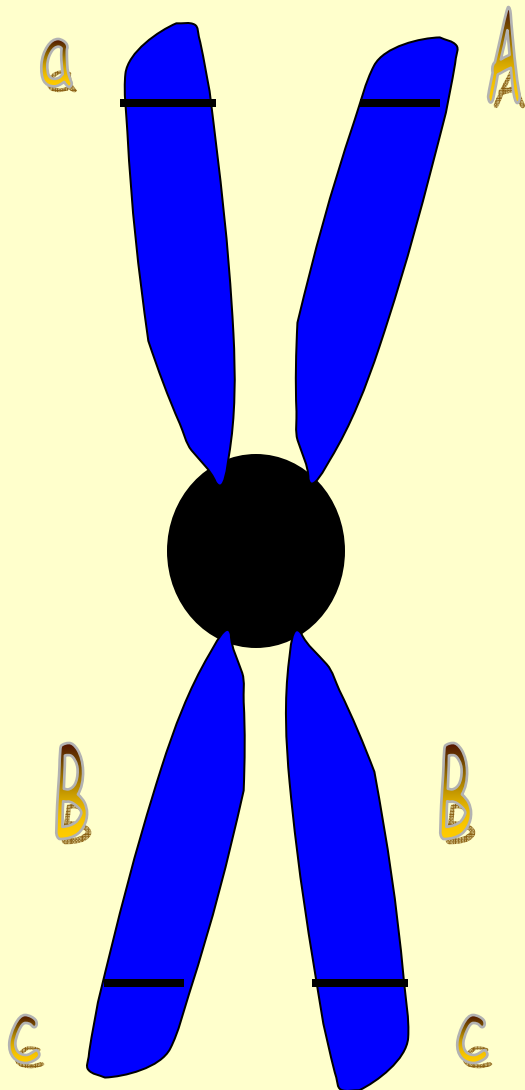


## Alleles

- ❖ alternate combination of genes
- ❖ represented by letters
- ❖ Only 3 types of letter combinations
- ❖ Example: hair color  
(H)  $\rightarrow$  HH, hh, Hh



# Vocabulary



## Homologous Chromosomes

❖ pair of chromosomes  
having alleles or  
genes in the same  
order of  
arrangement.

# 🧠 Practice of Homologous Chromosomes

1



2



3



4

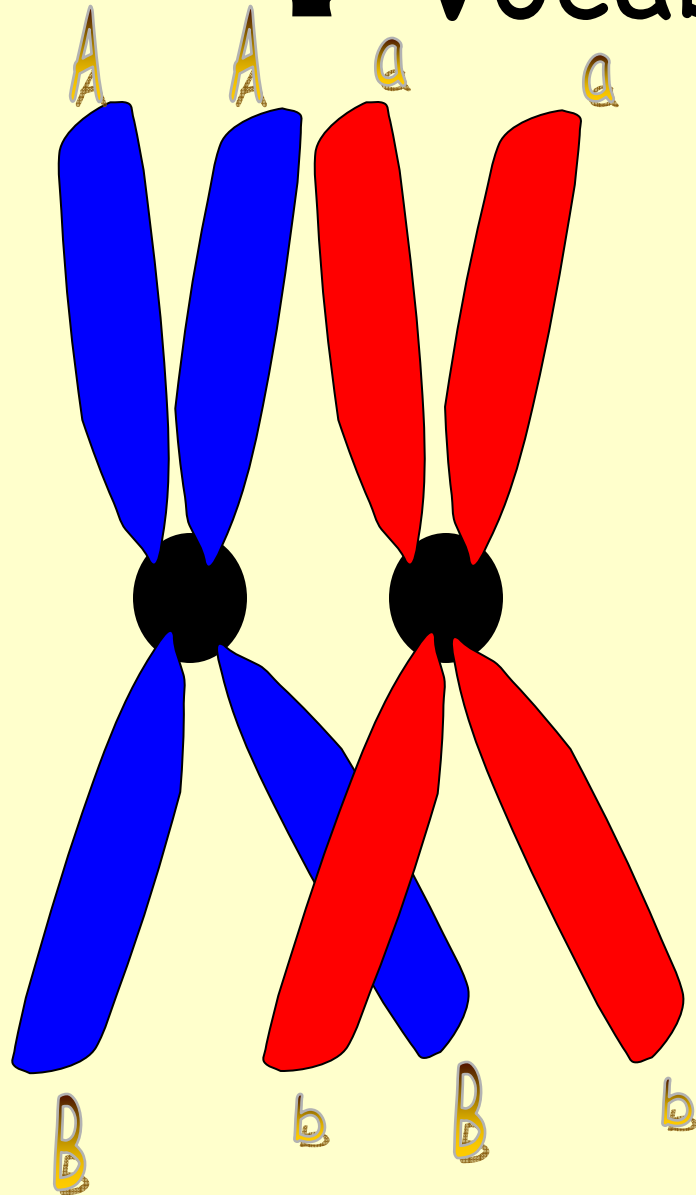


5





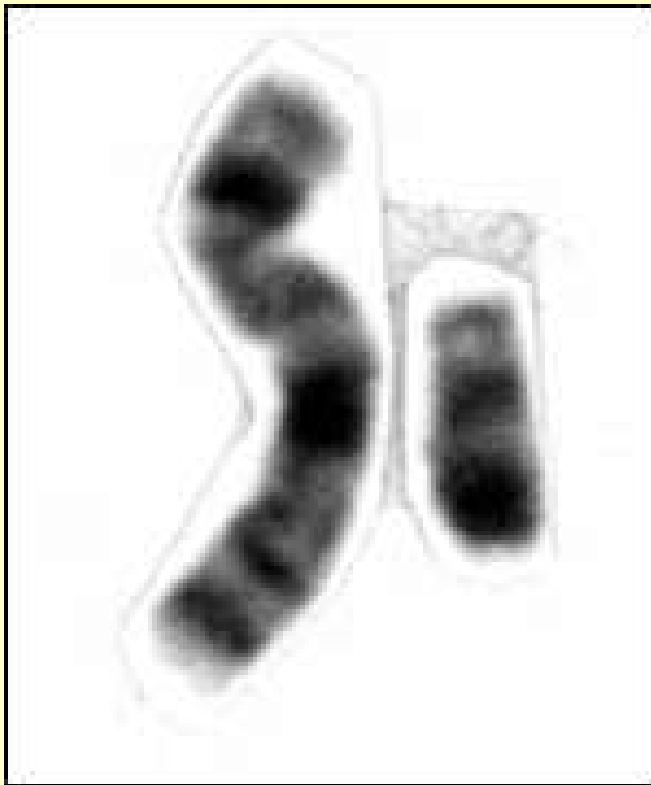
# Vocabulary Continues



## Crossing Over

- ❖ exchange of genetic material between nonsister homologous chromosomes
- ❖ results in new allele combinations
- ❖ occurs only in *prophase I* of meiosis

# 💡 Sex Chromosomes

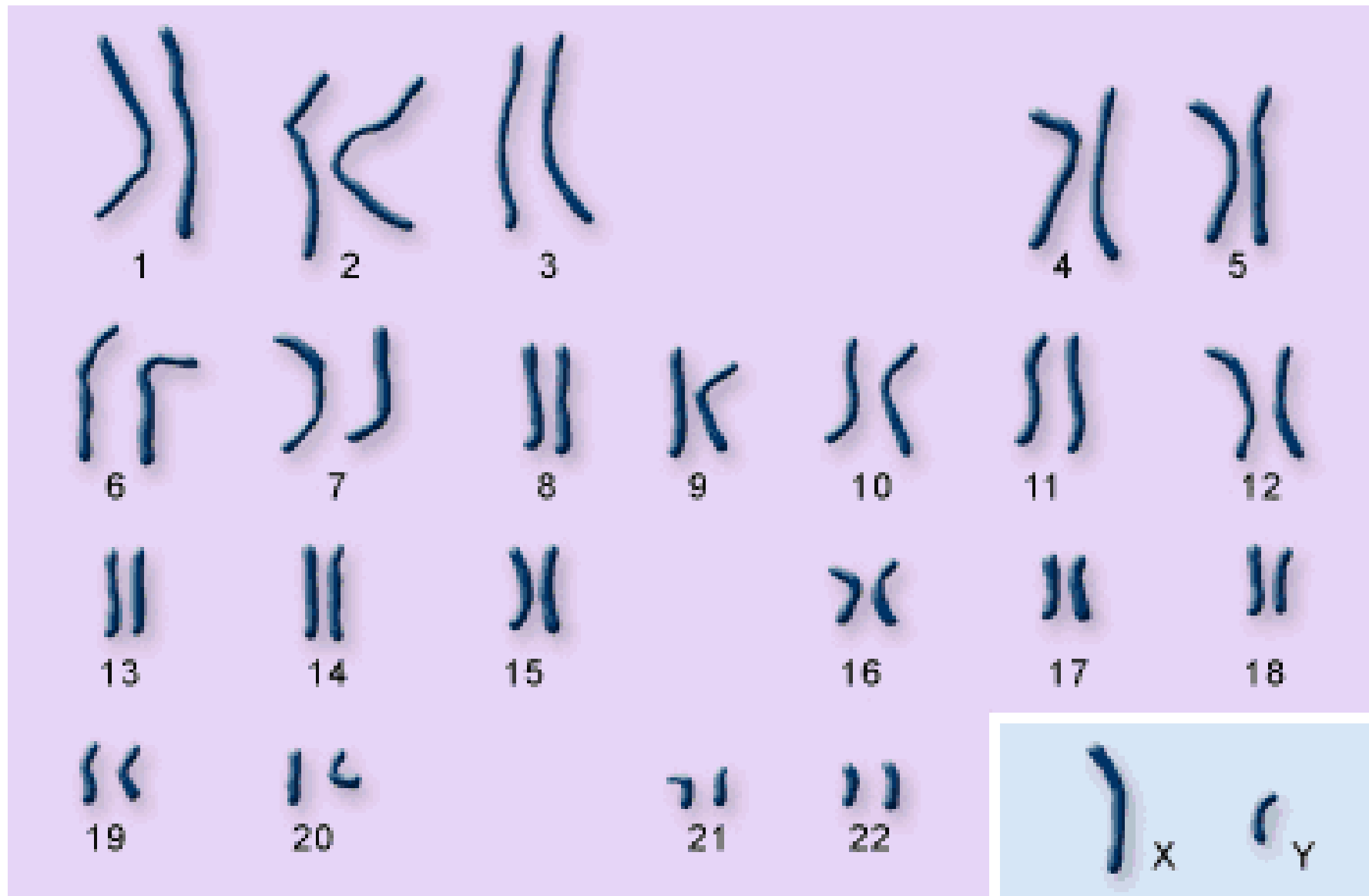


- ❖ chromosomes that determine the sex of an organism
- ❖ *only* 1 pair of sex chromosomes
- ❖ Female: XX and Male: XY
- ❖ carries genetic variations
  - ➔ mutations



# How many pairs and numbers of chromosomes exist among humans?

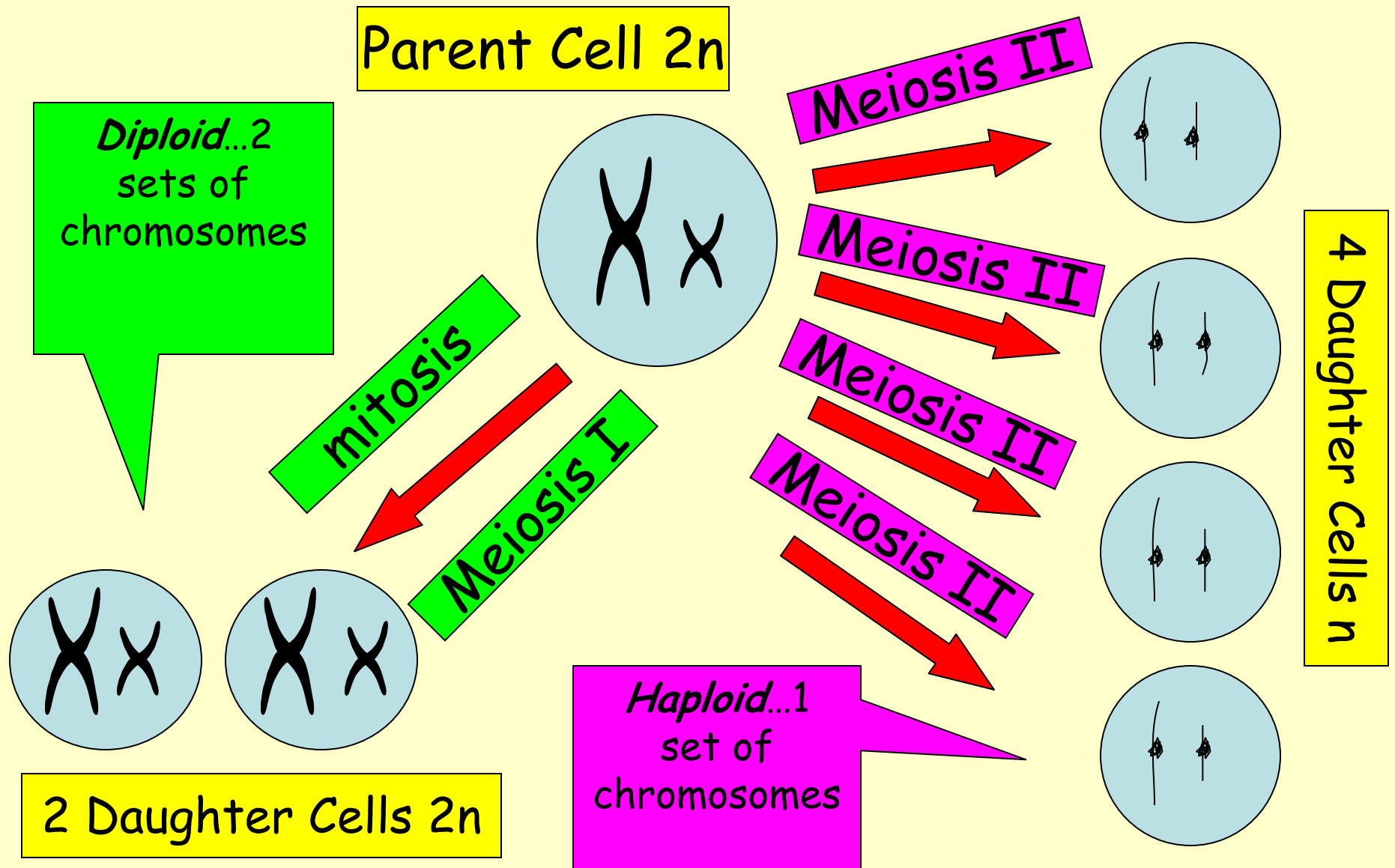
Autosomes	Sex Chromosomes	Total Pairs and Numbers
Pairs of matching homologous chromosomes ( <u>99.9%</u> )	Determines sex of an organism ( <u>0.1%</u> )	
<u>22</u> pairs	<u>1</u> pair	<i>23 pairs</i>
<u>44</u> chromosomes	<u>2</u> chromosomes	<i>46 chromosomes</i>



autosomes

sex chromosomes

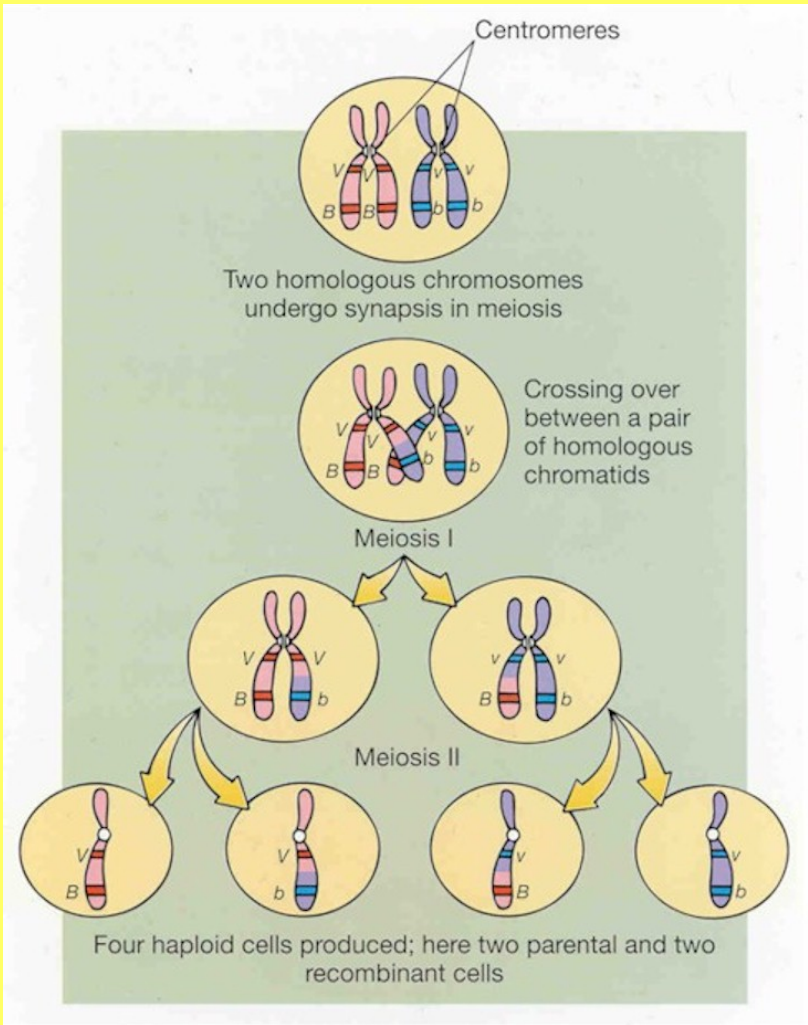
# Diploid versus Haploid







# Define *meiosis*.



Meiosis is the cell division that produces gametes containing half the number of chromosomes as the parent cell.



How many cell divisions occur during meiosis? Name them.

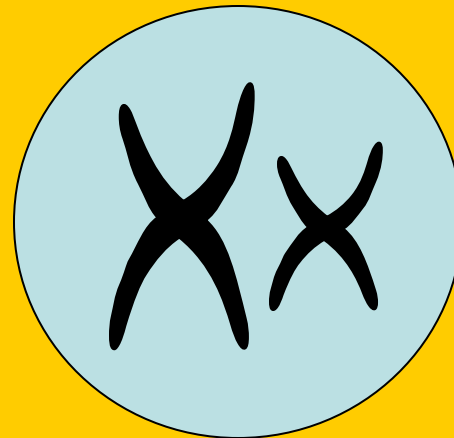
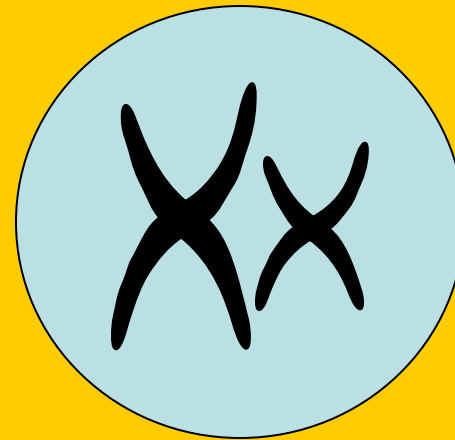
2

Meiosis I and Meiosis II



What type of cells (diploid or haploid) form at the end of **Meiosis I**?

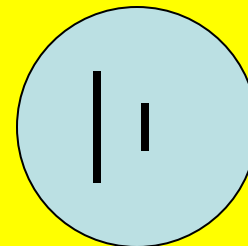
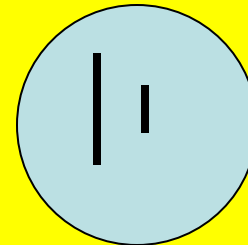
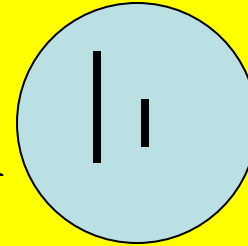
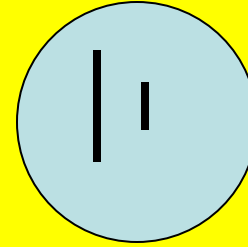
**2 Diploid  
Cells...2 sets of  
chromosomes in  
each**





What type of cells (diploid or haploid) form at the end of **Meiosis II**?

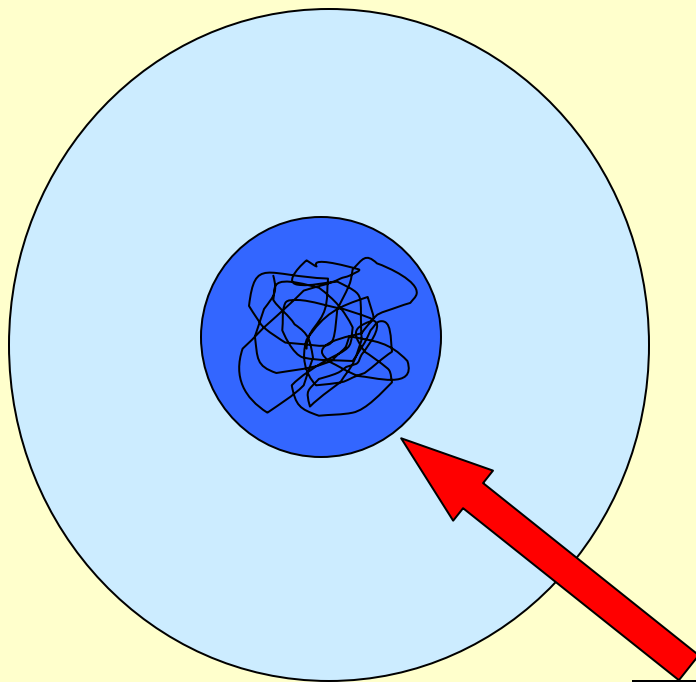
**4 Haploid Cells...** 1 set of chromosomes in each



# The Phases of Meiosis I

## 1.) Interphase I

❖ Visible chromosomes cannot be seen

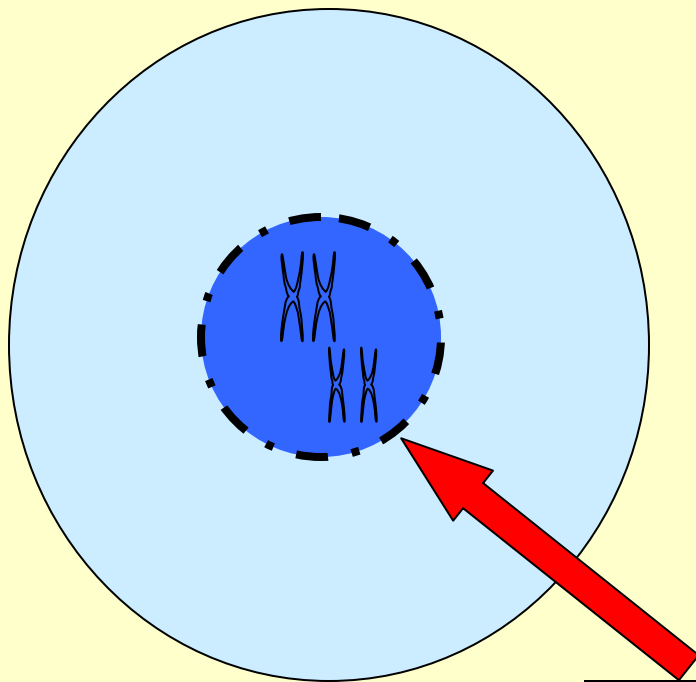


❖ DNA replicating (copying)

Nucleus

# The Phases of Meiosis I

## 2.) Prophase I



Nuclear Membrane

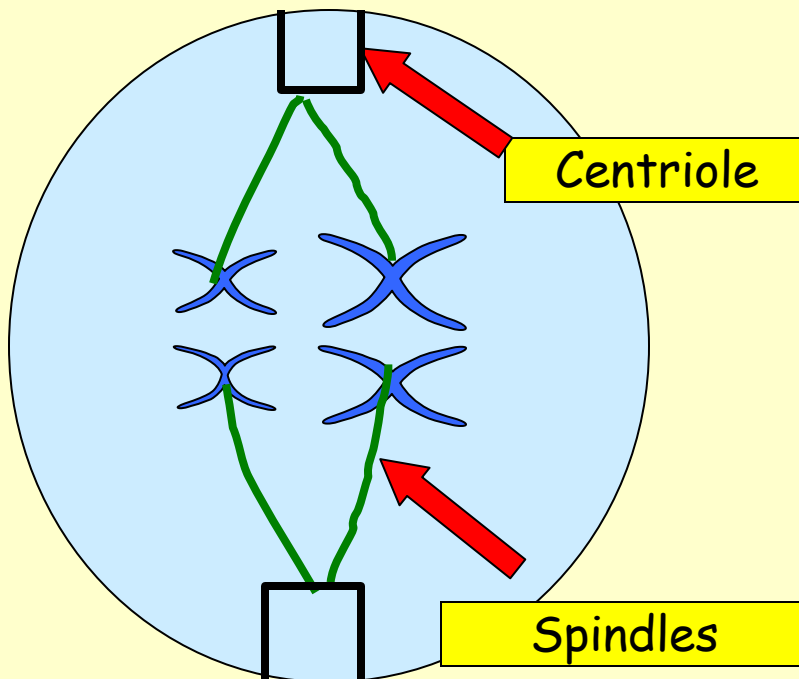
❖ Chromosomes pair up and start becoming visible

❖ *Crossing over* takes place

# The Phases of Meiosis I

## 3.) Metaphase I

Means "middle"



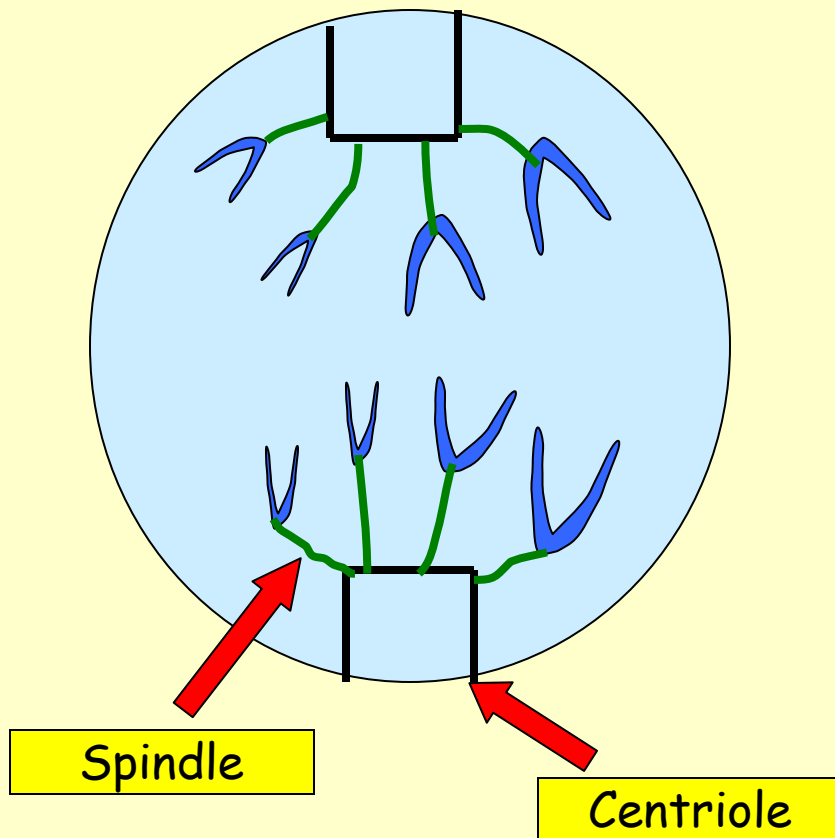
❖ Chromosomes line up side by side (horizontal) at the metaphase plate (equator)

# The Phases of Meiosis I

## 4.) Anaphase I

❖ Chromosomes split apart

❖ Sister chromatids move to opposite sides of centrioles (poles)

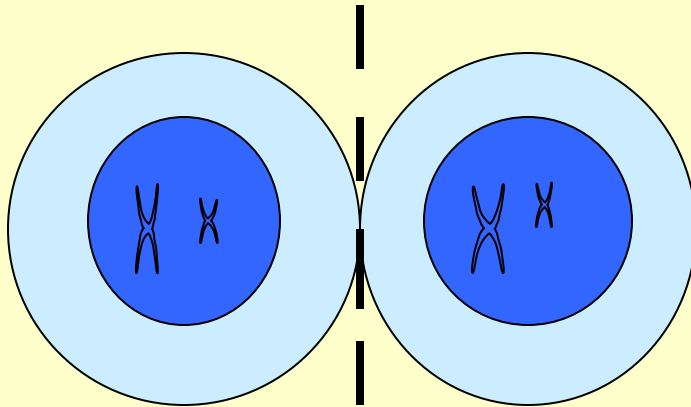




# The Phases of Meiosis I

## 5.) Telophase I

Two cells



❖ Through **cytokinesis**, the parent cell divides into **2 *diploid*** daughter cells ( $2n$ )

# The Phases of Meiosis II

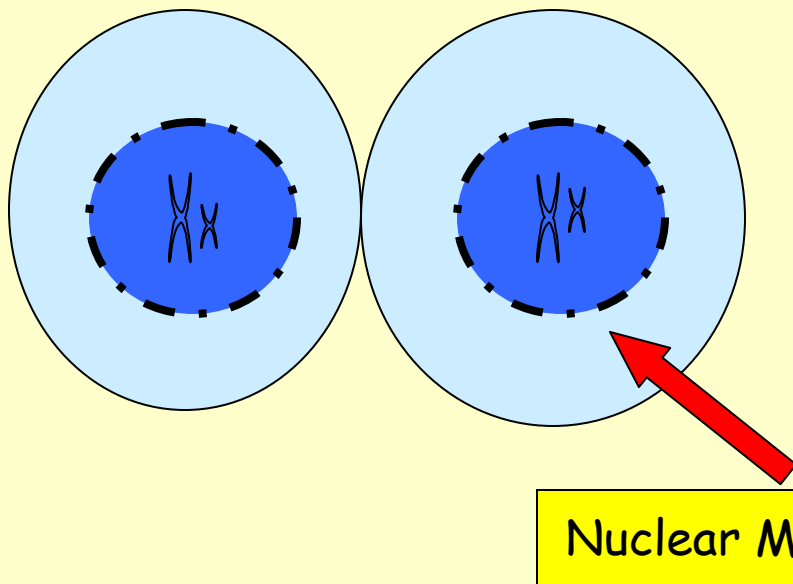
*NO Interphase II*

The text "NO Interphase II" is written in a large, yellow, cursive-style font with a thick outline. Below the text is a dark, shadowed version of the same text, creating a 3D effect. The background is a solid light blue.

# The Phases of Meiosis II

## 2.) Prophase II

❖ Nuclear membrane begins to break down



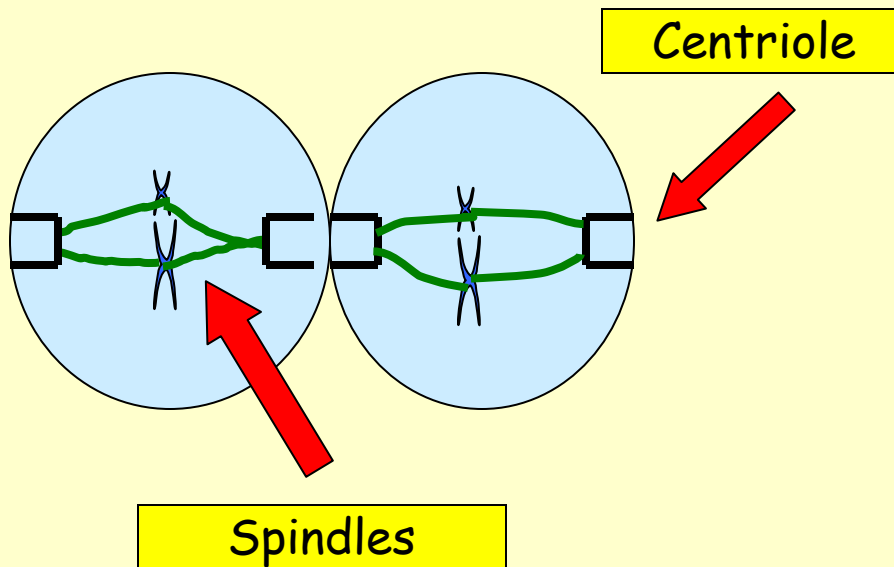
❖ Chromosomes pair up and start becoming visible

# The Phases of Meiosis II

## 3.) Metaphase II

Means "middle"

❖ Chromosomes line up vertically at the metaphase plate (equator)

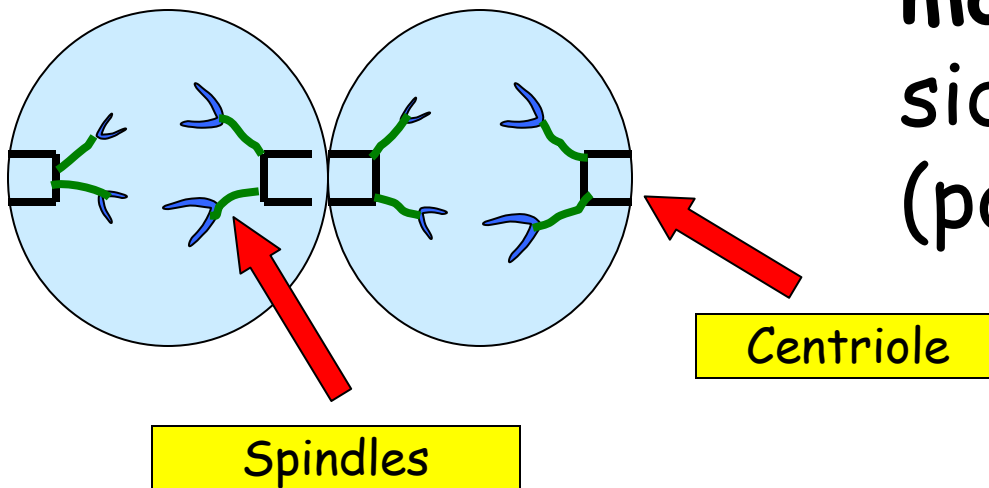


# The Phases of Meiosis II

## 4.) Anaphase II

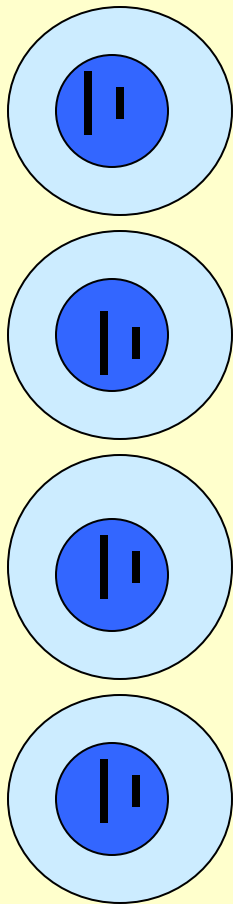
❖ Chromosomes split apart

❖ Sister chromatids move to opposite sides of centrioles (poles)



# The Phases of Meiosis II

## 5.) Telophase II



❖ Through **cytokinesis**, the cells divide into 4 *haploid* daughter cells (n)

🧠 Need to Understand

❖ *Crossing over* means any genetic variation that ONLY occurs in Prophase I of meiosis cell division.

# 🧠 Formula for Meiosis I & II

