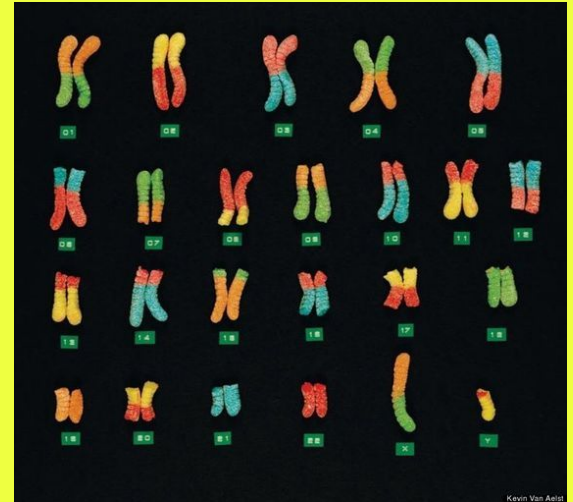
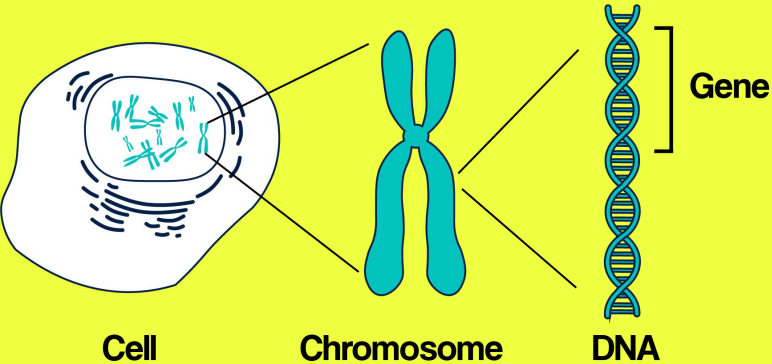

Intro to Genetics

— Ms. Rivera Spring 2020 —

Why do we look the way we do?

Why do we look the way we do?

Genetics!
























Mendelian Genetics



What he learned....

1. An individual's characteristics is determined by genes passed down from their parents.
2. If two different alleles are present, the dominant allele will determine the individual's traits while the recessive is not noticeable.
3. Alleles for a trait separate during gamete formation so that each gamete will have a copy of one allele.

Mendel's Seven F₁ Crosses on Pea Plants











	Seed Shape	Seed Color	Flower Color	Pod Shape	Pod Color	Flower Position	Plant Height
P	 Round X  Wrinkled	 Yellow X  Green	 Purple X  White	 Smooth X  Constricted	 Green X  Yellow	 Axial X  Terminal	 Tall X  Short
F ₁	 Round	 Yellow	 Purple	 Smooth	 Green	 Axial	 Tall

Vocabulary

Genes are a portion of DNA.

Alleles are forms of a single gene.

Traits are specific characteristics that are determined by your genes.

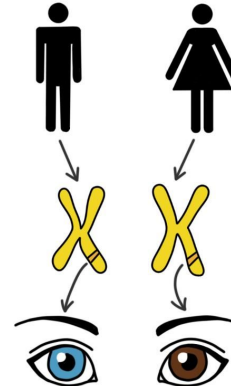
Gene	Alternative Alleles
 <i>Eye colour</i>	 <i>Brown</i>  <i>Blue</i>  <i>Emerald</i>  <i>Grey</i>
 <i>Hair colour</i>	 <i>Blonde</i>  <i>Red</i>  <i>Brown</i>  <i>Black</i>

humans get **2** copies of every gene, one copy from each parent

the 2 copies don't have to be identical

each variation of a gene is called an allele

For example:
if a gene contains information for eye color, one allele might code for blue eyes and another might code for brown eyes

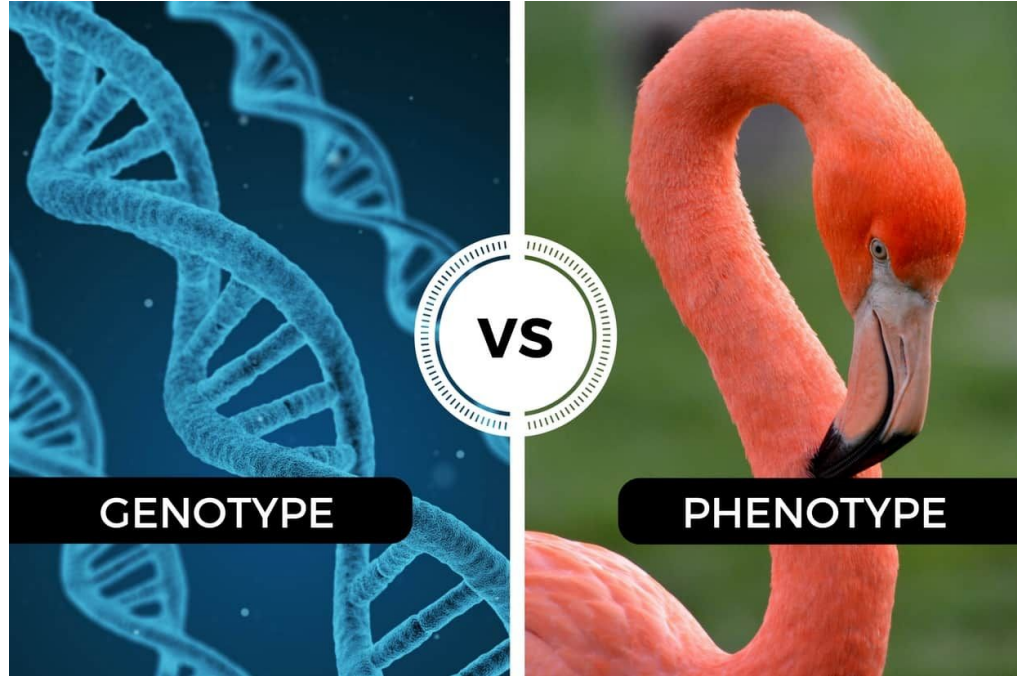


alleles create diversity

Vocabulary

Genotype - Genetic makeup of an individual

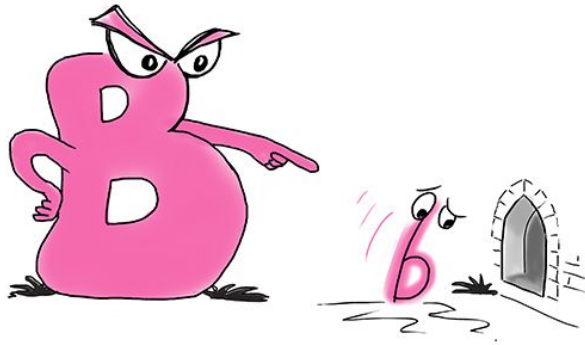
Phenotype - Physical Traits that are actually expressed



There's two types of alleles...

Dominant and Recessive

-Homozygous and
Heterozygous



Alleles of the eye color gene:

B Allele for brown eyes (dominant over the b allele)

b Allele for blue eyes (recessive to the B allele)

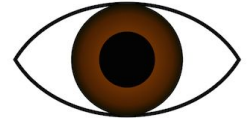
Possible genotypes:

Phenotypes:

BB Homozygous = brown eyes



Bb Heterozygous = brown eyes



bb Homozygous = blue eyes



Name the Genotype:

Gg

ZZ

ss

Choices: [Homozygous dominant, homozygous recessive, heterozygous]

D = Dimples, d = no dimples

A baby is born with the genotype **Dd**.

What is the genotype?

[Homozygous dominant, homozygous recessive, heterozygous]

What is the phenotype?

[Dimples, No dimples]

How can you predict the genotype and phenotype of an individual?

You can use Punnett Squares to find the probability of a genotype.

T = tall, t = short

Heterozygous Father (Tt)

Homozygous Recessive Mother (tt)

What genotypes and phenotypes can you expect from the offspring?

	T	t
t	Tt	tt
t	Tt	tt

You can even do Punnett Squares with Two Factors

T = tall, t = short

G = green, g = yellow

TtGg Father

TtGg Mother

In this case the parents can make 4 different types of gametes.

	TG	tG	Tg	tg
TG	TTGG	TtGG	TTGg	TtGg
tG	TtGG	ttGG	TtGg	ttGg
Tg	TTGg	TtGg	TTGg	Ttgg
tg	TtGg	ttGg	Ttgg	ttgg

Other Patterns of Inheritance

Incomplete Dominance





-When one allele is not completely dominant over the other

-Heterozygous will have an “in-between” phenotype



RR



	R	R
r	Rr 	Rr 
r	Rr 	Rr 

Codominance

-When both alleles are dominant

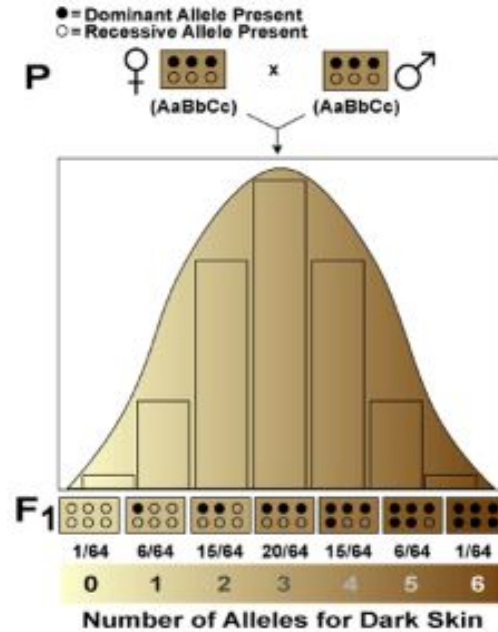
-Phenotype will have both traits



Polygenic Traits

-Traits that are not controlled by one gene but many.

Ex. skin color, height, and weight



Dept. Biol. Penn State ©2002



Activity

Fill out the table with your partner sitting next to you.

Answer the follow up questions with your whole table.

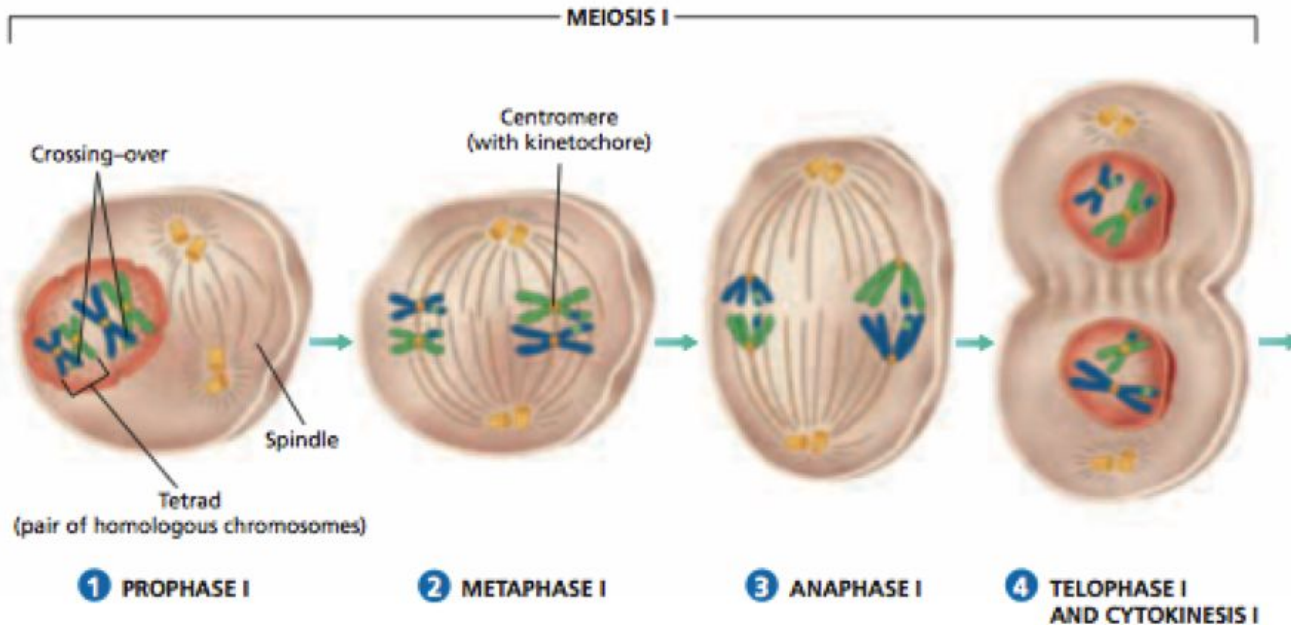
If you need help, raise your hand 😊



Meiosis



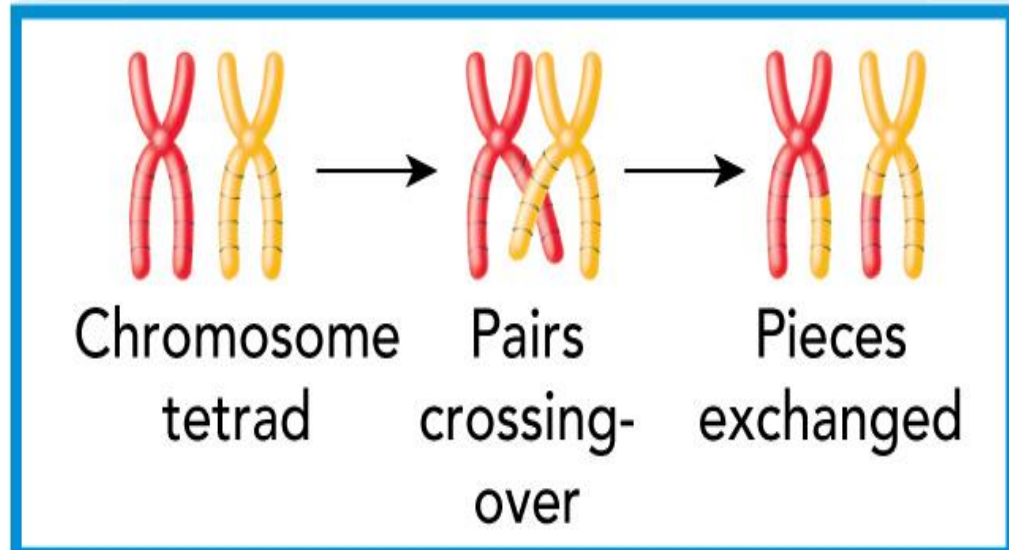
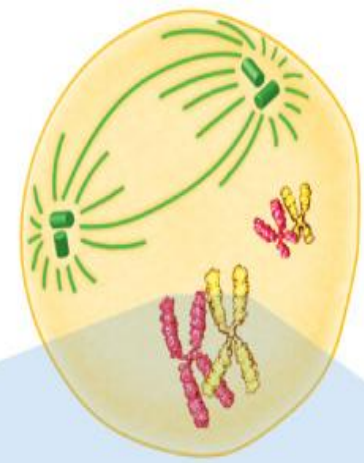
Meiosis I



Prophase I

Replicated chromosomes pair with homologous chromosomes to form a **tetrad**.

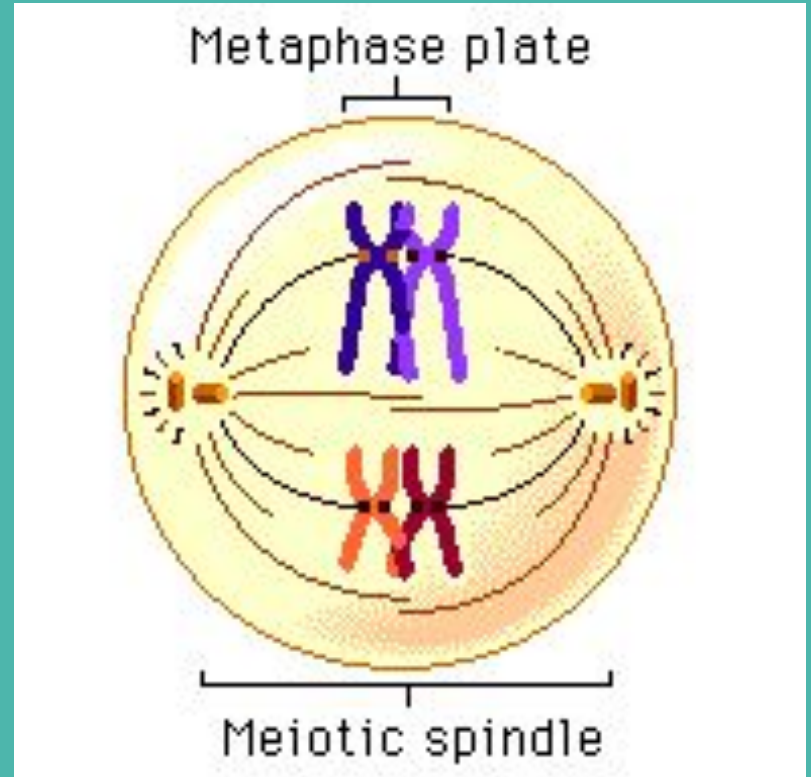
Crossing over occurs



Metaphase I

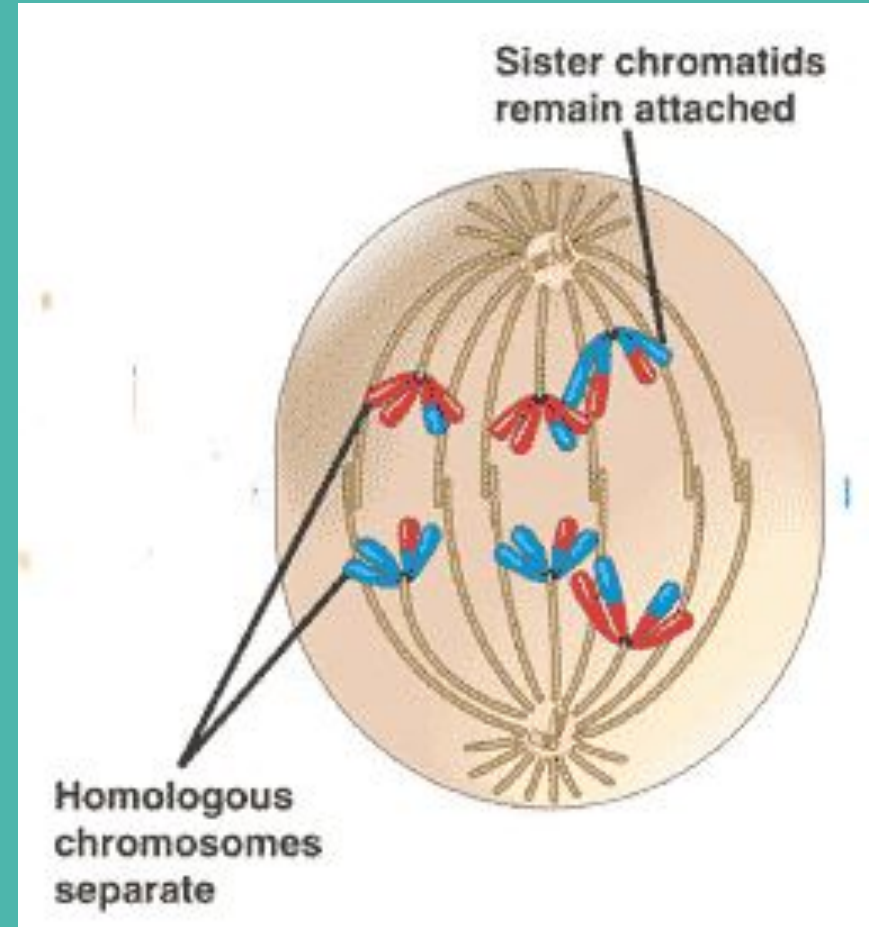
Spindle fibers attach to the center of the tetrad

Tetrads line up in the middle of the cell



Anaphase I

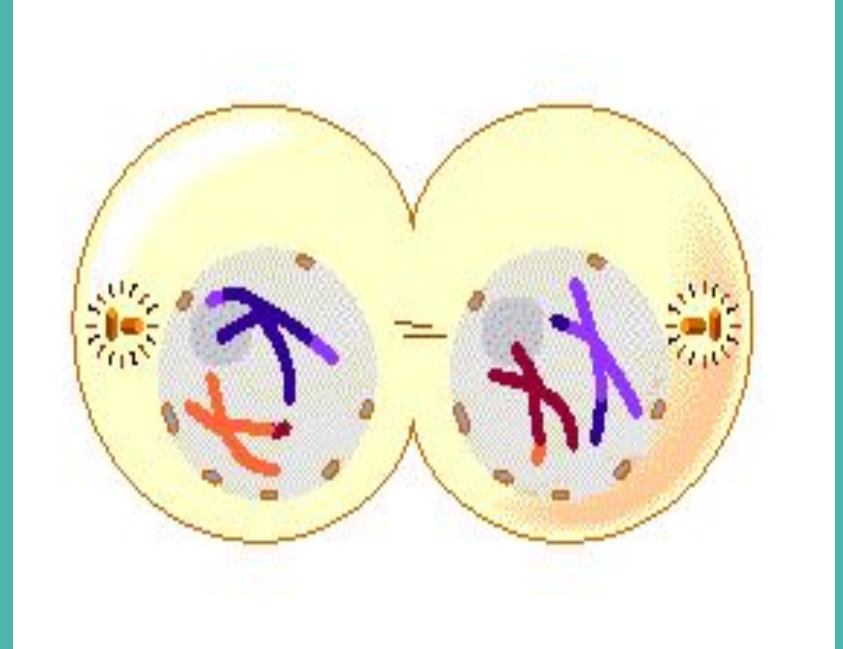
Spindle fibers pull apart each homologous chromosome



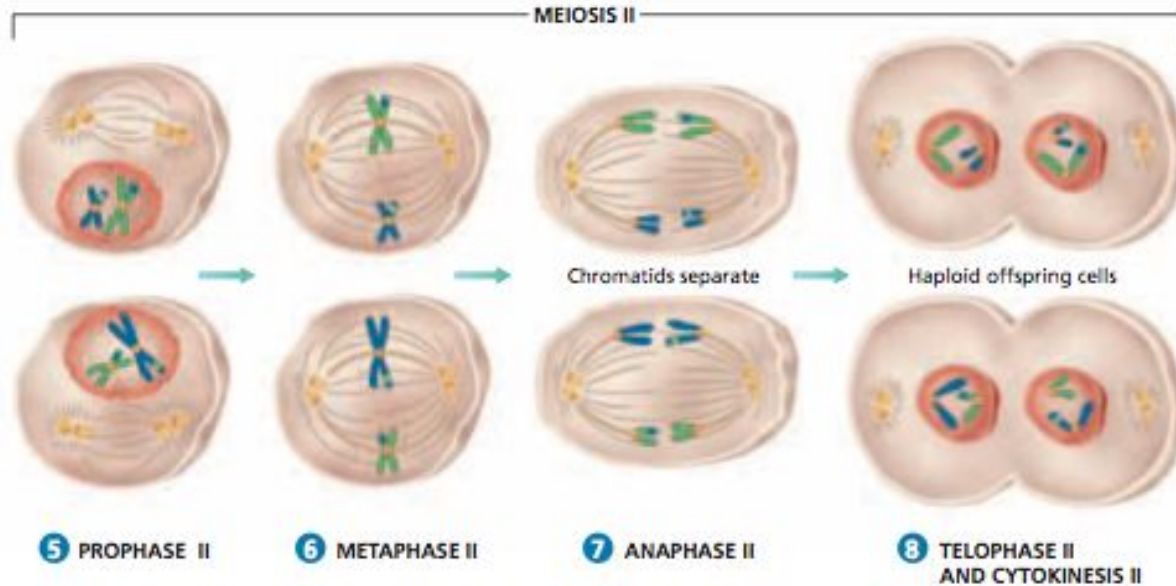
Telophase I & Cytokinesis

Nuclear membrane reforms around each cluster of chromosomes

In cytokinesis, two new cells are formed as the cytoplasm separates.



Meiosis II



Prophase II

Two cells produced in meiosis I
enter prophase II...

Nuclear envelope breaks down

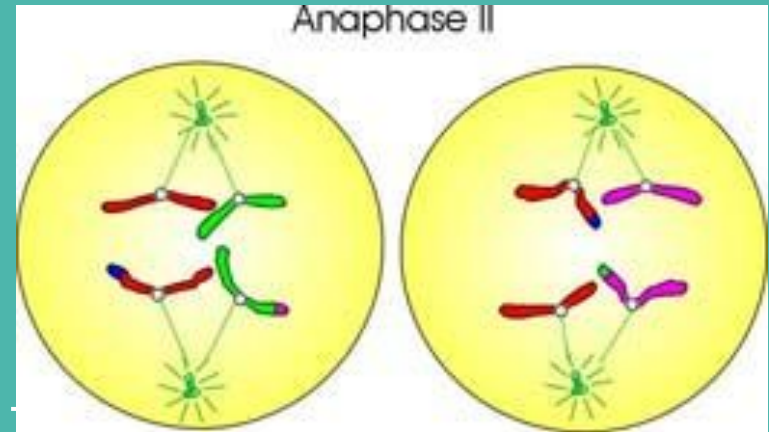
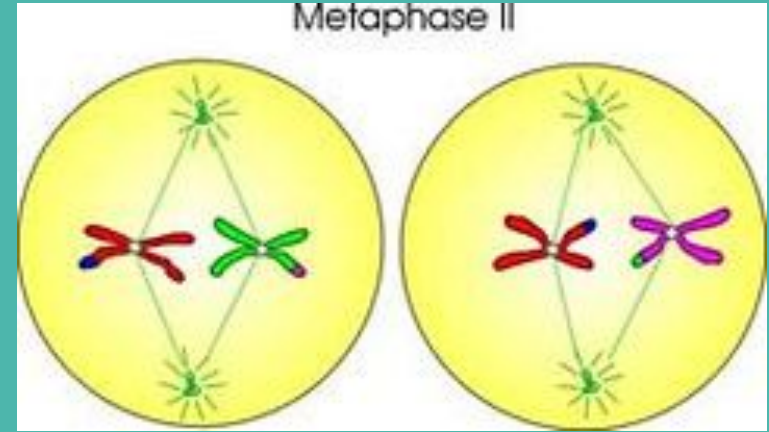
Chromosomes become visible



Metaphase II & Anaphase II

Metaphase II:
Chromosomes line up in the center

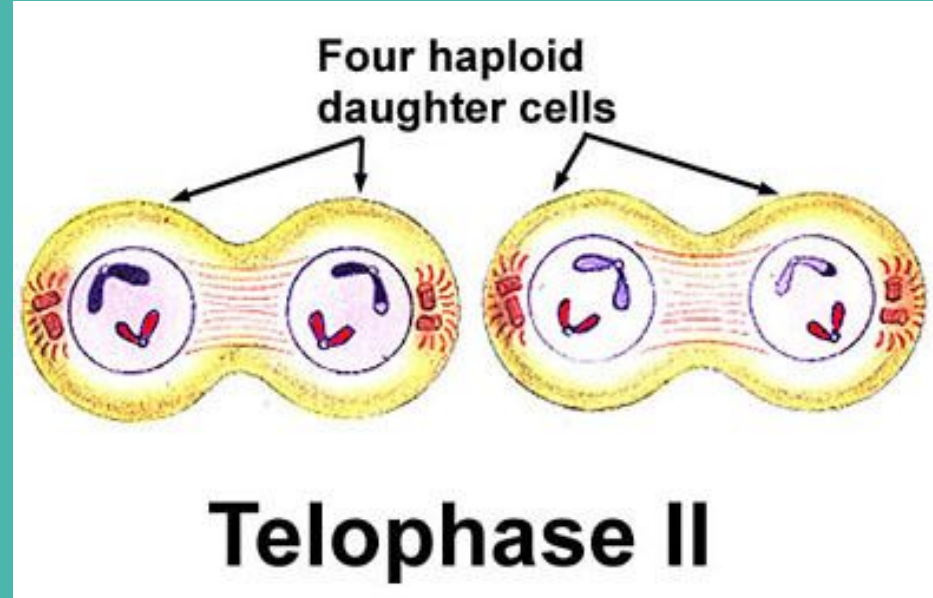
Anaphase II: Paired chromatids
are pulled apart by spindle
fibers



Telophase II & Cytokinesis

Telophase II: Nuclear membrane reforms

Cytokinesis: four haploid cells are formed as the cytoplasm separates.



Activities:

Activity 1:

Compare and contrast
Mitosis and Meiosis
with your group.

Activity 2:

Model the whole
process of Meiosis with
your group.