Engage: Comparing Mitosis and Meiosis Card Sort

INSTRUCTOR:
no_reply@example.com

Objective

The goal of this activity is to understand and compare the stages of mitosis and meiosis. By sorting the cards and discussing them, you will learn how these two processes are similar and different, and why these differences are important.

Instructions

1. **Sort the Cards**
    - In your group, sort the cards into two categories: Mitosis and Meiosis.
    - Arrange each set in the correct order of stages or concepts.
2. **Answer the Guiding Questions**
    - For each card, use the guiding questions to help you understand the key features and differences.
3. **Share Observations**
    - After sorting, discuss with your group how the stages of mitosis and meiosis are similar or different.
    - Use the sentence frames provided to guide your feedback.

Mitosis Cards

Card	Guiding Question	Sentence Frames for Feedback
Interphase (Preparation)	What happens to the cell before it starts dividing?	*"During Interphase, the cell prepares by _____."*
		"Interphase is important because _____."
G1 Phase	What does the cell do during the G1 phase?	*"In the G1 Phase, the cell _____."*
		"The G1 Phase is crucial because _____."

Name: _____ Date: _____

S Phase	What is the main event during the S Phase?	*"During the S Phase, the cell _____."*
		"The S Phase is important for _____."
G2 Phase	How does the G2 Phase prepare the cell for mitosis?	*"In the G2 Phase, the cell _____."*
		"The G2 Phase helps the cell by _____."
G1 Checkpoint	Why is the G1 checkpoint important for the cell?	*"The G1 Checkpoint checks for _____."*
		"The G1 Checkpoint is important because _____."
Prophase	What happens to the chromosomes during Prophase?	*"During Prophase, the chromosomes _____."*
		"Prophase is important because _____."
Metaphase	How do the chromosomes line up during Metaphase?	*"In Metaphase, the chromosomes _____."*
		"Metaphase ensures that _____."
Metaphase Checkpoint	What does the Metaphase Checkpoint check for?	*"The Metaphase Checkpoint makes sure that _____."*
		"The Metaphase Checkpoint is crucial for _____."
Anaphase	What happens to the sister chromatids during Anaphase?	*"During Anaphase, the sister chromatids _____."*
		"Anaphase is important because _____."
Telophase	What occurs during Telophase to complete mitosis?	*"In Telophase, the cell _____."*
		"Telophase is significant because _____."
Cytokinesis (Animal Cell)	How does Cytokinesis occur in animal cells?	*"Cytokinesis in animal cells involves _____."*
		"This process is important because _____."
Cytokinesis (Plant Cell)	How is Cytokinesis different in plant cells compared to animal cells?	*"In plant cells, Cytokinesis involves _____."*
		"This difference is important because _____."
Overall Process of Mitosis	What are the main stages of mitosis?	*"Mitosis includes the stages of _____."*
		"The process of mitosis is important because _____."

Name: _____ Date: _____

GO - Cell Arrest	What does it mean when a cell is in cell arrest?	*"Cell arrest means the cell _____."*
		"Cell arrest can happen because _____."
Apoptosis	Why might a cell undergo apoptosis?	*"Apoptosis happens when a cell _____."*
		"This process is important because _____."

Meiosis Cards

Card	Guiding Question	Sentence Frames for Feedback
Interphase (Preparation)	What happens to the cell during Interphase before meiosis starts?	"In Interphase before meiosis, the cell _____."
		"This preparation is crucial for _____."
G1 Phase	What does the cell do during the G1 phase in meiosis?	"During the G1 Phase of meiosis, the cell _____."
		"This phase is important because _____."
S Phase	How does the S Phase contribute to meiosis?	"In the S Phase of meiosis, the cell _____."
		"This phase is important for _____."
G2 Phase	How does the G2 Phase prepare the cell for meiosis?	"In the G2 Phase, the cell _____."
		"The G2 Phase helps the cell by _____."
G1 Checkpoint	What does the G1 checkpoint check for in meiosis?	"The G1 Checkpoint in meiosis checks for _____."
		"It is important because _____."
Prophase I	What happens during Prophase I in meiosis?	"During Prophase I, the cell _____."
		"This stage is important because _____."
Metaphase I	How do chromosomes align during Metaphase I?	"In Metaphase I, chromosomes _____."
		"This alignment is crucial for _____."
Anaphase I	What occurs to homologous chromosomes during Anaphase I?	"During Anaphase I, homologous chromosomes _____."
		"This separation is important because _____."
Telophase I	What happens during Telophase I in meiosis?	"In Telophase I, the cell _____."
		"This stage is significant because _____."
Prophase II	What happens during Prophase II of meiosis?	"During Prophase II, the cell _____."
		"Prophase II is important because _____."

Name: _____ Date: _____

Metaphase II	How do chromosomes line up during Metaphase II?	"In Metaphase II, chromosomes _____."
		"This arrangement is important for _____."
Anaphase II	What happens to sister chromatids during Anaphase II?	"During Anaphase II, sister chromatids _____."
		"This separation is crucial because _____."
Telophase II and Cytokinesis	What are the results of Telophase II and Cytokinesis?	"In Telophase II and Cytokinesis, the cell _____."
		"These stages are important because _____."
Independent Assortment	What does Independent Assortment mean for genetic diversity?	"Independent Assortment means that _____."
		"It increases genetic diversity by _____."

Reflection

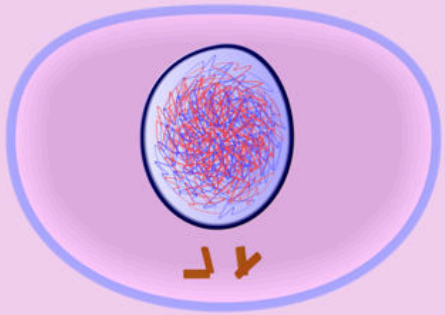
After completing the activity, reflect on your learning:

1. **Compare Mitosis and Meiosis:**
   - How are the stages of mitosis and meiosis similar?
   - How are they different?
2. **Importance of Differences:**
   - Why are the differences between mitosis and meiosis important for living organisms?
3. **Understanding the Process:**
   - What did you find most interesting about mitosis and meiosis?
   - How do these processes affect genetic diversity?

Sen*tence Frames for Reflection*:

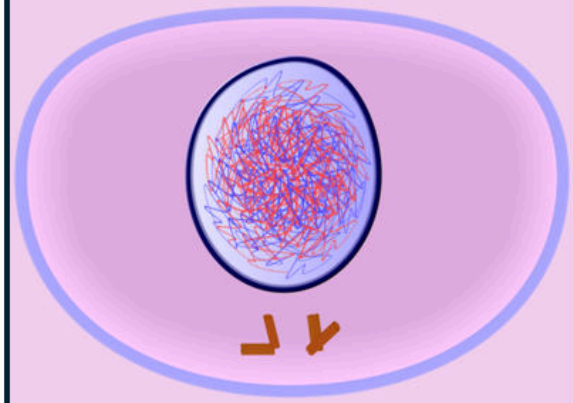
- *"Mitosis and meiosis are similar because _____ and different because _____."*
- *"The differences between mitosis and meiosis are important because _____."*
- *"I found it interesting that _____."*
- *"These processes affect genetic diversity by _____*

Name: _____ Date: _____



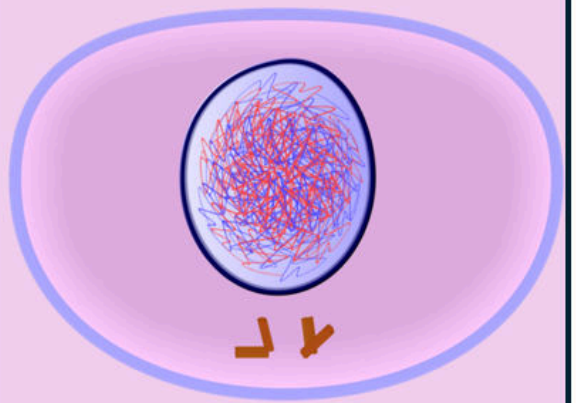
The cell prepares for division by duplicating its DNA and organelles. Chromosomes are not yet visible."

I

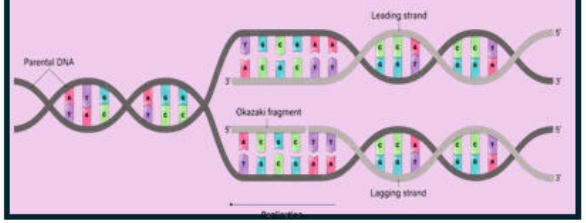


The cell grows and performs normal functions. It also prepares for DNA replication.

G1



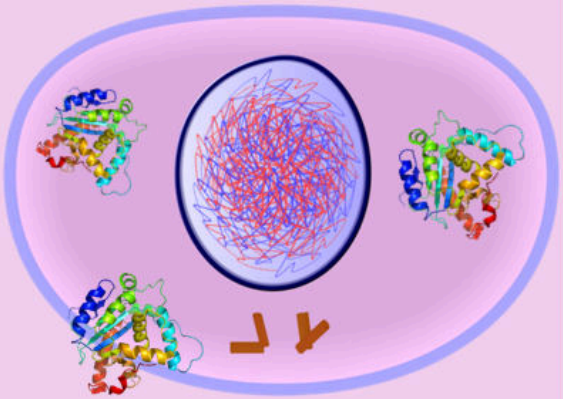
DNA Replication



DNA replication occurs, resulting in two identical sets of chromosomes.

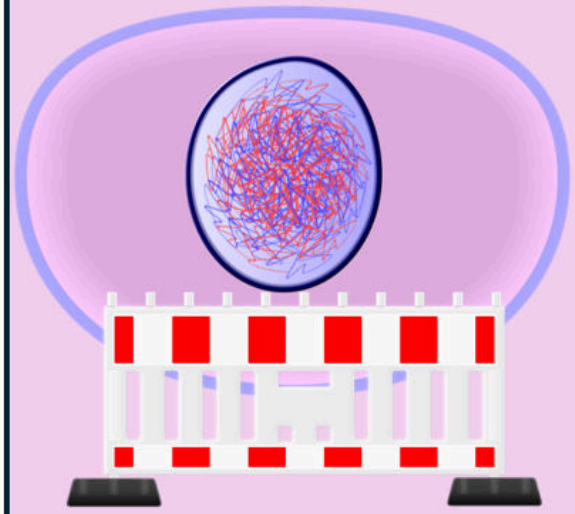
S

Name: _____ Date: _____



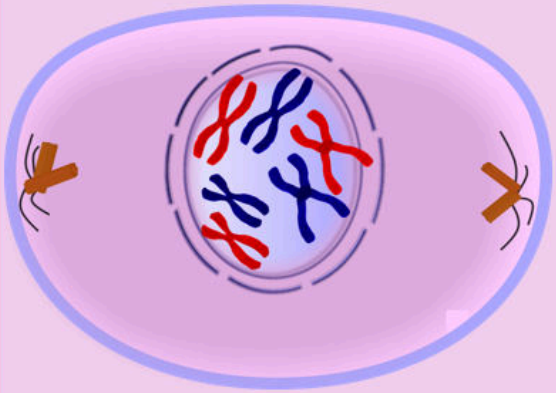
The cell continues to grow and prepare for mitosis, checking for DNA replication errors and makes proteins.

G2



The cell checks for DNA damage and ensures it is ready to proceed to DNA replication. If conditions are not favorable, the cell may enter a resting state.

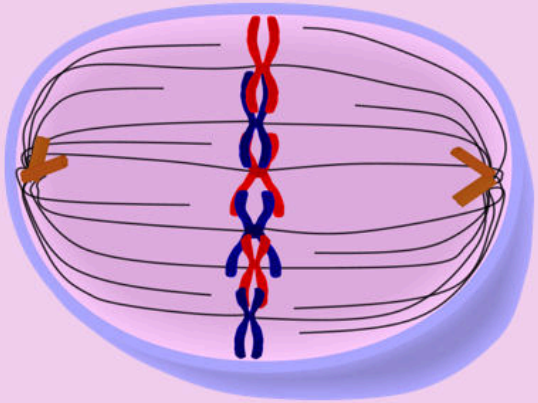
G2✓



Chromosomes condense and become visible. The nuclear membrane begins to break down, and spindle fibers start to form

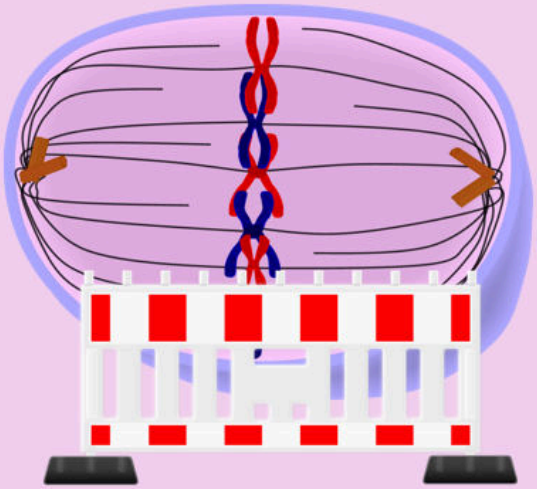
P

Name: _____ Date: _____



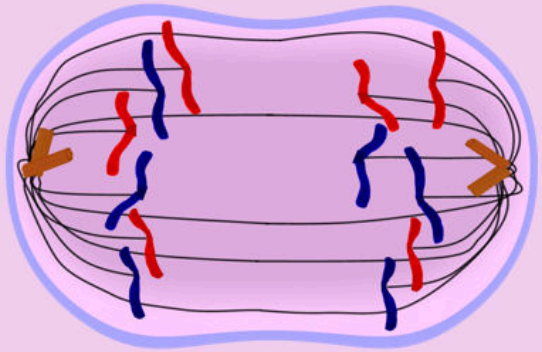
Chromosomes line up along the **middle** of the cell. Spindle fibers attach to the centromeres of the chromosomes

M



The cell checks that all chromosomes are properly attached to spindle fibers and aligned before proceeding to anaphase

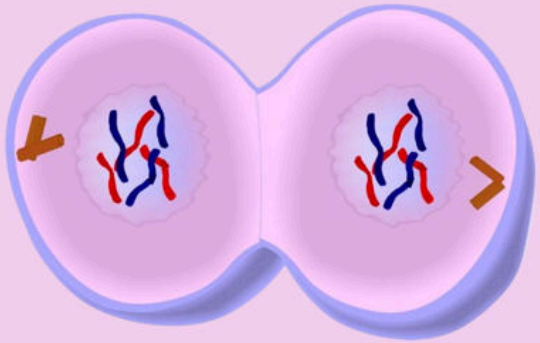
M✓



Sister chromatids are pulled **apart** by the spindle fibers towards opposite sides of the cell.

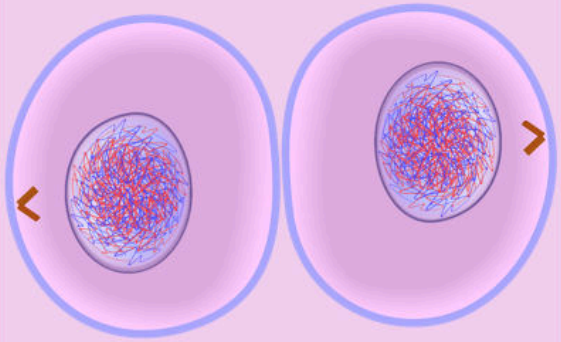
A

Name: _____ Date: _____



Chromosomes reach the poles and start to de-condense. Nuclear membranes reform around each set of chromosomes – **Animal** : Cleavage Furrow / **Plant**: Cell Plate

T



The cell membrane pinches inwards to divide the cell into two daughter cells, each with a full set of chromosomes.

C

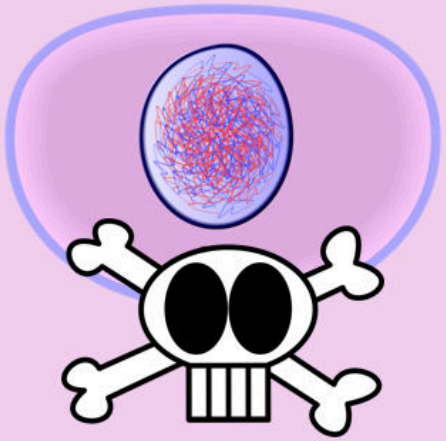
The cell is in a resting phase, not actively dividing. This can occur due to unfavorable conditions or cellular damage.

G0

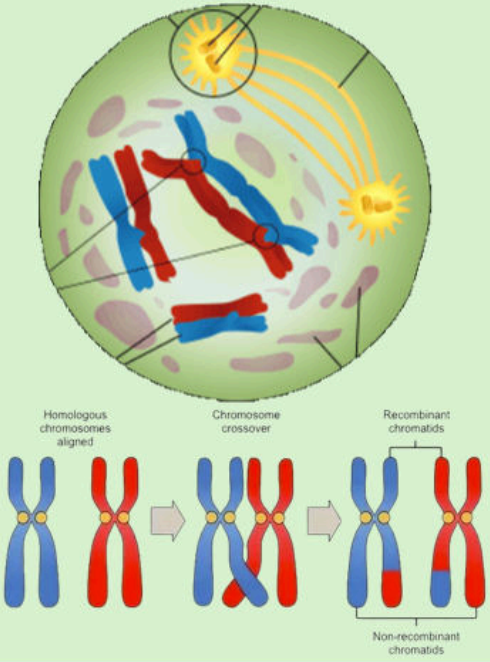
Name: _____ Date: _____

Programmed cell death, or apoptosis, occurs when a cell is damaged beyond repair or is no longer needed.

A-Pop



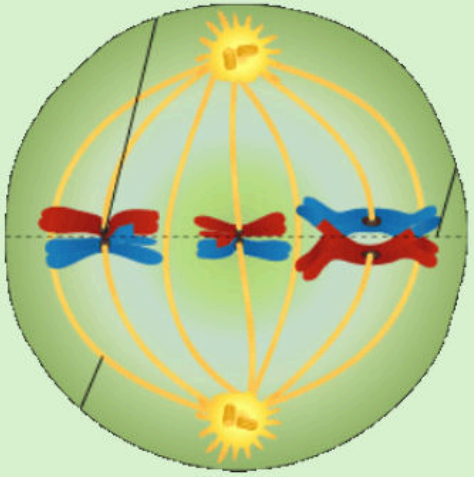
Interphase of Meiosis consists of the same 3 phases in Mitosis: G_1, S, and G_2 – nothing changes. Cell is Diploid.



Homologous chromosomes pair up and exchange genetic material through <u>crossing over</u>. The nuclear membrane breaks down, and spindle fibers start to form.

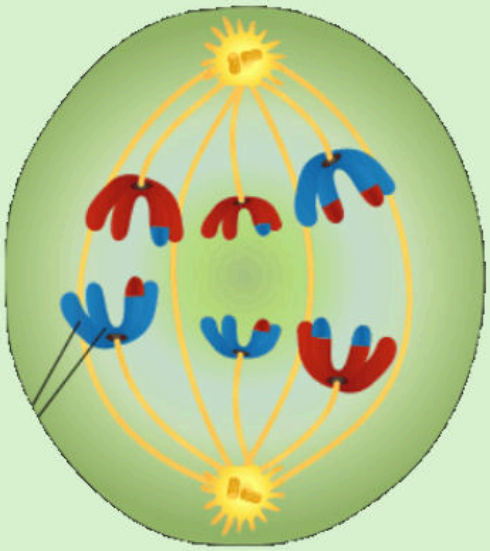
P_1

Name: _____ Date: _____



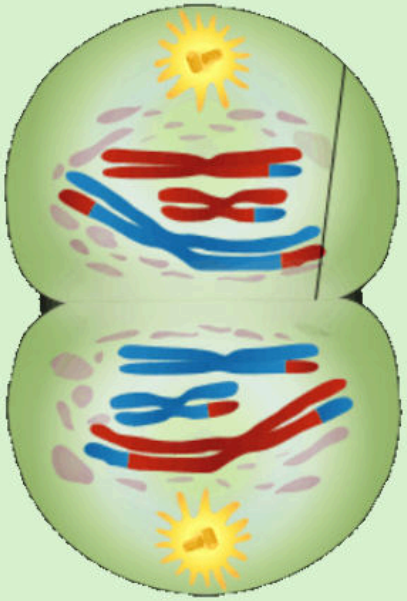
Homologous chromosome pairs line up along the center of the cell. Spindle fibers attach to the centromeres of each chromosome.

M1



Homologous chromosomes are separated and pulled towards opposite poles of the cell.

A1



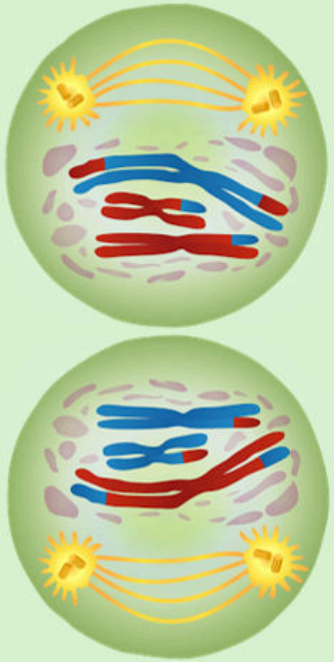
Chromosomes reach the poles, and the cell begins to divide. Nuclear membranes may reform briefly. Cell is now Haploid

T1

Name: _____ Date: _____

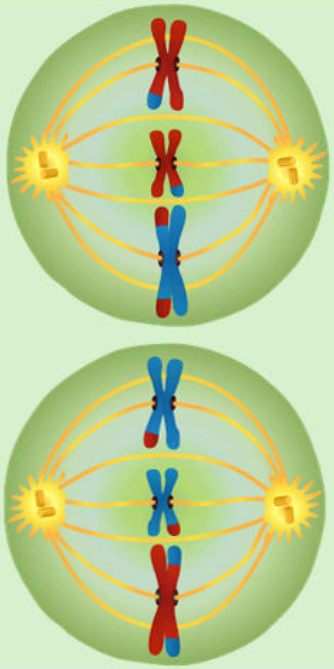
Chromosomes condense again, and spindle fibers form in each of the two daughter cells from Meiosis I.

P2



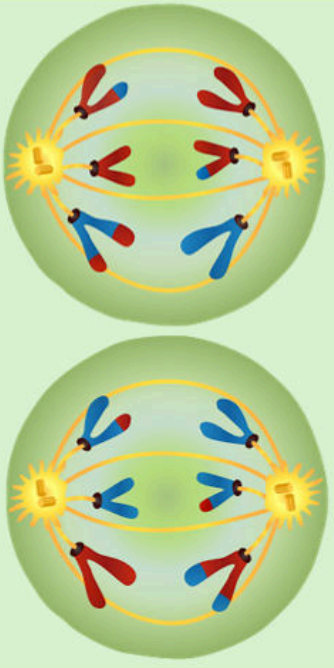
Chromosomes line up along the center of each cell. Spindle fibers attach to the centromeres

M2



Sister chromatids are pulled apart towards opposite poles in each of the two cells.

A2



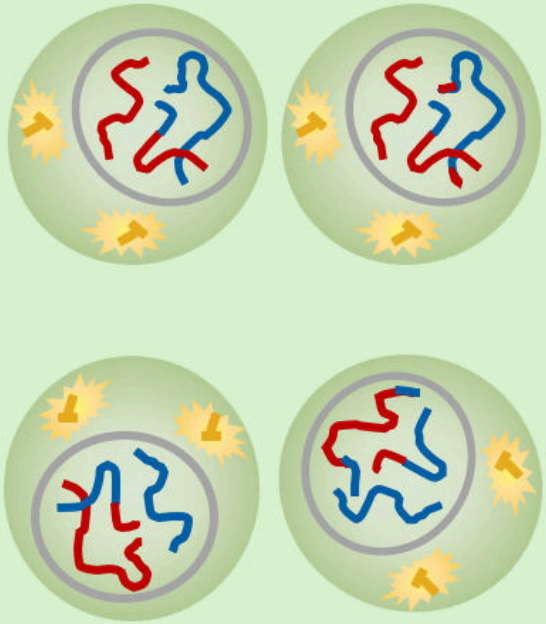
Name: _____ Date: _____

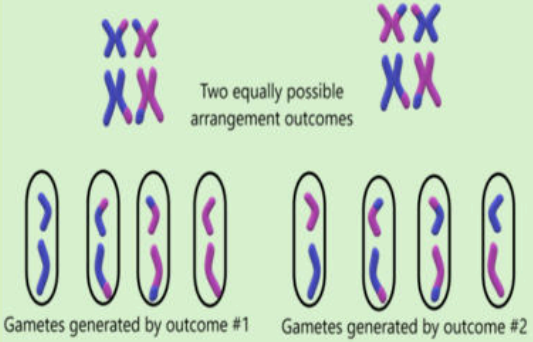
Chromosomes reach the poles, and nuclear membranes reform.

T2

The cells divide, resulting in four unique haploid daughter cells. Sperm or egg = Gametes

C





During Metaphase I of meiosis, homologous chromosome pairs align independently. This random arrangement leads to genetic diversity in the resulting gametes