

Name:

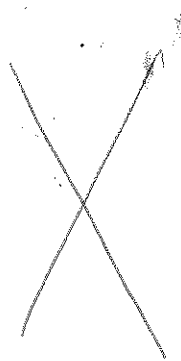
KEM

Date:

Mitosis vs. Meiosis

Review the processes of mitosis and meiosis, then fill in the charts below. Keep in mind that the stages of cell division were first recognized from examinations of fixed slides of tissues undergoing division. On fixed slides, cells are captured or frozen at particular points in the division cycle. Using these static slides, early microscopists identified specific arrangements or patterns of chromosomes that occurred at various stages of the cycle and gave these stages names (e.g. interphase, anaphase, etc.). Later work using time-lapse photography made it clear that mitosis and meiosis are continuous processes. Once division begins, the chromosomes move fluidly from one phase to the next.

1. What events occur during each phase of mitosis and meiosis?

	Interphase	Prophase	Metaphase	Anaphase	Telophase & Cytokinesis
Mitosis (Somatic) body cells	ex: G ₁ - Cell Growth 2 Protein Synthesis S- DNA Duplication G ₂ - Cell Growth, Proofreading.	nuclear membrane disappears chromosomes condense	ex: Duplicated chromosomes, each with two sister chromatids line up independently on the metaphase plate.	chromatids pull apart	2 new identical diploid (2n) cells *
Meiosis I sex cells (gametes) - gonads - egg + sperm	// //	nuclear membrane disappears chromosomes condense crossing over (synapsis)	homologous chromosomes line up in pairs X X X X	homologs pull apart apart	two unique cells each have 2n
Meiosis II similar stages to mitosis			sister chromatids line up	chromatids pull apart	4 new unique sex cells (n)

2. Fill in the chart to summarize the major similarities and differences in the two types of cell division (mitosis vs. meiosis). For example: For the similarities, include the event(s) that always happen in prophase, no matter which of the cell division cycles you're describing.

	Interphase	Prophase	Metaphase	Anaphase	Telophase
a. What similarities do you see?	(G ₁) protein synthesis DNA(S) replication	nuclear membrane disappears	Centrioles - spindle fibers	- pull apart	Nuclear membrane reappears
b. What differences do you see?		*homologs pair up <u>only</u> in meiosis *crossing over <u>only</u> occurs in meiosis	*the way they line up is different	*Meiosis I Pull apart different	*Produce different types of cells

c. If the amount of DNA in a somatic cell equals X during G₁ of interphase, how much DNA is present in the cell during each of the phases of mitosis and meiosis?

Amount of DNA in:	Interphase	Prophase	Metaphase	Anaphase	Telophase
Mitosis					
Meiosis I					
Meiosis II					

d. How do the similarities in prophase of mitosis and meiosis compare to the similarities in telophase of mitosis and meiosis?

↳ the only difference is the event of crossing over and the pairing of homologs in meiosis

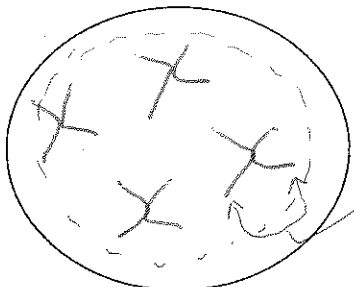
e. At what stage(s) does/do most of the differences among mitosis, meiosis I and meiosis II occur? For what reasons do these differences exist?

mitosis and meiosis I have the most differences b/c meiosis needs to create genetically unique cells that have half the # of chromosomes

LEM

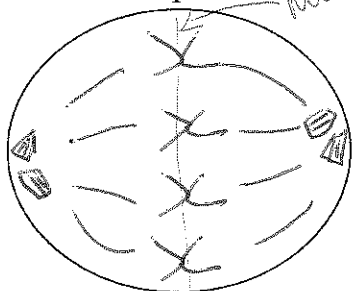
Mitosis

Prophase



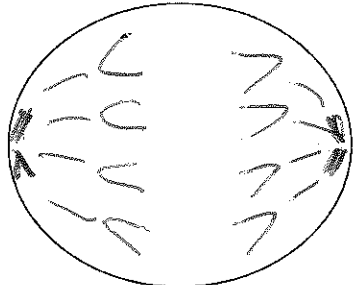
Sister Chromatids

Metaphase

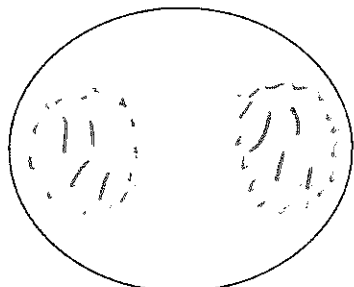


Metaphase plate "center"

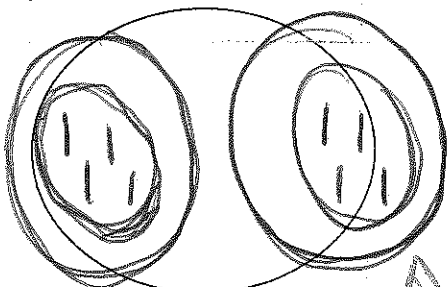
Anaphase



Telophase



Cytokinesis



2n *2n*

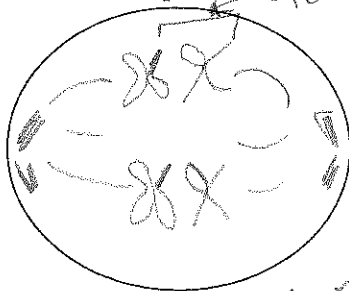
Meiosis I

Prophase I



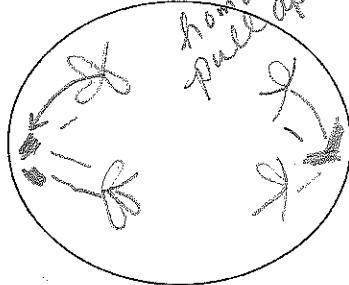
chiasma (where crossing over occurs)

Metaphase I



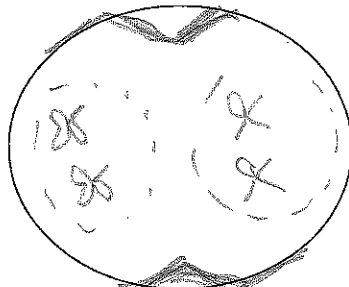
Tetrads

Anaphase I

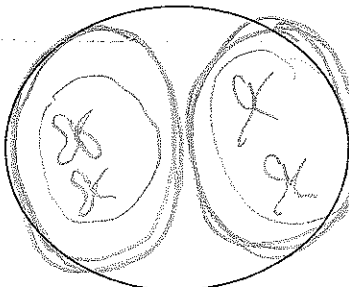


homologs pull apart

Telophase I

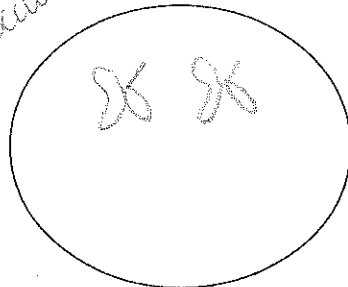


Cytokinesis

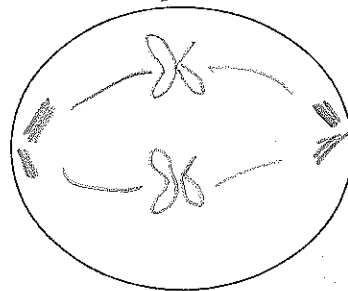


Meiosis II

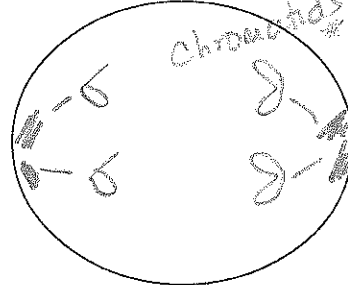
Prophase II



Metaphase II

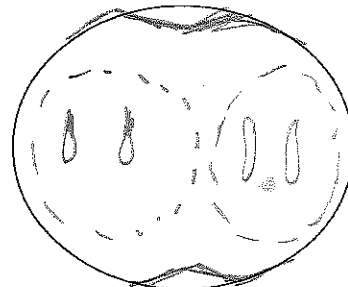


Anaphase II

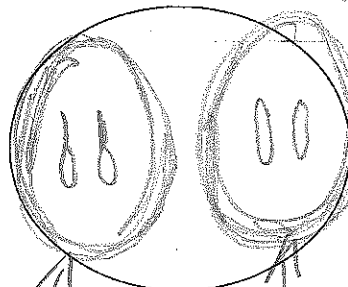


chromatids pull apart

Telophase II



Cytokinesis



n *n*

KEY

Mitosis Verses Meiosis

Directions: Write answers next to the question. Draw pictures on the back of this page, in order.

1. Describe the purpose of mitosis more identical daughter cells for growth
repair or
asexual
reproduction
2. How many times does the cell divide during mitosis? 1
3. What kind of cells are produced at the end of mitosis? identical daughter cells
- X 4. What are sister chromatids? Copies of chromosome attached at centromere
5. Briefly describe what happens during prophase nuclear envelope disappears; chromosomes condense
6. Draw and label picture of what a cell looks like during prophase. Draw on the back of page.
7. Briefly describe what happens during metaphase line up on metaphase plate
8. Draw and label a picture of what a cell looks like during metaphase. Draw on the back of page.
9. Briefly describe what happens during anaphase chromatids pull apart
10. Draw and label a picture of what a cell looks like during anaphase. Draw on the back of page.
11. Briefly describe what happens during telophase Nuclear membrane reappears
12. Draw and label a picture of what a cell looks like during telophase. Draw on the back of page.
13. Is cytokinesis part of mitosis no; event that occurs after
14. Briefly describe what happens during cytokinesis 2 new cells form
15. Draw a picture of what a cell looks like during cytokinesis. Draw on the back of page.
16. Describe the purpose of meiosis to make unique haploid sex cells (gametes)
17. How many times does the cell divide during Meiosis? 2
18. What kind of cells are produced at the end of meiosis? gametes (n)
19. Briefly describe the difference of prophase I & II. prophase I - crossing over occurs
20. Draw and label a picture of prophase I & II. Draw on the back of page.
21. Briefly describe the difference of metaphase I & II. line up in homologous pairs / sister chromatids line up
22. Draw and label a picture of metaphase I & II. Draw on the back of page.
23. Briefly describe the difference of anaphase I & II. homologs pull apart / chromatids pull apart
24. Draw and label a picture of anaphase I & II. Draw on the back of page.
25. Briefly describe the difference of telophase I & II. one cell divides / division of 2 cells
26. Draw and label a picture of telophase I & II. Draw on the back of page.
27. What would happen to cell division if a chemical was put in the cell that did not allow for cell division to occur?

— the cell couldn't divide so the organism couldn't grow, repair, or reproduce asexually