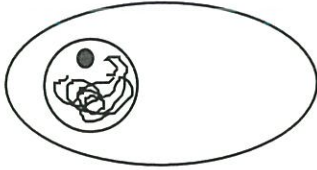


Key - Mitosis Review Packet

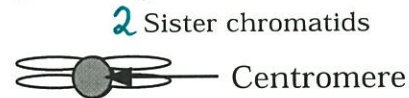
Mitosis Notes

Cell division occurs in a series of stages, or phases.

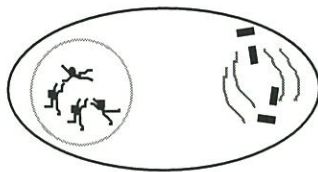
1st: INTERPHASE



- Chromosomes are copied
- Chromosomes appear as threadlike coils (chromatin) at the start, but each chromosome and its copy (sister chromosome) change to sister chromatids at end of this phase

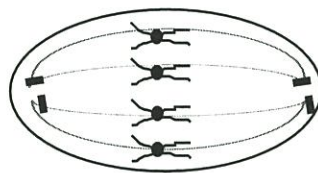


2nd: PROPHASE



- Mitosis begins (cell begins to divide)
- Centrioles (or poles) appear and begin to move to opposite ends of cell
- Spindle fibers form between the poles
- Chromatin coils to "chromosomes"
- Nuclear membrane & nucleolus disappear

3rd: METAPHASE

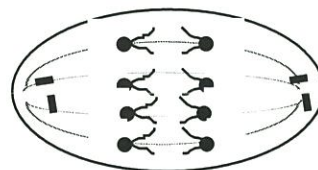


- Chromatids (or pairs of chromosomes) attach to the spindle fibers

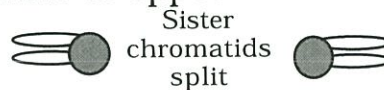


- Centromeres line up on the equator

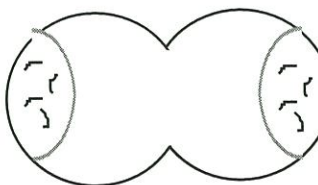
4th: ANAPHASE



- Chromatids (or pairs of chromosomes) separate and begin to move to opposite ends of the cell

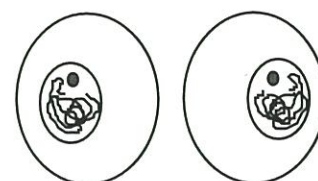


5th: TELOPHASE



- Two new nuclei form
- Chromosomes appear as chromatin (threads rather than rods)
- Mitosis ends

6th: CYTOKINESIS



- Cell membrane moves inward to create two daughter cells - each with its own nucleus with identical chromosomes

- Cleavage furrow completely "pinches" cell in half
- 2 daughter cells with identical DNA content as the original parent cell

MITOSIS WORKSHEET

Name: _____

Matching: match the term to the description (drag/drop or write the letter)

A. Prophase B. Interphase C. Telophase D. Metaphase E. Anaphase

- E 1. The sister chromatids are moving apart.
- A 2. The nucleolus begins to fade from view.
- C 3. A new nuclear membrane is forming around the chromosomes.
- C 4. The cytoplasm of the cell is being divided.
- C/B 5. The chromosomes become invisible.
- D 6. The chromosomes are located at the equator of the cell.
- A 7. The nuclear membrane begins to fade from view.
- C/B 8. The division (cleavage) furrow appears.
- E 9. The chromosomes are moving towards the poles of the cell.
- D 10. Chromatids line up along the equator.
- A 11. The spindle is formed.
- B 12. Chromosomes are not visible.
- B 13. Cytokinesis is completed. (END TELOPHASE)
- B 14. The cell plate is completed. (END TELOPHASE)
- B 15. Chromosomes are replicated.
- C 16. The reverse of prophase.
- B/A 17. The organization phase.

Fill in the blank: (drag/drop or write the word) Some will be used more than once.

A. Prophase

D. Metaphase

G. Chromatid

J. Spindle fiber

B. Interphase

E. Anaphase

H. Cytokinesis

K. Cell Plate

C. Telophase

F. Centromere

I. Mitosis

B

18. What phase are daughter cells in as a result of mitosis?

E

19. During what phase of mitosis do centromeres divide and the chromosomes move toward their respective poles?

A

20. What is the phase where chromatin condenses to form chromosomes?

F

21. What is the name of the structure that connects the two chromatids?

G

22. In a chromosome pair connected by a centromere, what is each individual chromosome called?

I

23. What are the two parts of cell division?

H

J

24. What structure forms in prophase along which the chromosomes move?

D

25. Which phase of mitosis is the last phase that chromatids are together?

B

26. Which phase of the cell cycle is characterized by a non-dividing cell?

J

27. What structure is produced when protein fibers radiate from centrioles?

K

28. What forms across the center of a cell near the end of telophase?

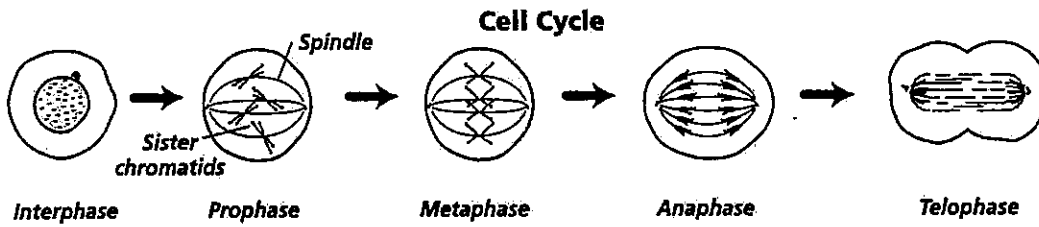
B

29. The period of cell growth and development between mitotic divisions?

C

30. What is the phase where cytokinesis occurs?

Mitosis Worksheet & Diagram Identification

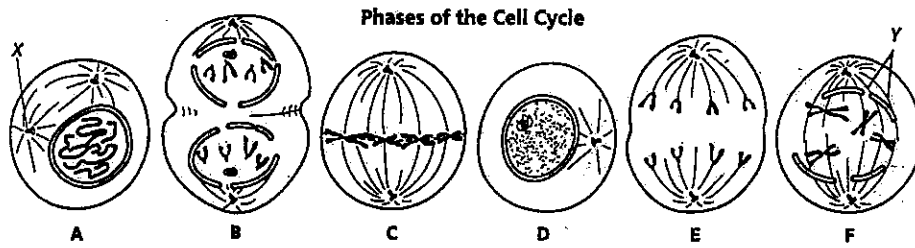


1. Chromosomes move to the middle of the spindle during what phase? prophase → metaphase
2. What are sister chromatids? When do they separate? exact copies of a chromosome; anaphase
3. During which phase do chromosomes first become visible? prophase
4. In multicellular organisms, the cell cycle produces groups of cells that perform the same function. What are these groups of cells called? tissues

Complete the table by checking the correct column for each statement.

Statement	Interphase	Mitosis
5. Cell growth occurs	✓	
6. Nuclear division occurs		✓
7. Chromosomes are distributed equally to daughter cells.		✓
8. Protein production is high	✓	
9. Chromosomes are duplicated	✓	
10. DNA synthesis occurs	✓	
11. Cytoplasm divides immediately after this period		✓
12. Mitochondria and other organelles are made.	✓	

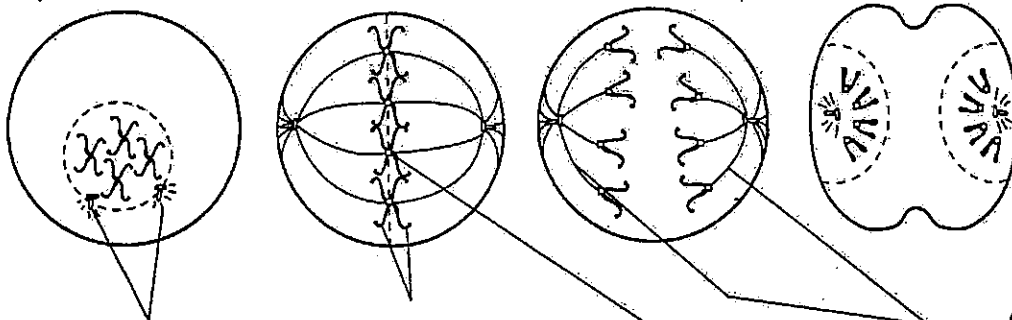
The following are not in the correct order. Please answer the questions below.



13. Which cell is in metaphase? C
14. Cells A and F show an early and late stage of the same phase of mitosis. What phase is it? prophase
15. In cell A, what is the structure labeled X? centrioles / centrosome
16. In cell F, what is the structure labeled Y? spindles (microtubules)
17. Which cell is not in a phase of mitosis? D
18. What two main changes are taking place in cell B? nucleus forms - cytokinesis
19. Sequence the six diagrams in order from first to last. D-A-F-C-E-B
20. What is the end product of mitosis? 2 identical daughter cells
21. What is the main difference between cytokinesis in plants and animals?
Plants - cell plate forms → cell wall
Animals - cytokinesis a cleavage furrow appears

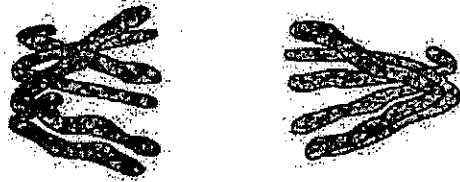
Identify the following phases of mitosis. Use these choices: telophase, metaphase, anaphase, prophase. Then label the diagrams. Use these choices: sister chromatids, centromere, spindle fibers, centrioles.

22. prophase 23. metaphase 24. anaphase 25. telophase



26. centrioles 27. Sister Chromatids 28. Centromere 29. spindle fibers

5. The drawing below has been made from a photograph showing a cell undergoing mitosis. Based on the drawing, in what stage of mitosis must the cell have been in?



late anaphase
early telophase

6. The drawings A-E show stages of mitosis in an animal cell.



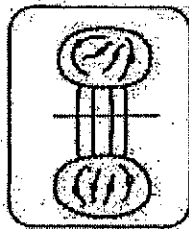
A



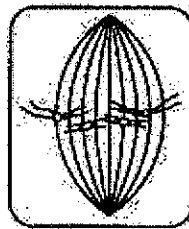
B



C



D



E

- (a) Which of the drawings A -E shows

- (i) interphase C (~~DNA is replicated~~) G₁
 (ii) prophase B (chromosomes – 2 sister chromatids – shorten)
 (iii) metaphase E (sister chromatids line up)
 (iv) anaphase A (sister chromatids separate)
 (v) telophase D (new nucleus forms at each end)
 (vi) cytokinesis D (cell contents divided between 2 daughter cells)

- (b) Give two processes which occur during interphase and which are necessary for nuclear division to take place.

Growth of the cell and replication of the DNA