1. Beadlike structures formed by DNA and histone molecules
nucleosome

2. Meshlike structure that helps move the chromosomes apart
Spindle

3. Process by which the cell nucleus is divided mitosis

4. First and longest phase of mitosis prophase

5. Phase of mitosis in which the chromosomes move to opposite poles of the cell
telophase

6. Material that makes up chromosomes Chromatin

7. Disorder in which the cells lose the ability to control their growth rate
Cancer

8. Point of attachment between each pair of chromatids Centromere

9. Phase of mitosis in which sister chromatids separate anaphase

10. Protein around which chromosomal DNA is coiled histones

11. Process by which a cell divides into two daughter cells Cell division

12. Process by which the cytoplasm divides cytokinesis

13. Period between cell divisions interphase

14. Phase of mitosis in which chromosomes line up along the equator of a cell
metaphase

15. Each chromosome consists of two of these at the beginning of mitosis
Chromatids

16. Microtubule-containing structures located near the nucleus during prophase
Centrioles

17. Cell structures that contain genetic information Chromosomes

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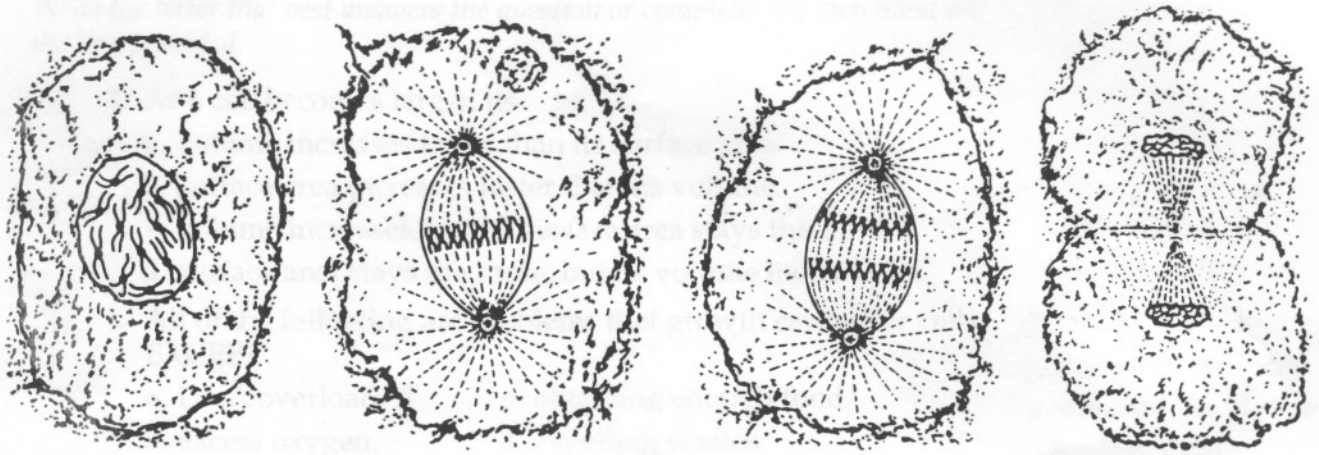
STUDY GUIDE

Chapter 7

Look at the diagrams of the stages of mitosis below. Then answer the questions.



Prophase Metaphase Anaphase Telophase

Prophase

14. What are sister chromatids? 2 copies of a chromosome

15. Where are sister chromatids held together? centromere

16. Where are centrioles? microtubule structures which produce spindle fibers

17. What do the microtubules form between the centrioles? spindle fibers

Metaphase

18. What happens to the chromatids? still together - lined up in middle

19. How is the metaphase distinguished? all chromosomes lined up on equator

Anaphase

20. What happens to the sister chromatids? pulled apart

21. How is the anaphase distinguished? single chromosomes are headed toward ends (poles) of cell

Telophase

22. What forms around each set of chromosomes? nuclear membrane

23. What does each nucleus now contain? chromosomes, nucleolus

24. What is the last part of the cell cycle? cytokinesis

25. What forms in plant cells to divide the cells? cell plate

26. Why can mitochondria and chloroplasts reproduce on their own? they have their own DNA

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Multiple Choice

Write the letter that best answers the question or completes the statement on the line provided.

A 1. As a cell becomes larger, its
   a. volume increases faster than its surface area.
   b. surface area increases faster than its volume.
   c. volume increases, but its surface area stays the same.
   d. surface area stays the same, but its volume increases.

B 2. All of the following are problems that growth causes for cells EXCEPT
   a. DNA overload. ★ c. obtaining enough food.
   b. excess oxygen. d. expelling wastes.

★ DNA can't code for enough proteins to keep a big cell going (communication)

B 3. Which of the following is NOT a way that cell division solves the problems of cell growth?
   a. Cell division provides each daughter cell with its own copy of DNA.
   b. Cell division increases the mass of the original cell.
   c. Cell division increases the surface area of the original cell.
   d. Cell division reduces the original cell's volume.

C 4. When during the cell cycle are chromosomes visible?
   a. only during interphase
   b. only when they are being replicated
   c. only during cell division
   d. only during the G_1 phase

B 5. Which pair is correct?
   a. G_1 phase, DNA replication
   b. G_2 phase, preparation for mitosis
   c. S phase, cell division
   d. M phase, cell growth

C 6. When during the cell cycle is a cell's DNA replicated?
   a. G_1 phase c. S phase
   b. G_2 phase d. M phase

A 7. Which event occurs during interphase?
   a. The cell grows. c. Spindle fibers begin to form.
   b. Centrioles appear. d. Centromeres divide.

C 8. During which phase of mitosis do the chromosomes line up along the middle of the dividing cell?
   a. prophase c. metaphase
   b. telophase d. anaphase

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A 9. Which of the following represents the phases of mitosis in their proper sequence?
a. prophase, metaphase, anaphase, telophase
b. interphase, prophase, metaphase, anaphase, telophase
c. interphase, prophase, metaphase, telophase
d. prophase, metaphase, anaphase, telophase, cytokinesis

A 10. What is the role of the spindle during mitosis?
a. It helps separate the chromosomes.
b. It breaks down the nuclear membrane.
c. It duplicates the DNA.
d. It divides the cell in half.

D 11. The two main stages of cell division are called
a. mitosis and interphase.
b. synthesis and cytokinesis.
c. the M phase and the S phase.
d. cytokinesis and mitosis.

A 12. Which of the following is a factor that can stop normal cells from growing?
a. contact with other cells
b. growth factors
c. a cut in the skin
d. cyclin that has been taken from a cell in mitosis

C 13. Which of the following explains why normal cells grown in a petri dish tend to stop growing once they have covered the bottom of the dish?
a. The cells lack cyclin.
b. The petri dish inhibits cell growth.
c. Contact with other cells stops cell growth.
d. Most cells grown in petri dishes have a defective p53.

A 14. Cyclins are a family of closely related proteins that
a. regulate the cell cycle.
b. produce p53.
c. cause cancer.
d. work to heal wounds.

C 15. Cancer is a disorder in which some cells have lost the ability to control their
a. size.
b. spindle fibers.
c. growth rate.
d. surface area.

Completion

Complete each statement on the line provided.

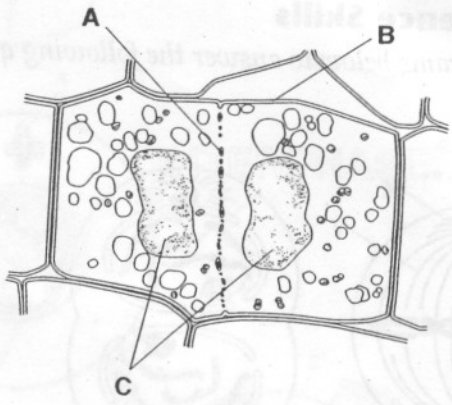
16. The process by which a cell divides into two daughter cells is called cell division.

17. Together, the G_1 phase, S phase, and G_2 phase are called interphase.

18. Another name for cell division is the mitosis phase.

19. Look at Figure 10-3. The process shown occurs directly following mitosis. This process is called cytokinesis.

Figure 10-3



20. Proteins called cyclins regulate the timing of the cell cycle in eukaryotic cells.

Short Answer

In complete sentences, write the answers to the questions on the lines provided.

21. List two problems that growth causes for cells.

transport
communication

22. The main events of the cell cycle are labeled A, B, C, and D in Figure 10-4. Name these events. Then briefly state what happens during each event.

A = G1 - growth
B = S - replication of DNA
C = G_2 - prep. for mitosis
D = cell division - nucleus divides
cytoplasm divides
2 daughter cells produced

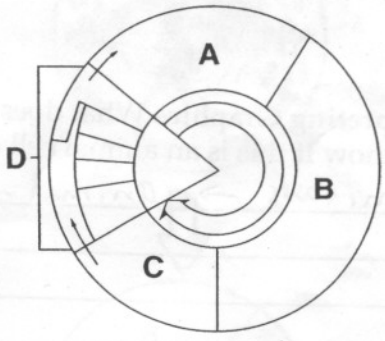


Figure 10-4

23. What effect do the cells surrounding a normal cell have on the cell's growth and division?

~~inhibit~~ once cells touch other cells, they will stop going through mitosis

24. Name two factors that help regulate the timing of the cell cycle.

cyclins (proteins) + cyclin-dependent kinases (enzymes)

25. Explain how cancer cells differ from normal cells.

uncontrolled mitosis -

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Using Science Skills

Use the diagrams below to answer the following questions on the lines provided.

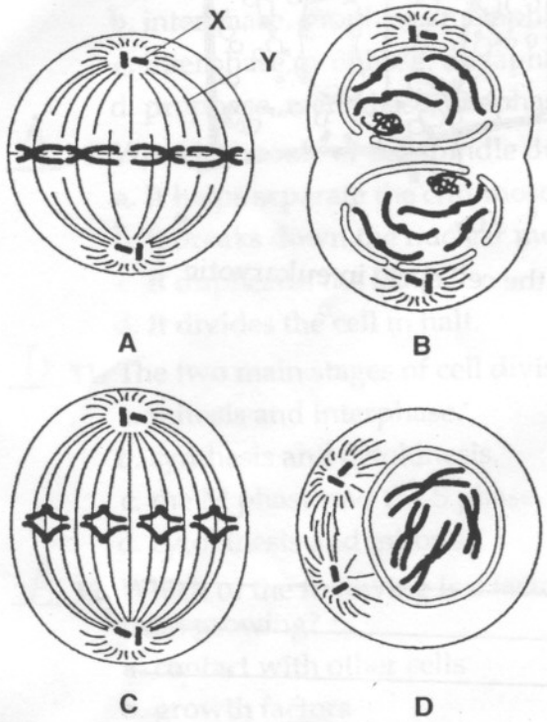

Figure 10-5

26. **Interpreting Graphics** What does Figure 10-5 represent? How do you know if this is an animal cell or a plant cell?

mitosis → animal – cytoplasm is pinching in for cytokinesis to occur

27. **Inferring** What is the chromosome number of the cell shown in Figure 10-5?

4

28. **Inferring** Identify the structures labeled X and Y in Figure 10-5.

X = centrioles, Y = spindle fibers

29. **Applying Concepts** List the correct order for the diagrams in Figure 10-5.

D - A - C - B

30. **Predicting** Describe the diagram that would be drawn to show the step after the last one once the steps are arranged in order.

2 new cells have been formed, each with 4 chromosomes each.