

CHAPTER 9

Study Guide

Section 1: Cellular Growth

In your textbook, read about cell size limitations.

List two alternative futures for cells when they reach their size limitations.

1. _____
2. _____

In your textbook, read about the cell cycle.

Draw the cell cycle in the space below. Include the following labels: cytokinesis, G₁, G₂, interphase, mitosis, S.

3. _____

Match the definition in Column A with the term in Column B.

Column A

Column B

- | | |
|--|--|
| <p>_____ 4. stage in which the cell divides into two daughter cells with identical nuclei</p> <p>_____ 5. substage of interphase immediately after a cell divides</p> <p>_____ 6. substage of interphase in which the cell copies its DNA in preparation for cell division</p> <p>_____ 7. stage in which the cell's nuclear material divides and separates</p> <p>_____ 8. main stage in which the cell grows, carries out normal functions, and duplicates its DNA</p> <p>_____ 9. substage in which the cell prepares for nuclear division and a protein that makes microtubules for cell division is synthesized</p> | <p>A. S phase</p> <p>B. cytokinesis</p> <p>C. G₁</p> <p>D. G₂</p> <p>E. interphase</p> <p>F. mitosis</p> |
|--|--|

Section Quick Check

CHAPTER 9 Section 1: Cellular Growth

After reading the section in your textbook, respond to each statement.

1. **Define** *mitosis*.

2. **Summarize** the stages of interphase.

3. **Clarify** the difference between chromatin and chromosomes.

4. **Distinguish** between mitosis and cytokinesis.

5. The unicellular spores of the fern *Ceratopteris richardii* are about 100 μm in diameter. **Calculate** the surface-area-to-volume ratio of a cube whose sides are 100 μm in length to approximate the surface-area-to-volume ratio of the fern spore cell. Show your work.

CHAPTER 9

Study Guide

Section 2: Mitosis and Cytokinesis

In your textbook, read about the stages of mitosis.

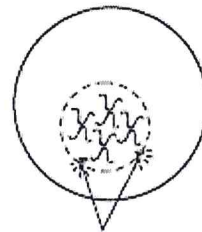
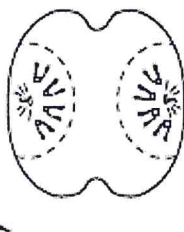
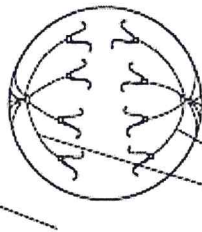
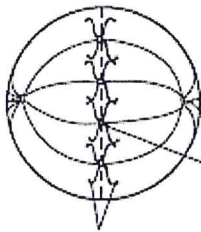
For each statement below, write true or false.

- _____ 1. The nuclear membrane disintegrates during prophase.
- _____ 2. Microtubules move chromatids to the poles of the cell during anaphase.
- _____ 3. Chromosomes reach the poles of the cell during metaphase.
- _____ 4. The cell's chromatin condenses into chromosomes during prophase.
- _____ 5. The nuclear envelope re-forms during anaphase.
- _____ 6. Chromosomes attach to spindle fibers and line up along the equator of the cell during metaphase.
- _____ 7. The nucleus reappears during prophase.
- _____ 8. Centrioles migrate to the poles of the cell during telophase.
- _____ 9. Chromatids are pulled apart during anaphase.
- _____ 10. The first stage of mitosis is telophase.
- _____ 11. The chromosomes decondense or unwind during telophase.
- _____ 12. One of the shortest stages of mitosis is metaphase.

Label the diagram of the stages of mitosis using lines 13–16. Use these choices:

anaphase metaphase prophase telophase

13. _____ 14. _____ 15. _____ 16. _____



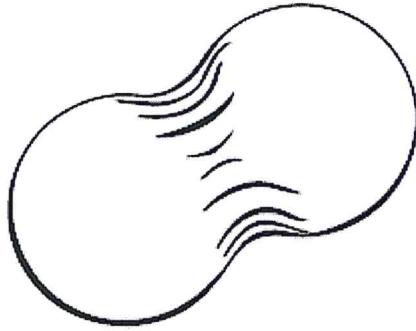
17. _____ 18. _____ 19. _____ 20. _____

Label the diagrams above using lines 17–20. Use these choices:

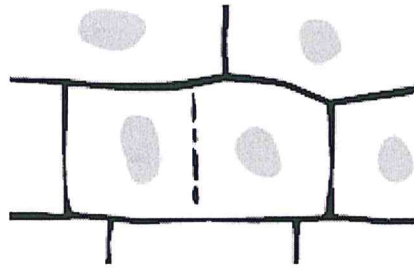
centrioles centromere sister chromatids spindle fibers

Study Guide, Section 2: Mitosis and Cytokinesis continued

In your textbook, read about cytokinesis.



Animal cell



Plant cells

Refer to the diagrams above. Respond to each statement.

21. Discuss the role of microfilaments in cytokinesis.

22. Summarize cell division in prokaryotes.

Draw the formation of two genetically identical cells in plants in the space below. Include the following labels: cell plate, identical daughter cells, new cell wall.

23.

Section Quick Check

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Section 2: Mitosis and Cytokinesis

After reading the section in your textbook, respond to each statement.

1. **Recount** the major events that happen during prophase.

2. **Describe** the structure of chromosomes during prophase.

3. **Summarize** how cytokinesis occurs in plant cells.

4. **Contrast** the spindle apparatus of an animal cell with that of a plant cell.

5. **Devise** a way to remember each stage of mitosis. **Propose** one word or a short phrase that describes each stage and also starts with the same letter as the name of that stage, for example, telophase—two nuclei.

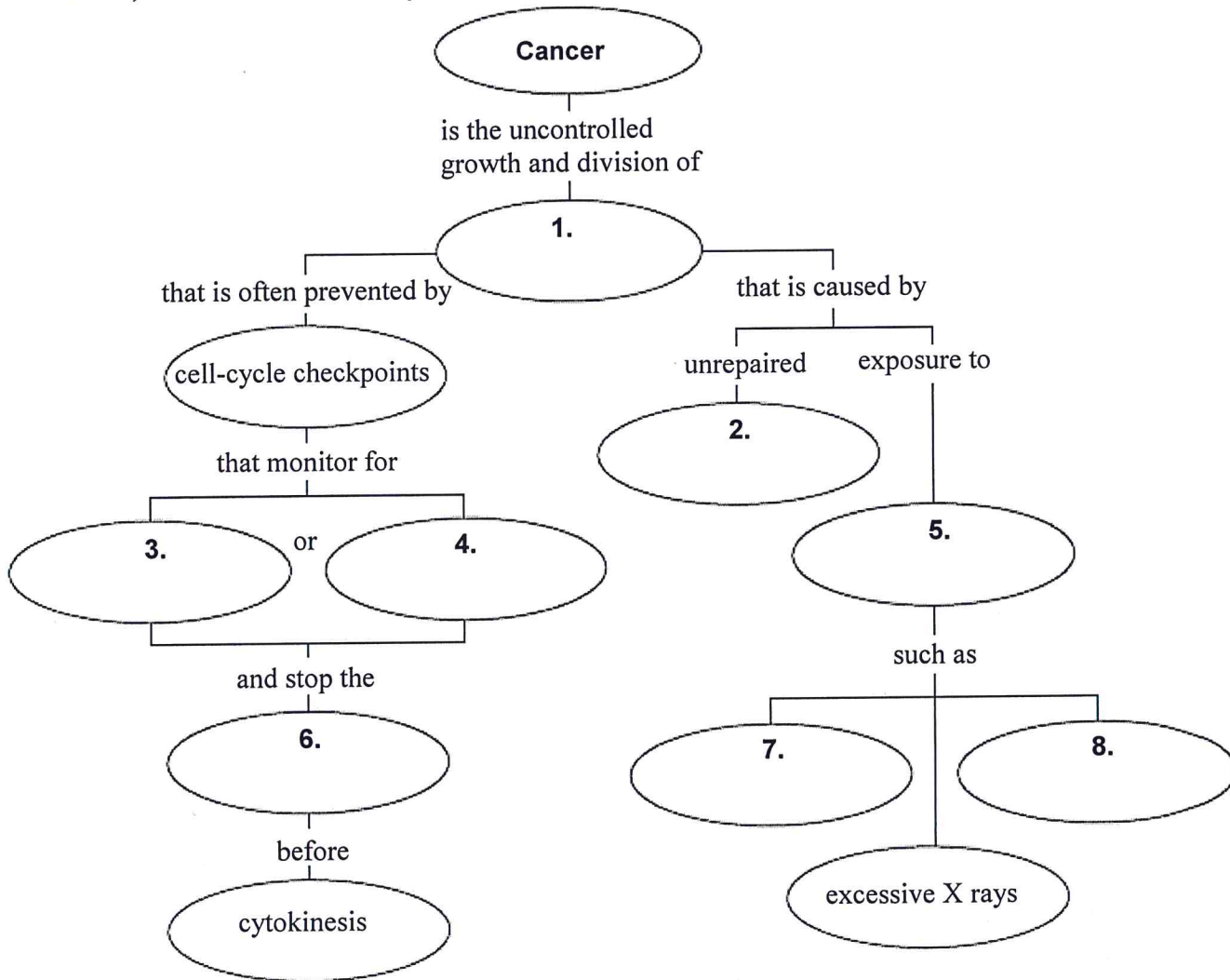
CHAPTER 9

Section 3: Cell Cycle Regulation

Study Guide

In your textbook, read about the abnormal cell cycle and cancer.

Complete the graphic organizer about the causes and prevention of cancer. These terms may be used more than once: carcinogens, cell cycle, cells, DNA damage, genetic changes, spindle fiber failure, the Sun's ultraviolet rays, tobacco.



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

Description	Apoptosis	Stem Cells
9. After a sperm fertilizes an egg, the resulting mass of cells divides until there are about 100 to 150 cells.		
10. Some cells go through a programmed death.		
11. Embryonic cells shrivel and die, resulting in the formation of fingers and toes.		
12. Unspecialized cells are either embryonic or adult.		
13. This event occurs in cells that are damaged beyond repair.		

Section Quick Check

CHAPTER 9 Section 3: Cell Cycle Regulation

After reading the section in your textbook, respond to each statement.

1. **Relate** apoptosis to cancer.

2. **Explain** how cancerous cell growth differs from normal cell growth.

3. **Identify** the protein and enzyme complex that is important in controlling the cell cycle and three of the processes it controls.

4. **Determine** the significance of stem cells.

5. **Deduce** what would happen if there were no spindle checkpoints.
