Name _____ Class _____ Date _____

Chapter 10

Cell Growth and Division

Section 10–1 Cell Growth (pages 241–243)

This section explains what problems growth causes for cells.

Limits to Cell Growth (pages 241–243)

1. What are two reasons why cells divide rather than continue to grow indefinitely?

a. The larger a cell becomes, the more demands the cell places on its DNA.

b. The larger a cell becomes, the more trouble the cell has moving nutrients and wastes across the cell membrane.

2. Is the following sentence true or false? As a cell increases in size, it usually makes extra copies of its DNA. false

3. Circle the letter of what determines the rate at which food and oxygen in a cell are used up and waste products produced.

a. The cell's organelles

b. The cell's volume

c. The cell's location

d. The cell's DNA

4. How can you obtain a cell's ratio of surface area to volume? Divide the surface area by the volume.

5. If a cell's surface area is 6 cm^3 and its volume is 1 cm^3, then what is its ratio of surface area to volume? 6 / 1 or 6 : 1

6. Is the following sentence true or false? As a cell grows in size, its volume increases much more rapidly than its surface area.

true

7. Circle the letter of what happens to a cell's ratio of surface area to volume as the cell's volume increases more rapidly than its surface area.

a. The ratio decreases.

b. The ratio increases.

c. The ratio remains the same.

d. The ratio disappears.

8. What is cell division? Cell division is the process by which a cell divides into two new daughter cells.

9. How does cell division solve the problem of increasing size? Cell division reduces cell volume.

Section 10–2 Cell Division (pages 244–249)

This section describes the main events of the cell cycle. It also explains what happens during mitosis, when cell division occurs.

Chromosomes (page 244)

1. Is the following sentence true or false? Chromosomes are not visible in most cells except during cell division.

true

2. When chromosomes become visible at the beginning of cell division, what does each chromosome consist of? Each chromosome consists of two identical sister chromatids.

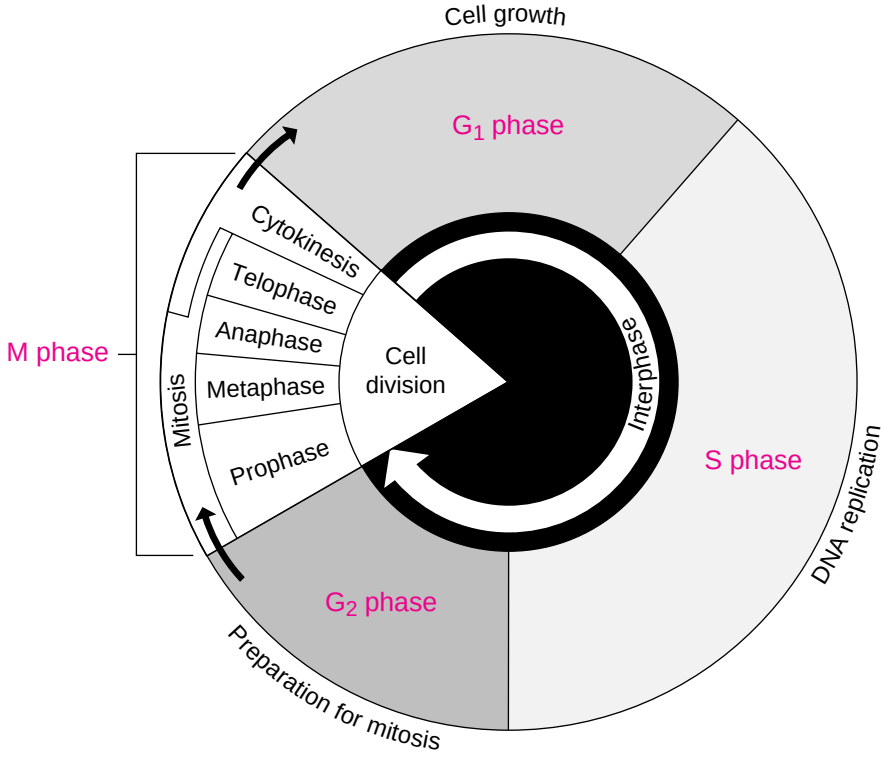
3. Each pair of chromatids is attached at an area called the centromere.

The Cell Cycle (page 245)

4. The period of growth in between cell divisions is called interphase.

5. What is the cell cycle? The cell cycle is the series of events that cells go through as they grow and divide.

6. Complete the diagram of the cell cycle by writing the names of each of the four phases.



Name _____ Class _____ Date _____

7. The division of the cell nucleus during the M phase of the cell cycle is called mitosis.

Events of the Cell Cycle (page 245)

8. Interphase is divided into what three phases?
   a. G_1 b. S c. G_2
9. What happens during the G_1 phase? Cells do most of their growing, increasing in size and synthesizing new proteins and organelles.
10. What happens during the S phase? Chromosomes are replicated and the synthesis of DNA molecules takes place. Also, key proteins associated with the chromosomes are synthesized.
11. What happens during the G_2 phase? Many of the organelles and molecules required for cell division are produced.

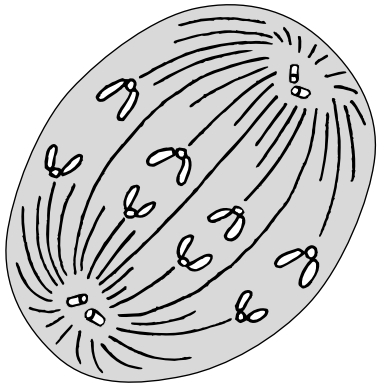
Mitosis (pages 246–248)

12. What are the four phases of mitosis?
    a. Prophase
    b. Metaphase
    c. Anaphase
    d. Telophase
13. Circle the letter of the name for the two tiny structures located in the cytoplasm near the nuclear envelope at the beginning of prophase.
    a. centrioles **c.** centromeres
    b. spindles **d.** chromatids
14. What is the spindle? The spindle is a fanlike microtubule structure that helps separate the chromosomes.

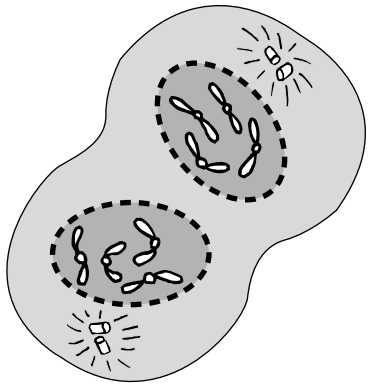
Match the description of the event with the phase of mitosis it is in. Each phase may be used more than once.

	Event	Phase
c	15. The chromosomes move until they form two groups near the poles of the spindle.	**a.** Prophase
a	16. The chromosomes become visible.	**b.** Metaphase
d	17. A nuclear envelope re-forms around each cluster of chromosomes.	**c.** Anaphase
a	18. The centrioles take up positions on opposite sides of the nucleus.	**d.** Telophase
b	19. The chromosomes line up across the center of the cell.	
d	20. The nucleolus becomes visible in each daughter nucleus.	

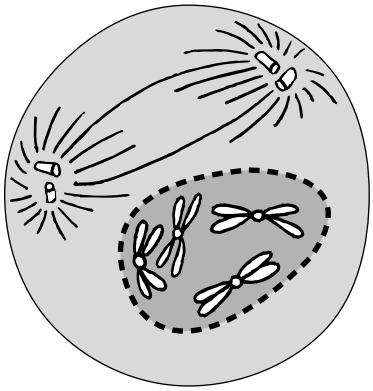
21. Identify each of the four phases of mitosis pictured below.



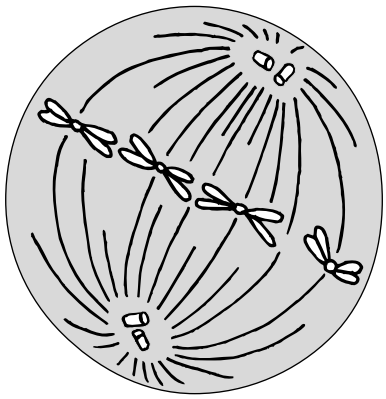
a. Anaphase



c. Telophase



b. Prophase



d. Metaphase

Cytokinesis (page 248)

22. What is cytokinesis? Cytokinesis is the division of the cytoplasm itself.

23. How does cytokinesis occur in most animal cells? The cell membrane is drawn inward until the cytoplasm is pinched into two nearly equal parts.

24. Circle the letter of what forms midway between the divided nucleus during cytokinesis in plant cells.

a. cell nucleus
b. cytoplasm
c. cell plate
d. cytoplasmic organelles

Reading Skill Practice

You may sometimes forget the meanings of the vocabulary terms that were introduced earlier in the textbook. When this happens, you can check the meanings of the terms in the Glossary, which you can find at the end of the book just before the Index. Use the Glossary to review the meanings of all the vocabulary terms listed on page 244. Write their definitions on a separate sheet of paper.

The wording of the definitions in the Glossary is often slightly different than how the terms are defined in the flow of the text. Students should write the Glossary definition of each term.

Name _____ Class _____ Date _____

Section 10–3 Regulating the Cell Cycle (pages 250–252)

This section describes how the cell cycle is regulated. It also explains how cancer cells are different from other cells.

Controls on Cell Division (page 250)

1. What happens to the cells at the edges of an injury when a cut in the skin or a break in a bone occurs? The cells at the edges of the injury are stimulated to divide rapidly.

2. What happens to the rapidly dividing cells when the healing process nears completion? The rate of cell division slows down, controls on growth are restored, and everything returns to normal.

Cell Cycle Regulators (page 251)

3. What do cyclins regulate? Cyclins regulate the timing of the cell cycle in eukaryotic cells.

4. What are internal regulators? They are proteins that respond to events inside the cell.

5. Circle the letter of each sentence that is true about external regulators.

   a. They direct cells to speed up or slow down the cell cycle.

   b. They prevent the cell from entering anaphase until all its chromosomes are attached to the mitotic spindle.

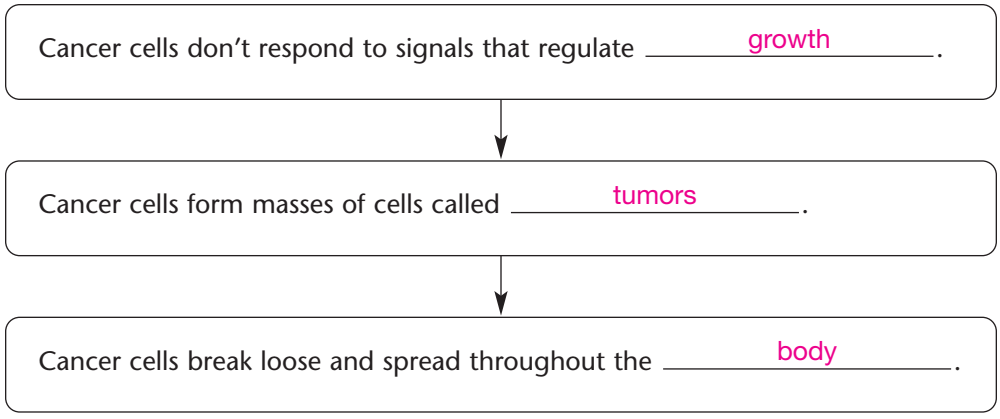
   c. They include growth factors.

   d. They prevent excessive cell growth and keep the tissues of the body from disrupting each other.

Uncontrolled Cell Growth (page 252)

6. What is cancer? Cancer is a disorder in which some of the body's own cells lose the ability to control growth.

7. Complete the flowchart about cancer.



8. Is the following sentence true or false? Cancer is a disease of the cell cycle. true

WordWise

Complete the sentences by using one of the scrambled words below.

Word Bank

spetmeaha	sdtihcmora	eshaploet	phsaeorp	kniesscitoy	aasehpan
nilpsed	lecl yeclc	elcl voisdini	metonercer	astinhepre	sotimsi
nacecr	cinlyc	tenilorec			

1. The division of a cell's cytoplasm is called cytokinesis.
2. The final phase of mitosis is telophase.
3. The phase of mitosis in which microtubules connect the centromere of each chromosome to the poles of the spindle is metaphase.
4. At the beginning of cell division, each chromosome consists of two sister chromatids.
5. The longest phase of mitosis is prophase.
6. The phase of mitosis that ends when the chromosomes stop moving is anaphase
7. The process by which a cell divides into two new daughter cells is called cell division.
8. A tiny structure located in the cytoplasm near the nuclear envelope is a(an) centriole.
9. A disorder in which some of the body's cells lose the ability to control growth is called cancer.
10. The area where a pair of chromotids is attached is the centromere.
11. The division of the cell nucleus is called mitosis.
12. A protein that regulates the timing of the cell cycle in eukaryotic cells is cyclin.
13. The series of events that cells go through as they grow and divide is known as the cell cycle.
14. A fanlike microtubule structure that helps separate the chromosomes is a(an) spindle.
15. The time period between cell divisions is called interphase.