

Chapter Assessment

Chapter Vocabulary

5.1 cell cycle, p. 134
mitosis, p. 135
cytokinesis, p. 135

5.2 chromosome, p. 138
histone, p. 139
chromatin, p. 139
chromatid, p. 139
centromere, p. 139
telomere, p. 139

prophase, p. 140
metaphase, p. 140
anaphase, p. 140
telophase, p. 140

5.3 growth factor, p. 144
apoptosis, p. 145
cancer, p. 146
benign, p. 146
malignant, p. 146
metastase, p. 146
carcinogen, p. 146

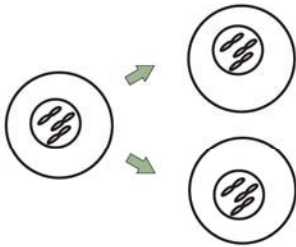
5.4 asexual reproduction, p. 148
binary fission, p. 148

5.5 tissue, p. 151
organ, p. 151
organ system, p. 151
cell differentiation, p. 152
stem cell, p. 153

Reviewing Vocabulary

Visualize Vocabulary

For each term below, draw a simple picture that represents the meaning of the word. Here is an example for *mitosis*.



1. prophase
2. metaphase
3. anaphase
4. telophase
5. cytokinesis
6. centromere
7. telomere

Word Origins

8. The prefix *pro-* means “earlier than” or “prior to.” Explain how this meaning relates to the word *prophase*.
9. The prefix *telo-* means “distant, far, or end.” How does this meaning relate to the words *telophase* and *telomere*?
10. The term *mitosis* comes from the Greek root *mitos*, which means “thread.” How does this meaning relate to the process of mitosis?

Reviewing MAIN IDEAS

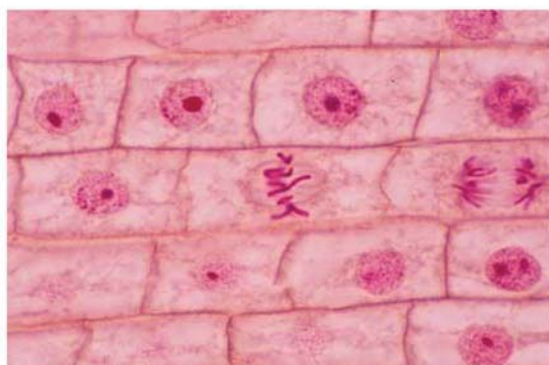
11. The cell cycle has four main stages— G_1 , S, G_2 , and M. What occurs in the cell during each stage?
12. Compare the rates of cell division occurring in your neurons and your hair follicles.
13. What is the relationship between a cell’s surface area and its volume?
14. You know that a chromosome is a very long, continuous strand of DNA. How do proteins help condense chromosomes?
15. Describe what happens in each main phase of mitosis—prophase, metaphase, anaphase, and telophase.
16. How does the process of cytokinesis differ from the process of mitosis?
17. Increased levels of cyclin help trigger a cell to divide. Do you think a growth factor would increase or decrease cyclin levels? Explain.
18. Describe how uncontrolled cell division is dangerous in organisms.
19. List one similarity and one difference between binary fission and mitosis.
20. You pull a leaf from a plant and place it in a cup of water. After a week, roots start to grow from the leaf. What type of reproduction has occurred, and what role does mitosis play in it?
21. Briefly describe how cell differentiation occurs in the developing animal embryo.
22. List three characteristics of all stem cells.

Critical Thinking

23. **Synthesize** How do regulatory proteins of the cell cycle help maintain homeostasis?
24. **Hypothesize** Plants often grow in the direction of a sunny window, yet plant cells cannot easily migrate due to their rigid cell walls. How do you think plants grow toward light?
25. **Analyze** A scientist wants to use asexually reproducing vegetables to increase crop yields. He plans to distribute budding potatoes and teach farmers how to separate them into new plants. What are some potential benefits and risks that could result from this situation?
26. **Analyze** The rates of DNA mutations in bacteria are known to increase when they are under stressed environmental conditions. Why do you think this is important for an organism that reproduces asexually?
27. **Apply** Suppose an organism usually has 24 chromosomes in its nucleus. How many chromatids would it have just after the S phase of the cell cycle?
28. **Predict** If a mutation made histone proteins bind less tightly to DNA, how might the cell cycle be affected?

Interpreting Visuals

Use the picture of onion root cells shown below to answer the next three questions.



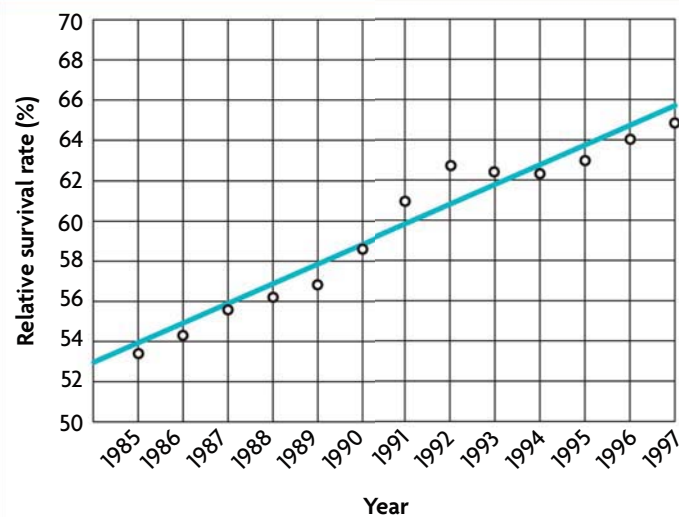
magnification 120×

29. **Apply** In what stage of the cell cycle are most of these cells? Explain.
30. **Apply** How can you visually distinguish between newly formed cells and older cells?
31. **Synthesize** If this onion were immersed in salt water, how would the cells undergoing mitosis be affected? (Hint: Think about the process of osmosis.)

Analyzing Data

The graph below shows the five-year survival rate, expressed as percentages, of patients diagnosed with cancer from 1985 through 1997. This data is for all types of invasive cancers and includes males and females of all races. Use the graph to answer the next two questions.

5-YEAR CANCER SURVIVAL RATE



Source: The National Cancer Institute

32. **Analyze** Which points do not follow the best-fit line for the data?
33. **Interpret** What is the trend in the data of cancer survival during the span of time given?

Connecting CONCEPTS

34. **Write a Narrative** Imagine that you are a single chromosome about to undergo replication and mitosis. Describe what will happen to you from the S phase through mitosis. Be creative. Use humor and first-person point of view. Come up with sounds or perspectives that illustrate what is happening. Be sure to include all details of the process and related terms.
35. **Design an Experiment** Cancer cells, such as those shown on page 133, are frequently grown in labs for research uses. Suppose you wanted to determine whether a certain substance was a carcinogen. Outline an experimental plan to describe what questions you would want to answer, what experiments you would perform, and what the different possible results would suggest.



STANDARDS-BASED ASSESSMENT

Test Practice
For more test practice,
go to ClassZone.com.

1. Scientists searching for new anticancer drugs treat a cell culture with a certain compound. Following treatment, they notice that the culture has stopped growing. Untreated cells from the same culture, however, have continued to grow. These results could indicate that the compound blocks the normal cell cycle. What else could have caused these results?

- A The compound had degraded.
- B The compound prevented cells from mutating.
- C The compound killed the treated cells.
- D The compound had no effect.

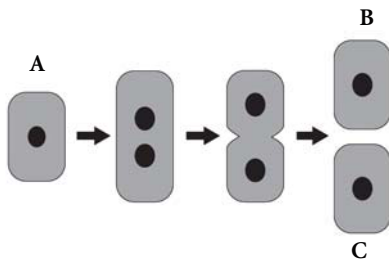
THINK THROUGH THE QUESTION

The untreated cells serve as a control in this experiment. Therefore, differences between the treated and untreated cells should be the result of the drug. If the drug has no effect, the two groups of cells should be the same.

2. After being scraped or a cut, the skin is able to heal. What biological process *best* accounts for the replacement of skin cells?

- A mitosis
- B meiosis
- C asexual reproduction
- D cementation

3.



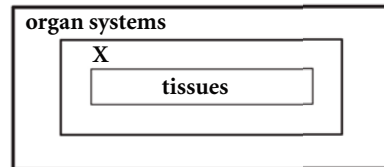
In this diagram, cell A is undergoing mitosis. If cell A has 6 chromosomes, how many chromosomes will the resulting cells B and C have?

- A none
- B 3 each
- C 6 each
- D 12 each

4. What is a main function of spindle fibers?

- A to condense chromatin into chromosomes
- B to separate chromosomes during mitosis
- C to replicate the chromosomes before cell division
- D to decondense chromosomes following mitosis

5.



This figure represents some levels of structural and functional organization in multicellular organisms. Which term fits in the box marked "X"?

- A cells
- B organelles
- C organs
- D organisms

6. Stem cells can form many kinds of cells. In contrast, most body cells cannot form different types of cells. For example, skin cells can only make skin cells, and nerve cells only make nerve cells. Which statement best explains why skin cells will never become nerve cells?

- A Each type of cell gets a different message from the central DNA, which is stored in DNA cells.
- B Each type of cell has only the part of the DNA necessary for making that type of cell.
- C Each cell type is determined by messages sent from the brain, which directs development.
- D Both types of cells have the same DNA, but each cell uses only part of the DNA message.