

Cell Processes and Energy ▪ Guided Reading and Study

# Chemical Compounds in Cells (pp. 74–78)

This section identifies the basic building blocks of cells. It also explains the importance of water to cells.

## Use Target Reading Skills

As you read, compare and contrast carbohydrates, proteins, and lipids in the table below.

Type of Compound	Elements	Functions
Carbohydrate	Carbon, hydrogen, oxygen	
Lipid		
Protein		

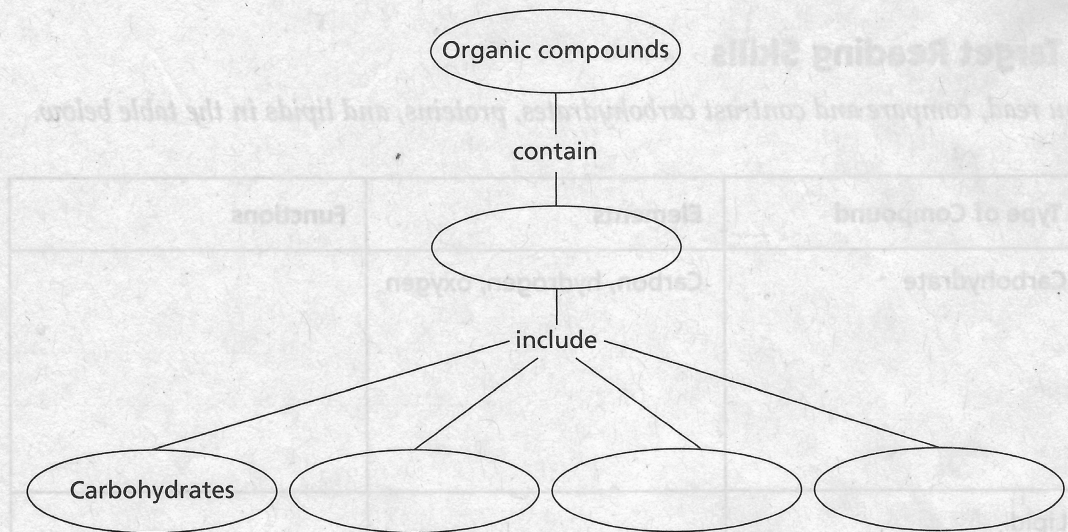
## Elements and Compounds (pp. 74–75)

1. A(n) \_\_\_\_\_ is any substance that cannot be broken down into simpler substances. Its smallest unit is the \_\_\_\_\_.
2. When two or more elements combine chemically, they form a(n) \_\_\_\_\_. Its smallest unit is usually called a(n) \_\_\_\_\_.
3. Most chemical reactions within cells could not take place without \_\_\_\_\_.

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**Chemical Compounds in Cells** (continued)

4. Complete this concept map on organic compounds.



5. Compounds that do not contain carbon are called \_\_\_\_\_.

**Carbohydrates** (p. 76)

6. A carbohydrate is made of carbon, hydrogen, and \_\_\_\_\_.

7. Starch is a kind of carbohydrate. What foods have starch?  
\_\_\_\_\_  
\_\_\_\_\_

8. How do cells use carbohydrates?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Lipids** (p. 76)

9. What are three examples of lipids?

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_



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10. How are lipids like carbohydrates?

\_\_\_\_\_

\_\_\_\_\_

11. Cells store \_\_\_\_\_ in lipids to use later.

**Proteins** (p. 77)

12. \_\_\_\_\_ form parts of cell membranes and many of the cell's organelles.

13. What small molecules make up proteins? \_\_\_\_\_

14. What do enzymes do?

\_\_\_\_\_

\_\_\_\_\_

**Nucleic Acids** (p. 78)

15. Very long organic molecules that contain instructions that cells need to function are called \_\_\_\_\_.

16. Is the following sentence true or false? Cells use the instructions in nucleic acids to carry out all life functions. \_\_\_\_\_

17. List the two kinds of nucleic acids.

a. \_\_\_\_\_ b. \_\_\_\_\_



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# The Cell in Its Environment (pp. 80–85)

*This section tells how things move into and out of cells.*

## Use Target Reading Skills

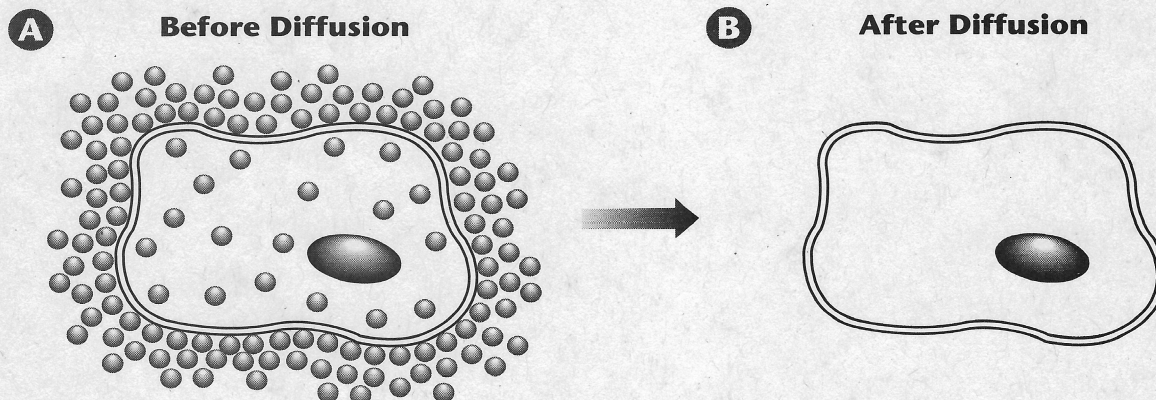
*After you read the section, reread the paragraphs that contain definitions of Key Terms. Use all the information you have learned to write a definition of each Key Term in your own words. Write your definitions on a separate sheet of paper.*

### Introduction (pp. 80–81)

1. The cell membrane is \_\_\_\_\_, which means that some substances can pass through it while others cannot.

### Diffusion (pp. 81–82)

2. List three ways that substances can move into and out of a cell.
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
3. In diffusion, molecules move from an area of \_\_\_\_\_ concentration to an area of \_\_\_\_\_ concentration.
4. Draw molecules on Part B of the diagram below to show how the molecules are distributed inside and outside the cell after diffusion has occurred.





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**Osmosis** (pp. 82–83)

5. In \_\_\_\_\_, water molecules diffuse through a selectively permeable membrane.

**Active Transport** (pp. 84–85)

6. Two ways of moving things into and out of cells that do NOT need energy are \_\_\_\_\_ and \_\_\_\_\_.  
Moving materials through a cell membrane without using energy is called \_\_\_\_\_ transport.

7. How does active transport differ from passive transport?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

8. List two ways that the cell moves things by active transport.

a. \_\_\_\_\_

b. \_\_\_\_\_

9. Is the following sentence true or false? As a cell gets larger, it takes longer for a molecule that has entered the cell to reach the middle of the cell.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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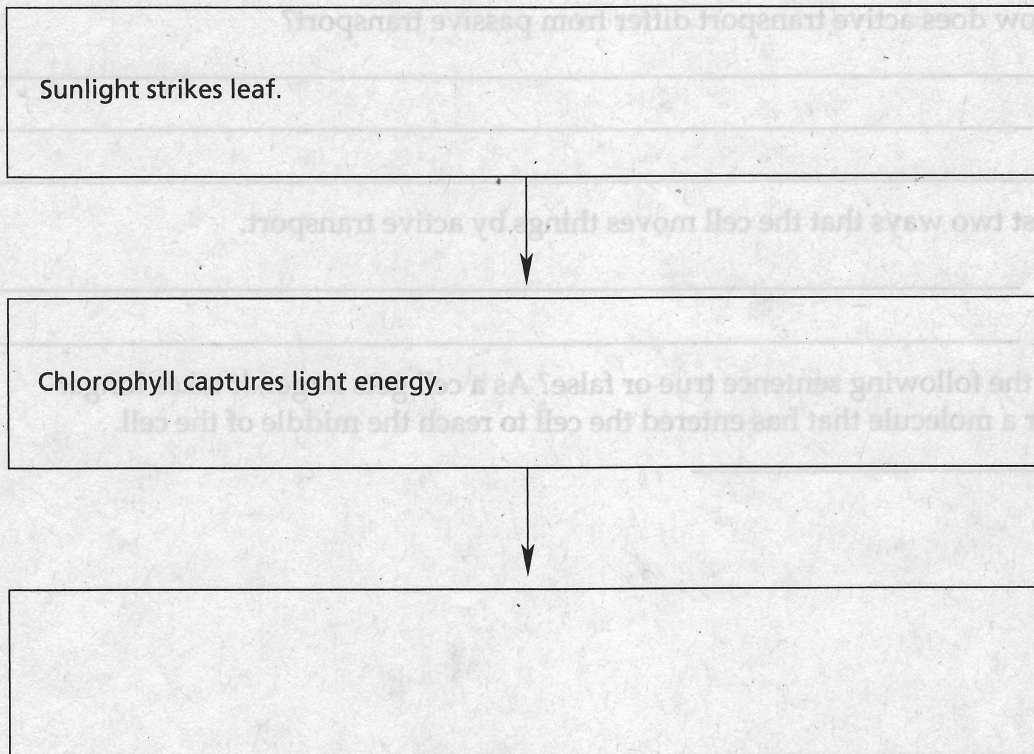
# Photosynthesis (pp. 86–90)

*This section explains how plants make food by using the energy from sunlight.*

## Use Target Reading Skills

*As you read, create a flowchart that shows the steps in photosynthesis. Put each step in a separate box in the flowchart in the order in which it occurs.*

### Steps in Photosynthesis



## Sources of Energy (p. 87)

1. In the process of photosynthesis, plants use the energy in \_\_\_\_\_ to make food.



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2. Complete the following table about how living things use the sun's energy.

How Living Things Obtain Energy From the Sun		
Living Thing	Autotroph or Heterotroph?	Obtains Energy From the Sun Directly or Indirectly?
Grass		
Zebra		
Lion		

**The Two Stages of Photosynthesis** (pp. 88–90)

3. List the two stages in the process of photosynthesis.
- a. \_\_\_\_\_
- b. \_\_\_\_\_
4. The green pigment in chloroplasts, called \_\_\_\_\_, absorbs light energy from the sun.
5. Is the following sentence true or false? Besides the energy in sunlight, the cell needs water and carbon dioxide to make sugar. \_\_\_\_\_
6. What are stomata?
- \_\_\_\_\_
- \_\_\_\_\_

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**Photosynthesis** *(continued)*

7. Circle the letter of each product of photosynthesis.

- a. water
- b. carbon dioxide
- c. oxygen
- d. sugars

8. Is the following sentence true or false? Photosynthesis produces the carbon dioxide that most living things need to survive. \_\_\_\_\_

9. Write the chemical equation for the process of photosynthesis.

\_\_\_\_\_

10. What word does the arrow in the chemical equation stand for?

\_\_\_\_\_

11. Circle the letter of each raw material of photosynthesis.

- a. carbon dioxide
- b. glucose
- c. water
- d. oxygen

12. Circle the letter of each sentence that is true about the products of photosynthesis.

- a. Plant cells use the sugar for food.
- b. Some of the sugar is made into other compounds, such as cellulose.
- c. Some of the sugar is stored in the plant's cells for later use.
- d. Extra sugar molecules pass out of the plant through the stomata.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



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# Respiration (pp. 91–94)

*In this section, you will learn how cells get energy from food.*

## Use Target Reading Skills

*Before you read, write a definition of respiration in the graphic organizer. As you read, revise your definition based on what you learn.*

What You Know	
1. Definition of respiration:	

What You Learned	

## What Is Respiration? (pp. 91–93)

1. What happens during respiration?

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2. Cells store energy in the form of \_\_\_\_\_.

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**Respiration** *(continued)*

3. How do cells “withdraw” energy?

\_\_\_\_\_

\_\_\_\_\_

4. Is the following sentence true or false? Respiration that takes place inside of cells is the same as breathing air in and out of the lungs.

\_\_\_\_\_

5. Use the table below to list the raw materials and products of respiration.

<b>Respiration</b>	
<b>Raw Materials</b>	<b>Products</b>

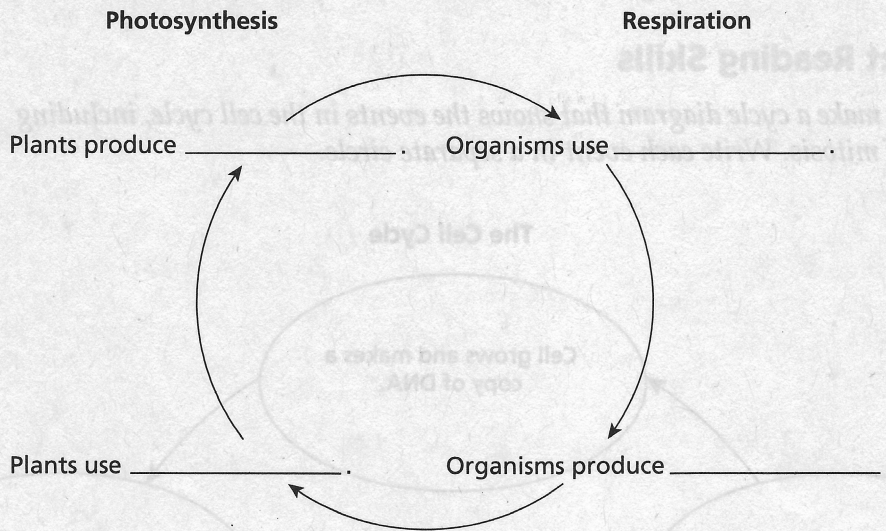
Match the events in respiration with the stages in which they occur. The items in the second column may be used more than once.

- | <b>Event in Respiration</b>                | <b>Stage of Process</b>         |
|--|---------------------------------|
| ___ 6. Takes place in the mitochondria     | a. first stage only             |
| ___ 7. Takes place in the cytoplasm        | b. second stage only            |
| ___ 8. Oxygen is involved.                 | c. both first and second stages |
| ___ 9. Energy is released.                 |                                 |
| ___ 10. Glucose molecules are broken down. |                                 |



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11. Complete the cycle diagram below, which describes the relationship between photosynthesis and respiration.



**Fermentation** (pp. 93–94)

12. What is fermentation?

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13. Is the following sentence true or false? Fermentation releases more energy than respiration. \_\_\_\_\_

14. List the two types of fermentation and tell where each takes place.

a. \_\_\_\_\_

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b. \_\_\_\_\_

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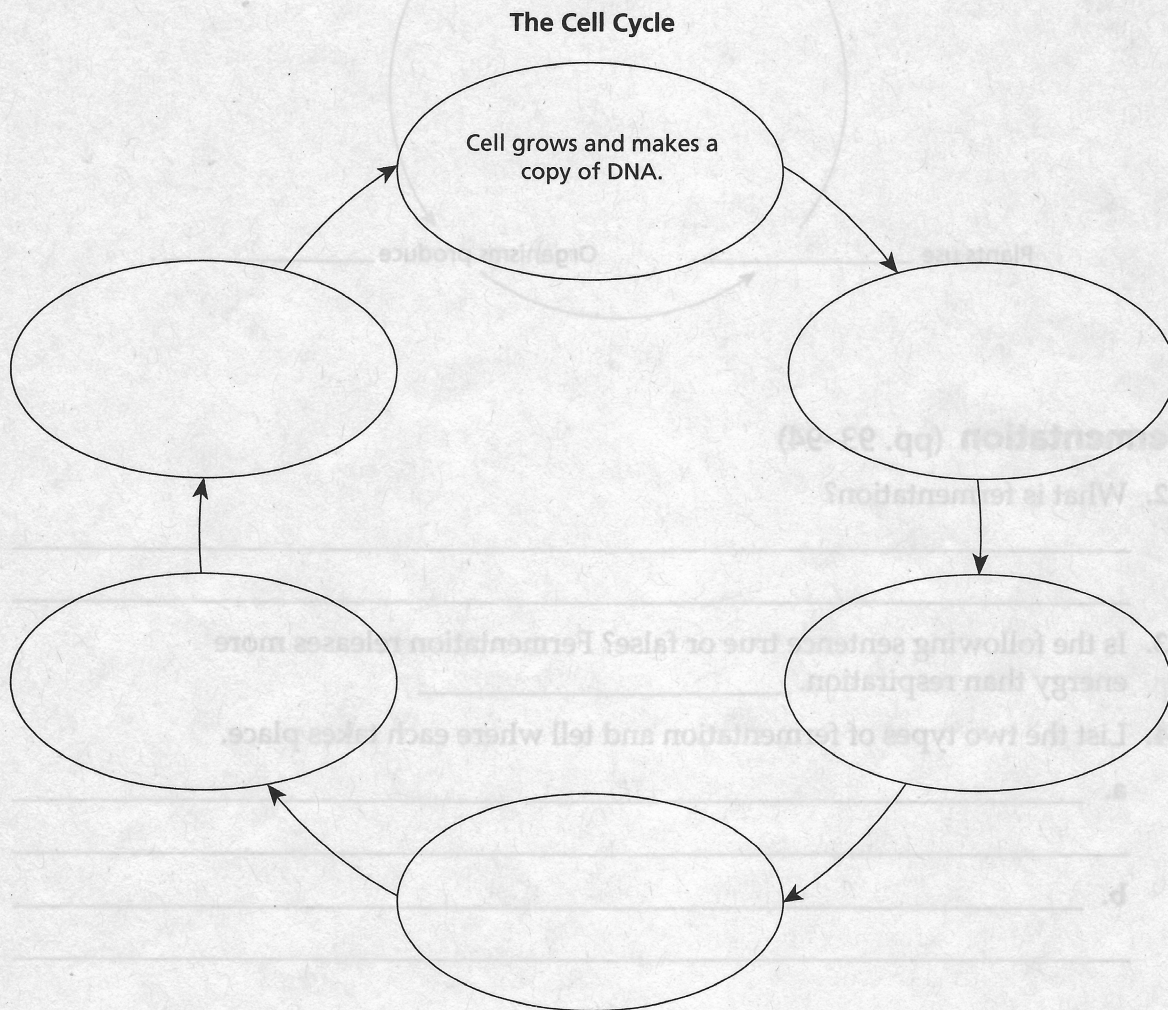
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# Cell Division (pp. 95–102)

*This section explains how cells grow and divide.*

## Use Target Reading Skills

*As you read, make a cycle diagram that shows the events in the cell cycle, including the phases of mitosis. Write each event in a separate circle.*





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**Stage 1: Interphase** (p. 96)

1. The regular sequence of growth and division that cells undergo is called the \_\_\_\_\_.
2. List three things that the cell is doing during interphase.
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
3. Circle the letter of the specific process during which the cell copies its DNA.
  - a. interphase
  - b. cytokinesis
  - c. replication
  - d. division

**Stage 2: Mitosis** (pp. 97–99)

4. Circle the letter of each sentence that is true about mitosis.
  - a. The cell makes a copy of its DNA.
  - b. The cell membrane pinches in around the middle of the cell.
  - c. The cell's nucleus divides into two new nuclei.
  - d. One copy of DNA is distributed into each daughter cell.

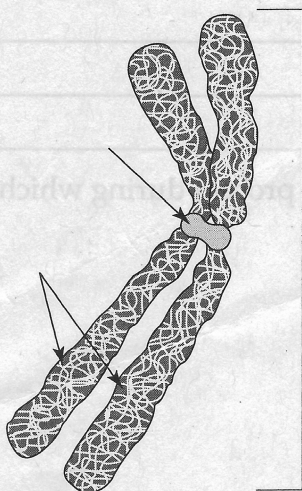
Match the phases of mitosis with the events that occur in each.

Event	Phase
_____ 5. The centromeres split and the chromatids separate.	a. prophase
_____ 6. The chromatin condenses to form chromosomes.	b. metaphase
_____ 7. A new nuclear envelope forms around each region of chromosomes.	c. anaphase
_____ 8. The chromosomes line up across the center of the cell.	d. telophase

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**Cell Division** (continued)

9. Label the parts of the structure in the diagram below.



**Stage 3: Cytokinesis** (p. 100)

- 10. During cytokinesis the \_\_\_\_\_ divides, distributing the organelles into each of the two new cells.
- 11. Is the following sentence true or false? During cytokinesis in plant cells, the new cell membrane forms before the new cell wall does.  
\_\_\_\_\_

**Structure and Replication of DNA** (pp. 101–102)

- 12. Why does a cell make a copy of its DNA before mitosis occurs?  
\_\_\_\_\_  
\_\_\_\_\_
- 13. Circle the letter of each molecule that makes up the sides of the DNA ladder.
  - a. deoxyribose
  - b. glucose
  - c. phosphate
  - d. oxygen



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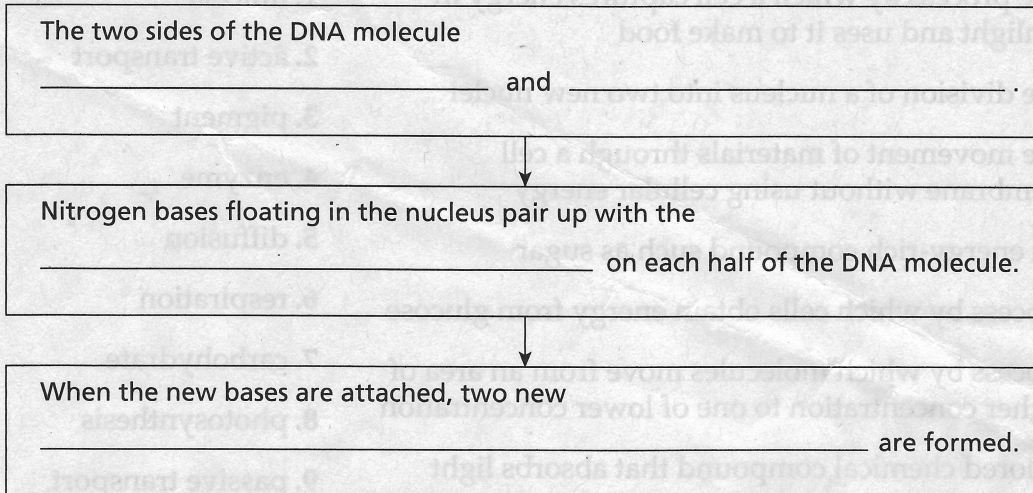
14. Name the nitrogen bases that pair up to make up the rungs of the DNA ladder.

a. \_\_\_\_\_ pairs with \_\_\_\_\_.

b. \_\_\_\_\_ pairs with \_\_\_\_\_.

15. Complete the flowchart to show what happens during DNA replication.

**DNA Replication**



	C	B	A
	_____	_____	_____
	F	E	D
	_____	_____	_____
	I	H	G
	_____	_____	_____