Section 2–3 Carbon Compounds (pages 44–48)

This section explains how the element carbon is able to form millions of carbon, or organic, compounds. It also describes the four groups of organic compounds found in living things.

The Chemistry of Carbon (page 44)

1. How many valence electrons does each carbon atom have? Each carbon atom has four electrons.

2. What gives carbon the ability to form chains that are almost unlimited in length? A carbon atom can bond to other carbon atoms.

Macromolecules (page 45)

3. Many of the molecules in living cells are so large that they are known as macromolecules.

4. What is the process called by which macromolecules are formed? Polymerization

5. When monomers join together, what do they form? Polymers

6. What are four groups of organic compounds found in living things?
   a. Carbohydrates
   b. Lipids
   c. Nucleic acids
   d. Proteins

Carbohydrates (pages 45–46)

7. What atoms make up carbohydrates? Carbon, hydrogen, and oxygen atoms make up carbohydrates.

8. Circle the letter of each sentence that is true about carbohydrates.
   (a.) Starches and sugars are examples of carbohydrates.
   (b.) Living things use them as their main source of energy.
   c. The monomers in sugar polymers are starch molecules.
   (d.) Plants and some animals use them for strength and rigidity.

9. Single sugar molecules are also called monosaccharides.

10. Circle the letter of each monosaccharide.
    (a.) galactose b. glycogen (c.) glucose (d.) fructose

11. What are polysaccharides? They are large macromolecules formed from monosaccharides.

12. How do plants and animals store excess sugar? Plants use a polysaccharide called plant starch, whereas animals use a polysaccharide called glycogen.

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Lipids (pages 46–47)

13. What kinds of atoms are lipids mostly made of? They are made mostly of carbon and hydrogen atoms.

14. What are three common categories of lipids?

a. Fats **b.** Oils **c.** Waxes

15. Many lipids are formed when a glycerol molecule combines with compounds called fatty acids.

16. Circle the letter of each way that fats are used in living things.

a. As parts of biological membranes
b. To store energy
c. To give plants rigidity
d. As chemical messengers

17. Complete the table about lipids.

LIPIDS

Kind of Lipid	Description
Saturated	Each carbon atom in a lipid's fatty acid chain is joined to another carbon atom by a single bond.
Unsaturated	There is at least one carbon-carbon double bond in a fatty acid.
Polyunsaturated	A lipid's fatty acids contain more than one double bond.

Nucleic Acids (page 47)

18. Nucleic acids contain what kinds of atoms? They contain hydrogen, oxygen, nitrogen, carbon, and phosphorus atoms.

19. The monomers that make up nucleic acids are known as nucleotides.

20. A nucleotide consists of what three parts? It consists of a nitrogenous base, a phosphate group, and a 5-carbon sugar.

21. What is the function of nucleic acids in living things? Nucleic acids store and transmit hereditary, or genetic, information.

22. What are two kinds of nucleic acids?

a. Ribonucleic acid (RNA)

b. Deoxyribonucleic acid (DNA)

Proteins (pages 47–48)

23. Proteins contain what kinds of atoms? They contain nitrogen, carbon, hydrogen, and oxygen atoms.

24. Proteins are polymers of molecules called amino acids.

25. What are four roles that proteins play in living things?

a. Some control the rate of reactions and regulate cell processes.

b. Some are used to form bones and muscles.

c. Some transport substances into or out of cells.

d. Some help to fight diseases.

Reading Skill Practice

You can often increase your understanding of what you've read by making comparisons. A compare-and-contrast table helps you to do this. On a separate sheet of paper, make a table to compare the four groups of organic compounds you read about in Section 2–3. You might use the heads *Elements, Functions,* and *Examples* for your table. For more information about compare-and-contrast tables, see Organizing Information in Appendix A.

Students' tables should include the basic information about carbohydrates, lipids, nucleic acids, and proteins.