Name _____ Class _____ Date _____

CHAPTER 2 It's Alive!! Or Is It?

SECTION 2

The Necessities of Life

BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- What things do almost all organisms need?
- Why do living things need food?

National Science Education Standards

LS 1a, 1c, 2c, 3a, 3d, 4b, 4c, 4d

STUDY TIP

Organize As you read, make a table of the basic needs of most organisms. Fill in examples of how different organisms meet those needs.

What Do Living Things Need?

Would it surprise you to learn that you have the same basic needs as a tree, a frog, and a fly? Almost every organism has the same basic needs: water, air, a place to live, and food.

WATER

Your body is made mostly of water. The cells that make up your body are about 70% to 85% water. Cells need water to keep their inside environments stable. Most of the chemical reactions that happen in cells need water. Your body loses water as you breathe, sweat, or get rid of wastes, such as urine. Because of this, you must replace the water that you lose.

Organisms get water from the fluids they drink and the foods they eat. However, organisms need different amounts of water. You could survive only three days without water. A kangaroo rat never drinks. It lives in the desert and gets all the water it needs from its food.

AIR

Oxygen, nitrogen, and carbon dioxide are some of the gases in air. Most organisms use oxygen to help them break down food for energy. Other organisms, such as green plants, use carbon dioxide to make food.

STANDARDS CHECK

LS 1c Cells carry out the many functions needed to sustain life. They grow and divide, thereby producing more cells. This requires that they take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or organism needs.

Word Help: function
use or purpose

1. Explain Why do cells need water?

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TAKE A LOOK

2. Infer Why do you think this diving spider surrounds itself with a bubble in the water?

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A PLACE TO LIVE

Just as you do, all living things need a place to live. Organisms look for an area that has everything they need to survive. Often, many organisms live in the same area. They all must use the same resources, such as food and water. Many times, an organism will try to keep others out of its area. For example, some birds keep other birds away by singing.

FOOD

All organisms need food. Food gives organisms energy and nutrients to live and grow. However, not all organisms get food in the same way. There are three ways in which organisms can get food. ☑

READING CHECK

3. Explain Why do living things need food?

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Some organisms, such as plants, are producers. **Producers** make their own food using energy from their environment. For example, plants, and some bacteria and protists, use the sun's energy to make food from carbon dioxide and water. This process is called *photosynthesis*.

Many organisms are consumers. **Consumers** eat other organisms to get food. For example, a frog is a consumer because it eats insects. All animals are consumers.

A mushroom is a decomposer. Decomposers are a special kind of consumer. **Decomposers** break down dead organisms and animal wastes to get food. Although they are a kind of consumer, decomposers play a different role in an ecosystem than most other consumers. Without decomposers, dead organisms and wastes would pile up all over the Earth!

Critical Thinking

4. Identify Are you a producer, consumer, or decomposer? Explain your answer.

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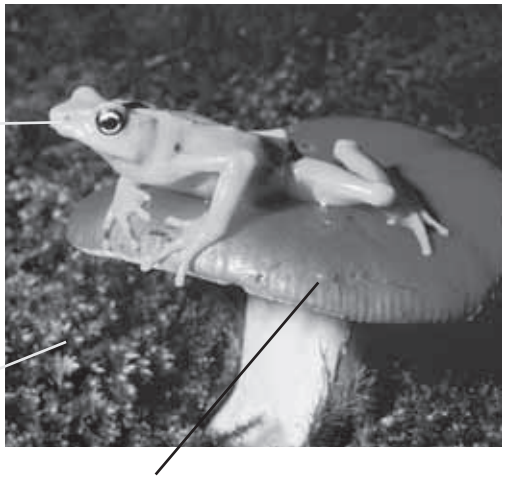

TAKE A LOOK

5. Label On the picture, label the producer, consumer, and decomposer.

What Do Organisms Get from Food?

As you just read, organisms can get their food in three different ways. However, all organisms must break down their food to use the nutrients.

Nutrients are molecules. *Molecules* are made of two or more atoms joined together. Most molecules in living things are combinations of carbon, nitrogen, oxygen, phosphorus, and sulfur. Proteins, nucleic acids, lipids, carbohydrates, and ATP are some of the molecules needed by living things.

PROTEINS

Proteins are used in many processes inside a cell. **Proteins** are large molecules made up of smaller molecules called *amino acids*. Living things break down the proteins in food and use the amino acids to make new proteins. ☑

An organism uses proteins in many different ways. Some proteins are used to build or fix parts of an organism's body. Some proteins stay on the outside of a cell, to protect it. Proteins called *enzymes* help to start or speed up reactions inside a cell.

Some proteins help cells do their jobs. For example, a protein called *hemoglobin* is found in our red blood cells. It picks up oxygen and delivers it through the body.

Spider webs, horns, and feathers are made from proteins.

Say It

Discuss With a partner, name 10 organisms and describe what foods they eat. Discuss whether these organisms are producers, consumers, or decomposers.

READING CHECK

6. Complete Proteins are made up of _____.

Math Focus

7. Calculate Each red blood cell carries about 250 million molecules of hemoglobin. If every hemoglobin molecule is attached to four oxygen molecules, how many oxygen molecules could one red blood cell carry?

NUCLEIC ACIDS

When you bake a cake, you follow instructions to make sure the cake is made correctly. When cells make new molecules, such as proteins, they also follow a set of instructions. The instructions for making any part of an organism are stored in *DNA*.

DNA is a nucleic acid. **Nucleic acids** are molecules made of smaller molecules called *nucleotides*. The instructions carried by DNA tell a cell how to make proteins. The order of nucleotides in DNA tells cells which amino acids to use and which order to put them in.

Critical Thinking

8. Identify Relationships What is the relationship between amino acids and nucleotides?

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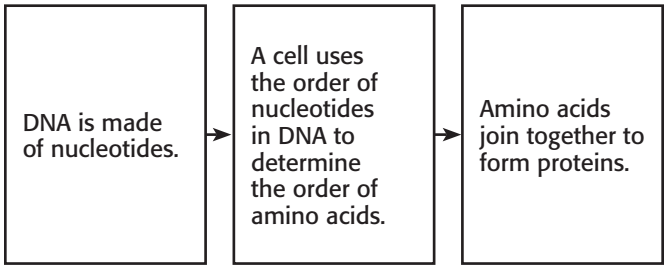

LIPIDS

Lipids are molecules that cannot mix with water. They are a form of stored energy. When lipids are stored in an animal, they are usually solid. These are called *fats*. When lipids are stored in a plant, they are usually liquid. These are called *oils*. When an organism has used up other sources of energy, it can break down fats and oils for more energy.

Lipids also form cell membranes. Cell membranes surround and protect cells. They are made of special lipids called **phospholipids**. When phospholipids are in water, the tail ends of the molecules come together and the head ends face out. This is shown in the figure below.

TAKE A LOOK

9. Describe Describe the structure of a phospholipid, and how it behaves in water.

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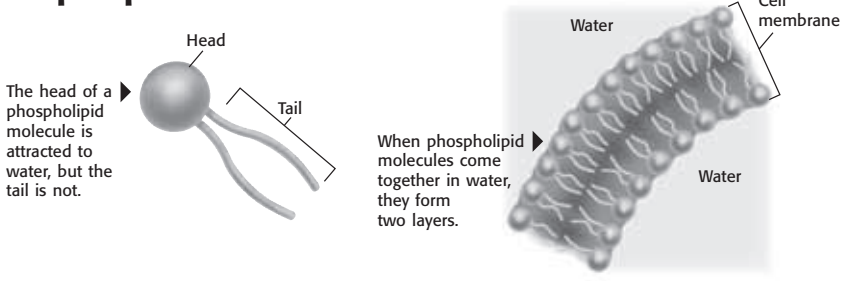
Phospholipid Membranes



CARBOHYDRATES

Carbohydrates are molecules made of sugars. They provide and store energy for cells. An organism's cells break down carbohydrates to free energy. There are two types of carbohydrates: simple and complex. ☑

Simple carbohydrates are made of one or a few sugar molecules. Both table sugar and sugar in fruits are simple carbohydrates. The simple carbohydrate *glucose* is the most common source of energy for cells. The body breaks down simple carbohydrates more quickly than complex carbohydrates.

Complex carbohydrates are made of hundreds of sugar molecules linked together. When organisms such as plants have more sugar than they need, they can store the extra sugar as complex carbohydrates. For example, potatoes store extra sugar as starch. You can also find complex carbohydrates in foods such as whole-wheat bread, pasta, oatmeal, and brown rice.

READING CHECK

10. Identify What are two types of carbohydrates?

_____

_____

Type of carbohydrate	Structure	Example
	made of one or a few sugar molecules	
Complex		

TAKE A LOOK

11. Complete Complete the table to explain the two types of carbohydrates.

ATP

After carbohydrates and fats have been broken down, how does their energy get to where it is needed? The cells use **a**denosine **t**riphos**p**hate, or ATP. **ATP** is a molecule that carries energy in cells. The energy released from carbohydrates and fats is passed to ATP molecules. ATP then carries the energy to where it is needed in the cell. ☑

READING CHECK

12. Identify What molecule carries energy in cells?

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Name _____ Class _____ Date _____

Section 2 Review

NSES LS 1a, 1c, 2c, 3a, 3d, 4b, 4c, 4d

SECTION VOCABULARY

ATP adenosine triphosphate, a molecule that acts as the main energy source for cell processes

carbohydrate a class of energy-giving molecules that includes sugars, starches, and fiber; contains carbon, hydrogen, and oxygen

consumer an organism that eats other organisms or organic matter

decomposer an organism that gets energy by breaking down the remains of dead organisms or animal wastes and consuming or absorbing the nutrients

lipid a type of biochemical that does not dissolve in water; fats and steroids are lipids

nucleic acid a molecule made up of subunits called nucleotides

phospholipid a lipid that contains phosphorus and that is a structural component in cell membranes

producer an organism that can make its own food by using energy from its surroundings

protein a molecule that is made up of amino acids and that is needed to build and repair body structures and to regulate processes in the body

1. List Name four things that organisms need to survive.

2. Explain Why are decomposers also consumers?

3. Identify What two nutrients store energy?

4. Describe Describe the structure of a cell membrane.

5. Compare Name two ways that simple carbohydrates differ from complex carbohydrates.

6. Explain Why is ATP important to cells?