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?

California Science Standards

7.1.a

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.

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.

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.

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.

CALIFORNIA STANDARDS CHECK

7.1.a Students know cells function similarly in all living organisms.

Word Help: function to work

1. Explain Why do cells need water?

Cells need water to keep their environments stable. Cells are like microscopic water balloons. Without water they would shrivel up.

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.

Some organisms do not need air. These are called *anaerobic organisms*. Most anaerobic organisms are single-celled organisms, such as bacteria. Air can actually kill these organisms.

TAKE A LOOK

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

so it can breathe oxygen while underwater

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. ☑

Some organisms, such as plants, are producers. **Producers** make their own food using energy from their environment. For example, plants 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.

A mushroom is a decomposer. **Decomposers** break down dead organisms and animal wastes to get food. Decomposers are also consumers because they get their food from other organisms.

READING CHECK

3. Explain Why do living things need food?

Food gives organisms energy and nutrients to live and grow.

Critical Thinking

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

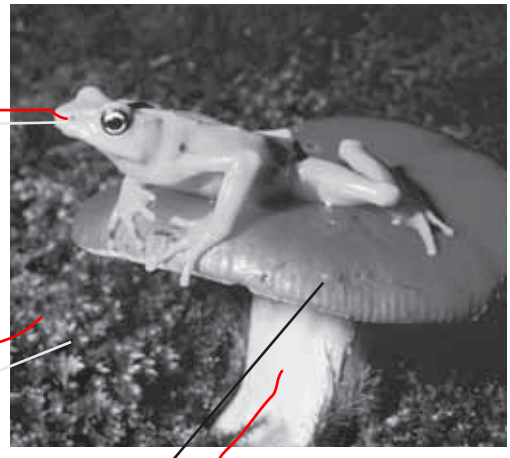
Consumer, because we eat other organisms for food.

We are not green and do not produce food.

We do not eat animal wastes.

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 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 _____ amino acids _____.

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?

4oxygens X 250million hemoglobins = 1 billion oxygens

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*.

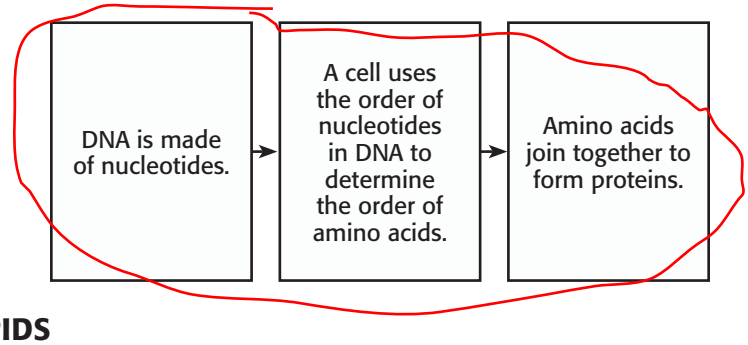
DNA is a nucleic acid. **Nucleic acids** are molecules made of smaller molecules called *nucleotides*. The instructions carried by DNA tell a cell how to make proteins. The order of nucleotides in DNA tells cells which amino acids to use and which order to put them in.

Critical Thinking

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

The sequence (order of arrangement) of amino acids is determined by the sequence of nucleotides.

Nucleotides make up the template (design plan) for amino acid chains.



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.

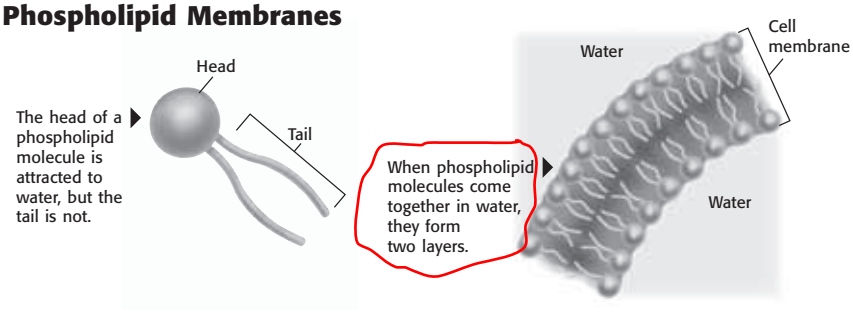
Lipids also form cell membranes. Cell membranes surround and protect cells. They are made of special lipids called **phospholipids**. When phospholipids are in water, the tails come together and the heads face out. This is shown in the figure below.

TAKE A LOOK

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

Phospholipids form a bilayer with the inside and outside heads next to water, the inside tails are oily and repel from water.

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 examples of 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?

Simple carbohydrates or complex carbohydrates

Type of carbohydrate	Structure	Example
simple	made of one or a few sugar molecules	glucose, fructose, galactose
complex	made of hundreds of sugar molecules	glycogen, amylose, cellulose

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 adenosine triphosphate, 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?

ATP

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Section 2 Review

7.1.a 

SECTION VOCABULARY

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

carbohydrate a class of molecules that includes sugars, starches, and fiber

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 fat molecule or a molecule that has similar properties

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

Wordwise The root *phospho* means "containing phosphorus." The root *lip* means "fat."

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.

Water, air and a place to live and nutrients

2. Explain Why are decomposers also consumers?

They are eating a form of energy that they did not make.

3. Identify What two nutrients store energy?

Carbohydrates and lipids

4. Describe Describe the structure of a cell membrane.

A phospholipid bilayer. Two rows of lipid molecules that form a barrier to water since the nonpolar tails are in the middle. The polar heads are on the edges and interact with water.

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

Simple carbohydrates are monosaccharides and store quick absorbing energy. Simple sugars can travel through the blood. Complex carbohydrates are broken down in the stomach and intestines.

6. Explain Why is ATP important to cells?

ATP is a more portable energy storage molecule than sugar.