

The Organization of Living Things

BEFORE YOU READ

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

- What are the advantages of being multicellular?
- What are the four levels of organization in living things?
- How are structure and function related in an organism?

National Science Education Standards
LS 1a, 1d, 1e

What Is an Organism?

Anything that can perform life processes by itself is an **organism**. An organism made of a single cell is called a *unicellular organism*. An organism made of many cells is a multicellular organism. The cells in a multicellular organism depend on each other for the organism to survive. ✓

STUDY TIP

Outline As you read, make an outline of this section. Use the heading questions from the section in your outline.

What Are the Benefits of Having Many Cells?

Some organisms exist as one cell. Others can be made of trillions of cells. A *multicellular organism* is an organism made of many cells.

There are three benefits of being multicellular: larger size, longer life, and specialization of cells.

READING CHECK

1. Define What is an organism?

LARGER SIZE

Most multicellular organisms are bigger than one-celled organisms. In general, a larger organism, such as an elephant, has few predators. ✓

LONGER LIFE

A multicellular organism usually lives longer than a one-celled organism. A one-celled organism is limited to the life span of its one cell. The life span of a multicellular organism, however, is not limited to the life span of any one of its cells.

READING CHECK

2. Identify Name one way that being large can benefit an organism.

SPECIALIZATION

In a multicellular organism, each type of cell has a particular job. Each cell does not have to do everything the organism needs. Specialization makes the organism more efficient.

SECTION 3 The Organization of Living Things *continued*

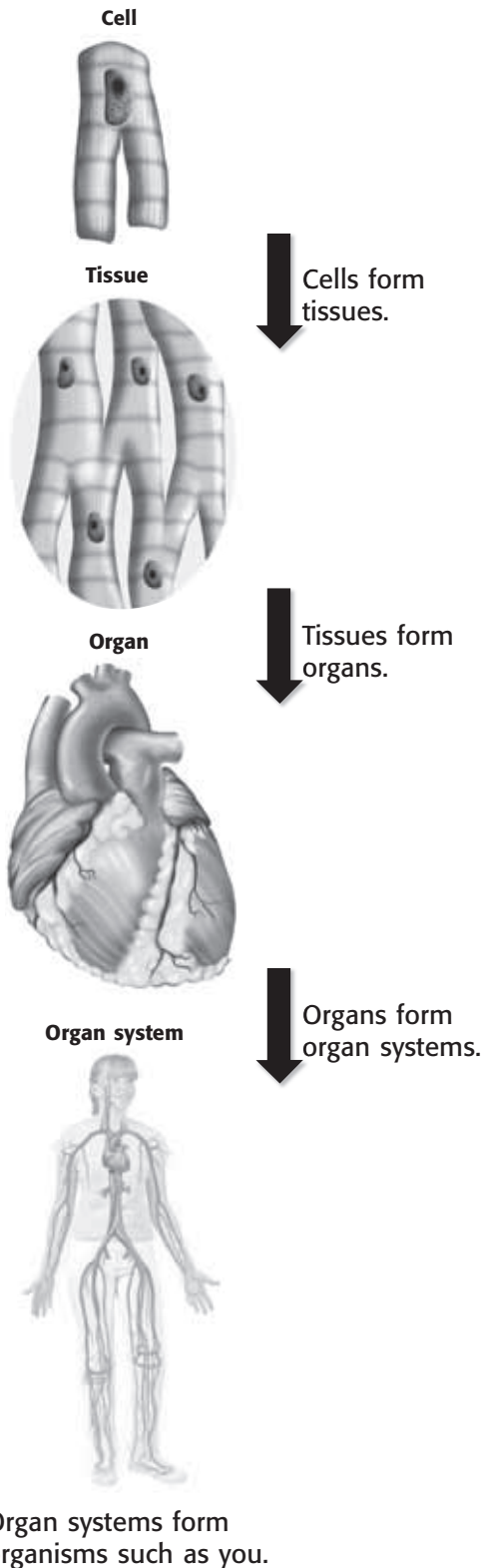
Standards Check

LS 1d Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form a tissue, such as a muscle. Different tissues are in turn grouped together and form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.

3. List What are the four levels of organization for an organism?

What Are the Four Levels of Organization of Living Things?

Multicellular organisms have four levels of organization:



TAKE A LOOK

4. Explain Are the cells that make up heart tissue prokaryotic or eukaryotic? How do you know?

SECTION 3 The Organization of Living Things *continued*

CELLS WORK TOGETHER AS TISSUES

A **tissue** is a group of cells that work together to perform a specific job. Heart muscle tissue, for example, is made of many heart muscle cells.

TISSUES WORK TOGETHER AS ORGANS

A structure made of two or more tissues that work together to do a certain job is called an **organ**. Your heart, for example, is an organ made of different tissues. The heart has muscle tissues and nerve tissues that work together.

ORGANS WORK TOGETHER AS ORGAN SYSTEMS

A group of organs working together to do a job is called an **organ system**. An example of an organ system is your digestive system. Organ systems depend on each other to help the organism function. For example, the digestive system depends on the cardiovascular and respiratory systems for oxygen.

HOW DOES STRUCTURE RELATE TO FUNCTION?

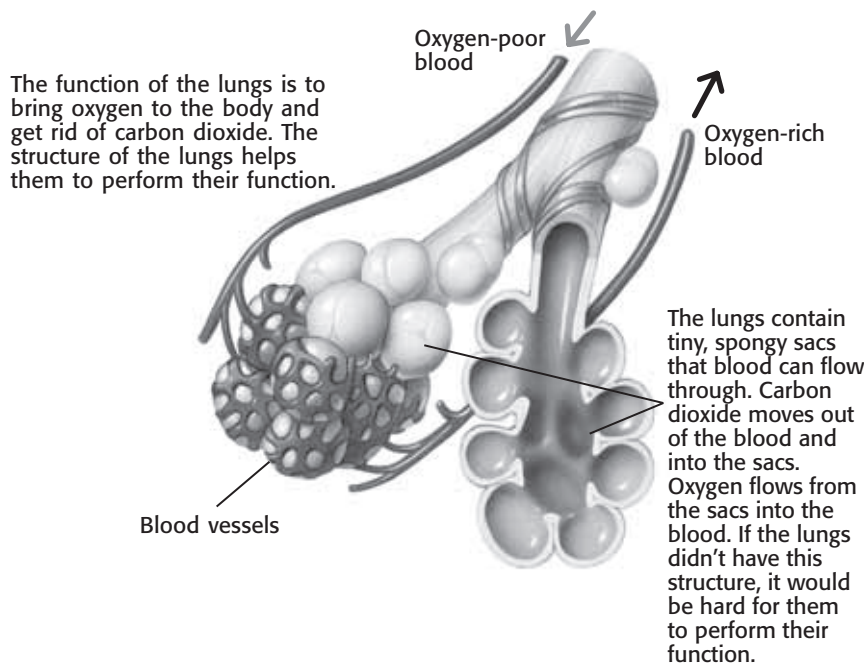
In an organism, the structure and function of part are related. **Function** is the job the part does. **Structure** is the arrangement of parts in an organism. It includes the shape of a part or the material the part is made of.

Critical Thinking

5. Apply Concepts Do prokaryotes have tissues? Explain.

 **Say It**

Name With a partner, name as many of the organs in the human body as you can.



Section 3 Review

NSES LS 1a, 1d, 1e

SECTION VOCABULARY

<p>function the special, normal, or proper activity of an organ or part</p> <p>organ a collection of tissues that carry out a specialized function of the body</p> <p>organ system a group of organisms that work together to perform body functions</p>	<p>organism a living thing; anything that can carry out life processes independently</p> <p>structure the arrangement of parts in an organism</p> <p>tissue a group of similar cells that perform a common function</p>
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1. **List** What are three benefits of being multicellular?

2. **Apply Concepts** Could an organism have organs but no tissues? Explain.

3. **Compare** How are structure and function different?

4. **Explain** What does “specialization of cells” mean?

5. **Apply Concepts** Why couldn't your heart have only cardiac tissue?

6. **Explain** Why do multicellular organisms generally live longer than unicellular organisms?

Review

1. large central vacuole, chloroplasts, cell wall
2. Water can pass through the cell membrane into the cell. Nutrients enter the cell through proteins in the membrane.
3. The cell couldn't break down materials. Old cell parts and dangerous materials would build up and could damage or kill the cell.
4. A muscle cell—mitochondria make energy for a cell. A muscle cell would use more energy than a skin cell.
5. structure, movement

SECTION 3 THE ORGANIZATION OF LIVING THINGS

1. anything that can perform life processes by itself
2. In general, a large animal has fewer predators.
3. cells, tissues, organs, organ systems
4. Eukaryotic—each cell has a nucleus.
5. No, prokaryotes have only one cell. Tissues are made of groups of cells.

Review

1. Multicellular organisms are larger and don't have as many predators. They typically live longer than single-celled organisms. Cells in a multicellular organism are specialized, so they function more efficiently.
2. No. Organs are made of tissues, so to have organs, an organism must have tissues.
3. Function is the purpose of a part, or the job the part does. Structure is the arrangement of parts in an organism.
4. Specialization of cells means that, in multicellular organisms, different cells perform different functions to help keep the organism alive.
5. An organ has to have two or more tissues. Tissues have to work together for an organ to do a job.
6. The life span of a multicellular organism is not limited to the life span of any one of its cells.

Chapter 4 The Cell in Action

SECTION 1 EXCHANGE WITH THE ENVIRONMENT

1. the movement of particles from areas of high concentration to areas of low concentration

2. by diffusion
3. The 200 molecules of water have a higher concentration of water because 100% of the molecules are water.
4. Water moves into it by osmosis.
5. by osmosis
6. energy
7. The vesicle in the third picture should be labeled.

Review

1. Both involve moving large particles across the cell membrane. In endocytosis, particles move into the cell. In exocytosis, particles move out of the cell.
2. Osmosis is the diffusion of water across a semipermeable membrane.
3. During passive transport, particles move from areas of high concentration to areas of low concentration. During active transport, particles move from areas of low concentration to areas of high concentration. Active transport uses energy from the cell, and passive transport does not.
4. channels
5. An arrow should point from the pure water to the water mixed with sugar.

SECTION 2 CELL ENERGY

1. chloroplasts
2. glucose and oxygen
3. cellular respiration, fermentation
4. glucose and oxygen
5. carbon dioxide, water, energy (ATP)
6. Plants and animals wouldn't have oxygen for cellular respiration. They couldn't use cellular respiration to get energy.
7. ATP

Review

1. plant cells
2. Plant cells use carbon dioxide, water, and energy from the sun to make food by photosynthesis.
3. Chloroplasts make food for the plant, and mitochondria break down the food to release energy.