

Red Edition
Grade 3–4
reading level

Purple Edition
Grade 4–5
reading level

Objectives

- Describe cells, the basic units of all living things.
- List the four main kinds of tissue in the body.
- Understand organs and organ systems.
- Explore ten main systems in the human body.
- Explain ways that the body's systems work together.

Reading Comprehension Skills

Preview the Book ♦ How to Read Diagrams

Skillbuilders are available for this title.

Supporting English Learners

Teach Academic English Make school language comprehensible to English Learners. Carefully select words that have to do with academic tasks, such as *preview*, *heading*, *diagram*, *label*, and *caption*, and teach them in meaningful contexts. Provide daily, explicit instruction to teach both science vocabulary and school language in depth.

Summary

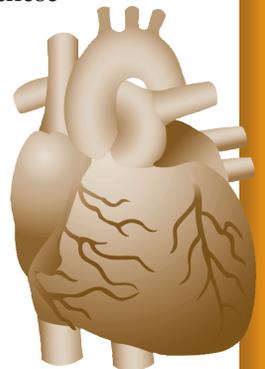
Understanding the human body promotes personal health and wellness, in addition to increasing scientific understanding. In the Delta Science Content Reader *Human Body Systems*, students first learn about the basic organization of the human body. They discover how cells make up tissues, tissues make up organs, and organs make up organ systems. Students then learn about ten main systems in the human body and explore ways in which these systems function together to support complex life processes, such as movement and eating.

Science Background

The human body is a busy place! The heart beats, pumping blood to all parts of the body. The lungs repeatedly take in and expel air. The skin constantly sheds dead cells and grows new ones. Even when asleep, the body's systems are constantly at work.

Like all organisms, the human body is made of cells, the microscopic building blocks of life. The human body is made of trillions of cells. But humans and other multicellular organisms are not merely random collections of cells. Each organism has structures that serve specific functions for survival, growth, and reproduction. This specialization begins at the cellular level. Different cells are specialized to perform different tasks. A group of one type of cells that works together forms a tissue. A group of tissues working together forms an organ. Organs and other structures working together form organ systems.

Humans are mammals, and as such we have complex organ systems. Among these are the circulatory system, respiratory system, digestive system, skeletal system, muscular system, nervous system, excretory system, immune system, reproductive system, and endocrine system. All of these systems perform specific functions, yet they do not work alone. In many cases, a system would have trouble functioning if one of the other systems were not working properly. For example, damage to the nervous system can affect a person's ability to use their muscular and skeletal systems. Thus organ systems are themselves interrelated.



How Is the Human Body Organized? (pages 2–5)

Before Reading

Discuss the Cover

Cover Image Discuss the photograph on the cover of *Human Body Systems*. Use the information on the inside front cover to support the discussion.

Science Statement Discuss the science statement.

Ask: *What parts of your body do you use to run?* (Possible answers: legs, bones, muscles, lungs, heart)
How do you think these parts work together when you run?

Build Reading Skills (page 2)

Preview the Book Use Build Reading Skills on page 2 to review how to preview the book. Discuss the steps. Then model previewing words in bold type.

Think Aloud *Why are some words set in bold type? I know that sometimes science vocabulary is set in bold type. Maybe that is the case here. To see if I'm right, I'll look at the Vocabulary box on page 3. The words organism, cell, and tissue are all Vocabulary words. Are they set in bold type later in the book? Yes, I see them all on page 4. I was right: the words in bold type are Vocabulary words.*

Guide students as they finish previewing *Human Body Systems*. Focus on nonfiction text features.

- Prompt them to look at the headings, photographs, captions, and diagrams. Ask questions such as *Why do you think that feature is there? How will it help you understand what you read?*
- Prompt them to look at other bold Vocabulary words. Guide the class in looking up a Vocabulary word in the Glossary.

Students can apply the skill in the Reflect on Reading activity on page 5.

K-W-L Chart Have students begin a K-W-L chart. They should add to it after each section.

What I Know	What I Want to Learn	What I Learned
The heart is an organ.	What is an organ system?	

Make a Connection (page 3)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about how the human body is organized. (Possible answer: There are many different parts in the human body, so I think there must be many different kinds of cells.) Point out the image of red blood cells. Explain that images such as this are often made with an electron microscope, which can magnify objects much more than a traditional microscope can.

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

Vocabulary Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a word web on the board with *Organism* in the center. Have students add *cell*, *tissue*, and other important words as they read.

During Reading

Cells, Tissues, Organs, and Organ Systems (page 4)

- Tell students that the tissues on page 4 were stained with a special dye to make them stand out under the microscope. That is not their natural color.
 - Ask: *What are some examples of organs?* (Possible answers: heart, skin, stomach, lungs)
What are organs made of? (tissues)
 - Ask: *Which has a bigger job to do, a tissue or an organ system?* (organ system)
- Checkpoint** (page 5) (Alike: part of an organism, has a special job; Different: cell is tiny living building block, organ system includes many parts that work together to get an even bigger job done)

After Reading

Reflect on Reading (page 5) Have students review the pictures, captions, and other book features on pages 2–5 before answering. (Possible answer: The drawing on page 5 helped me understand how cells, tissues, organs, and organ systems are related.)

Apply Science Concepts (page 5) This activity applies a concept from Find Out About on page 3. Before students complete the activity, explain that a system is a group of parts that work together, forming a whole. (Possible answer: Like organ systems, these systems are made of many parts that work together to get a big job done. For example, drivers and buses are parts of a transportation system, which has the big job of transporting lots of people.)

How Do the Body's Systems Work?

(pages 6–22)

Before Reading

Build Reading Skills (page 6)

How to Read Diagrams Use Build Reading Skills on page 6 to review how to read diagrams. Discuss the tips. Discuss with students that arrows, numbers, keys, legends, symbols, and color coding can be important features of diagrams. Then model how to read the circulatory system diagram on page 8.

Think Aloud *First, I read the title, "Circulatory System." Then, I read the labels "heart," "artery," and "vein." These must be parts of the circulatory system. I also see a small circle with dotted lines leading to a bigger circle with a small picture inside. The small picture is labeled "capillaries." This must be a close-up of what capillaries look like. I will look for information about these four parts of the circulatory system as I read.*

Guide students as they read the digestive system diagram on page 12. Students can apply the skill in the Reflect on Reading activity on page 22.

Make a Connection (page 7)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about how the body's systems work. (Possible answers: brain must tell legs to move, muscles must move legs, body must have energy to move)

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

Vocabulary Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a word web on the board with *Human Body* in the center. Have students add information about each body system as they read.

During Reading

Circulatory System (page 8)

- Ask: *What does the heart do?* (works like a pump to move blood through the body)
- Ask: *What part of blood carries oxygen, as well as carbon dioxide and other waste gases?* (red blood cells)
- Ask: *Some diseases make a person have fewer white blood cells. How might this affect that person?* (Possible answer: It might make the person get more infections.)
- Review the names of the kinds of blood vessels on page 9. Provide the following mnemonic for remembering which vessels do what: Arteries carry blood Away from the heart, and Capillaries Connect arteries and veins. This leaves veins, which carry blood back toward the heart.

✓ **Checkpoint** (page 9) (brings nutrients and oxygen to the body's cells, carries carbon dioxide gas and other wastes away from the cells)

Respiratory System (page 10)

- If students do not believe that water is given off when you breathe out, remind them that a window fogs up with water vapor when breathed on.
- Discuss the respiratory system diagram on page 10. Help students follow the path oxygen takes through the nose or mouth, throat, trachea, bronchial tubes, lungs, and bronchioles into the alveoli. Ask: *What two things happen in the alveoli?* (Oxygen moves from the lungs into the blood. Waste carbon dioxide in the blood moves into the lungs.)
- Ask: *Which muscle does most of the work to move air in and out of your body?* (diaphragm)
- Ask: *Why do your breathing and heartbeat get faster when you are more active?* (Your cells need more oxygen.) *What might happen to your breathing and heartbeat when you are less active, such as when you are asleep?* (They might slow down.)

- ✓ **Checkpoint** (page 11) (Cells use oxygen to break apart nutrients from food. This releases energy the body uses to live, move, and grow.)

Digestive System (page 12)

- Ask: *What do nutrients do?* (give your body energy to live, help your body grow and repair itself) *Where do we get nutrients?* (from food)
- Ask: *What are two ways your body breaks down, or digests, food?* (by crushing or grinding food, by mixing food with chemicals called acids and enzymes)
- Explain that, while we tend to think of the stomach as the main organ that digests food, much more digestion takes place in the small intestine. The stomach breaks down food until it is soupy. The small intestine breaks down food until it is small enough that cells can use it.
- Discuss the villi diagram on page 13. Explain that the finger-like shape of the villi provides much more area to absorb nutrients than there would be if the inside of the small intestine were smooth.
- Ask: *How are villi like alveoli in the lungs?* (Possible answer: Both have capillaries for passing materials into the blood.)
- ✓ **Checkpoint** (page 13) (Possible answer: The body might not get the nutrients it needs.)

Skeletal System (page 14)

- Since most bones that students observe directly are no longer part of a living thing, students may not realize that their bones are alive, just as all other structures in their bodies are alive. Emphasize that even the hard parts of bones contain blood vessels and other living tissues.
- Point out that over half of an adult's 206 bones are in the hands and feet. Ask: *Why do you think these parts have so many bones?* (Possible answer: so they can move in many different ways)
- Discuss the diagram of movable joints on page 15. Ask: *What do the arrows show?* (the direction and amount of bone movement each kind of joint allows) *Which kind of joint allows the most movement?* (ball-and-socket)
- ✓ **Checkpoint** (page 15) (gives the body shape and support, helps the body move, protects the organs inside the body)

Muscular System (page 16)

- Ask: *What two jobs does the muscular system do?* (works with the skeletal system to make the body move, helps move materials such as blood and oxygen through the body)
- Ask: *What part of the circulatory system has muscles to pump blood?* (the heart)
- Ask: *You also learned about some muscles in the digestive system. What do these muscles do?* (muscles in esophagus push food down to stomach, muscles in stomach help mix everything together) *Are the muscles in the digestive system skeletal muscle or smooth muscle?* (smooth)
- Ask: *How do tendons and skeletal muscle work together to move bones?* (Skeletal muscle is attached to two or more bones by tendons. When skeletal muscle contracts, it shortens. This pulls bones closer together.)
- Discuss the diagram of a pair of muscles. Tell students they can feel the muscle pairs contracting in their own arms. Have them wrap a hand around their upper arm, then bend and straighten their arm at the elbow. Tell them that a muscle feels firmer when it is contracted. Ask: *Which muscle feels firmer when your arm is bent?* (biceps) *Which muscle feels firmer when your arm is straight?* (triceps)
- ✓ **Checkpoint** (page 17) (You can control voluntary muscles. You do not control involuntary muscles. They do their jobs on their own.)

Nervous System (page 18)

- Remind students that some words have different meanings in science than in everyday speech. Ask: *What does the word nervous often mean in everyday speech?* (Possible answers: scared, frightened) *What might your body do when you are nervous?* (Possible answers: heart might beat faster, breathing might get faster, might start to sweat) Tell students that these reactions are controlled by the nervous system. When we are scared, our nervous system gets the body ready to react to danger. So the everyday meaning of *nervous* does have to do with the nervous system, but the nervous system is working all the time, not just when we are scared.
- Ask: *What are the parts of the nervous system?* (brain, nerves, spinal cord)

- Ask: *What does the brain do?* (lets you think and feel, stores your memories, controls most voluntary actions, controls many involuntary actions)
 - Emphasize that nerves carry information both to and from the brain and other parts of the body.
 - Ask: *Sometimes people suffer damage to their spinal cord in an accident. Afterward, they might not be able to move their legs or other body parts. Why do you think this happens?* (Possible answer: The spinal cord connects the brain to many nerves in the body. If it were damaged, it might not be able to pass information telling the body what to do.)
 - Ask: *If you walk from a darkly lit room into a brightly lit room, you will close or squint your eyes. Do you have to think about doing this, or do you just do it? (You just do it.) What is this kind of action called?* (reflex)
- ✔ **Checkpoint** (page 19) (Nerves pass information from the sense organs to the spinal cord and brain.)

Excretory System (page 20)

- Ask: *Where does ammonia in the body come from?* (It is a waste that comes from some of the jobs cells do.) *Which organ changes ammonia into a less harmful substance?* (liver)
 - Ask: *What is sweat made from?* (water, salts, and other wastes)
- ✔ **Checkpoint** (page 20) (through the ureters and the bladder, through the skin when you sweat)

Other Body Systems (page 21)

- Ask: *What are pathogens?* (things that can cause diseases and infections) *What are some examples of pathogens?* (viruses and some bacteria)
 - You may wish to note that many helpful bacteria live in our bodies, such as those that help us digest certain foods.
 - Ask: *Where are white blood cells made?* (bone marrow, tonsils, lymph nodes, thymus, spleen)
- ✔ **Checkpoint** (page 21) (The immune system keeps your body safe from pathogens. For example, the skin keeps some pathogens out of the body, and white blood cells attack pathogens in the blood.)

Body Systems Working Together

(page 22)

- Point out that not only do body systems work together, but some organs are part of multiple organ systems. For example, the liver is part of the digestive system and the excretory system.
 - Discuss the photograph of the boy eating an apple. Ask: *What different ways does the boy's nervous system work to help him eat?* (Possible answers: It lets him know he is hungry, tells his muscular and skeletal systems to move so he can pick up and eat the apple, and helps him taste and feel the apple with his sense organs.)
- ✔ **Checkpoint** (page 22) (Possible answer: The digestive system and circulatory system work together to help your body get nutrients for energy, growth, and repair. Your digestive system breaks down the food after you take a bite. Your circulatory system carries the food's nutrients to your cells.)

After Reading

Reflect on Reading (page 22) Before students complete the activity, review the tips for how to read diagrams on page 6. (Possible answer: The diagram helps me understand how muscle pairs work by showing that when the biceps muscle contracts and the triceps muscle relaxes, the arm bends. When the biceps muscle relaxes and the triceps muscle contracts, the arm straightens.)

Apply Science Concepts (page 22) This activity applies a concept from Find Out About on page 7. If students need help getting started, allow them to quietly walk around the classroom while thinking about all the body systems involved in this simple activity. (Possible answer: My circulatory, respiratory, digestive, skeletal, muscular, and nervous systems all work together when I take a walk; circulatory and respiratory work to bring oxygen to cells and take away carbon dioxide; circulatory and digestive work to bring nutrients to cells for energy; skeletal and muscular work to make body move; nervous controls other systems, including getting information about surroundings from sense organs and telling body how to move and respond)

➡ **Continued on last page**

Name: _____

Date: _____

Test: Human Body Systems

Part A: Vocabulary

cell	circulatory system	digestive system	muscular system
nervous system	organ	respiratory system	skeletal system

Choose the correct vocabulary word for each sentence. Write the word on the line.

1. The basic unit of all organisms is the _____.
2. The heart is one _____ in the human body.
3. The _____ brings nutrients to all parts of the body and takes away wastes.
4. The nose and trachea are part of the _____.
5. The _____ breaks down food so that the body can use it.
6. The _____ gives the body shape and support and helps it move.
7. Tendons are part of the _____.
8. The _____ controls almost everything your body does.

Part B: Science Concepts

Mark the best answer to each question.

9. Organs are made up of different kinds of _____.

(A) joints	(C) veins
(B) nerves	(D) tissues
10. Which two systems work together to bring oxygen to your cells?

(A) circulatory and skeletal	(C) respiratory and circulatory
(B) respiratory and digestive	(D) muscular and skeletal

Test: Human Body Systems (continued)

11. Which part of the digestive system mixes partly digested food into a soup-like liquid?

- (A) lungs
- (B) esophagus
- (C) diaphragm
- (D) stomach

12. Which system protects the organs inside the body?

- (A) muscular system
- (B) skeletal system
- (C) digestive system
- (D) nervous system

Write the answer.

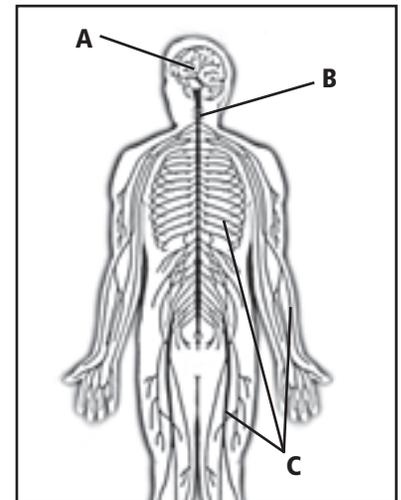
13. Look at the diagram. Label each part of the nervous system with the correct word from the word box. Describe what each labeled part does.

nerves	brain	spinal cord
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A _____

B _____

C _____



14. Tell about the main parts of the circulatory system and what each part does.

15. Explain how your skeletal system, muscular system, and nervous system work together to help you take this test.

Let's Review

(inside back cover)

Have students complete their K-W-L charts before answering these questions. Possible answers are shown.

- 1. Cover Connection** (An organ system includes organs and other body parts that work together to get a big job done. Our bodies are made up of many organ systems. Organ systems work together. For example, the digestive system breaks down the food we eat into nutrients. The circulatory system then brings the nutrients to our bodies' cells.)
- 2.** (Muscle tissue is made of muscle cells. Muscle tissue is found attached to bones, inside the walls of organs, and in the heart. Muscle tissue shortens to move parts of the body.)
- 3.** (The kidneys are part of the excretory system. Their main job is to take urea and water out of the blood and turn them into urine. Urea is made from ammonia, a harmful waste that comes from some of the jobs cells do. The kidneys' job is important because it helps the body get rid of this waste.)
- 4. How to Read Diagrams** (The diagram shows the skeletal system. Bones are labeled. The diagram has two drawings so that it can show bones in the front and back of the body.)
- 5. Write** (The sport students choose to write about will vary. Stories should explain that muscles are attached to bones, and that when muscles contract, they pull bones closer together to move them. Stories may also reference muscle pairs, such as the biceps and triceps.)

Try It! Hand lenses can reveal a lot of detail, especially in good light. Students will probably note that the back of their arm has the most hair and that the tips of the fingers have the most lines and wrinkles. Pores may or may not be visible; the back of the hand is a likely place to see them.

Science at Home Have students do this activity at home with a family member. Students should find that smell and taste are connected—foods will probably have weaker flavors when they eat while holding their noses.

Answers to Test

(Teacher's Guide pages 6–7)

1. cell **2.** organ **3.** circulatory system **4.** respiratory system
5. digestive system **6.** skeletal system **7.** muscular system **8.** nervous system **9.** D **10.** C **11.** D **12.** B **13.** A: brain—command center of the body, lets you think and feel, stores your memories, controls most voluntary actions and many involuntary actions; B: spinal cord—connects the brain to many nerves in the body; C: nerves—carry signals, such as information from the senses, to and from the brain and spinal cord **14.** The heart works like a pump to move blood through the body. Blood is a kind of flowing connective tissue that carries nutrients and gases. Blood vessels are tubes that carry blood through the body. **15.** The brain works with the rest of the nervous system to let me read the questions and then think of answers. The nervous system tells the muscular system to pick up the pencil. Muscles work with bones in the skeletal system to pick up the pencil and move it across the paper to write the answers.

ADDITIONAL ASSESSMENT OPPORTUNITIES Use the Checkpoints, Reflect on Reading, and Apply Science Concepts features and Let's Review questions as additional assessment opportunities.

Delta Science Content Readers are 24-page nonfiction student books with informative, engaging text and full-color photos and illustrations. The readers present key science content and vocabulary found on state tests, present key reading skills and strategies useful for reading informational text, support and extend the experiences and content of hands-on activities, promote scientific inquiry, and serve as a home-school link. They are available in two editions: Red Edition for Grades 3–4 and Purple Edition for Grades 4–5.

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Human Body Systems
Teacher's Guide
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