



SCIENCE • GRADE 5

California Content Standards
Life Sciences: 2.A
Life Sciences: 2.B
Life Sciences: 2.C
Life Sciences: 2.D

On Level

# Internal Structures of Animals

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•  
Reproducible  
Student Book

•  
Reproducible  
English-language  
Arts Activities

# Internal Structures of Animals

## California's Content Standards Met

### GRADE 5 SCIENCE

**LIFE SCIENCES: 2**—Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. As a basis for understanding this concept:

- a. Students know many multicellular organisms have specialized structures to support the transport of materials.
- b. Students know how blood circulates through the heart chambers, lungs, and body and how carbon dioxide (CO<sub>2</sub>) and oxygen (O<sub>2</sub>) are exchanged in the lungs and tissues.
- c. Students know the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.
- d. Students know the role of the kidney in removing cellular waste from blood and converting it into urine, which is stored in the bladder.

### GRADE 5 ENGLISH LANGUAGE ARTS

#### 1.0 WORD ANALYSIS, FLUENCY, AND SYSTEMATIC VOCABULARY DEVELOPMENT

*Vocabulary and Concept Development 1.3*—Understand and explain frequently used synonyms, antonyms, and homographs.

*Vocabulary and Concept Development 1.5*—Understand and explain the figurative and metaphorical use of words in context.

#### 2.0 READING COMPREHENSION

*Structural Features of Informational Materials 2.1*—Understand how text features (e.g., format, graphics, sequence, diagrams, illustrations, charts, maps) make information accessible and usable.

On Level



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# Student Book

*Internal Structures of Animals*

Print pages 5 – 18 of this PDF for the student book.

# How to Make the Student Book

- The student book is contained on pages 5–18 of this PDF. It begins on the next page.
- To make one student book, or a two-sided master copy that can be photocopied, you will print on both sides of seven sheets of 8.5" x 11" paper.
- Do a test printout of one book first to familiarize yourself with the procedure.
- Follow these instructions carefully.

## First—Select the Paper

Since you will be printing on both sides of the sheets of paper, select a good quality white paper. We recommend using at least a 22 lb sheet.

## Second—Check Printer Settings

Be sure you have the correct page setup settings for your computer and printer. You will print these pages in landscape format.

## Third—Print EVEN Pages

Open the PDF of the book you want to print. Select print from your file menu. In your printer's dialogue box enter pages 5–18 to print. Then select EVEN pages only. It is important to print only the EVEN pages first. Click "Print" to print the even pages. (**Important note:** The first page that prints will be blank. DO NOT discard this page. It will be needed to print the cover in the next step.)

## Fourth—Print ODD Pages

When the even pages have printed, flip the stack of pages over to print the odd pages. Place the stack back in your printer. Select print from the file menu again. In your printer's dialogue box, select pages 5–18 to print. Then select ODD pages. Click "Print" to print the odd pages.

## Fifth—Fold the Book

You now have a complete book. Check to be sure the pages are in the correct order with the book's cover as the top page. Then fold the stack of paper in half.

## Sixth—Staple the Book

Use an extended-length stapler to staple the pages together. Place two staples in the spine of the book.

## Please Note

Printers vary in how they output pages. Do a test printing of one book and adjust the procedure as necessary.

If you want to make a one-sided master copy, print ALL pages 5–18 at once. Then select "one-sided to two-sided" on the copy machine.

# Internal Structures of Animals

## California's Content Standards Met

OL

### GRADE 5 SCIENCE

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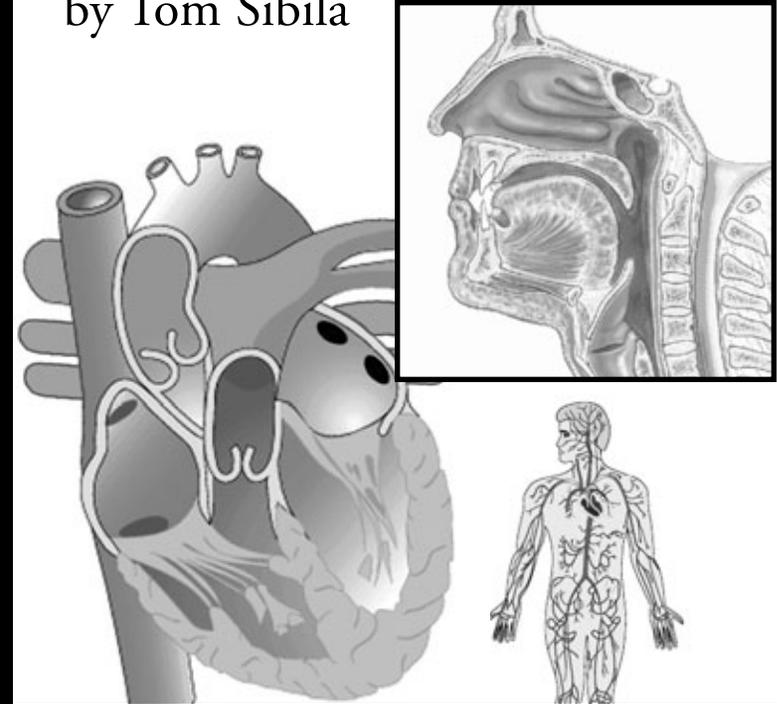
Life Sciences: 2.C

Life Sciences: 2.D



# Internal Structures of Animals

by Tom Sibila





SCIENCE • GRADE 5

California Content Standards

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# Table of Contents

## Introduction:

Transportation Systems . . . . . 4

## Chapter 1:

The Respiratory System . . . . . 5

Lungs . . . . . 6

Trachea . . . . . 8

Bronchial Tubes . . . . . 8

Diaphragm . . . . . 8

## Chapter 2:

The Circulatory System . . . . . 10

Heart . . . . . 11

Arteries and Veins . . . . . 12

## Chapter 3:

The Digestive System . . . . . 13

Mouth . . . . . 15

Esophagus . . . . . 15

Stomach . . . . . 17

Small Intestine . . . . . 18

Liver . . . . . 18

Large Intestine . . . . . 19

Kidneys . . . . . 20

Glossary . . . . . 22

To Find Out More . . . . . 23

Index . . . . . 24

## INTRODUCTION

# Transportation Systems

All animals need food, water, and oxygen to survive. Food, water, and oxygen are **consumed** to obtain energy. Energy is used by the body to move, grow, and repair itself.

The food and water animals take in has to be carried to cells in all parts of the body. The oxygen animals breathe in also has to be carried to every cell in the body.

When the body uses food, water, and oxygen to create energy, waste is created. This waste then has to be carried out of the body.

In this book, you will learn about the amazing transportation systems found in the bodies of all animals that allow them to survive.

**consumed:** used up

## The Respiratory System

To survive, animals must exchange the air inside their bodies with the air outside their bodies. The system that transports air into and out of the body is called the respiratory system.

The purpose of the respiratory system is the same in all animals. It takes in oxygen for the body so the cells can unlock the energy in food. It also eliminates carbon dioxide, a waste product, from the body.

However, animals have different types of respiratory systems. For example, animals that live in water use gills to exchange these gases. Animals that live on dry land, including you, use lungs. Frogs and salamanders use their moist skin along with their lungs to exchange gases.

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## Lungs

The main organ of the respiratory system in most animals is the lungs. Air that is rich in oxygen is inhaled into the lungs and air with carbon dioxide is exhaled. These gases are exchanged in the lungs and transported through the body by blood.

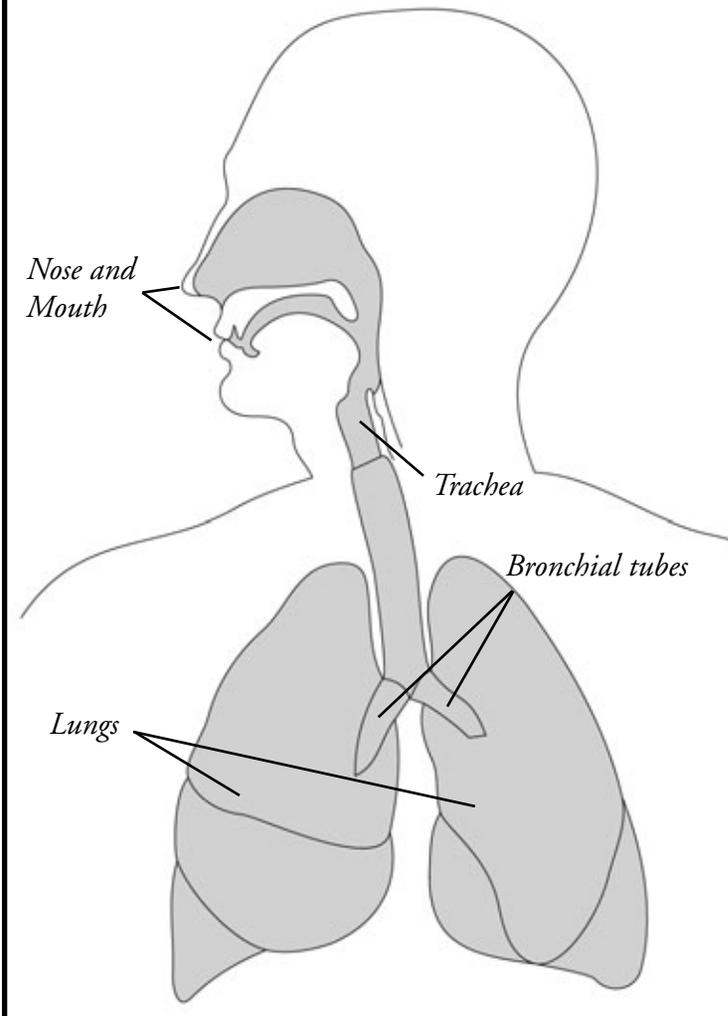
When we inhale, red blood cells in the lungs pick up oxygen and carry it to all the cells in the body. The red blood cells drop off the oxygen to the body cells and pick up carbon dioxide from those same body cells. Carbon dioxide is a waste product created when the cells use oxygen to release energy from **carbohydrates** in the food.

*What is a benefit of animals releasing carbon dioxide into the air?*

**carbohydrates:** sugars and starches found in foods we eat

---

## Organs of the Respiratory System



*Humans have two lungs inside their bodies. The lungs are rich in blood vessels that pick up inhaled oxygen and drop off carbon dioxide to be exhaled.*

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## Trachea

The trachea, or windpipe, is located in the back of the throat. It has rings made of strong, flexible tissue. You can feel these rings on the front of your neck. They keep the trachea open when you turn or bend your neck.

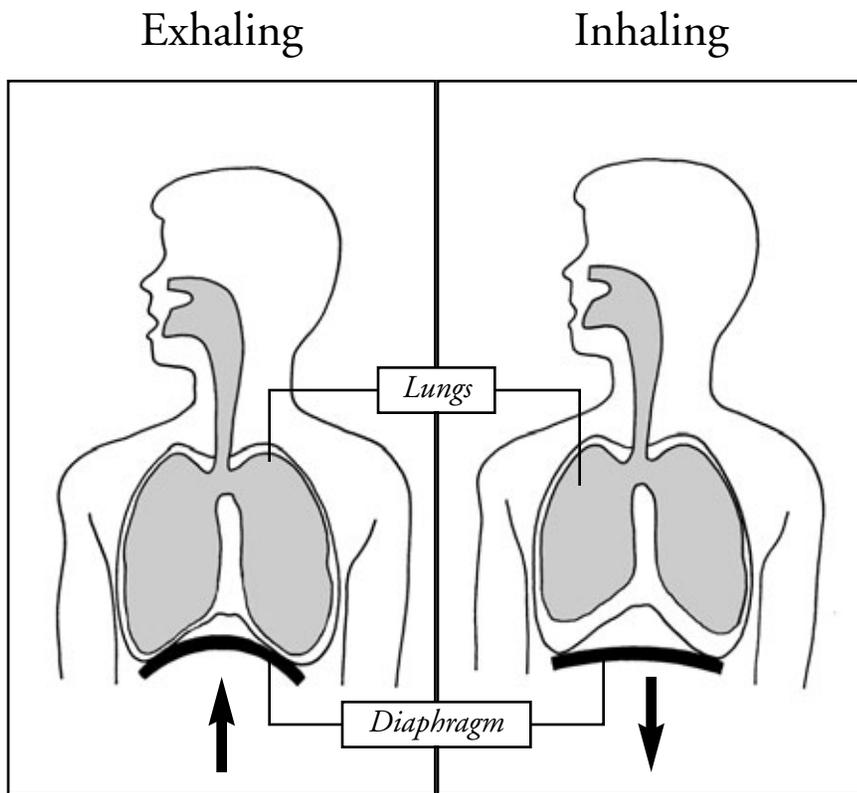
## Bronchial Tubes

The bronchial tubes are two tubes that branch off the trachea and carry air directly into the lungs. In each lung, the bronchial tubes divide into hundreds of smaller tubes. At the ends of these smaller tubes are clusters of tiny air sacs called alveoli.

## Diaphragm

The diaphragm is a muscle below your lungs. When you inhale, your diaphragm flattens and moves downward making your chest cavity larger. When you exhale, it pushes up making your chest cavity smaller.

## How the Diaphragm Works



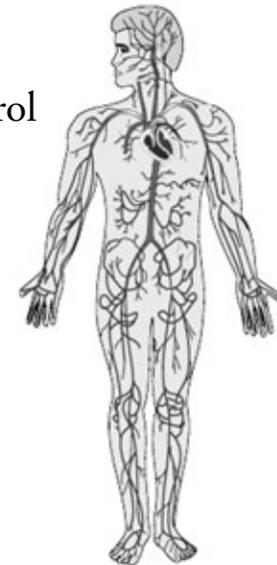
*When you inhale, your diaphragm flattens and moves downward making your chest cavity larger. When you exhale, it pushes up making your chest cavity smaller.*

## CHAPTER 2

# The Circulatory System

You know oxygen is carried to cells in the body through blood. Other **nutrients** are also carried by blood. The circulatory system moves blood through the body to provide the necessary oxygen and nutrients cells need.

The circulatory system is made up of the vessels and the muscles that control the flow of blood around the body. The main parts of the system are the heart, arteries, and veins.

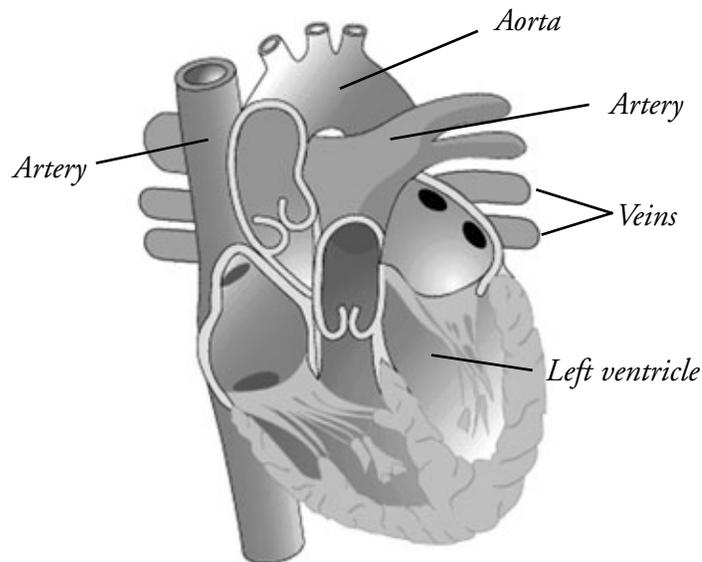


**nutrients:** any substance found in food that is needed for the life and growth of plants and animals

---

## Heart

The heart's job is to pump blood around your body. It is divided into two sides. The right side receives blood from the body except the lungs. It pumps blood to the lungs where it picks up oxygen and gets rid of carbon dioxide. The blood leaves the lungs and enters the left side of the heart and then is pumped to the rest of the body.



*The left side of the heart receives blood from the lungs and pumps it to the rest of the body. The right side of the heart pumps blood back to the lungs.*

---

## Arteries and Veins

Blood leaves the left side of the heart through the aorta. The aorta is the largest artery in our body. Arteries are tubes that carry oxygen-rich blood away from the heart.

As the arteries move into tissues and organs, they become smaller and smaller. The smallest blood vessels are called capillaries. The capillaries deliver oxygen and nutrients to individual cells and pick up waste products from them.

After picking up waste materials from cells, the blood moves through larger and larger veins on its way back to the right side of the heart. The pulmonary artery carries the blood back to the lungs and the cycle is repeated thousands of times each day.

*Explain the functions of the heart, arteries, and veins.*

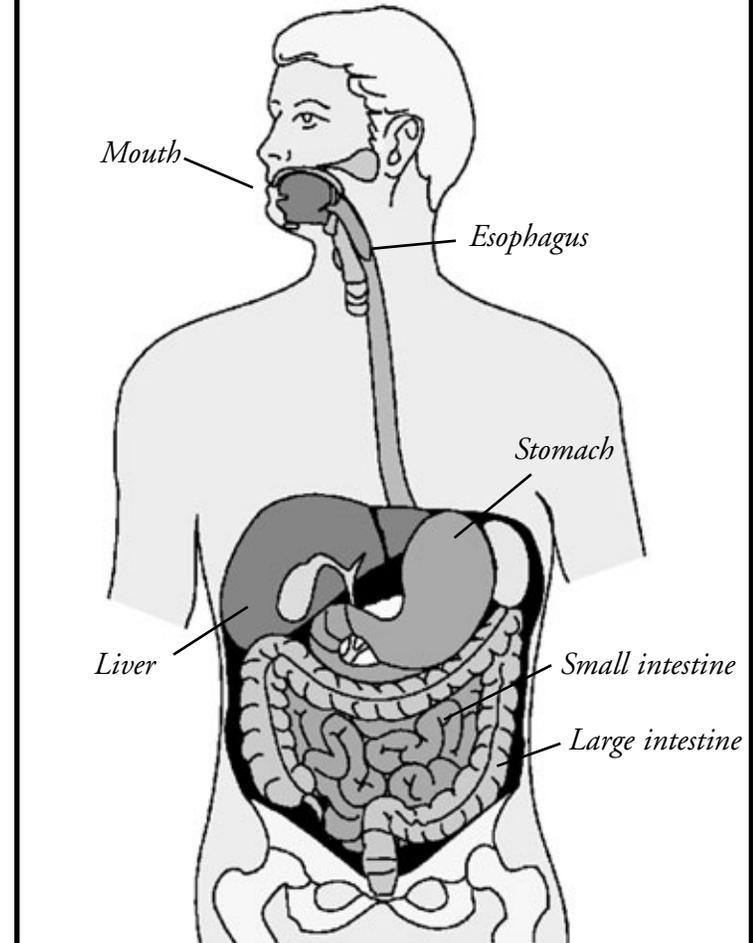
## The Digestive System

The digestive system is responsible for converting the food we eat into smaller particles. Digestion, or the breaking down of food, is important because the food we eat, such as bread, meat, and vegetables, are not in a form that our bodies can use as **nourishment**. Food and drink must be changed into smaller particles before they can be absorbed into the blood and carried to cells throughout the body.

The main organs that make up the digestive system are the mouth, esophagus, stomach, small intestine, large intestine (including the colon and rectum), and anus.

**nourishment:** something that contributes to health and growth

## The Digestive System



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## Mouth

Digestion of food begins when you put food into your mouth and begin to chew. Your teeth start to break the food into smaller pieces. **Saliva** in your mouth helps soften the food. **Enzymes** in the saliva also help begin the digestion process. When the food is small and soft enough, your tongue can push the food into your throat to swallow.

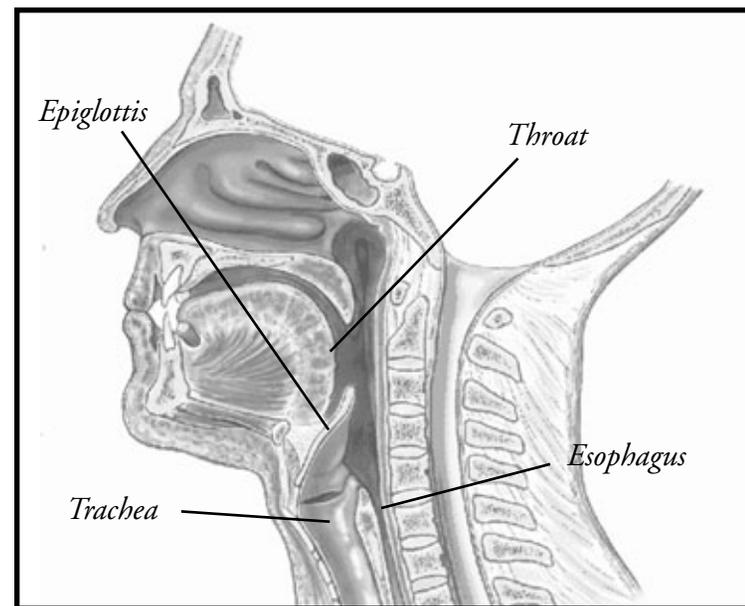
## Esophagus

Swallowed food is pushed into the esophagus. This connects the back of the throat to the stomach. When food enters, muscles in the walls of the esophagus squeeze the food downward to the stomach.

**saliva:** a thin, watery liquid produced in the mouth to help in swallowing and digestion  
**enzymes:** materials that speed up some digestive processes

---

You know the trachea is in the back of your throat. When you eat, a small flap called the epiglottis closes your windpipe keeping food out of the trachea. Sometimes, when eating or drinking, the flap does not close fast enough. Then the food goes “down the wrong pipe” and you cough to clear your windpipe.



*The epiglottis is a flap that keeps food from entering the trachea.*

---

## Stomach

The stomach is a muscular sack that receives food and liquid from the esophagus. It has three functions, or jobs.

1. It stores food and liquid.
2. It breaks down the food into a thick liquid or paste.
3. It empties the broken down food and liquid into the small intestine.

The stomach receives and stores the food you eat and the liquid you drink. It also acts like a mixer and grinder.

The stomach produces digestive juices that help further break down the food. The strong muscles in the walls of the stomach then mix the food, liquid, and digestive juices. Food is usually treated in the stomach for about two hours and then empties into the small intestine.

*Describe the three functions of the stomach.*

---

## Small Intestine

After leaving the stomach, food enters the small intestine. This is a long tube about 2 inches around and about 20 to 25 feet long. The small intestine is loosely coiled and packed beneath the stomach.

The small intestine breaks down the food mixture even more so that the body can absorb nutrients from the food. This allows the food to be absorbed into your blood stream and the nutrients to be carried to all the cells in the body.

## Liver

The nutrient-rich blood coming from the stomach, small intestine, and large intestine passes through the liver. The liver removes harmful substances and stores nutrients not immediately needed.

*What is the main purpose of the small intestine?*

---

## Large Intestine

The body does not digest all the food we eat. What is left over passes from the small intestine to the large intestine.

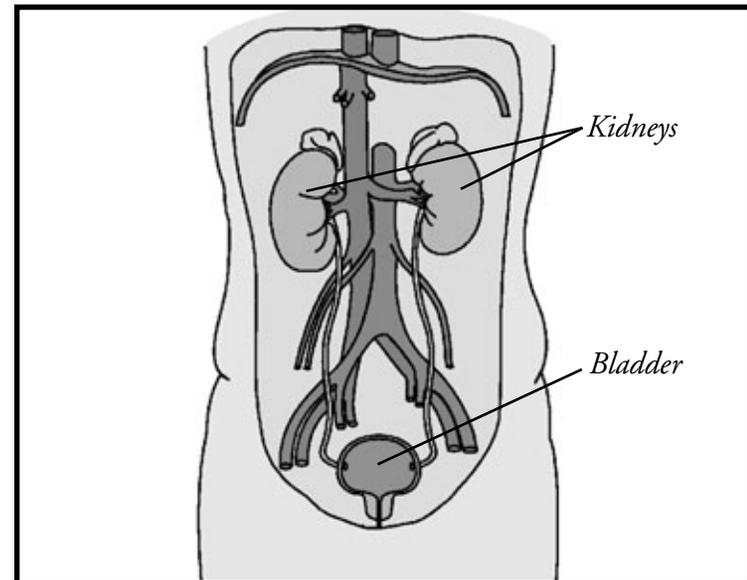
Undigested food enters the large intestine as a liquid paste. The large intestine removes the water and turns what is left into a solid waste. The waste then passes through the part of the large intestine called the colon. This is the body's last chance to absorb water and nutrients into the body.

Finally, the waste leaves the colon and is pushed into the rectum. The waste is stored there until the body is ready to get rid of it. When you go to the bathroom, you are getting rid of this solid waste through the anus.

---

## Kidneys

Your body has another filtering system as well. The kidneys filter harmful waste products carried from the cells by the blood. Much of the liquid waste is processed into **urea** by the liver and then transported to the kidneys. Urea is filtered out of the blood by the kidneys and stored in the bladder as urine.



**urea:** a liquid waste product resulting from the breakdown of food particles in cells

---

## Specialized Structures

You have learned that animals have specialized structures to support the transport of materials in their bodies.

The respiratory system supplies oxygen to the body and releases carbon dioxide waste. The digestive system allows the body to take in food for energy and eliminate waste. The circulatory system is the engine that pumps blood through the body to carry the oxygen, food, and waste products.

Without these amazing transportation systems, animals could not survive. Think about it when you breathe in and out and when you eat food and drink liquids. Ask yourself how your body uses these substances to help you survive.

*Name and describe the transportation systems that help animals survive.*

---

## Glossary

**carbohydrates**—sugars and starches found in foods we eat

**consumed**—used up

**enzymes**—materials that speed up some digestive processes

**nourishment**—something that contributes to health and growth

**nutrients**—any substance found in food that is needed for the life and growth of plants and animals

**saliva**—a thin, watery liquid produced in the mouth to help in swallowing and digestion

**urea**—a liquid waste product resulting from the breakdown of food particles in cells

---

## To Find Out More . . .

Want to learn more about the internal structures of animals?

### Try these books

*Guts: Our Digestive System* by Seymour Simon. HarperCollins, 2005.

*The Circulatory System* (True Books-Health) by Darlene R. Stille. Childrens Press, 1998.

*The Heart: Our Circulatory System* by Seymour Simon. HarperCollins, 2006.

*Lungs: Your Respiratory System* by Seymour Simon. HarperCollins, 2007.

### Access these Web sites

KidsHealth for Kids  
<http://kidshealth.org/kid/htbw/>

### Write for more information

The American Heart Association  
National Center  
7272 Greenville Avenue  
Dallas, TX 75231

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## Index

alveoli, 8  
aorta, 12  
blood, 10, 18, 20, 21  
carbon dioxide, 5, 6, 12  
circulation, 10  
colon, 19  
digestion, 13  
digestive juices, 17  
energy, 4, 5, 14  
enzymes, 15  
epiglottis, 16  
liver, 18  
oxygen, 5, 6, 10, 21  
red blood cells, 6  
saliva, 15  
urine, 20  
windpipe, 8



ENGLISH-LANGUAGE ARTS • GRADE 5

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Vocabulary and Concept Development: 1.3
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Vocabulary and Concept Development: 1.5
Structural Features of Informational Materials, 2.1

# English-language Arts Activities

*Internal Structures of Animals*

Print pages 20–24 of this PDF for the reading activities.

# Connotation and Denotation

## TRY THE SKILL

A denotation is a dictionary definition. A connotation is an emotional meaning, and it can be positive or negative.

For example, a dog might be a collie/shepherd mix (a positive connotation) or a mutt (a negative connotation).

A neighbor might be called curious (a positive connotation) or nosy (a negative connotation).

The words that you choose as you write can show your feelings about your topic, so choose them carefully. The words that you read in a book or a passage often show whether that author has positive or negative feelings about his or her topic.

Shade in the letter of the word with the more positive connotation.

1. Food, water, and oxygen are \_\_\_\_\_ to obtain energy.  
Ⓐ consumed  
Ⓑ devoured
2. The respiratory system \_\_\_\_\_ carbon dioxide, a waste product, from the body.  
Ⓐ eradicates  
Ⓑ eliminates

Shade in the letter of the word with the more negative connotation.

3. Carbon dioxide is a \_\_\_\_\_ product created when the cells use oxygen to release energy from carbohydrates in food.  
Ⓐ useless  
Ⓑ waste
4. The digestive system is \_\_\_\_\_ for converting the food we eat into smaller particles.  
Ⓐ responsible  
Ⓑ accountable

# Use Graphic Organizers

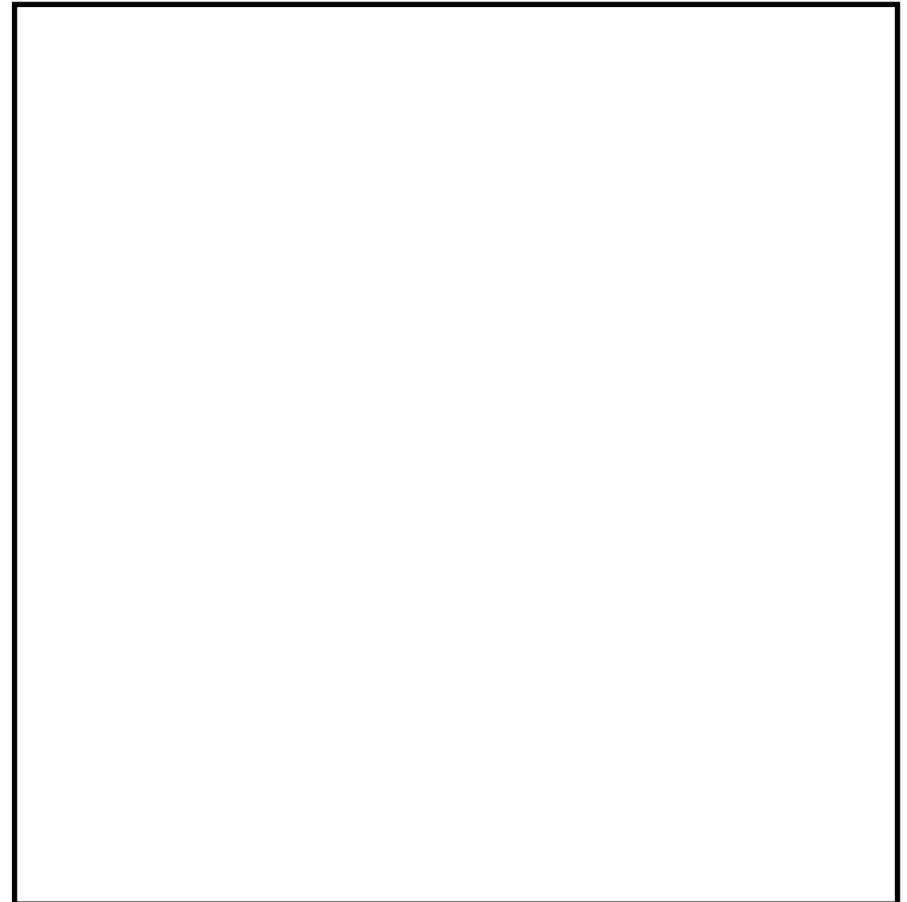
## TRY THE SKILL

**Graphic organizers help you organize information. You can use them to help explain the main points in your reports or to better understand and remember what you read.**

**Here are some common graphic organizers:**

- **Time lines** show events in the order they occurred. One might show a time line of discoveries relating to transportation.
- **Line graphs** show changes over time. For example, a line graph could show changes in the average rainfall during the past four years.
- **Charts** can classify information into groups or categories. For example, a chart could show changes caused by natural forces, plants and animals, and people. Charts can also help you record observations during an experiment.
- **Venn diagrams** are two overlapping circles. They help you compare and contrast two things. You describe each thing in one circle and tell how they are alike in the overlapping part.

**Choose one of the graphic organizers described on this page, and use it to share some information about internal structures of animals. Complete your graphic organizer with facts or examples from this book.**



# Homophones and Homographs

## TRY THE SKILL

**Homophones are words that are pronounced the same but usually have a different spelling or meaning. Here are some examples.**

too—also

two—a number

sight—ability to see or view

site—a location

claws—nails on an animal's feet or paws

clause—a part of a sentence

carrot—a vegetable

karat—one 24th part of pure gold

**Homographs are words that are spelled the same but have a different meaning. Some examples include:**

bow—a weapon used for shooting arrows

bow—bend in greeting or respect

fair—beautiful or lovely

fair—just or honest

fast—speedy

fast—to go without food

entrance—going in

entrance—delight or charm

**Read the following paragraph from *Internal Structures of Animals*. Write the homographs and homophones on the lines and define each one.**

The digestive system is responsible for converting the food we eat into smaller particles. Digestion, or the breaking down of food, is important because the food we eat, such as bread, meat, and vegetables, are not in a form that our bodies can use as nourishment. Food and drink must be changed into smaller particles before they can be absorbed into the blood and carried to cells throughout the body.

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**Next, go back through the book and identify other homographs. Write them on the back of this page.**

# Antonyms

## TRY THE SKILL

**Antonyms are words that have opposite meanings. Some examples of antonyms are:**

*night and day*  
*up and down*  
*inside and outside*  
*left and right*

**Read the paragraph from the book. Look for the antonyms.**

To survive, animals must exchange the air inside their bodies with the air outside their bodies. The system that transports air into and out of the body is called the respiratory system.

***Inside* and *outside* are antonyms. Here is another. Look for the antonyms.**

The purpose of the respiratory system is the same in all animals. It gets oxygen for the body so the cells can unlock the energy in food. It also eliminates carbon dioxide, a waste product, from the body.

***Gets* and *eliminates* are antonyms.**

**1. Read the paragraph from the book. Circle the antonyms.**

The diaphragm is a muscle below your lungs. When you inhale, your diaphragm flattens and moves downward making your chest cavity larger. When you exhale, it pushes up making your chest cavity smaller.

**2. Read the paragraph from the book. Circle the antonyms.**

The heart's job is to pump blood around your body. It is divided into two sides. The right side receives blood from the body except the lungs. It pumps blood to the lungs where it picks up oxygen and gets rid of carbon dioxide. The blood leaves the lungs and enters the left side of the heart and then is pumped to the rest of the body.

**3. Think of some antonyms that have to do with an animal's body. Write them on the back of this page.**

# Answer Key

## Connotation and Denotation

1. A
2. B
3. A
4. B

## Use Graphic Organizers

Graphic organizers will vary.

## Homophones and Homographs

### Homophones

meat: the flesh of an animal used as food

meet: to come face to face with

### Homographs

cells: the basic units of living matter

cells: rooms in a prison

Some homographs in the book include: body, live, dry, organ, pick, waste, branch, chest, vessels, left, cycle, flap, sack, stores

### Antonyms

1. inhale / exhale
2. right side / left side; receives / leaves