



The Excretory System

6

☑ Lesson Objectives

Core Content Objectives

Students will:

- ✓ Identify important components of the excretory system and their functions
- ✓ Describe how the digestive and excretory systems work together

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Describe the connection between a series of steps in the excretory process in “The Excretory System” (RI.2.3)
- ✓ Interpret information from diagrams of the human body to understand the excretory process (RI.2.7)
- ✓ Compare and contrast the digestive system and the excretory system (RI.2.9)
- ✓ With assistance, categorize and organize facts and information from “The Excretory System” to make a diagram of the excretory system (W.2.8)
- ✓ Prior to listening to a read-aloud, identify orally what students know and have learned about the digestive system

Core Vocabulary

bladder, n. A balloon-like sac in which urine collects before it is excreted from the body

Example: When I drink lots of water, my bladder seems to fill up very quickly.

Variation(s): bladders

excrete, v. To expel or get rid of

Example: Our bodies excrete moisture in the form of sweat and urine.

Variation(s): excretes, excreted, excreting

regulate, v. To control something

Example: My mom and dad regulate how much television I get to watch.

Variation(s): regulates, regulated, regulating

sweat, n. Moisture that comes out of the skin's pores due to exercise, fever, heat, or fear; perspiration


Example: Sweat ran down my face after the relay race.

Variation(s): none

toxic, adj. Poisonous

Example: The chemical factory dumped toxic waste into the river.

Variation(s): none

| <i>At a Glance</i> | Exercise | Materials | Minutes |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------|
| <i>Introducing the Read-Aloud</i> | What Have We Already Learned? | | 10 |
| | Purpose for Listening | | |
| <i>Presenting the Read-Aloud</i> | The Excretory System | | 15 |
| <i>Discussing the Read-Aloud</i> | Comprehension Questions | | 10 |
| | Word Work: Toxic | | 5 |
|  Complete Remainder of the Lesson Later in the Day | | | |
| <i>Extensions</i> | Model of the Excretory System | Instructional Master 6B-1; two kidney beans for each student; yarn; scissors; glue or tape | 20 |
| | Vocabulary Instructional Activity: Maintain | | |



The Excretory System

6_A

Introducing the Read-Aloud

10 minutes

What Have We Already Learned?

Ask students to list some of the purposes of the digestive system and its organs. Answers may include: processing food, breaking it down into nutrients that the body can use, and getting rid of waste that the body can't use. Tell students that their bodies produce both solid and liquid waste. Remind students that the digestive system deals with solid waste, eliminating it in the form of feces. Tell them that today they are going to learn about the excretory system, the system that processes liquid waste.

Purpose for Listening

Ask students to name an organ of the digestive system that cleans the blood. (liver)

Then tell them that today they are going to learn about two more organs, part of the excretory system, that filter waste from the blood. Ask them to listen carefully to learn the name of these two organs.



The Excretory System

◀ Show image 6A-1: Nick Nutri and the lower digestive system

Humans are exposed to lots of toxins, or poisons, in the environment. Your body may take in toxins through the air or through the food that you eat. If these toxins hang around in your body too long, they may become **toxic**, or poisonous, to you. The amazing human body has ways of getting rid of these toxins before they become harmful.

Last time we met, you learned how your digestive system works to process food into usable nutrients, separating the nutrients from the sometimes-toxic waste materials.¹ At the end of the digestive process, some food is not completely broken down by the intestines.² This leftover solid waste, called feces, is pushed out of your anus at the end of the digestive tract.

Bowel movements contain your body's solid waste, but what happens to the body's liquid waste? Where does it go? Some waste leaves your body through your skin. Other waste is processed through a system like the digestive system. Just as the digestive system processes solid waste, there is a system that processes liquid waste. It is called the excretory system. To **excrete** means to expel, or get rid, of something that is not needed. Toxins, or poisons, are definitely not needed in your body.



◀ Show image 6A-2: Sweat

Let's begin by talking about the liquid waste that leaves the body through your skin. We call it **sweat**. What is another name for sweat? It is also called perspiration. You already know that your skin is the largest body organ. It covers your entire body surface. Sweat glands below the surface of the skin help rid the body of waste through perspiration. When you perspire, water, salt, and other waste flows out through these microscopic sweat glands.³ They are excreted from all parts of your body. If you do not bathe

1 What are nutrients?

2 What are the intestines?

3 So, are we able to see these sweat glands? (No, they are microscopic, too small to see without the aid of a microscope.)

4 What are bacteria?



for a while, you can begin to smell this waste as it builds up on the surface of your skin.

The body's main liquid waste is urine, sometimes called pee. Urine is cleaner than spit. Unlike the saliva in your mouth, urine contains no bacteria.⁴ It is about ninety-six percent water and four percent waste. This means that if urine were divided into one hundred parts, ninety-six parts would be water, and only four parts would be waste. Like feces, urine passes through several different organs as it makes its journey through your body. Today we will take a look at the organs that are a part of the excretory system.

← **Show image 6A-3: The kidneys**

The kidneys are the primary organs of excretion. Everybody, stand up for a minute so that I can make sure that you know where your kidneys are located. Let your arms hang by your sides. Your kidneys are in line with your elbows, at your back above your waist. Reach around and place your hands just above your waist on either side of your backbone. Your two kidneys hang near your spine, one on either side of your backbone, in the middle of your back. Your bottom ribs and layers of fat protect the kidneys. Do you have a pretty good idea of where they live? Okay, let's sit down and see how they work.

Arteries, or muscular tubes, carry blood from other parts of your body to your kidneys. These two, dark red, bean-shaped organs act like washing machines for the blood, cleaning it of waste and toxins. As blood flows to your body cells, it passes through the kidneys where millions of tiny microscopic filter tubes capture the waste products and excess, or extra, water.



← **Show image 6A-4: Strainer**

5 [Point to the strainer/sieve in the image.]

Think of a kitchen strainer or sieve.⁵ Have you ever seen cooked pasta poured into a strainer? The liquid flows through and the strainer catches the pasta. Your kidneys act a little like that kitchen strainer. They filter, or separate, the liquid waste from the blood. Clean blood travels to your body's cells, while the liquid waste, called urine, is collected in each kidney.



← **Show image 6A-5: Diagram of kidneys, ureters, bladder, and urethra**

Urine drains out of both kidneys through two tubes called ureters. The ureters lead from the kidneys to your urinary **bladder**. The bladder is a muscular storage bag located in the lower part of your abdomen, which is below your waist. When it gets full, we can feel it. This stretchy, sac-like muscle stores urine. It is a little like a water balloon with three openings, the two ureters that connect to the kidneys, and a third opening at the other end of the bladder called the urethra. As urine passes into the bladder through the ureters, the walls stretch, and the rubbery balloon begins to fill.

Nerve endings in the muscular bladder walls send signals to the brain that the bladder is full and about to burst. That's when you know it is time to urinate. Urine passes out of your body through the urethra, the tube at the bottom of the bladder. Just like the anus, the urethra has a muscular gate, called the sphincter muscle, that opens and closes to let the urine pass. When the sphincter muscle is tightened, urine stays in the bladder. When it is relaxed, urine is released. This is a voluntary muscle, meaning that you are able to control its opening and closing, but you need to listen to your brain when it tells you that it is time to go to the bathroom. The excretory system works the same for both boys and girls. The only difference is in the length of the urethra. The urethra is longer in boys than it is in girls.



← **Show image 6A-6: Importance of drinking water**

In addition to preparing liquid waste for removal from the body, the kidneys also **regulate**, or control, the amount of salt and nutrients in the blood. They help to maintain a state of balance in the body by controlling the amount of water your body loses, balancing the amount of water excreted with the amount of water kept in the body.⁶ If you have too much water in the body, you may feel bloated or swollen. If there is too little water in the body, you may become dehydrated, or dried out. Dehydration can cause serious damage to your body. That is why it is important to drink lots of water, never letting your body dry out.

6 What does *excreted* mean?

Let's name all of the different parts of the excretory system. The excretory system is made up of the kidneys, the bladder, the two tubes that connect them—the ureters—and the urethra, the final tube in the process. It may appear less complicated than the digestive system, but it is just as important for filtering the blood and helping your body get rid of toxic substances. You probably know that liquid waste is excreted from your body a bit more frequently than solid waste. That's because it does not stay in the bladder as long as solid waste stays in the rectum.



◀ **Show image 6A-7: Big and strong**

We've been talking a lot about getting rid of the body's waste, but along the way you have learned that the body turns a lot of the food that you eat into nourishment and provides your body with the energy that it needs to grow and repair itself. What are the good parts that are carried through your blood and stored in your body called? ⁷ Next time, we'll find out just exactly what nutrients are and what you can do to make sure that you are getting enough of them.

See you next time. Until then, make sure that you listen to your body and respond when it sends you messages. That's really important to maintaining good health.

7 (nutrients)

Comprehension Questions

10 minutes

1. *Literal* What are the names of the two red, bean-shaped organs that clean the blood of undesirable substances? (kidneys)
2. *Literal* Once the blood is filtered, two tubes called ureters carry the leftover liquid waste from the kidneys to a balloon-like storage bag. What is this stretchy bag called? (bladder or urinary bladder)
3. *Inferential* What does the word *urinate* mean? (to pass urine from the body)
4. *Literal* Urine is the body's main liquid waste. What is another form of the body's liquid waste? (sweat or perspiration)
5. *Literal* Solid waste passes out of the body through an opening called the anus. What is the name of the opening through which urine leaves the body? (urethra)
6. *Evaluative* How are the digestive and excretory systems similar? (The digestive system gets rid of waste, and the excretory system also gets rid of waste.) How are the digestive and excretory systems different? (The digestive system deals with solid waste, and the excretory system gets rid of liquid waste. The digestive system also processes food and liquids into nutrients for the body. The excretory system just processes waste.)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Evaluative Think Pair Share:* You are watching a marathon race. One of the runners has not had anything to drink during the race and suddenly collapses. What is a logical explanation for his collapse? (Answers may vary, but lead students to the conclusion that the runner may be dehydrated. Discuss the importance of replenishing the body with liquids, especially during periods of exercise.)

8. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Toxic

5 minutes

1. In the read-aloud you heard, "If these toxins hang around in your body too long, they may become *toxic*, or poisonous, to you. "
2. Say the word *toxic* with me.
3. A toxic substance is poisonous; it will kill or injure living things.
4. Chocolate can be very toxic to some pets.
5. If a container has a picture of a skull and crossbones on it, you should not use it without the assistance of an adult. Think of a time when you saw that symbol and tell us what product had it on the label. If you haven't seen something with a picture of a skull and crossbones on it, think of something else you know of that is poisonous. Use the word *toxic* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase students' responses: "The toxic spray was used to . . . "]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I am going to name several common household products that may or may not be toxic, or poisonous to humans. If the product is toxic, say, "That's toxic." If it is not harmful to humans, say, "That's not toxic." Remember to answer in complete sentences.

1. insect spray (That's toxic.)
2. milk (That's not toxic.)
3. gasoline (That's toxic.)
4. dog food (That's not toxic.)
5. drain cleaner (That's toxic.)
6. cookies (That's not toxic.)



Complete Remainder of the Lesson Later in the Day

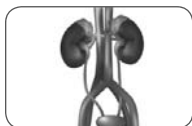


The Excretory System

6_B

Extensions

20 minutes



Model of the Excretory System (Instructional Master 6B-1)

◀ Show image 6A-5: Diagram of kidneys, ureters, bladder and urethra

Discuss the organs of the excretory system, and review how the system works to excrete urine from the body. Give each student a copy of Instructional Master 6B-1, two kidney beans, a length of yarn, scissors, and glue or tape. Ask students to use the printed diagram as a model for adding the parts. When they have finished gluing or taping, have them label the parts, using the words provided at the bottom of the page.

↔ Vocabulary Instructional Activity

Word Work: Maintain

1. In the read-aloud today, you heard that the kidneys “help to maintain a state of balance in the body by controlling the amount of water your body loses, balancing the amount of water excreted with the amount of water kept in the body.”
2. Say the word *maintain* with me.
3. The word *maintain* means to keep something the same way. So the kidneys maintain, or keep a state of balance in the body, by controlling the water your body uses.
4. It’s important to maintain your car in good repair so it won’t break down.
5. Students who maintain good grades usually do so by always completing their homework and studying for tests. Can you think of anything else that you or someone or something else might maintain? [Ask two or three students. If necessary guide and/or rephrase students’ answers, “_____ maintain _____.”]

6. What's the word we've been talking about? What part of speech is *maintain*?

Use a *Discussion* activity for follow-up. Directions: Tell your partner about something that you maintain or something you have seen somebody else maintain. Describe in detail what you do or have observed being done to maintain this thing.

Domain- Related Trade Book

Refer to the recommended trade books in the domain introduction at the front of this teacher's guide, and choose one that provides information about the digestive and excretory systems to read aloud to the class. As you read, pause and ask occasional questions, rapidly clarifying critical vocabulary within the context of the read-aloud, etc. After you finish reading the trade book, lead students in a discussion as to how the information in the book relates to the read-aloud they heard today.