Sunshine State STANDARDS
SC.F.1.3.1: The student understands that living things are composed of major systems that function in reproduction, growth, maintenance, and regulation.
SC.H.1.3.2: The student knows that the study of the events that led scientists to discoveries can provide information about the inquiry process and its effects.

OUTLINE
Add Life processes produce wastes to your outline. Include four ways the body disposes of waste products.

1. Main idea
   A. Supporting idea
      1. Detail
      2. Detail
   B. Supporting idea

BEFORE, you learned
• The digestive system breaks down food
• Organs in the digestive system have different roles

NOW, you will learn
• How different body systems remove different types of waste
• Why the kidneys are important organs
• About the role of the kidneys in homeostasis

VOCABULARY
urinary system p. 615
urine p. 615

KEY CONCEPT
The urinary system removes waste materials.

How Waste Removal
How does the skin get rid of body waste?

PROCEDURE
1. Place a plastic bag over the hand you do not use for writing and tape it loosely around your wrist.
2. Leave the bag on for five minutes. Write down the changes you see in conditions within the bag.

WHAT DO YOU THINK?
• What do you see happen to the bag?
• How does what you observe help explain the body's method of waste removal?

EXPLORE Waste Removal
How does the skin get rid of body waste?

MATERIALS
• plastic bag
• tape
• stopwatch

Life processes produce wastes.
You have read that the respiratory system and the digestive system provide the body with energy and materials necessary for important processes. During these processes, waste materials are produced. The removal of these wastes is essential for the continuing function of body systems. Several systems in your body remove wastes.

• The urinary system disposes of liquid waste products removed from the blood.
• The respiratory system disposes of water vapor and waste gases from the blood.
• The digestive system disposes of solid waste products from food.
• The skin releases wastes through sweat glands.

CHECK YOUR READING
What are four ways the body disposes of waste products?
The urinary system removes waste from the blood.

If you have observed an aquarium, you have seen a filter at work. Water moves through the filter, which removes waste materials from the water. Just as the filter in a fish tank removes wastes from the water, structures in your urinary system filter wastes from your blood.

As shown in the diagram, the urinary system contains several structures. The kidneys are two organs located high up and toward the rear of the abdomen, one on each side of the spine. Kidneys function much as the filter in the fish tank does. In fact, the kidneys are often called the body’s filters. Materials travel in your blood to the kidneys. There, some substances are removed, and others are returned to the blood.

After the kidneys filter chemical waste from the blood, the liquid travels down two tubes called ureters (yu-REE-tuhrz). The ureters bring the waste to the bladder, a storage sac with a wall of smooth muscle. The lower neck of the bladder leads into the urethra, a tube that carries the liquid waste outside the body. Voluntary muscles at one end of the bladder allow a person to hold the urethra closed until he or she is ready to release the muscles. At that time, the bladder contracts and sends the liquid waste, or urine, out of the body.

The urinary system transports wastes out of the body.

The kidneys filter wastes from blood.

The bladder stores liquid wastes.

The ureters are tubes that carry waste from the kidneys to the bladder.

The urethra carries liquid waste out of the body.
The kidneys act as filters.

At any moment, about one quarter of the blood leaving your heart is headed toward your kidneys to be filtered. The kidneys, which are about as long as your index finger—only 10 centimeters (3.9 in.) long—filter all the blood in your body many times a day.

The Nephron

Inside each kidney are approximately one million looping tubes called nephrons. The nephron regulates the makeup of the blood.

1. Fluid is filtered from the blood into the nephron through a structure called the glomerulus (gloh-MEHR-yuh-luhs). Filtered blood leaves the glomerulus and circulates around the tubes that make up the nephron.

2. As the filtered fluid passes through the nephron, some nutrients are absorbed back into the blood surrounding the tubes. Some water is also filtered out in the glomerulus, but most water is returned to the blood.

3. Waste products travel to the end of the nephron into the collecting duct. The remaining liquid, now called urine, passes out of the kidney and into the ureters.
Water Balance

The kidneys not only remove wastes from blood, they also regulate the amount of water in the body. You read in Chapter 16 about the importance of homeostasis—a stable environment within your body. The amount of water in your cells affects homeostasis. If your body contains too much water, parts of your body may swell. Having too little water interferes with cell processes.

About one liter of water leaves the body every day. The kidneys control the amount of water that leaves the body in urine. Depending on how much water your body uses, the kidneys produce urine with more or less water.

How do your kidneys regulate the amount of water in your body?