What Is This Module About?

Water is very important for life. The cells that make up the human body need water to function well. Water is also a very important component of **blood,** the fluid of life. The human body is almost 80% made up of water. We need to drink water every day to keep us alive. Without water, life as we know it would be impossible.

Water goes in and out of the body. Too much water inside the body is bad. It can cause the organs of the body to malfunction. Too little water, on the other hand, can cause dehydration and even death. It is therefore important for the human body to regulate the amount of water it contains. Aside from that, the quality of the fluids the body contains must also be checked regularly so that the body's organ systems can function well.

That is why we can consider ourselves fortunate to have an organ system that is solely for this purpose.

This module will tell you all about the urinary system. It will help you discover the structures that comprise this system and how it works. You will also learn about the diseases that can affect it and how you can best take care of it.

This module is made up of three lessons:

Lesson 1 – *The Parts of the Urinary System and How They Work*

Lesson 2 – *Diseases of the Urinary System*

Lesson 3 – *Taking Care of the Urinary System*

What Will You Learn From This Module?

After studying this module, you should be able to:

- identify the functions of the urinary system;
- enumerate and describe the structures comprising the urinary system;
- describe how the urinary system works;
- name some injuries and illnesses that can affect the urinary system;
- identify recent technologies available in diagnosing diseases that affect the urinary system; and
- cite ways to best take care of the urinary system.

Let's See What You Already Know

Before you start studying this module, take this simple test first to find out what you already know about the topic.

Fill in the blanks with the correct answers.

_____ 1. The system whose primary function is to remove substances from the blood in the form of urine to regulate various metabolic processes

_____ 2. The vital organs that filter the blood and remove metabolic wastes then excrete them from the body

_____ 3. A tube leading from the kidney to the urinary bladder whose primary function is to move urine into the urinary bladder

_____ 4. Stores urine and forces it into the urethra for excretion from the body

_____ 5. A tube that directs urine from the urinary bladder to outside of the body

_____ 6. Circular muscles that help keep urine from leaking

_____ 7. A test that studies the content of urine for abnormal substances such as protein or signs of infection

_____ 8. The term commonly used to refer to stones or calculi in the urinary system

_____ 9. Caused by bacteria in the urinary tract

_____ 10. A doctor who specializes in treating problems of the urinary system and the male reproductive system

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on page 27 to find out.

If all your answers are correct, very good! This shows that you already know much about the topics in this module. You may still study the module to review what you already know. Who knows, you might learn a few more new things as well.

If you got a low score, don't feel bad. This means that this module is for you. It will help you understand some important concepts that you can apply in your daily life. If you study this module carefully, you will learn the answers to all the items in the test and a lot more! Are you ready?

You may go now to the next page to begin Lesson 1.

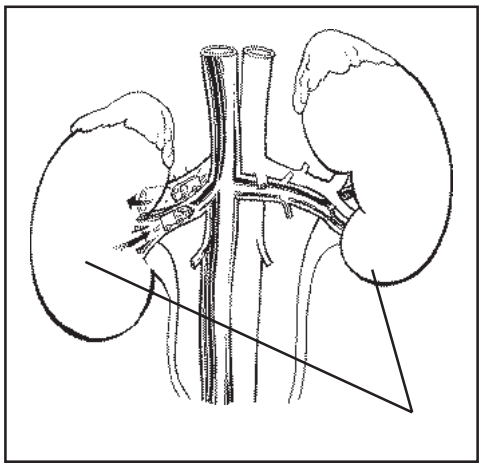
The Parts of the Urinary System and How They Work

The human body is like a wonderful machine. It is made up of parts that work together in an orderly way to perform special functions. Each of these parts is called an **organ system.** This lesson will tell you all about one of these systems—the urinary system.

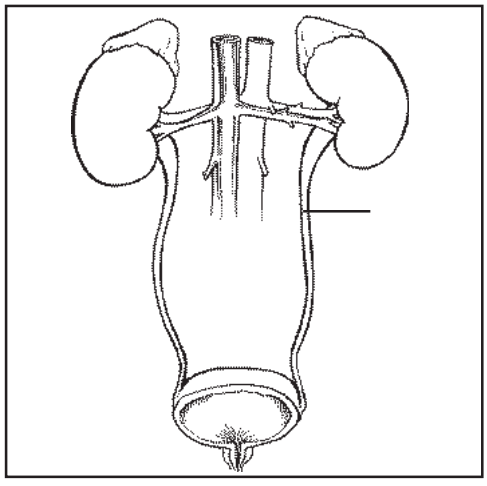
This lesson will tell you about the urinary system and its various functions.

Let's Try This

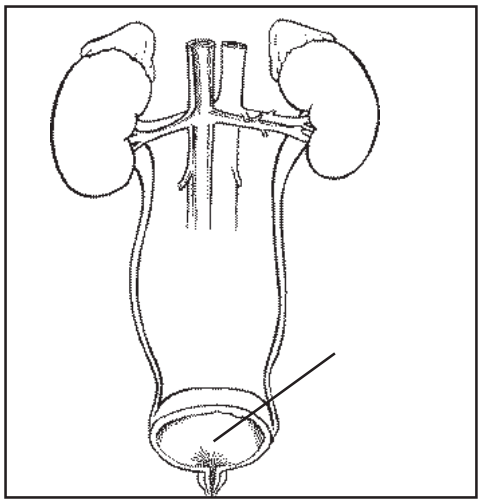
Identify the part of the urinary system being shown by each picture below. Refer to the given descriptions for clues.

1. 

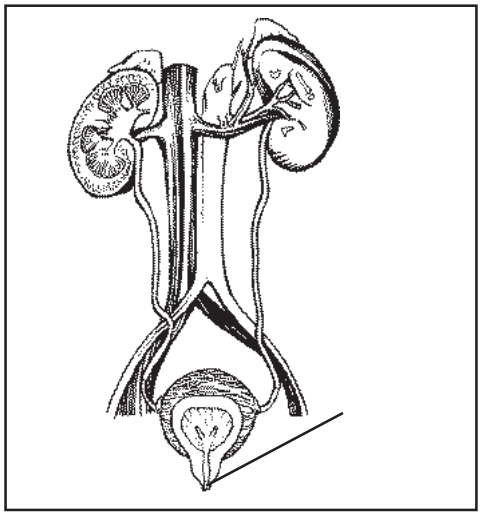
The organs that filter the blood and remove metabolic wastes then excrete them out of the body

2. 

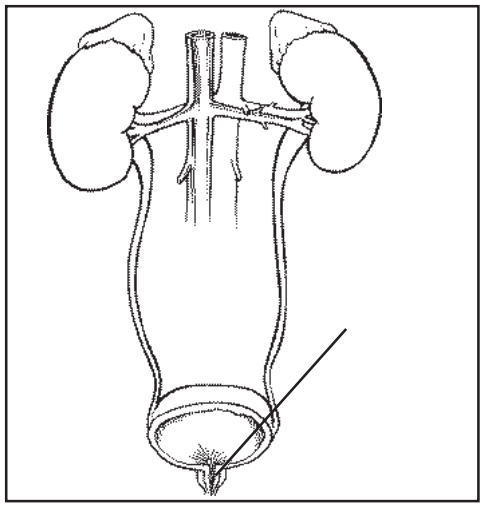
A tube leading from the kidney to the urinary bladder whose primary function is to move urine into the urinary bladder

3. 

Stores urine and forces it into the urethra for excretion from the body

4. 

A tube that directs urine from the urinary bladder to outside of the body

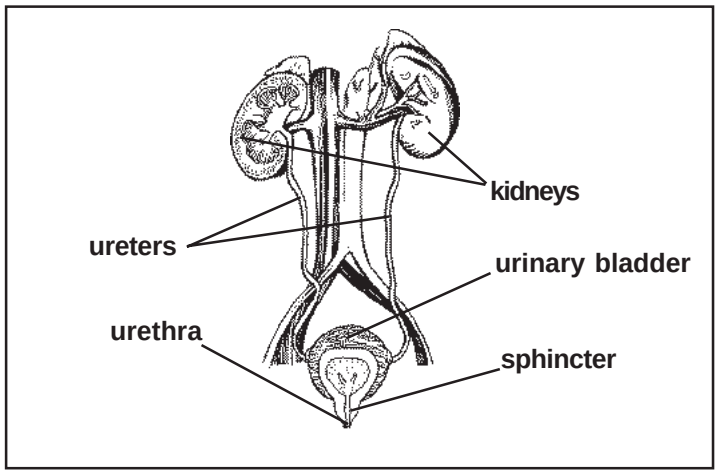
5. 

Circular muscles that help keep urine from leaking

Compare your answers with those in the *Answer Key* on page 27. Did you get a perfect score? If you did, that's very good! You may go on with the rest of the lesson. If you didn't, don't worry. Just read the lesson carefully to understand its important contents.

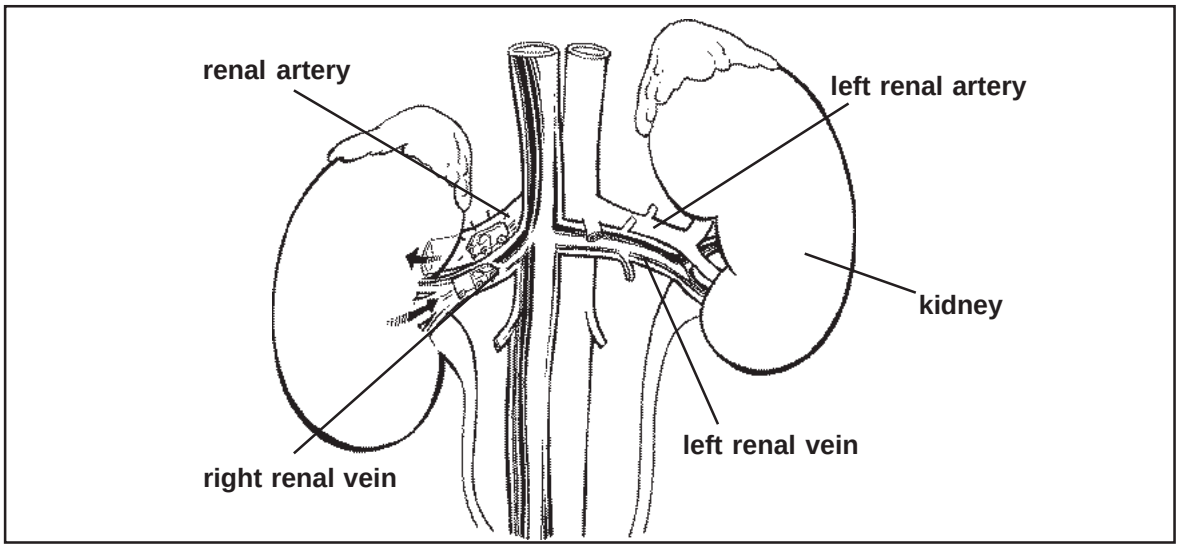
Let's Learn

The **urinary system** is the system that removes substances from the blood in the form of urine to regulate various metabolic processes. It is made up of five basic components, namely, the two kidneys, two ureters, the urinary bladder, the urethra and two sphincters.

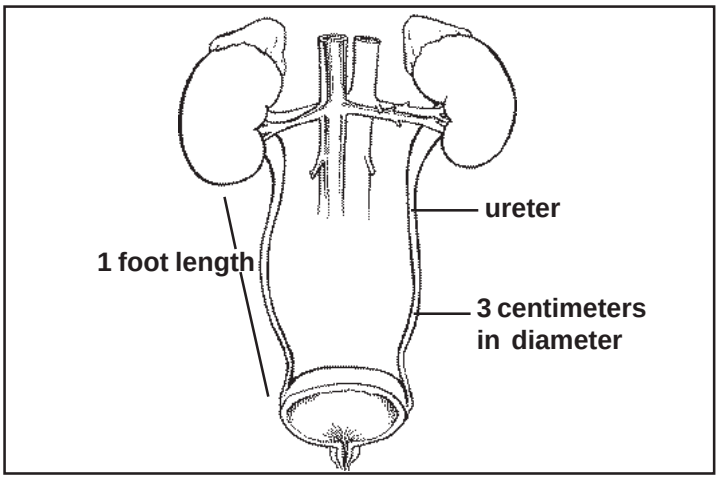


The **kidneys** perform two primary functions. First, they filter the blood and remove metabolic wastes then excrete them out of the body. **Metabolic wastes** are the chemicals produced by all the activities inside our cells. These include carbon dioxide, heat, a nitrogen waste called **urea,** salts and water. If they are not removed, they can build up inside our bodies and become poisonous.

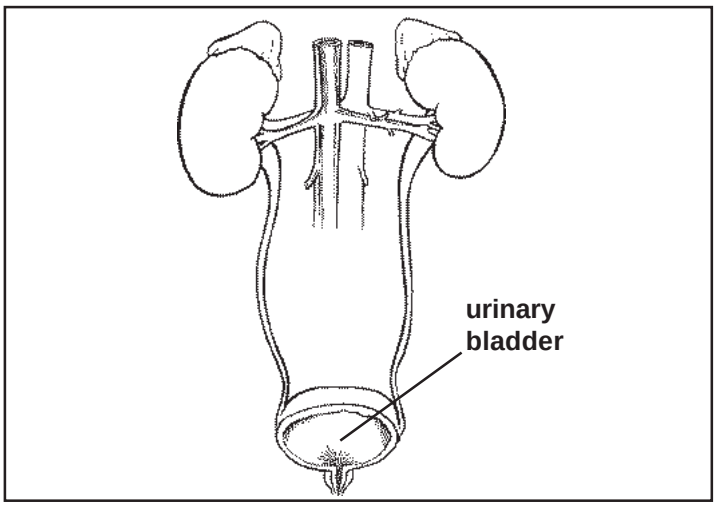
The kidneys also help regulate the production of red blood cells, blood pressure and the volume, composition and pH of the blood. Normally, there are two kidneys. They lie on either side of the spinal column in a depression high on the rear wall of the abdominal cavity and are positioned behind the parietal peritoneum against the deep muscles of the back.



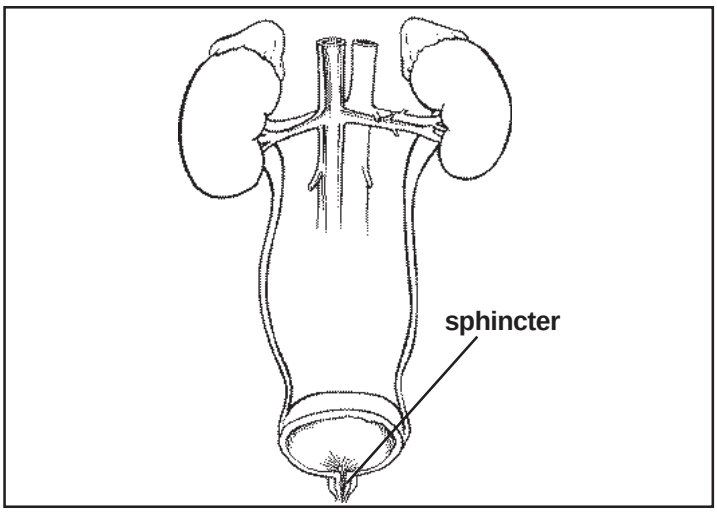
The **ureters** are simply tubes leading from the kidneys to the urinary bladder which move urine into the urinary bladder. Peristaltic muscle movements cause the urine to move from the kidneys to the ureters and into the urinary bladder.



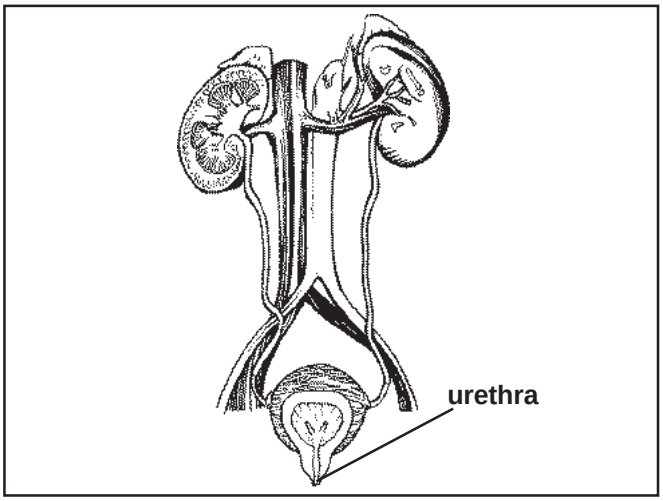
The **urinary bladder** then stores urine and forces it into the urethra for excretion from the body.



The **sphincters** prevent the urine from leaking.

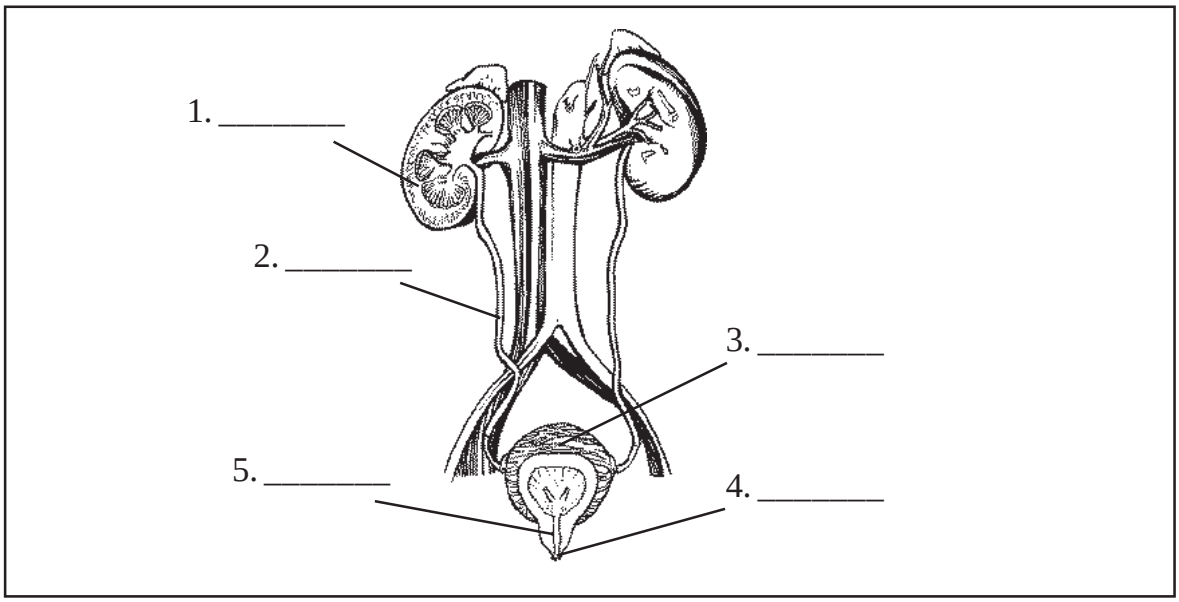


Finally, the **urethra** directs urine from the urinary bladder to outside the body.



Let's Review

Look at the following diagram and identify each of the numbered parts of the urinary system. Write your answers in the blanks provided below.



Compare your answers with those in the *Answer Key* on page 27. Did you get a perfect score? If you did, that's very good! That means you learned a lot from the previous discussion and can go on to the next part of the lesson. If you didn't, review the parts you missed first before continuing with the lesson.

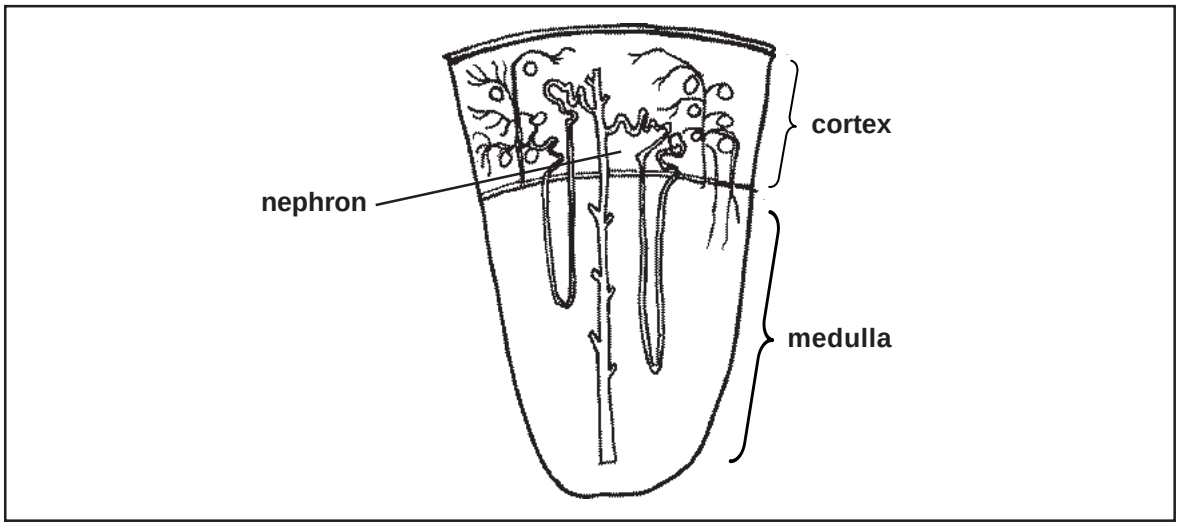
Let's Learn

Now that you know the different parts of the urinary system and their individual functions, you can now study how the whole system works.

Your body takes nutrients from food and uses them to maintain all bodily functions including energy and self-repair. After your body has taken what it needs from the food, waste products are left behind in the blood and in the bowel. The urinary system works with the lungs, skin and intestines—all of which also excrete wastes—to keep the chemicals and water in your body balanced. Adults eliminate about a quart and a half of urine each day. The amount depends on many factors, the major ones being the amount of fluid and food a person consumes and how much fluid is lost through sweat and breathing. Certain types of medications can also affect the amount of urine eliminated.

The urinary system removes a type of waste called **urea** from your blood. Urea is produced when foods containing protein, such as meat, poultry and certain vegetables, are broken down in the body. It is carried in the bloodstream to the kidneys.

The kidneys remove urea from the blood through tiny filtering units called **nephrons.** Each nephron consists of a ball of small blood capillaries called a **glomerulus** and a small tube called a **renal tubule.** Urea, together with water and other waste substances, form the urine as it passes through the nephrons and down the renal tubules of the kidneys.



From the kidneys, urine travels down to the two thin tubes called ureters to the urinary bladder. Muscles in the ureter walls constantly tighten and relax to force urine downward away from the kidneys. If urine is allowed to stand still or back up, a kidney infection can develop. Small amounts of urine are emptied into the bladder from the ureters about every 10 to 15 seconds.

The urinary bladder stores urine until you are ready to go to the bathroom to empty it. It swells into a round shape when it is full and gets smaller when empty. If the urinary system is healthy, it can hold up to 16 ounces (two cups) of urine comfortably for two to five hours.

The **sphincters** help keep urine from leaking. They close tightly like a rubber band around the opening of the urinary bladder into the urethra.

The nerves in the urinary bladder tell you when it is time to urinate. As the bladder first fills with urine, you may notice a feeling that you need to urinate. The sensation to urinate becomes stronger as the bladder continues to fill and reaches its limit. At that point, nerves from the urinary bladder send a message to the brain that it is full and your urge to empty it intensifies.

When you urinate, the brain signals the urinary bladder muscles to tighten, squeezing urine out. At the same time, the brain signals the sphincter muscles to relax. As they relax, urine exits the urinary bladder through the urethra. When all the signals occur in the correct order, normal urination occurs.

Let's Review

Recall what you have just learned about how the urinary system works. Arrange the following steps in proper order. Number them from 1 to 10 (1 for the first step, 2 for the second and so on).

_____ a. Waste products are left in your blood and bowel.

_____ b. Urine travels through your ureters to your urinary bladder.

_____ c. Your nerves tell you when it is time to urinate.

_____ d. The nutrients from the food you eat are used by your body.

_____ e. The urinary bladder stores urine until you are ready to go to the bathroom to empty it.

_____ f. You eat food.

_____ g. Your sphincters close tightly around the opening of your urinary bladder into your urethra.

_____ h. Your kidneys remove urea from your blood using nephrons.

_____ i. Your brain signals your urinary bladder muscles to tighten squeezing urine out of your bladder through the urethra.

_____ j. Urea is produced and carried in your bloodstream to the kidneys.

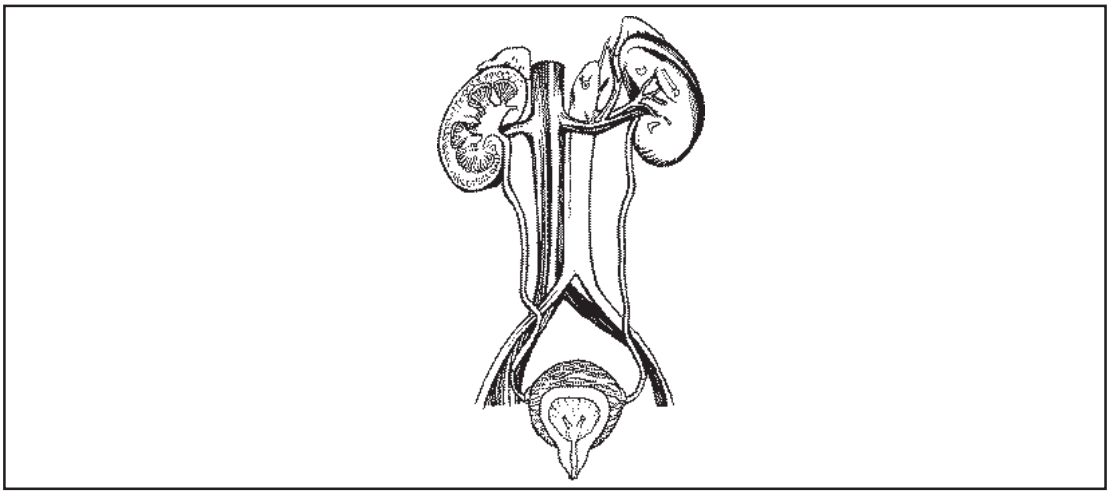
Compare your answers with those in the *Answer Key* on page 28. Did you get a perfect score? If you did, that's very good! You can now go to the next part of the lesson. If you didn't, don't worry. Just review the parts you missed before doing so.

Let's See What You Have Learned

A. Match the items in Column A with their descriptions in Column B. Write only the letters of the correct answers in the blanks provided before the numbers.

Column A	Column B
_____ 1. Urinary system	a. Tubes leading from the kidneys to the urinary bladder whose primary function is to move urine from the kidneys to the ureters and into the urinary bladder
_____ 2. Kidneys	b. Circular muscles that help keep urine from leaking
_____ 3. Uriters	c. A ball of blood capillaries in a nephron
_____ 4. Urinary bladder	d. Filter the blood and remove metabolic wastes then excrete them out of the body
_____ 5. Urethra	e. A tube that directs urine from the urinary bladder to outside the body
_____ 6. Sphincters	f. A small tube in a nephron
_____ 7. Urea	g. Type of waste removed by the urinary system
_____ 8. Nephrons	h. Stores urine and forces it into the urethra for excretion from the body
_____ 9. Glomerulus	i. Tiny filtering units that remove urea from the blood
_____ 10. Renal tubule	j. Removes substances from the blood in the form of urine which regulates various metabolic processes

B. Trace the path in the flow of urine in the following diagram of the urinary system below.



Compare your answers with those in the *Answer Key* on page 28. Did you get a perfect score? If you did, that's very good! You can now go to the next lesson. If you didn't, don't worry. Just review the parts of the lesson you misunderstood before going to Lesson 2.

Let's Remember

- The **urinary system** removes substances from the blood in the form of urine and regulates various metabolic processes.
- The urinary system is made up of two kidneys, two ureters, the urinary bladder, two sphincters and the urethra.
- The **kidneys** filter the blood and remove metabolic wastes then excrete them out of the body.
- The **ureters** are tubes leading from the kidneys to the urinary bladder that move urine into the urinary bladder.
- The **urinary bladder** stores urine and forces it into the urethra for excretion from the body.
- The **sphincters** are circular muscles that help keep urine from leaking.
- The **urethra** is a tube that directs urine from the urinary bladder to outside the body.

Diseases of the Urinary System

By now, you have already learned about the different parts of the urinary system and their functions. You also learned how the urinary system works and how important it is in helping your body function properly. But what if something wrong happens to it? What diseases can affect it?

This lesson will discuss some common diseases that can affect the urinary system. Some recent advances in technology used to diagnose and treat these diseases will be tackled as well.

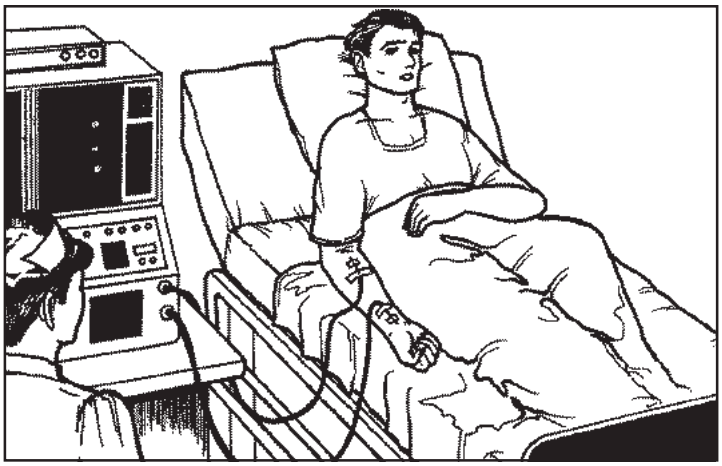
Let' Read

Read the following article then answer the following questions briefly.

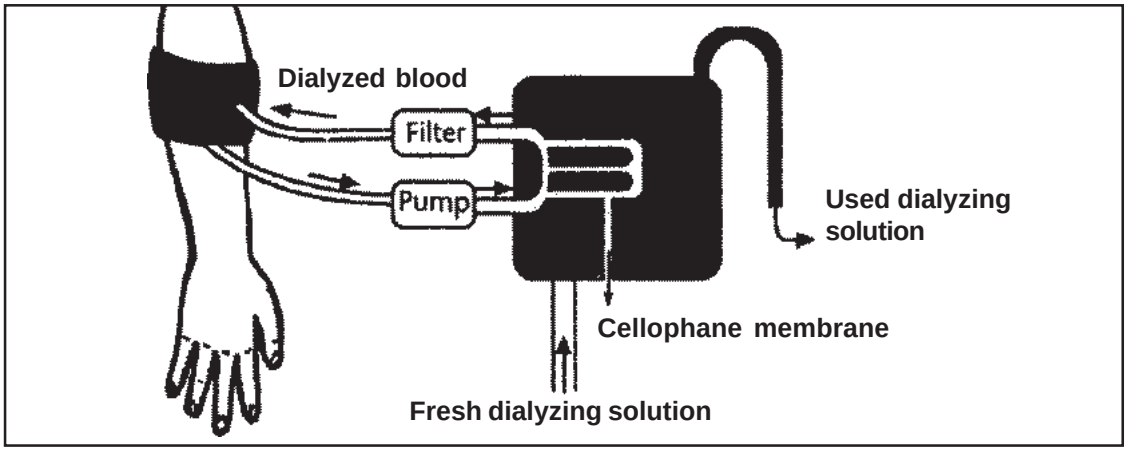
The Artificial Kidney Machine: A Lifesaver

Our remarkable kidneys continually filter our blood, remove wastes and maintain the proper salt and water balance in our bodies. But what if the kidneys stop working? Most victims of kidney failure hope for a kidney transplant. However, donor kidneys are hard to find and the kidney transplant operation does not always work.

This man is waiting for a kidney donor. In the meantime, he must have his blood cleaned by an artificial kidney machine. The machine, as you can see, is much larger than a life-sized kidney and is not portable like a real kidney. But it can keep the man alive. So several times every week he hooks up to the kidney machine.



A tube is placed in one of the man's arteries. The other end of the tube is connected to the machine. The man's blood enters the machine on one side of a cellophane barrier. Across the barrier, there is a solution that is very similar to blood but does not contain any wastes. The wastes in the blood diffuse through the cellophane and into the solution. Food and other substances stay in the blood. The waste-collecting solution is continually replaced as wastes build up in it. After the blood has circulated through the machine, it returns to the man's body through a tube in his vein. Each cleansing takes between six and eight hours. It is expensive and uncomfortable.



People who depend on artificial kidney machines to survive can never be too far from their machines. This limits many activities, especially traveling. Scientists are working to come up with small, portable kidney machines that patients can carry with them anywhere they go. But for people like the man in the picture, even the large artificial kidney machine is remarkable. It keeps him alive while he waits for a real kidney.

Source: Scott, Foresman and Company. *Biology.* M.M., Philippines: Academe Publishing House, 1986.

1. Why are artificial kidneys important?

   _____

   _____

   _____

2. Why are scientists trying to make small, portable artificial kidneys?

   _____

   _____

   _____

Consult your Instructional Manager or Facilitator in checking your work.

Let's Learn

Causes of Problems in the Urinary System

Problems in the urinary system can be caused by aging, illness or injury. As you get older, changes in the kidneys' structure cause them to lose some of their ability to remove wastes from the blood. Also, the muscles in your ureters, urinary bladder and urethra tend to lose some of their strength. You may have more urinary infections because the urinary bladder muscles do not tighten enough to empty your bladder completely. A decrease in strength of muscles of the sphincters and the pelvis can also cause **incontinence,** the unwanted leakage of urine. Illness or injury can also prevent the kidneys from filtering the blood completely or block the passage of urine.

Let's Think About This

Think of ways on how you can avoid the causes of urinary system illnesses mentioned above. List them in the space provided below.

_____
_____
_____
_____
_____
_____

Ask your Instructional Manager or Facilitator to check your list before proceeding with the rest of the lesson.

Let's Learn

How Are Problems in the Urinary System Detected?

Urinalysis is a test that studies the content of urine for abnormal substances such as protein or signs of infection. This test involves urinating into a special container and leaving the sample to be studied.

Urodynamic tests evaluate the storage of urine in the urinary bladder and the flow of urine from the bladder through the urethra. Your doctor may want to do a urodynamic test if you are having symptoms that suggest problems with the muscles or nerves of your lower urinary system and pelvis (ureters, urinary system, urethra and sphincters).

Urodynamic tests measure the contraction of the urinary bladder muscle as it fills and empties. The test is done by inserting a small tube called a **catheter** through your urethra into your bladder to fill it either with water or gas. Another small tube is inserted into your rectum to measure the pressure put on your bladder when you strain or cough. Other bladder tests use X-ray dye instead of water so that X-ray pictures can be taken when the bladder fills and empties to detect any abnormalities in the shape and function of the bladder. These tests take about an hour.

Let's Try This

Do you know what a catheter looks like? Draw a catheter in the space provided below.

Have your Instructional Manager or Facilitator check your work.

Let's Learn

Diseases of the Urinary System

1. ***Urinary Tract Infections (UTI)***

   Urinary tract infections are caused by bacteria in the urinary tract. Women get UTIs more often than men do. UTIs are treated with antibiotics. Drinking lots of fluids also helps by flushing out the bacteria.

   The name of the UTI depends on its location in the urinary tract. An infection in the urinary bladder is called **cystitis.** If the infection is in one or both of the kidneys, the infection is called **pyelonephritis.** This type of UTI can cause serious damage to the kidneys if it is not adequately treated.

Urinary incontinence, loss of urinary bladder control, is the involuntary passage of urine. There are many causes and types of incontinence, and many treatment options. Treatments range from simple exercises to surgery. Women are affected by urinary incontinence more often than men.

Urinary retention or bladder-emptying problems is a common urological problem with many possible causes. Normally, urination can be initiated voluntarily and the bladder empties completely. Urinary retention is the abnormal holding of urine in the bladder. **Acute urinary retention** is the sudden inability to urinate, causing pain and discomfort. Causes can include an obstruction in the urinary system, stress or neurologic problems. **Chronic urinary retention** refers to the persistent presence of urine in the bladder after incomplete emptying. Common causes of chronic urinary retention are bladder muscle failure, nerve damage or obstructions in the urinary tract. Treatment for urinary retention depends on the cause.

2. ***Kidney Stones***

Kidney stones is the term commonly used to refer to stones or calculi in the urinary system. Stones form in the kidneys and may be found anywhere in the urinary system. They vary in size. Some stones cause great pain while others cause very little pain. The aim of treatment is to remove the stones, prevent infection and prevent recurrence. Both nonsurgical and surgical treatments are used. Kidney stones affect men more often than women.

3. ***Renal (Kidney) Failure***

Kidney failure results when the kidneys are not able to regulate water and chemicals in the body or remove waste products from your blood. **Acute renal failure** (ARF) is the sudden onset of kidney failure. This can be caused by an accident that injures the kidneys, loss of a lot of blood or some drugs or poisons. ARF may lead to permanent loss of kidney function. But if the kidneys are not seriously damaged, they may recover. **Chronic renal failure** (CRF) is the gradual reduction of kidney function that may lead to permanent kidney failure or end-stage renal disease (ESRD). You may go on living for several years without knowing you have CRF.

4. ***Urinary Tract Cancer***

Urinary tract cancer is a general term for tumors in the kidneys, bladder and the tubes that connect them. These life-threatening tumors occur mostly after the age of 65. Urinary tract cancer is three times more common in men than in women.

There are a number of risk factors for cancers of the kidney and bladder. Cigarette smoking is a known risk for both kidney and bladder tumors. Another risk is on-the-job exposure to chemicals called aromatic amines used in the petroleum and aniline dye industries. People who have worked with the following materials have a greater-than-average risk of getting urinary tract cancer:

a. dyes
b. rubber
c. leather
d. paint especially cadmium-containing ones
e. other organic chemicals

Repeated exposure to these materials for two years or more increases the risk of cancer but the cancer may not appear until many years later.

5. ***Neurogenic Bladder***

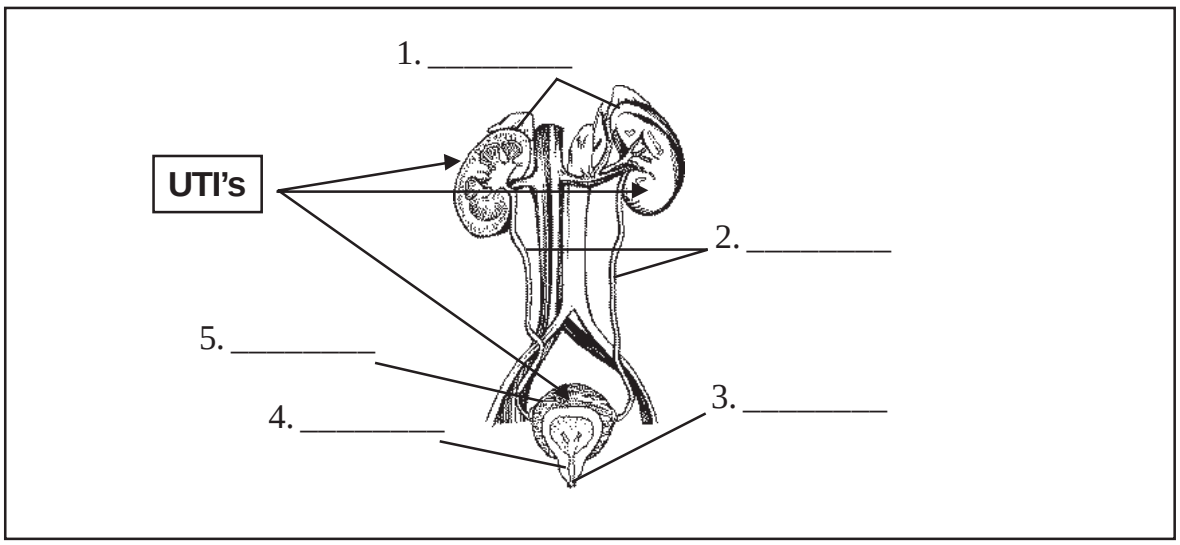
In a **neurogenic bladder,** the nerves that are supposed to carry messages from the brain to the urinary bladder do not work properly.

Neurogenic bladder can lead to different kinds of problems. It may result in urine leakage if the muscles holding urine do not get the right message—that it is time to urinate. If the bladder becomes too full, urine may back up into the kidneys and the extra pressure causes damage to the tiny blood vessels in the kidney. Or urine that stays too long may lead to an infection in the bladder or ureters.

Accidents that cause trauma to the brain or spinal cord, heavy metal poisoning, diabetes and acute infections are among the ways nerves and nerve pathways can be damaged. Some children are born with nerve problems which can keep a baby's bladder from releasing urine, leading to urinary infections or kidney damage.

Let's Try This

Look at the diagram of the urinary system below. Label its parts then indicate what organ is affected by each of the diseases or illnesses mentioned earlier. An example has been given to guide you.



Compare your answers with those in the *Answer Key* on page 29. Did you get a perfect score? If you did, that's very good! You can move on to the next part of the lesson. If you didn't, don't worry. Just review the parts that you made mistakes in before doing so.

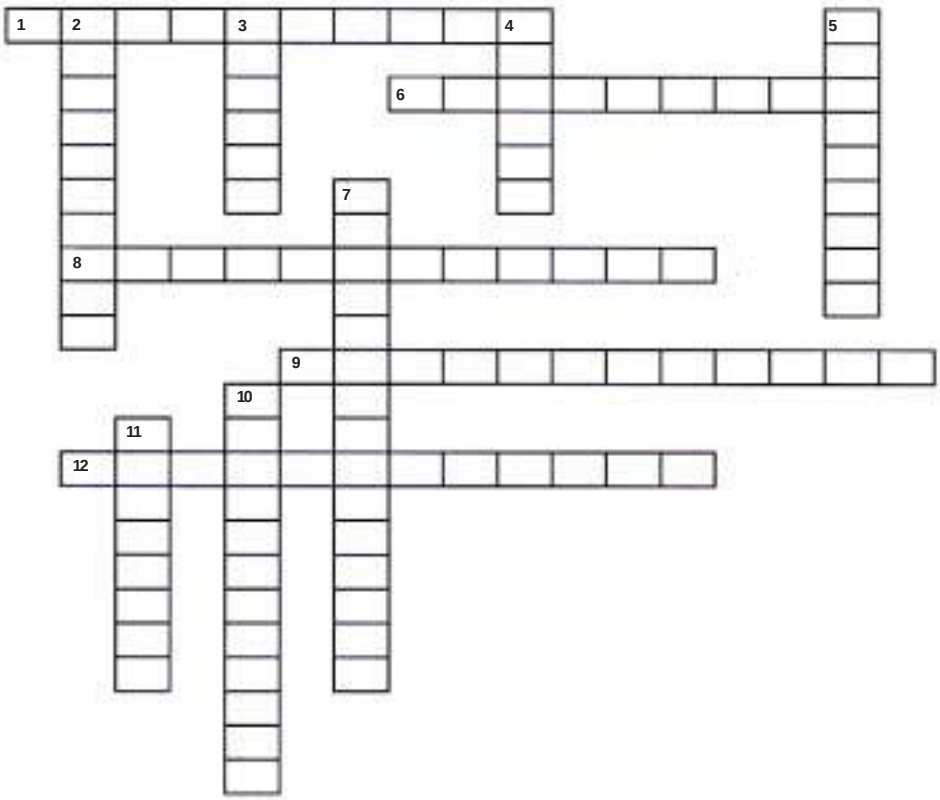
Let's Learn

Who Can Help Me With My Urinary Problem?

Your family doctor can help you with some urinary problems. Your pediatrician may be able to treat some of your child's urinary problems. But some problems may require the attention of a **urologist,** a doctor who specializes in treating problems of the urinary system and the male reproductive system. A **gynecologist** is a doctor who specializes in the female reproductive system and may be able to help with some urinary problems. A **urogynecologist** is a gynecologist who specializes in the female urinary system. A **nephrologist** specializes in treating diseases of the kidneys.

Let's See What You Have Learned

Complete the crossword puzzle below. Let the given clues guide you in answering.



1. Urinary tract _ _ _ _ _ _ _ _ _ _ — caused by bacteria in the urinary tract
2. Urinary tract _ _ _ _ _ _ — a general term for tumors in the kidneys, bladder and the tubes that connect them
3. _ _ _ _ _ _ _ _ _ _ bladder — malfunctioning of the nerves that are supposed to carry messages from the brain to the muscles of the bladder
4. Kidney _ _ _ _ _ _ — the term commonly used to refer to stones or calculi in the urinary system
5. Urinary _ _ _ _ _ _ _ _ — bladder-emptying problems
6. _ _ _ _ _ _ _ _ _ — a doctor who specializes in treating problems of the urinary system and the male reproductive system
7. _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ — a gynecologist who specializes in the female urinary system
8. _ _ _ _ _ _ _ _ _ _ _ _ — specializes in treating diseases of the kidneys
9. Urinary _ _ _ _ _ _ _ _ _ _ _ _ — loss of bladder control or the involuntary passage of urine

10. _ _ _ _ _ _ _ _ _ _ _ _ — urinary tract infection in one or both of the kidneys

11. _ _ _ _ _ _ _ _ — urinary tract infection in the bladder

12. _ _ _ _ _ _ _ _ _ _ _ _ — a doctor who specializes in the female reproductive system and may be able to help with some urinary problems

Compare your answers with those in the *Answer Key* on page 29. Did you get a perfect score? If you did, that's very good! You may proceed to the next lesson. If you didn't, review the parts you missed first before doing so.

Let's Remember

- The following are some of the diseases that can affect the urinary system:
  - urinary tract infections;
  - kidney stones;
  - renal (kidney) failure;
  - urinary tract cancer; and
  - neurogenic bladder.
- A **urologist** is a doctor who specializes in treating problems of the urinary system and the male reproductive system.
- A **gynecologist** is a doctor who specializes in the female reproductive system and may be able to help with some urinary problems.
- A **urogynecologist** is a gynecologist who specializes in the female urinary system.
- A **nephrologist** specializes in treating diseases of the kidneys.

Taking Care of the Urinary System

In the previous lesson, you learned about some diseases that can affect your urinary system. You also discovered whom you can consult when faced with urological problems.

This lesson will now tell you how you can take care of your urinary system.

Let's Think About This

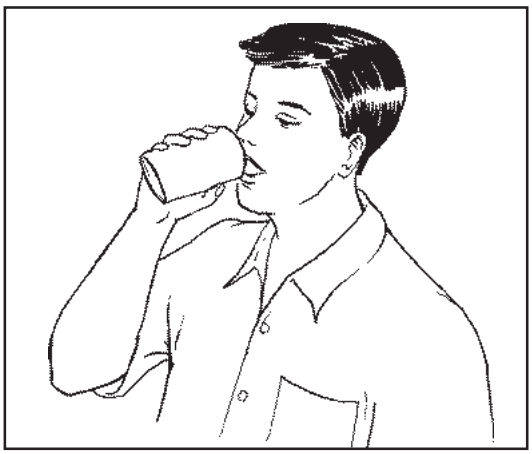
Based on what you have learned so far, how do you think you can take good care of your urinary system? List your answers down in the space provided below.

_____
_____
_____
_____
_____

Let's Learn

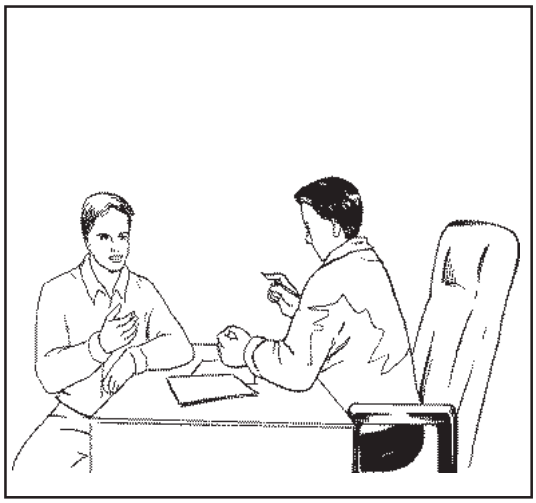
The following are some ways of taking care of your urinary system.

Maintain a healthy diet.



Drink at least eight glasses of water each day. This replaces the fluids lost by your body and maintains fluid levels to keep your body functioning well.

Maintain proper hygiene especially in using the toilet. This prevents urinary tract infections.



When you feel something is wrong in your body such as abdominal pains and difficulty in urinating, consult a doctor right away. These could be symptoms of urinary tract infections.

Practice monogamy. Sexually transmitted diseases can damage your urinary system.

Regular examination of your urine through urinalysis can help you monitor the status of your urinary system.

Let's See What You Have Learned

Check the statements that show how one can take care of his/her urinary system.

1. Take a bath regularly to avoid infections.
2. Drink at least eight glasses of water a day.
3. Get enough sleep and rest.
4. Consult a doctor only when needed.
5. Maintain a healthy diet.
6. Wear helmets when in construction sites.
7. Practice monogamy.
8. Have a regular checkup.
9. Observe proper bathroom habits.
10. Clean ears and nose regularly.

Compare your answers with those in the *Answer Key* on page 29. Did you get a perfect score? If you did, that's very good! You can then proceed to the next part of the module. If you didn't, don't worry. Review the parts you made mistakes in before doing so.

Let's Remember

Observe the following practices to keep your urinary system healthy:

- Maintain a healthy diet.
- Drink at least eight glasses of water a day.
- Maintain proper hygiene especially when using the toilet.
- Consult your doctor immediately when you feel something unusual.
- Practice monogamy.
- Have a regular checkup.

Well, this is the end of the module! Congratulations for finishing it. Did you like it? Did you learn anything useful from it? A summary of its main points is given on the next page to help you remember them better.

Let's Sum Up

This module tells us that:

- The **urinary system** removes substances from the blood in the form of urine and regulates various metabolic processes.
- The urinary system is made up of two kidneys, two ureters, the urinary bladder, two sphincters and the urethra.
- The **kidneys** filter the blood and remove metabolic wastes then excrete them from the body.
- The **ureters** are tubes leading from the kidneys to the urinary bladder that move urine into the urinary bladder.
- The **urinary bladder** stores urine and forces it into the urethra for excretion from the body.
- The **sphincters** are circular muscles that help keep urine from leaking.
- The **urethra** is a tube that directs urine from the urinary bladder to outside the body.
- The following are some of the diseases that can affect the urinary system:
  - urinary tract infections;
  - kidney stones;
  - renal (kidney) failure;
  - urinary tract cancer; and
  - neurogenic bladder.
- A **urologist** is a doctor who specializes in treating problems of the urinary system and the male reproductive system.
- A **gynecologist** is a doctor who specializes in the female reproductive system and may be able to help with some urinary problems.
- A **urogynecologist** is a gynecologist who specializes in the female urinary system.
- A **nephrologist** specializes in treating diseases of the kidneys.
- The following are some ways to take care of your urinary system:
  - Maintain a healthy diet.
  - Drink at least eight glasses of water a day.
  - Maintain proper hygiene especially when using the toilet.
  - Consult your doctor immediately when you feel something unusual.
  - Practice monogamy.
  - Have a regular checkup.

What Have You Learned?

Answer the following questions briefly.

1. What have you learned about the urinary system?

   _____
   _____

2. What are the parts of the urinary system? How does each of them function?

   a. _____
      _____

   b. _____
      _____

   c. _____
      _____

   d. _____
      _____

   e. _____
      _____

3. How is urine formed then excreted from the body? List down the steps below.

   a. _____
      _____

   b. _____
      _____

   c. _____
      _____

   d. _____
      _____

   e. _____
      _____

   f. _____
      _____

g. _____
_____

h. _____
_____

i. _____
_____

j. _____
_____

4. What are some of the diseases that can affect the urinary system? Describe each one of them.

a. _____
_____

b. _____
_____

c. _____
_____

d. _____
_____

e. _____
_____

5. How can you take care of your urinary system? List down three ways below.

a. _____
_____

b. _____
_____

c. _____
_____

Compare your answers with those in the *Answer Key* on page 30. Did you get a perfect score? If you did, that's very good! You can now move on to another module. If you didn't, don't worry. Just review the parts of the module you still find difficulty in before doing so.

Answer Key

A. Let's See What You Already Know *(page 2)*

1. urinary system
2. kidneys
3. ureter
4. urinary bladder
5. urethra
6. sphincters
7. urinalysis
8. kidney stones
9. urinary tract infections
10. urologist

B. Lesson 1

Let's Try This (pages 3–4)

1. kidneys
2. ureter
3. urinary bladder
4. urethra
5. sphincters

Let's Review (page 7)

1. kidney
2. ureter
3. urinary bladder
4. urethra
5. sphincters

Let's Review (page 9)

a. 3

b. 6

c. 9

d. 2

e. 7

f. 1

g. 8

h. 5

i. 10

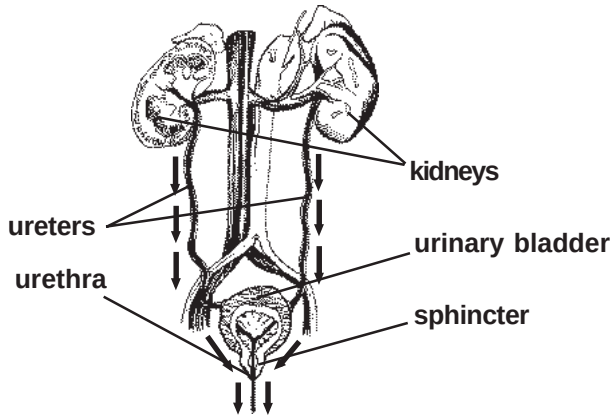
j. 4

Let's See What You Have Learned (pages 10–11)

A.

1.	j	6.	b
2.	d	7.	g
3.	a	8.	i
4.	h	9.	c
5.	e	10.	f

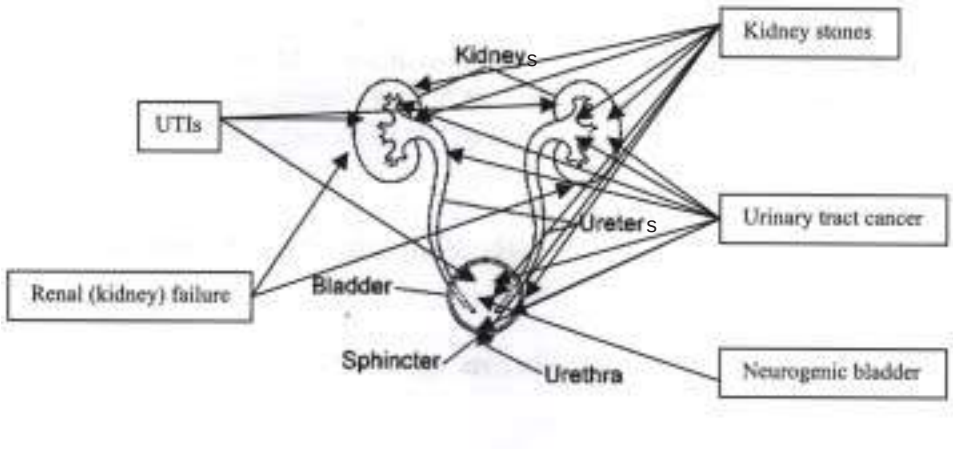
B.



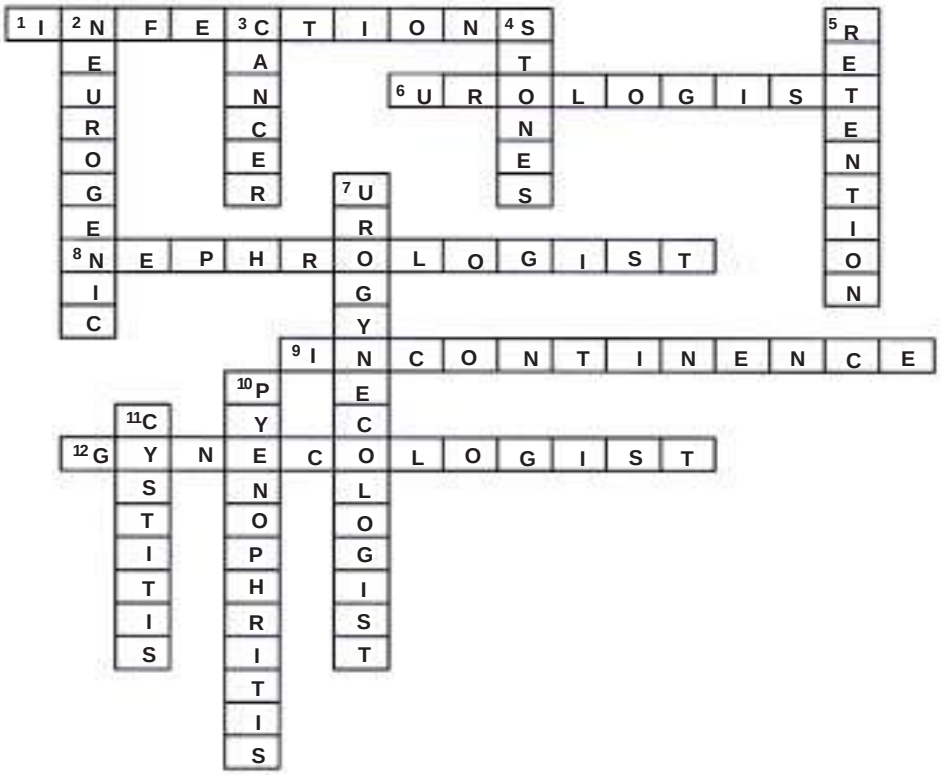
The kidneys remove urea from the blood. Urea, water and other waste substances form urine. The urine travels through the ureters into the urinary bladder. The bladder then stores the urine until it is time to urinate. The ureters then force the urine out through the urethra. The sphincter muscles finally get a message from the brain instructing it to relax thereby letting urine out of the body.

C. Lesson 2

Let'sTry This (page 18)



Let's See What You Have Learned (pages 19–20)



D. Lesson 3

Let's See What You Have Learned (page 23)

Check the following numbers: 1, 2, 5, 7, 8 and 9.

E. What Have You Learned? *(pages 25–26)*

1. The urinary system is the system that removes substances from the blood in the form of urine to regulate various metabolic processes.

2. a. *kidneys* – filter the blood and remove metabolic wastes then excrete them out of the body
   b. *ureters* – tubes leading from the kidneys to the urinary bladder which move urine to the urinary bladder
   c. *urinary bladder* – stores urine and forces it into the urethra for excretion from the body
   d. *sphincters* – prevent the urine from leaking
   e. *urethra* – directs urine from the urinary bladder to outside the body

3. a. You eat food.
   b. The nutrients from the food you ate are used by your body.
   c. Waste products are left in your blood and bowel.
   d. Urea is produced and carried in your bloodstream to the kidneys.
   e. Your kidneys remove urea from your blood using nephrons.
   f. Urine travels through your ureters to your urinary bladder.
   g. The urinary bladder stores urine until you are ready to go the bathroom to empty it.
   h. Your sphincters close tightly around the opening of your urinary bladder into your urethra.
   i. Your nerves tell you when it is time to urinate.
   j. Your brain signals your urinary bladder muscles to tighten squeezing urine out of your bladder through the urethra.

4. a. *urinary tract infections* – caused by bacteria in the urinary tract
   b. *kidney stones* – the term commonly used to refer to stones or calculi in the urinary system
   c. *renal (kidney) failure* – results when the kidneys are not able to regulate water and chemicals in the body or remove waste products from your blood
   d. *urinary tract cancer* – a general term for tumors in the kidneys, bladder and the tubes that connect them
   e. *neurogenic bladder* – when the nerves that are supposed to carry messages from the brain to the urinary bladder do not work properly

5. Choose only three from the list below.

   a. Maintain a healthy diet.
   b. Drink at least eight glasses of water a day.
   c. Maintain proper hygiene especially in using the toilet.
   d. Consult your doctor immediately when you feel something unusual.
   e. Practice monogamy.
   f. Have a regular checkup.

Glossary

Abdominal cavity A hole leading to the abdomen.

Acute renal failure The sudden onset of kidney failure.

Acute urinary retention The sudden inability to urinate, causing pain and discomfort.

Aromatic amines Chemicals that are used in the petroleum and aniline dye industries.

Cadmium A soft, bluish-white metallic element used in alloys, corrosion-resistant plating, control rods in nuclear reactors and nickel-cadmium batteries.

Calculi Hard, stone-like masses consisting of calcium salts and other compounds that form within hollow body structures.

Catheter A small tube inserted into your urethra and bladder when performing a urodynamic test.

Chronic renal failure The gradual reduction of kidney function that may lead to permanent kidney failure or end-stage renal disease.

Chronic urinary retention The persistent presence of urine in the bladder after incomplete emptying.

Cystitis A urinary tract infection in the bladder.

Glomerulus A ball of small blood capillaries in a nephron.

Gynecologist A doctor who specializes in the female reproductive system and may be able to help with some urinary problems.

Kidneys Filter the blood and remove metabolic wastes then excrete them from the body.

Kidney stones Refer to stones or calculi in the urinary system.

Metabolic wastes The chemicals produced by all the activities inside our cells.

Monogamy The state or practice of having only one husband or wife at a time.

Nephrologist Specializes in treating diseases of the kidneys.

Nephrons Tiny filtering units in the kidneys.

Neurogenic bladder When the nerves that are supposed to carry messages from the brain to the urinary bladder do not work properly.

Parietal peritoneum A multi-layered membrane which lines the abdominal cavity and protects the organs within it.

Pediatrician A doctor who specializes in the study, diagnosis and treatment of children's diseases.

pH A measure of the relative acidity or alkalinity of a solution expressed as the logarithm of the reciprocal of the hydrogen-ion concentration of the solution.

Pyelonephritis A urinary tract infection in one or both of the kidneys.

Renal (kidney) failure Results when the kidneys are not able to regulate water and chemicals in the body or remove waste products from the blood.

Renal tubule A small tube in a nephron.

Sexually transmitted diseases Diseases that are characteristically transmitted by sexual intercourse.

Sphincters Circular muscles that prevent the urine from leaking.

Urea Waste produced when food containing protein such as meat, poultry and certain vegetables are broken down in the body.

Ureters Tubes leading from the kidneys to the urinary bladder which move urine into the urinary bladder.

Urethra Directs urine from the urinary bladder to outside the body.

Urinalysis A test that studies the content of urine for abnormal substances such as protein or signs of infection.

Urinary bladder Stores urine and forces it into the urethra for excretion from the body.

Urinary incontinence Loss of urinary bladder control or the unwanted leakage of urine.

Urinary retention The abnormal holding of urine in the bladder.

Urinary system The system that removes substances from the blood in the form of urine to regulate various metabolic processes.

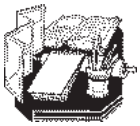
Urinary tract cancer A general term for tumors in the kidneys, bladder and the tubes that connect them.

Urinary tract infection A disease caused by bacteria in the urinary tract.

Urodynamic tests Evaluate the storage of urine in the urinary bladder and the flow of urine from the bladder through the urethra.

Urogynecologist A gynecologist who specializes in the female urinary system.

Urologist A doctor who specializes in treating problems of the urinary system and the male reproductive system.



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