

## THE REPRODUCTIVE SYSTEMS

19

gametes (GUM meets),  
male or female sex cells  
produced by the gonads

Do you have younger brothers or sisters? If so, do you ever help take care of them? You may play with them, help dress them, or even help feed them. You even may help care for younger children in your neighborhood.

Helping to care for children is a big responsibility. Being a parent is an even bigger responsibility. However, you cannot be a parent until you have reached sexual maturity. You reach sexual maturity when your gonads start producing sex cells, or gametes. Only when a male gamete and a female gamete join together can a new human being begin to form.



## SECTION 1

# MALE AND FEMALE SEX CELLS

The gonads are part of the reproductive system. This is the body system involved in the making of new human beings. The organs of reproduction are called genitals. In childhood, the genitals are only about one-tenth their adult size. At puberty, they begin to grow and develop more fully.

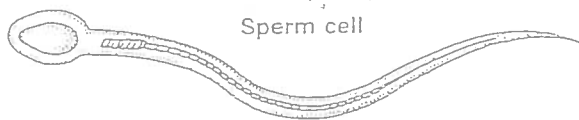
genitals (JEHN uh tuhz)  
organs of reproduction;  
produce male and female  
gametes

Although the gonads play an important part in growth, they also have another very important job. They produce male and female gametes.

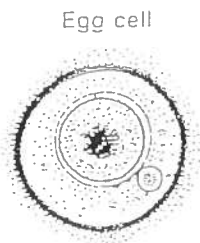
## Male Gametes

The male gamete is the sperm cell. The testes—the male gonads—begin to make sperm cells at puberty. A sperm cell is very tiny. It is only about 0.002 inch (0.00508 centimeter) long, and can be seen only through a microscope. As you can see in the drawing, a sperm cell looks something like a tiny tadpole. Each sperm has a head, a neck, and a long, threadlike tail that helps it move. The nucleus of the cell fills up most of the head.

sperm cell, male gamete,  
produced in the testicles.



Sperm cells are so small that 500 of them placed end to end would cover only 1 inch (2.5 centimeters).



This is a human egg cell. An egg cell is about 40 times larger than a sperm cell.

## Female Gametes

The female gamete is the egg cell, or ovum. Egg cells begin to mature at puberty in the ovaries—the female gonads. An egg cell is much larger than a sperm cell. In fact, it is one of the largest cells in the human body. An egg cell is about the size of the period at the end of this sentence. The nucleus of the egg cell lies within a jellylike substance called the cytoplasm. This jellylike part of the cell contains food and cell chemicals. The cytoplasm is surrounded by a membrane. The membrane is like “skin” around the cell.

egg cell, or ovum, female  
gamete, produced in the  
ovaries

## SECTION 1 REVIEW

1. How are the gonads important to human reproduction?
2. What is the male gamete called? The female gamete?

## THE FEMALE REPRODUCTIVE SYSTEM

The diagram shows a side view of the female reproductive system. As you can see, most of the reproductive organs are inside the body. There are, however, some parts on the outside of the female body.

### Outer Organs

**outer labia** (LAY bee uh), the two thick folds of skin between the legs on the outside of the female's body.

**inner labia**, two thin folds of skin within the outer labia.

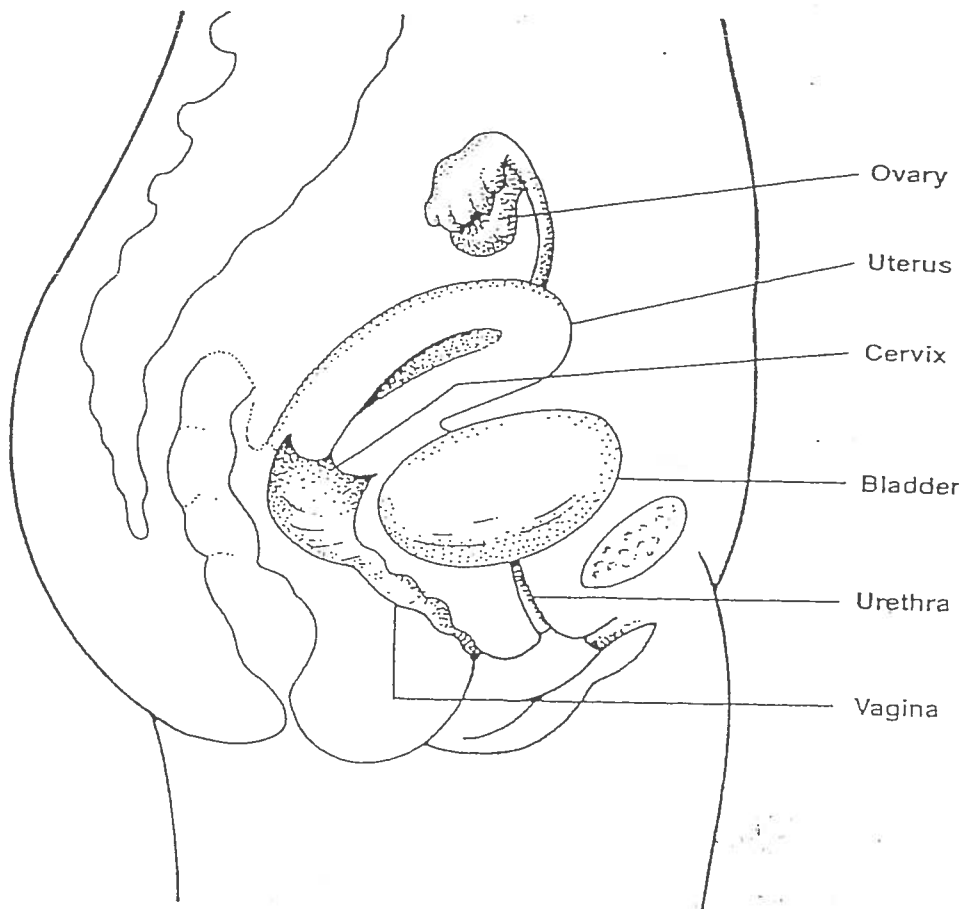
**clitoris** (KLIHT uh ruhs), sensitive, bean-shaped organ containing many blood vessels and nerve endings.

**urethra** (yu REE thruh), tube from the bladder to the outside of the body; urine leaves the body through this opening.

On the outside of the body, there are two thick folds of skin between the legs. These are called the outer labia. The outer labia protect the soft, delicate tissues under them. Within the outer labia are two thin folds of skin. These are the inner labia. At the very front of the labia is the clitoris, a bean-shaped organ. The clitoris has many blood vessels and nerve endings, which make it very sensitive to the touch.

### Inner Organs

The inner labia also surround two body openings. The opening closest to the pubic bone is the urethra. Urine from the bladder leaves the body through this opening. The bladder and urethra, however, are not part of the reproductive system. They are part of the excretory system—the system through which urine passes from the body.



*This is a side view of the female reproductive system.*

Slightly below the opening of the urethra is the opening of the vagina. The vagina is a tube about 3 1/2 inches (9 centimeters) long. It extends backward and upward into the body. Its walls are made of muscle fibers that can stretch a great deal.

The vagina leads directly to the uterus. This hollow, pear-shaped organ has a thick muscular wall. The uterus also is called the womb. The lower part of the uterus is called the cervix. It extends a little into the vagina.

The lower diagram shows a front view of the female reproductive system. Notice the location of the vagina, the cervix, and the uterus. Notice also where four other important organs of the reproductive system are found. These are the two Fallopian tubes and the two ovaries. Each Fallopian tube is about 4 inches (10 centimeters) long. Each one extends from the upper part of the uterus to one of the ovaries. One end of each Fallopian tube opens directly into the uterus. At the other end, however, is a funnel-shaped opening. This opening surrounds the ovary but is not connected to it.

**vagina** (vuh JY nuh), muscular tube that extends backward and upward into the body to the uterus.

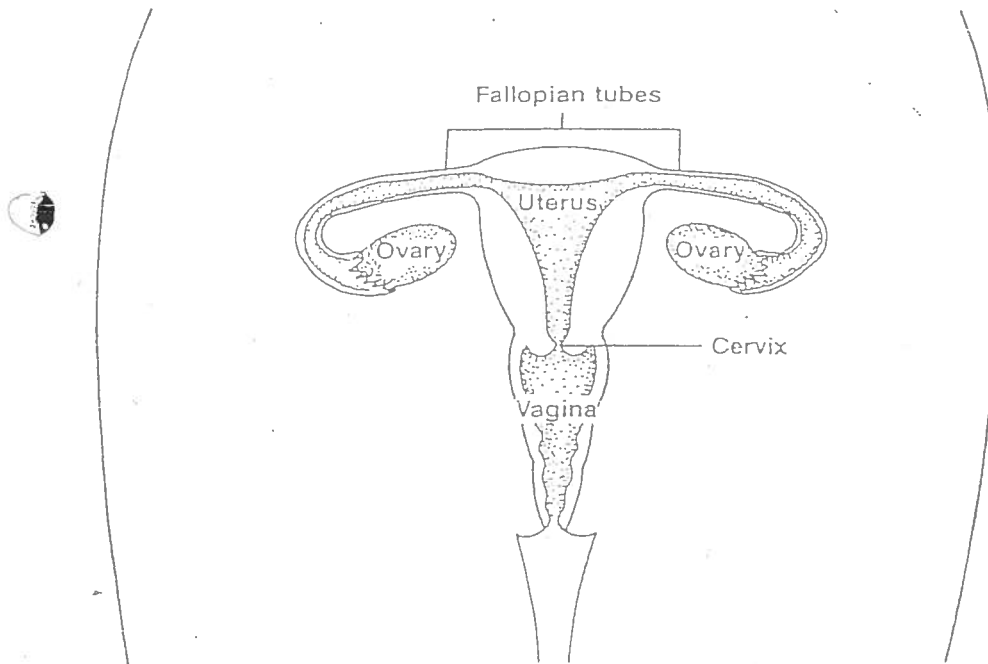
**uterus** (YOOT uh ruhs), hollow pear-shaped organ with a thick muscular wall.

**womb** (WOOM), another word for the uterus.

**cervix** (SUR vihks), lower part of the uterus that extends a little into the vagina.

**Fallopian** (fuh LOH pee uh) tubes, the tubes from the ovaries to the uterus, through which an egg cell passes.

**ovaries** (OHV uh rees), almond-shaped organs that produce hormones and sex cells.



*This is a front view of the female reproductive system.*

The ovaries are almond-shaped. Each is about 1 1/2 inches (4 centimeters) long, about 1 inch (2.5 centimeters) wide, and about 1/4 inch (6 millimeters) thick. The ovaries produce hormones and sex cells.

## SECTION 2 REVIEW

1. What is the tube that leads from the uterus to the outside of the body?
2. The Fallopian tubes provide a passageway between which two organs?

## OVULATION AND THE MENSTRUAL CYCLE

When a female reaches puberty, her ovaries begin to perform two very special jobs. One of these jobs, as stated earlier, is to produce hormones. The other job is to release egg cells.

### Releasing the Egg Cell

Each ovary contains thousands of small pockets called follicles. Inside each follicle is an immature egg cell. When a girl reaches puberty, one of these follicles breaks. Out of it comes a mature, or ripe, egg cell. This process is called ovulation. For most women, ovulation happens about once a month. The ovaries usually take turns releasing egg cells. Most girls have about 1 million immature egg cells in each ovary at birth. However, only about 400 of these egg cells will ever mature.

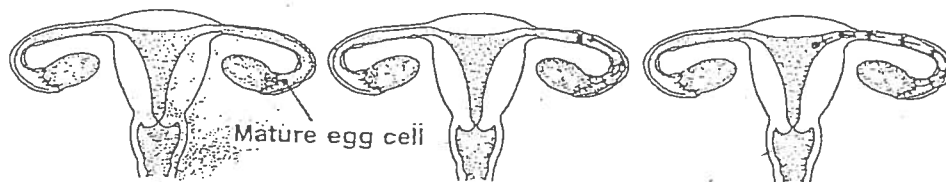
**follicles** (FAHL ih kuhlz), small pockets inside an ovary that contain immature egg cells.

**ovulation** (ahv yuh LAY shuhn), release of a mature egg cell from an ovary.

### Moving the Egg Cell

After an egg cell comes out of an ovary, it is swept into the opening of a Fallopian tube. The walls of the tube are lined with tiny, hairlike cilia that ripple and wave. This action sweeps the egg cell toward the uterus. The Fallopian tube also helps move the egg cell by tightening and relaxing. The trip to the uterus takes about three days.

**cilia** (SIHL ee uh), tiny, hairlike structures lining the Fallopian tubes that move to help the egg cell reach the uterus.



*Ovulation occurs when the egg cell breaks out of the follicle. The egg cell enters the Fallopian tube and travels through the Fallopian tube into the uterus.*

### Preparing the Uterus

Meanwhile, the uterus is changing. It is getting ready to hold the egg cell. Its lining is becoming thicker and softer. More blood is moving into the lining to help provide food for the egg cell.

### Sex Cells Join

A new life will start only if a sperm cell joins with an egg cell. When these two cells join, fertilization has taken place. Fertilization occurs in a Fallopian tube. The fertilized egg then sinks into the soft lining of the uterus. There it begins to grow and develop.

**fertilization** (furt uhl uh ZAY shuhn), joining of a sperm cell with an egg cell.

## SECTION 3 REVIEW

1. After ovulation, how does an egg cell reach the uterus?
2. How does the uterus prepare for an egg cell?

## SECTION 4

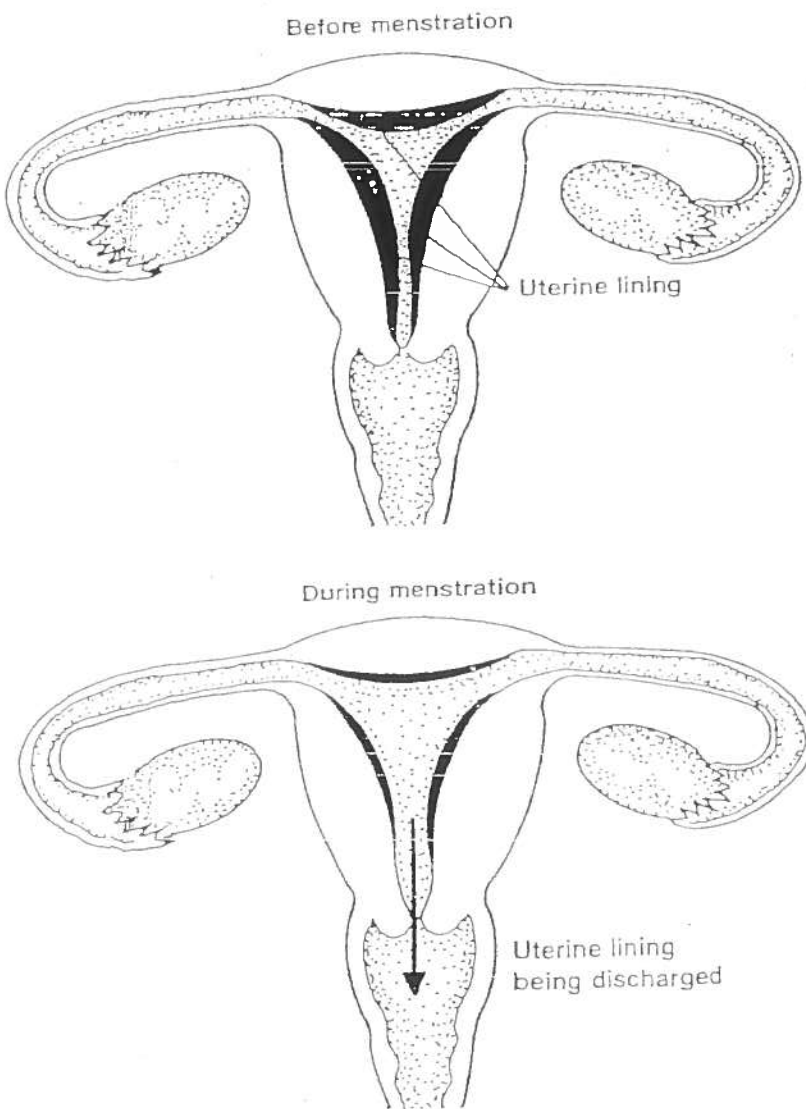
# MENSTRUATION

If an egg cell is not fertilized, it dissolves soon after reaching the uterus. Then the thickened lining of the uterus breaks down. Along with a small amount of blood, the lining leaves the body through the vagina. This discharge is called menstruation. Menstruation is one sign that a girl is becoming a woman.

Menstruation comes from the Latin word *mensis*, meaning month. Menstruation usually takes place about once a month. The menstrual period—when menstruation is taking place—usually lasts from three to seven days. This event is also called the woman's *period*.

menstruation (ˈmeɪnstruːˈweɪʃən), normal discharge from the uterus containing blood and the lining of the uterus.

menstrual (ˈmeɪnstruːəl) period, time when menstruation is taking place; usually lasts about three to seven days.



During menstruation, the lining of the uterus is discharged through the vagina. Menstruation usually takes place once a month.

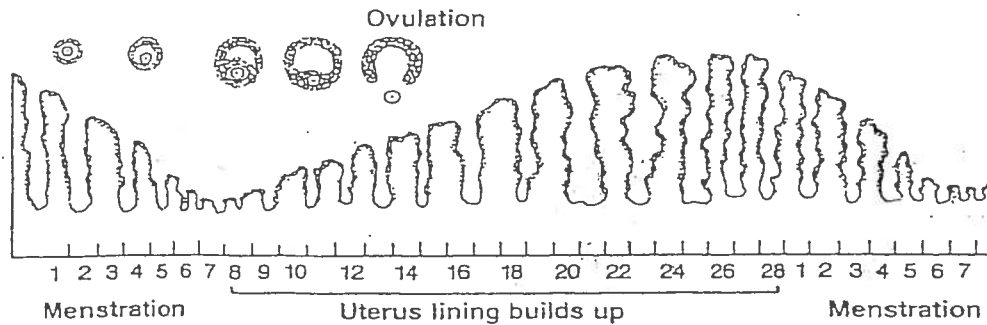
## The Menstrual Cycle

The time from the beginning of one menstrual period to the beginning of the next is called the menstrual cycle. It is called a cycle because the events repeat again and again. Each menstrual cycle usually takes about 28 days.

Ovulation takes place about every 28 days. It occurs about two weeks before menstruation—that is, about halfway through the menstrual cycle. Ovulation and menstruation mean that many things occur in a woman's body. During ovulation, an egg cell leaves one of the ovaries. It travels down a Fallopian tube and enters the uterus. If the egg cell is not fertilized, menstruation follows in about two weeks. After menstruation, the special lining inside the uterus rebuilds itself. About two weeks later, another egg cell is released. Again, if the egg cell is not fertilized, menstruation follows.

*menstrual (MEHN struh vuhl) cycle, time from the beginning of one menstrual period to the beginning of the next, about 28 days.*

*The events of an average menstrual cycle are shown here.*



This cycle goes on month after month, year after year. One way in which it is interrupted is when an egg cell becomes fertilized. Then the egg cell attaches itself to the uterus and begins to grow and develop. This condition is known as pregnancy.

## The First Menstrual Period

A girl's first menstrual period most often occurs between ages eleven and thirteen. However, it may occur as early as age ten or as late as age seventeen. These differences are normal, as is menstruation itself.

Menstruation may not be regular at first. One month, the period may begin several days early. Another month, it may be a little late. Sometimes it even may skip a month. Irregular periods usually are due to irregular ovulation. The flow, too, may be heavier in some months than others. Within a year or two, however, a regular pattern usually develops. For many women, the cycle never becomes regular. For most women, there are occasional irregularities. These irregularities may be caused by illness, upset feelings, too much exercise, or even travel.

During menstruation, a girl or woman may wear a sanitary napkin, which collects the menstrual flow. These napkins, or "pads," are worn inside the underwear. Most pads come with an adhesive strip to hold the pad in place. The pads should be changed frequently, especially when the flow is heavy.

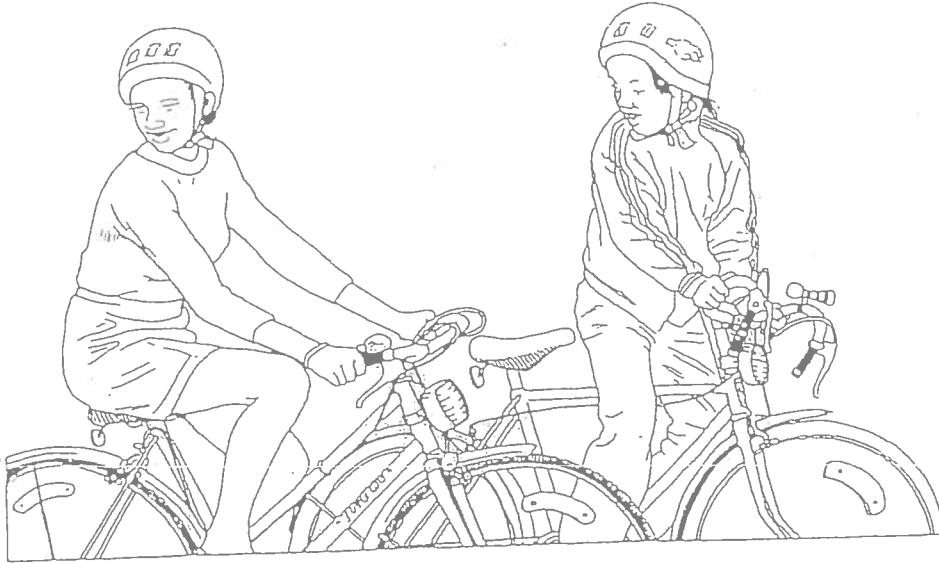
*pregnancy (PREHG nuhn see), the condition in which the fertilized egg cell has attached itself to the uterus and begins to grow and develop.*

*sanitary napkin, pad worn inside the underwear to collect the menstrual flow.*

Some women prefer to use tampons. Tampons are tight rolls of absorbent material that are inserted into the vagina. The tampon is held in place by the wall of the vagina. Tampons need to be changed often.

**tampons** (TAM pahnz), tight rolls of absorbent material inserted into the vagina to absorb the menstrual flow.

Menstruation is a natural process. It need not keep a woman from her normal activities. Some physical exercise on the first day or two may help the body adjust to menstruation.



*Physical activity often helps to relieve any discomfort that might accompany menstruation.*

During menstruation, however, the body does seem to be more sensitive to very high or very low temperatures. Girls can—and should—take a daily warm shower or bath during their menstrual periods.

Most women and girls feel little or no discomfort during menstruation. However, some do feel ill. A few girls suffer from painful cramps early in their periods. Girls with severe cramps should let their physician know about the cramps. In general, however, regular menstrual periods are a sign of good health.

## Menopause

Beginning sometime in their late forties or early fifties, women go through menopause, the time at which menstruation stops permanently. Menopause also is called “change of life.” At first, menstruation becomes more and more irregular. Then it stops. The ovaries no longer produce mature egg cells. They also make smaller amounts of sex hormones. After this time, a woman can no longer bear children.

**menopause** (MEHN uh pawz), the time at which menstruation stops permanently.

### SECTION 4 REVIEW

1. When does a girl's first menstrual period most often take place?
2. What is the difference between the menstrual period and the menstrual cycle?
3. What is menopause?



## SECTION 5

# THE MALE REPRODUCTIVE SYSTEM

The diagram shows a side view of the male reproductive system. As you can see, several of the male reproductive organs are outside the body. There are several other parts inside the male's body.

**penis** (PEE nuhs), external male reproductive organ.

**foreskin**, fold of skin covering the top of the penis when a boy is born.

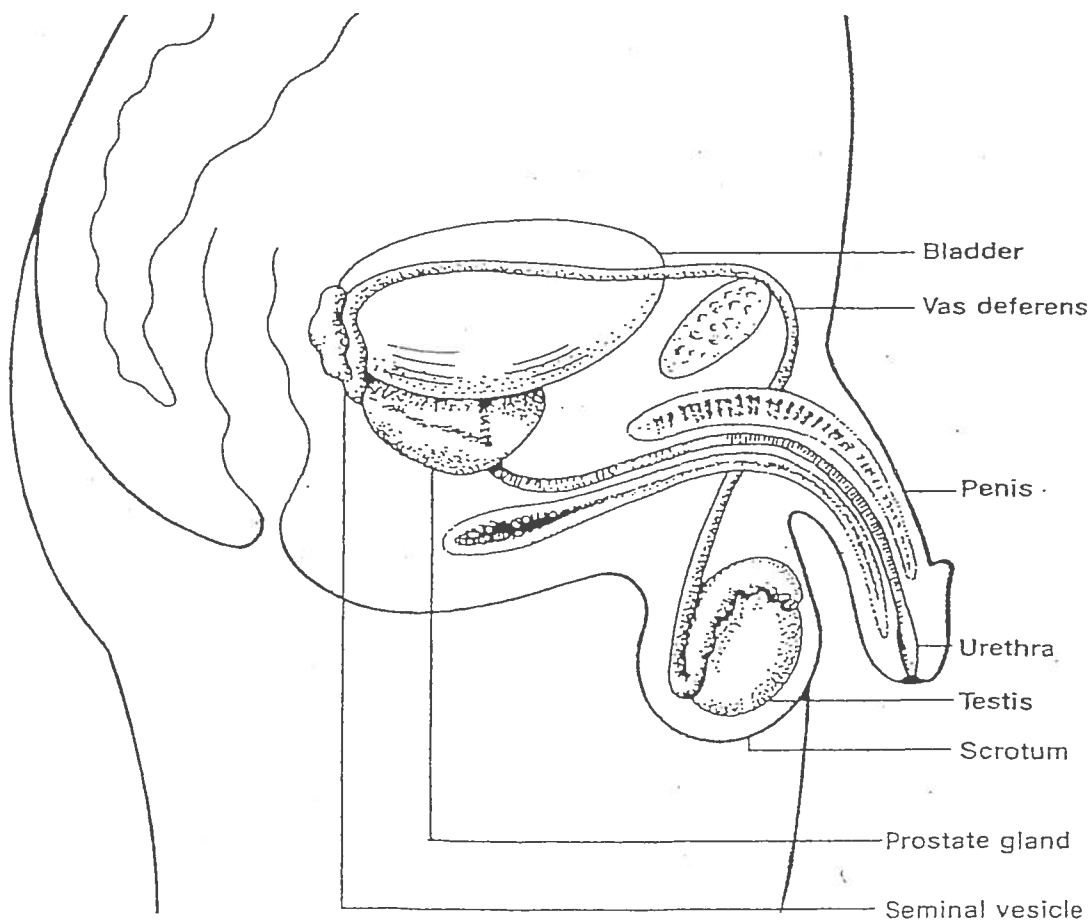
**circumcision** (suhr kuhm SIHZH uhn), removal of the foreskin on the penis.

**scrotum** (SKROHT uhm), pouch of muscular skin located behind the penis.

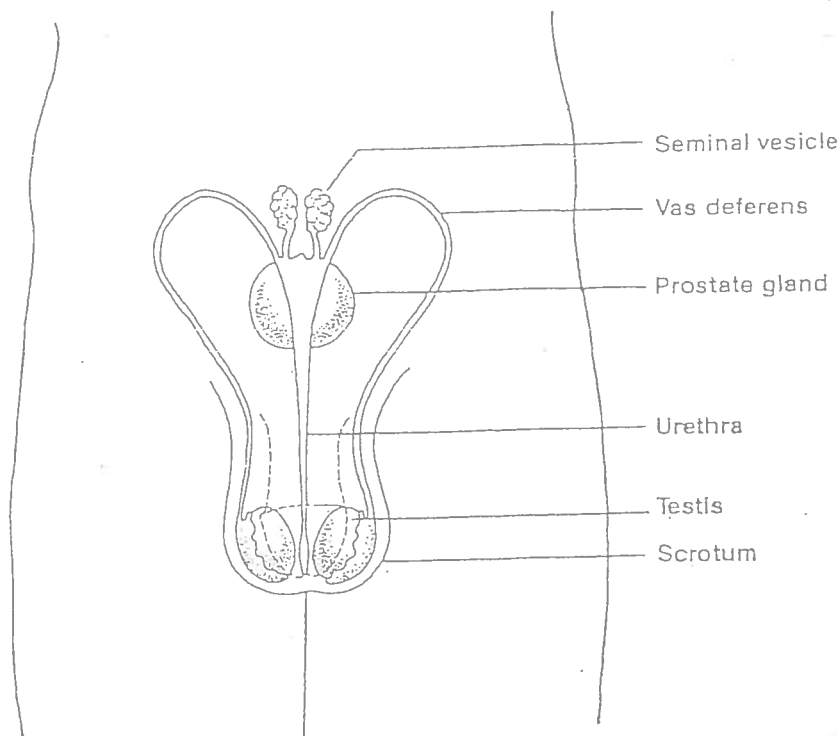
The penis, which is at the base of the abdomen, hangs down at the front of the body, in front of the thighs. A fold of skin, called the foreskin, covers the top of the penis when a boy is born. In many cases, parents will ask the physician to remove the foreskin shortly after birth. Removal of this skin is called **circumcision**. Some physicians believe that circumcision helps in keeping the penis clean. For males who are not circumcised, the foreskin can be pulled back to clean the top of the penis. This cleaning should be done each day.

Behind the penis is a pouch of loose skin called the **scrotum**. The scrotum is a muscular pouch. Its main job is to protect the organs of the male reproductive system, which are inside it.

*This is a side view of the male reproductive system.*



HBV material copyrighted under notice appearing earlier in this work.



*This is a front view of the male reproductive system.*

Inside the scrotum are the testes. Their location outside the body helps keep them slightly cooler than the internal body temperature. Sperm cells, which form in the testes, cannot grow in a place as warm as the inside of the body. In warm weather, the testes hang lower in order to keep the sperm cells away from the body's heat. The testes lower because muscles in the scrotum relax. In cooler weather, muscles in the scrotum draw the testicles closer to the body's heat. It is normal for one testis to hang slightly below the other.

The testes are oval-shaped. Each is about 1 3/4 inches (4.5 centimeters) long and about 1 inch (2.5 centimeters) thick. Each testis has 200 to 300 small saclike parts. Packed into each sac are tiny threadlike tubes. About 1,000 such tubes fill each testis. Sperm cells form within these tubes. After puberty, sperm cells form by the hundreds of millions, day after day.

The many tubes in a testis join into one large coiled tube, the epididymis. Sperm cells are stored in the epididymis while they mature. This tube opens into a tube called the vas deferens. One vas deferens travels from each testis into the body. Each vas deferens is about 24 inches (40 centimeters) long. Each curves under the bladder. Then the two tubes connect with a single tube—the urethra. The urethra extends from the bladder down through the penis. Urine from the bladder leaves the body through the urethra.

**epididymis** (ehp uh DIHD uh muhs), large coiled tube where sperm cells are stored.

**vas deferens** (VAS • DEHF uh ruhnz), one of two tubes that carry sperm cells from the testes to the urethra.

**urethra** (yu REE thruh), tube extending from the bladder down through the penis, through which urine leaves the body.

### SECTION 5 REVIEW

1. What is the job of the muscles in the scrotum?
2. What would happen if the testes were located inside the body?

## SECTION 6

# RELEASING SPERM CELLS

When a male reaches puberty, his testicles begin two very special jobs. Not only do the testicles produce hormones, they also make sperm cells that may fertilize an egg cell.

## Erection

**erection** (ih REHK shuhn), condition in which the tissues in the penis fill with blood and the penis becomes firm and erect.

**seminal vesicles** (SEHM uhn uhl • VEHS ih kuhlz), glands that produce certain fluids that mix with sperm cells.

**prostate** (PRAHS tayt) **gland**, gland that produces certain fluids that mix with sperm cells to form semen.

**Cowper's glands**, glands that produce a clear fluid to wash away urine that may be in the urethra.

**semen** (SEE muhn), mixture of sperm and other fluids.

**ejaculation** (ih jak yuh LAY shuhn), process of semen passing through the urethra and forcefully leaving the penis.

**nocturnal emission** (nahk TUHRN uhl • ee MIHSH uhn), wet dream; sometimes occurs when the penis becomes erect while a boy is sleeping and a small amount of semen may be ejaculated.

Most of the time, the penis hangs limp. Sometimes, however, certain tissues within the penis fill with blood. The penis then becomes firm and erect. This condition is called an erection. Before sperm cells can leave the body, the penis must be erect.

## Ejaculation

When certain signals come from the nervous system, each vas deferens tightens and its opening narrows. This squeezing action moves sperm toward the urethra. On the way through the vas deferens, the sperm cells mix with certain fluids. These fluids are made by the seminal vesicles and the prostate gland. While the penis is erect, the Cowper's glands also release a clear fluid. Scientists think this helps wash away urine that may be in the urethra. Urine is harmful to sperm. The mixture of sperm and fluids is called semen. An ejaculation occurs when semen passes through the urethra and forcefully leaves the penis.

Semen and urine both leave the body through the urethra. They never leave at the same time, however. At the base of the bladder is a clamplike muscle. When sperm cells are passing through the urethra, this muscle closes to stop urine from leaving the bladder.

## Ejaculating at Other Times

There are times when the penis becomes erect while a boy is sleeping. A small amount of semen may be ejaculated, leaving a wet spot on sheets or pajamas. This event is known as a nocturnal emission, or a wet dream. It usually happens for the first time during adolescence. Nocturnal emissions are normal. A boy or a man may wake up in the morning with his penis erect. This, too, is normal. It happens most often because the bladder is full of urine.

When some men are in their fifties or early sixties, they may experience something similar to menopause in women. The glands that produce sex hormones and sperm may stop working for a while. After this time, most men are less likely to become fathers than when they were younger.

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## SECTION 6 REVIEW

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1. What happens when the tissues in the penis fill with blood?
2. What prevents semen and urine from passing through the urethra at the same time?

# CHAPTER 4 REVIEW

## Main Ideas

- The reproductive system is involved with the making of new human beings.
- The gonads, which are part of the reproductive system, produce the male and female gametes.
- The outer female reproductive organs, the labia, enclose the opening of the vagina. The vagina leads to the uterus. From the uterus, two Fallopian tubes lead to the ovaries, which contain egg cells.
- At puberty, a female begins ovulation and menstruation.
- The male reproductive organs include the penis and the scrotum. The scrotum contains the testes, which make sperm cells.
- Sperm cells leave the body in semen, which is ejaculated from the penis.
- During adolescence, semen is sometimes ejaculated at night, an event called a nocturnal emission.
- Late in life, people's sex organs become less active. In women, this event is called the menopause. After menopause, menstruation no longer occurs.

## Modified True or False

Write the numbers from 1 to 10 on your paper. Then read the statements below. After each number, write *T* if the statement is *true*. Write *F* if the statement is *false*. If the statement is false, change the underlined term to make the statement true.

1. The labia surround two body openings—the vagina and the urethra.
2. A girl has about 400 immature egg cells at birth.
3. During ovulation, a mature egg cell is released by the uterus.
4. Ovulation takes place once a month, near the beginning of the menstrual cycle.
5. Menstruation is a process in which the lining of a women's uterus breaks down and flows out of her body.
6. The average menstrual cycle usually lasts from three to seven days.
7. Normally, a girl's first menstrual period occurs around the time of her thirteenth birthday.
8. The testes need to stay outside the body because the temperature inside the body is too cool for sperm cells.
9. Semen is a mixture of sperm and certain fluids made in the seminal vesicles and in the prostate gland.
10. Each vas deferens extends from the epididymis to the urethra.

## Complete the Sentence

Write the numbers from 11 to 20 on your paper. Copy each sentence, and fill in the missing word or words.

11. The vagina leads directly to a hollow, pear-shaped organ called the \_\_\_\_\_.
12. The part of the uterus that extends into the vagina is called the \_\_\_\_\_.
13. After ovulation the egg cell travels through one of the two \_\_\_\_\_.
14. When a sperm cell and an egg cell join together, the process is called \_\_\_\_\_.
15. An early sign of puberty in a girl is the start of \_\_\_\_\_.
16. The permanent end of the menstrual cycle is called \_\_\_\_\_.
17. The scrotum contains a pair of organs called \_\_\_\_\_.
18. The forceful discharge of semen from the body is called \_\_\_\_\_.
19. When the tissues in the penis fill with blood, an \_\_\_\_\_ results.
20. Semen and urine are two fluids that pass through the \_\_\_\_\_.

## Information to Find

1. What is a hysterectomy? Why might this operation be performed? What are its effects? Look up *hysterectomy* in an encyclopedia, or ask a physician about the operation.
2. Health problems related to menstruation include toxic shock syndrome and premenstrual syndrome. Find out the possible causes and the symptoms of these two conditions. How may they be prevented? How may they be treated? Ask your librarian for help in finding newspaper and magazine articles about these health problems.

## Books and Articles to Read

Here are some books and articles you and your parents can look for in your school library or public library to find more information about the reproductive systems.

Avraham, Regina. *The Reproductive System*. (The Healthy Body Series). Chelsea House Publishers, 1991.

Hoch, Dean, and Nancy Hoch. *The Sex Education Dictionary for Today's Teens and Preteens*. Landmark Publishing, 1990.

Marzollo, Jean. *Getting Your Period: A Book About Menstruation*. Dial Books for Young Readers, 1989.

Nicholson, Mary E., and Richard St. Pierre. *Sexuality: A Health Education Perspective*. Venture Publications, 1991.

