What’s Your Health IQ?

Which of the statements below are true, and which are false? Check your answers on p. 642.

1. Sperm are made in the vas deferens.
2. Both sperm and urine travel through a man’s urethra, although not at the same time.
3. Testicular cancer is most common among men who are over the age of 50.
4. Estrogen is the primary hormone in males.
5. Eggs are made in the ovaries.
6. The uterus is the organ in which a fetus develops.
7. A woman produces several eggs every month.
8. Fertilization of the egg usually occurs in the fallopian tubes.
9. By the end of the sixth month of pregnancy, all the baby’s major body structures are formed.
SECTION 1
Male Reproductive System

SECTION 2
Female Reproductive System

SECTION 3
Pregnancy and Early Development

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Lance Armstrong raced through the Tour de France on the streets of Paris. He was minutes from winning his fourth victory. Winning the race 4 years in a row was special enough. Winning the race after recovering from testicular cancer was even more incredible!

Maintaining good reproductive health is important to your total health. Lance Armstrong first noticed something was wrong with his reproductive health when he found a lump on his testicle. When he started to cough up blood, he went to the doctor. His cancer had spread, but luckily, it was treatable. Armstrong learned how important it is to be aware of health problems that can occur and to know how to keep the reproductive system healthy. He went on to create the Lance Armstrong Foundation for cancer research and awareness.

The male reproductive system works to produce sperm and deliver it to the female reproductive system. Sperm are sex cells that are produced by the male reproductive organs called the testes and that are needed to fertilize an egg. Eggs, or ova (singular, ovum), are the sex cells that are produced by the female reproductive organs called ovaries. The process by which a sperm and an egg and their genetic material join to create a new human life is called fertilization.

When a human sperm and egg combine, a new human being begins to grow. In most cases, about 9 months later, a mother gives birth to her baby. The process of producing a new human is called reproduction.
How the Male Reproductive System Works

The male reproductive system is made up of internal and external organs. Figure 1 shows the organs of the male reproductive system.

**Testes**  The testes (testicles) (singular, testis) are the male reproductive organs that make sperm and testosterone. At puberty and continuing throughout a male’s life, the testes produce several hundred million sperm each day. The sperm are made inside the testes in tightly coiled tubes called seminiferous tubules.

Testosterone is the major sex hormone of males. During puberty, testosterone causes facial and body hair to grow, the shoulders to broaden, and the voice to deepen. Testosterone also influences sperm production.

The two testes rest in the scrotum, a skin-covered sac that hangs from the body. The small muscles in the scrotum move the testes closer or farther from the body. This movement keeps the sperm a little cooler than normal body temperature. Sperm cannot develop properly at the higher temperatures of the inner body.

**Penis**  The penis is the male reproductive organ that removes urine from the male’s body and that can deliver sperm to the female reproductive system. The penis is made of soft tissue and blood vessels. During sexual activity, the penis becomes erect, or firm. The erection occurs as the blood vessels in the penis fill with blood. The penis must be erect during ejaculation (ee JAK yoo LAY shuhn). Ejaculation occurs when sperm are released from the penis after sexual excitement. It is also normal for males to ejaculate while they are sleeping. These ejaculations are called nocturnal emissions or “wet dreams.”

For more information about the excretory system, see the Express Lesson on pp. 540–541 of this text.
The penis also provides a passage for urine to leave the body. Urine passes through the urethra, a tube that starts at the bladder and ends at the opening of the penis. Sperm also pass through the urethra during ejaculation, but not at the same time as urine is carried.

The tip of the penis is covered by a sheath of skin called the foreskin. The foreskin is sometimes surgically removed shortly after birth in a procedure called circumcision. The health advantage of circumcision is under debate. Some parents circumcise their infant for religious or cultural reasons. Many males are never circumcised.

**Epididymis and Vas Deferens** From the testes, the sperm travel, as shown by the arrows in Figure 2. Sperm first travel into a tightly coiled tube called an epididymis (EP uh DID i mis), which is where sperm mature and are stored. The mature sperm in each epididymis then move into a long tube called the vas deferens. As sperm travel through the vas deferens, they mix with fluids made by three accessory reproductive organs—the seminal vesicles, the prostate gland, and the bulbourethral glands. The mixture of sperm and other secretions from the male reproductive organs is a fluid known as semen. Semen leaves the male body by passing through the urethra.

**Seminal Vesicles** The seminal vesicles are found near the base of the urinary bladder. They produce thick secretions that nourish the sperm and help sperm move easier.

**Prostate Gland** The prostate gland encircles the urethra near the bladder. The prostate gland secretes a thin, milky fluid that protects the sperm from acid in the female reproductive system.

**Bulbourethral (Cowper’s) Glands** The bulbourethral (buhl boh yoo REE thruhl), or Cowper’s, glands are found near the urethra below the prostate. Prior to ejaculation, this gland secretes a clear fluid that protects the sperm from acid in the male urethra.
Problems of the Male Reproductive System

Good hygiene and preventive healthcare are important for maintaining reproductive health. However, even with good care, problems with the male reproductive system can occur. Some of these problems are described in Table 1.

<table>
<thead>
<tr>
<th>Problem</th>
<th>What is it?</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jock itch</td>
<td>fungal infection of groin area; exposure to moisture and heat increases the risk of jock itch</td>
<td>itchy rash in groin</td>
<td>keeping area cool and dry; over-the-counter antifungal creams</td>
</tr>
<tr>
<td>Cystitis (bladder infection)</td>
<td>inflammation of the urinary bladder; usually due to a bacterial infection</td>
<td>inflammation of the bladder, burning during urination, blood in urine, strong-smelling urine, and fever</td>
<td>antibiotics prescribed by a doctor</td>
</tr>
<tr>
<td>Prostatitis</td>
<td>bacterial infection of the prostate; may be related to a sexually transmitted disease</td>
<td>inflammation of the prostate, fever, pain in the pelvis, abdomen, testes, or lower back, and discomfort with urination</td>
<td>antibiotics prescribed by a doctor</td>
</tr>
<tr>
<td>Inguinal hernia</td>
<td>bulging of portion of the intestines or other structure through a weakness in the abdominal wall</td>
<td>abnormal bulge in the abdomen, groin, or scrotum; can cause a sense of heaviness, fullness, or pain</td>
<td>immediate medical care; surgery</td>
</tr>
<tr>
<td>Testicular torsion</td>
<td>twisting of a testis on the nerves and blood vessels attached to it; can happen during athletic or other physical activities</td>
<td>elevation of a testis, swelling and tenderness of the scrotum, or abdominal pain accompanied by nausea or vomiting</td>
<td>immediate medical care; surgical removal of the affected testis may be necessary if not treated immediately</td>
</tr>
<tr>
<td>Undescended testes</td>
<td>failure of one or both testes to move from the abdomen to the scrotum during fetal development</td>
<td>one or no testes in the scrotum</td>
<td>surgery or hormone therapy</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>abnormal division of cells in the prostate; may be hereditary</td>
<td>difficulty urinating or defecating, burning during urination, or blood in urine</td>
<td>surgery, radiation, and/or chemotherapy</td>
</tr>
<tr>
<td>Testicular cancer</td>
<td>abnormal division of cells in the testes; may be hereditary</td>
<td>lump on testes, enlargement of testes, or sense of heaviness or fullness in the scrotum</td>
<td>surgery, radiation, and/or chemotherapy</td>
</tr>
</tbody>
</table>
Keeping the Male Reproductive System Healthy

Protecting your reproductive health is important because your reproductive health is an essential part of your total health. Decisions you make and actions you take now can affect your health in the years ahead.

**Preventing Problems** Males should watch for any changes or symptoms that might indicate a problem. If symptoms of any problem are present, see a doctor right away. In many cases, prompt care is the key to avoiding future problems. Here are specific ways to prevent some problems.

- **Preventing sexually transmitted diseases** Some male reproductive infections are transmitted by sexual activity. Chapters 19 and 20 discuss the prevention and treatment of STDs.
- **Preventing jock itch** *Jock itch* is a fungal infection that occurs in a male’s groin area. Males who are physically active in hot and humid locations may be more likely to get jock itch. Males can usually prevent jock itch by wearing cotton clothing and by drying themselves thoroughly after a shower. It is also important to avoid wearing damp clothes for too long and to avoid sharing towels or clothes with others.
- **Preventing trauma** *Trauma* refers to injuries that are due to an external force, such as being hit in the genitals. Such injuries can happen while playing sports, from car or bicycle accidents, or during “horseplay” with friends. One way to reduce the risk of traumatic injuries to the testes is to wear protective gear (a “cup”) when playing sports.
- **Preventing hernias** A *hernia* happens when a piece of the intestine bulges into a weak place in the wall of the abdomen or groin. Hernias often appear when abdominal pressure is increased by straining to lift or push something heavy. It can also appear when coughing or sneezing. Doctors check for signs of a hernia by feeling for bulges in the groin while a male coughs. One way for males to prevent hernias is to avoid strenuous lifting. For example, use your knees, and not your back, when lifting heavy objects.
- **Preventing infertility** Male *infertility* is the inability to fertilize an egg. Infertility can be genetic, but can also be caused by environmental conditions such as heat and trauma to the testes area. A young male can protect his fertility by avoiding injury to the genitals. Males should also avoid hot temperatures in the testes, which can lead to low sperm counts.

**Early Detection of Testicular Cancer** Testicular cancer is a disease that can occur in young men. In fact, testicular cancer is the most common cancer in males between the ages of 15 and 35. A man is particularly at risk for testicular cancer if he had undescended testes as a child, or if testicular cancer runs in his family. However, if detected early, testicular cancer can be treated very effectively.

**Six Ways to Keep Healthy**

1. Wear appropriate protective gear (a “cup”) when playing contact sports.
2. Avoid wearing tight clothing.
3. Wash the penis and scrotum every day, and dry yourself carefully after showering.
4. If you are not circumcised, wash underneath the foreskin.
5. Perform a monthly testicular self-exam.
6. Have an annual checkup with a doctor.
All males who have reached puberty should do routine testicular self-examinations about once per month. Males should also have an annual checkup by a doctor. Talk with a doctor or other healthcare provider to find out how to perform the exam correctly. Here is a brief summary of how to perform a testicular self-exam:

1. Perform the self-exam during or after a warm bath or shower, when the skin of the scrotum is relaxed.
2. Stand in front of a mirror, and hold the penis out of the way.
3. Examine each testicle separately. Hold each testicle between the thumbs and fingers with both hands, and roll each testicle gently between the fingers.
4. Look and feel for any lumps or any change in the size, shape, or consistency of the testicle.
5. Contact your doctor if you detect any troublesome signs.

Males should be aware of the signs for testicular cancer even if it does not run in his family. However, do not confuse lumps with blood vessels, supporting tissues, and tubes that carry sperm. Look for unusual lumps, swelling, or a feeling of heaviness, pain, and discomfort in your scrotum or abdomen. If you notice any of these signs or have any doubts, tell your parents and see a doctor right away.

**Early Detection of Prostate Cancer** Prostate cancer occurs primarily in older males. When men become older, testosterone can cause the prostate gland to enlarge. The gland can enlarge in either a cancerous or a noncancerous fashion. Prostate cancer can be found early during a physical examination or blood test given by a doctor. Treatment is more effective when prostate cancer is detected early. Males shouldn’t wait until it’s too late. Delaying treatment can be deadly.

**SECTION 1 REVIEW** Answer the following questions on a separate piece of paper.

**Using Key Terms**

1. **Identify** the term for “the sex cell that is produced by the testes and that is needed to fertilize an egg.”
2. **Define** the term testis.

**Understanding Key Ideas**

3. **State** the functions of the male reproductive system.
4. **Identify** one of the functions of the penis.
   - a. delivers sperm to the female
   - b. makes sperm more mobile
   - c. carries sperm to the epididymis
   - d. produces and stores sperm
5. **Order** the path of the sperm through the following male reproductive organs: penis, urethra, vas deferens, testes, and epididymis.
6. **Compare** the symptoms of testicular cancer with those of inguinal hernia.
7. **LIFE SKILL** **Practicing Wellness** List five things a male can do to keep his reproductive system healthy.

**Critical Thinking**

8. Why do you think the male reproductive system produces so many sperm cells?
9. How might the male reproductive system be affected if the seminal vesicles did not function?
Female Reproductive System

**OBJECTIVES**

State the role of the female reproductive system.

Describe the function of each of the organs of the female reproductive system.

Describe the changes in the body during the menstrual cycle.

Summarize four problems that can occur with the female reproductive system.

List five things a female can do to keep her reproductive system healthy.

**KEY TERMS**

- **ovary** the female reproductive organ that produces eggs and the hormones estrogen and progesterone
- **vagina** the female reproductive organ that connects the outside of the body to the uterus and that receives sperm during reproduction
- **fallopian tube** the female reproductive organ that transports an egg from the ovary to the uterus
- **uterus** the female reproductive organ that provides a place to support a developing human
- **menstrual cycle** a monthly series of hormone-controlled changes that prepare the uterine lining for a pregnancy

Ann Curry was scared when she found out her sister had breast cancer. This was the first case of cancer in her family. Ms. Curry, a TV news anchor, helped her sister fight the cancer. Then she became dedicated to the fight against breast cancer. A sister's love is saving thousands of lives!

**What the Female Reproductive System Does**

Keeping your reproductive system healthy is important for your total health. Ann Curry began spreading the message about the importance of maintaining good reproductive health after her sister’s battle with and recovery from breast cancer. She often reports about breast cancer. Ms. Curry is involved with the Susan G. Komen Breast Cancer Foundation to support the fight against breast cancer. Ms. Curry has also appeared in public service announcements about the importance of early detection of breast cancer. She continues to empower women and their families with the knowledge that they need to protect their reproductive health.

So, how can you maintain good reproductive health? You should learn about how the reproductive system works. Another important part of maintaining good reproductive health is being aware of possible problems that can occur. You should also know important skills for keeping your reproductive system healthy.

Like the male reproductive system, the female reproductive system is well suited for reproduction. The function of the female reproductive system is to make eggs and to provide a place to support and nourish a developing human.
How the Female Reproductive System Works

The female reproductive system is made up of several internal and external organs. Figure 3 shows the primary organs of the female reproductive system. Although breasts are not directly involved in producing a human life, they are considered secondary reproductive organs because they produce milk for the child.

**Ovaries** The two ovaries are found deep in the pelvic area. The ovaries (singular, ovary) are the female reproductive organs that produce eggs and the hormones estrogen and progesterone. Recall that eggs (ova) are the sex cells that are produced by the ovaries and that can be fertilized by sperm. All of the eggs that a female will ever have are in her two ovaries when she is born.

The ovaries make the hormones estrogen and progesterone. During puberty, estrogen causes the reproductive organs to mature into their adult shape and size. Estrogen also causes the growth of pubic and underarm hair and helps strengthen the bones. Both estrogen and progesterone regulate the monthly release of an egg and prepare the body for a pregnancy.

**Vagina** The vagina is the female reproductive organ that connects the outside of the body to the uterus and that receives sperm during reproduction. This tubular organ runs from the lower end of the uterus to the outside of the body. In addition to functioning in reproduction, the vagina allows menstrual flow to exit the body. The vagina is also part of the birth canal through which a baby is delivered. Above and separate from the vagina is a tube called the urethra, which carries urine from the bladder to the outside of the body.
Fallopian Tubes and Uterus  From the ovaries, the egg travels into the fallopian tube, as shown by the black arrows in Figure 4. The fallopian tubes are the female reproductive organs that transport an egg from the ovary to the uterus. The uterus is the female reproductive organ that provides a place to support a developing human. It is a muscular cavity (the size of a fist) found at the top of the vagina and between the bladder and rectum. The uterus meets the vagina at its lower end, called the cervix.

How the Menstrual Cycle Works

The menstrual cycle occurs in most females from puberty to menopause. The menstrual cycle is a monthly series of hormone-controlled changes that prepare the uterine lining for a pregnancy.

The menstrual cycle, shown in Figure 5, is a complex combination of hormonal and physical changes in the body. Increasing levels of two hormones (follicle stimulating hormone [FSH] and luteinizing hormone [LH]) cause the maturation and release of an egg. The release of an egg from a follicle in the ovary is called ovulation. Prior to ovulation, increasing levels of estrogen cause the uterine lining to thicken. This lining nourishes and supports the growing human during a pregnancy. Following ovulation, high levels of estrogen and progesterone further thicken and maintain the uterine lining.

If pregnancy does not occur (the egg is not fertilized), estrogen and progesterone levels quickly fall. Menstruation, or the breakdown and discharge of the uterine lining out of the vagina, then occurs. During this time, females use sanitary napkins or tampons to absorb the blood and tissue released during menstruation. Menstruation usually lasts between 3 and 7 days.
The Menstrual Cycle Can Vary  The average menstrual cycle lasts 28 days. However, this length can vary from one individual to another and from month to month. Ovulation usually occurs on the 14th day of the cycle. Environmental factors, such as stress, diet, travel, exercise, weight gain or loss, and illness, can influence the timing of a female’s cycle. It is important for a female to check with her healthcare professional if she has any questions about irregularity in her menstrual cycle.

Menstruation, ovulation, and thickening of the uterine lining, are the events that make up the menstrual cycle.

Analyzing DATA

Menstrual Cycle Hormones

1. The horizontal (x) axis shows the independent variable, *Day of cycle*.
2. The vertical (y) axis shows the dependent variable, *Hormone level*.
3. Each line shows the level of a hormone at each day in the cycle.

**Your Turn**

1. Which day of the cycle has the largest rise in estrogen levels?
2. On what day is the egg released from the ovary?
3. CRITICAL THINKING
   Why do you think luteinizing hormone reaches its highest level around day 14?
### Problems of the Female Reproductive System

**Table 2** describes some problems and conditions of the female reproductive system.

<table>
<thead>
<tr>
<th>Problem</th>
<th>What is it?</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cystitis</strong> (bladder infection)</td>
<td>▶ inflammation of the urinary bladder; usually due to a bacterial infection</td>
<td>▶ burning during urination, strong-smelling urine, fever, or blood in urine</td>
<td>▶ antibiotics prescribed by a doctor</td>
</tr>
<tr>
<td><strong>Vaginitis</strong></td>
<td>▶ vaginal infection by fungus, bacteria, or protozoa; may also be from an STD</td>
<td>▶ irritation or itching around the vagina, vaginal secretions of unusual color and/or unpleasant odor</td>
<td>▶ over-the-counter vaginal cream or medication prescribed by a doctor</td>
</tr>
<tr>
<td><strong>Delayed puberty</strong> (amenorrhea)</td>
<td>▶ late puberty due to anorexia, endocrine problems, excessive weight loss, and/or overexercise</td>
<td>▶ no breast development and/or no menstrual periods</td>
<td>▶ determined by a doctor</td>
</tr>
<tr>
<td><strong>Menstrual cramps</strong></td>
<td>▶ cramps due to prostaglandin (hormone-like substance) production during menstruation</td>
<td>▶ contractions of uterine muscles, lower abdominal pain, and occasional nausea and vomiting</td>
<td>▶ over-the-counter medications and a warm bath; further treatment provided by a doctor</td>
</tr>
<tr>
<td><strong>Premenstrual syndrome</strong> (PMS)</td>
<td>▶ mental and physical changes related to menstrual cycle, but not completely understood</td>
<td>▶ irritability, mood swings, depression, abdominal bloating, and breast tenderness</td>
<td>▶ determined by a doctor</td>
</tr>
<tr>
<td><strong>Toxic shock syndrome</strong> (TSS)</td>
<td>▶ poisoning of body from bacteria in vagina; often related to tampon use</td>
<td>▶ fever, chills, weakness, and rash on palms of hands</td>
<td>▶ antibiotics and immediate medical treatment</td>
</tr>
<tr>
<td><strong>Endometriosis</strong></td>
<td>▶ growth of tissue from uterine lining outside the uterus</td>
<td>▶ severe cramping and pain in lower abdominal area or pelvis</td>
<td>▶ determined by a doctor; hormone therapy or surgery may be required</td>
</tr>
<tr>
<td><strong>Ovarian cyst</strong></td>
<td>▶ failure of follicle in ovary to rupture and release an egg; may also be from growths or cancer</td>
<td>▶ pain in lower abdomen or pelvis for a month</td>
<td>▶ determined by a doctor; cysts often go away on their own but sometimes require surgery</td>
</tr>
<tr>
<td><strong>Cervical cancer</strong></td>
<td>▶ abnormal division of cells in the cervix; may also be from an STD</td>
<td>▶ vaginal bleeding, discharge, or pelvic pain; may not be any symptoms</td>
<td>▶ surgery, radiation, and/or chemotherapy</td>
</tr>
</tbody>
</table>
Keeping the Female Reproductive System Healthy

Most healthy teenage females do not have any major problems with their reproductive system. But it is important to be on the lookout for any problems that may arise.

Preventing Problems  Females can protect their reproductive health with good hygiene, self-examinations, and regular visits to the doctor. Here are some other specific ways to prevent problems:

► Preventing sexually transmitted diseases  Some female reproductive infections are transmitted by sexual activity. Chapters 19 and 20 discuss the prevention and treatment of STDs.

► Preventing vaginal irritation  One common problem that is confused with vaginitis is vaginal irritation. Vaginal irritation is redness, itching, or mild pain around the opening of the vagina. However, unlike vaginitis, no vaginal discharge is present. A female can reduce the chance of irritation by wearing loose cotton underclothes. Washing underclothes in mild, unscented soap, and avoiding soaps, toilet paper, and feminine products that are scented also help reduce the chance of irritation. Finally, avoid wearing pantyhose, tight jeans, or wet clothes for long periods of time.

► Relieving menstrual cramps  Some females have cramps before or during a menstrual period. Menstrual cramps are cramps caused by contractions of the uterine muscles. Many over-the-counter, anti-inflammatory medicines are available for the temporary relief of menstrual cramps. Taking a warm bath, eating a balanced diet, exercising regularly, and reducing caffeine and sugar intake may also help reduce cramps. Females should see a doctor if cramps become very painful.

► Preventing infertility  Infertility, the inability to get pregnant, is a problem that occurs in some females. Infertility may be genetic. However, endometriosis and STDs can also lead to infertility. Women can protect their future ability to have children by preventing STDs.

Annual Pelvic Exam  Females should have an annual pelvic exam with a doctor. A doctor can find problems that females may not be able to detect. The annual exam includes a breast and genital exam, and a Pap smear. A Pap smear examines the cells of the cervix. A Pap smear is important for detecting and preventing cervical cancer. Cervical cancer rates are higher among older women. However, this cancer is on the rise in younger women due to certain STDs and the lack of regular screening with a Pap test.

Ovarian cancer can also be detected during an annual exam, but it is difficult to find in the early stages of the disease. Ovarian cancer is usually discovered late in its development during a physical examination. Ovarian cancer occurs primarily in older women and may be hereditary.
Early Detection of Breast Cancer  Breast cancer is a disease that occurs primarily in older women. In fact, over 77 percent of the cases occur in women who are over the age of 50. However, females of any age (and some males too) can get breast cancer. Females are at risk for breast cancer if the disease runs in their family. Yet many women who do not have a family history of the disease get breast cancer.

The good news is breast cancer can often be treated effectively if it is detected early. A mammogram test usually detects breast cancer. Women should also have their breasts checked annually by a doctor. Another way to check for breast cancer is to do a breast self-examination (BSE) each month. To find out how to perform a BSE correctly, talk with a doctor. Here is a brief summary of how to perform a BSE:

1. Perform the BSE during or after a warm bath or shower, and at least 1 week after a menstrual period.
2. Stand in front of a mirror. Place one hand over your head and use the other hand to examine each breast separately.
3. Use your thumb and index finger to gently squeeze each nipple and look for any unusual discharge.
4. Check each breast for swelling, dimpling, or scaliness.
5. Use three or four fingers to feel each breast for unusual lumps or thickening under the skin. Check under the armpits and between the armpits and breasts, too.

Lumps, called cysts, may occur in breast tissue. Most cysts are noncancerous and do not need to be removed. Also, most breasts contain normal lumps. Be aware of any changes in your breasts from month to month. If you detect any signs or have any doubts, tell your parents and contact your doctor. Recognizing breast cancer early is important. It could save your life!
Pregnancy and Early Development

OBJECTIVES
Describe how a human life begins.
Summarize how a baby develops during the three trimesters of pregnancy.
Identify five things a couple can do to stay healthy before and during pregnancy.
Summarize four problems that can occur during pregnancy.
Describe the stages of childbirth.
List three changes that occur during early child development.

KEY TERMS
sexual intercourse the reproductive process in which the penis is inserted into the vagina and through which a new human life may begin
embryo a developing human, from fertilization through the first 8 weeks of development
placenta a blood vessel–rich organ that forms in a mother’s uterus and that provides nutrients and oxygen to and removes wastes from a developing human
fetus a developing human, from the start of the ninth week of pregnancy until delivery
prenatal care the healthcare provided for a woman during her pregnancy

How extraordinary it is that the female body can support the growth of a new human life. Isn’t it amazing that one of the most complex and important events of your life took place inside your mother’s body?

How Life Begins
Life begins with the union of an egg from a female and a sperm from a male. Fertilization (conception), or joining of the sperm and egg, can occur because of sexual intercourse. Sexual intercourse is the reproductive process in which the penis is inserted into the vagina and through which a new human life may begin. During sexual intercourse, the penis can deliver millions of sperm to the female.

Fertilization  From the vagina sperm travel through the uterus and into the fallopian tubes, where fertilization normally occurs. Only a small fraction of the sperm complete the journey to the egg. However, it takes only one sperm to fertilize an egg.

Once a sperm penetrates the egg, a chemical change prevents other sperm from entering the egg. The genetic material of the egg and sperm combine to form one cell, called a zygote. Genes play an important role in the development of a human. In fact, all of the genetic information needed to create a human is found in the zygote.

The Fertilized Egg Divides  The zygote travels down the woman’s fallopian tube toward her uterus. The journey takes about 3 to 5 days. As the zygote moves down the fallopian tube, it divides into two cells, then into four cells, and then into a ball of many cells.
Chapter 18
Reproduction, Pregnancy, and Development

The Embryo Implants in the Uterus
A developing human from fertilization through the first 8 weeks of development is called an embryo. The embryo travels from the fallopian tube into the uterus. Within 3 to 5 days, this ball of hundreds of cells becomes embedded in the uterine wall. This event is called implantation. Once implantation of the embryo happens, the female is considered to be pregnant. The uterus will be the embryo’s home until the baby is born.

A Placenta Supports the Baby
The baby’s growth in the uterus is dependent on a placenta. The placenta is a blood vessel–rich organ that forms in a mother’s uterus and that provides nutrients and oxygen to and removes wastes from a developing human. Most substances, including drugs and alcohol, can pass through the placenta into the baby. If a mother eats, injects, or inhales anything harmful, her baby can be affected.

How a Baby Develops
The growth of a baby is a fascinating process. What begins as one cell develops into a baby made of trillions of cells over a 38 to 40 week period. Figure 6 summarizes some of the developmental changes in the growing baby.

First Trimester
The first trimester, or first 3 months, is a major time of growth and change. After implantation, the embryo starts growing rapidly. By the fourth week of development, the heart starts beating, arm and leg buds appear, and the eyes and brain begin to develop. The embryo is less than a fourth of an inch long, or about the size of a BB pellet.

Surrounding the embryo is a thin, fluid-filled membrane called the amnion. The amnion protects the growing embryo. The umbilical cord is another new development. It connects the embryo to the placenta.

The term for a developing human from the start of the ninth

Beliefs vs. Reality

“A missed menstrual period is a sure sign of pregnancy.”
It is common for women to have irregular periods. A woman is not necessarily pregnant if she misses a period.

“It takes the entire 38 to 40 weeks for the major structures in a growing baby to develop.”
By the end of the first 3 months, all of the baby’s major body structures have formed.

“Drugs cannot cross the placenta into the baby during pregnancy.”
Most drugs can cross the placenta into the baby’s body.

“Pregnant women do not have to visit the doctor until the last 3 months of pregnancy.”
Regular doctor visits from the first sign of pregnancy are necessary to ensure the mother’s and baby’s health.
week of pregnancy until delivery is **fetus**. Brain waves can be detected and muscle movement begins in the fetus. The bones and muscles are developing. By the end of the first trimester, all of the major body parts, such as the heart, brain, lungs, eyes, arms, and legs, have formed. The most critical development is complete. However, not all parts can function fully.

**Second Trimester**  
The second trimester, or months 4 through 6, is a time when the organ systems continue to develop. By 4 months, the mother can feel the fetus move or “kick.” The reproductive organs can be recognized as distinctly male or female. By the end of this trimester, the fetus can hear and recognize voices. Hair forms on the body. Head and facial features become apparent, and fingers and toes grow nails. Although development is not complete, a fetus born prematurely at the end of this trimester may be able to survive with medical assistance and support.

**Third Trimester**  
The third trimester, or months 7 through 9, is a time when the fetus gains most of its weight. A fetus requires a lot of nutrients from the mother. A large percent of the iron and calcium in the mother’s food will be delivered to the growing fetus. By 8 months, most fetuses are about 20 inches long. The brain develops further, and all other organs are almost complete. The fetus can even grasp with his or her hands. Fat deposited underneath the skin makes the fetus’s skin become very smooth. By the end of 36 weeks, the fetus is almost ready to live outside the mother’s body. However, the fetus’ nervous system will continue to develop after birth.
Keeping Healthy Before and During Pregnancy

Preparing for a pregnancy can help reduce the chance of problems during pregnancy. Both parents should support each other in leading a healthy life. The baby’s health is affected by the parents’ health before and during pregnancy. For example, sperm and eggs are susceptible to damage by environmental toxins, such as lead. Here are some tips pregnant women can follow:

1. **Avoid alcohol and other drugs (including caffeine and tobacco), and exposure to cigarette smoke.** Alcohol can interrupt the fetus’ brain development. Smoking while pregnant can lead to miscarriage, sudden infant death syndrome (SIDS), premature birth, and low birth weight.

2. **Maintain a nutritious diet that follows the Food Guide Pyramid and eat regular meals.** A pregnant woman needs up to 450 extra Calories a day, but she should not eat for two people. Consult a healthcare provider about how to make those Calories count.

3. **Take prenatal vitamins, prescribed by a healthcare provider, before and throughout a pregnancy.** A very important element in a prenatal vitamin is folic acid (folate). Taking folate has been found to reduce the chance of birth defects in the baby.

4. **Get regular, moderate levels of exercise, if approved by a doctor.** Exercise improves circulation, prevents excessive weight gain during pregnancy, and prepares a mother for labor. However, do not overexercise during pregnancy, and avoid injury.

5. **Have all medical conditions evaluated by a doctor early in the pregnancy.** Pregnant women are routinely tested for diseases such as STDs, HIV, diabetes, and rubella (German measles). If a woman is not immune to rubella, she should be vaccinated before pregnancy. Rubella can lead to heart defects and mental retardation in a child. Also, illnesses such as STDs, HIV, or hereditary diseases in either parent, can hurt a fetus.

**Prenatal Care During Pregnancy** A pregnant woman should visit a doctor on a regular basis throughout pregnancy. The healthcare provided for a woman during her pregnancy is called **prenatal care.** The visits help make sure that the mother and baby are healthy, and provide education about fetal growth. The father can play an active role in a pregnancy by going to all doctor visits.

During the first visit, the doctor will do a complete physical examination. This includes blood tests and a discussion of childbirth options. Thereafter, prenatal visits should take place at least every 3 to 4 weeks.
Some of the routine procedures that are done during prenatal visits are blood pressure, weight, urine, and fetal heartbeat checks. The doctor will be on the lookout for any problems. Several tests also help provide information on the health of the baby. An ultrasound uses sound waves to draw pictures of a baby on a monitoring screen. This test can be used to determine if the baby is a boy or girl, how many babies there are, and whether the baby is growing in a healthy way. Amniocentesis tests the amniotic fluid to detect any genetic problems.

**Problems During Pregnancy**

Even with the best of prenatal care, problems such as those listed in Table 3 can occur during pregnancy.

<table>
<thead>
<tr>
<th>Problem</th>
<th>What is it?</th>
<th>Symptoms</th>
<th>Treatment or prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fetal alcohol syndrome (FAS)</strong></td>
<td>a set of birth defects that affect a fetus that has been exposed to alcohol during pregnancy</td>
<td>physical and mental problems, such as mental retardation, growth deficiency, and hyperactivity in newborn baby</td>
<td>none; prevented by a woman completely avoiding alcohol during her pregnancy</td>
</tr>
<tr>
<td><strong>Miscarriage (spontaneous abortion)</strong></td>
<td>death of fetus from natural complications before the 20th week of pregnancy</td>
<td>vaginal bleeding or pregnancy tissue expelled from uterus</td>
<td>treatment determined by a doctor</td>
</tr>
<tr>
<td><strong>Ectopic (tubal) pregnancy</strong></td>
<td>implantation of the fertilized egg in the fallopian tube</td>
<td>abdominal pain early in the pregnancy, weakness, and faintness</td>
<td>surgery or medical treatment is required immediately</td>
</tr>
<tr>
<td><strong>Toxemia (preeclampsia)</strong></td>
<td>medical problem with unknown cause, but common in pregnant teens; may be related to the placenta or hormones</td>
<td>swelling of face and ankles, high blood pressure, and protein in urine of mother; convulsions if severe</td>
<td>medications, frequent checkups, and, in some cases, early delivery of baby; may be prevented with good prenatal care</td>
</tr>
<tr>
<td><strong>Gestational diabetes</strong></td>
<td>diabetes during pregnancy</td>
<td>high blood sugar levels in mother</td>
<td>change in diet, medication, and, in some cases, early delivery of baby</td>
</tr>
<tr>
<td><strong>Rh incompatibility</strong></td>
<td>a condition in which mother’s immune system reacts against the fetus’s blood due to an incompatibility in blood cell type</td>
<td>anemia (low red blood cell count) in fetus or fetal death</td>
<td>immunization of mother before and after pregnancy prevents this condition; monitoring of health of fetus</td>
</tr>
<tr>
<td><strong>Premature birth</strong></td>
<td>early birth of baby due to abnormal uterus, bleeding behind placenta, STD, multiple pregnancy, or other causes</td>
<td>delivery of baby before 38th week</td>
<td>good postnatal care in hospital’s premature baby nursery</td>
</tr>
</tbody>
</table>
**Stages of Childbirth**

Childbirth begins with the onset of labor and goes through three stages, as shown in Figure 7. Contractions, or tightening of the uterine muscles, are the major sign of the onset of labor. The contractions feel like a bad cramp, which is why mothers call them “labor pains.” The contractions help push the baby out of the uterus and through the vagina for delivery of the baby.

**Dilation**  In the first stage of birth, called dilation, the uterus contracts, which causes the cervix to dilate or open up. The membranes surrounding the baby rupture. At this point, the mother’s “water breaks”—the amniotic fluid surrounding the baby is released out of the vagina. The baby’s head begins to push into the birth canal. The cervix and vagina have to dilate enough for the head and body of the baby to pass through it. The first stage ends when the cervix is fully dilated to 10 centimeters.

**Expulsion**  During the second stage, called expulsion, the baby’s head emerges fully and the shoulders rotate. An episiotomy may be done at this stage. An episiotomy is a surgical incision of the outer end of the vagina to allow more room for delivery of the baby. The second stage ends with delivery of the baby.

**Placental**  The third, or placental, stage begins after the delivery of the baby and ends when the uterus expels the placenta (or “afterbirth”) and umbilical cord out of the mother’s body. After the baby is

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**Figure 7**
Childbirth begins with the onset of labor and goes through three stages.

**Before childbirth**  The fetus usually drops to a lower position in the mother’s uterus about 1 month before childbirth.

**First stage: Dilation**  During the dilation stage, the mother’s cervix dilates and the membranes surrounding the baby rupture.
born, the doctor suctions mucus from the baby’s mouth so the baby can breathe. The umbilical cord is tied and cut. Then, both the baby and mother are checked for signs of problems.

After birth, the mother may breast-feed her baby immediately if the baby is not ill. Most doctors recommend breast-feeding because breast milk provides all of the nutrients an infant needs and helps protect the baby from infections and stomach problems. Breast-feeding also helps establish the bond between a mother and her baby. However, some mothers prefer to bottle-feed their baby.

**Types of Childbirth**  The doctor and parents decide at the time of birth what type of birth is best for keeping the mother and her baby healthy. Most mothers can deliver a baby naturally through the vagina. This type of delivery is called *natural childbirth*.

Sometimes, for health reasons, a woman cannot safely have a vaginal delivery. The baby is then delivered by *Cesarean section*, or *C-section*. A C-section is a type of childbirth in which the baby and placenta are carefully lifted out of the mother’s body by surgery. In this procedure, an incision is made in the mother’s lower abdomen and then into the uterus. The baby is then lifted out. There are many reasons that a baby would be born by C-section. A C-section is often performed if a baby is under stress inside the uterus. For example, babies may not be in the correct position, with the baby coming “rear end” first (*breech birth*). Another reason for a C-section is if a baby is too large to fit through the birth canal.
Early Child Development

The fastest period of growth after birth takes place from birth to the age of one. By 2 months, a baby will spend several hours a day awake but mostly sleeps. Babies can raise their head at this age because of good neck control. Babies also begin smiling at faces they recognize.

At 4 months, babies are rolling from front to back, making “cooing” sounds, smiling, and spending more time awake. Their feeding schedules become more regular, and many babies can sleep through the night.

By 6 months, babies can sit up and have excellent head control. Most babies will crawl at 9 months and begin walking and talking by 1 year. The nervous system undergoes extraordinary development during the first year of life.

The “twos” are marked by social independence. “Temper tantrums” may occur as children desire healthy independence. Toilet training often begins this year. Encouraging a healthy diet at this age can help establish future healthy eating habits.

Between 5 and 6 years, most children are ready to begin school. By this age, they are toilet trained, have well-developed speech, and are ready for more social interactions with other children.

The late childhood years from age 6 to 12 are marked by dramatic intellectual and psychological changes. Children experience an important part of their social development in school. Children learn to read, do math, and interact with others. Parents should encourage their children to eat nutritious food, communicate their feelings, and respect all people. It is important for parents to be positive role models for their children. Childhood ends with the beginning of adolescence, which brings changes and responsibilities.

SECTION 3

REVIEW

Answer the following questions on a separate piece of paper.

Using Key Terms

1. Define the term embryo.
2. Identify the term for “the healthcare provided for a woman during her pregnancy.”

Understanding Key Ideas

3. Describe how a life begins.
4. Identify the development that occurs during the first trimester of pregnancy.
   a. baby moves
   b. arms and legs form
   c. lungs mature
   d. body hair grows
5. Describe the importance of prenatal care for keeping healthy before and during pregnancy.

6. Identify how fetal alcohol syndrome is prevented during pregnancy. (Hint: See Table 3.)
7. Distinguish the event that occurs during stage three of childbirth.
   a. “water breaks”
   b. cervix dilates
   c. baby’s head emerges
   d. uterus expels placenta
8. Summarize the changes that occur in a baby during early child development.

Critical Thinking

9. Why do you think genes are so important in the development of a fetus?
10. What factors should a couple consider before they decide to have children?
The role of the male reproductive system is to produce sperm and deliver it to the female reproductive system.
The penis deposits semen into the reproductive tract of a female to bring about fertilization of an egg. The penis also provides a passage for urine to leave the body.
The testes are the primary organs of the male reproductive system. They produce both sperm and testosterone.
Some problems of the male reproductive system include infections, trauma injuries, and cancer.
Keeping the male reproductive system healthy requires practicing good hygiene, being able to detect problems, and getting checkups each year.

The role of the female reproductive system is to make eggs and to provide a place to support and nourish a developing baby.
The ovaries are the primary organs of the female reproductive system. They produce eggs and the female hormones estrogen and progesterone.
The menstrual cycle functions to produce and release a mature egg each month and to prepare a female's body for pregnancy.
Some problems of the female reproductive system include infections, menstrual cycle problems, and cancer.
Keeping the female reproductive system healthy involves practicing good hygiene, being able to detect problems, and getting checkups each year.

The joining of an egg from a female and a sperm from a male begins the process of a pregnancy and the development of a new human life.
Development of a baby occurs over 3 trimesters, or 9 months. All of the major body structures are formed by the end of the first trimester.
Maintaining a healthy diet, avoiding alcohol and drugs, doing moderate exercise, taking prenatal vitamins, and seeing a doctor on a regular basis are very important to have a healthy pregnancy and baby.
Childbirth begins with the onset of labor and goes through 3 stages.
Early development includes gaining head control, learning to walk, getting toilet trained, learning to speak, and learning to socialize.
Using Key Terms

egg (ovum) (430)  placenta (444)
embryo (444)    prenatal care (446)
fallopian tube (438)  semen (432)
fertilization (430)    sperm (430)
fetus (445)    testis (testicle) (431)
mensural cycle (438)  uterus (438)
owary (437)    vagina (437)
penis (431)

1. For each definition below, choose the key term that best matches the definition.
   a. the organ that produces sperm and testosterone
   b. healthcare for a woman during her pregnancy
   c. the female organ in which a human develops
   d. the organ through which sperm and urine exit a man’s body
   e. the process by which a sperm and an egg join
   f. the female reproductive organ that receives sperm during reproduction

2. Explain the relationship between the key terms in each of the following pairs.
   a. semen and sperm
   b. egg and menstrual cycle
   c. fetus and placenta

Understanding Key Ideas

Section 1

3. What is the role of the male reproductive system?

4. Where is sperm produced in the male body?
   a. testes
   b. seminal vesicles
   c. vas deferens
   d. prostate

5. Summarize the journey of the sperm within the male reproductive system.

6. What causes jock itch?

7. Which of the following is most likely to occur in older males?
   a. prostate cancer
   b. testicular cancer
   c. undescended testes
   d. inguinal hernia

8. Wearing a protective cup when playing sports can help prevent
   a. jock itch.
   b. testicular cancer.
   c. cystitis.
   d. testicular injury.

Section 2

9. What is the function of the female reproductive system?

10. What organ transports an egg from the ovary to the uterus after ovulation?

11. During the menstrual period, blood and tissue that exit the body are derived from the
   a. follicle.
   b. vaginal lining.
   c. uterine lining.
   d. fallopian tubes.

12. Which of the following problems may be due to the entry of bacteria into the urinary bladder?
   a. cystitis
   b. breast cancer
   c. menstrual cramps
   d. endometriosis

13. Which of the following will be least likely to help a woman stay healthy?
   a. good hygiene
   b. annual checkups
   c. scented soaps
   d. breast self-exams

14. CRITICAL THINKING What might happen if 2 eggs were released from the ovaries during 1 menstrual cycle?

Section 3

15. What events lead to the beginning of a new life?

16. Summarize what happens to the fetus during the second trimester of pregnancy.

17. Which of the following is not part of prenatal care?
   a. regular visits to a doctor
   b. ultrasound tests
   c. blood tests
   d. fertility testing

18. Summarize what happens during the second stage of childbirth.

19. During what time period of child development does the fastest period of growth occur?

20. CRITICAL THINKING How do you think both parents’ lifestyle and responsibilities change after the birth of their baby?
Interpreting Graphics

Study the figure below to answer the questions that follow.

![Hormonal Changes During the Menstrual Cycle](image)

21. On what day of the menstrual cycle is the progesterone level the highest?

22. Which hormones peak prior to ovulation?

23. CRITICAL THINKING Why do you think estrogen and progesterone levels decrease toward the end of the menstrual cycle?

Activities

24. Health and You Choose one type of cancer of the reproductive system (for example, testicular, prostate, or breast). Write a one-page report that describes the cancer. Include information on the symptoms of the cancer, ways the cancer can be prevented, and treatments.

25. Health and You Choose an environmental toxin that is harmful to the fetus, such as lead, alcohol, or tobacco. Write a one-page report that describes the effects of the hazard on the growing fetus.

26. Health and Your Family Write an essay about two hypothetical pregnant females who have different backgrounds, such as age, culture, financial status, or family support. Compare their experiences through pregnancy and delivery of the baby.

Action Plan

27. LIFE SKILL Practicing Wellness Discuss five things you can do as a teen to improve and protect your current and future reproductive health.

Standardized Test Prep

Read the passage below, and then answer the questions that follow.

Being pregnant is laborious. This is something Roberta and her husband, Ben, know firsthand. “A lot of changes started to happen soon after I got pregnant,” Roberta says. “I couldn’t lift grocery bags anymore. I got nauseated a lot at first and couldn’t keep any of my food down.” Roberta also suffered from swelling in her feet and face. She explains, “I had too much salt in my body.” Excessive salt intake, even from eating potato chips, can cause swelling of the feet and other changes in the body. It is not easy being pregnant.

28. In this passage, the word laborious means
   A simple
   B nice
   C difficult
   D easy

29. What can you infer from reading this passage?
   E Pregnancy does not change the body.
   F Eating fatty foods is healthy for pregnant woman.
   G Avoiding excess salt is healthy for pregnant women.
   H Cramps can occur during pregnancy.

30. Write a paragraph describing some of the things that Roberta could do to feel better and to protect her health during her pregnancy.

31. Write a paragraph describing Roberta and her husband’s life after the birth of their child.