

# Human Reproduction



**A**ll living things have the ability to reproduce offspring—this is how a species survives. Many species, including humans, reproduce by a process known as **sexual reproduction**. This means that offspring receive half of their genetic information from one parent and half of their genetic information from the other parent. This results in a unique individual, different from either parent. Other species reproduce by a process known as asexual reproduction. In asexual reproduction only one parent is needed and the offspring produced are identical to that single parent. In this activity you will read about sexual reproduction and the process that leads to the development of a human.



## CHALLENGE

What are the structures involved in the process of human sexual reproduction?

### MATERIALS

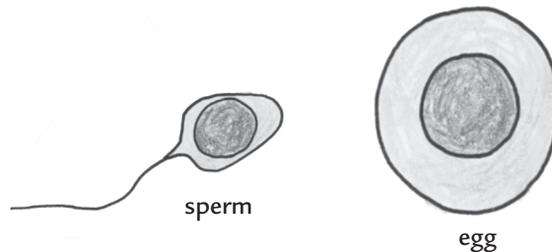


*For each student*

- 1 Student Sheet HR.1, “Structures and Functions of the Human Reproductive System”

### READING

You began life as a single cell. A male sex cell, called a **sperm**, joined with a female sex cell, called an **egg**, during a process called **fertilization** (fur-tuh-lih-ZAY-shun). These sex cells contained half of the normal amount of information in a human body cell, so that when they combined, the full amount of information was present in the offspring. The new cell formed by fertilization, called a **zygote** (ZYE-goat), contained all of the information needed to grow into you—a complex organism made up of trillions of cells. All organisms that reproduce by the process of sexual reproduction begin life this way. Let's take a closer look at the organs of the human body that make this process possible.



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#### STOPPING TO THINK 1

What is a zygote and how does it form?

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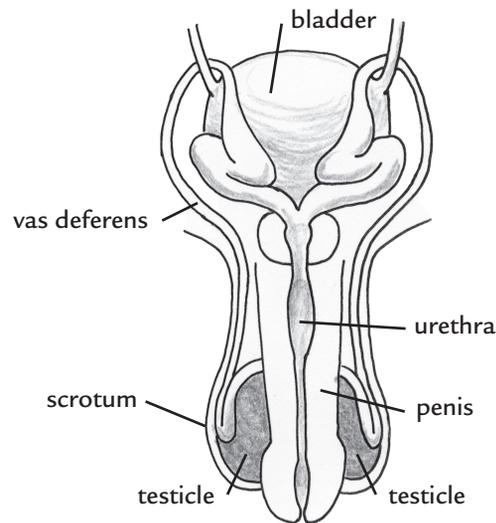
### The Male Reproductive System

Males have two sex organs on the outside of their body, the **testes** (singular testis) and the **penis**. The testes contain clusters of tiny, coiled tubes which produce sperm and testosterone. The testes are contained in a sac called the scrotum. They are outside of the human body because sperm cannot develop properly at the normal body temperature of 98.6°F or 37°C. They must be kept about two degrees cooler in order to develop properly.

Once sperm are produced in the testes, they travel through one of two muscular tubes inside the body called the **vas deferens** (VASS deaf-uh-RENS). As sperm travel through this system of tubes, they mix with several fluids produced by the male reproductive system. This mixture of fluids is called **semen**. Besides providing a watery environment for

sperm, semen also contains nutrients for the sperm cells. There are 5 to 10 million sperm in a single drop of semen!

From these tubes the sperm-rich semen passes into the urethra within the penis. This is the same tube that urine travels through. However, when semen passes through the urethra, muscles near the bladder contract so semen and urine do not travel through the urethra at the same time. Finally, semen leaves the body through the opening of the penis.



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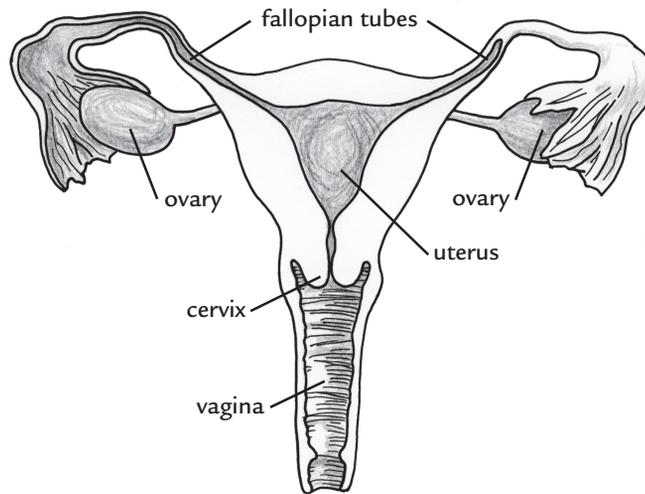
### STOPPING TO THINK 2

- Use the diagram above [check layout], to describe the path of sperm from the testis to the outside of the male body.
  - What is the relationship between sperm and semen?
  - How do you think a high fever might affect sperm production? Explain.
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Besides sperm, the testes produce the hormone testosterone. Although males produce testosterone before birth, they start producing greater quantities at the beginning of puberty, usually in the early teenage years. This hormone influences the development of a male before birth and is responsible for the physical characteristics in males such as facial hair, a deep voice and developed muscles.

### The Female Reproductive System

Almost all of a female's sexual organs are located inside the body. Just as a male has a pair of testes, a female has a pair of **ovaries** (singular ovary). The **ovaries** contain the female sex cells (eggs) and produce the hormone estrogen. Ovaries are located in a female's abdomen as shown in the image below.



Once a male reaches puberty, the reproductive system will produce sperm almost continuously, until the end of his life. Females, however, are born with all of the potential eggs they will ever have—about 400,000. After puberty, one egg matures a month. This means that during a female's lifetime, only about 500 eggs will mature and be released from the ovaries.

When a mature egg is released from an ovary, it travels through one of the **fallopian tubes**, which are shown in the diagram above. If an egg meets sperm while in the fallopian tube, fertilization is likely to result. Although an egg may be surrounded by millions of sperm, only one sperm can successfully fertilize the egg. The egg continues through the fallopian tube until it reaches the uterus. The **uterus** (YEW-tur-uss) is a hollow, muscular organ that is normally smaller than an average size fist. The fertilized egg attaches to the wall of the uterus, where it continues to develop for nine months. During pregnancy, the uterus can stretch to the size of a basketball!

If an egg has not been fertilized, it starts to break down as it enters the uterus. The lining of the uterus, which has been thickening with blood and extra tissue to support the fertilized egg, also breaks down. The

unfertilized egg and extra tissue leave the uterus through an opening called the cervix. As they pass through the cervix, they enter the vagina, the outer opening of the female reproductive system, and leave the body. This process is called menstruation and generally lasts four to six days. The vagina is also called the birth canal because it is the path a baby travels through as it leaves the mother's body during childbirth.

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### STOPPING TO THINK 3

- a. Use the diagram above to describe the path of an egg from the ovary to the outside of the female body.
  - b. Look at the photograph of a sperm at the beginning of this reading. How does a sperm's structure help it get to the egg in the fallopian tube?
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Besides eggs, the ovaries produce the hormone estrogen. Although estrogen, like testosterone in males, is produced before birth, it is produced in greater quantities starting at the beginning of puberty, usually in the pre-teen years. This hormone influences the development of a female before birth and is responsible for the female physical characteristics such as breasts and wider hips.

### From Fertilized Egg to Birth

The fertilized egg, called a **zygote**, is very small, about the size of the period at the end of this sentence. At the moment of fertilization, it is only one cell but it begins dividing immediately. Approximately four days later, it reaches the uterus and attaches itself to the lining of the uterus. It is now a tiny ball made of hundreds of cells and is called an **embryo** (EM-bree-oh).

A structure called the amniotic sac forms around the developing embryo. It is filled with fluid and protects the embryo during the next nine months. The amniotic sac is attached to the uterus by another struc-



ture called the placenta. A ropelike cord called the umbilical cord forms between the placenta and the developing fetus. You still have a scar from your umbilical cord—it is your belly button!

In the placenta, blood vessels from the developing fetus are very close to the blood vessels of the mother. Although the circulatory systems of the mother and the fetus do not mix, the blood vessels are close enough that nutrients, oxygen, and other chemicals can pass from the mother's blood vessels to the fetus's blood vessels. This is why it is extremely important that pregnant women are careful to eat healthy foods and not smoke, drink alcohol, or take any drugs, because these substances can be transferred from the mother's blood to the fetus's blood and they might harm the developing fetus. Chemicals, mostly wastes, also pass from the fetus to the mother through the placenta.

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### STOPPING TO THINK 4

- a. What is the difference between a zygote and an embryo?
  - b. Why is it important for a mother to take good care of herself when she is pregnant?
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When an embryo has been developing for nine weeks, it is a little bigger than your thumbnail, but you would recognize it as a developing human. Most of the internal organs have formed. At this point, it is called a **fetus** (FEE-tuss).

Tissues in the fetus continue to develop. Between four and six months, bones can be seen on an X-ray, a heartbeat can be heard with a stethoscope, and the developing fetus begins to move and kick. Between six and nine months, the brain develops grooves and the lungs develop so that the newborn baby will be able to breathe. This is also the time when the developing fetus gains the most weight. When the fetus is at about nine months of development, it will undergo another event in development, birth. The amniotic sac surrounding the fetus breaks and the fetus moves through the vagina, or birth canal. After leaving the warm, watery environment of the uterus and amniotic sac, the newborn baby will take its first breaths.