

## Lesson 1

# The Beginning of the Life Cycle

### VOCABULARY

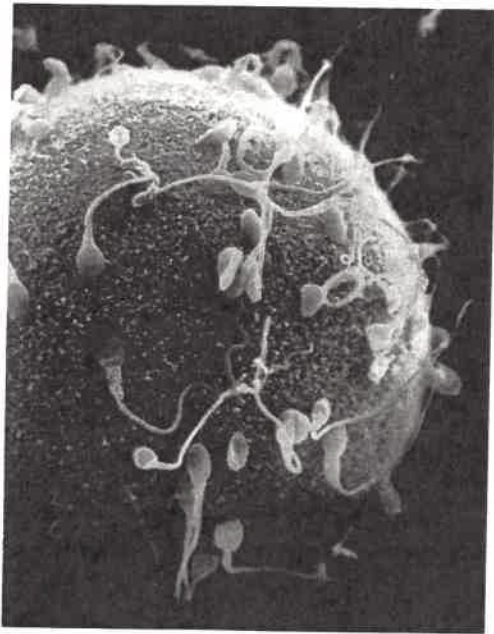
**fertilization**  
**implantation**  
**embryo**  
**fetus**  
**amniotic sac**  
**umbilical cord**  
**placenta**  
**labor**

### YOU'LL LEARN TO

- Explain fetal development from conception through pregnancy and birth.
- Recognize how nutrients and other substances are transferred from a pregnant female to her fetus.

### QUICK START

A developing baby grows rapidly inside its mother's body. How is an unborn baby nourished? Write down your ideas.



**A** This human egg cell is surrounded by sperm. Chemical changes take place in the egg's surface so that only one sperm can fertilize it.

**D**id you know that your body is made of trillions of cells? These cells form the tissues and organs in your body. Yet your heart, lungs, skin, bones, and other body organs all began as a single cell that is smaller than the period at the end of this sentence.

## Conception and Implantation

**T**he entire complex human body begins as one microscopic cell that is formed by the union of an egg cell, or ovum, from a female and a sperm cell from a male. The *union of a male sperm cell and a female egg cell* is called **fertilization**, which is also known as *conception*. The resulting cell is called a *zygote* (ZY-goht).

Look at **Figure 19.1** on page 487. Notice that within a day after the zygote forms, it begins dividing as it travels down the fallopian tube. By the time it reaches the uterus, the zygote has divided many times to form a cluster of cells with a hollow space in the center. Within a few days, *the zygote attaches to the uterine wall* in the process called **implantation**. *The cluster of cells that develop between the third and eighth weeks of pregnancy* is called an **embryo** (EM-bree-oh). *After about the eighth week, this developing group of cells* is called a **fetus** (FEE-tuhs).

## Embryonic Growth

As the embryo grows, its cells continue to divide, forming three tissue layers that later become various body systems. One layer becomes the respiratory and digestive systems. A second layer develops into muscles, bones, blood vessels, and skin. A third layer forms the nervous system, sense organs, and mouth.

During this time two important structures form outside the embryo:

- ▶ The **amniotic** (am-nee-AH-tik) **sac** is a thin, fluid-filled membrane that surrounds and protects the developing embryo. It also insulates the embryo from temperature changes.
- ▶ The **umbilical** (uhm-BIL-uh-kuhl) **cord** is a ropelike structure that connects the embryo and the mother's placenta. The **placenta** (pluh-SEN-tuh) is a thick, blood-rich tissue that lines the walls of the uterus during pregnancy and nourishes the embryo.

Although the blood supply of the mother and the developing embryo are kept separate, materials diffuse from one blood supply to the other through the umbilical cord. Nutrients and oxygen pass from the mother's blood to the embryo, and wastes from the embryo diffuse into the mother's blood. The wastes are excreted from the mother's body along with her body wastes.

Substances that are harmful to the developing embryo can pass through the umbilical cord, too. If a pregnant female uses harmful substances, such as tobacco, alcohol, or other drugs, they can cross the placenta and harm the developing embryo.



### How do twins form?

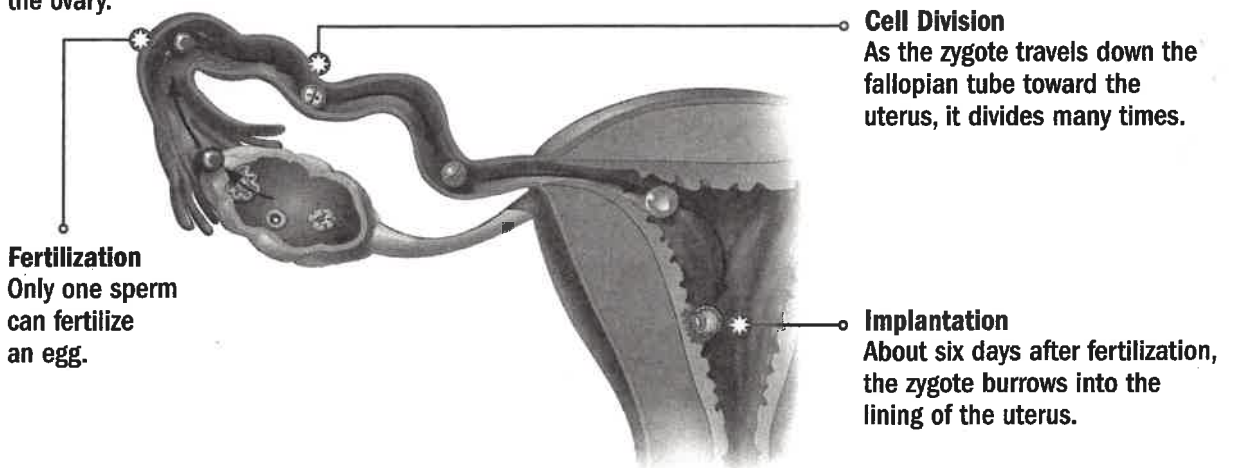
Identical twins result when a single egg that has been fertilized by a single sperm divides and forms two embryos. Because they develop from the same zygote, identical twins have the same genetic information, are the same gender, and look almost exactly the same.

Fraternal twins form when a female's ovaries release two eggs. Separate sperm fertilize each egg, and two embryos develop. Each twin has a different genetic makeup, and they may or may not be the same gender. Fraternal twins do not resemble each other any more than other brothers and sisters do. Fraternal twins are much more common than identical twins.

FIGURE 19.1

## IMPLANTATION

Fertilization and implantation occur after an egg is released from the ovary.



## Fetal Development

The time from conception to birth is usually about nine full months. These nine months are divided into three 3-month periods called *trimesters*. Read about the changes that take place during each trimester in **Figure 19.2**. Compare the images to see the growth of the fetus in each trimester.

FIGURE 19.2

### STAGES OF EMBRYONIC AND FETAL DEVELOPMENT

#### First Trimester (0 to 14 weeks)

#### Major Changes

##### 0–2 weeks

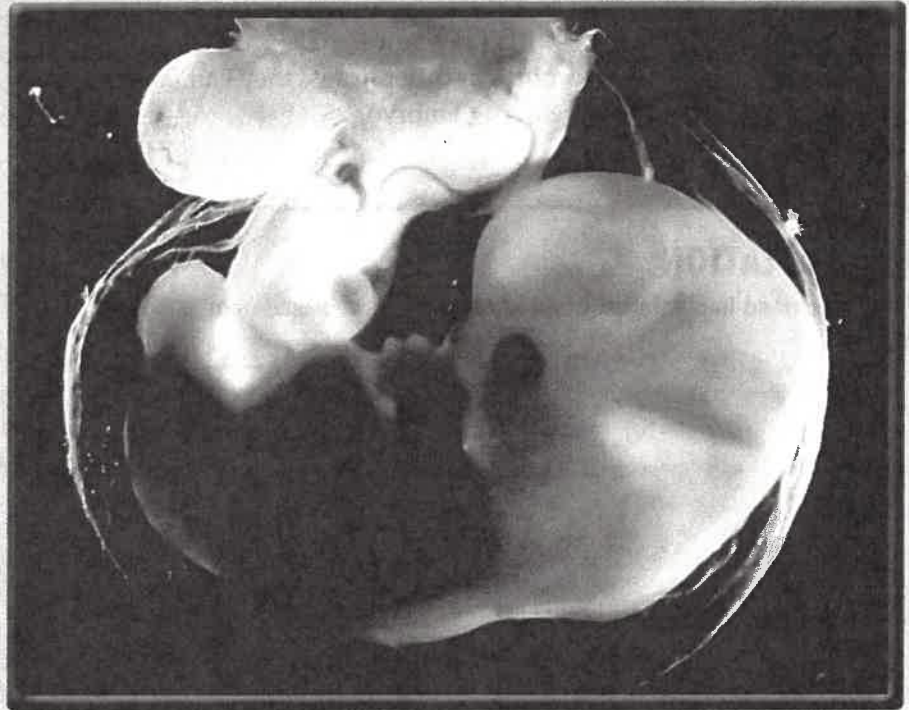
A zygote may float freely in the uterus for 48 hours before implanting. The spinal cord grows faster than the rest of the body. The brain, ears, and arms begin to form. The heart forms and begins to beat.

##### 3–8 weeks



The embryo is about 1 inch long at 8 weeks. The mouth, nostrils, eyelids, hands, fingers, feet, and toes begin to form. The nervous system can respond to stimuli. The cardiovascular system is fully functional.

##### 9–14 weeks

The fetus develops a human profile. Sex organs, eyelids, fingernails, and toenails develop. By week 12 the fetus makes crying motions but no sound and may suck its thumb.



During the period of growth in the uterus, the fetus develops in preparation for living outside the mother's body. Organs develop and become ready to function on their own. The fetus grows and gains weight. After about the seventh month, fat deposits are added under the skin to help the baby maintain body heat after birth. The fetus stores nutrients and builds immunity and protection from diseases and infections.

<b>Second Trimester (15 to 28 weeks)</b>		<b>Major Changes</b>
<b>15–20 weeks</b>		The fetus can blink its eyes. The body begins to grow, growth of the head slows, and the limbs reach full proportion. Eyebrows and eyelashes develop. The fetus can grasp and kick and becomes more active.
<b>21–28 weeks</b>		The fetus can hear conversations and has a regular cycle of waking and sleeping. Weight increases rapidly. The fetus is about 12 inches long and weighs a little more than 1 pound. The fetus may survive if born after 24 weeks but will require special medical care.
<b>Third Trimester (29 weeks to birth)</b>		<b>Major Changes</b>
<b>29–40 weeks</b>		The fetus uses all five senses and begins to pass water from the bladder. Brain scans have shown that some fetuses dream during their periods of sleep in the eighth and ninth months of development. Approximately 266 days after conception, the baby weighs 6 to 9 pounds and is ready to be born.

### Did You Know?

Immediately after birth a newborn is given an *Apgar* score. The Apgar test is used to assess an infant's physical condition at birth. The score measures appearance, heart rate, reflex irritability, activity, and respiration.

## Stages of Birth

In the final weeks of pregnancy, the fetus becomes more and more crowded in the uterus and puts increased demands on its mother's body. Most often the baby's head moves to the lower part of the uterus. Many females experience weak, irregular muscular contractions of the uterus for weeks or even months before the baby is born. As the time approaches for the baby to be born, however, these contractions become regular, stronger, and closer together. The stronger contractions induce **labor**, the final stage of pregnancy in which the uterus contracts and pushes the baby out of the mother's body. The stages of labor are summarized in **Figure 19.3**.

## Real-Life Application

### Fetal Ultrasound Technology

Ultrasound is a noninvasive technology that uses the reflection of sound waves to monitor a fetus in the uterus. A moving image of the developing fetus can be viewed on a monitor. Doctors can measure how the fetus is growing and whether organs such as the heart are developing properly. Ultrasound is used to determine the position of the fetus before birth.

Ultrasound can be done quickly in a doctor's office.

#### ACTIVITY

Access print or online sources to investigate at least two other technologies used in fetal monitoring. Tell when and why each is used, cite your sources of information, and provide the criteria you used to evaluate your sources of valid health information. Write a paragraph explaining how fetal ultrasound technology helps protect the health of the mother and the unborn child.

Fetal ultrasound is harmless for the mother and child.

Only a trained specialist should interpret an ultrasound image.

In many cases gender can be determined with ultrasound.




Ultrasound is helpful for identifying twins and other multiple births.



FIGURE 19.3

## LEAVING THE WOMB

A female goes through three stages of labor to deliver a baby. Labor can last from a few hours to several days.

Stage 1: Dilation	Stage 2: Passage Through Birth Canal	Stage 3: Afterbirth
<p>The contractions of the uterus cause the cervix, the opening to the uterus, to begin to dilate, or widen. In about 95 percent of pregnancies, the baby's head is resting on the cervix. Toward the end of this stage, contractions break the amniotic sac that surrounds the baby.</p>	<p>When the cervix is fully dilated, the baby passes through the birth canal and emerges from the mother's body. Right after birth the baby takes its first breath and cries to clear the lungs of amniotic fluid.</p>	<p>The placenta is still attached to the baby by the umbilical cord. Contractions continue until the placenta, now called the <i>afterbirth</i>, is pushed from the mother's body. The umbilical cord is cut to separate the placenta from the baby.</p>
		

### Lesson 1 Review

#### Reviewing Facts and Vocabulary

1. Define *fertilization* and *implantation*.
2. Explain fetal development from conception through pregnancy and birth.
3. How is a developing fetus nourished?

#### Thinking Critically

4. **Synthesizing.** Considering what you learned about the female reproductive system in Chapter 18, explain what would happen if the zygote did not implant in the uterus after leaving the fallopian tube.
5. **Applying.** Explain how harmful substances taken in by a pregnant female can be transferred to a developing fetus. How might fetal development be affected?

#### Applying Health Skills

**Accessing Information.** Research the changes that occur in a female's body during the nine months of pregnancy. Make an informative pamphlet that summarizes this information by trimester. Illustrate the pamphlet with pictures that show fetal development during each trimester.



**PRESENTATION SOFTWARE** Create a slide show that describes changes during pregnancy and fetal development. For help in making a computer slide show, see [health.glencoe.com](http://health.glencoe.com).



[health.glencoe.com](http://health.glencoe.com)