

## SECTION 1

## Forty Weeks of Preparation

## OBJECTIVES

- Name the three stages of pregnancy.
- Describe the prenatal development during each of the three stages of pregnancy.

**D**uring pregnancy, a single cell grows and develops into a human being capable of independent existence. This amazing process takes place over a period of 40 weeks (or about nine months).

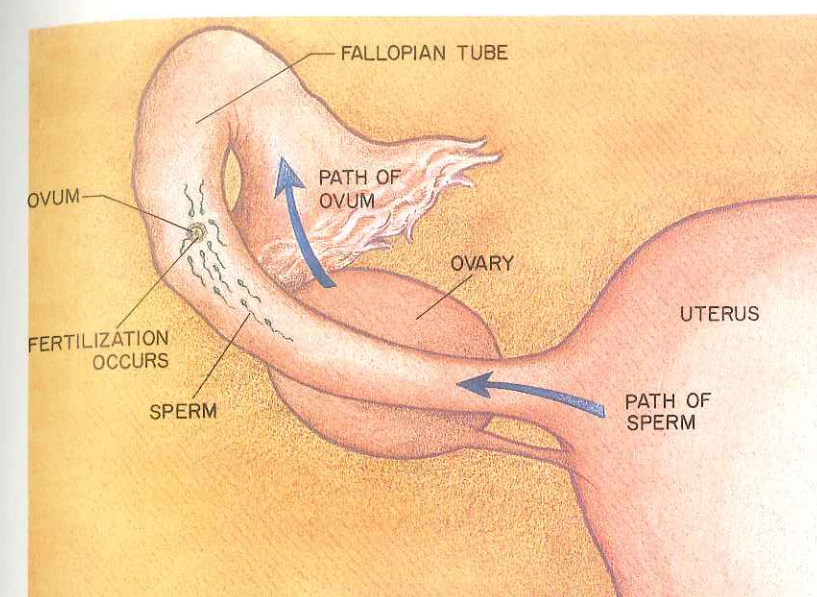
## Prenatal Development

**Prenatal** development is the development of a baby *during the period before birth*. Prenatal development is usually considered in three stages: the period of the zygote, the period of the embryo, and the period of the fetus. The chart on pages 118-119 shows how the unborn baby develops during these three periods. It also shows corresponding physical changes in the mother.

## Conception

Once each month, an **ovum**—a female cell or egg—is released by one of a woman's ovaries. The egg moves through the Fallopian tube to the **uterus**, or womb, the organ in a woman's body in which a baby develops during pregnancy. This short journey takes about two or three days. It is only in the Fallopian tube that fertilization can take place.

When the egg reaches the uterus, it usually disintegrates and is flushed away with the menstrual flow. However, if the egg meets and is fertilized in the Fallopian tube by a **sperm**, or male cell, **conception**—the union of an ovum and a sperm, resulting in the beginning of pregnancy—takes place. This union is called a zygote.



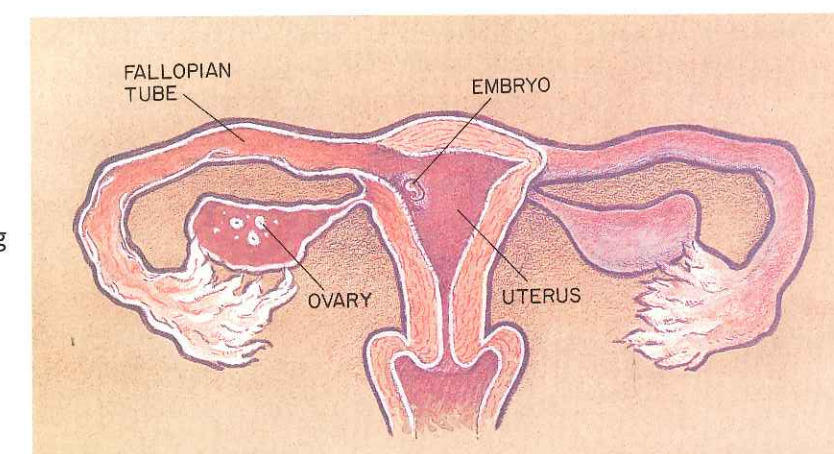
Conception—the beginning of pregnancy—occurs when an ovum is fertilized. The ovum is about the size of the dot over a printed letter i.

## Period of the Zygote

The first stage in the development of a human baby is called the period of the **zygote**, or *fertilized egg*. It lasts approximately two weeks.

When the fertilized egg reaches the uterus, it attaches itself to the thickened lining of the uterus and begins to grow. Since the lining is needed to nourish the fertilized egg, it cannot be shed in menstruation as usual. Therefore, menstruation does not take place. The woman's menstrual periods stop and will not begin again until after the baby is born.

The thickened lining of the uterus provides both a soft, warm bed and food for the fertilized egg. It grows by a process called cell division. This single, complete cell divides and becomes two. Two cells become four and so on, until there is a mass of cells. In spite of the remarkable growth during this period, at the end of two weeks, the zygote is still only the size of a pinhead.



The embryo has made its home by attaching itself to the inner lining of the uterus. The uterus is about 3 inches long at this stage. The embryo is still smaller than a grain of rice.







## TERMS TO LEARN

amniotic fluid  
conception  
embryo  
fetus  
ovum  
placenta  
prenatal  
sperm  
umbilical cord  
uterus  
zygote




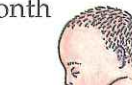

# **PRENATAL DEVELOPMENT MONTH BY MONTH**

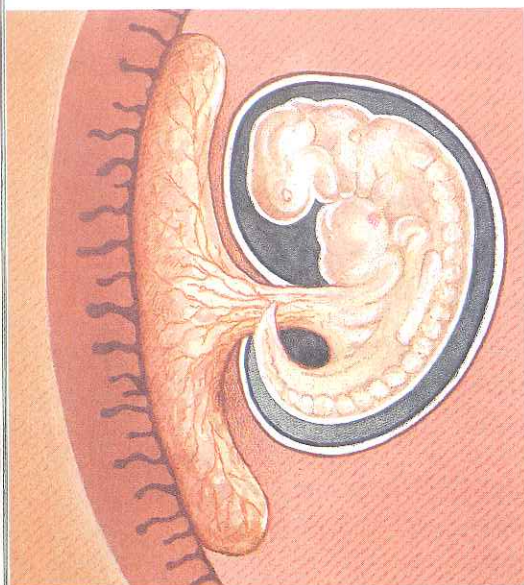
Keep in mind that growth patterns and reactions are individual. Not all babies develop at exactly the same rate, nor does every pregnant woman experience all of the effects described here.

	PRENATAL DEVELOPMENT	EFFECTS ON MOTHER
During the First Month 	<ul style="list-style-type: none"> <li>Cell multiplication begins.</li> <li>The fertilized egg attaches itself to the lining of the uterus.</li> <li>Internal organs and the circulatory system begin to form. The heart begins to beat.</li> <li>By the end of the month, small bumps indicate the beginning of arms and legs.</li> </ul>	<ul style="list-style-type: none"> <li>Missed menstrual period.</li> <li>Other signs of pregnancy may not yet be noticeable.</li> </ul>
During the Second Month 	<ul style="list-style-type: none"> <li>At five weeks, the embryo is only about 1/4 inch (6 mm) long.</li> <li>Face, eyes, ears, and limbs take shape.</li> <li>Bones begin to form.</li> <li>Internal organs continue to develop.</li> </ul>	<ul style="list-style-type: none"> <li>Breasts begin to swell.</li> <li>Pressure on bladder from enlarging uterus results in need to urinate more frequently.</li> <li>Possible nausea ("morning sickness").</li> <li>Fatigue is common.</li> </ul>
During the Third Month 	<ul style="list-style-type: none"> <li>As this month begins, the fetus is about 1 inch (25 mm) long.</li> <li>Nostrils, mouth, lips, teeth buds, and eyelids form.</li> <li>Fingers and toes are almost complete.</li> <li>All organs are present, although immature.</li> </ul>	<ul style="list-style-type: none"> <li>Breasts become firmer and fuller and may ache.</li> <li>Nausea, fatigue, and frequent urination may continue.</li> <li>Abdomen becomes slightly larger. The uterus has grown to about the size of an orange.</li> <li>Weight gain totals 2-4 pounds (0.9-1.8 kg).</li> </ul>
During the Fourth Month 	<ul style="list-style-type: none"> <li>At the beginning of this month, the fetus is about 3 inches (76 mm) long and weighs about 1 ounce (28 g).</li> <li>The fetus can suck its thumb, swallow, hiccup, and move around.</li> <li>Facial features become clearer.</li> </ul>	<ul style="list-style-type: none"> <li>Size change continues slowly.</li> <li>Most discomforts of early pregnancy are usually gone by this time.</li> <li>Appetite increases.</li> </ul>

(Continued on next page)

# **PRENATAL DEVELOPMENT MONTH BY MONTH**

	PRENATAL DEVELOPMENT	EFFECTS ON MOTHER
During the Fifth Month 	<ul style="list-style-type: none"> <li>As this month begins, the fetus is about 6 1/2-7 inches (16-18 cm) long and weighs about 4-5 ounces (113-142 g).</li> <li>Hair, eyelashes, and eyebrows appear.</li> <li>Teeth continue to develop.</li> <li>Organs are maturing.</li> <li>The fetus becomes more active.</li> </ul>	<ul style="list-style-type: none"> <li>Enlarged abdomen becomes apparent.</li> <li>Slight fetal movements are felt.</li> <li>Fetal heartbeat may be heard through a stethoscope.</li> <li>Increased size may begin to affect posture.</li> </ul>
During the Sixth Month 	<ul style="list-style-type: none"> <li>The fetus is now about 8-10 inches (21-25 cm) long and weighs about 8-12 ounces (227-340 g).</li> <li>Fat is being deposited under the skin, but the fetus still appears wrinkled.</li> <li>Breathing movements begin.</li> </ul>	<ul style="list-style-type: none"> <li>Fetal movements are now sensed as strong kicks, thumps, and bumps. Some may be visible.</li> <li>Weight gain by the beginning of this month may total 10-12 pounds (4.5-5.4 kg).</li> </ul>
During the Seventh Month 	<ul style="list-style-type: none"> <li>The fetus is about 10-12 inches long and weighs about 1 1/2-2 pounds (680-907 g).</li> <li>Periods of fetal activity are followed by periods of rest and quiet.</li> </ul>	<ul style="list-style-type: none"> <li>Increased size may begin to affect posture.</li> </ul>
During the Eighth Month 	<ul style="list-style-type: none"> <li>Weight gain continues rapidly. The fetus is about 14-16 inches (36-41 cm) long and weighs about 2 1/2-3 pounds (1.0-1.4 kg).</li> <li>The fetus may react to loud noises with a reflex jerking action.</li> <li>In most cases, the fetus moves into a head-down position.</li> </ul>	<ul style="list-style-type: none"> <li>There may be discomfort as size increases. Backache, leg cramps, shortness of breath, and fatigue are common.</li> <li>Fetal kicks continue to be felt; they may disturb the mother's rest.</li> <li>At the beginning of this month, weight gain totals about 18-20 pounds (8.2-9.1 kg).</li> </ul>
During the Ninth Month 	<ul style="list-style-type: none"> <li>At the beginning of the final month, the fetus is about 17-18 inches (43-46 cm) long and weighs about 5-6 pounds (2.3-2.7 kg). Weight gain continues until the week before birth.</li> <li>Skin becomes smooth as fat deposits continue.</li> <li>Fetal movements decrease as the fetus has less room to move around.</li> <li>The fetus acquires disease-fighting antibodies from the mother's blood.</li> <li>The fetus descends into the pelvis, ready for birth.</li> </ul>	<ul style="list-style-type: none"> <li>"Lightening" is felt as the fetus drops into the pelvis. Breathing becomes easier.</li> <li>Other discomforts of late pregnancy may continue.</li> <li>A total weight gain of 24-30 pounds (10.9-13.6 kg) is typical. The uterus is the size of a small watermelon by the time of birth.</li> <li>False labor pains may be experienced.</li> </ul>



At three weeks after conception, the embryo is surrounded by a sac of amniotic fluid (shown in dark gray). Between the amniotic sac and the uterine lining is the membrane that will soon develop in the placenta. The heart is the largest organ so far and has already begun to beat.

## Period of the Embryo

The second stage of pregnancy is the period of the embryo. The **embryo** is the developing cluster of cells in the uterus during about the third through eighth weeks of pregnancy. In the course of this period, an amazing change occurs as the mass of embryonic cells develops into all the major organ systems of the human body.

Throughout this stage, the embryo grows rapidly. It becomes firmly attached to the inner lining of the uterus. By the end of this stage, the **placenta**, the tissue that connects the sacs around the unborn baby to the mother's uterus, has developed. The **umbilical cord**, a long tube that connects the placenta to the unborn baby, has also developed. Nourishment and oxygen from the mother's bloodstream are carried from the placenta to the developing baby through the umbilical cord.

The umbilical cord is uniquely formed to supply nourishment to the baby and to take waste products away from the baby. The cord contains three blood vessels. It is usually stiff and firm, like a garden hose filled with water. Usually, it is not flexible enough to loop around the fetus, although this may occur in rare cases. Only after the baby is born does the umbilical cord become limp and ropelike.

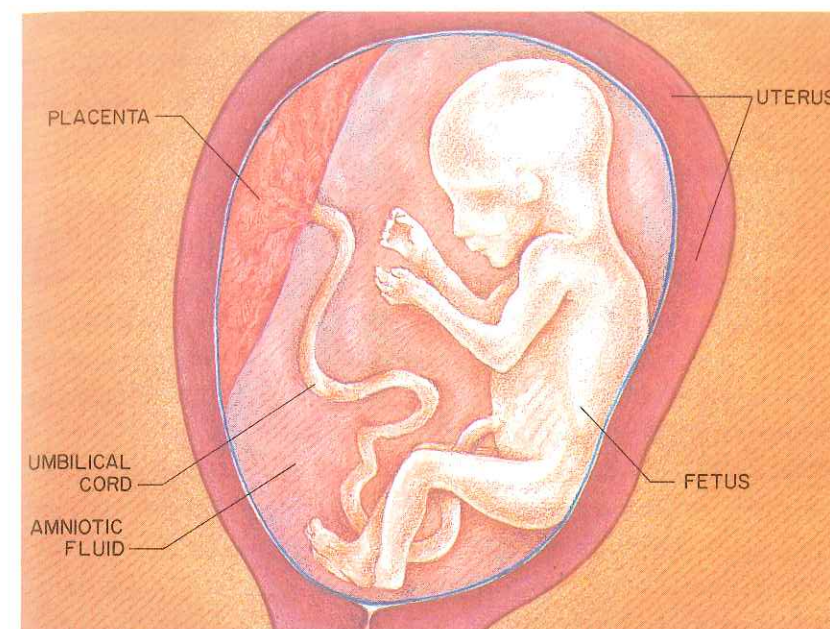
The growing embryo is soon surrounded by a bag of liquid called **amniotic fluid**, a special fluid that surrounds and protects the developing baby during pregnancy. The amniotic fluid acts as a cushion to protect the embryo, even through minor bumps or falls of the mother. The baby remains within this sac of liquid until just before birth.

## Period of the Fetus

The third and last stage of pregnancy begins about the eighth or ninth week and lasts until birth. This stage is called the fetal period, or the period of the **fetus**, the unborn baby from about the eighth or ninth week of pregnancy until birth.

By the beginning of this period, the embryo has developed the beginnings of all organs and body parts. The cells are now recognizable as a developing human. Arms, legs, and even fingers and toes have developed. Facial features are also forming. All the internal organs are present, but they are not ready to function yet. They continue to develop in the remaining months of pregnancy.

Sometime during the fourth or fifth month, the kicks and other movements of the fetus touch the wall of the uterus. These fluttering movements are faint and infrequent at first. Gradually, they become stronger and more frequent. This sensation of feel-



By the fourth month, the fetus looks more like a baby. The eyelids will remain shut until about the sixth month.

ing life, sometimes called quickening, tells the mother that she does, indeed, carry a live child within her. Actually, the baby has been very active long before this time.

Her doctor usually asks the expectant woman when she first felt life. Knowing this helps the doctor estimate the baby's fetal age and project a more accurate delivery date. The fetus's heart-beat can usually be heard before movement is felt.

As the fetus grows, so does the volume of the surrounding fluid. The uterus expands, too, and the woman's abdomen grows. Just before delivery, the amniotic fluid decreases as the baby becomes more active and swallows it. As the fetus grows, it no longer has the room to stretch out. The developing baby curls up in what is called the fetal position.



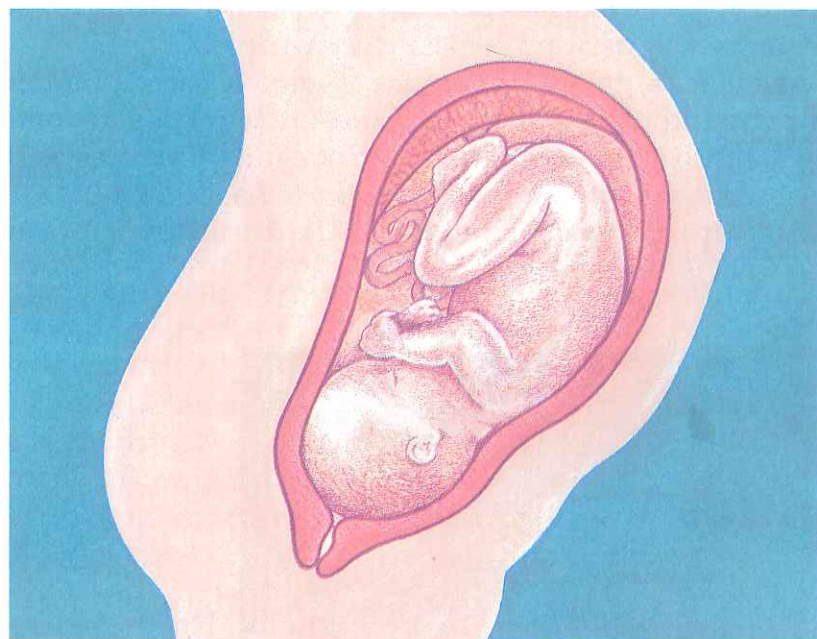
The fetus floats comfortably within the amniotic sac. After brief active periods, the fetus spends long hours resting. The same will be true of the baby after birth.



By the seventh month, most fetal development has already taken place. The fetus is capable of living outside the womb, but not without a great deal of medical help. Now the fetus's main task is to get ready for independent life outside the womb. In these remaining months, the major organs become ready to function without the assistance of the mother's body. The fetus also gains weight rapidly. Fat deposits, which will help the baby maintain body heat after birth, are added under the skin. Gradually, the fetus, which had been thin and wrinkled, takes on the smoother, rounder appearance of a baby. During these final weeks of pregnancy, the fetus also stores nutrients and builds immunity to diseases and infections.

The fetus can do a surprising number of things—suck its thumb, cough, sneeze, yawn, kick, and hiccup. A baby can even cry before birth. In almost all cases, the crying is soundless.

Sometime during the ninth month of pregnancy, the baby's weight seems to shift down and the mother feels noticeably more comfortable in her upper abdomen. Lightening has occurred. This means that the baby has dropped into the birth canal. Birth is not far off. With a first baby, lightening may take place several days—or even weeks—before labor begins. If the mother has given birth before, lightening may occur just before the beginning of labor. Sometimes lightening is accompanied by slight abdominal pains, which first-time mothers may mistake for the beginning of labor.



At full term (after nine months of development), the baby has put on weight and settled into the pelvis. The desired position is head down.

At this point in the pregnancy, the fetus is usually upside down, with the head nestled in the pelvis. This is the easiest and safest position for birth. The baby is less active than in previous weeks, because there is so little space in which to move.

The skin of the mother's abdomen appears stretched to capacity. The abdominal muscles are stretched, too. Both are capable of remarkable stretching—and contracting. The muscles of the uterus and abdomen can be stretched up to 60 times their original size during pregnancy, yet they return to nearly their original size within a month or so after the birth.

The nine months of pregnancy bring many changes, both in the pregnant woman and the developing baby. For family members, the signs are clearly evident and their anticipation of a new family member is usually greeted with enthusiasm. After about 40 weeks of preparation, the baby is ready to be born.

## SECTION 1 REVIEW

### CHECK YOUR UNDERSTANDING

1. What is conception? Where does it take place?
2. During what period of pregnancy do the placenta and umbilical cord develop? Why are they important to the developing baby?
3. What is amniotic fluid? Why is it important to the developing baby?
4. What is a fetus?
5. What is quickening? When does it usually first occur?
6. What are the most important changes that take place in a fetus during the last two months of pregnancy?
7. What is lightening? When does it usually occur?

### DISCUSS AND DISCOVER

1. What emotional changes do women experience during pregnancy? Read about these changes, or discuss them with women who are or have been pregnant. Do all women experience the same emotional changes? How do you think a woman's emotional responses to pregnancy vary according to her situation? How do you think a woman's age, marital situation, and economic situation affect her emotions during pregnancy?
2. With a group of other students, collect photographs (from magazines or from other sources) of pregnant women. Then discuss what the photographs show. About how many months pregnant do you think each woman is? What physical changes make the pregnancy apparent? How do women at about the same stage of pregnancy look different? How do they look alike?