After studying this chapter, you will be able to:

- **describe** what happens during conception.
- **explain** how genetic factors affect prenatal development.
- **describe** how a person inherits traits through genes.
- **list** the three different types of multiple pregnancies.
- **describe** the three main stages of prenatal development.

**Terms to Know**

- cell
- sperm
- ovum
- conception
- zygote
- fallopian tubes
- uterus
- genetic factors
- chromosomes
- dominant traits
- recessive traits
- multiple pregnancy
- fraternal
- chorion
- identical
- prenatal development
- germinal stage
- amnion
- placenta
- umbilical cord
- embryonic stage
- embryo
- cartilage
- fetal stage
- fetus
- quickening
- age of viability

**Reading Advantage**

Find the list of terms at the beginning of the chapter. Write what you think each term means. Then look up the term in the glossary and write the textbook definition.

**Companion Web Site**

Learn more about a multiple pregnancy by completing the Read, Discuss, and Analyze Activity for Chapter 4 at g-wlearning.com.

**Academic English Language Arts Standards**

This chapter is correlated to IRA/NCTE 1, 3, 4, 5, 6, 7, 8, and 12. The complete list of standards is located in the front of the text.
Pregnancy is a special time for a couple. The feelings of parents-to-be range from great excitement to anxiety. However, when both spouses want children, they adjust rather easily to parenthood.

Pregnancy is the process through which a new human prepares to enter the world. This process begins when a baby is created inside the mother’s body. During the nine months of pregnancy, the baby grows and develops at a fast rate. Before the baby is actually born, however, many complex changes must take place.

Many factors influence these changes. One factor is a baby’s genes. Genes determine much about a person’s looks, personality, and physical size. A baby’s genes come from both the mother and father, and these genes start to control how babies grow and develop before they are even born.

Conception

A cell is the smallest unit of life that is able to reproduce itself. Life begins with the joining of two separate cells—one from the male and one from the female. These cells are called germ cells (the cells involved in reproduction). The male germ cell is called the sperm. The female germ cell is the ovum (often called the egg). The joining of these two cells is called conception. At conception, ovum and sperm combine to form a single cell called a zygote. Another name for the zygote is a fertilized egg.

How do these two types of germ cells form and unite to create new life? Ovum are produced and stored by the woman’s ovaries. Inside the ovary, the ovum is stored in a small sac called a follicle. Hormones cause some follicles to grow and fill with fluid each month.
Around the middle of the menstrual cycle, one ovum is released from the follicle, and the other follicles that were growing become inactive. (Sometimes more than one ovum is released.) The release of the ovum from the ovary is called ovulation.

When the egg is released, it travels toward the fallopian tubes. These are two hollow tubes that extend from the right and left sides of the uterus. The uterus is the organ in which the baby develops and is protected until birth. One end of each fallopian tube is connected to the uterus. The other end of each tube has fingerlike projections. These projections lie near, but are not attached to, the ovary. The projections from the fallopian tube help gather the ovum as it emerges from the ovary. Once inside the fallopian tube, the ovum moves very slowly down the tube. Here, the ovum is ready and available to be joined by a sperm, 4-2.

Semen, a liquid which contains over 300 million sperm, enters the woman’s body during intercourse. These sperm begin a journey to the ovum that lasts only minutes. Many sperm do not survive. Only 300 to 500 reach the fallopian tube.

Sperm may meet the ovum at any point. Conception usually happens when the ovum is less than one-third of the way down the fallopian tube. After that point, conception is unlikely because the ovum has a short life span. It only lives about 24 hours after ovulation.

The sperm approach the ovum and try to break through its surface. Only one sperm successfully enters, or fertilizes the egg. Once one sperm is accepted, no other sperm can enter the ovum. Conception has occurred, and the zygote forms.

**Enrich**

With a chart or transparency, illustrate the female reproductive system. Show students what occurs during conception.

**Note**

Explain that an infertile male may not produce enough sperm or may produce sperm that do not have enough activity and die before reaching the ovum.
Genetic Factors and the Unborn Baby

In Chapter 1, you learned that genetics is the study of heredity. A person's inherited traits are passed to him or her at conception. The total heredity is received at this one time—no new genes will be inherited.

Genetic factors are the traits passed through the genes. These factors affect all stages of growth and development. In many ways, genetic factors influence the prenatal stage more than any other stage of life. Following certain rules, each parent's genes combine to make a blueprint for the unborn child's growth and development. During pregnancy, this blueprint, called a genome, guides growth and development as the baby changes from a zygote to a baby ready to be born. The unborn baby will come to look much like other members of the family. He or she will likely have abilities, interests, and personality traits that are similar to those of family members, too.

During the prenatal period, the genetic blueprint also gives the cells instructions for family-like traits that will unfold throughout life. For example, during the prenatal period a baby boy’s cells receive instructions on hair loss later in life. These instructions determine whether he will be bald, what the pattern of hair loss will be, and when hair loss will occur. Some people’s genes lead them to lose hair, while others have genes that promote keeping a full head of hair. What causes each person to be so different? Heredity does, and it works in complex ways. You may understand heredity better by reading about Steve.

Heredity and Steve

Steve is a five-year-old boy. Like many children his age, Steve asks many questions, enjoys pretend games, and shows interest in letters and numbers. Although Steve shares many traits with other five-year-olds, he is uniquely Steve—not Kate, Peter, Susan, or even his older brother, Chris. How did Steve become the person he is?

Like all people, Steve began life as a single-celled zygote. The nucleus, or center, of this cell contains a set of instructions to build a living being. These directions tell the body whether a being will be a person, an animal, or a plant. The instructions are written in what scientists call a genetic code.

Where does nature keep this important genetic code? The genetic code is stored in DNA (deoxyribonucleic acid). DNA is a chemical compound that is found in threadlike structures called chromosomes. The chromosomes carry genes in living cells. Chromosomes contain the information nature needs to make Steve a human.
Chromosomes and Genes

All living organisms have a certain number of chromosomes. Each human baby receives a total of 46 chromosomes, which form 23 pairs. Half of these chromosomes come from the mother and half come from the father. Each sperm contains 23 chromosomes, as does each ovum, 4-3.

Each chromosome contains about 20,000 genes. These genes determine a person’s individual traits. Human cells contain about a million genes. Sometimes one gene determines a trait. Other times, a group of genes decides a trait.

Steve’s genes have determined he has blue eyes; light brown hair with a reddish tinge; and fair, freckled skin. His genes give him Rh positive blood, type O. They also carry a better-than-average chance of having high blood pressure. Because of his genes, Steve learns quickly. These qualities are only part of Steve’s genetic information. The sum of Steve’s genes, along with his environment, makes him Steve and no one else.

Steve’s appearance is unique; he does not look exactly like anyone in his family. He looks like his father in some ways and his mother in other ways. Some of Steve’s features do not look like either of his parents’ features. Steve’s hair is the same color as his mother’s, but his body is built like his father’s. Even though both of Steve’s parents have brown eyes, his eyes are blue.

Steve’s traits were passed to him through his parents’ germ cells (ovum and sperm). Of the 46 total chromosomes a parent has, only half (23) will be present in his or her germ cell. Chance determines which chromosomes these will be. The baby inherits a set of 23 chromosomes from each parent. It is the final combination of these two sets of chromosomes that makes each person unique.
Dominant and Recessive Traits

In all but one chromosome pair, all the genes occur in pairs. In each gene pair, one gene originates from the father and the other is from the mother. The genes from each parent work together to determine the appearance of each trait in a child.

In the case of Steve, his genes give him blue eyes, but both his parents are brown-eyed. You may wonder how Steve’s parents could pass on this trait even though neither of them has blue eyes. This is an example of how heredity can be complex.

People can pass on traits that do not show in them. This is because some traits are dominant and some are recessive. **Dominant traits** are those that always show in a person even if only one gene of the pair is inherited for that trait. **Recessive traits** typically do not show in a person unless both genes for the trait are inherited (one from each parent). In a few cases, a boy can inherit recessive traits by receiving a single recessive gene from his mother. Examples are color blindness and hemophilia. Most often, however, it takes two recessive genes for a recessive trait to show. A person who inherits only one recessive gene for a trait becomes a *carrier* of that trait. This makes it possible for the trait to show up in later generations.

People can have dominant, recessive, or both types of genes for height. Tallness is dominant and shortness is recessive, 4-4. There

### Dominant and Recessive Traits

<table>
<thead>
<tr>
<th>T = tallness</th>
<th>t = shortness</th>
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<tbody>
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<td><strong>tt</strong></td>
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</tbody>
</table>

A dominant trait shows if either gene (or both genes) in the pair is for that trait. Recessive traits show when only both genes are for that trait.
were both tall and short relatives in Steve’s mother’s family—possibly for several generations. Because of this, Steve’s mother inherited one gene for tallness and one for shortness, so she is tall. Steve’s father also had tall and short relatives. He is a tall man, but also has one gene for tallness and one for shortness. Some of the ova from Steve’s mother were for tallness and some for shortness. In like manner, some sperm from Steve’s father were for tallness and some for shortness. Steve received both an ovum and a sperm for shortness. Because he has two recessive genes, Steve shows the recessive trait of shortness. Steve’s brothers and sisters could be short like Steve or tall like Steve’s parents.

**Sex Chromosomes**

Of the 23 pairs of chromosomes, 22 are alike in both males and females. These 22 pairs provide genetic information for both males and females, such as height and eye color. The chromosomes that make up the twenty-third pair are different for females and males. This pair is called the sex chromosomes. The sex of a child, however, is determined by this whole chromosome pair, unlike traits that are determined by a few genes on chromosome pairs.

Females have the chromosome pair called XX (because when viewed with a microscope, the pair looks somewhat like the letters X and X). When a female’s chromosome pair splits to form germ cells (ova), all ova will be X because each chromosome pair was XX.

Males have the chromosome pair called XY (because when viewed with a microscope, the pair looks somewhat like the letters X and Y). When a male’s chromosome pair splits to form germ cells (sperm), some will be X and some will be Y. This is because each chromosome pair was XY.

All the mother’s egg cells will carry the X chromosome. If fertilized by a sperm carrying an X chromosome, the child will be female (XX). If the sperm cell carries the Y chromosome, the child will be male (XY). Because the father’s sex chromosome is the one that can vary, it is the father’s sperm that always determines the sex of the child, 4-5.

**Activity**

Diagram the example of the female X chromosome combining with the male X chromosome. Diagram another example combining the female X chromosome with the male Y chromosome.

**Resource**

Sex-Linked Traits, reproducible master 4-2, TR. Have students choose a specific sex-linked trait and write an essay covering the number of people affected, symptoms, and treatments or outcomes.
In the XY chromosome pair, a few of boys’ traits are determined only by their mothers. Think of an X as having four legs and a Y as having three legs. Genes on the fourth leg of the X alone determine these traits. There is no fourth leg of the Y to follow the laws of dominant and recessive genes. This is not the case for girls whose sex chromosome pair is XX. For boys, the genes on the unmatched fourth-leg of the X chromosome determine the sex-linked traits. Some sex-linked traits include color blindness and hemophilia, a serious blood disorder. Girls would only have these disorders if they received these recessive genes from both parents.

Multiple Pregnancy

Sometimes two or more babies develop in the same pregnancy. This is called a multiple pregnancy. Sometimes, twins are more common than triplets. In very rare cases, as many as seven or eight babies can be conceived in the same pregnancy.

Doctors are often concerned about the health of multiple births with three or more babies. Most babies in these births are born early and have low birthweights (under 3.3 pounds for multiple births). This puts them at risk for severe vision, hearing, mental, and developmental disabilities. Twins are also almost 5 times (triplets almost 10 times) more likely to die in their first year than single-birth children.

Fraternal Births

The most common multiple pregnancy is caused when multiple babies develop from two or more ova. Each ova is fertilized with a different sperm. This means each child has a different genetic makeup. These babies are as much alike and different as any other brothers and sisters. Children born in these multiple births are called fraternal children. They can be twins, triplets, or higher multiple births. (Fraternal comes from a Latin word meaning brother.)

Fraternal children may or may not be the same gender. They look different at birth and show greater differences as they mature. Each child in a fraternal birth has his or her own chorion. The chorion is a membrane that surrounds the baby in the uterus.

Identical Births

In identical births, children develop from a single ovum that was fertilized by a single sperm. During the early days of the
Pregnancy, the ovum splits to produce two or more children. Scientists do not know why the ovum splits. The chances of identical births are much less than the odds for fraternal births, 4-7.

If the ovum does not completely split, the babies will be conjoined twins. The bodies of these twins are joined in one or more places. They may share external body parts, such as legs, or internal organs, such as the liver. Conjoined twins occur in about one in 250,000 live births.

Babies from an identical birth have the same genetic makeup. This is because they came from one fertilized ovum. These babies are called identical. Identical children can be twins, triplets, or higher multiple births.

Identical children are very similar in appearance. People often confuse which child is which. Even family members may confuse them, 4-8.

**Learn More About Factors Affecting Multiple Births**

Although multiple pregnancies are not as common as single pregnancies, they have become more common. This is due to several factors.

- **Maternal Age** (Note: Older mothers have a greater risk than younger mothers for pregnancy problems, including the loss of the baby. Babies born to older women are at an increased risk for abnormalities compared with those of younger women.)
- rate doubles between 35 and 40 years
- rate decreases between ages 40 and 45 years
- after age 45, 1 in 9 pregnancies are multiples

**Better Nutrition**

**History of Earlier Pregnancies**

- compared to the first pregnancy, the rate increases four times for the fourth or fifth pregnancy
- rate is four times greater for women who have had multiples over those who have had singletons

**Multiple Pregnancies on the Maternal Side of the Family**

**Use of ART**

Is there something common about these factors? Yes, they all increase the chances of multiple ovulation due to hormones. The hormones in fertility drugs stimulate ovulation. Thus, successful ART almost always produces a multiple pregnancy. In the 1990s when ART was new, it was not uncommon for some of these women to have more than three babies. Higher-number multiples are now on the decline. This is due to improvements in ART.

**Chances of Having Spontaneous Identical Multiples***

<table>
<thead>
<tr>
<th>Multiples</th>
<th>Chances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twins</td>
<td>1 in 250 pregnancies</td>
</tr>
<tr>
<td>Triplets</td>
<td>1 in almost 62.5 thousand pregnancies</td>
</tr>
<tr>
<td>Quadruplets</td>
<td>1 in over 15.5 million pregnancies</td>
</tr>
<tr>
<td>Quintuplets</td>
<td>1 in almost 4 billion pregnancies</td>
</tr>
</tbody>
</table>

*These numbers exclude pregnancies of women using ART.

4-7 Identical multiples are far less common than fraternal multiples.
However, except for their genes, identical children are not exactly alike. Their fingerprints, palm prints, and footprints are similar, but not exactly the same. Also, environment makes identical children different. For example, one child may be larger because of better nourishment, even before birth.

Some identical twins are mirror twins. They look the way you and your mirror image would appear. For instance, one may have a birthmark on the right shoulder and the other may have one on the left shoulder. One may be right-handed and the other left-handed.

Sometimes it is difficult to tell whether children are identical. At birth, the delivering physician may be able to tell. If not, blood tests or skin grafting can be used for proof. Identical children are always of the same gender. Unlike fraternal children, they usually share one chorion. However, it is possible for each identical child to have a separate chorion.

Mixed Types

Multiple pregnancies may be both identical and fraternal if three or more children are born. In mixed types of pregnancies, separate sperm fertilize two or more eggs (fraternal). Then, one or more of the fertilized ova may split (identical).

If all children are identical or all are fraternal, this is not a mixed pregnancy. However, triplets are often from a mixed pregnancy, with two children identical and one fraternal.

In like manner, quadruplets may also be all identical or all fraternal. However, quadruplets are

**Activity**

Diagram the process that produces identical twins and the process that produces fraternal twins to help students visualize these processes.

**Enrich**

Use the library to research cases of conjoined twins. Write a report and report findings to the class.

**Discuss**

What other environmental conditions would make identical twins different?

**Resource**

Multiple Births, Activity C, WB. Students should write answers to these questions about multiple births.
often a mixed pregnancy type. With quadruplets, there could be several combinations. Three children could be identical and one fraternal, or two could be identical with the other two fraternal. There could even be two identical pairs, but such a case has not been known.

Stages in Prenatal Development

Many changes happen between conception and birth. The development that takes place during this time is called prenatal development. Prenatal development is divided into the germinal, embryonic, and fetal stages. See 4-9.

Germinal Stage

The first stage of prenatal development is the germinal stage. Conception marks the beginning of the germinal stage. This stage covers about the first two weeks of the pregnancy.

The fertilized egg (zygote) remains a single cell for about 30 hours. Then it starts to divide. On the third day, it has formed a hollow ball of 32 cells. This ball of cells enters the uterus, where it continues dividing rapidly for about three more days. During this time, the ball of cells floats freely in the uterus.

About 10 days after conception, the ball of cells begins to embed in the wall of the uterus. The cells continue to divide. The chorion and amnion (a fluid-filled sac) begin to form. They surround the cells and protect the baby until birth. The placenta, an organ filled with blood vessels, begins to develop against the wall of the uterus. The umbilical cord grows out from the developing child, at the site of the future navel, and connects with the placenta. The **umbilical cord** contains three blood vessels that connect the child with the placenta. As the placenta develops, it will begin to nourish the baby, remove the baby’s wastes, exchange gases between mother and baby, and provide the baby with needed hormones. When the baby can receive nourishment from the mother, the germinal stage has ended.

Embryonic Stage

The second stage of prenatal development is the embryonic stage. Experts say this is the most critical stage of pregnancy because almost all body systems develop during this stage. The embryonic stage lasts about six weeks. During this stage, the baby is called an embryo.

Changes happen so quickly that, when this stage ends, the embryo looks like a small human being. The embryo has tiny arms, legs, fingers, toes, and a face. All the major organs, such as the heart, brain, and lungs, are present. The heart begins beating in this stage. The embryo’s body does not yet have solid bones, but is supported by cartilage. **Cartilage** is soft, elastic, flexible tissue that provides structure for the body. Cartilage is the tissue found in the tip of your nose.

The baby now receives both good and harmful substances from the mother’s placenta through the umbilical cord. Because the baby’s body parts are developing so quickly, passing harmful substances to the child can affect him or her for life. That is why the mother’s health habits become very important during
Part Two  Prenatal Development and the Newborn

Prenatal Development by Week

The Germinal Stage
Conception through 2 weeks
- Cell divisions occurring
- Fertilized egg embedding in the wall of the uterus
- Amnion, placenta, and umbilical cord beginning to form

The Embryonic Stage
2 weeks through 8 weeks
- Internal organs (heart, liver, digestive system, brain, and lungs) developing
- Tissue segments (future vertebrae) in a spinal column forming
- Limb buds (future arms and legs) appearing
- Ears and eyes beginning to form

Fetal Stage
When bone cells start to replace cartilage, the baby enters the fetal stage of development. This stage begins about nine weeks after conception. From this point until birth, a baby is known medically as a fetus.

Reflect
What is your reaction to the pictures of the zygote, embryo, and fetuses? Do they look similar to what you expected or different?

this stage. She should eat healthful foods so her baby receives the needed nutrients. She should also avoid substances like alcohol, drugs, caffeine, tobacco, and X-rays that may harm the baby. With regular medical care and by taking care of herself, a woman does her part to help her baby be born healthy.
During the fetal stage, all parts of the body mature, and overall size increases quickly. Major changes happen in the fetus, 4-10. By the fourth month, the fetus has usually grown enough to give the mother’s growing abdomen a pregnant look.

Two milestones happen during the fetal stage. In the third month of pregnancy, parents-to-be may be able to hear their baby’s heartbeat for the first time. They can do this at their doctor’s office with the use of a special listening device. In the past, parents-to-be had to wait until much later in the pregnancy when the heartbeat could be picked up by the doctor’s stethoscope.

### The Fetal Stage

<table>
<thead>
<tr>
<th>9 weeks</th>
<th>20 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Facial features forming</td>
<td>- 10–12 in. long; weight 1 lb.</td>
</tr>
<tr>
<td>- Limbs, hands, feet, fingers, and toes developing</td>
<td>- Sweat glands forming</td>
</tr>
<tr>
<td>- 12 weeks</td>
<td>- Head hair appearing</td>
</tr>
<tr>
<td>- 3 in. long; weight 1 oz.</td>
<td>- Vernix caseosa (cheesy material) covering body</td>
</tr>
<tr>
<td>- Muscles forming</td>
<td>- Skin developing</td>
</tr>
<tr>
<td>- Teeth and vocal cords developing</td>
<td>- 16 weeks</td>
</tr>
<tr>
<td>- Eyelids and nails appearing</td>
<td>- 6–8 in. long; weight 5–6 oz.</td>
</tr>
<tr>
<td>- 16 weeks</td>
<td>- Lanugo (cottony growth) appearing</td>
</tr>
<tr>
<td>- 6–8 in. long; weight 5–6 oz.</td>
<td>- Heartbeat audible by stethoscope</td>
</tr>
<tr>
<td>- Lanugo (cottony growth) appearing</td>
<td>- Eyebrows and eyelashes growing</td>
</tr>
<tr>
<td>- 20 weeks</td>
<td>- 24 weeks</td>
</tr>
<tr>
<td>- Growing rapidly</td>
<td>- 14 in. long; weight 2 lbs.</td>
</tr>
<tr>
<td>- Lanugo disappearing</td>
<td>- Eyes maturing</td>
</tr>
<tr>
<td>- Fatty tissue forming under skin</td>
<td>- Taste buds developing</td>
</tr>
<tr>
<td>- Body organs maturing</td>
<td>- 28–40 weeks</td>
</tr>
<tr>
<td>- Growing rapidly</td>
<td>- Lanugo disappearing</td>
</tr>
<tr>
<td>- Lanugo disappearing</td>
<td>- Fatty tissue forming under skin</td>
</tr>
<tr>
<td>- Body organs maturing</td>
<td>- 24 weeks</td>
</tr>
</tbody>
</table>

**Enrich**

Obtain an anonymous fetal sonogram and try to identify the baby’s body parts. (A labeled picture will help.) Discuss or research the ultrasound’s purpose and timing.
Between the fourth and fifth months, a mother will begin to feel her baby move. Amazingly, the baby can turn, swallow, and even suck its thumb. The fetus can also move its head and push with the hands, feet, and limbs. When the mother feels these movements, it is called quickening. The mother should tell her doctor when she first feels movement.

A second milestone is reached when the fetus is seven months (28 weeks) old. This is the age at which most babies could survive if they were born. It is called the age of viability. By this time, the baby’s brain has more control over body systems than before. However, most babies born at this time would need some intensive care in hospitals. With recent advances in medicine, more babies born before seven months have survived with special care.

Although a baby born at seven months can survive, the chance of surviving improves with each week closer to nine months. (This is true unless earlier delivery is needed for medical reasons.) In the last two months of pregnancy, the inner surface of the baby’s lungs must produce a substance that allows the baby to breathe air. A baby that is born too early experiences respiratory distress syndrome (RDS). The baby also becomes larger.

In the ninth month of pregnancy, the fetus receives immunities from the mother. These help prevent the baby from catching some diseases after birth. In most cases, the baby also turns to a head-down position to prepare for birth.

**Note**
Babies born early may miss out on the immunities gained from the mother in the ninth month of pregnancy. This, along with other factors, puts them at higher risk for illness.

**Enrich**
Invite a doctor or pediatric nurse to talk about the importance of positive health habits before and during pregnancy. Ask the speaker to describe cases where parents did not follow positive habits.
Chapter 4  Pregnancy

The nine-month pregnancy process begins with conception. At this moment, ovum and sperm unite and combine to form a single cell. In this one cell is all the genetic information the child will receive from each parent. These genetic factors will influence all stages of life, especially the prenatal period. Genetic factors provide a blueprint for the future unfolding of family traits.

The zygote’s nucleus stores this blueprint within DNA molecules, which are part of the chromosomes. Humans have 23 pairs of chromosomes—an equal number of which are received from the mother and father. Genes within each chromosome can determine some of an individual’s traits. How genes from the parents interact can also determine traits. Two types of traits are dominant and recessive. Gender of the child is controlled by whether an X or Y sex chromosome is received from the father’s sperm.

Multiple pregnancies occur when one or more eggs are fertilized by one or more sperm. Two types of multiple births are fraternal and identical. Each type forms differently from the other. While fraternal twins differ genetically, identical twins share the same genetic makeup. Multiple pregnancies may include combinations of identical and fraternal children.

Prenatal development is divided into the germinal, embryonic, and fetal stages. In the germinal stage, the dividing cells of the zygote travel toward the uterus, float freely, and then embed in the wall of the uterus. Almost all body systems develop during the embryonic stage. The fetal stage lasts from about nine weeks until birth. During this stage, the fetus grows and its body systems mature. At the end of the ninth month, the baby is ready to be born.

Summary

Summary

 Companion Web Site

Interactive Activity

Review vocabulary terms and key concepts for Chapter 4 at g-wlearning.com.

Resource

Chapter 4: Pregnancy,
Teacher’s PowerPoint Presentations CD.
Show students the slide presentation to review chapter material.
Review and Reflect

Write your answers to the following questions on a separate sheet of paper.

1. Describe briefly what happens during conception.

2. Each sperm contains _____ (23, 46) chromosomes; each ovum contains _____ (23, 46) chromosomes.

3. Explain what determines an unborn baby's gender.

4. Paul and Emily both have blue eyes, a recessive trait. They are expecting a baby. What eye color will the baby have? Why?

5. List the three different kinds of multiple pregnancies.

6. Patty and Patrick—who look almost alike in size, coloring, and facial features—are _____ (identical, fraternal) twins.

7. True or false. In the germinal stage, the zygote receives nutrients through the placenta.

8. In which stage do the baby’s body systems and organs start to form?

9. True or false. The mother’s nutrition does not matter during the embryonic stage because the baby has not developed enough.

10. During the fetal stage, the baby’s limbs are supported by _____ (cartilage, bones).

11. True or false. By the fourth or fifth month of pregnancy, the baby begins to make movements the mother can feel.

Cross-Curricular Link

12. Science, Career Study, Technology. Use the Internet to research genetic counseling. What job duties do professionals in this field have, and what technologies do they use to investigate which genes a child might inherit from parents? Using word processing software, compose a short report on your findings. Check your report for correct spelling, grammar, and punctuation. Adhere to all copyright laws and cite any sources you may use for the report.

13. Science. Collect pictures of identical and fraternal siblings and note how alike or different they are. Try to find various pictures of the same people taken over several years.

14. Technology. Create an electronic presentation showing how quadruplets can be all identical, three identical and one fraternal, two identical and two fraternal, two identical pairs, and all four fraternal.

15. Science. Record the color of your eyes and those of each of your parents. (If you wish, record the eye colors of another person and his or her parents instead.) Based on what you have learned about dominant and recessive traits, try to determine the following: (A) What gene combinations are possible for you, given
your eye color? (B) What gene combinations are possible for your mother, given her eye color and yours? (C) What gene combinations are possible for your father, given his eye color and yours?

16. Writing. Write a story about prenatal development from the unborn baby's point of view. Use your creativity to explore what life might be like for the baby as new developments occur before birth. Refer to Figure 4-10 to gather ideas as you write. Check your story for correct spelling, grammar, and punctuation.

Making Observations

17. Observe your physical features. Which features seem to come from your mother's family and which from your father's family? Which features do you share with other relatives?

18. Observe brothers and sisters. Which characteristics do they share? How are they different?

19. If possible, observe identical twins. Which of their characteristics are most alike? Which are similar but somewhat different? Which are dissimilar?

Thinking Critically

20. Conception is sometimes referred to as the "miracle of life." Biologically, why can conception indeed be thought of as a miracle?

21. How do the stages in prenatal development follow the principles of growth and development (that is, growth and development are constant, happen in sequenced steps, happen at different rates, and have interrelated parts)? Give specific examples as part of your explanation.

22. Identical births have exactly the same heredity. What are some of the biological advantages of having an identical sibling? Are there disadvantages, too?