

# SECTION 3 Growth and Development

## BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- What happens after an egg is fertilized?
- How does a fetus develop?
- How does a person develop after birth?

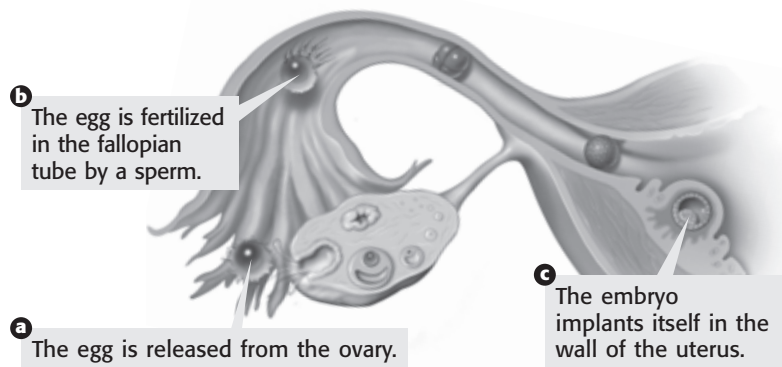
**National Science Education Standards**  
**LS 1a, 1c, 1d, 1e, 2b**

## How Does Fertilization Occur?

A man can release millions of sperm at once. However, only one sperm can fertilize an egg. Why are so many sperm needed?

Only a few hundred sperm survive the journey from the vagina to the uterus and into a fallopian tube. In the fallopian tube only a few sperm find and cover the egg. Once one sperm enters, or *penetrates*, the egg, it causes the egg's covering to change. This change keeps other sperm from entering the egg. When the nuclei of the sperm and egg join, the egg is fertilized.

### Fertilization and Implantation



## STUDY TIP

**Summarize** As you read, make a a timeline that shows the stages of human development from fertilized egg to adulthood.

## Critical Thinking

**1. Form Hypothesis** Why do you think millions of sperm are released to fertilize one egg?

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## TAKE A LOOK

**2. Identify** Where does fertilization usually take place?

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## What Stages Does a Fertilized Egg Go Through?

At fertilization, the egg is only a single cell. At this stage, the fertilized egg is called a *zygote*. As the zygote becomes an embryo it moves down the fallopian tube, and divides many times. After about a week, the **embryo** is a ball of cells. This ball of cells implants in the uterus. ✓

As the cells of the embryo continue to divide, some cells start to *differentiate*. They develop special structures for certain jobs in the body. After week 10 of the pregnancy, the embryo is called a **fetus**.

## READING CHECK

**3. Identify** What is the egg called right after fertilization?

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**SECTION 3** Growth and Development *continued*

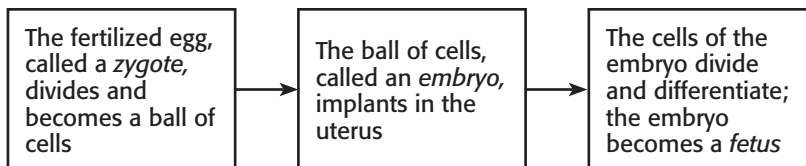
**TAKE A LOOK**

**4. List** List the three stages a fertilized egg goes through as it develops.

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**How Does an Embryo Develop?**

**WEEKS 1 AND 2**

A woman's pregnancy starts when an egg is fertilized, and ends at birth. Pregnancy is measured from the starting date of a woman's last menstruation. This is easier than trying to determine the exact date fertilization took place. Fertilization takes place at about the end of week 2. ✓

**READING CHECK**

**5. Explain** Why is pregnancy measured from the starting date of the woman's last period?

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**WEEKS 3 AND 4**

In week 3, the embryo moves to the uterus. As the embryo travels, it divides many times. It becomes a ball of cells that implants itself in the wall of the uterus.

**WEEKS 5 TO 8**

After an embryo implants in the uterus, the placenta forms. The **placenta** is an organ used by the embryo to exchange materials with the mother. The placenta has many blood vessels that carry nutrients and oxygen from the mother to the embryo. They also carry wastes from the embryo to the mother.

In week 5 of pregnancy, the **umbilical cord** forms. It connects the embryo to the placenta. A thin membrane called the amnion develops. The *amnion* surrounds the embryo and is filled with fluid. This fluid cushions and protects the embryo. ✓

**READING CHECK**

**6. Explain** What is the function of the umbilical cord?

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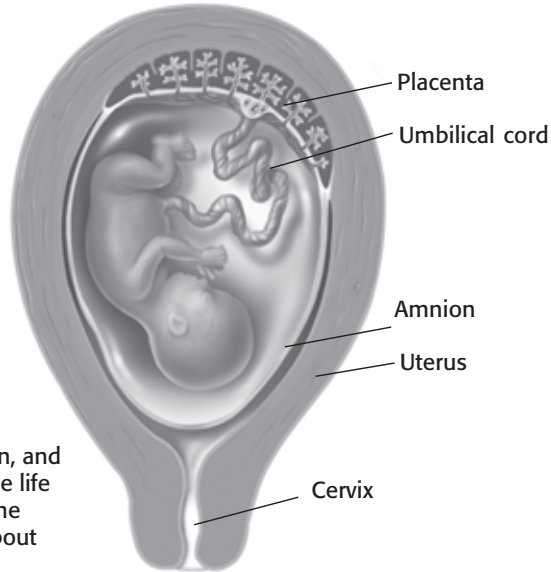
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**WEEKS 9 TO 16**

At week 9, the embryo may start to make tiny movements. The fetus grows very quickly during this stage. It doubles, then triples in size within a month. In about week 13, the fetus's face begins to look more human. During this stage the fetus's muscles also grow stronger. It can even make a fist.

**SECTION 3** Growth and Development *continued***WEEKS 17 TO 24**

By week 17 the fetus can make faces. By week 18 the fetus starts to make movements that its mother can feel. It can also hear sounds through the mother's uterus. By week 23 the fetus makes a lot of movements. A baby born during week 24 might survive, but it would need a lot of help.



The placenta, amnion, and umbilical cord are the life support system for the fetus. This fetus is about 20 to 22 weeks old.

**WEEKS 25 TO 36**

At about 25 or 26 weeks, the fetus's lungs are well-developed. However, they are not fully mature. The fetus still gets oxygen from its mother through the placenta. The fetus will not take its first breath of air until it is born.

By the 32nd week, the fetus can open and close its eyes. Studies show that the fetus responds to light. Some scientists think fetuses at this stage show brain activity and eye movements like sleeping children or adults. These scientists think a sleeping fetus may dream. After 36 weeks, the fetus is almost ready to be born.

**BIRTH**

At weeks 37 to 38 the fetus is fully developed. A full pregnancy is usually 40 weeks. As birth begins, the muscles of the uterus begin to squeeze, or contract. This is called *labor*. These contractions push the fetus out of the mother's body through the vagina. ✓

Once the baby is born, the umbilical cord is tied and cut. The navel is all that will remain of the point where the umbilical cord was attached. Once the mother's body has pushed out the placenta, labor is complete.

**TAKE A LOOK**

**7. Identify** What structure surrounds the fetus?

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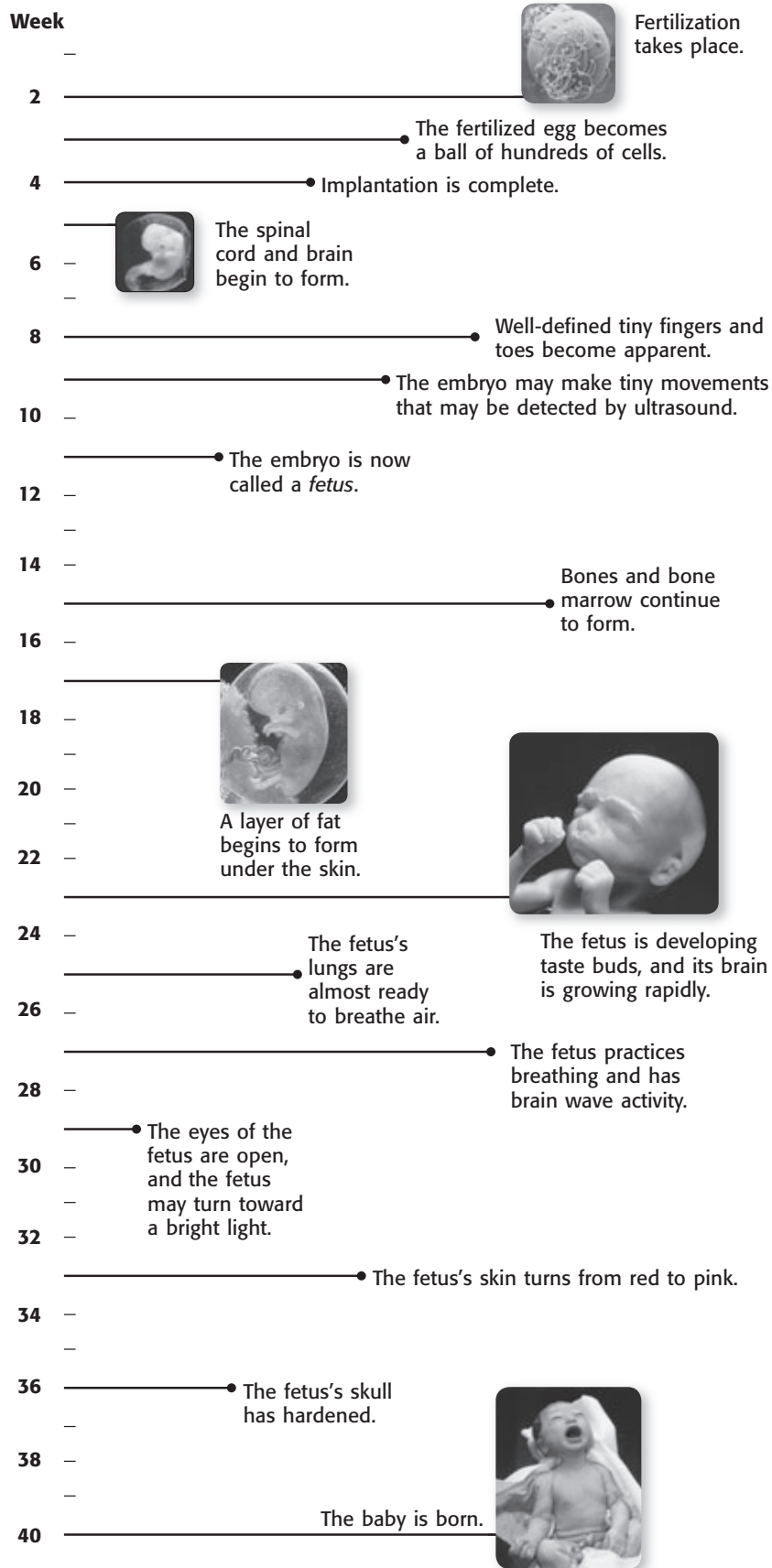
 **READING CHECK**

**8. Define** What is labor?

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**SECTION 3** Growth and Development *continued*

**Pregnancy Timeline**



**TAKE A LOOK**

**9. Identify** By what week has the brain of the embryo started to form?

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**10. Identify** At around what week does the fetus start to develop taste buds?

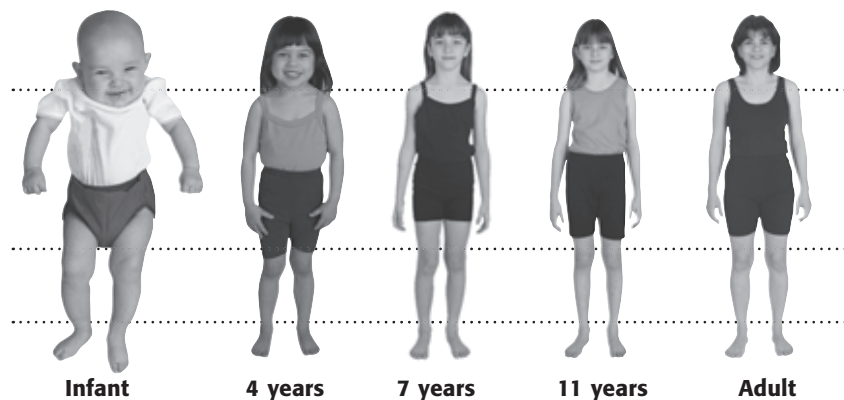
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**SECTION 3** Growth and Development *continued*

## How Does a Person Grow and Change?

The human body goes through several stages of development. One noticeable difference is the change in body proportion.

### Body Proportions During Stages of Human Development



### TAKE A LOOK

**11. Identify** At which stage or age is the head largest in proportion to the rest of the body?

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The chart below lists the different stages of life and the characteristics of that stage.

Stage	Ages	Characteristics
Infancy	birth to age 2	<ul style="list-style-type: none"> <li>• Baby teeth appear.</li> <li>• Nervous system and muscles develop.</li> <li>• Coordination improves.</li> </ul>
Childhood	age 2 to puberty	<ul style="list-style-type: none"> <li>• Permanent teeth grow.</li> <li>• Nerve pathways mature, and child can learn new skills.</li> <li>• Muscle coordination increases.</li> </ul>
Adolescence	in females, puberty takes place between the ages of 9 and 14	<b>Females:</b> <ul style="list-style-type: none"> <li>• Breasts enlarge.</li> <li>• Body hair appears.</li> <li>• Menstruation begins.</li> </ul>
	in males, puberty takes place between the ages of 11 and 16	<b>Males:</b> <ul style="list-style-type: none"> <li>• Body grows more muscular.</li> <li>• Voice deepens.</li> <li>• Facial and body hair appear.</li> </ul>
	puberty to adulthood	<ul style="list-style-type: none"> <li>• Reproductive system matures (puberty).</li> </ul>
Adulthood	age 20+	<ul style="list-style-type: none"> <li>• From ages 20 to 40, physical development is at its peak.</li> <li>• After age 40, hair may turn gray, skin may wrinkle, athletic ability may decrease.</li> </ul>

### Math Focus

**12. Calculate** Alice is 80 years old. She started puberty at age 12. Calculate the percentage of her life that she has spent in each stage of development.

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### TAKE A LOOK

**13. Identify** Which stage of development are you in?

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# Section 3 Review

NSES LS 1a, 1c, 1d, 1e, 2b

## SECTION VOCABULARY

**embryo** in humans, a developing individual from first division after fertilization through the 10th week of pregnancy

**fetus** a developing human from the end of the 10th week of pregnancy until birth

**placenta** the partly fetal and partly maternal organ by which materials are exchanged between a fetus and the mother

**umbilical cord** the ropelike structure through which blood vessels pass and by which a developing mammal is connected to the placenta

1. **Define** What is fertilization?

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2. **Explain** Why can only one sperm enter an egg?

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3. **Explain** What does it mean that cells differentiate?

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4. **Identify** What is the function of the amnion?

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5. **Explain** Why is the placenta important to a developing embryo?

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6. **Explain** Why is it necessary for cells in an embryo to differentiate?

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7. **List** What are the four stages of human development after birth?

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8. **Identify** What is the main characteristic of adolescence?

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