

# Sexual Reproduction

## Before You Read

You began as a zygote. How many cells were you made up of then? How many cells are you made up of now? Record your ideas on the lines below.

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### What is the difference between external and internal fertilization?

**Mating** is the means by which gametes (sperm and egg cells) meet in the same place at the same time. Mating enables fertilization to take place. Recall that fertilization is the joining of a haploid sperm cell with a haploid egg cell to form a diploid zygote.

When sperm and egg cells join outside of the bodies of the parents, the joining is called **external fertilization**. This type of fertilization is common with animals that live in water and with plants that live in moist places.

When sperm and egg cells join inside the body of the female parent, the joining is called **internal fertilization**. This type of fertilization is common with birds, mammals, and flowering and cone-forming plants.

### How does the embryo develop?

**Embryonic development** takes place during the first eight weeks after fertilization. During this time, the embryo develops. Its cells divide constantly, and tissues and organs form. During the first week, the single fertilized cell, the zygote, develops into a mass of many cells. This mass of cells then hollows out and is called a **blastula**. The cells of the blastula are embryonic stem cells. All tissues and organs will develop from these cells. ✓

During the second week, the blastula cells become organized into three distinct layers of cells. The outer layer is called the **ectoderm**. The middle layer is called the **mesoderm**. The inner layer is called the **endoderm**. The illustration on the next page shows which organs and body structures are formed from the cells of these layers. The development of organs and body structures from these cell layers is called **differentiation**.

### ✓ Reading Check

1. When does embryonic development take place?

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## What happens during fetal development?

After the first eight weeks of development, the embryo is called a fetus. During fetal development, the organs and parts of the body continue to develop. The body adds a great deal of mass. At birth, the human baby is made up of trillions of cells. The table below summarizes some key events in fetal development. ✓

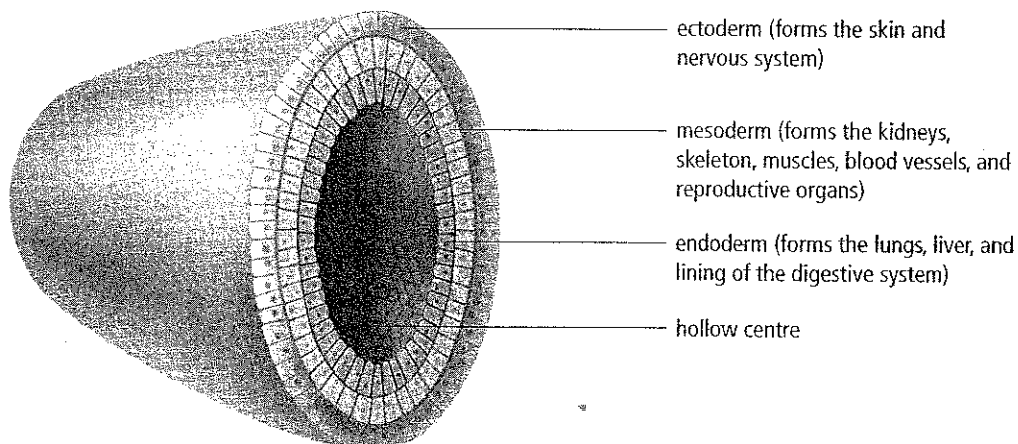
Trimester (Group of 3 Months)	Stage	Time from Fertilization	Length of Embryo/ Fetus
First	◆ Brain and spinal cord are forming.	4 weeks	4 mm
	◆ Fingers and toes have appeared. Ears, kidneys, lungs, liver, and muscles are developing.	8 weeks	4 cm
	◆ Sexual differentiation almost complete.	12 weeks	9 cm
Second	◆ Fetal movements are felt.	16–18 weeks	20 cm
	◆ Eyelids open. Fetus can survive outside of the mother with specialized care.	24 weeks	35 cm
Third	◆ Rapid weight gain occurs due to the growth and accumulation of fat.	26–38 weeks	40–50 cm

### ✓ Reading Check

2. What happens during fetal development?

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Blastula cells organize into three layers of cells.

## Embryonic and fetal development

Vocabulary	
birds	fetus
blastula	fish
differentiation	gametes
ectoderm	internal
embryo	mating
embryonic stem cells	mesoderm
endoderm	offspring
external	

Use the terms in the vocabulary box to fill in the blanks. Use each term only once. You will not need to use every term.

- \_\_\_\_\_ is how gametes meet in the same place at the same time.
- When sperm and egg cells join outside of the bodies of the parents, the joining is called \_\_\_\_\_ fertilization. This type of fertilization is common with \_\_\_\_\_.
- When sperm and egg cells join inside the body of the female parent, the joining is called \_\_\_\_\_ fertilization. This type of fertilization is common with \_\_\_\_\_.
- During embryonic development, the \_\_\_\_\_ develops. Its cells divide constantly, and tissues and organs form.
- During the first week, the mass of cells hollows out and is called a(n) \_\_\_\_\_. Its cells are \_\_\_\_\_. All tissues and organs will develop from these cells.
- During the second week, the blastula cells become organized into three distinct layers of cells. The outer layer is called the \_\_\_\_\_. The middle layer is called the \_\_\_\_\_. The inner layer is called the \_\_\_\_\_.
- The development of organs and body structures from the blastula cell layers is called \_\_\_\_\_.
- After the first eight weeks of development, the embryo is called a(n) \_\_\_\_\_.