Name _____ Class _____ Date _____

34.4 Fertilization and Development

Lesson Objectives

- Describe fertilization and the early stages of development.
- Identify the major events of later stages of development.

Lesson Summary

Fertilization and Early Development Fertilization is the joining of a sperm and an egg. Following fertilization, a series of events called development begins.

- A fertilized egg is called a **zygote**. The zygote divides and undergoes repeated rounds of mitosis and develops into a hollow ball of cells called a **blastocyst**.
- About a week after fertilization, the blastocyst attaches to the wall of the uterus in the process of **implantation**. At the same time, cells of the blastocyst start to specialize through differentiation. Some cells migrate to form two cell layers—the ectoderm and the endoderm.
- A third layer of cells is produced by a process called **gastrulation**, in which cells from the ectoderm migrate to form the mesoderm. The three layers eventually develop into the different organs of the embryo.
- During **neurulation**, the notochord and the neural tube form. The neural tube eventually develops into the brain and spinal cord.
- As the embryo develops, membranes for protection and nourishment also form. Part of one membrane combines with the uterine lining to form the **placenta**. Mother and embryo/fetus exchange gases, food, and waste products across the placenta. The umbilical cord connects the embryo/fetus to the placenta.
- After eight weeks of development, the embryo is called a **fetus**. By the end of three months, most organs are fully formed.

Later Development Another six months of development occurs before birth.

- During months 4–6, the fetus's tissues become specialized and organs such as the heart begin to function.
- During months 7–9, the fetus's organ systems mature as the fetus grows in size and mass. The lungs and the central nervous system complete their development.
- Childbirth occurs about nine months after fertilization, when hormones cause contractions in the mother's uterus. The contractions first push the baby out through the vagina. Then, more contractions expel the placenta and amniotic sac from the uterus. Shortly after birth, the mother's breast tissue begins to produce milk that contains everything the baby needs for the first months of life.
- The placenta is a barrier to many harmful agents, but some are able to pass through it, such as viruses that cause AIDS and German measles. Alcohol, drugs, and smoking also have negative effects on embryos and fetuses. Prenatal care and advancements in medical technology have lowered the infant mortality rate.

Name _____ Class _____ Date _____

Fertilization and Early Development

For Questions 1–4, complete each statement by writing the correct word or words.

1. The fusion of a sperm with an egg is called _____.

2. During implantation, the _____ embeds itself into the lining of the uterus.

3. Embryonic structures called _____ combine with the uterine lining to form the _____.

4. The embryo is surrounded by fluid called the _____ fluid.

5. Complete the table by identifying events and structures of early development.

Event or Structure	What It Is
	The process in which sperm joins an egg
	The layer of cells that develops into the skin and nervous system
Gastrulation	
	Early stage in the development of the nervous system
Endoderm	
	Fluid-filled structure that cushions and protects the embryo
	Embryo's organ of respiration, nourishment, and excretion
Mesoderm	
Umbilical cord	

Later Development

6. What major changes occur in a developing fetus during months 4–6 of pregnancy?

_____

_____

7. What major changes occur in a developing fetus during months 7–9 of pregnancy?

_____

_____

_____

Name _____ Class _____ Date _____

For Questions 8–13, write the letter of the correct answer on the line at the left.

_____ **8.** The contractions of labor before childbirth are triggered by

A. the amniotic fluid.

B. the hormone oxytocin.

C. the umbilical cord.

D. the uterine wall.

_____ **9.** The term "afterbirth" refers to the

A. amnion and the chorion.

B. clamping of the umbilical cord.

C. placenta and amniotic sac.

D. production of milk for the baby.

_____ **10.** What is a belly button?

A. a structure with an unknown purpose

B. a scar left from the umbilical cord

C. remains of the notochord

D. the point where implantation occurred

_____ **11.** Which hormone causes the mother's breast tissue to begin producing milk?

A. estrogen

B. oxytocin

C. progesterone

D. prolactin

_____ **12.** Using alcohol during pregnancy can harm a developing embryo, especially its

A. reproductive system.

B. circulatory system.

C. endocrine system.

D. nervous system.

_____ **13.** Which public health measure has decreased the incidence of spina bifida?

A. the addition of folic acid to grain products

B. the development of new types of baby formula

C. the programs aimed at reducing smoking and alcohol use

D. the use of a vaccine that prevents German measles

Apply the Big idea

14. Women with Type 1 diabetes may face challenges controlling blood sugar levels during pregnancy. Early in pregnancy, the developing fetus removes glucose from the mother's blood at a great rate. Would this raise or lower her need for insulin?

_____

_____

_____