



CHAPTER RESOURCES



Chapter: Regulation and Reproduction

Section 1: The Endocrine System

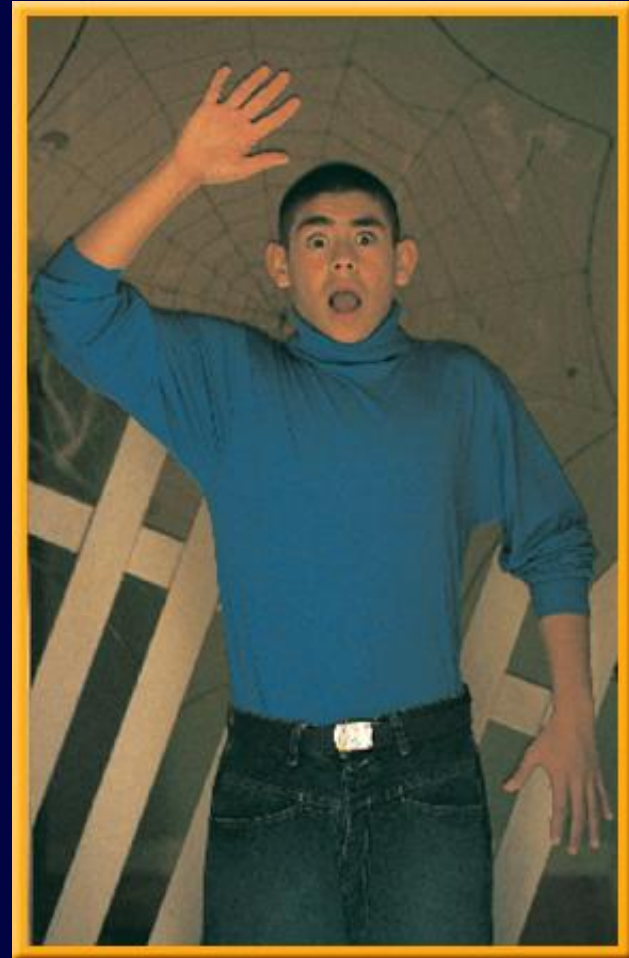
Section 2: The Reproductive System

Section 3: Human Life Stages



Functions of the Endocrine System

- Preparing the body for fight or flight in times of emergency, is one of the functions of the body's control system.




Control Systems

- The endocrine (EN duh krun) and the nervous systems are your body's control systems.
- The **endocrine system sends chemical messages in your blood that affect specific tissues called target tissues.**
- The **nervous system sends rapid impulses to and from your brain, then throughout your body.**



Endocrine Glands

- Tissues found throughout your body called endocrine glands produce the chemical messages called **hormones** (HOR mohnz). 
- Hormones can speed up or slow down certain cellular processes.



Endocrine Glands

- Endocrine glands are ductless and each endocrine gland releases its **hormone directly into the blood.**
- Then, **the blood transports the hormone to the target tissue.**



Gland Functions

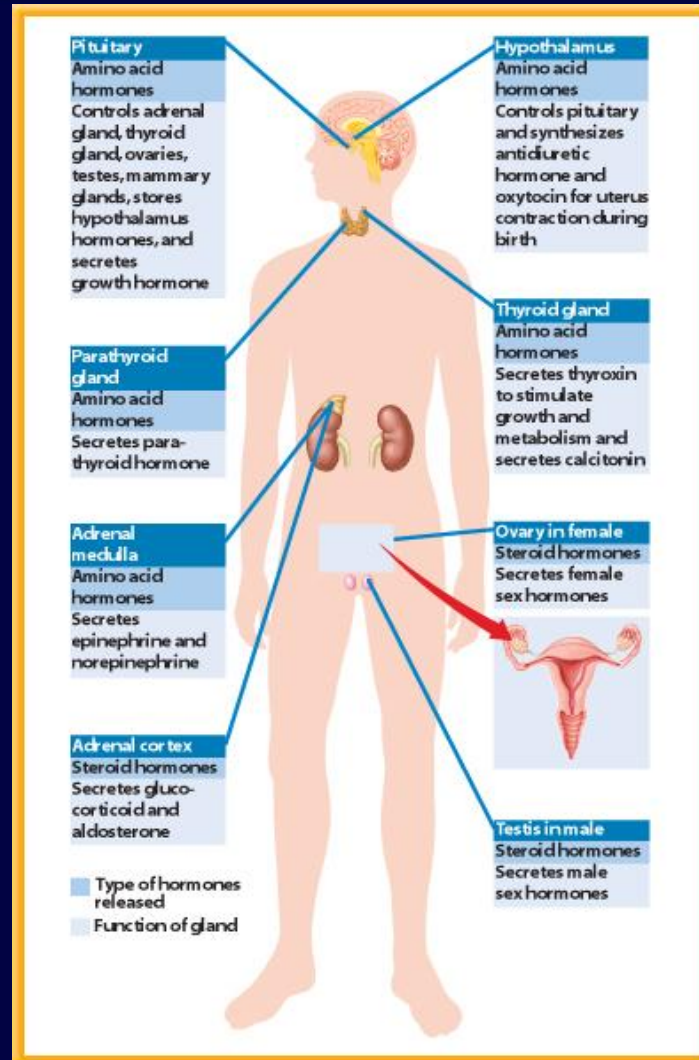
- Endocrine gland functions include the regulation of the internal environment, adaptation to stressful situations, promotion of growth and development, and the coordination of circulation, digestion, and the absorption of food.



The Endocrine System

1

Gland Functions



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END



Endocrine Glands

- Pineal-produces melatonin and controls wake/sleep cycle.
- Pituitary- controls growth and reproduction
- Thymus- produces infection fighting cells
- Testes-produce testosterone and controls the production of sperm and secondary sex characteristics
- Thyroid- regulates metabolic rate





- Parathyroid- regulates calcium levels

Adrenal- helps body cope with stress

Pancreas-produces insulin and regulates blood sugar levels

Ovaries- produce estrogen and progesterone and control the reproductive cycle and secondary sex characteristics



A Negative-Feedback System

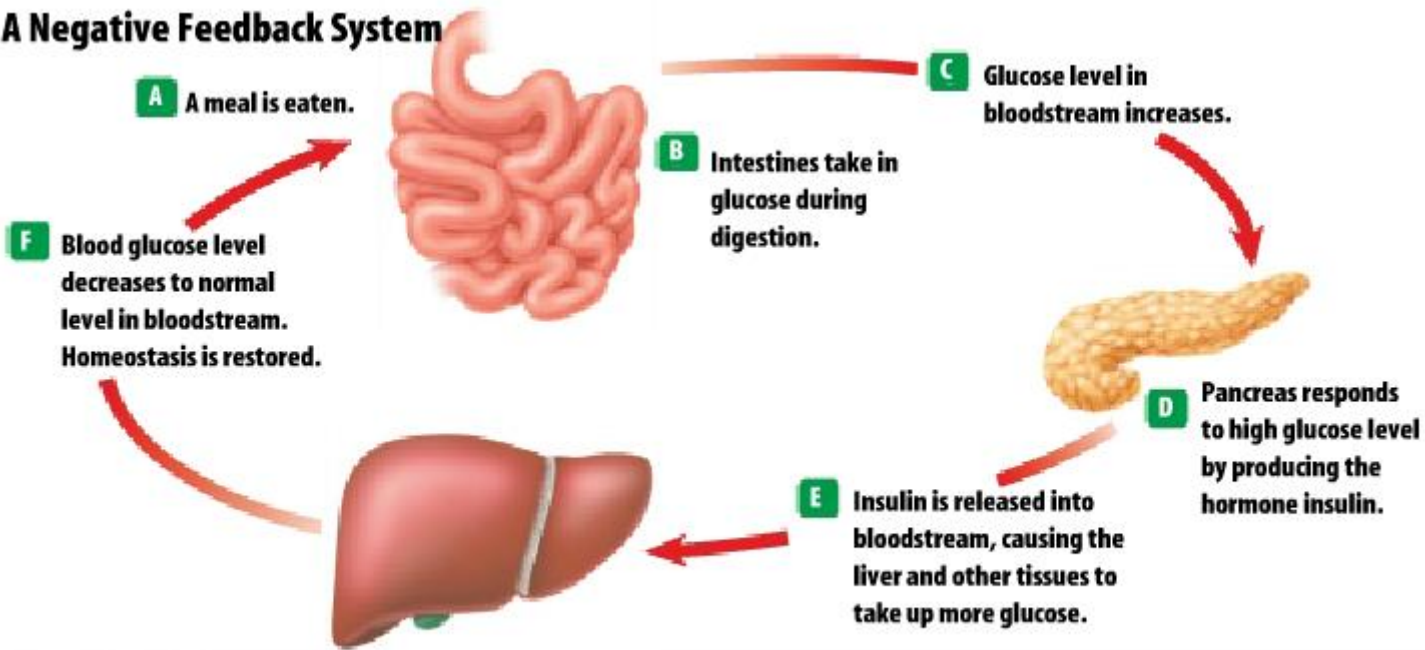
- Many internal body conditions, such as hormone level, blood sugar level, and body temperature, are controlled by negative-feedback systems.
- System that uses blood hormone levels to signal when a gland should/should not secrete a hormone



A Negative-Feedback System

MAC OSX users click here to view.

A Negative Feedback System



1

Question 1

The _____ system sends chemical messages in your blood that affect specific tissues called target tissues.



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Answer

The answer is endocrine system. The endocrine system is one of your body's control systems.



1

Question 2

The chemical messages produced by the endocrine glands are called _____.

Answer

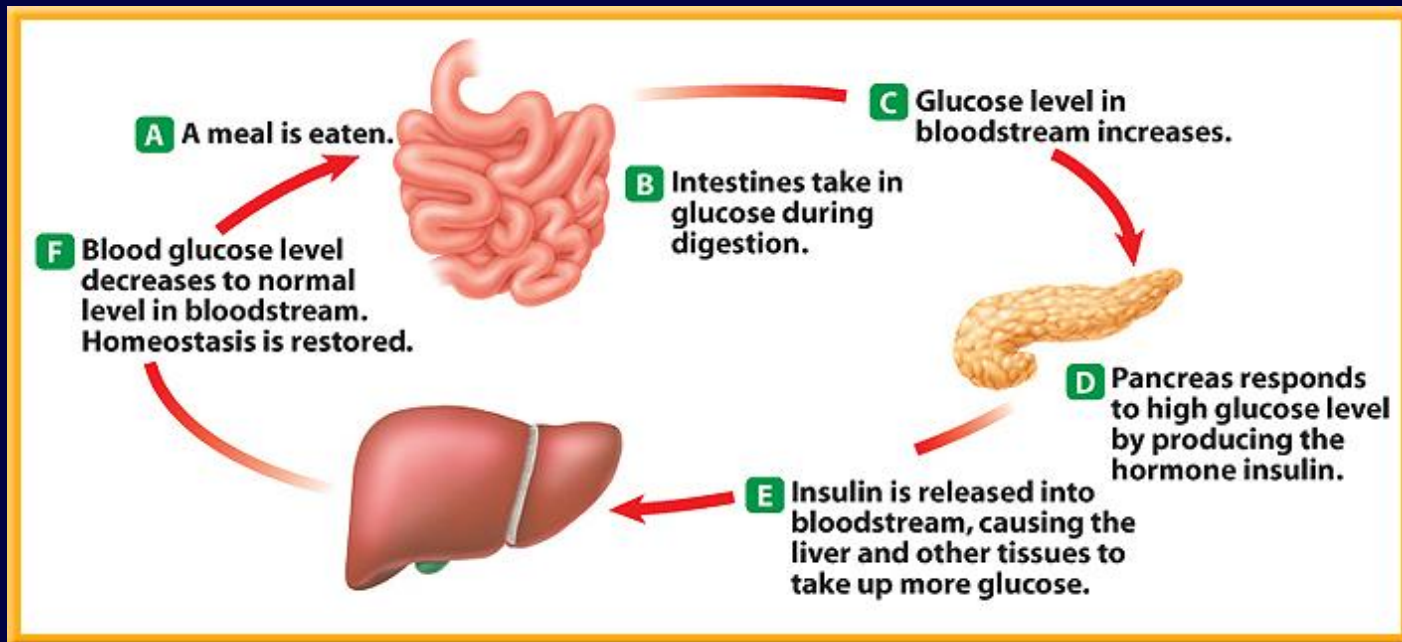
The answer is hormones. Hormones can speed up or slow down certain cellular processes.



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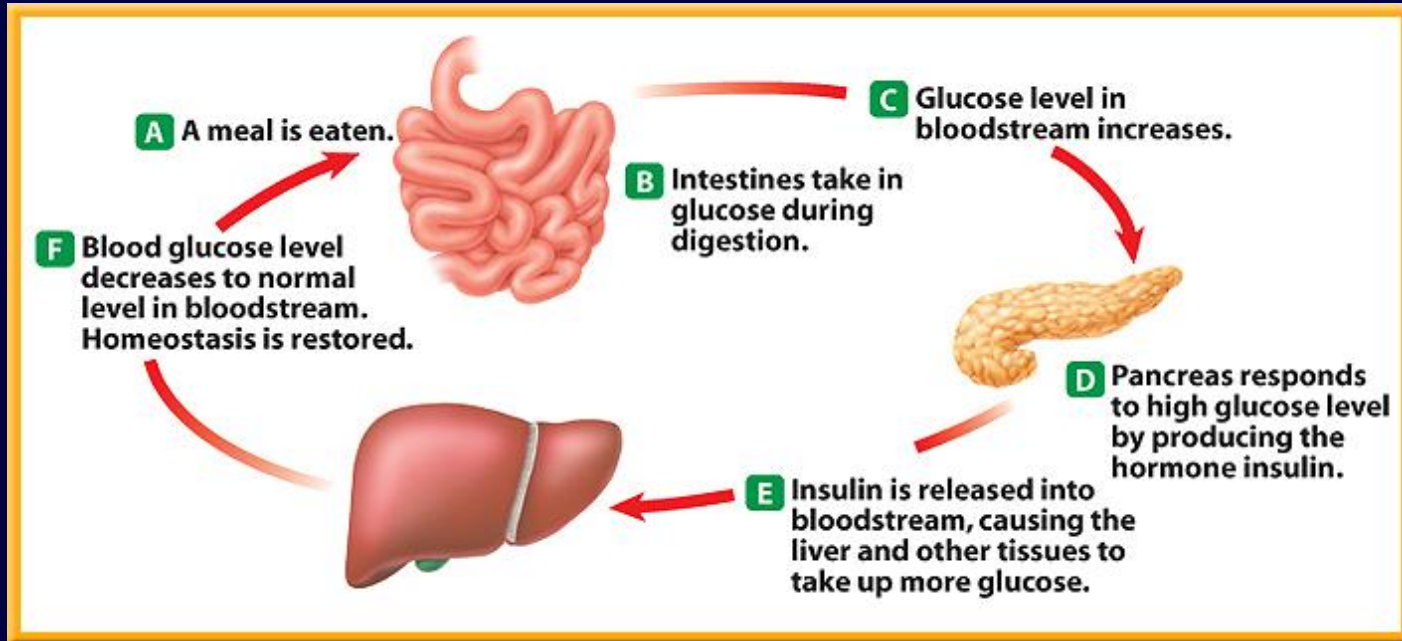
Question 3

This illustration is an example of a _____ system.



Section Check

1



A. internal loop

B. external loop

C. negative-feedback

D. positive-feedback



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1

Answer

The answer is C. Many internal body conditions, such as hormone levels, blood sugar levels and body temperature, are controlled by negative-feedback systems.



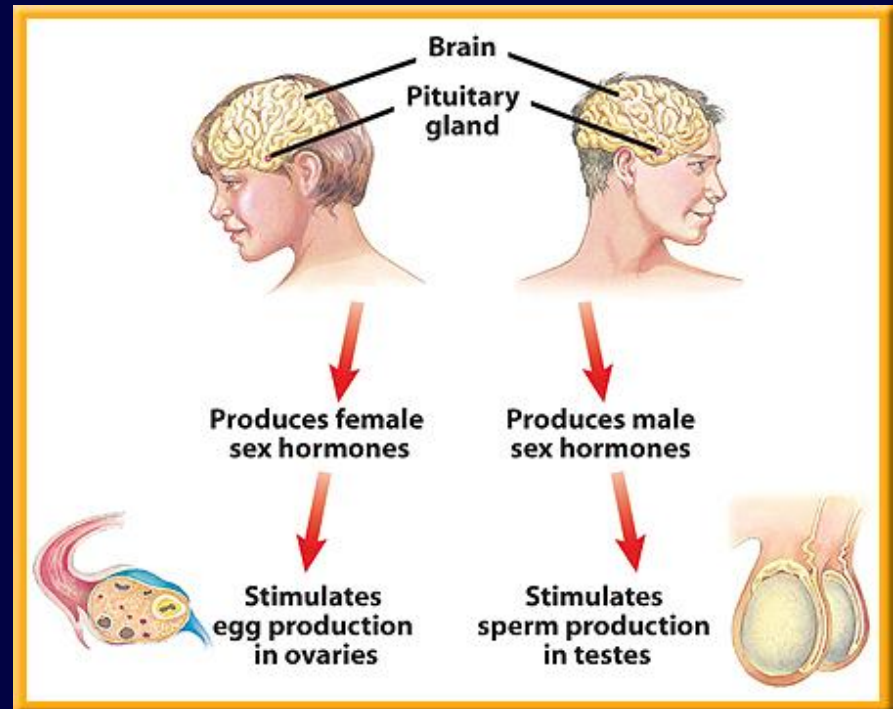
Reproduction and the Endocrine System

- Although structurally different, both the male and female **reproductive systems are adapted to allow for a series of events that can lead to the birth of a baby.**



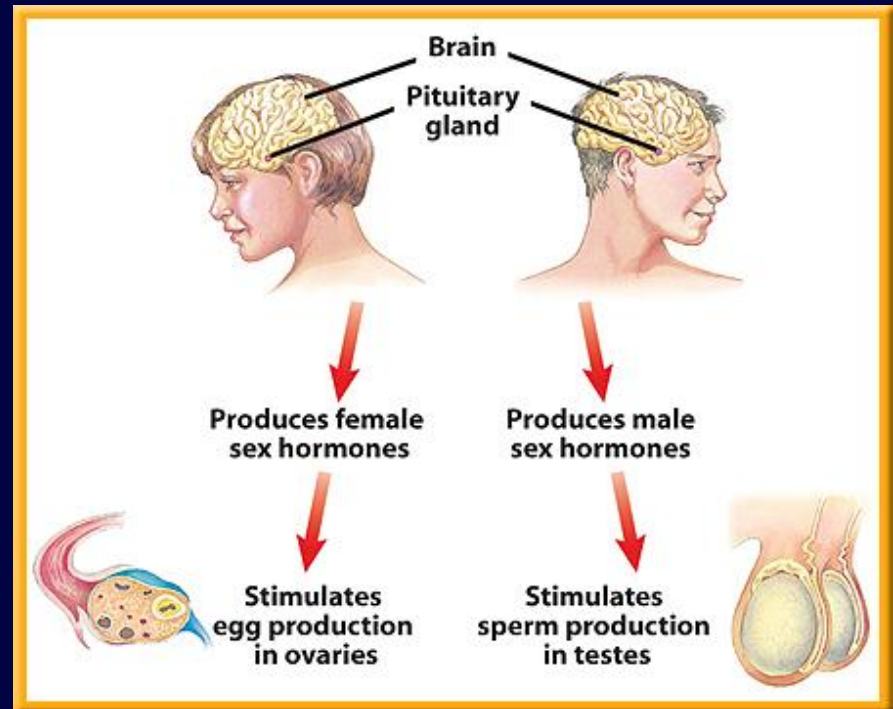
Reproduction and the Endocrine System

- Sex hormones are necessary for the development of sexual characteristics, such as breast development in females and facial hair growth in males.



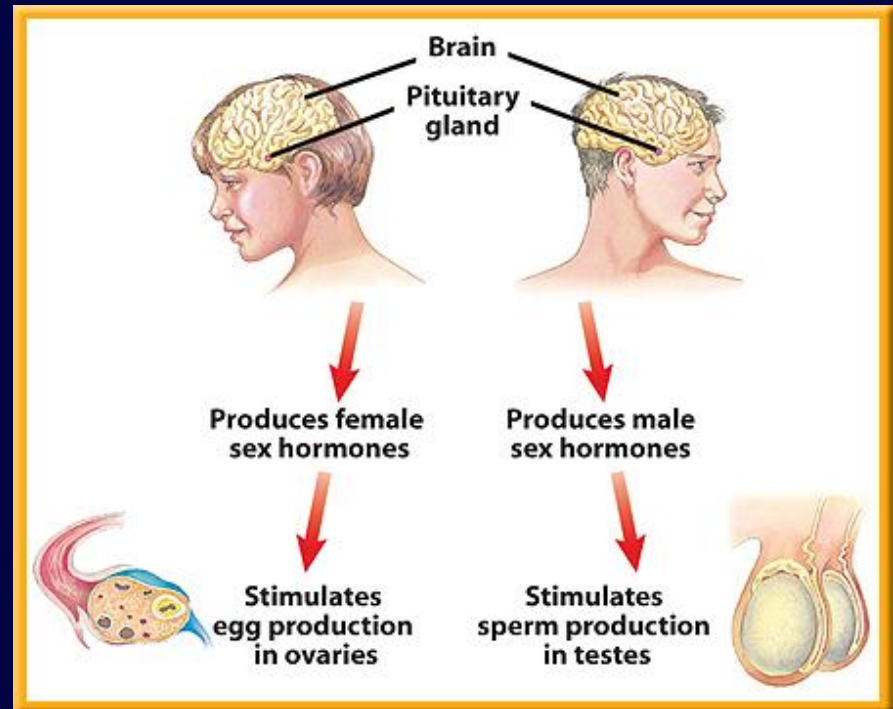
Reproduction and the Endocrine System

- Hormones from the pituitary gland also begin the production of eggs in females and sperm in males.



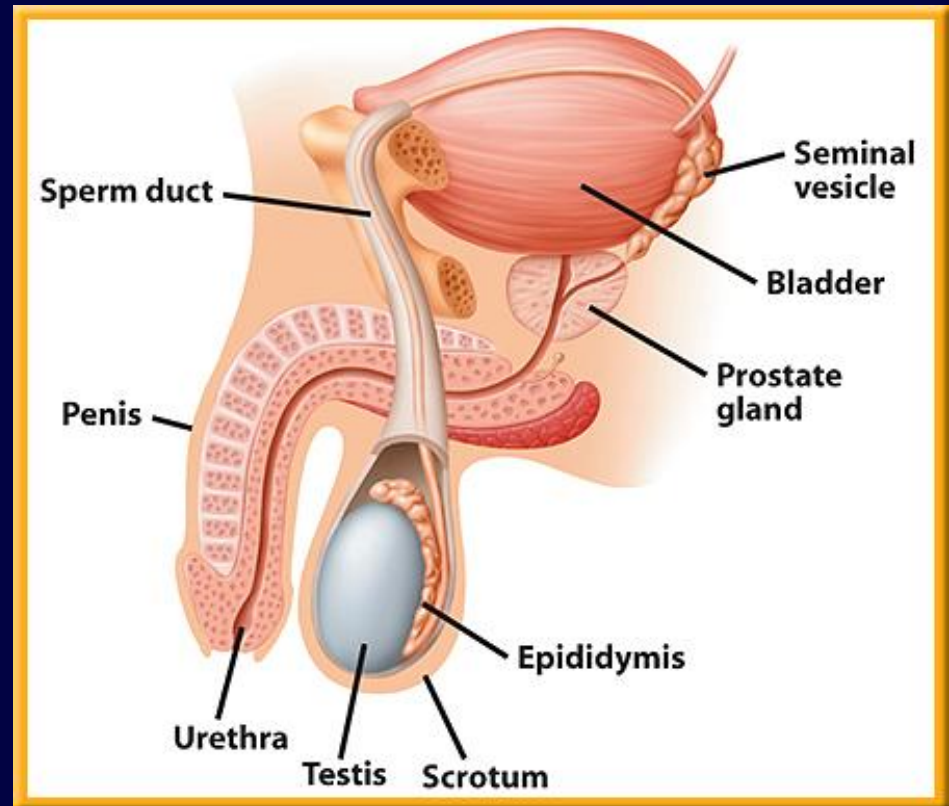
Reproduction and the Endocrine System

- Eggs and sperm transfer hereditary information from one generation to the next.




The Male Reproductive System

- The **external** organs of the male reproductive system are the **penis** and **scrotum**.
- The **scrotum** contains two organs called **testes** (TES teez).



The Male Reproductive System

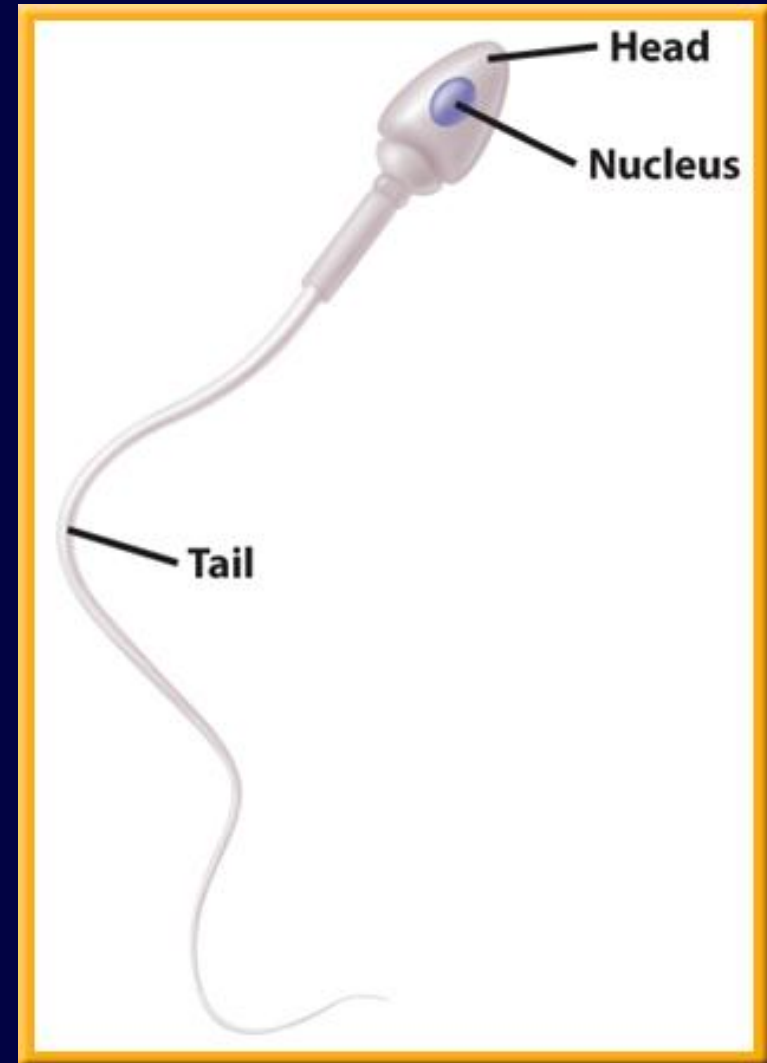
- As males mature sexually, the **testes** begin to produce testosterone, the male hormone, and **sperm**, which are male reproductive cells. 




2

Sperm

- Each **sperm cell** has a head and tail. The **head contains hereditary information**, and the **tail moves the sperm**.
- Sperm are produced in greater numbers at lower temperatures.



Sperm

- After **sperm** are produced, they **travel from the testes through sperm ducts** that circle the bladder.
- Behind the bladder, a gland called the **seminal vesicle provides sperm with a fluid.**
- This mixture of sperm and fluid is called **semen** (SEE mun). 



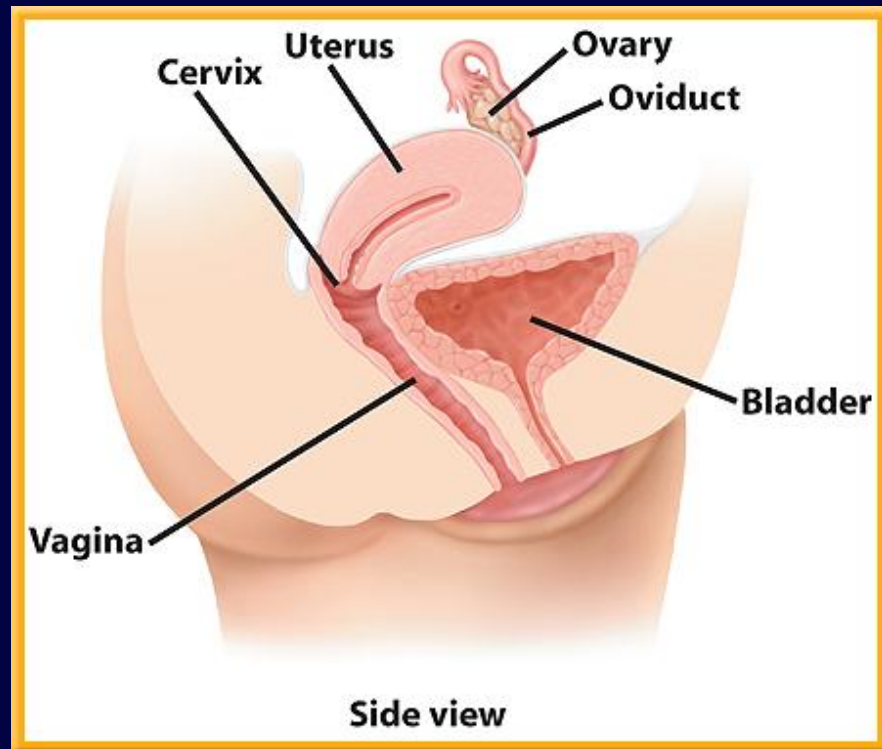
Sperm

- Semen leaves the body through the urethra, which is the same tube that carries urine from the body.
- However, semen and urine never mix.
- A muscle (prostate) at the back of the bladder contracts to prevent urine from entering the urethra as sperm leave the body.




The Female Reproductive System

- Most of the reproductive organs of the female are inside the body.
- The **ovaries**—the female sex organs—are located in the lower part of the body cavity. 🔊



The Egg

- When a female is born, she already has all of the cells in her ovaries that eventually will develop into eggs—the female reproductive cells.
- About once a month, an egg is released from an ovary in a hormone-controlled process called **ovulation** (ahv yuh LAY shun). 




The Egg

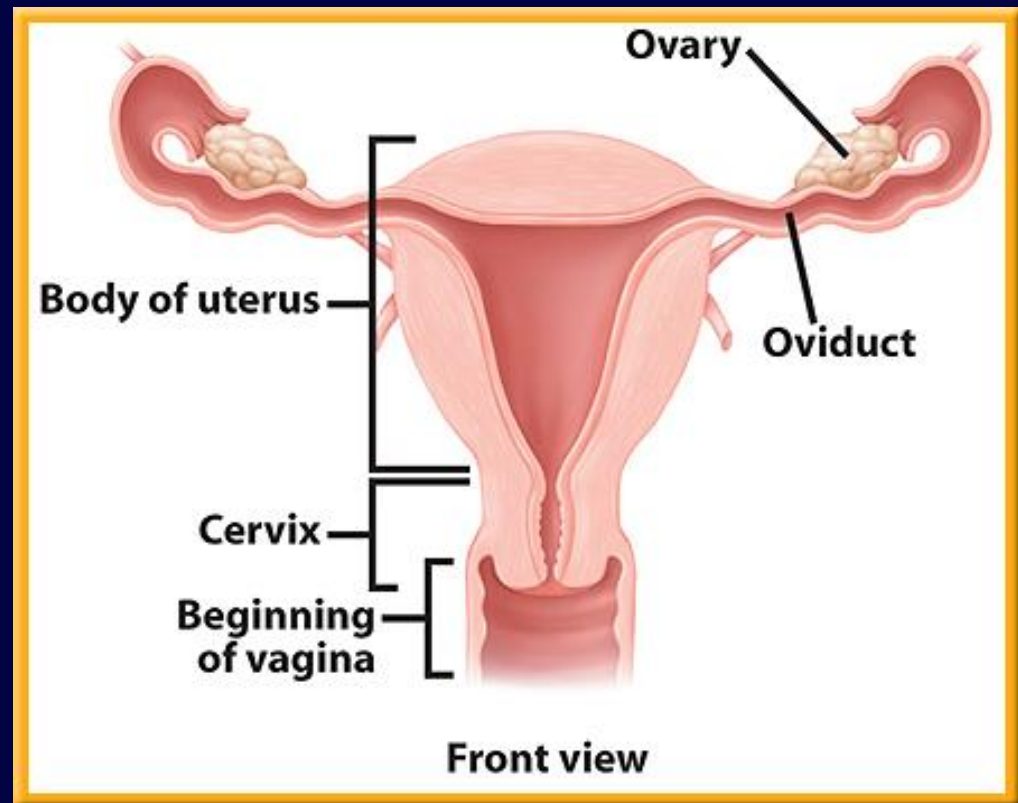
- After the egg is released, it enters the oviduct.
- If a sperm fertilizes the egg, it usually happens in an oviduct.
- Short, hairlike structures called cilia help sweep the egg through the oviduct toward the uterus (YEW tuh rus).



2


The Egg

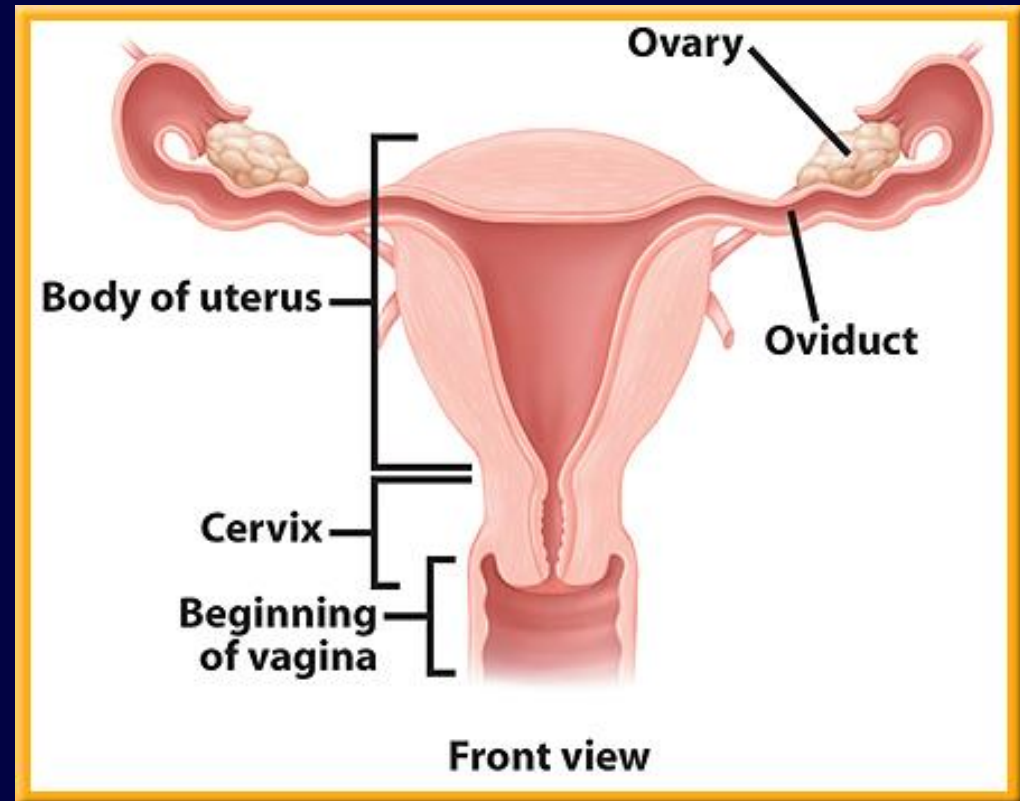
- The **uterus** is a hollow, pear-shaped, muscular organ with thick walls in which a fertilized egg develops. 




2

The Egg

- The lower end of the uterus, the cervix, narrows and is connected to the outside of body by a muscular tube called the **vagina** (vuh JI nuh). 



The Menstrual Cycle

- The **menstrual cycle** is the monthly cycle of changes in the female reproductive system. 
- Changes include the maturing of an egg, the production of female sex hormones, the preparation of the uterus to receive a fertilized egg, and menstrual flow.



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Endocrine Control

- Hormones control the entire menstrual cycle.
- Hormones start the development of eggs in the ovary.



Endocrine Control

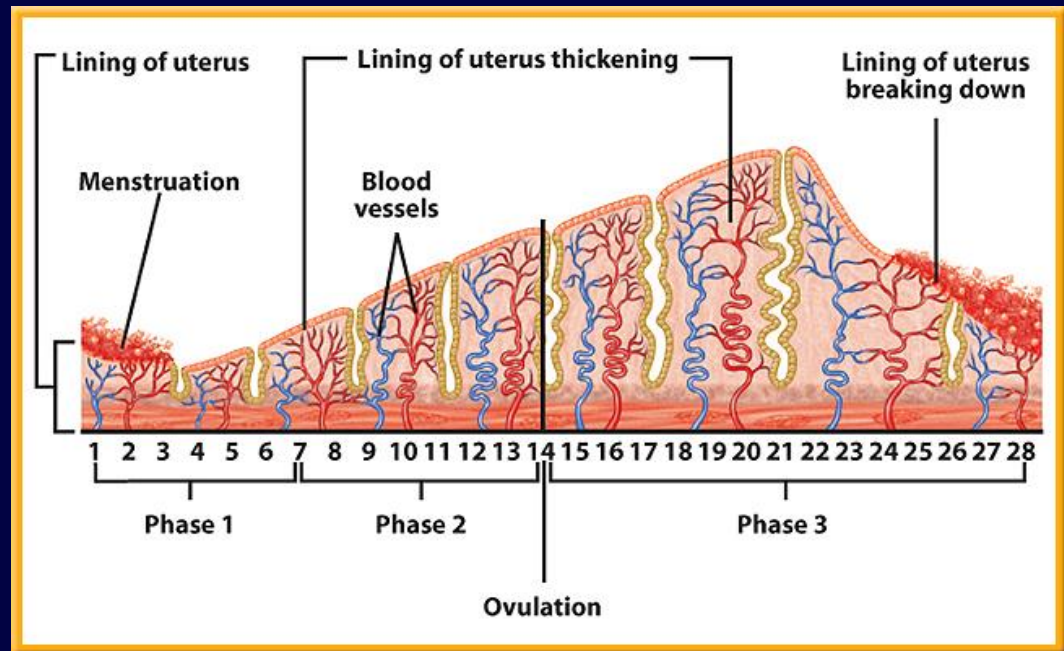
- They also start the production of other hormones in the ovary, including estrogen (ES truh jun) and progesterone (proh JES tuh rohn).
- The interaction of all these hormones results in the physical processes of the menstrual cycle.



2

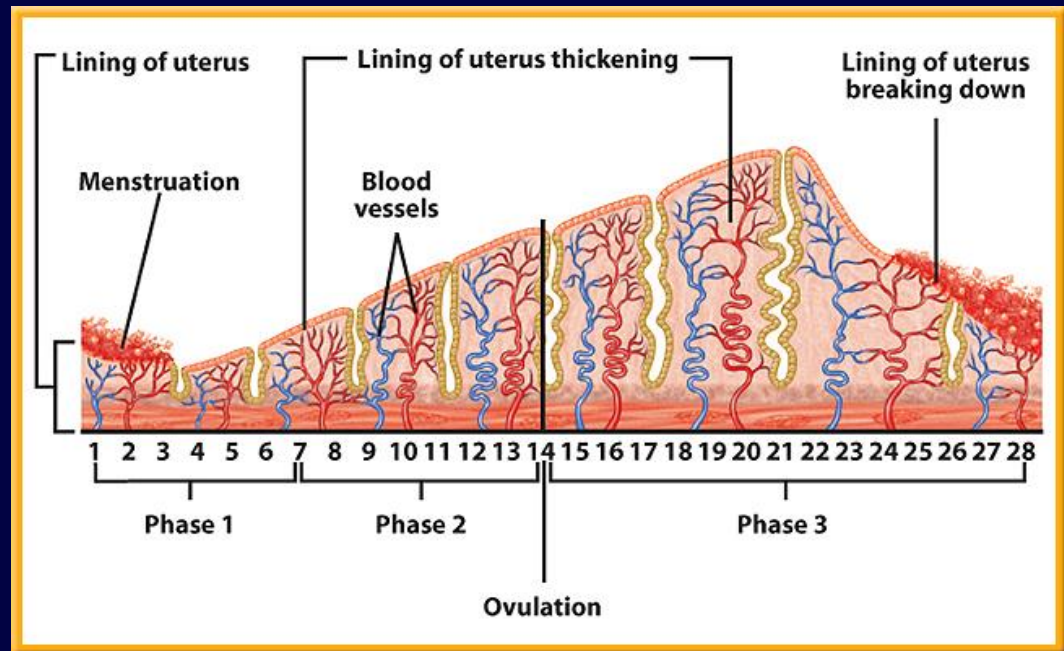
Phase One

- The first day of **phase 1** starts when **menstrual flow begins**.
- This flow usually continues for **four to six days** and is called **menstruation** (men STRAY shun).



Phase Two

- Hormones cause **the lining of the uterus to thicken** in phase 2.
- Hormones also control the development of an egg in the ovary.



2

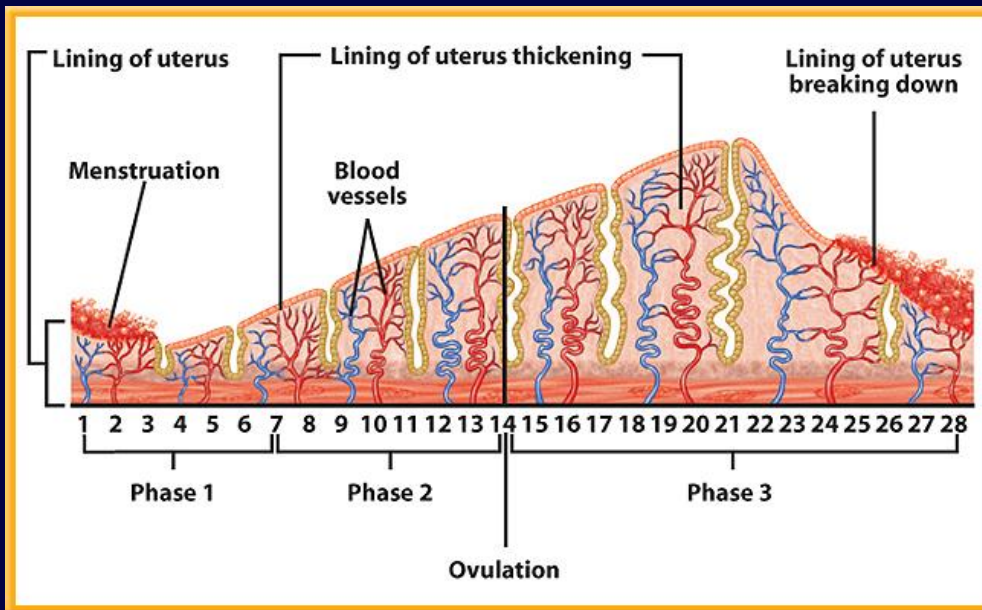
Phase Two

- Ovulation occurs about 14 days before menstruation begins.
- Once the egg is released, it must be fertilized within 24 h or it usually begins to break down.



Phase Three

- Hormones produced by the ovaries continue to cause an **increase in the thickness of the uterine lining** during phase 3.



- If a fertilized egg does arrive, the uterus is ready to support and nourish the developing embryo.



Phase Three

- If the egg is not fertilized, the lining of the uterus breaks down as the hormone levels decrease.
- Menstruation begins and the cycle repeats itself.



Menopause

- A gradual reduction of menstruation takes place as hormone production by the ovaries begins to shut down.
- Menopause occurs when both ovulation and menstrual periods end.
- It can take several years for the completion of menopause.



2

Question 1

The _____ produces hormones that control the male and female reproductive systems.



2

Answer

The answer is pituitary gland. The pituitary gland is a pea-size structure attached to the hypothalamus of the brain.

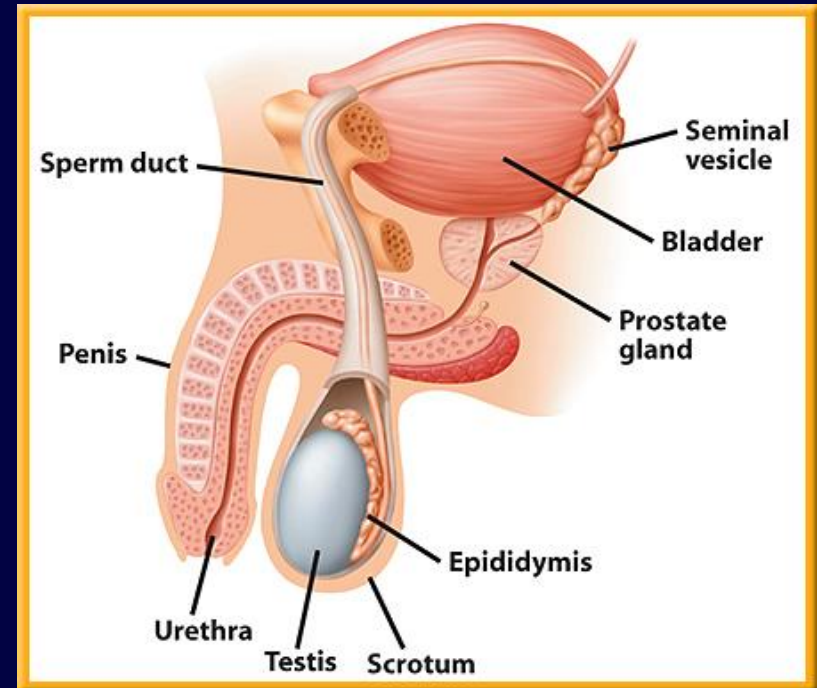


2

Question 2

Which is responsible for producing testosterone?

- A. bladder
- B. epididymis
- C. scrotum
- D. testes



2

Answer

The answer is D. The testes are located within the scrotum.



2

Question 3

The female's egg is released from an ovary during _____.

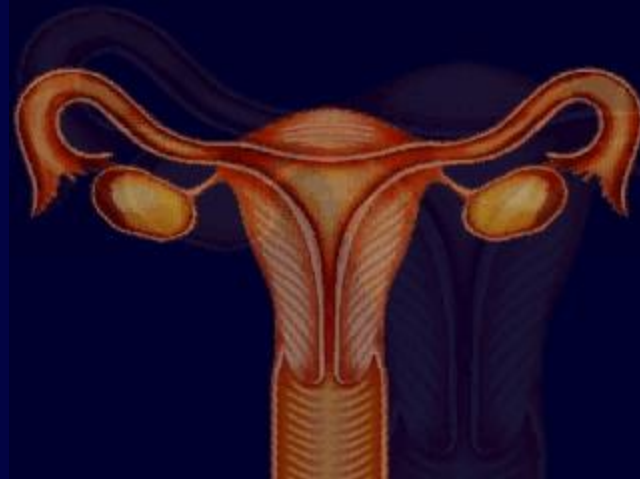
Answer

The answer is ovulation. Ovulation occurs about once a month.



The Function of the Reproductive System

- With the development of the cell theory in the 1800s, scientists recognized that a human develops from an egg that has been fertilized by a sperm.
- The **uniting of a sperm and an egg** is known as **fertilization**.



Click image to view movie.



3

Fertilization

- Although 200 million to 300 million sperm can be deposited in the vagina, only several thousand reach an egg in the oviduct.
- As they enter the female, the sperm come into contact with chemical secretions in the vagina.



3

Fertilization

- The sperm then become capable of fertilizing the egg.



- Enzymes help speed up chemical reactions that have a direct effect on the protective membranes on the egg's surface.



3

Fertilization

- The structure of the egg's membrane is disrupted, and the sperm head can enter the egg.



Zygote Formation

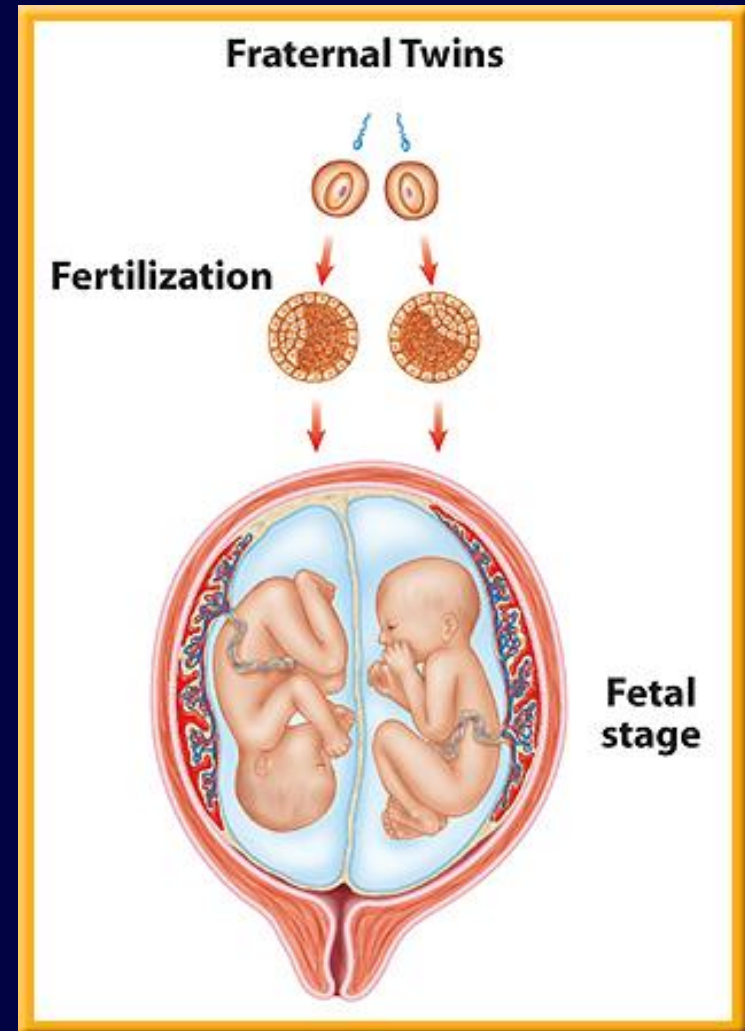
- Once a sperm has entered the egg, changes in the electric charge of the egg's membrane prevent other sperm from entering the egg.
- The nucleus of the successful sperm joins with the nucleus of the egg.
- This joining of nuclei creates a fertilized cell called the zygote.



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Multiple Births

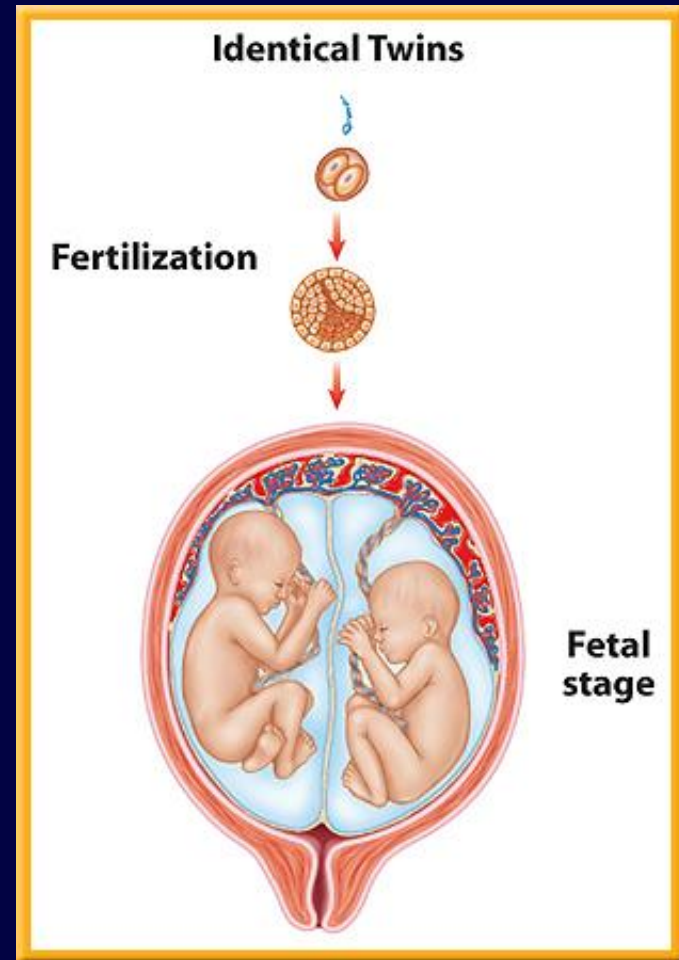
- Fraternal twins develop from **two different eggs** that have been **fertilized by two different sperm**.



3

Multiple Births

- **Identical twins** develop from **one egg** that has been **fertilized by one sperm**.
- The **zygote** divides into **two separate zygotes**.



3


Development Before Birth

- After fertilization, the **zygote moves along the oviduct to the uterus.**
- During this time, the zygote is dividing and forming into a ball of cells.



3


Development Before Birth

- After about seven days, the **zygote attaches to the wall of the uterus**, which has been thickening in preparation to receive a zygote.
- The zygote will develop into a baby in about nine months.
- This period of development from fertilized egg to birth is known as **pregnancy**. 

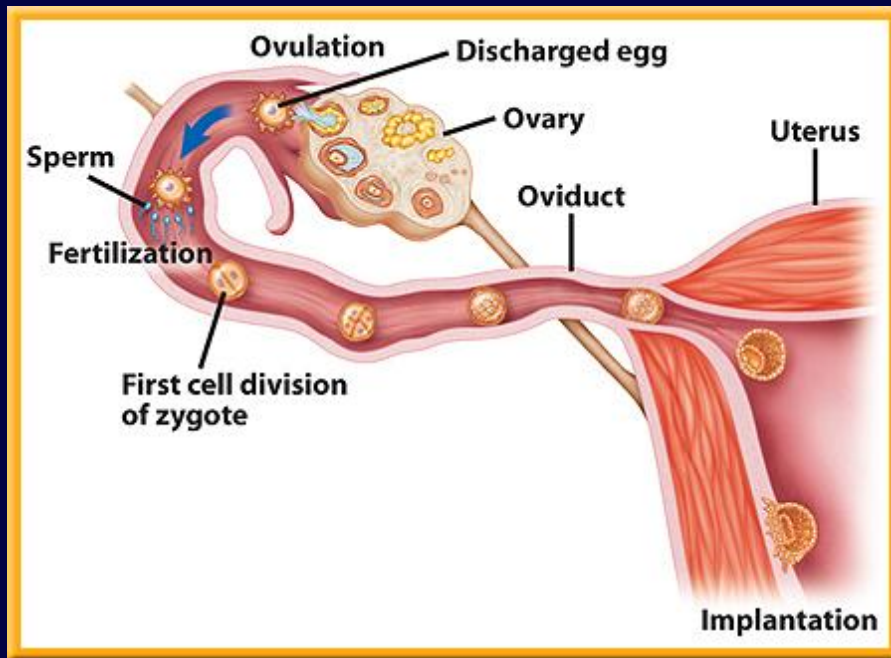


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The Embryo

- After the zygote attaches to the wall of the uterus, **it is known as an embryo.** 

- **It receives nutrients from fluids in the uterus until the placenta (plu SEN tuh) develops from tissue of the uterus and the embryo.**



3

The Embryo

- An umbilical cord develops that connects the embryo to the placenta.
- Blood vessel in the umbilical cord carry nutrients and oxygen from the mother's blood through the placenta to the embryo.



3


The Embryo

- Other substances in the mother's blood can move into the embryo, including drugs, toxins, and disease organisms.
- Waste from the embryo are carried in other blood vessel in the umbilical cord through the placenta to the mother's blood.



3

The Embryo

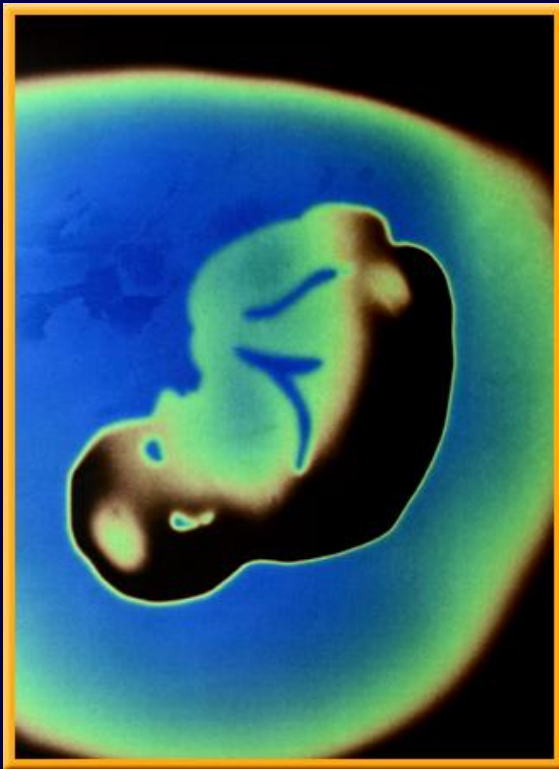
- Pregnancy in humans last about 38 to 39 weeks.
- During the third week, a thin membrane called the **amniotic** (am nee AH tihk) **sac** begins to form around the embryo. 



3

The Embryo


- During **the first two months** of development, the embryo's **major organs form** and the heart structure begins to beat.



- **At five weeks**, the embryo has a **head with eyes, nose, and mouth** features.
- During the **sixth and seventh weeks**, **fingers and toes** develop.



The Fetus

- After the first two months of pregnancy, the developing embryo is called a **fetus**, body organs are present. 
- Around the third month, the fetus is 8 cm to 9 cm long.
- The fetus is 30 cm to 38 cm in length by the end of the seventh month of pregnancy.



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The Fetus

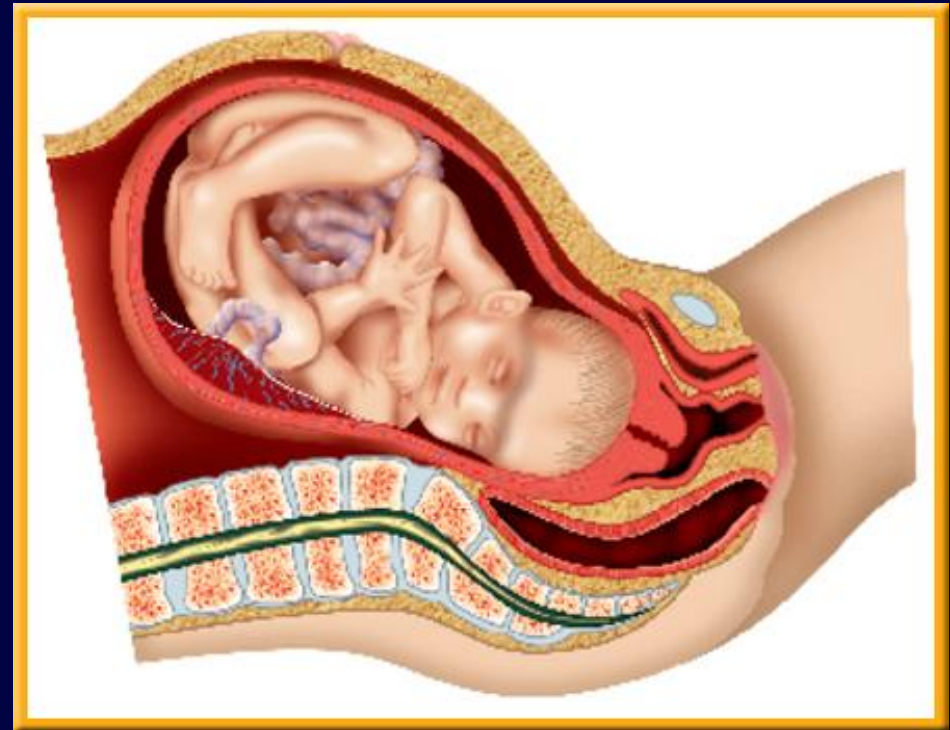
- By the **ninth month**, the **fetus** usually has **shifted to a head-down position** within the uterus, a position **beneficial for delivery**.
- The fetus is about 50 cm in length and weighs from 2.5 kg to 3.5 kg.



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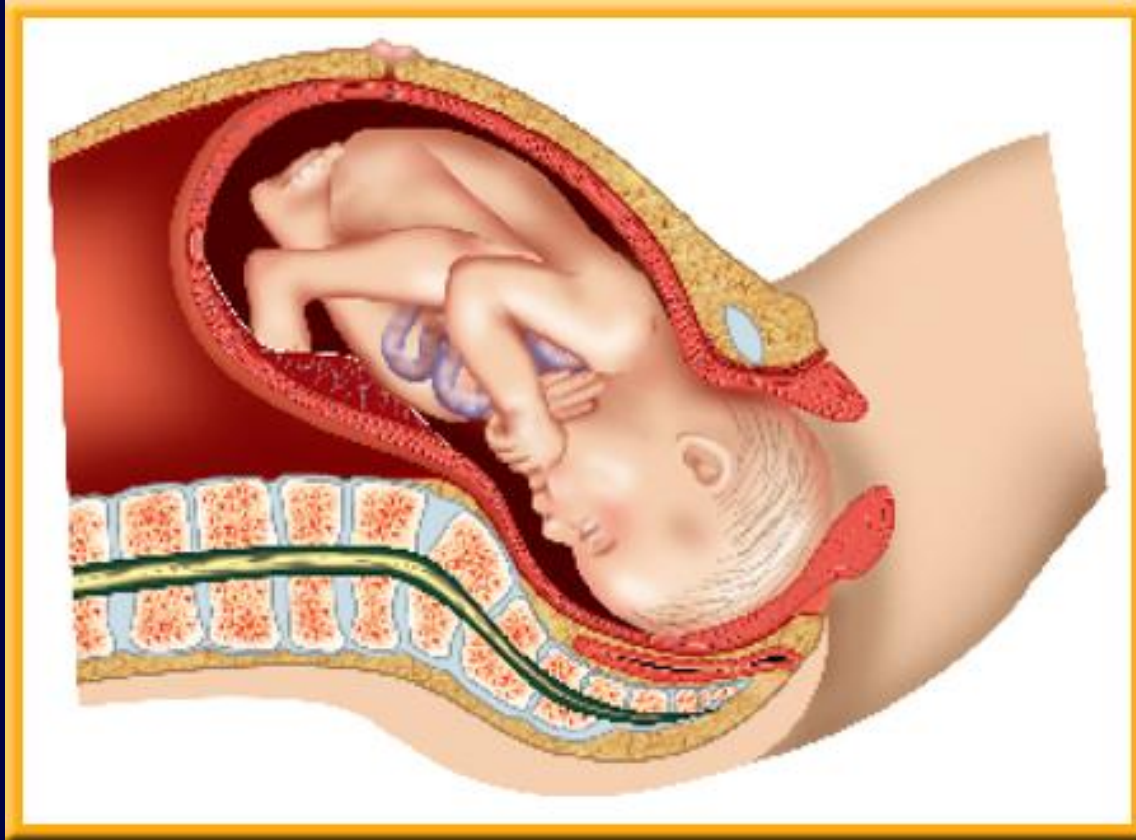
The Birthing Process

- Childbirth begins with labor.
- The fetus moves into the opening of the birth canal, and the uterus begins to widen.



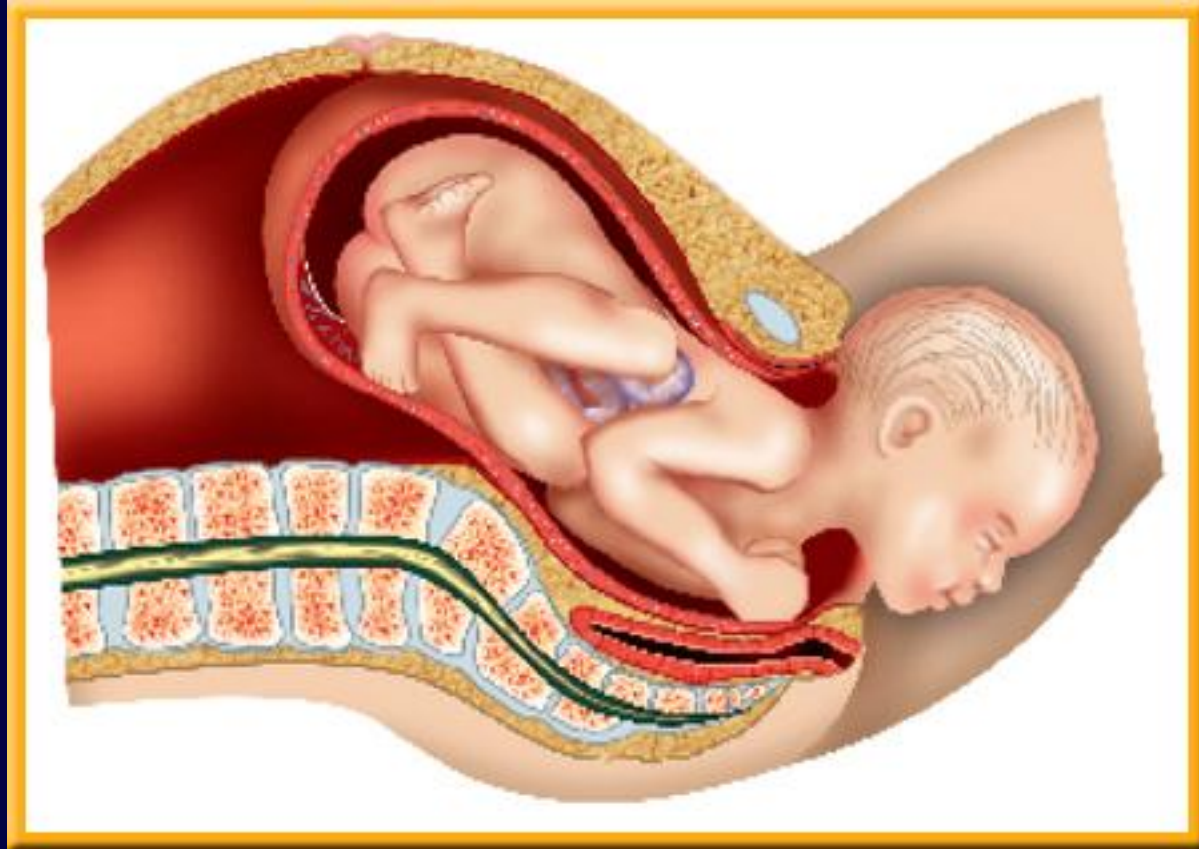
The Birthing Process

- The **base of the uterus** is completely **dilated**.



The Birthing Process

- The fetus is pushed out through the birth canal.



3

Delivery

- Often a mother is given assistance by a doctor during the delivery of the baby.
- When the head is free, any fluid in the baby's nose and mouth is removed by suction.
- After the head and shoulders appear, contractions force the baby out completely.



Cesarean Section

- Sometimes a baby must be delivered before labor begins or before it is completed.
- In cases like these, **surgery** called a cesarean (suh SEER ee uhn) section is performed.
- An incision is made through the mother's abdominal wall, then through the wall of the uterus. The **baby is delivered** through this opening.



After Birth

- When the **baby** is born, it **is attached to the umbilical cord**.
- The person assisting with the birth clamps the cord in two places and **cuts** it between the clamps.
- The **scar that forms** where the cord was attached is called the **navel**.



3

Stages After Birth

- Defined stages of development occur after birth, based on the major developments that take place during those specific years.
- Infancy lasts from birth to around 18 months of age.
- Childhood extends from the end of infancy to sexual maturity, or puberty.




Stages After Birth

- The years of adolescence vary, but they usually are considered to be the teen years.
- Adulthood covers the years of age from the early 20s until life ends, with older adulthood considered to be over 60.



3

Infancy

- The experiences the fetus goes through during birth cause **fetal stress**. 
- However, in a short period of time, the infant's body becomes adapted to its new world.



3

Infancy

- The first four weeks after birth are known as the neonatal (nee oh NAY tul) period.
- During this time, the baby's body begins to function normally.



3

Infancy

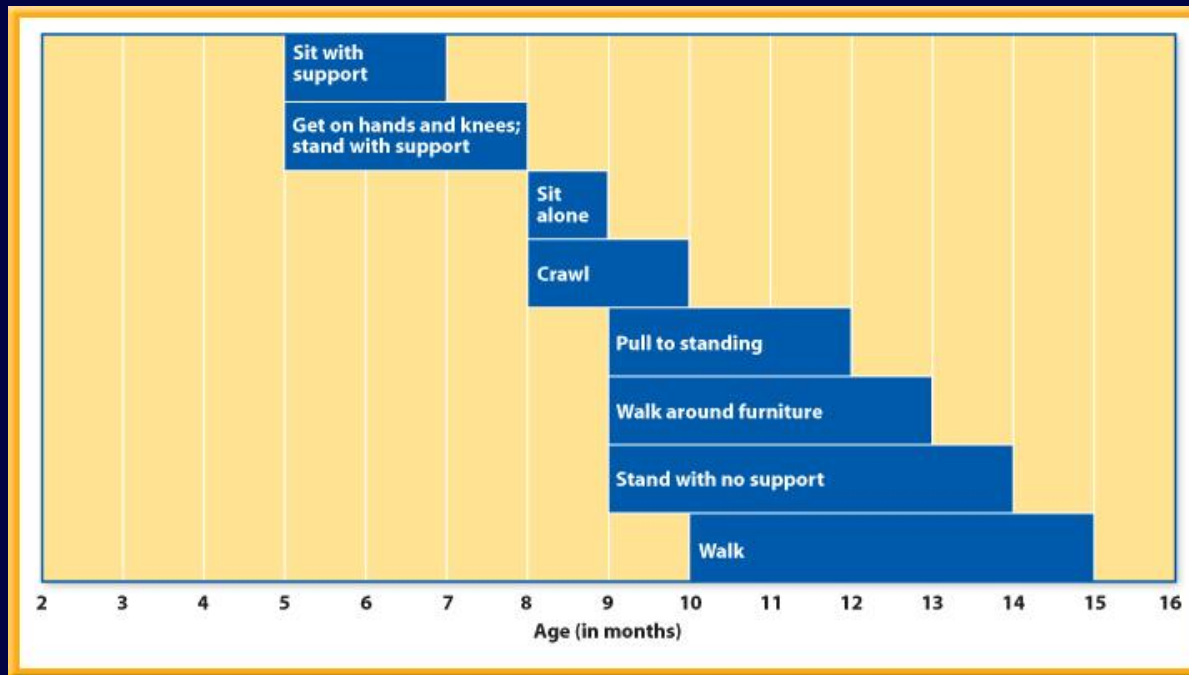
- Human babies depend on other humans for their survival.
- Many other animals, begin walking a few hours after they are born.



3

Infancy

- During these first 18 months, infants **show increased physical coordination, mental development, and rapid growth.**



- Many infants will triple their weight in the first year.



3

Childhood

- Sexual maturity occurs around 12 years of age.
- Growth during early childhood is rather rapid, although the physical **growth rate for height and weight is not as rapid as it is in infancy.**



3

Childhood

- Between two and three years of age, the child learns to control his or her bladder and bowels.
- At age two to three, most children can speak in simple sentences.
- Throughout this stage, **children develop their abilities to speak, read, write, and reason.**



3

Adolescence

- A part of adolescence is puberty—the time of **development when a person becomes physically able to reproduce.**
- For girls, puberty occurs between ages nine and 13.
- For boys, puberty occurs between ages 13 and 16.



3

Adolescence

- Secondary sex characteristics also develop.
- In females, the breasts develop, pubic and underarm hair appears, and fatty tissue is added to the buttocks and thighs.
- In males, the hormones causes a deepened voice, an increase in muscle size, and the growth of facial, pubic, and underarm hair.



3

Adolescence

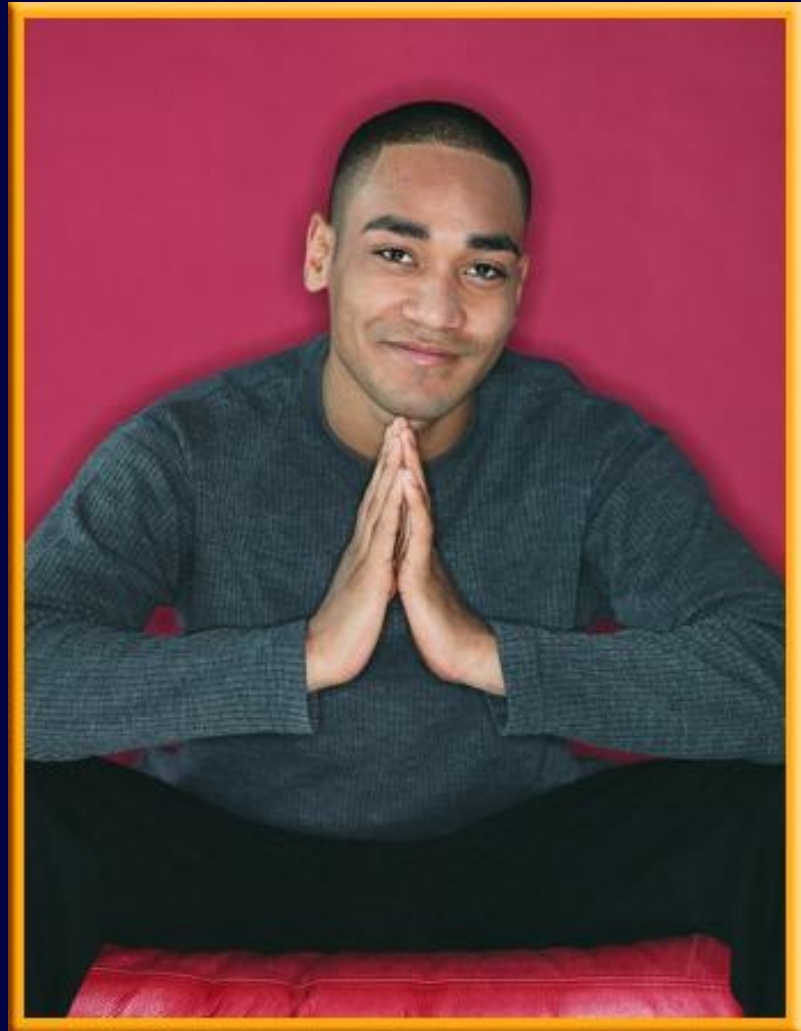
- Girls often begin their final growth phase at about age 11 and end around age 16.
- Boys usually start their growth spurt at age 13 and end around 18 years of age.



3

Adulthood

- Adulthood begins with the end of adolescence and continues through old age.
- This is when the **growth of the muscular and skeletal system stops.**



3

Adulthood

- People from age 45 to age 60 are sometimes considered **middle-aged adults**.
- During these years, **physical strength begins to decline**.



3

Adulthood

- Blood circulation and respiration become less efficient.
- Bones become more brittle, and the skin becomes wrinkled.



3

Older Adulthood

- People over the age of 60 may experience an overall decline in their physical body systems.
- Connective tissue lose their elasticity, causing muscles and joints to be less flexible.



3

Older Adulthood

- Bones become thinner and more brittle.
- Hearing and vision are less sensitive.
- Exercise and eating well over a lifetime can help extend the health of one's body systems.



Human Life Spans

- **Seventy-seven years is the average life span**—from birth to death—of humans in the United States, although an increasing number of people live much longer.



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Question 1

The joining of nuclei from the sperm and egg create a fertilized egg called the _____.

- A. embryo
- B. enzyme
- C. fetus
- D. zygote



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Answer

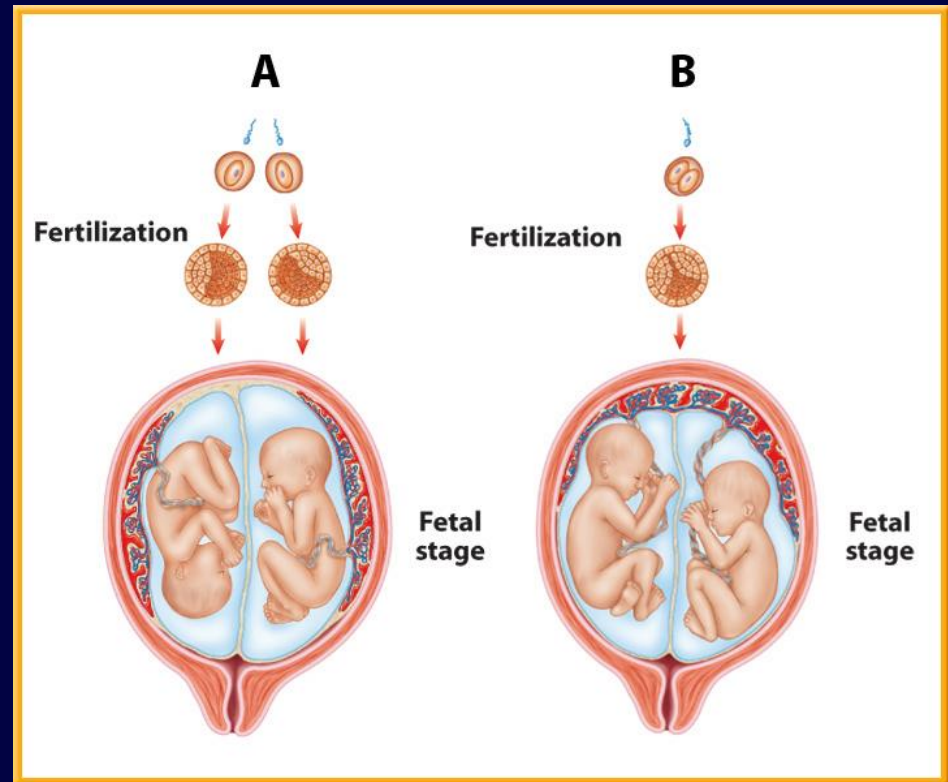
The answer is D. The zygote divides and forms into a ball of cells and, after about seven days, attaches to the wall of the uterus where it will develop into a baby.



3

Question 2

Which results in the development of identical twins?



3

Answer

The answer is B. Identical twins develop from the same egg and sperm and, therefore, have the same hereditary information.



3

Question 3

The scar that forms where the umbilical cord was attached is called the _____.

Answer

The answer is naval. The umbilical cord connects the embryo to the placenta.



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CHAPTER RESOURCES

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End of Chapter Summary File



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