

Reproductive System from the **Human Body System Series**

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THE HUMAN REPRODUCTIVE SYSTEM

Grade Levels: 6 - 9

(Review for grades 10 - 12)

Viewing Time: 17 minutes with video quiz

INTRODUCTION

This video is designed for use in grades 6-9 as an introduction to the major ideas and concepts associated with the human reproductive system, and for use in grades 10-12 as review.

PROGRAM OBJECTIVES

After viewing the video and participating in the lesson activities, the students will be able to ...

- Identify the parts of the human female reproductive system.
- Identify the parts of the human male reproductive system.
- Define mitosis and meiosis of human cells.
- Define key vocabulary terms associated with the human reproductive system.
- Identify the phases of the human menstrual cycle.

SUMMARY OF THE VIDEO

This video describes the functions of the human reproductive system. Reproduction is the process that allows living things to produce new individuals of the same kind. The male and female reproductive systems are described, as well as the process of fertilization of an egg by a sperm cell.

INSTRUCTIONAL NOTES

Before presenting this lesson to your students, we suggest that you preview the video and review this guide and the accompanying blackline master activities in order to familiarize yourself with their content. Duplicate any blackline masters you wish to distribute. If you plan to use the Video Quiz, which immediately follows the video presentation, you may wish to distribute Blackline Master 1, **Video Quiz**, before the program. Also, plan to pause the tape between questions if students require more time.

As you review the materials presented in this guide, you may find it necessary to make some changes, additions, or deletions to meet the specific needs of your class. We encourage you to do so, for only by tailoring this program to your class will they obtain the maximum instructional benefits afforded by the materials.

It is also suggested that the video presentation take place before the entire group under your supervision. The lesson activities grow out of the context of the video; therefore, the presentation should be a common experience for all students.

INTRODUCING THE VIDEO

Remind students that all living things must have a method for reproducing themselves or extinction of that species can occur. All humans start out no larger than a human egg cell barely visible to the unaided eye. After the egg is fertilized by a sperm cell, a tremendous transformation occurs as over the next nine months the individual increases in size by two billion times.

Present the video. The viewing time is 12 minutes for the program and about 5 minutes for the Video Quiz.

BLACKLINE MASTER DESCRIPTIONS

Most of the follow-up activities for this program are designed for middle school grades. If you use this program with an older audience, you will need to adapt the materials appropriately.

- **Blackline Master 1, Video Quiz**, is to be used at the end of the video program. At the completion of the video, there is a short quiz. The narrator will read the questions which are displayed on the screen. Students can use this sheet to record their answers. Answers to the questions are provided in the Answer Key found on page 4.
- **Blackline Master 2, Vocabulary**, is a collection of important vocabulary words from the video. You may want to distribute this sheet before viewing the video so students can listen for definitions.
- **Blackline Master 3, The Male Reproductive System**, asks students to identify the parts of the male reproductive system.
- **Blackline Master 4, The Female Reproductive System**, asks students to identify the parts of the female reproductive system.
- **Blackline Master 5, The Menstrual Cycle**, asks students to use the words at the bottom of the page to fill in the blanks in a paragraph that describes the menstrual cycle.
- **Blackline Master 6, Quiz**, is the formal test for this unit of study.

INTERNET ACTIVITIES

1. Visit this site for good information and diagrams about human reproduction:

<http://www.trc2.ucdavis.edu/coursepages2/bislo97/reprod.htm>

2. This site also contains good information but should be visited by the teacher first because of the nature of its title: “A Woman’s Guide to Contraception and Responsible Sex”

<http://epigee.netministries.org/guide/index.htm>

DISCUSSION QUESTIONS

1. Discuss the idea that every human was once no larger than a single human egg cell which is smaller than a grain of sand.

2. There have been some very interesting breakthroughs in the area of cloning. Students may wish to discuss cloning and its ramifications.

ANSWER KEY

Blackline Master 1, Video Quiz

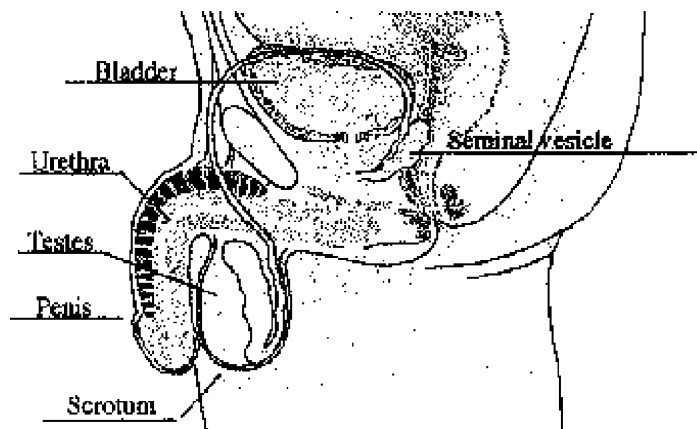
1. b
2. c
3. d
4. a
5. d
6. c

Blackline Master 2, Vocabulary

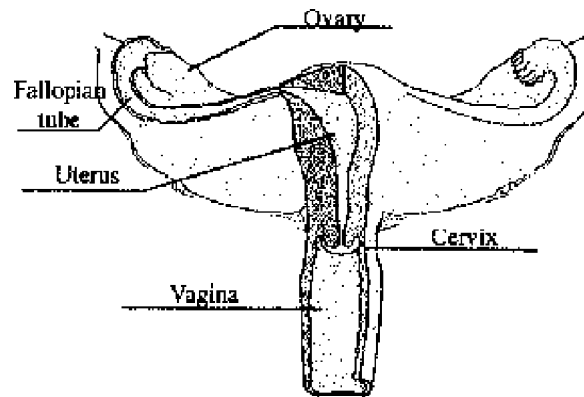
1. reproduction- system that allows living things to produce new individuals of the same kind

2. fertilization - the union of a sperm cell and an ovum or egg
3. ovary - females have two ovaries where eggs are produced; these are glands
4. ovum - the egg cell produced in the ovaries
5. sperm - the male sex cell produced in the testes
6. testes - the two testes are where sperm cells are formed and stored
7. scrotum - a sac below the male abdomen where the testes are found
8. urethra - a tube through which urine travels
9. uterus - also known as the womb, it is a pear-shaped organ where the fertilized egg develops
10. vagina - also called the birth canal, a passage connected to the uterus
11. mitosis - cell division in which two daughter cells form from one cell
12. meiosis - a process of cell division in which sex cells are formed that have half the human number of chromosomes

Blackline Master 3, The Male Reproductive System



Blackline Master 4, The Female Reproductive System



Blackline Master 5, The Menstrual Cycle

An important change during adolescence for a female is the beginning of a monthly cycle to prepare the uterus to receive and nourish a possible fertilized egg. This monthly cycle is called the menstrual cycle. Approximately every 28 days, an egg is released from one of the ovaries and begins to travel down the Fallopian tube. The ovaries alternate the release of eggs. One month, the left ovary releases an egg, and the next month, the right ovary takes its turn. The release of an egg from an ovary is referred to as ovulation. During this time, the uterus has been undergoing changes. The walls of the uterus fill with blood and become thicker. If the egg that travels through the Fallopian tube becomes fertilized by a sperm cell, then the egg will implant itself in the lining of the uterus and begin the process of development, which can lead to new life. If the egg isn't fertilized, it will break down and leave the body with the used blood and tissue that had collected in the uterine wall. The blood and tissue leave the body through the vagina over an average five-day period of time. This is called menstruation.

Blackline Master 6, Quiz

1. Reproduction is the system that allows living things to produce new individuals of the same kind.
2. Fertilization is the joining or union of male and female sex cells to create a new life.
3. Chromosomes are rod-shaped structures found in the nucleus of cells that are responsible for passing on inherited traits.
4. Mitosis is the cell division that gives every cell in the body the same identical sets of chromosomes except for the red blood cells and the sex cells.
5. Meiosis is a specialized cell division that mixes up the chromosomes and produces sex cells that have only 23 chromosomes, or half of what is needed to be a human.
6. Gregor Mendel, who lived in the 1800s, conducted a great deal of research on inherited traits. He experimented with pea plants over an eight-year period of time. He cross-pollinated a tall plant with a short plant and was surprised to find that all the new plants were tall. Then he cross-pollinated these plants and three out of four were tall and one out of four was short. He deduced that there are certain traits that are dominant and will show up whenever they are present. He figured that there were other traits that were recessive and these would only appear if the same trait was passed on from each parent. They were called recessive because they could be hidden for generations.
7. The menstrual cycle is a monthly cycle that prepares the uterus in a female for the possibility of a fertilized egg needing to be nourished and cared for. The walls of the uterus fill with blood and an egg is released from one of the ovaries. If the egg is fertilized by a sperm cell during its trip down the Fallopian tube, it will imbed itself in the wall of

the uterus and begin to divide. If the egg cell isn't fertilized, it will leave the body with the used blood and tissue that had collected in the uterine wall.

SCRIPT OF VIDEO PRESENTATION

THE EXCRETORY SYSTEM

For a species to continue, there must be a method for reproduction. Reproduction is the system that allows living things to produce new individuals of the same kind. When reproduction of a species doesn't occur, the species becomes extinct, which means it no longer exists on earth. Plants and animals reproduce to continue their species. Reproduction for humans, like that for all mammals, is sexual. That means there are separate male and female organs designed to produce the necessary sex cells for reproduction. In human beings the reproductive organs are called gonads.

SEXUAL REPRODUCTION

All humans started out no larger than a dot just barely visible to the unaided eye. This was the female gamete or sex cell called the ovum. It was fertilized by a male gamete called a sperm. Fertilization occurs when the sperm nucleus joins the ovum or egg nucleus. Nine months later, a complete human may be born. During those nine months, the fertilized egg has changed from a single cell to an individual with trillions of cells. It has increased in size by two billion times. The one cell has evolved into a complex organism with specialized cells, tissues, and organs designed to carry out life's functions.

MALE REPRODUCTIVE SYSTEM

The male gonads are called testes. They are suspended in a sac below the abdomen. The sac is called the scrotum and is suspended outside the body where the temperature is slightly cooler. The lower temperature is important to the production of healthy sperm, which are the male ga-

metes or sex cells. The sperm are produced inside the testes in hundreds of tightly packed tubes called seminiferous tubules.

The sperm move into the epididymis and then into the vas deferens where they are stored. During ejaculation, muscular contractions cause the sperm to travel through the urethra, in the penis, and out of the body. Before moving into the urethra, the sperm are mixed with a fluid produced by nearby glands. This mixture of sperm and fluid is called semen. In each drop of semen there are approximately five million sperm cells.

There are three parts to each sperm cell. The head contains the nucleus or control center of the cell. The middle section provides energy and the tail moves the sperm along by swishing back and forth.

The testes also produce a hormone called testosterone. This hormone causes changes in the male body during puberty. These changes include a deepening of the voice, broader shoulders, and the growth of facial and body hair.

THE FEMALE REPRODUCTIVE SYSTEM

The female reproductive organs are all located within the body of the female. The main organs of this system are the ovaries. The two ovaries are located at about hip level. The ovaries are responsible for producing the ova or eggs.

Below the ovaries is the uterus, a pear-shaped muscular organ about the size of a fist. This is where a fertilized egg will develop over the nine months of gestation into a child. Connected to the uterus are two Fallopian tubes. These tubes each lead to one of the ovaries. The Fallopian tubes are not attached to the ovaries, but are located in such a way that a newly matured and released egg can be easily moved into the tube by tiny cilia located at the end of the

Fallopian tubes. The egg travels slowly through the Fallopian tube and into the uterus. If the egg is fertilized, then it will embed itself in the lining of the uterus and begin developing over the next nine months. If it is not fertilized, it will eventually be eliminated from the body. The uterus narrows at the lower end into a small opening called the cervix. The cervix opens into a wider area called the vagina or birth canal. At the end of the vagina is an opening to the outside.

OVA OR EGGS

A female is born with all the eggs she will ever have. These are undeveloped eggs and can number over 400,000. During a female's life, only about 500 of these eggs will ever mature and travel to the uterus. Hormones produced by the ovaries initiate changes during puberty, which is the beginning of adolescence. Adolescence is a period of change that begins in the early teens and goes until about the age twenty. During this time, a person's body changes from that of a child into that of an adult. The hormone estrogen, produced and released by the ovaries, causes the following changes during this period; an enlargement of the breasts, the widening of the hips, the growth of body hair, and the maturing of egg cells in the ovaries.

THE MENSTRUAL CYCLE

Another important change during adolescence is the beginning of a monthly cycle to prepare the uterus to receive and nourish a possible fertilized egg. This monthly cycle is called the menstrual cycle. Approximately every 28 days, an egg is released from one of the ovaries and begins to travel down the Fallopian tube. The ovaries alternate the release of eggs. One month the left ovary releases an egg, and the next month the right ovary takes its turn. The release of an egg from an ovary is referred to as ovulation. During this time, the uterus has been undergoing changes. The walls of the uterus fill with blood and become thicker.

If the egg that travels through the Fallopian tube becomes fertilized by a sperm cell, then the egg will implant itself in the lining of the uterus and begin the process of development, which can lead to a new life. If the egg isn't fertilized, it will break down and leave the body with the used blood and tissue that had collected in the uterine wall. This blood and tissue leave the body through the vagina over a five-day period of time. This is called menstruation. As menstruation takes place, a new egg is maturing in the other ovary to begin the whole cycle again.

FERTILIZATION

If an egg and sperm cell unite, then menstruation won't take place. Instead, the fertilized egg embeds itself in the lining of the uterus wall, which has been prepared with extra blood. The sperm are introduced to the female body during sexual intercourse. The male penis is inserted into the vagina of the female and semen is ejaculated into the vagina. Of the approximately 400,000,000 sperm released into the vagina, only about a few thousand will manage to make their way to the Fallopian tube, where the egg is moving towards the uterus. The sperm will surround the egg and try to penetrate it. If a sperm is successful, the head and mid-section of the sperm move into the egg. The tail falls off. When a sperm penetrates the egg's membrane, a change occurs that keeps all other sperm from entering. The reason for this is only one sperm can unite with an egg. That's because each sex cell is contributing half the number of chromosomes to the fertilized egg, which is now called a zygote.

Human beings have 46 chromosomes inside every cell except the sex cells. The sex cells each contain 23 chromosomes. Chromosomes are rod-shaped structures found in the nucleus of cells. The chromosomes are responsible for passing on inherited traits or characteristics, such as hair color, eye color, and skin color.

The chromosomes include the detailed information that will become a complex organism. All living things have chromosomes. The number of chromosomes has nothing to do with how sophisticated an organism is. For instance, all humans have 46 chromosomes. A dog has 78 chromosomes and corn has 20 chromosomes. The chromosomes carry thousands of genes which determine the characteristics of the new individual. The genes are specific locations on the chromosomes. The genes are arranged in pairs.

MITOSIS

There are 100 trillion living cells in the human body and everyone of them, except for the red blood cells and the sex cells, have identical sets of chromosomes. They have all formed as new cells of the body and are made during cell division called mitosis. After the egg cell has been fertilized by the sperm cell, the contents of the nuclei combine and the 23 chromosomes from the egg and the 23 chromosomes from the sperm combine. The new cell has the correct number of chromosomes for a human—46 and a new nucleus. Now, new cells will develop from this cell.

First the chromosomes line up in the nucleus and split right down the middle. Each chromosome has doubled by forming another chromosome just like it. Now they all gather near the center of the cell and then begin to pull apart with one of the double chromosomes moving to one end of the cell and the other chromosome moving to the other side of the cell. This means there is a complete set of chromosomes at each end of the cell. Now a membrane forms around each set of chromosomes and two new nuclei appear. The cell begins to pinch in the center and it divides, creating two identical cells each with exactly the same chromosomes.

MEIOSIS

All the cells of the body divide by mitosis except for the

sex cells. The sperm and egg cells form during a different process called meiosis. Meiosis starts out the same as mitosis with the duplication of each member of the 46 chromosomes. Matching pairs of chromosomes line up and undergo an exchange of genes that is unique and can never be exactly duplicated. In this way, the genes are randomly mixed. Then the chromosomes line up in the center of the cell and half of the chromosomes are pulled to one end of the cell and the other half moves to the other end of the cell. The cell divides down the middle and two new cells are formed. Now the chromosomes line up in the middle of each cell again and then spread apart with half of the chromosomes moving to one side and the other half moving to the other end. The cells divide again with a result of four cells with 23 chromosomes in each. This way, the sex cells each contain half the number of human chromosomes, so that when an egg is fertilized by a sperm, each sex cell is providing one half the chromosomes for a total of 46.

So, an individual receives 23 chromosomes from their mother and 23 chromosomes from the father to equal the 46 chromosomes that make a human. The chromosomes contain genes, which are found on a long-coiled molecule called DNA. Each chromosome contains about 100,000 genes, which are responsible for the individual traits and characteristics of a person. Things like hair and eye color, height, and athletic ability are all determined by the match up of genes found on the chromosomes.

Gregor Mendel, an Austrian monk who lived from 1822 to 1884, made many investigations into the way traits are passed on from one generation to another. He studied pea plants over an eight-year period. One of his most famous investigations had to do with short and tall pea plants. He cross-pollinated a tall pea plant with a short pea plant. We'll identify the gene for tall with a "T" and the gene for short with an "s."

By pollinating a tall plant and a short plant, you might expect some to be medium sized, but Mendel was surprised to find that all the new plants were tall. Mendel then cross-pollinated these new plants and found that three fourths were tall and one out of four was short. This is how he explained it. The first plants, which were pure tall or pure short plants, produced all tall plants because the tall gene is dominant over the short gene, which is recessive. If a tall gene is present, the resulting plant must be tall.

However, in the next generation there is a one in four chance that a plant would receive a short gene from both parent plants. With an “ss” combination, the plant would be short. Mendel then realized that genes pair up and the resulting trait or characteristic is determined by which gene is dominant or recessive.

Mendel picked these terms to describe genes because of their Latin derivation. Dominant comes from a Latin word that means master and recessive comes from a Latin word meaning to draw back. Certain traits are dominant traits, which means they will show up in offspring. Some traits are recessive and will only appear in offspring if the gene for that trait is provided by both the father and mother. An example of this is the gene for red hair. It is a recessive gene. The only way that red hair will show up in a child is if the gene for red hair is present in the sperm and egg cells. In any other situation, the other hair color trait will show up because all the other hair color traits are dominant over the red hair trait.

Today we have taken a look at the reproductive systems of human beings. These systems provide a means for ensuring the species continues. There is a tremendous responsibility that goes along with being a parent. Unlike many of the animals on our planet, human babies are totally depen-

dent on their parents. They are completely helpless and rely on constant care and attention. So before two people decide to be parents, they had better be prepared for a lot of hard work and patience.

VIDEO QUIZ

Students may write the answers to the following questions on a separate sheet of paper or on the duplicating master entitled **Video Quiz**.

1. The name of the female sex cell is _____.
 - a. sperm
 - b. ovum
 - c. meiosis
 - d. mitosis

2. The beginning of adolescence is called _____.
 - a. mitosis
 - b. meiosis
 - c. puberty
 - d. menstruation

3. The human being has how many chromosomes _____?
 - a. 23
 - b. 52
 - c. 25
 - d. 46

4. The monthly cycle during which the womb of a female prepares itself for the possibility of pregnancy is called _____.
 - a. menstruation
 - b. puberty
 - c. meiosis
 - d. mitosis

5. The dividing of cells into two daughter cells is called

_____.

- a. menstruation
- b. puberty
- c. meiosis
- d. mitosis

6. The forming of sex cells which contain 23 chromosomes is called _____.

- a. menstruation
- b. puberty
- c. meiosis
- d. mitosis

THE HUMAN REPRODUCTIVE SYSTEM**Video Quiz**

Directions: At the end of the video production is a short quiz with these questions. Use this sheet to record your answers.

1. The name of the female sex cell is _____.
 - a. sperm
 - b. ovum
 - c. meiosis
 - d. mitosis

2. The beginning of adolescence is called _____.
 - a. mitosis
 - b. meiosis
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 - b. puberty
 - c. meiosis
 - d. mitosis

6. The forming of sex cells which contain 23 chromosomes is called _____.
 - a. menstruation
 - b. puberty
 - c. meiosis
 - d. mitosis

THE HUMAN REPRODUCTIVE SYSTEM**Vocabulary**

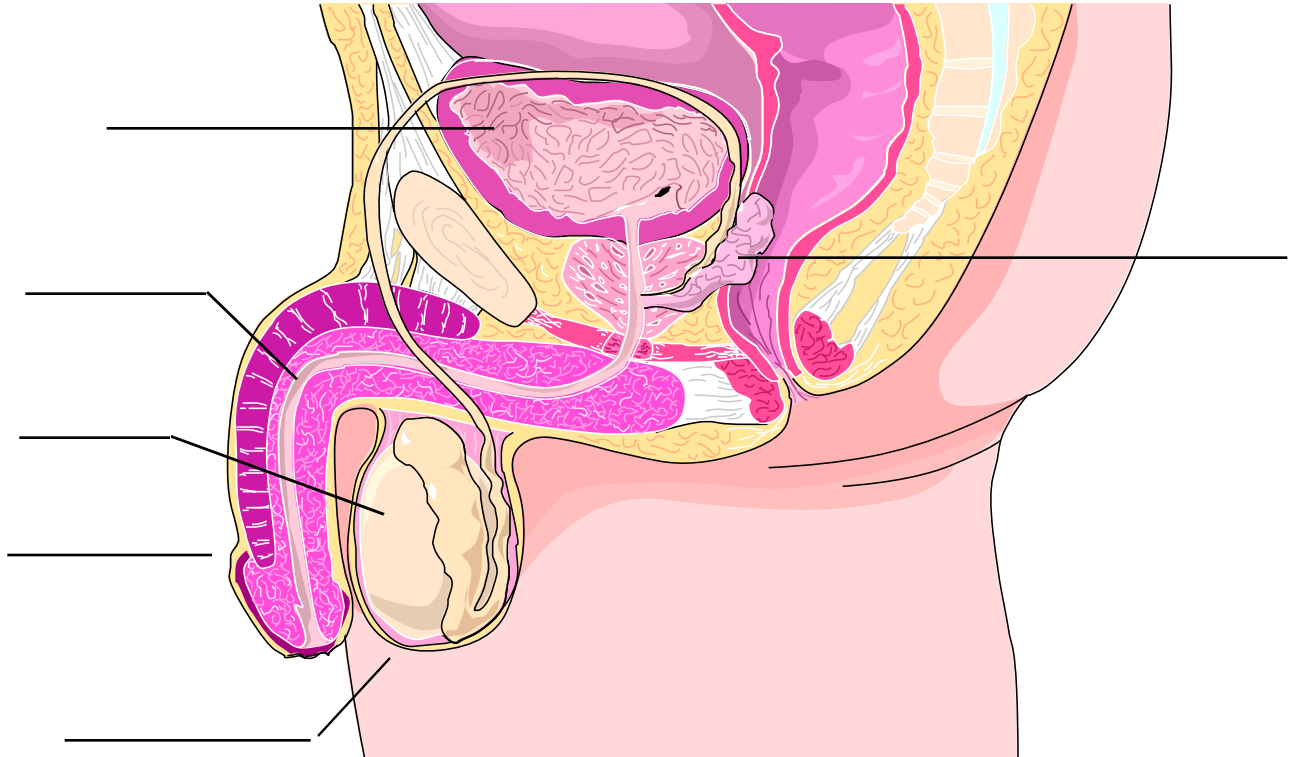
Directions: Write a definition for each of the terms listed below:

1. reproduction-
2. fertilization-
3. ovary-
4. ovum-
5. sperm-
6. testes-
7. scrotum-
8. urethra-
9. uterus-
10. vagina-
11. mitosis-
12. meiosis-

THE HUMAN REPRODUCTIVE SYSTEM

The Male Reproductive System

DIRECTIONS: Place the words from the box, at the bottom of the page, next to the lines on the diagram of the male reproductive system.

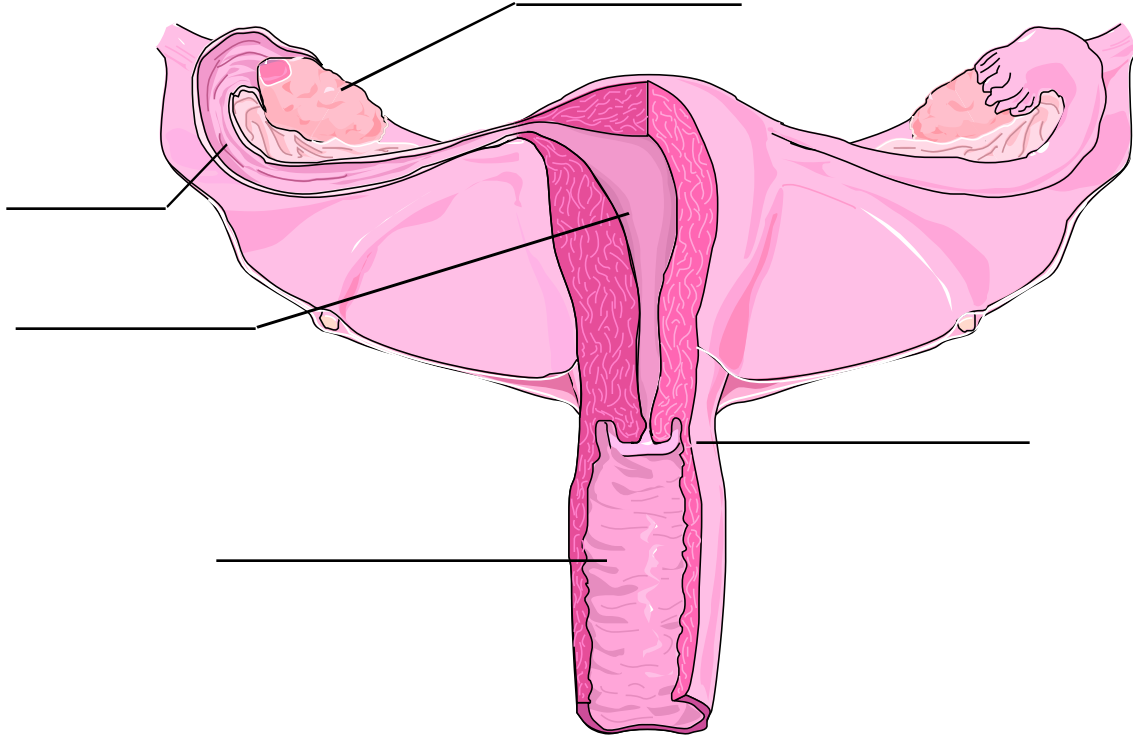


penis scrotum seminiferous tubules
urethra bladder testes
seminal vesicle

THE HUMAN REPRODUCTIVE SYSTEM

The Female Reproductive System

Directions: Put the words from the box at the bottom of the page on the lines in the diagram of the female reproductive system.

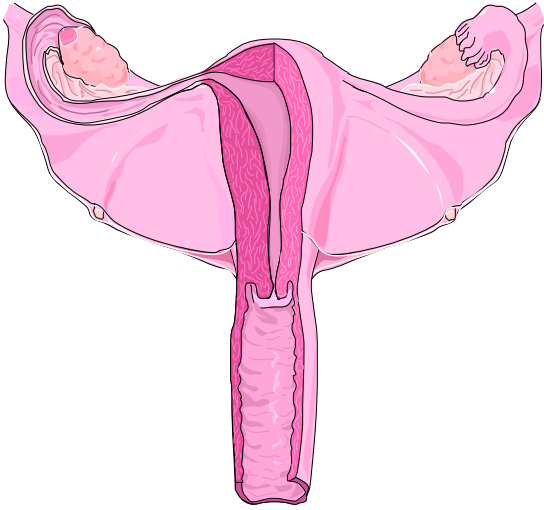


uterus	Fallopian tube	ovary	vagina
	cervix		

THE HUMAN REPRODUCTIVE SYSTEM

The Menstrual Cycle

Directions: Use the words from the box at the bottom of the page to fill in the blanks in the following paragraph. Not all the words in the box will be used in the selection. Some words will be used more than once.



An important change during adolescence for a female, is the beginning of a monthly cycle to prepare the uterus to receive and nourish a possible fertilized egg. This monthly cycle is called the menstrual cycle. Approximately every ____ days, an egg is released from one of the _____ and begins to travel down the _____. The _____ alternate the release of eggs. One month, the left _____ releases an egg, and the next month, the right _____ takes its turn. The release of an egg from an ovary is referred to as _____. During this time, the _____ has been undergoing changes. The walls of the _____ fill with _____ and become thicker. If the egg that travels through the _____ becomes fertilized by a _____, then the egg will implant itself in the lining of the _____ and begin the process of development, which can lead to new life. If the egg isn't _____, it will break down and leave the body with the used _____ and tissue that had collected in the _____ wall. The blood and tissue leave the body through the _____ over an average ____ -day period of time. This is called _____.

uterus	sperm	cell	fertilization	blood	menstruation	egg	5	20
32	28	cycle	fallopian tube	ovulation	ovary	vagina	uterine	ovaries

