

# **HUMAN REPRODUCTION AND CHILDBIRTH**

DVD Version

# HUMAN REPRODUCTION AND CHILDBIRTH

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### TEACHER'S RESOURCE BOOK

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# HUMAN REPRODUCTION AND CHILDBIRTH

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### MAIN MENU

### PLAY

### CHAPTER SELECTION

From here you can access many different paths of the DVD, beginning with the introduction and ending with the credits.

1. Introduction
2. The Male Reproductive System
3. The Female Reproductive System
4. Fertilization and Pregnancy
5. First Trimester
6. Second and Third Trimester
7. Giving Birth
8. Review and Conclusion

### TEACHER'S RESOURCE BOOK

A file of the accompanying Teacher's Resource Book is available on the DVD. To open the file you need to load the DVD onto a computer that has a DVD-ROM and Adobe Acrobat Reader. Right click on the DVD icon and then double click on the file titled "Teacher's Resource Book."

The human body is a marvel of integrated systems. In fact, with one exception, every system of our body is necessary for our survival as individuals. The exception, of course, is the reproductive system—its function is related to the survival of our species, rather than the individual.

We can't know with any certainty when humans first understood that creating new life required both a male and a female, but this knowledge was commonplace by the time the Greeks and Romans were recording history. While they understood that intercourse was required for conception, they had many erroneous beliefs about reproduction. There were many superstitions about how to select the gender of the child, how to overcome infertility and how development of a human fetus occurred.

It was the early 1700s before sperm were viewed by human eyes. Earlier references to “male seed” were about semen—not sperm. As microscopes opened up new worlds for exploration, scientific observations fueled new ideas about human conception and development. One of the more colorful hypotheses was the preformation theory. This theory proposed that sperm—or, in some versions, the egg—contained a fully formed, miniature human. Pregnancy, in this theory, was merely a period of time during which the miniature grew larger.

It is only during the last century that we have gotten accurate, detailed information about human fetal development. The spectacular photographs of fetal development by Lennart Nilsson published in the 1960s were both a shock and a revelation to the millions of *LIFE* magazine readers who saw them. Images that previously had been seen by only a few doctors and scientists became available to the world—and with them, our understanding of pregnancy was altered forever.

The video *Human Reproduction and Childbirth* builds on this background as it explores human reproduction. While the video focuses on the biology of reproduction, this is only one aspect of sex in human lives. Certainly, sexual reproduction in humans is very complex—a biological process with many sophisticated social, religious, political, psychological and cultural overlays. All of these overlays influence how we behave and how we feel when it comes to sexual matters. Even today, with all of our scientific knowledge about reproduction, myths and misconceptions persist.

It is hoped that this video will help students understand how their own reproductive system—and that of the opposite gender—works and encourage them to make healthy reproductive choices. It is also hoped that a thorough description of fetal development will demystify pregnancy and help students begin to think about their future roles as parents. The activities included in this Teacher's Resource Book allow students to explore reproduction in a variety of ways. The fact sheets provide additional information about the reproductive process and offer resource materials for further exploration of this topic.

LEARNING OBJECTIVES

After watching the video *Human Reproduction and Childbirth* and participating in the class activities included in this Teacher's Resource Book, your students will be able to:

- name the structures of the male reproductive system
- explain the function of the structures of the male reproductive system
- name the structures of the female reproductive system
- explain the function of the structures of the female reproductive system
- trace the path of the sperm and egg to fertilization
- describe what happens after an egg is fertilized
- identify the key events that occur during the first trimester of pregnancy
- identify the key events that occur during the second trimester of pregnancy
- identify the key events that occur during the final trimester of pregnancy
- provide details on how pregnancy affects a woman's body

*Human Reproduction and Childbirth* provides an overview of the male and female human reproductive systems, as well as fetal development. The video opens with a montage of human families and emphasizes the similarities between parents and children. The point is made that many traits are passed from generation to generation by the process of sexual reproduction.

Next, the video uses animation to explore the male reproductive system. Main structures are identified and the process of sperm formation is described. The function of the ducts and glands are also explained as the viewer follows the path of sperm through the system.

The next section provides a similar exploration of the female reproductive system. Each structure and its function are described. An egg is shown maturing in an ovary. Viewers follow its path through the female reproductive system. Menstruation is explained in this section as well.

Dramatic animation traces the path of egg and sperm in the female reproductive system and shows how a single sperm successfully enters the egg. The nuclear material of sperm and egg fuse together to form a fertilized egg. Viewers see the fertilized egg divide repeatedly as it continues its journey through the fallopian tube and down into the uterus where it implants. Formation of the embryo, placenta and amniotic membranes are shown through animation.

The second half of the video combines additional animation of fetal development together with candid interviews with a young couple expecting a baby. Viewers see animation of the events occurring internally interspersed with comments from the couple describing how her pregnancy has affected their daily lives. The mother-to-be describes how she feels during pregnancy. The father-to-be talks about trying to care for her and their future child. They discuss their expectations about parenthood.

In the next sequence, animation shows fetal development as it progresses, trimester by trimester. In the first trimester, viewers see the bulge that will become the head, the future heart pulse, and buds push out where limbs will develop. The second trimester shows refinement of external structures and describes the increasing development of organs and the nervous system. During the final trimester, viewers see the dramatic increase in size of the fetus and preparation for birth. In each stage, markers are used to indicate fetal size.

The final segment of the video is an animation of the birth process and pictures of the couple's newborn followed in the video. A quick overview provides a summary of the entire video.

## About this Teacher's Resource Book:

This Teacher's Resource Book contains many worksheets that are specific to the biology of human reproduction, but it also includes activities and fact sheets which will allow you and your students to extend the discussion into related topics such as prenatal care, fetal alcohol syndrome, stem cell research and more.

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### Please note:

Activities 2, 3 and 4 cover similar topics but in very different ways. Please review these worksheets before deciding which one are most appropriate to use with your students.

Activity 2: **Male Anatomy**

Activity 3: **Female Anatomy**

These are basic worksheets that require students to properly identify and label a set of blackline diagrams of the male and female reproductive systems.

Activity 4: **Comparative Anatomy**

This interactive assignment allows students to work in groups to properly draw, identify and label the human reproductive system of the opposite sex.

In other words, female students will draw and label the male reproductive system, and male students will draw and label the female reproductive system.

No diagram is provided (except in the answer key).

Choose the appropriate activity for your class, depending upon your teaching style, your students' maturity level and other factors.

# STUDENT ACTIVITIES

Name: \_\_\_\_\_

## Pre/Post Test

Decide whether the following statements are true or false.

1. TRUE or FALSE: Males produce new sperm throughout their lifetime. \_\_\_\_\_
2. TRUE or FALSE: Sperm and urine can pass through a male's penis at the same time. \_\_\_\_\_
3. TRUE or FALSE: Females produce new eggs throughout their lifetime. \_\_\_\_\_
4. TRUE or FALSE: Fertilization occurs when the genetic material from an egg and sperm combine. \_\_\_\_\_
5. TRUE or FALSE: Many sperm can fertilize a single egg. \_\_\_\_\_
6. TRUE or FALSE: The embryo, placenta and other structures develop from the fertilized egg. \_\_\_\_\_
7. TRUE or FALSE: At the end of the first trimester of pregnancy, the fetus is a fully formed, but miniature, human. \_\_\_\_\_
8. TRUE or FALSE: The second trimester is generally the most uncomfortable for a pregnant woman. \_\_\_\_\_
9. TRUE or FALSE: The fetal lungs do not develop fully until the third trimester of pregnancy. \_\_\_\_\_
10. TRUE or FALSE: Human pregnancy typically lasts about 270 days. \_\_\_\_\_

*The Answer Key for this activity appears on the next page.*

Name: \_\_\_\_\_

## Answer Key

- |  |       |
|--|-------|
| 1. TRUE or FALSE: Males produce new sperm throughout their lifetime.   | TRUE  |
| 2. TRUE or FALSE: Sperm and urine can pass through a male's penis at the same time.                                  | FALSE |
| 3. TRUE or FALSE: Females produce new eggs throughout their lifetime.  | FALSE |
| 4. TRUE or FALSE: Fertilization occurs when the genetic material from an egg and sperm combine.                      | TRUE  |
| 5. TRUE or FALSE: Many sperm can fertilize a single egg.   | FALSE |
| 6. TRUE or FALSE: The embryo, placenta and other structures develop from the fertilized egg.                         | TRUE  |
| 7. TRUE or FALSE: At the end of the first trimester of pregnancy, the fetus is a fully formed, but miniature, human. | FALSE |
| 8. TRUE or FALSE: The second trimester is generally the most uncomfortable for a pregnant woman.                     | FALSE |
| 9. TRUE or FALSE: The fetal lungs do not develop fully until the third trimester of pregnancy.                       | FALSE |
| 10. TRUE or FALSE: Human pregnancy typically lasts about 270 days.   | TRUE  |

Name: \_\_\_\_\_

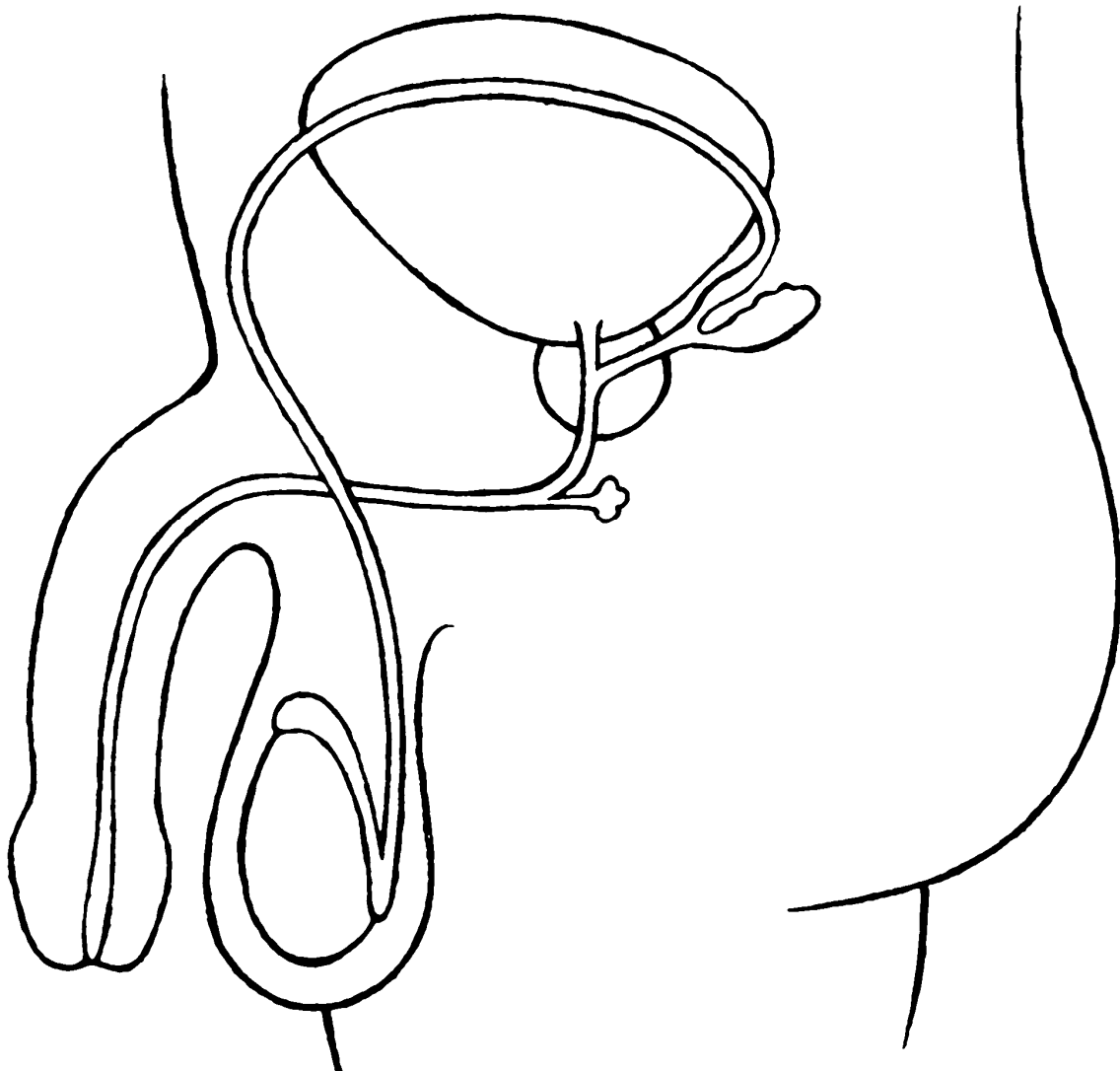
The diagram below shows the male reproductive system. Use the terms listed below to label your diagram.

*scrotum*  
*epididymus*

*penis*  
*sperm duct*

*urethra*  
*testis*

### Male Reproductive System



*The Answer Key for this activity appears on page 10.*

Name: \_\_\_\_\_

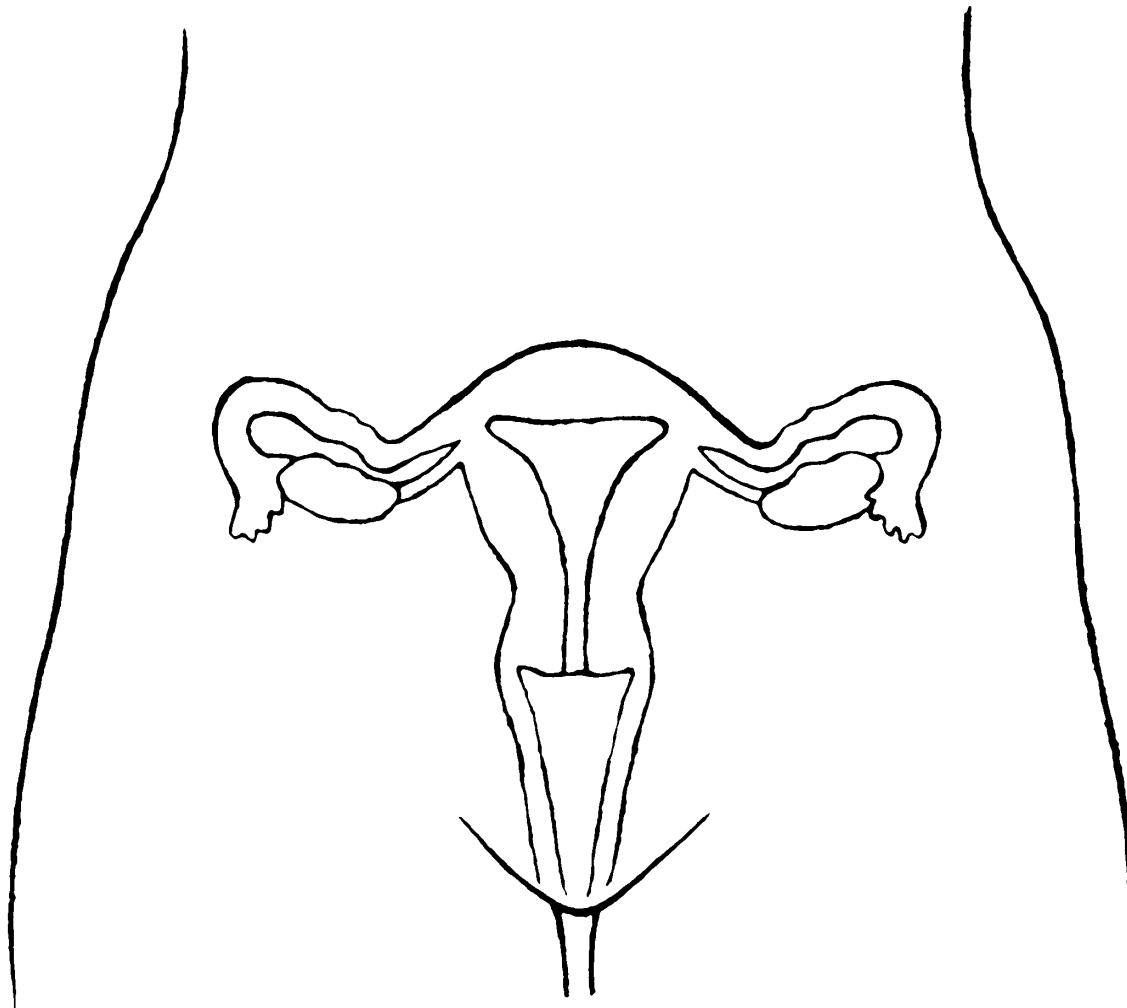
The diagram below shows the female reproductive system. Use the terms listed below to label your diagram.

*cervix*  
*uterus*

*fallopian tubes*  
*vagina*

*ovary*  
*vulva*

### Female Reproductive System



*The Answer Key for this activity appears on page 11.*

Name: \_\_\_\_\_

You and your classmates will work in groups for this activity. Each group should consist of **ONLY** males or **ONLY** females—ideally each group should be composed of two to four students.

### Part One:

Each group will use a blank sheet of paper to draw and label the reproductive system of the opposite sex. In other words, females will draw and label the male reproductive system, and males will draw and label the female reproductive system.

### Part Two:

When all groups are finished with their labels, switch drawings—male groups should give their drawings to female groups and vice versa. Make any corrections on the drawings to make them accurate.

### Part Three:

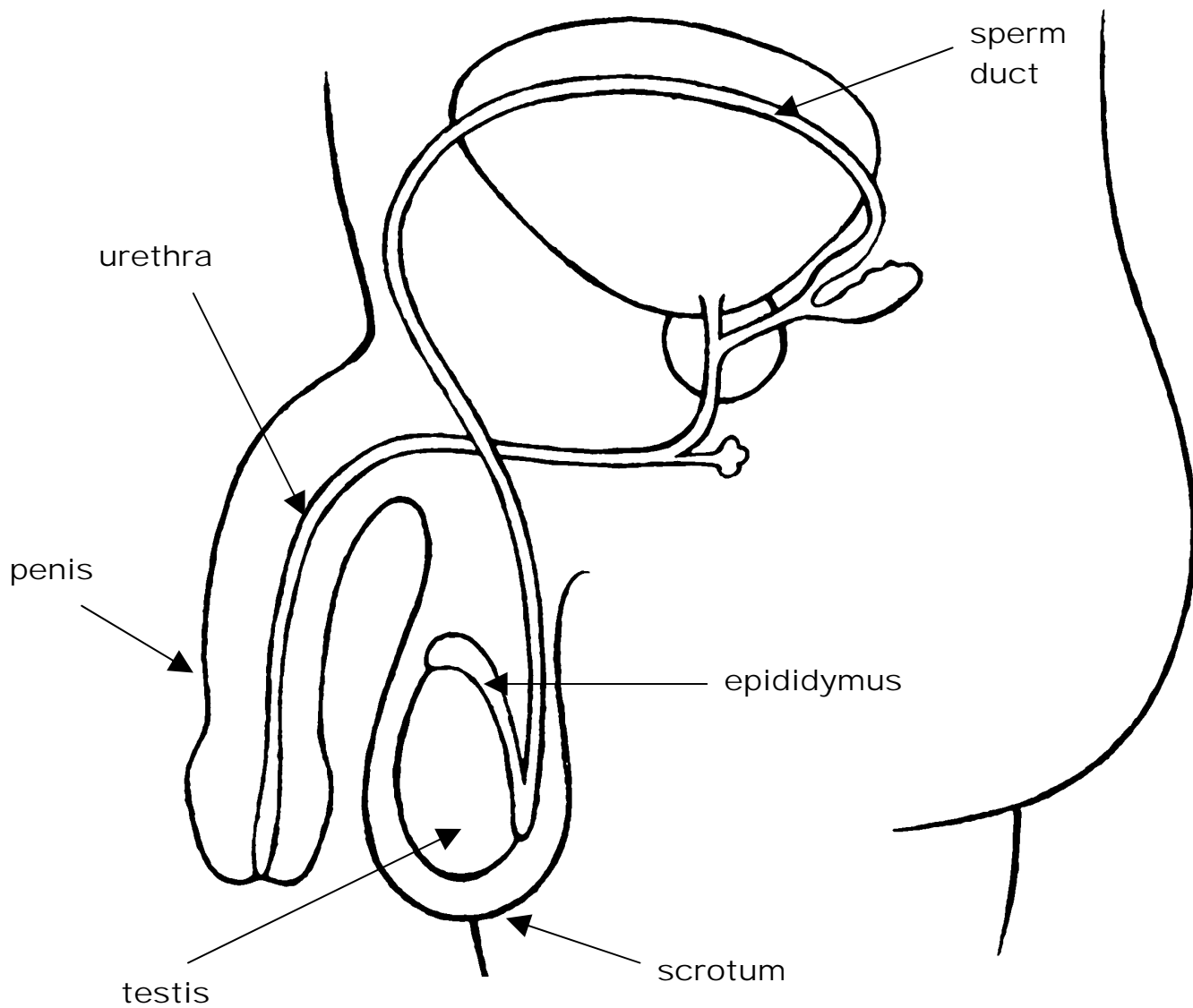
The class should consult the answer keys to determine how clearly you have identified different anatomical structures.

*The Answer Key for this activity appears on pages 10-11.*

Name: \_\_\_\_\_

# Answer Key

## Male Reproductive System

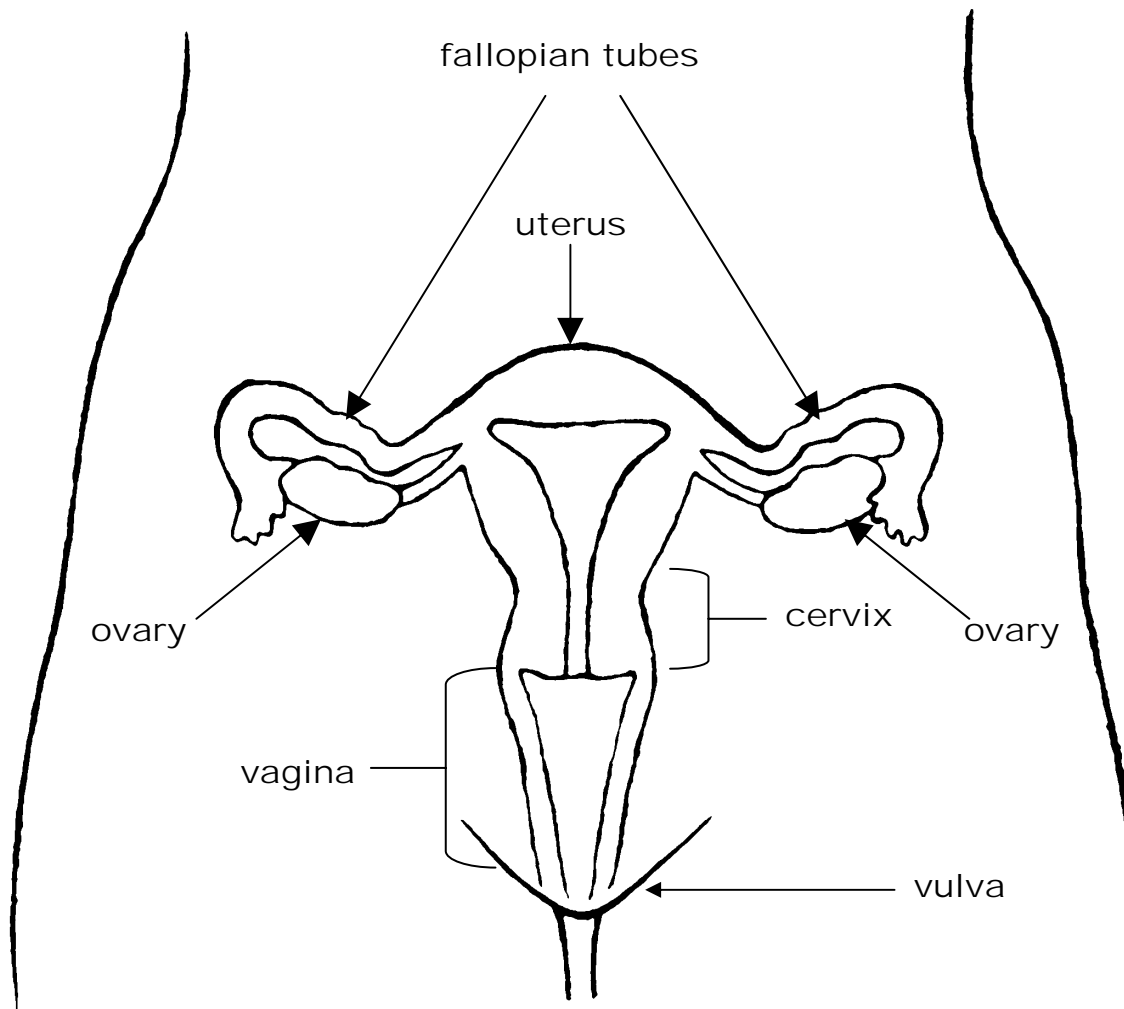


*The Answer Key for this activity is continued on the next page.*

Name: \_\_\_\_\_

# Answer Key

## Female Reproductive System



Name: \_\_\_\_\_

Match the terms in column A with their functions in column B.

Column A

Column B

- |                    |    |  |       |
|--------------------|----|--|-------|
| 1. ovary           | a. | organ where sperm are produced   | _____ |
| 2. penis           | b. | tubes that carry sperm from where they are produced to the outside of the body | _____ |
| 3. sperm ducts     | c. | pouch outside the body that holds the testes                                   | _____ |
| 4. scrotum         | d. | tubules that act as a nursery for sperm  | _____ |
| 5. uterus          | e. | organ through which sperm leave the body                                       | _____ |
| 6. fallopian tubes | f. | organ where eggs are produced  | _____ |
| 7. vagina          | g. | tubes that carry eggs to the uterus  | _____ |
| 8. epididymus      | h. | hollow organ where a fetus develops  | _____ |
| 9. testis          | i. | muscle at the base of the uterus   | _____ |
| 10. cervix         | j. | birth canal  | _____ |

*The Answer Key for this activity appears on the next page.*

Name: \_\_\_\_\_

## Answer Key

Match the terms in column A with their functions in column B.

COLUMN A

COLUMN B

1. ovary	a. organ where sperm are produced	<u>F</u>
2. penis	b. tubes that carry sperm from where they are produced to the outside of the body	<u>E</u>
3. sperm ducts	c. pouch outside the body that holds the testes	<u>B</u>
4. scrotum	d. tubules that act as a nursery for sperm	<u>C</u>
5. uterus	e. organ through which sperm leave the body	<u>H</u>
6. fallopian tubes	f. organ where eggs are produced	<u>G</u>
7. vagina	g. tubes that carry eggs to the uterus	<u>J</u>
8. epididymus	h. hollow organ where a fetus develops	<u>D</u>
9. testis	i. muscle at the base of the uterus	<u>A</u>
10. cervix	j. birth canal	<u>I</u>

Name: \_\_\_\_\_

Pregnancy is an orderly process by which an egg and sperm give rise to a new human infant. The video shows the major events in each of the three trimesters. Use the list of events below and match the events with the trimester in which they occur. The events are listed in a random order.

## Events

- Body systems complete development
- Sperm and egg unite
- Fetus is about 11 inches long
- Limb buds form
- Fetus increases dramatically in size and weight
- Fetus has a tail
- Pregnant woman experiences “morning sickness”
- Birth occurs
- Head bulge forms
- Fetus becomes active
- Fetus is about 20 inches long
- Heartbeat can be heard with a stethoscope
- Gender can be determined with a sonogram
- Pregnant woman may find movement difficult
- Fetus is about three inches long
- Placenta forms

First Trimester:

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*This activity is continued on the next page.*

Name: \_\_\_\_\_

### Second Trimester:

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### Third Trimester:

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To learn more about the stages of fetal development, consult the *Fetal Development* fact sheet.

*The Answer Key for this activity appears on the next page.*

Name: \_\_\_\_\_

## Answer Key

### First Trimester:

Sperm and egg unite

Limb buds form

Fetus has a tail

Pregnant woman experiences “morning sickness”

Head bulge forms

Fetus is about three inches long

Placenta forms

### Second Trimester:

Fetus becomes active

Heartbeat can be heard with a stethoscope

Gender can be determined with a sonogram

Fetus is about 11 inches long

### Third Trimester:

Body systems complete development

Fetus increases dramatically in size and weight

Pregnant woman may find movement difficult

Fetus is about 20 inches long

Birth occurs

Name: \_\_\_\_\_

**THE FERTILIZATION PROCESS**

Use the space below to describe the path of an egg and a sperm from the time they are produced in the body until a fertilized egg implants. Identify each structure they pass through.

Sperm

Egg

↓	↓
↓	↓
↓	↓
↓	↓
↓	
↓	
↓	
↓	

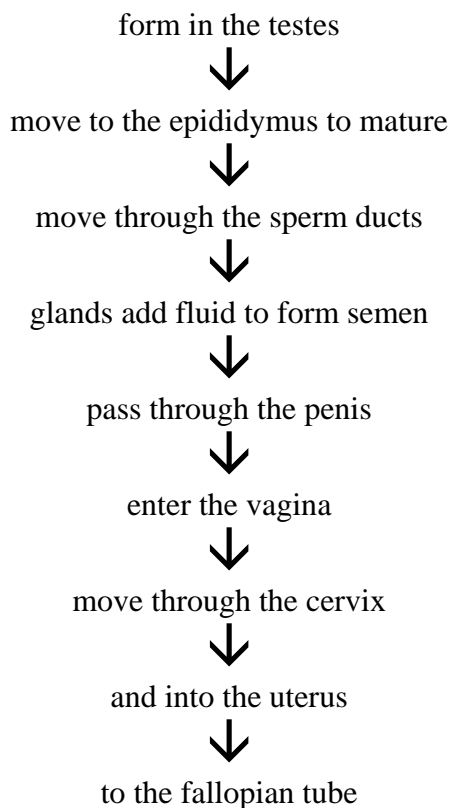
*The Answer Key for this activity appears on the next page.*

Name: \_\_\_\_\_

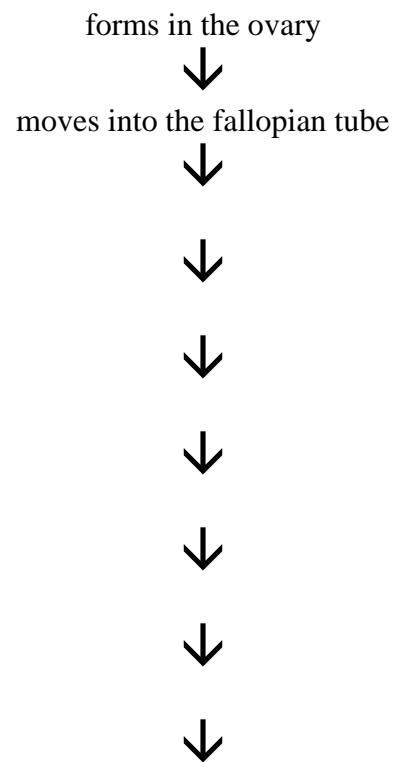
## Answer Key

Use the space below to trace the path of an egg and a sperm from the time they are produced in the body until a fertilized egg implants. Identify each structure they pass through.

### Sperm



### Egg



Sperm and egg meet and join in the fallopian tube.



Egg is now fertilized.



Fertilized egg moves through the remainder of the fallopian tube.



Enters the uterus and implants itself in the uterine lining.

Name: \_\_\_\_\_

Receiving good medical care during pregnancy greatly increases a woman's chance of having a healthy baby. This is called *prenatal care*. It is important for both the pregnant woman as well as her developing fetus. Getting regular prenatal checkups is an effective way to catch any potential problems early and to monitor fetal development.

For this activity, find out what prenatal services are available in your community. You can use your local phone book or the Internet. Answer the questions below.

Who offers prenatal care? (List at least three practitioners in your local area.)

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Does prenatal care include:

- medical checkups?
- nutrition counseling?
- HIV testing?
- parenting education?

What other services are provided?

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How often during her pregnancy should a woman go for prenatal care?

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How much does each visit cost? What does giving birth cost?

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Why is prenatal care important for a pregnant woman and her fetus?

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Name: \_\_\_\_\_

Research one of the topics below and write a brief paper on your findings. You can gather information at your school or local library, as well as on the Internet. Use a *Resource Tracker* to collect information.

### Folic acid deficiency:

What is it? What effect does it have on the fetus? How is it treated? How big a problem is it?

### Gestational diabetes:

What is it? What effect does it have on the fetus? How is it treated? How big a problem is it?

### Drug or alcohol use during pregnancy:

Chose either alcohol or a specific illegal drug. What effect does it have on the fetus? How is it treated? How big a problem is it?

### Low birth weight babies:

What causes low birthweight? What effect does it have on the baby? How can it be prevented? How big a problem is it?

### Exercise in the third trimester:

What kinds of exercise are safe in the third trimester? Is it safe for a pregnant woman to exercise? How often should a pregnant woman exercise? How does exercise affect pregnancy?

### Nutrition during pregnancy:

How many extra calories does a pregnant woman need? What foods should she eat? Which should she avoid? Use the USDA recommendations ([www.mypyramid.com](http://www.mypyramid.com)) to create a sample menu for one day for a pregnant woman in her second trimester.

*This activity is continued on the next page.*

Name: \_\_\_\_\_

Title of book or article:	Title of book or article:
Author(s):	Author(s):
Published by:	Published by:
Copyright date:	Copyright date:
Subject covered:	Subject covered:
Quote(s):	Quote(s):
Notes:	Notes:



Name: \_\_\_\_\_

The fertilized egg is a unique cell. It has the capacity to develop into every different kind of cell in the human body. A cell like this—one that can divide and produce different types of cells—is called a stem cell. Even after being born, a human has stem cells. In the testes, stem cells give rise to sperm. In the bone marrow, stem cells give rise to all the different kinds of blood cells.

Stem cells hold promise in treating many kinds of diseases. Have you heard of bone marrow transplants? This medical treatment uses stem cells. The marrow in the bones of a person who has leukemia, for example, is destroyed, then new, healthy blood stem cells are injected. These stem cells migrate to the bone marrow and produce healthy blood cells rather than the cancerous blood cells of leukemia.

It has been discovered that the blood in the umbilical cord of a newborn is filled with stem cells. There is now a program, called the National Cord Blood Program, that collects and stores cord blood so its stem cells can be used to help save lives.

Use the Internet to find out about the National Cord Blood Program.

What does it do?

Is there a hospital near you that participates?

Who can donate to this program?

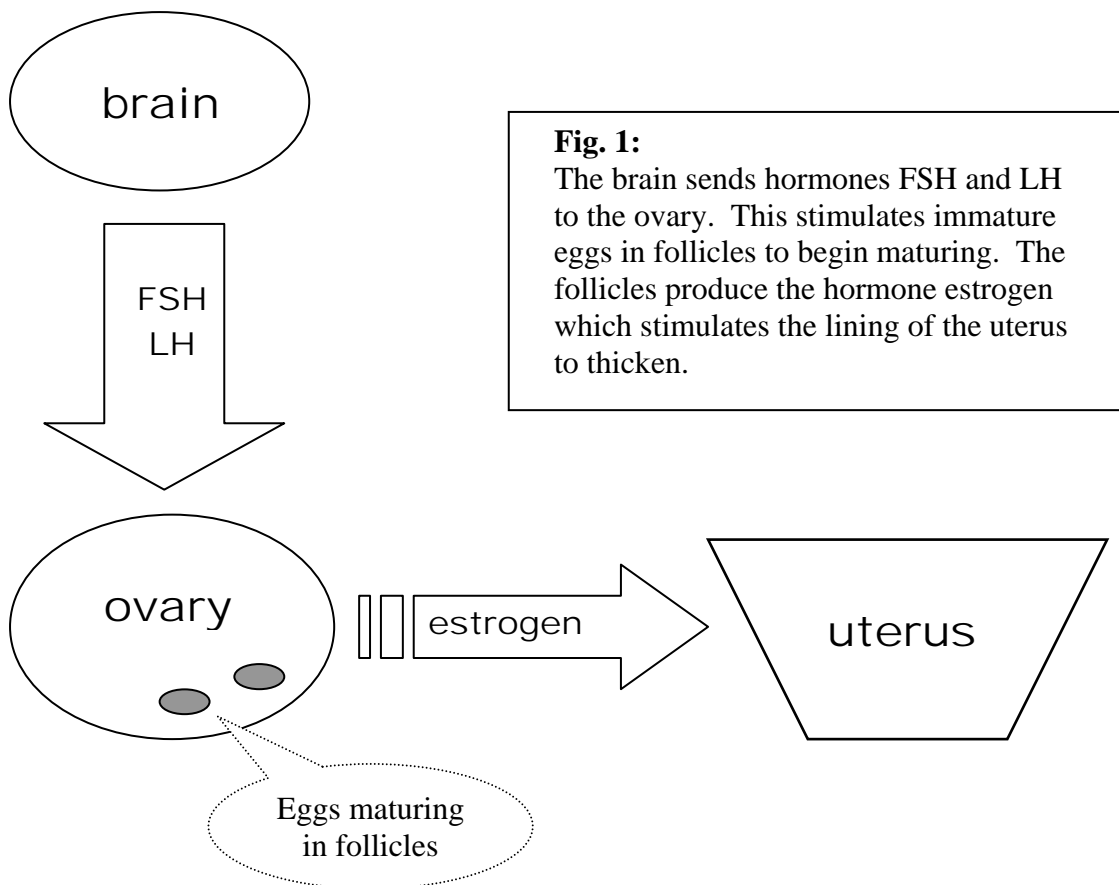
Who can benefit from this program?

# FACT SHEETS

Name: \_\_\_\_\_

Under the direction of male hormones, men produce sperm continuously beginning at puberty. Women, on the other hand, usually produce only one mature egg each month. Inside a woman's body, hormones, the brain, ovaries and uterus interact in an intricate series of activities that end with a monthly flow of blood called the menstrual cycle.

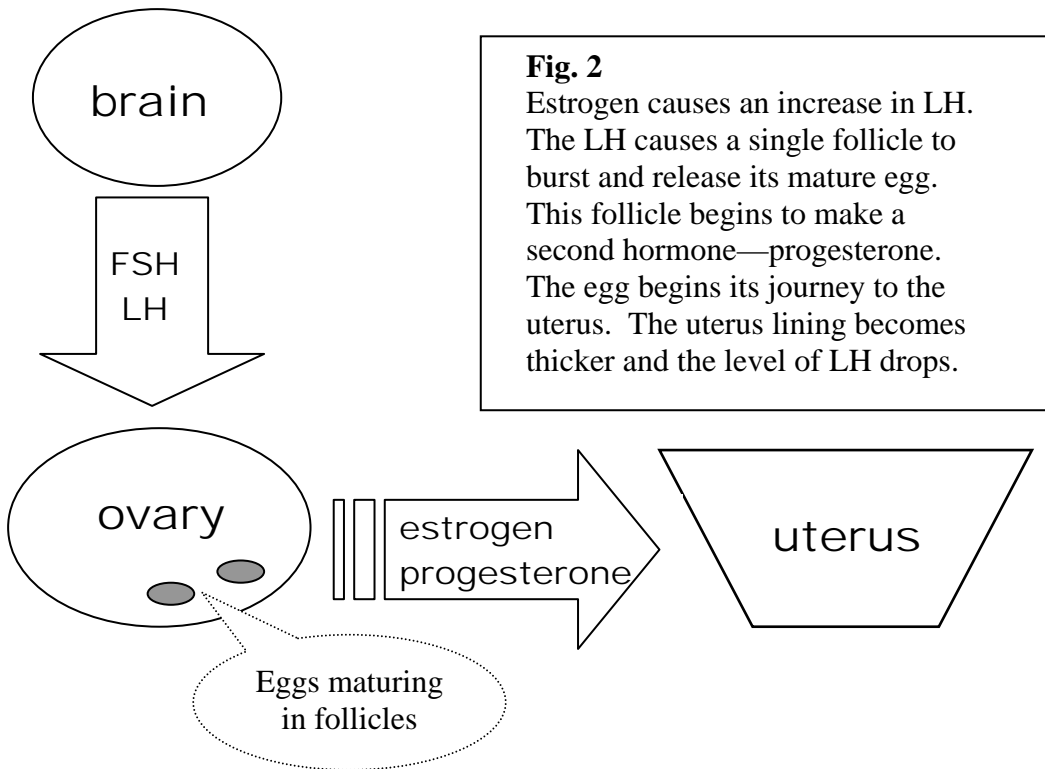
Note: FSH is follicle-stimulating hormone. LH is leutinizing hormone.



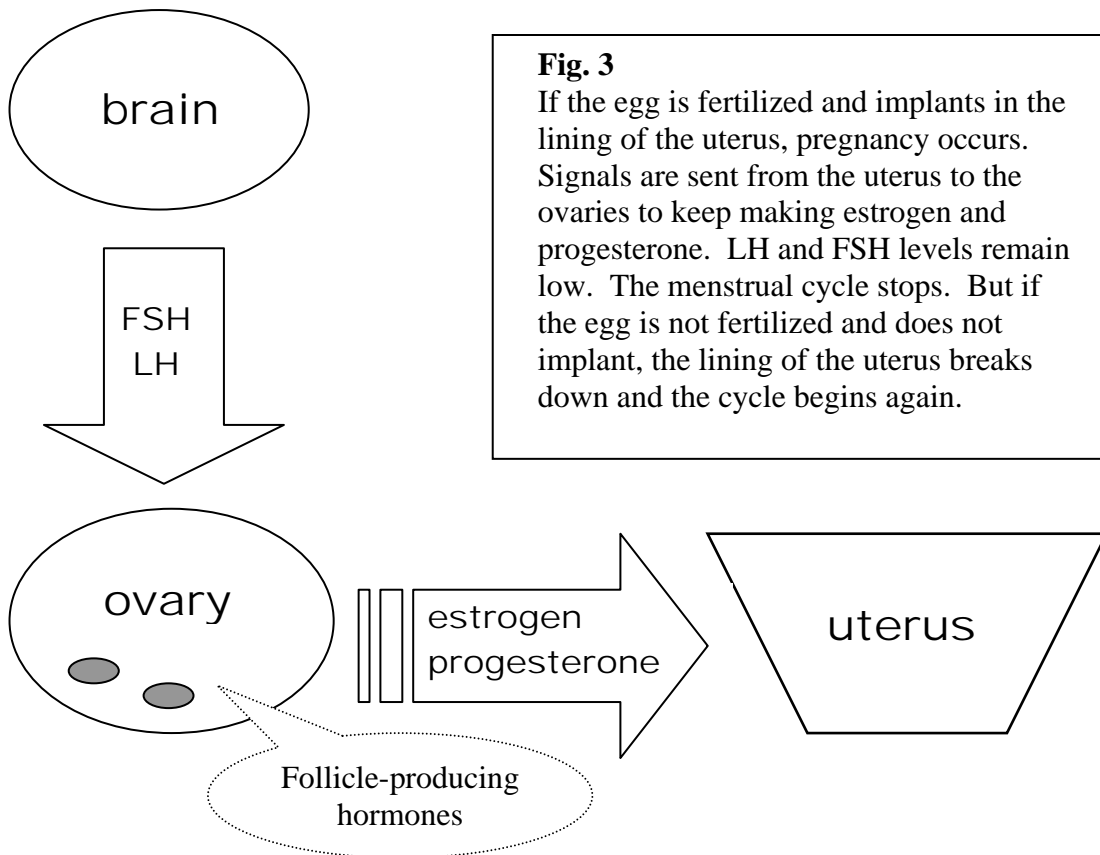
*This fact sheet is continued on the next page.*

Name: \_\_\_\_\_

THE MENSTRUAL CYCLE



**Fig. 2**  
Estrogen causes an increase in LH. The LH causes a single follicle to burst and release its mature egg. This follicle begins to make a second hormone—progesterone. The egg begins its journey to the uterus. The uterus lining becomes thicker and the level of LH drops.



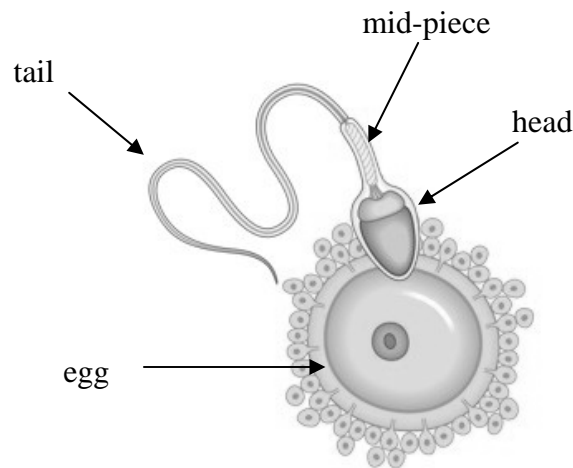
**Fig. 3**  
If the egg is fertilized and implants in the lining of the uterus, pregnancy occurs. Signals are sent from the uterus to the ovaries to keep making estrogen and progesterone. LH and FSH levels remain low. The menstrual cycle stops. But if the egg is not fertilized and does not implant, the lining of the uterus breaks down and the cycle begins again.

**THE PRODUCTION OF SPERM**

Women are born with all the eggs that they will release in a lifetime. But men produce new sperm every day from puberty to the end of their lives. The testes are the workshops that produce the sperm.

Each sperm looks like a tiny tadpole with a pointy head and a long beating tail. But they don't start out this way. Sperm begin as very ordinary looking cells and go through a series of transformations to take on their distinctive shape.

Inside each testis are coils of tiny tubing—about 750 feet of tubing in each testis. The cells lining these tubes divide constantly to form the cells that will become sperm. The cells lengthen and form into three distinct sections. The head is almost completely filled by the nucleus—genetic material that is the sperm's payload, the cargo it will try to deliver to form the next generation. The sperm's mid-section is the energy pack. This area of the sperm is packed with mitochondria, the cell's powerhouse. The final section is the tail. At the very front of the head is a cap filled with enzymes. These enzymes are released when a sperm meets an egg. They break down the jelly-like coating that surrounds the egg, making it possible for the sperm to embed itself into the egg.



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Even though these cells look like sperm, they are not mature yet and they cannot swim on their own. The immature sperm travel out of the testes and into a duct that carries them up to coiled ducts on the top of each testis called the epididymus. This is the nursery where sperm complete their maturation. The epididymus is also a waiting area where sperm remain until they travel through the sperm ducts to be released.

Hormones from the brain control the production of male hormones. LH (leutinizing hormone) stimulates the production of testosterone. FSH (follicle-stimulating hormone), with testosterone, stimulates the production of sperm.

Name: \_\_\_\_\_

Prenatal care is a special kind of regular medical care that a woman gets during her pregnancy. It checks on her health and the health of her fetus. It helps the woman learn about nutrition, vitamin supplements and exercise during pregnancy. Additionally, it provides reassurance that the pregnancy is going normally.

### Who Should Have Prenatal Care?



Prenatal care is recommended for all pregnant women—even those who have had problem-free pregnancies in the past. Women who have prenatal care are much less likely to have a *low-birthweight* baby—that is, a baby who weighs less than 5 pounds 8 ounces at birth. Some babies have low birthweight because they are born before they reach full term—37 weeks of development in the mother’s uterus. Others are full term, but have low birthweight for a number of factors: an infection in their mother’s uterus, inadequate nutrition, smoking or drug use. These babies have immediate and often long-term health problems, including respiratory problems, vision problems and delayed mental development. Prenatal care can detect—and correct—some of the problems that can result in low birthweight.

### What is Prenatal Care?

Prenatal care begins when a woman sees a doctor because she thinks she might be pregnant. When her pregnancy is confirmed, she will see a doctor each month through the first six months of pregnancy, then twice a month during the seventh and eighth months. After the eighth month, she will have weekly visits until the baby is born. If any problems are discovered, additional visits may be recommended.

Blood and urine tests will be done regularly to check for infections and other conditions, such as *gestational diabetes*. This condition occurs late in pregnancy in women who have no history of diabetes and is marked by high blood sugar. If untreated, their babies are at risk for obesity and developing type 2 diabetes. However, if diagnosed early, a special diet and exercise can minimize the effects on the developing fetus.

During the 18<sup>th</sup> - 20<sup>th</sup> week of pregnancy, an ultrasound or sonogram will be done. This lets the doctor look inside the uterus and check on the fetus. Many questions can be answered with a sonogram when a trained person is interpreting it:

- Is the fetus the right size for this stage of pregnancy?
- Are there any obvious birth defects?
- What is its gender?
- Is the placenta healthy?

In most pregnancies, the ultrasound is reassuring. But occasionally problems are identified that will need some type of medical intervention.

Name: \_\_\_\_\_

In the video, you saw the stages an embryo and fetus go through during their development. The table below provides a review of what you have seen.

Weeks	Key Events
1-4	<p>Egg is fertilized (zygote) and begins dividing rapidly as it moves toward the uterus.</p> <p>The lining of the uterus thickens.</p> <p>The zygote implants in the lining of the uterus.</p> <p>The cells of the zygote split into groups to form the embryo that will develop into the fetus, the beginnings of the placenta that will nourish the fetus and the membranes that surround the fetus.</p> <p>The cells of the embryo form three layers—one gives rise to skin and hair, another produces the muscles and bones and the third will form the internal organs.</p>
5-8	<p>Two tubes form that are the beginning of the heart.</p> <p>Another tube forms that will become the brain and spinal cord.</p> <p>One end begins to bulge where the head is forming; bumps on the bulge will grow into the eyes and nose. At the other end is a tail.</p> <p>Buds form that will push out to form the arms and legs with webbed fingers and toes.</p> <p>Lips and eyelids begin to form.</p> <p>Kidneys begin to form.</p> <p>The fetus is about one-half inch long.</p>
9-13	<p>The liver begins to form.</p> <p>Bones and teeth begin to form.</p> <p>The outlines of the body system are formed.</p> <p>White blood cell production begins.</p> <p>Vocal cords are forming.</p> <p>The head is about half the size of the body.</p> <p>The placenta is still small and weighs about one ounce.</p> <p>The fetus is about two and a half inches long.</p>

*This fact sheet is continued on the next page.*

14-17	<p>The developing eyes move from the sides of the head to the face.</p> <p>The fetus moves constantly, but is too small for the movements to be felt.</p> <p>Eyebrows and eyelashes begin to grow.</p> <p>The fetus makes sucking motions and sucks in amniotic fluid.</p> <p>The fetus begins to put on body fat.</p> <p>The fetus is about five inches long and weighs about three ounces.</p> <p>The pregnancy may begin to “show.”</p>
18-22	<p>Nerves are forming and connecting with one another.</p> <p>The areas of the brain that will interpret taste, touch, sight and hearing begin to form.</p> <p>Movements of the fetus become more coordinated and can be felt.</p> <p>Gender can be determined by ultrasound.</p> <p>If the fetus is female, eggs begin to form in her ovaries.</p> <p>The fetus is about eight inches long and weighs about one pound.</p>
23-27	<p>Heartbeat can be heard with a stethoscope.</p> <p>Blood vessels are forming under the skin.</p> <p>The fetus can hear sounds.</p> <p>The retinas of the eyes have formed and the eyes, which have been closed, are beginning to open.</p> <p>The fetus may hiccup.</p> <p>Growth has been rapid, but the fetus is still very thin.</p> <p>The fetus is about 15 inches long and weighs about two pounds.</p>
28-31	<p>Punches and kicks become stronger.</p> <p>The brain, which has been smooth, begins to develop folds.</p> <p>Red blood cells, which had been produced in the spleen, are now produced in the bone marrow.</p> <p>The fetus responds to external stimuli.</p> <p>The fetus has just about reached its total length—about 18-20 inches—and weighs three to four pounds.</p>

*This fact sheet is continued on the next page.*

Name: \_\_\_\_\_

<p>32-36</p>	<p>If the fetus is male, the scrotum has formed and the testicles descend into it.</p> <p>The lungs finish development.</p> <p>The fetus will turn to the head-down position.</p> <p>As the fetus gains weight, it moves less because it has less room.</p> <p>The fetus is 18-20 inches long and weighs about six pounds.</p>
<p>37- birth</p>	<p>At 37 weeks, the fetus is considered “full term”—most systems are developed and functioning and the chance of survival is very high.</p> <p>Weight gain slows.</p> <p>Some pregnancies, especially first pregnancies, may last several more weeks.</p>

Name: \_\_\_\_\_

**SCREENING NEWBORNS  
FOR INHERITED DISEASES**

In the video, we saw that genetic material from the mother and father unite in the fertilized egg. This genetic map provides the blueprint for the development of a new human. But sometimes there are flaws in the genetic map—genes that cause disease. In some cases only one parent needs to contribute the defective gene; more often, the offspring has to receive a gene from each parent for the defect for disease to result.

Twenty-eight of these diseases can be detected easily in newborns. In the U.S. all states require the testing of newborns for some or all of these diseases. Soon after birth, a blood sample is taken from the baby—usually by a heel stick—and tested for inherited diseases.

These diseases fall into several categories. Some are malfunctions of the endocrine system, others are problems with blood and the largest group are problems with metabolism—digesting and using nutrients. Most of these diseases have complicated names that only people in the medical profession understand. But there is one disease you’ve probably heard of—sickle cell anemia. This is a blood disorder. In sickle cell anemia, red blood cells are deformed and, as a result, can’t carry as much oxygen as a normal red blood cell. A person with sickle cell anemia may tire easily and the deformed red blood cells can clog the capillaries, causing organ damage and extreme pain. A baby with this disease has received a sickle cell gene from each parent.

One of the most common metabolic disorders is PKU (phenylketonuria). A baby with PKU has received defective genes from both parents that makes him or her unable to produce an enzyme necessary to metabolize an amino acid called phenylalanine. If untreated, this condition interferes with normal development of the brain and can cause mental retardation. However, if a baby with PKU is put on a special diet that is low in phenylalanine, he or she will develop normally. For unknown reasons, some children with PKU can safely go off their special diet when they’re about 12 and have no negative results.

Most of these diseases are rare. PKU, one of the more common ones, occurs in one birth out of every 100,000-150,000. With four million births in the U.S. each year, that’s only 25-40 babies with PKU. So why test? The purpose of these tests is to identify these inherited diseases early. With some, like PKU, there are interventions that can reduce or prevent problems the disease can cause. With others, parents can be educated about the disease so they can provide appropriate care for their child. In all cases, it is important that these babies be referred to doctors who are knowledgeable about their condition. Taking these steps can improve the health of these children and make their lives more normal.

Name: \_\_\_\_\_

Has a couple expecting a baby ever offered to show you their “baby” pictures? It’s obvious that they don’t have a baby yet, so what is it they’re showing you?

Most pregnant women get sonograms—also called ultrasounds—as part of their prenatal care. A doctor or technician moves a wand over the woman’s abdomen. The wand sends out low-frequency sound waves that enter the woman’s body. As the sound waves hit tissue, they bounce back forming an echo. (This is the same phenomenon you experience when you shout in a canyon and hear the echo of your voice.) The wand detects the echo and sends the information to a computer. The computer, in turn, uses the information to form an image on its screen.

This picture shows the 20-week sonogram of the fetus of the couple in this video. The head and face are to the left in the picture.



Prenatal sonograms have many purposes. They let the doctor check to see that the fetus is developing normally and that the placenta is healthy. After 16 weeks they can show the gender of the fetus—if the prospective parents want to know it. Sonograms can also detect certain health problems that can be treated before birth.

Sometimes this means dietary changes or medication for the prospective mother; sometimes it means performing surgery on the developing fetus. They can also detect certain birth defects, such as cleft lip and palate, which will be treated after birth. And, of course, they can detect multiple fetuses.

Sonogram technology was developed around 1960 and has a wide variety of medical uses. You may have had a sonogram for a soft tissue injury like a torn ligament or tendon. This long, successful history has shown that ultrasound technology is quite safe. But while ultrasound is a vital tool in prenatal care, doctors urge the same caution as with most other things during pregnancy—don’t overuse it.

There are no hard-and-fast rules for when ultrasound should be done, but most women will have it at 18-20 weeks and again after 31 weeks. This late sonogram is to assess any problems that might affect a normal birth, such as low weight of the fetus, problems with the attachment of the placenta or the umbilical cord wrapped around the fetus in a way that would hamper normal birth. Additional sonograms can be done earlier to confirm that a woman is pregnant or after 20 weeks to follow up on any apparent problems in the 18-20 week sonogram.

Now, when pregnant friends offer to show you their “baby” pictures, you’ll know what to expect.

Name: \_\_\_\_\_

You've probably heard it said that a pregnant woman is "eating for two." This is true in a very real sense. After the embryo uses up the food stores in the yolk sac, the fetus is dependent on the placenta for its nutrition. These nutrients come from the diet of the prospective mother.

In comparison to its size, the developing fetus has huge nutritional needs—calcium for the formation of bones, iron for blood, folate (a B vitamin) for normal development of the nervous system, many other vitamins and minerals and, of course, enough energy to fuel the many dramatic changes that are taking place.

Fetal nutritional needs take priority over those of the prospective mother. As a result, a woman can experience nutritional deficiencies if she is not "eating enough for two." If you've seen how a woman's body grows over the course of pregnancy, you'll have noticed that she gains weight. Women of normal weight at the beginning of pregnancy should gain around 25 pounds, including the fetus. Those of higher weight are counseled to gain less.

"Eating for two" is not an invitation to consume twice as much food as normal. In fact, this maxim doesn't begin until the second trimester of pregnancy. Then the woman is advised to increase her food intake by 300 calories a day—an extra glass of low-fat milk and a couple of extra servings of fresh fruit is about 300 calories.

But weight gain alone doesn't mean a healthy pregnancy. **What** is eaten is even more important. For women, pregnancy is the most critical time to follow a healthy diet plan. This means no junk food, absolutely no alcohol and reducing sugar and salt intake. It does mean eating sensibly. Five small meals or three meals and two snacks a day are recommended.

Although a well-balanced diet is essential during pregnancy, it may not be quite enough. The demand for certain nutrients can be so high during pregnancy that diet alone cannot meet them.

Iron and folic acid are prime examples. Iron is necessary for red blood cells. If a pregnant woman does not get enough iron, she can become anemic, which makes her tire easily. Folic acid is a B vitamin that is necessary for the fetus to develop a normal nervous system. If there is inadequate folic acid during early pregnancy, birth defects, called neural tube defects, can occur. To remedy this, most pregnant women are put on prenatal vitamins to supplement dietary iron and other vitamins and minerals.

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Name: \_\_\_\_\_

Now for what to eat. The U.S. Department of Agriculture has a nutrition website called MyPyramid ([www.mypyramid.gov](http://www.mypyramid.gov)). The daily recommendations for pregnant women are:

Dairy and eggs: three cups	low-fat or nonfat dairy
Meat and beans: six ounces	meat, fish, poultry, eggs, lunch meat, beans
Fruit: two cups	a piece of fruit usually counts as one cup
Vegetable: three cups	cooked vegetables are measured by the cup; two cups leafy greens = one cup cooked vegetables
Grain: seven to nine ounces	one ounce = one slice whole grain bread, one cup whole grain cereal; ½ cup rice, pasta or cooked cereal
Oils: small amounts only	cooking and salad oils, nuts, olives

The MyPyramid website has an interactive feature that allows a pregnant woman to input basic information—age, height, weight and due date—and receive nutritional recommendations.

Name: \_\_\_\_\_

You have probably heard the public service announcements telling women not to drink alcohol during pregnancy or if they are trying to become pregnant. You may even have been in stores that sell alcoholic beverages and seen signs telling pregnant women not to drink.

Why all this concern? Anything a pregnant woman takes into her body is shared with her fetus—food, nutritional supplements, drugs and alcohol. If she takes a drink, her fetus does, too. It is safe for adults to drink small amounts of alcohol. But for a developing fetus, no amount of alcohol seems to be safe.

The effects of alcohol on a fetus are dramatic and lifelong. The most devastating effects take place in the brain and nervous system. Structures within the brain can develop abnormally—sometimes they are underdeveloped, sometimes they are misshapen. This can result in learning disabilities, behavioral problems, and, in some cases, mental retardation. In fact, fetal alcohol syndrome (FAS) is now considered the major cause of mental retardation.

Alcohol also affects fetal growth. The fetus will be small and, even near birth, will have a low weight. After birth the baby can be irritable and fail to thrive—that is, fail to gain weight and develop normally. This small size can persist for the child's entire life.

Babies born with fetal alcohol syndrome have distinctive facial characteristics. Their eyes are wide apart. The cleft below the nose is absent or shallow and their upper lip is thin. These facial characteristics are often used with height and weight to diagnose fetal alcohol syndrome.

Early diagnosis can get the baby medical help that can address failure to thrive, but the effects of fetal alcohol syndrome cannot be reversed. Children born with this will have problems throughout their lives and can benefit from training in social skills and extra help in school.

In the U.S. between one in 500 and one in 5,000 babies are born with fetal alcohol syndrome. This means that 800 to 8,000 babies every year are born with FAS.

Fetal alcohol syndrome is the extreme—the fetus was exposed to high levels of alcohol during pregnancy. **Fetal alcohol spectrum disorder** (FASD) is a term used to describe a broad range of effects associated with alcohol use during pregnancy. Unlike people with FAS, those with other prenatal alcohol-related conditions under the umbrella of FASD may not show the identifying physical characteristics of FAS and, as a result, they often go undiagnosed. The baby may be smaller than normal, but not considered low birthweight. The facial characteristics are present, but are not as pronounced. Learning difficulties and behavioral problems may occur, but are less severe than those seen in children with fetal alcohol syndrome.

The good news about fetal alcohol syndrome is that it is 100 percent preventable by avoiding alcohol during pregnancy.

Name: \_\_\_\_\_

**WHAT ABOUT MULTIPLES?**

You probably know people who are twins. Maybe you even know triplets. What you may not know is how multiple births occur.

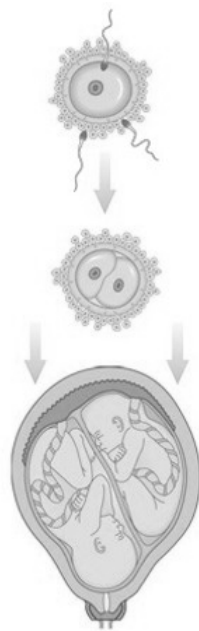
As you saw in the video, a single egg is released from the ovary, fuses with a sperm in the fallopian tube, then implants in the uterus and develops into a single human offspring. This is the usual pattern. Most human births are only a single child.

But sometimes the usual pattern isn't followed. Remember how the fertilized egg, or zygote, divides rapidly as it travels to the uterus? Sometimes, during this division process, the tiny ball of cells actually splits, forming two balls of cells. If both zygotes successfully implant in the uterus, two genetically identical fetuses develop. These are **identical twins**.

But what about **fraternal twins**—babies that are born at the same time, but are no more alike than brothers or sisters born years apart? In this case two eggs, rather than the usual one, are released from the ovary and fertilized on their way to the uterus. Each implants and develops into a fetus. Since each grows from a different egg and sperm, they are as genetically similar as any two siblings, but they are not identical.

What about **triplets**? If you said that a single zygote splits into three or that three eggs are released and fertilized, you'd be right. It can also be a case of one zygote splitting in two and a second zygote developing in the usual manner. In the first case—one zygote—the triplets are identical. In the second—three zygotes—they are fraternal. In the final example, two triplets are identical and the third is fraternal to the other two.

identical twins



fraternal twins



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*This fact sheet is continued on the next page.*

## What are the chances of multiple births?

In the U.S. about four of every 1,000 births produces identical twins. The number for fraternal twins varies by the age of the mother. Women younger than 20 have fraternal twins in about three of every 1,000 pregnancies, while those between ages 35 and 40 have fraternal twins in about 14 of every 1,000 pregnancies.

Race also plays a role in frequency of fraternal twins. African-American women have more than ten sets of fraternal twins per 1,000 pregnancies. White women have seven to ten sets and Asian women have three sets per 1,000 births.

As you might guess, triplets occur even less frequently—about one set in every 10,000 births. **Quadruplets**—four babies born at the same time—are even rarer. Only one set of quads is born for each 600,000 births.

## More multiple births lately

Compare the number of twins and triplets you know with the number your parents knew when they were your age. You might find that you know more. Could it be that there are more twins and triplets now than there were 25 years ago? The answer is YES.

Over the last 25 years the study of fertility has matured and is now frequently used by couples who are having difficulty getting pregnant. Doctors specially trained in fertility problems work with these couples. There are two techniques that are commonly used.

The first is the use of fertility drugs. These medications cause the woman to ovulate at a specific time; intercourse is then timed to increase the likelihood of pregnancy. In some instances the male partner's sperm may be collected and injected into the woman near the cervix or even into the uterus. This is called artificial insemination; it is timed carefully so sperm will reach the egg while it is in the fallopian tube.

The second is *in vitro* (literally, in glass) fertilization or IVF. In this process eggs are removed from the woman and are fertilized with sperm outside the body. The zygotes that form are returned to the woman's reproductive tract where they can develop.

In both procedures multiple births are common. Women who take fertility drugs frequently release multiple eggs and often more than one is fertilized and implants. Since, under normal circumstances, an estimated 40 percent of all fertilized eggs fail to implant and develop, *in vitro* fertilization routinely returns multiple zygotes to the woman's body to increase the chance that at least one will implant.

Source: <[www.emedicine.com/PED/topic2599.htm](http://www.emedicine.com/PED/topic2599.htm)> *Multiple Births* by Terence Zach, MD, Department Vice-Chair, Professor, Department of Pediatrics, Section of Newborn Medicine, Creighton University.

Name: \_\_\_\_\_

The resources below can help you find almost any information you want to know or need to find out about human reproduction.

<[www.kidshealth.org](http://www.kidshealth.org)>

This website has sections for teens, kids and parents and a wealth of health information for all three.

<[www.kidshealth.org/teen/sexual\\_health/guys/male\\_repro.html](http://www.kidshealth.org/teen/sexual_health/guys/male_repro.html)>

This link provides a thorough overview of the male reproductive system.

<[www.kidshealth.org/teen/sexual\\_health/girls/female\\_repro.html](http://www.kidshealth.org/teen/sexual_health/girls/female_repro.html)>

This link provides a thorough overview of the female reproductive system.

<[www.plannedparenthood.org/index.htm](http://www.plannedparenthood.org/index.htm)>

Planned Parenthood's website has excellent information about pregnancy and prenatal care.

<[www.marchofdimes.com](http://www.marchofdimes.com)>

The March of Dimes Foundation website provides information on pregnancy, prematurity and preventing birth defects.

<[www.mypyramid.gov](http://www.mypyramid.gov)>

This US government website provides nutrition guidelines for people at all stages of life, including pregnancy, and includes interactive features that let users of the site get personalized information.

<[www.webmd.com](http://www.webmd.com)>

WebMD is a website of excellent medical information on a range of medical topics including pregnancy and human reproduction.

<[www.babycenter.com/pregnancy-fetal-development-index](http://www.babycenter.com/pregnancy-fetal-development-index)>

The Baby Center shows fetal development week by week and uses a cursor rollover feature to allow the user to get more information on key developments.

Name: \_\_\_\_\_

There are thousands of books about human reproduction and even more articles. This selected bibliography focuses on recent books written for young adults.

**101 Questions About Reproduction: Or How 1 + 1 = 3 or 4 or More**

by Faith Hickman Brynie, 2004, 21<sup>st</sup> Century Press

*Human reproduction is explained in a question-and-answer format, using questions from teens. Each chapter is followed by a feature article that expands on questions in the chapter.*

**S.E.X.: The All-You-Need-To-Know Progressive Sexuality Guide to Get You Through High School and College**

by Heather Corinna, 2007, Da Capo Press

*This popular book provides a wealth of useful information about all aspects of reproduction and sexuality for the teen audience.*

**Eating for Pregnancy: An Essential Guide to Nutrition with Recipes for the Whole Family**

by Catherine Jones (Author), Rose Ann Hudson (Contributor), 2003, Da Capo Press

*This book provides nutrition information that is specific for pregnant women, including how to achieve gradual weight gain, food items to avoid during pregnancy and good solid information on the different nutrients. Most of the book is devoted to recipes (including which nutrients are featured in each) and has sample menus to get the reader started on a nutritionally sound pregnancy.*

**A Child is Born**

by Lennart Nilsson, 2004, Delta

*This book is a collection of the ground-breaking photographs of fetal development done by Nilsson in the 1960s.*

**Life**

by Lennart Nilsson, Hans Wigzell, Mark Holborn, 2006, Harry N. Abrams

*Including many of the photographs from A Child is Born, this book traces the human lifespan.*

**The Best I Can Be: Living with Fetal Alcohol Syndrome Effects**

by Liz Kulp and Jodee Kulp, 2000, Better Endings New Beginnings

*This is Liz Kulp's story of what it is like to be a teenager living with FASE.*

**The Underground Guide to Teenage Sexuality, 2nd Edition**

by Michael J. Basso, 2003, Fairview Press

*Clear, accurate, current information for teens about their reproductive systems.*

**Changing Bodies, Changing Lives: Expanded Third Edition: A Book for Teens on Sex and Relationships**

by Ruth Bell, 1998, Three Rivers Press

*This is a classic that still speaks to teens.*

OTHER PROGRAMS  
FROM HUMAN RELATIONS MEDIA

<i>STDs: Just the Facts</i>	PowerPoint presentation
<i>Preparing for Marriage</i>	PowerPoint presentation
<i>Contraception Options</i>	PowerPoint presentation
<i>Understanding HIV and AIDS</i>	Video/print or DVD/print
<i>Understanding Fetal Alcohol Syndrome</i>	Video/print or DVD/print
<i>Diabetes: Why Many Teens Are at Risk</i>	Video/print or DVD/print
<i>Lifestyle Diseases and How to Avoid Them</i>	Video/print or DVD/print
<i>Nutrition Myths and Facts</i>	Video/print or DVD/print
<i>Do You Have an Eating Disorder?</i>	Video/print or DVD/print
<i>Straight Talk: The Truth about STDs</i>	Video/print or DVD/print
<i>Parenthood: Are You Prepared?</i>	Video/print or DVD/print
<i>No Safe Amount: Women, Alcohol and Fetal Alcohol Syndrome</i>	Video/print or DVD/print
<i>From A to ZZZs: What Teens Need to Know about Sleep</i>	Video/print or DVD/print
<i>Curriculum in a Box: Human Sexuality and Responsibility</i>	Video/DVD/print curriculum
<i>Systems of the Body: Digestion</i>	Video/print or DVD/print
<i>Systems of the Body: Muscle and Bone</i>	Video/print or DVD/print
<i>Systems of the Body: The Nervous System</i>	Video/print or DVD/print
<i>This Is Your Brain on Tobacco: A Research Update</i>	Video/print or DVD/print
<i>Pharm Parties: A Lethal Mix</i>	Video/print or DVD/print
<i>Teen Depression: Signs, Symptoms and Getting Help</i>	Video/print or DVD/print
<i>The Five Essential Habits of Healthy Teens</i>	Video/print or DVD/print

**Visit our website for detailed descriptions of the above programs.**

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