CHAPTER 19:
The Endocrine System and Reproduction
Chapter 19 Objectives

Section 1: Endocrine System
1. Explain the function of the endocrine system
2. Define a hormone
3. Describe how a hormone and target cell interact
4. List the major endocrine glands of the body and their functions
5. Describe the concept of negative feedback
6. Explain the connection between hormones, puberty, and sexual maturation.

Section 2: The Male and Female Reproductive Systems
1. Differentiate between adolescence and puberty;
2. List several changes in secondary sexual characteristics in both males and females during puberty;
3. Analyze the importance of hormones to the reproductive system;
4. Identify and describe the function of the following male reproductive organs:
   a. Testes (testicle)
   b. Scrotum
   c. Epididymis
   d. Vas deferens
   e. Seminal vesicle
   f. Prostate gland
   g. Cowper's gland
   h. Bladder
   i. Urethra
   j. Penis
   k. Foreskin
   l. Penis
5. Explain the mechanism by which an erection occurs;
6. Trace the route of sperm from the testes until it meets the egg in the fallopian tube;
7. Define orgasm and nocturnal emissions (wet dreams);
8. Identify and describe the function of the following female reproductive organs:
   a. Anus
   b. Bladder
   c. Cervix
   d. Clitoris
   e. Fallopian tube
   f. Inner labia
   g. Outer labia
   h. Ovary
   i. Rectum
   j. Urethra and urethral opening
   k. Uterus
   l. Vagina
9. Describe the stages of the menstrual cycle;
10. Describe the egg’s maturation and ovulation.

Section 3: The Human Life Cycle
1. Identify processes in which hormones influence the development of the egg;
2. Recognize that gametes contain hereditary information in the form of 23 chromosomes, and give two examples of inherited traits;
3. Define fertilization and how genetic information is combined;
4. Explain how the gender of an embryo is determined;
5. Describe the processes leading to the formation of fraternal or identical twins and the differences or similarities in the resulting genetic information;
6. Trace the path of a zygote from its formation until implantation;
7. Discuss the function of the uterus and uterine lining for the embryo;
8. Discuss the general function of the hormones during pregnancy;
9. Discuss why the first eight weeks of pregnancy are critical to the embryo’s development;
10. Differentiate between a zygote, embryo, and fetus;
11. List 5 substances harmful to the embryo and describe the importance of avoiding them;
12. Describe the function of the placenta and its formation from tissues of the embryo and mother to provide nourishment and waste removal;
13. Describe the function of amniotic fluid;
14. Discuss 3 problems that may occur in an embryo and options for embryonic screening;
15. Briefly describe the differences in development of the embryo and fetus during the three trimesters of pregnancy;
16. Describe a normal birth position and a breech position;
17. Identify and briefly explain the three main stages of childbirth;
18. Define caesarean section and possible reasons for one at childbirth;
19. Recognize the purpose of the fontanel during passage through the birth canal;
20. Define abstinence as a lifestyle choice;
21. Recognize the value in choosing abstinence over sexual activity during adolescence;
22. Explain the difference between “love” and “like” and their relevance to adolescent relationships;
23. Recognize effects of alcohol and/or drug use in making decisions about sexual activity;
24. Define sexually transmitted infection (STI);
25. List examples of bacterial STIs and viral STIs and treatments for each.
## ENDOCRINE SYSTEM FUNCTIONS

DIRECTIONS: Fill in the following table

<table>
<thead>
<tr>
<th>GLAND</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thyroid</td>
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<tr>
<td>Parathyroid</td>
<td></td>
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<tr>
<td>Pancreas</td>
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<tr>
<td>Ovaries</td>
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<td>Hypothalamus</td>
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<td>Pituitary</td>
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<tr>
<td>Thymus</td>
<td></td>
</tr>
<tr>
<td>Adrenals</td>
<td></td>
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<tr>
<td>Testes</td>
<td></td>
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</tbody>
</table>
PRE-TEST: Vocabulary Challenge

Directions: Place the correct letter in the blank to the left. Letters are used only once.

1. _____ testosterone  A. brings urine and semen out of body through the penis
2. _____ fetus  B. adds a chemical fluid to the semen
3. _____ semen  C. when the penis becomes engorged with blood & hard
4. _____ fertilization  D. where fertilization occurs
5. _____ erection  E. glands that produce the egg cells and hormones
6. _____ prostate gland  F. first two months of development in the uterus
7. _____ ovaries  G. organ that nourishes the fetus
8. _____ egg cells  H. stores sperm cells
9. _____ cervix  I. female organ of intercourse; birth canal
10. _____ seminal vesicles  J. female erectile tissue between labia
11. _____ testes  K. houses the fetus during pregnancy
12. _____ vas deferens  L. adds a sugary fluid to semen
13. _____ ejaculation  M. folds of skin outside the vagina
14. _____ puberty  N. a hormone produced in the ovaries
15. _____ scrotum  O. cells produced in the ovaries
16. _____ vagina  P. cells produces in the tests
17. _____ fallopian tubes  Q. entrance to the uterus
18. _____ embryo  R. when the semen leaves the penis
19. _____ estrogen  S. fluid ejaculated from the penis
20. _____ uterus  T. organ that produces sperm
21. _____ labia  U. male hormone
22. _____ epididymis  V. begins at about age 12 or 13
23. _____ urethra  W. last 7 months of prenatal development
24. _____ clitoris  X. tube that carries sperm from testes
25. _____ sperm cells  Y. sperm cell joins egg cell
26. _____ placenta

Z. sac that regulates the temperature of the testes

Mass vs. Age / Height vs. Age

Problem: How do the growth rates of males and females compare?

Adolescence is a time of rapid growth for both males and females. Are their growth rates the same? If not, how do they differ? On the following page, plot the data for mass on one graph and the data for height on another graph. Use a different color for males than females. Then answer the questions that follow.

<table>
<thead>
<tr>
<th>Average Mass Growth in Females and Males (kg)</th>
<th>Average Height Growth in Females and Males (cm)</th>
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<tbody>
<tr>
<td>AGE</td>
<td>FEMALE</td>
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Questions:
1. Between what ages do females increase most in height?
2. During what age do males increase in height?
3. When does the mass of the female change the most?
4. How can you explain the differences in growth between males and females?
5. Is average growth the same in males and females? Explain your answer.

\textbf{Mass vs. Age / Height vs. Age}
Internal Male Anatomy

Label each of the following structures on the diagram below.

- anus
- bladder
- epididymis
- pubic bone
- foreskin
- intestine
- penis
- ureter
- prostate
- rectum
- scrotum
- Cowper's
- seminal vesicle
- testis
- urethra
- vas deferens
- erectile tissue
- vertebrae
- urethral opening
MALE ANATOMY CROSSWORD

ACROSS:
1. tube leading from testes to urethra
3. stores urine
5. sac that holds testes; regulates temperature of testes
7. gland located at junction of vas deferens & urethra; closes off bladder for ejaculation
8. opening for evacuation of feces
9. last part of large intestine; processes wastes producing feces
10. storage area for sperm at top of testes
11. male hormone responsible for sexual maturity

DOWN:
2. flap of skin covering the end of the penis; often removed by circumcision
4. tube leading out through penis for removal of urine and sperm
5. small gland located between bladder and rectum; makes fluid & nourishes sperm
The Male Reproductive System

Directions: Using the fifteen words provided, fill in the blanks to make this explanation of the male reproductive system correct. Each word will be used only once.

Cowper’s Gland  | penis  | sperm  
epididymis    | prostate | testes  
erection      | scrotum  | urine  
nighttime emissions | semen  | urethra  
orgasm        | seminal vesicle | vas deferens

First, ________________ are produced in the small seminiferous tubules of the ________________. These oval-shaped glands are protected by a sac called the ________________. After the sperm cells are produced, they are stored in a large coiled tube on the outer surface of each testicle called the ________________. From this tube the sperm go into a larger tube called the ________________, which eventually carries them to the external male reproductive organ, the ________________. Along the way, sperm is nourished by a sugary fluid from ________________, a chemical fluid from the ________________, which is the most common site of cancer in men, and fluid from the ________________, which are two small glands located near the bladder. These fluids plus the sperm cells combine to form ________________, the fluid ejaculated from the penis during ________________. Before a male can ejaculate, the spongy tissue surrounding the penis becomes engorged with blood causing the penis to become stiff and hard. This is known as an ________________. The tube that carries the semen from the body is the ________________. This tube also carries ________________ from the bladder. Males can also have uncontrolled ejaculation during sleep, which are called ________________. 
Internal Female Anatomy

Label each of the following structures on the diagram below.

- anus
- bladder
- cervix
- clitoris
- fallopian tube
- outer labia
- inner labia
- intestine
- ovary
- vagina
- urethral opening
- rectum
- urethra
- uterus
- vertebrae
FEMALE ANATOMY CROSSWORD

ACROSS:
1. opening at base of the uterus
4. produces eggs and female sex hormones
5. place for the growth and development of the baby
6. another name for 5 across
10. canal leading from uterus to outside of body; aka birth canal
11. opening for the removal of feces
12. tube leading from bladder to outside of body

DOWN:
2. packages and processes feces
3. carries eggs from ovary to uterus; place for fertilization; aka oviduct
7. stores urine
8. small piece of sensitive tissue in front of urethral opening and vaginal opening
9. folds of skin covering and protecting urethral and vaginal openings
DIRECTIONS: Using the words below, label the parts of the female reproductive system.

CERVIX

UTERUS

OVUM

FALLOPIAN TUBE
THE FEMALE REPRODUCTIVE SYSTEM

**Directions:** Using the sixteen words provided, fill in the blanks to make this explanation of the female reproductive system correct. Each word will be used only once.

- cervix
- egg cells
- Fallopian tubes
- labia
- ovaries
- ovum
- puberty
- uterus
- clitoris
- estrogen
- hymen
- menstruation
- clitoris
- progesterone
- sperm cell
- vagina

First, __________________ are produced in two almond-shaped organs known as the ________________. During the process of ___________________, a mature egg (______________________) is released and enters one of two ______________________________. For a few days the egg cell travels towards the pear-shaped ______________________. The lining of this organ thickens in preparation for a fertilized egg. If the egg is not fertilized by the male ______________________, it will leave the body together with the lining of the uterus and a small amount of blood. This is called ______________________________. The lower portion of the uterus is called the ________________ and is a common site of cancer in women. The female organ of intercourse is the _________________. A circular fold of skin is usually present at the entrance to this organ and is called the _________________. Outside of this organ are folds of skin covered with pubic hair known as the _________________. Between these skin folds is a small, round, sensitive area of skin called the _________________. The development of the reproductive system is triggered by the hormones __________________ and __________________, which cause many physical changes in a girl. This period of change is called ______________________.
"If your parents want you excused from tomorrow's film on pollination, you'll need a note from home."
The Reproductive System

Across
3. The egg passes through the ____ ____ on the way to the uterus.
5. the lower part of the uterus that extends into the vagina
8. a sac around the testes
9. a tube where sperm mature
12. They produce eggs.
13. a tube that connects the epididymis and the urethra
14. a tube that carries urine out of the body
15. a term for the external reproductive structures

Down
1. the surgical removal of the foreskin
2. where a baby grows and develops
3. a sheath of skin at the end of the penis
4. the female reproductive cell
5. They help move an egg through the fallopian tube.
6. a tube that is sometimes called the birth canal
7. one of the glands that produces the fluid in semen
10. a time of development between childhood and adulthood
11. They produce sperm.
Reproductive Anatomy

Match each of the following words with the correct definition.

A. Fetus  I. Ovary
B. Embryo  J. Circumcision
C. Fallopian Tube  K. Semen
D. Fertilization  L. Sperm
E. Vagina  M. Testicles
F. Menstruation  N. Urethra
G. Ovulation  O. Uterus
H. Ovum

1. _____ birth canal; place where the sperm are released.
2. _____ the removal of the foreskin from the penis.
3. _____ the organ in a woman’s body that holds the developing baby during pregnancy.
4. _____ the male sex glands where sperm cells are made.
5. _____ a fluid that carries sperm outside the male’s body.
6. _____ a word used to describe the developing baby during the last six months of a pregnancy.
7. _____ when a male sperm cell joins with a female egg cell and a fertile egg is created.
8. _____ a narrow tube that carries the ovum from the ovary to uterus; fertilization takes place here.
9. _____ also called the egg cell; the female reproductive cell.
10. _____ the breaking up of the lining of the uterus that results in a small amount of blood flow approximately once every 28 days in females who have reached puberty.
11. _____ when an ovum (or egg) is released by the ovary.
12. _____ female sex glands that produce the ovum and hormones estrogen and progesterone.
13. _____ a small tube in both males and females through which urine leaves the body.
14. _____ a word used to describe a developing baby during the first three months of a pregnancy.
15. _____ the male reproductive cell.
PART A: Graphing the Hormones
Use the data provided in the data table below to plot the amount of each of the four female hormones during the menstrual cycle. Use a different color for each of the different hormones.

<table>
<thead>
<tr>
<th>DAY</th>
<th>LH</th>
<th>FSH</th>
<th>Estrogen</th>
<th>Progesterone</th>
</tr>
</thead>
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<td>5</td>
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<tr>
<td>28</td>
<td>13</td>
<td>7</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

PART B: Follicle Stage
Within the ovaries are located many egg cells. Each is egg is enclosed within a structure called a follicle. The follicle is said to be immature. Under the influence of a hormone called FSH (follicle stimulating hormone), the follicle matures. FSH is produced by the pituitary gland.

Figure 1 shows the various stages of a follicle’s maturation. An immature follicle is small in comparison to a mature follicle. The egg is shown in the follicle. The entire structure containing the follicle is an ovary. Keep in mind that one ovary contains many immature follicles.

Label these structures on Figure 1:
egg  immature follicle  mature follicle  ovary
PART C: Luteal Stage

Once a follicle is mature, it bursts open and the egg is released. The egg passes into the oviduct where it may or may not become fertilized. Meanwhile, the mature follicle, once it loses its egg, forms a body within the ovary called the corpus luteum.

Figure 2 shows the changes of the corpus luteum. A mature corpus luteum is rather large. After maturation, the corpus luteum begins to break apart and disappear.

A hormone called lutenizing hormone (LH) is responsible for the changes in the corpus luteum. The amount of this hormone in the bloodstream influences the changes just described. LH is produced by the pituitary gland.

Label these structures in Figure 2:

- newly formed corpus luteum
- mature corpus luteum
- disappearing corpus luteum
- ovary
- egg release

PART D: Changes in the Uterus

While the follicle and luteal stages are taking place in the ovaries, a series of changes is also occurring in the uterus. The uterus lining changes from being very thin to being very thick. This change in thickness occurs because the number of cells increases through rapid cell division.

At one point the uterus ceases to thicken and the buildup of cells begins to break apart. This loss of uterine lining is called menstruation.

Two hormones are responsible for the thickening and maintaining of the lining of the uterus. Estrogen is produced by the maturing follicle and is responsible for thickening the uterus. Progesterone is produced by the corpus luteum and is responsible for maintaining the lining if a pregnancy occurs. If no pregnancy occurs, the level of progesterone drops off and menstruation occurs.

Label these three phases on the diagram below:

- thick uterus lining
- thin uterus lining
- menstruation
QUESTIONS: The Menstrual Cycle

1. What is a follicle?

2. What hormone causes a follicle to mature?

3. Use your graph to determine the day of the menstrual cycle in which the hormone in #2 peaks.

4. In Figure 1, which part of the diagram (A – E) would correspond to the peak hormone level?

5. Name the process that occurs after the follicle is fully mature.

6. What does the follicle become after the egg is released? What hormone causes this structure to change?

7. Use your graph to determine when the hormone in #6 peaks.

8. Name the hormone responsible for the thickening of the uterine lining. What produces this hormone?

9. Use your graph to determine when the hormone in #8 peaks.

10. Name the hormone that is responsible for maintaining the uterine lining during pregnancy. What produces this hormone?

11. Use your graph to determine with the hormone in #10 peaks.

12. Menstruation occurs when the lining of the uterus is shed. Study the graph of the hormones. What hormonal changes causes menstruation?
HORMONES OF THE MENSTRUAL CYCLE
DEVELOPMENT OF THE EGG

Days (in 30-day cycle)

CHANGES IN THE UTERUS

Days (in 30-day cycle)

ovulation
## Fetal Development and Childbirth

**Directions:** Read the information on fetal development in the table below and review the diagrams on the next page. Then use the information to answer the questions that follow.

<table>
<thead>
<tr>
<th>Age*</th>
<th>Fetal Size</th>
<th>Characteristics (present by the end of the time period)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>a speck</td>
<td>Embryo grows from single cell to hollow sphere; travels down fallopian tube and embeds in uterus; does not look at all like a baby.</td>
</tr>
<tr>
<td>2 – 4 weeks</td>
<td>½ cm</td>
<td>Spinal cord, brain, and heart have started to form; blood begins to circulate; spots for ears and eyes are barely visible; flipperlike arms and bumps for legs; appears to have a tail.</td>
</tr>
<tr>
<td>5 – 8 weeks (2nd month)</td>
<td>4 cm (5 g)</td>
<td>All internal organs present but not well-formed; eyes present and open; ears look low; vague mouth; arms and legs recognizable; abdomen still open somewhat at umbilical cord; head looks very large because of rapid brain growth.</td>
</tr>
<tr>
<td>9 – 12 weeks (3rd month)</td>
<td>9 cm (200 g)</td>
<td>Sex can be identified; head makes up half the size of the fetus; face is broad; eyes are wide-spaced; eyelids closed; upper limbs reach proportionate length; fingernails start to appear.</td>
</tr>
<tr>
<td>13 – 16 weeks (4th month)</td>
<td>14 cm (200 g)</td>
<td>Very rapid growth; bones start to ossify so can be seen on x-ray; head looks small compared to 12-week fetus; eyes still closed; ears stand out from head.</td>
</tr>
<tr>
<td>17 – 20 weeks (5th month)</td>
<td>19 cm (460 g)</td>
<td>Digestive muscles working so fetus swallows amniotic fluid; mother feels movement; lower limbs reach final proportion; toenails appearing; head and body are visible; skin is “greased.”</td>
</tr>
<tr>
<td>21 – 24 weeks (6th month)</td>
<td>23 cm (820 g)</td>
<td>Organs well-developed but respiratory system still too immature to support life; substantial weight gain; body better proportioned; skinny; wrinkled skin; definite fingernails.</td>
</tr>
</tbody>
</table>

*It is unusual for a baby who weighs less than 1000 grams or is less than 26 weeks into development to survive.

<table>
<thead>
<tr>
<th>Age*</th>
<th>Fetal Size</th>
<th>Characteristics (present by the end of the time period)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 – 29 weeks (7 months)</td>
<td>27 cm (1500 g)</td>
<td>Eyelids separate so eyes can reopen; eyelashes present; more head hair; skin less wrinkled and appears somewhat red; face looks more like a baby.</td>
</tr>
<tr>
<td>30 – 38 weeks (8 – 9 months)</td>
<td>36 cm (3400 g)</td>
<td>Testes in scrotum; toenails well-formed; more body fat so baby looks plump; skin is smooth and its pink color light – even in dark-skinned races; head turns down in uterus. It’s a full-term baby!</td>
</tr>
</tbody>
</table>

*Note that the fetus develops from “head to toe.” Look at the limbs as an example: the arms and hands are formed before the legs and feet.

*Time is measured from the moment of fertilization.
Fetal Development and Childbirth

Directions: Number the following stages of fetal development in order.

Directions: Put the following stages of childbirth in order.
Baby in Uterus

Directions: Label the following terms.

placenta  cervix
fetus       uterus
umbilical cord  amniotic fluid
vagina
Childbirth Word Search

1. ________________ liquid that surrounds developing fetus
2. ________________ tube containing blood vessels that nourish fetus
3. ________________ joining of an egg and a sperm
4. ________________ place where fertilization takes place
5. ________________ another name for #4
6. ________________ process where egg is released from an ovary
7. ________________ term for a fertilized egg
8. ________________ term for unborn baby in first 2 months of gestation
9. ________________ process where penis is inserted into the vagina
10. ________________ membrane that surrounds fetus
11. ________________ structure that provides connection between mother & fetus
12. ________________ term for developing baby after 2 months of gestation
13. ________________ term for the first stage of childbirth
14. ________________ term for uterine muscles squeezing
15. ________________ when baby is pushed out of the mother
16. ________________ term for the delivery of the placenta
17. ________________ when baby is cut from mother’s stomach
18. ________________ place for growth and development of the fetus
19. ________________ term for when egg grows into wall of uterus
Fetal Development Crossword

Across:
3. where fertilization takes place
9. pregnancy
10. place for growth and development of a baby
13. when cervix and vagina expand to 10 cm
15. when egg is released from ovary
16. liquid surrounding the fetus
17. birth canal
18. connection between fetus and placenta

Down:
1. structure which baby gets food and O2 from mother
2. opening into the uterus
3. term for baby after 2 months of development
4. another name for fallopian tube
5. when baby is delivered by cutting open the uterus
6. process that occurs monthly when fertilization does not occur
7. series of contractions that pushes baby out of mother
8. when fetus is pushed out of mother
11. term for baby from conception to 8 weeks
12. when embryo grows into the wall of the uterus
14. when baby is born
Human Fetal Growth

Complete development of a human fetus takes about 38 to 40 weeks. Increases in size and mass are two of the many changes that the fetus undergoes. The increases do not occur at the same rate. Many factors affect the birth size of a human baby, but there is an average mass and an average length standard for each stage of development. The approximate age of a fetus can be determined from its mass and length.

OBJECTIVES:

i. calculate the length of a human fetus at various stages of development;
ii. graph the length of a developing human fetus;
iii. graph the mass of a developing human fetus;
iv. determine the period of development during which the greatest changes in mass and length occur.

MATERIALS:

v. metric ruler
vi. pencil

PROCEDURE:

Part A. Development of a Human Fetus

1. Examine Figure 1. It shows six stages of a developing human fetus. The stages are shown at 40% of the fetus’ natural size.
2. Study the lengths indicated on the diagram of the 38 week fetus. Use these as a guide to measuring the other diagrams.
3. Measure each length in millimeters. Record your data in the spaces provided in Table 1.
   a. Measure the body length from the rump to the top of the head.
   b. Measure the thigh length from the rump to the knee.
   c. Measure the leg length from the heel to the knee.
4. Add the three measurements for each stage together. Record the total length in the space provided in Table 1.
5. Multiply the total by 2.5 to give a figure that is close to the actual length of the fetus at each stage. Record the actual length in Table 1.

![Figure 1.](image-url)
TABLE 1

<table>
<thead>
<tr>
<th>Age of Fetus in Weeks</th>
<th>Body Length (mm)</th>
<th>Thigh Length (mm)</th>
<th>Leg Length (mm)</th>
<th>Total Length (mm)</th>
<th>Actual Length (mm)</th>
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<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part B. Graphing the Length of a Developing Fetus

1. The point showing the length (2mm) of the 2-week fetus has already been marked on the prepared graph labeled Figure 2.
2. Using the data you measured in Table 1 above, mark a point on the Figure 2 graph that shows the age and length of each fetal stage.
3. Once you have plotted the data, begin at 0 and connect the points to make a line that completes the graph.
Part C. Graphing the Mass of a Developing Fetus

1. Look at the data supplied in Table 2.
2. Mark points on the prepared graph labeled Figure 3 to show the ages and masses of the developing fetus.
3. Once you have plotted that data, begin at 0 and connect the points to make a line that completes the graph.

Table 2

<table>
<thead>
<tr>
<th>Time (weeks)</th>
<th>Mass (grams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>300</td>
</tr>
<tr>
<td>24</td>
<td>650</td>
</tr>
<tr>
<td>28</td>
<td>1100</td>
</tr>
<tr>
<td>32</td>
<td>1700</td>
</tr>
<tr>
<td>36</td>
<td>2400</td>
</tr>
<tr>
<td>38</td>
<td>3300</td>
</tr>
</tbody>
</table>
ANALYSIS:

1. What is the actual length of the fetus at week 9? ___________________

2. How much mass does the fetus gain from 0 to 8 weeks? ___________________

3. Look at the graphs for Figure 2 and Figure 3 for the halfway point in development at week 19.
   a. Is the fetus half of its full length at this time? ___________________
   b. Is the fetus half of its full mass at this time? ___________________

4. Why was the total length of the fetus multiplied by 2.5 to obtain the actual length in Table 1?
   _____________________________________________________________

5. Why do you think the length of a fetus increases more rapidly than the mass of a fetus?
   _____________________________________________________________

6. At what week does the fetus reach
   a. Half its full length? _________________________________________
   b. Half its full mass? __________________________________________

7. If a premature baby is born with a mass of
   a. 2200 grams, how old is the fetus? _____________________________
   b. 1800 grams, how old is the fetus? _____________________________
What Changes Occur During Birth?
A human baby develops for about 38 - 40 weeks inside the mother. Then labor begins and the baby is born. What changes take place during and after birth? Why must a doctor sometimes have to perform a caesarean operation to help in delivery?

OBJECTIVES:

vii. compare the changes that occur during birth;
viii. learn why a caesarean delivery may be needed;
ix. compare a delivery through the birth canal with a caesarean delivery.

MATERIALS:

x. metric ruler
xi. pencil

PROCEDURE:
Part A. Stages of Birth
1. Look at the diagrams of four stages of birth shown in Figures 1 below and Figure 2.
2. Answer yes or no to each of the following questions in Table 1.
Table 1

<table>
<thead>
<tr>
<th></th>
<th>Three Days Before Birth</th>
<th>Two Hours Before Birth</th>
<th>During Birth</th>
<th>Few Minutes After Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is baby inside uterus?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is baby inside vagina?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is baby outside the mother’s body?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is baby inside the amniotic sac?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the amniotic sac broken?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are contractions occurring?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is baby attached to the umbilical cord?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the umbilical cord attached to the placenta?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the placenta attached to the uterus?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the placenta being pushed out?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the vagina opened?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is baby attached to the mother?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has liquid been lost from the amniotic sac?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is baby still dependent on the mother?</td>
<td></td>
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</tr>
</tbody>
</table>

Part B. What is a Caesarean Birth?

1. Look at the diagram in Figure 3 that shows the outline of the pelvis and the head of the fetus just before the time of birth.
2. Note carefully that the head must be able to pass through the opening in the pelvis during birth.
3. Measure Line A. This represents the width of the opening in the pelvis.
4. Measure Line B. This represents the width of the head of the fetus.
5. Record your data below:
   a. Width of pelvis opening ________________
   b. Width of fetus’ head ________________
6. Notice that this fetus would not be able to pass through this pelvis opening.
7. A caesarean operation must be done to deliver the baby.

Figure 3. Sizes of pelvis and head of fetus
8. Look at how a caesarian birth is done in Figure 4. This is usually done before the mother does into labor.

9. To compare a birth canal delivery with a caesarean delivery, answer the questions in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Trait</th>
<th>Birth Canal</th>
<th>Caesarean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the fetus pass through the opening in the pelvis?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the fetus pass through the vagina?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the placenta move through the vagina?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the fetus lifted from the uterus?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the uterus cut open?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the amniotic sac cut open?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Must the cord be cut to separate the fetus from the placenta?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do contractions occur?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Questions:

1. What two body parts surround and protect the fetus as it develops?

2. What is the job of the placenta?

3. What is the job of the umbilical cord?

4. What is meant by the word labor?

5. The placenta is sometimes called the afterbirth. Why is this a good name for the part?

6. List at least three changes that take place several hours before birth.

7. List at least three changes that take place a few minutes after birth.