Animal Reproduction and Endocrine System

GOALS:

1. **Explain how hormones control reproductive systems of males and females.**

2. **Identify and explain functions of human male and female reproductive systems.**

3. **Explain the human female reproductive cycle.**

4. **Describe the steps of human development.**

5. **Describe various reproductive characteristics for a variety of organisms including plants and animals.**

6. **Define the following vocabulary words:**

zygote	**embryo**	**menstruation**
Implantation	**oxytocin**	**estrogen**
testosterone	**progesterone**	**labor**
ovulation	**corpus luteum**	**HCG hormone**
follicle	**meiosis**	**FSH - follicle stimulating**
fertilization	**gamete**	**gametogenesis**
leutenizing hormone(LH)	**fetus**	**endocrine**
placental	**mammal**	**hormone**
monotreme	**marsupial**	**sexual**
asexual	**positive feedback**	
negative feedback	**puberty**	**homeostasis**

THE DIVERSITY OF REPRODUCTION

SOURCES

Course Textbook, especially Chapter 43

2. **Bio Web sites on Embryology**
3. **Other reference books available in classroom or from library**

THROUGH THE FOLLOWING ACTIVITIES WE WILL LEARN THE IMPORTANCE OF REPRODUCTION AND DEVELOPMENT TO LIVING ORGANISMS. AT THE END OF THIS UNIT YOU WILL BE ABLE TO DESCRIBE THE STRUCTURE AND FUNCTION OF THE HUMAN REPRODUCTIVE ANATOMY, THE REPRODUCTIVE PROCESS, FERTILIZATION, IMPLANTATION AND DEVELOPMENT OF THE EMBRYO.

YOU WILL WORK IN GROUPS OF 3. QUIZZES AND LECTURE WILL BE DISPERSED THROUGH OUT THE WORK DAYS. **YOU WILL NEED TO DO WORK OUTSIDE OF CLASS ON THE ACTIVITIES AS WELL** AS THE INFO GATHERING. PARTNERS WILL BE RANDOMLY ASSIGNED BY COMPUTER!!!!!!!!!!!! YOU WILL BE GRADED WITH A N EXAM, ON EACH AREA AND BY YOUR PARTNERS. REMEMBER YOU NEED TO BE ORGANIZED WHEN WORKING AND LEARNING. **IF THE THREE OF YOU AVERAGE AN 85% ON YOUR EXAM AT THE END YOU CAN PICK UP 4 BONUS POINTS**.

MATERIALS NOT FINISHED ON DUE DATES WILL NOT BE ACCEPTED. DEADLINES ARE IMPORTANT, BUT SO IS **UNDERSTANDING AND LEARNING** THE MATERIAL. WORK ON BOTH AS YOU GO THRU THIS UNIT.

ACTIVITY 1: DOES ONE PLUS ONE EQUAL TWO?

Reproductive Success: You will need to use your book as a guide to answer these questions. Your text will help you to answer most of the questions, but you may need to look elsewhere! Include great examples and explanations for the questions. These can be anywhere in the text or online.

1. What is asexual reproduction? What are three ways organisms reproduce asexually? What are the advantages of sexual reproduction? What are the disadvantages to asexual reproduction?
2. What is genetic diversity or variation? What is its importance to survival of a species?
3. How do bacteria usually reproduce? How often?
4. How do protists reproduce? Name a method of reproduction in protists that ensures genetic diversity.

5. How do algae reproduce? What part of the life cycle ensures diversity?
6. What is pollen? Where is it produced? What is an ovule? Where is it found in a plant? How do plants carry out sexual reproduction?
7. Do plants have asexual reproduction? How is it accomplished? How do plants ensure genetic diversity?
8. What type of reproduction do most animals use? (Humans)
9. Why are separate sexes found in higher animals? What is the advantage of reproduction by sperm and egg?
10. Humans are Placental mammals. What is the advantage of a placenta?

ACTIVITY 2A: Label the male and female anatomy pictures at the end of this packet. Use your textbook to help you. **You must also include the FUNCTIONS OF EVERY** male and female part!! Create a list of parts and functions in your notebook.

ACTIVITY 2B: A DAY IN THE LIFE OF AN EGG OR A SPERM

Explain a day in the life of an ovum OR of a sperm. Write a short story using the vocabulary words from either list. Explain the path the ovum or sperm travels through the female or male reproductive system. *Be creative*, but make sure all biology words are used correctly and are explained in the proper sequence. **Underline** all words in your story. Please type or write your story neatly using pen. **NO** points will be given for work done in pencil. Your story is worth 15 points.

Female		**Male**	
oogenesis	uterus	spermatogenesis	vas deferens
ovary	cervix	spermatozoa	prostate gland
follicle	vagina	testis or testes	seminal vesicle
ovum	implantation	scrotum	bulbourethral gland
fallopian tube (oviduct)		epididymus	semen
ovulation		penis	urethra
fertilization			

***assume pregnancy does not occur and explain what happens to gamete**

GROUP ACTIVITY 2C: HUMAN REPRODUCTIVE ANATOMY: DESCRIBE THE HUMAN MALE AND FEMALE REPRODUCTIVE ANATOMY AND HOW THESE STRUCTURES ARE INVOLVED DURING FERTILIZATION, IMPLANTATION, AND DEVELOPMENT OF THE EMBRYO.

Each group will be given a series of pictures concerning the human male and female reproductive systems. The pictures and terms represent events from the formation of the gametes to the implantation of the embryo to the development of the fetus. Your task is to **create a graphic picture on no more than 2 large pieces of paper** provided by your teacher. **Relate these pictures and terms in a SEQUENCE that represents human reproduction and the development of the fetus. Divide the task equally among the members of your group, then share your information. YOU NEED TO MAKE SURE YOU ARE ORGANIZED and ACCURATE. USE YOUR TEXT. Below is the sequence that must be included in the flow chart. You may do anything to better enhance the poster.**

1. Relate the following terms to male and female anatomy: gamete formation, puberty, **oogenesis, spermatogenesis (outside source).**

2. Explain development from **zygote thru implantation and fetal development**
3. Cut out the different pictures and arrange them into a large poster representing **anatomy, gamete formation, fertilization,** and **division of zygote (blastula, gastrula) through implantation and development of the fetus.** Now illustrate the sequence of events of human reproduction.
   Use **arrows and/or labels** to indicate the sequence. For example, in the human female drawing, since the egg is produced in the ovary, the arrow would begin in the ovary, and travel through the oviduct (fallopian tubes) and enter the uterus.
   Use the **key words from the vocabulary you have created from the work above** to label the arrows and the sequence of different event. **Include definitions & explanations in notebooks and on posters.**

4. Tie the following information into your poster
   - Explain what occurs after fertilization starting with the division of **zygote** through **implantation (the web sites will help you.)**

5. See "Activity 2C Grading Sheet" on page 15 so you know how this poster will be graded.

You may ask questions on problems as they arise. I will help you with problems but I will not tell you answers unless you have exhausted all options!!

ACTIVITY 3A: Thinking Questions! Answer Questions #1-7 on Packet page 7. Be sure to use complete sentences and **CITE where you found the answer** for each question so you can refer to that source for more information later in the unit!

ACTIVITY 3B: Thinking Questions! Answer Questions #8-15 on Packet page 7-8. Be sure to use complete sentences and **CITE where you found the answer** for each question so you can refer to that source for more information later in the unit!

ACTIVITY 3C: Thinking Questions! Answer Questions #16-20 on Packet page 8. Be sure to use complete sentences and **CITE where you found the answer** for each question so you can refer to that source for more information later in the unit!

ACTIVITY 4: A lecture on female hormones, endocrine system basics and the menstrual cycle will be given in class.

ACTIVITY 5: COMPARING THE DEVELOPMENT OF THE DIFFERENT SYSTEMS

Using Chart 1 of human fetal development, you will make a **line graph** to illustrate the development of the different systems over time. You will graph the % of development of the embryo in relationship to the embryo's age in weeks. Percentages are given on each system. Your graphs should illustrate correct graphing procedures.

GROUP ACTIVITY 6: GRAPHING THE TRUE SIZE OF THE HUMAN EMBRYO OVER TIME

Using **Chart 1 AGAIN**, you will construct a graph to illustrate the size of the fetus in relationship to age. This graph will be done on **special graph paper** so that the fetal measurements can actually be done to scale. In other words, one inch will equal one inch. **One graph will be done as a group. YOU WILL GET ONE PIECE OF GRAPH PAPER/GROUP. MATERIAL FROM ACTIVITY 5 and other pages of your picture packet or outside pictures SHOULD BE ADDED TO THE GRAPH. NEATNESS IS IMPORTANT AS WELL AS ACCURACY. Rubric is on page 16.**

Use the following ideas to distribute work amongst all group members:

1. **Graph Engineer:**
   Neatly label axes with units, plot data, put shapes around points, make title, use ruler
   Write group members' names on front of graph
   Assist creative consultant
2. **Creative Development Consultant:**
   Includes other, relevant information or pictures to graph
   Adhere to rubric requirements (see packet p. 10)
   Attach grade sheet and factor paragraph(s) to completed graph.
   Keep group on task, time management

ALL MEMBERS DO THE FOLLOWING:

Factors affecting development of fetus paragraphs: 10 points

A. Name of factor (1)
B. Common effects of factor on developing fetus (3)
C. How are effects treated before or after birth (4)
D. Typed (1)

ACTIVITY 3 A, B, C QUESTION SHEET: HUMAN REPRODUCTION AND DEVELOPMENT
ANSWER IN COMPLETE SENTENCES WITH EXPLANATIONS ON A SEPARATE 3 HOLE SHEET OF PAPER.!!!!!!

You must include a reference citation for each response so I know where you found the information!! AND so you can use the sources to study for any quizzes / unit test!

3A: ANATOMY

1. What should be found in a male's semen?

2. Using the components of semen from question 2, try to explain what would happen if each was not present when the semen enters the female.

3. What might be the affect on the fertility of a male if the testes were always held close to the body by clothing? Why?

4. What three factors that can cause sperm to die before they can reach an egg to fertilize it?

5. Explain what a vasectomy is and why it is used as a means of family planning.

6. Why is the uterus is thicker and more muscular at the top?

7. Why are all of the "important" reproductive structures are found in pairs?

3B: DEVELOPMENT

8. During labor and child birth they always mention "dilation". What are they talking about and why is it important?

9. A. What is fertilization (be specific)? Where does fertilization occur?
   B. You start out as a single cell, explain what happens to that cell from the time of fertilization until it implants. Define the terms cleavage, morula, blastula, gastrula in your answer.
   C. How are identical twins created? How are fraternal twins created?

10. What is implantation and where does it occur? When (in days) does implantation occur?

11. What happens if fertilization or implantation does not occur?

12. What is an ectopic pregnancy and what can be a few of the problems associated with it?

13. Compare zygote, embryo, and fetus.

14. What nourishes a developing fetus? What structure cushions a developing fetus?

15. Why can't a fetus's blood physically mix with a mothers blood? (**HINT**: it has nothing to do with blood type!! **HINT #2:** Think about diffusion rules!)

3C: HORMONES

16. What is testosterone and what is its importance to males? Cite the male secondary sex characteristics.

17. What hormone is necessary for female secondary sex characteristics to develop? Why do each of these characteristics develop?

18. What hormone stimulates ovulation? How often does ovulation occur per menstrual cycle?

19. What is negative feedback and how does it work during the menstrual cycle? Why is negative feedback so important.

20. Based on negative feedback, how do the birth control pills work, what is in them, and what do they prevent that prevents fertilization?

Human Development

The process of human development is one continuous process form conception until death. We physically grow until we are 25 years old. We continue to mature and develop our learning process as human beings until death.

Conception: Human life begins as one sperm (with father's 23 chromosomes) and one ovum (with mother's 23 chromosomes) unite. This is called **Fertilization**. This is the beginning of a new, unique human being, and it is called a zygote.

Day One: Conception takes place in the **Fallopian Tube**. The zygote starts cell division 23 hours after sperm and ovum have united.

Day Two: Cells continue to divide by mitosis as the zygote moves toward the womb.

Day Six: Zygote arrives in uterus and burrows into lining of uterus. **Blastula/gastrula**

Day 7 - 8: Specialized cells in cluster will become the placenta; others are the developing baby. The cells which become the placenta secrete a hormone, HCG *(human chorionic gonadotropin)*, which prevents the uterus from sloughing off lining when the time comes for the next menstrual period.

Day 9 - 10: The cells forming the baby have begun an ordered and regular developmental procedure. an embryologist can determine the age of the embryo within 2 - 3 days.

Day 17: Blood cells begin to form.

Day 18: A simple tube which is the heart begins a rudimentary beat.

Day 19: Eyes begin to form.

Day 21: Formation of brain and nervous system.

Day 25: Heartbeat smoothes out; becomes stronger each day and soon starts circulating its own blood through the placenta for nourishment.

Day 26: Arm and leg buds begin to appear.

Day 28: Beginnings of internal organs. spinal cord, nervous system, thyroid gland, lungs, liver, stomach, kidney and intestines.

Day 30: Ears and nasal organs begin to form.

Day 33: Fingers appear. Pigment in retina formed. Wide nostrils begin formation of nose and upper jaw. Spinal vertebrae appear.

Day 37: Tip of nose appears. Internal ear almost complete.

Day 42: When lips stroked, baby responds by bending upper body to one side and making quick movement. Male penis starts to appear.
It is on this 42nd day that determination of pregnancy may first be diagnosed

Day 43: Brain waves have been recorded

Day 44: Eyelid covers almost all of eyeball. Definite mouth and lips. Has complete skeleton of cartilage.

Six Weeks: Baby is fetus soon. About 10 inches long.

Seven Weeks: Ears finished development. Muscles forming. Cartilage cells begin replacement by bone cells.

Eight Weeks: Fingers and palm prints present for life. Baby becomes very human in appearance. All organs present. Only maturation to be completed. Begins to swim in amniotic fluid.

Nine Weeks: Sex hormones form, estrogens and androgens.

Ten Weeks: Baby can squint, swallow, move tongue. Will make fist if palm is stroked.

Eleven Weeks: Inhales and exhales fluid into and out of lungs. Nerves and muscles becoming synchronized.

Twelve Weeks: Sex clearly identifiable. Fingernails and teeth buds are forming. Three inches long.

Four Months: Eyelashes appear. Sucks thumb. Transparent layer of skin replaces protective membrane. Five and a half inches long. Is large enough that its movements are felt by mother. Kicks legs, turns feet, bends wrist, turns head, frowns, opens mouth, presses lips tightly together. Vocal cords are complete. Taste buds and salivary glands develop. Palate fuses. Begins to urinate. Swallows regularly.

Five Months: Twelve inches long, weighs one pound. Baby has hair and eyebrows. Sleeps and wakes as he will after birth. Hiccoughs often. Becoming quite vigorous. 10% chance of survival if born now.

Six Months: Accumulates fat under skin. Fourteen inches long and weighs 1 and 3/4 pounds. Opens and closes eyelids. Can move eyes and perceive light. Permanent teeth buds form behind milk teeth.

Seven Months: Viable (by definition). May survive if born now. Sixteen inches long and weighs 2.25 pounds.

Eight Months: Ninety percent chance of survival if born now. Male testes descend into scrotum. Develops immunities. Eighteen inches long and weighs 4 pounds.

Nine Months: Maturation continues through date of birth. 19-21 inches long. On average, babies weigh seven pounds.

AFTER BIRTH, BABY IS AS DEPENDENT ON ITS MOTHER AS IT WAS IN UTERO. THE BABY STILL NEEDS FOOD, OXYGEN, AND HIS PARENTS OR (S)HE WILL NOT BE ABLE TO SURVIVE.

****

Embryology: Types of Birth Information Sheet

Birth: This is the act of being born. It is the passage of a child from the mother's uterus. (Birth canal is the vagina and the uterus.)

Live Birth: This is an infant showing one of three evidences of life after birth. (Breathing, heart action, movements of involuntary muscles are evidences for life.)

Breech Birth: This occurs when the baby emerges buttocks first, head last. 3% of all births are breech.

Premature Birth: This occurs sometimes after the fetus is old enough to survive but before reaching 5.3 pounds. The real problem is that the fetus does not have well developed body organs and body systems.

Still Birth: An infant that does not show signs of life after completing birth.

Miscarriage: An interruption of pregnancy before the seventh month. *(This usually refers to the exit of the fetus around the fourth month.)* ** A miscarriage is when the baby is aborted by itself - nature's way.

Abortion: The termination of pregnancy before the stage of viability, that is before any organs and physical features develop. This is a performed operation preventing birth and killing the child, according to your instructor.

More about premature babies....

Prematurity is the leading cause of death among infants weighing less than 5 1/2 pounds at birth. Death is 20 times greater, than if the baby would weigh more than 5 1/2 pounds.

Any of the following can occur in premature babies:

a. abnormal breathing
b. infection - not being able to fight off diseases
c. abnormal blood conditions
d. eight congenital (present at birth) abnormalities

The following factors contribute to prematurity or low birth weight:

a. rupture of membranes before birth
b. chronic diseases
c. infections
d. pelvic abnormalities of the mother
e. physical or emotional trauma of mother
f. fetus is already malformed
g. multiple birth (twins, triplets, etc.)
h. use of drugs by mother

Labor Information

A. Gestation: The period of the development of the fetus in the uterus from conception until birth.

B. Lightening: This occurs several weeks before the onset of labor. Fetus' head descends into the pelvis.

C. Induced Labor: This is the use of chemicals or other methods to stimulate uterine contractions prior to the time they would normally occur.

D. Ectopic Pregnancy: This is when the fetus develops outside the uterus, such as in a fallopian tube.

E. False Labor: At this time the pains do not extend to the back of the abdomen and does not cause the cervix to open.

F. Labor: This is the physiological process by which the fetus is expelled from the uterus. There are three main stages to **labor**.

First Stage: the onset of regular contractions of the uterus until the cervix is fully opened. This takes one average, about 12 hours.

Second Stage: This stage goes from the complete dilation (opening up) through the birth of the fetus. This may average from 20 to 50 minutes.

Other events in this stage: Labor pains are severe, occurring at 2 -3 minute intervals and each may last from a little less than a minute to a minute and a half. The rupture of membranes and flow of amniotic fluid also exits from the vagina. With each pain or contraction, the fetus' head advances a little more and then recedes (goes back).

The contractions continue until more of the head is visible and the vaginal opening encircles the head. **This process is called <u>crowning</u>.**

Third Stage: This period takes place from birth of fetus through expulsion of placenta and membranes. This **after birth** lasts 8 - 10 minutes.

ACTIVITY 2C GRADING SHEET

NAMES:_____CLASS _____

I. **Completeness of Information** (30)
Anatomy and function of male and female reproductive systems (10)
Oogenesis (3)
Spermatogenesis (3)
Fertilization (3)
Implantation (3)
Development (8)

II. **Neatness** (10)
Neat construction: cutting, labeling, etc. (3)
Legible: writing, labeling, used marker or pen (no pencil) (4)
Mechanics: Grammar, spelling of key vocabulary words, define **all** new words (3)

III. **Organization/Creativity** (15)
Eye Catching: Colorful (use color wisely and effectively), titles/labels for all pictures, main concepts emphasized (5)
Logically Organized Presentation and Concepts: All concepts and pictures connected and related to one another (10)

ACTIVITY 6 GRADING SHEET

GRAPHING THE TRUE SIZE OF THE HUMAN EMBRYO OVER TIME

I. GRAPH: 20 points

A. x and y axis labeled properly with units (2)
B. Title of graph is present and specific(2)
C. Scale is appropriate and at equal intervals (2)
D. Line Graph (1)
E. Creative use of materials and information from unit packet incorporated on graph(10)
F. Easy to read and interpret (3)

II. FACTORS AFFECTING DEVELOPMENT OF FETUS: 10 points

A. Name of factor (1)
B. Common effects (4)
C. How are effects treated before or after birth (4)
D. Typed (1)

Group Evaluation: 16 points

CRITERIA: NAME: _____

1. Cooperation with group members ___/ 4 points
2. Amount of physical work (cutting, pasting, etc.) on the project ___/ 4 points
3. Amount of input on ideas, organization, knowledge of concepts. ___/ 4 points
4. Completion of assigned tasks on time and quality of material given ___/ 4 points

[ ] **total**

A = 4, B = 3, C = 2, D = 1, F= 0

****DO NOT GIVE SOMEONE FULL CREDIT IF THEY WERE ABSENT. BE HONEST!! DO NOT ALLOW FREELOADERS TO EARN THE SAME AS YOU -- THERE ARE MORE PROJECTS LIKE THIS LATER THIS SEMESTER!! HELP THEM LEARN TO BE PRODUCTIVE GROUP MEMBERS *NOW* !!**

****Teacher grade based on classroom observations. (if you aren't here, you don't earn full credit!)**

_____/10 points

---> YOU MUST explain reasons for points on back of this piece of paper -->

Group Evaluation: 16 points

CRITERIA: NAME: _____

1. Cooperation with group members ___/ 4 points
2. Amount of physical work (cutting, pasting, etc.) on the project ___/ 4 points
3. Amount of input on ideas, organization, knowledge of concepts. ___/ 4 points
4. Completion of assigned tasks on time and quality of material given ___/ 4 points

[ ] **total**

A = 4, B = 3, C = 2, D = 1, F= 0

****DO NOT GIVE SOMEONE FULL CREDIT IF THEY WERE ABSENT. BE HONEST!! DO NOT ALLOW FREELOADERS TO EARN THE SAME AS YOU! HELP THEM LEARN TO BE PRODUCTIVE GROUP MEMBERS *NOW* !!**

****Teacher grade based on classroom observations. (if you aren't here, you don't earn full credit!)**

_____/10 points

---> **YOU MUST explain reasons for points on back of this piece of paper** --