Name _____ Date _____ Period _____

HUMAN BIOLOGY – CLASS NOTES
FERTILIZATION

A. Sexual intercourse must occur no more than 72 hrs. before the egg is released, or within 24 hrs. after the egg is released (this gives a 72-96 hr "window of opportunity").

B. It usually take 4 days for the egg to reach the uterus, there fertilization must take place in the oviduct (remember, the egg only lives about 24 hours)

C. Hundreds of millions of sperm are released, only several thousand reach the oviduct & only about 50 reach the egg. This is why males produce so many sperm.

D. Enzymes from the acrosome of the sperm are needed to penetrate the ovum. When one sperm enters the ovum a chemical change takes place that blocks the entry of the other sperm. When this sperm enters the ovum it leaves its tail behind.

E. About 36 hours after fertilization, rapid cell division of the zygote takes place. This early division of the zygote is called "cleavage". Although cleavage increases the number of cells, it does NOT result in an increase in the size of the zygote. Successive cleavages produce a solid mass of tiny cells called "morula".

F. About 4-5 days after fertilization, the morula forms a hollow ball of cells, now referred to as a "blastocyst".

G. The blastocyst consist of an outer layer, the "trophoblast" which surrounds a fluid filled cavity & an "inner cell mass" which develops into the embryo by the end of the second week.

H. The trophoblast will form the chorion and placenta.

I. The attachment of the bloastocyst to the endometrium about 6 days after fertilization is called "implantation". In this process the tyrophoblast screttes enzymes that digest the uterine lining and allow the blastocyst to bury into the endometrium.

J. Now the trophoblast has begun to secrete human chorionic gonadotropin (hCG), a hormone that is the basis of a positive pregnancy test. This hormone may cause the woman to feet nauseated (morning sickness)

K. The first two months the baby is considered an embryo. By the end of the embryonic period the beginnings of all principal adult organs are present.

L. The third to ninth month the baby is considered a fetus. By the end of the third month the placenta is functioning.

Pregnancy & Birth

1. After implantation, the inner cell mass begins to differentiate (this is a "miracle", we don't know how this happens) into 3 primary germ layers: ectoderm, endoderm and mesoderm. These are tissues from with all tissues and organs of the body will develop.

2. The ectoderm separates to form the amniotic cavity.

3. The endoderm separates to form the yolk sac.

4. The cells between the amniotic cavity & & the yolk sac are called the embryonic disc & they will form the embryo.

5. About the 14th day the cells of the embryonic disc differentiate into the 3 layers. These layers are attached to the trophoblast (now called the chorion) by the body stalk (future umbilical cord). *Early in embryonic life the yolk sac merges with the body stalk & become nonfunctional.

6. Endoderm becomes the lining of the gastrointestinal tract, respiratory tract & a number of other organs.

7. Mesoderm forms the peritoneum, muscles, bone & other connective tissue.

8. Ectoderm develops into the skin & nervous system.

9. The amnion is a thin, protective membrane that currounds the embryo & becomes filled with amniotic fluid, which serves as a shock absorber for the fetus.

10. The chorion surrounds the embryo & amnion and forms part of the placenta.

11. The placenta is fully developed by the 3rd month. It allows the fetus & mother to exchange nutrients & wastes & secretes hormones necessary to maintain pregnancy.

12. Chorionic villi (fingerlike projections of the chorion) grow into the endrmetrium of the uterus. They are bathed in maternal blood sinuses (intervillous spaces). These fetal & maternal blood vessels are brought close together BUT they do NOT normally mix. Oxygen & nutrients for the mother diffuse into capillaries of the villi & go into the umbilical VEIN. Waste leaves the fetus through the umbilical ARTERIES, pass into the villi & diffuse into the maternal blood.

13. Placenta does prevent many things from reaching the fetus. However, aspirin, alcohol, chemicals in cigarette smoke, crack, heroin, etc, can pass.

14. Birth will occur approximately 280 days after the last menstrual period Plus or minus about 2 weeks)

15. The umbilical cord is cut at birth and after about 10 days it shrivels & drops off, the scar is called the navel.

16. The oil glands produce a protective cheese-like covering the "vernex caseosa" which should be left on the child after it is born.

17. The intestines become filled with a green paste-like material called "meconium". After several days of feeding this material is eliminated by the newborn.

18. The baby gets antibodies form the mother across the placenta which help protect the child for several months.

19. The 9 month pregnancy is divided into 3 "trimesters"

20. The onset of labor appears to be hormonally directed.

    a. Progesterone inhibits uterine contractions, labor cannot take place until its level falls (end of gestation).

    b. Now the level of estrogen is higher than progesterone and labor begins.

    c. Oxytocin also stimulates uterine contractions.

    d. Relaxin assists by relaxing the pubic symphysis & helps to dilate the uterine cervix.

21. Uterine contractions occur in waves that start at the top of the uterus and move downward.

22. In over 90% of births, the baby will be head down by this stage. If the "buttocks" is down it is called "breech" and the baby is usually delivered by a cesarean "C" section.

23. Labor is divided into 3 stages:
    a. Stage 1: Dilation – uterus contracts & cervix dilates & this out (effacement). No movement of the fetus through the cervix takes place until the cervix is dilated to 10cm.

    b. Stage 2: Expulsion – the time from complete cervical dilation to delivery. After delivery the umbilical cord will continue to pump plead and oxygen. The infant will soon breathe on its' own & the umbilical cord will stop functioning. It is then tired and cut.

    c. Stage 3: Placental – the time after delivery until the placenta or "afterbirth" is expelled by powerful