Honors Biology – Unit 4 – Chapter 9
"PATTERNS OF INHERITANCE"

1. Gregor Mendel's experiments with pea plants

2. important vocabulary:

    - allele
    - homozygous vs. heterozygous
    - dominant allele vs. recessive allele
    - law of independent assortment (during metaphase I of meiosis)
    - law of segregation (during anaphase I of meiosis)
    - Punnett square
    - genotype vs. phenotype
    - gene locus
    - carrier

3. types of genetics problems:

    - monohybrid cross
    - incomplete dominance
    - co-dominance (blood types)
    - dihybrid cross
    - sex-linked traits
    - polygenic inheritance
    - pedigrees

4. other genetics topics:

    - bioethical considerations
    - inbreeding
    - effect of the environment on phenotype
    - effect of crossing over
    - linked genes
    - gene mapping

Honors Biology – Chapter 9 Word Roots
"PATTERNS OF INHERITANCE"

-centesis = a puncture (*amniocentesis:* a technique for determining genetic abnormalities in a fetus based on the presence of certain chemicals or defective fetal cells in the amniotic fluid, obtained by aspiration from a needle inserted into the uterus)

co- = together (*co-dominance:* an inheritance pattern in which a heterozygote expresses the distinct trait of both alleles)

di- = two (*dihybrid cross:* an experimental mating of individuals differing at two genetic loci)

gen- = produce (*genotype:* the genetic makeup of an organism)

hemo- = blood (*hemophilia:* a human genetic disease caused by a sex-linked recessive allele, characterized by excessive bleeding following injury)

hetero- = different (*heterozygous:* having two different alleles for a given gene)

homo- = alike (*homozygous:* having two identical alleles for a given gene)

mono- = one (*monohybrid cross:* an experimental mating of individuals differing at one genetic locus)

pedi- = a child (*pedigree:* a family tree describing the occurrence of heritable characters in parents and offspring across a number of generations)

pheno- = appear (*phenotype:* the expressed traits of an organism)

pleio- = more (*pleiotropy:* the control of multiple phenotypic characteristics by a single gene)

poly- = many; **gene-** = produce (*polygenic inheritance:* the additive effect of two or more gene loci on a single phenotypic character)

re- = again; **com-** = together; **bin-** = two at a time (*recombinant:* an offspring carrying combinations of alleles different from those in either of its parents as a result of independent assortment or crossing over)

PROPERTY OF:

HONORS BIOLOGY – UNIT 4 – CHAPTER 9 NOTES

PATTERNS OF INHERITANCE

IMPORTANT VOCABULARY:

1. *dominant gene* = a gene that is expressed in individuals whether there are 2 copies or just one
2. *recessive gene* = a gene that is expressed in individuals only when there are 2 copies
3. *homozygous* = a condition when both copies of the gene are the same (could be dominant or recessive)
4. *heterozygous* = a condition when both copies of the gene are different (almost always dominant)
5. *co-dominance* = a condition when the heterozygous form shows both the "dominant" and "recessive" traits
6. *incomplete dominance* = a condition when the heterozygous form shows a blending or mixture of the "dominant" and "recessive" traits
7. *genotype* = the letters that represent the genes for an individual
8. *phenotype* = the physical trait that results from an individual's genotype
9. *pedigree* = a chart or "family tree" that shows a particular genetic trait

HOW TO DO PUNNETT SQUARE WORD PROBLEMS:

1. Use capital letters for dominant genes and lowercase letters for recessive genes.
2. List the genotypes of the mother and father.
3. Determine the genes for their gametes. Draw all the possible egg and sperm cells.
4. Determine the size of the Punnett Square by listing the father's genes across the top and the mother's genes down the side.
5. Fill in the Punnett Square, keeping similar letters together, but always with the capital letter first (if applicable).
6. Analyze the % of genotypes and phenotypes of the offspring.

TYPES OF GENETICS WORD PROBLEMS:

1. *monohybrid* = examines one genetic trait at a time (problem set 1)
2. *incomplete dominance* and *co-dominance* = examines one incompletely dominant or co-dominant trait at a time (problem set 2)
3. *blood type* = examines one blood-typing trait at a time (problem set 3)
4. *dihybrid* = examines two genetic traits at a time (problem set 4)
5. *sex-linked* = examines one X chromosome trait at a time (problem set 5)

HOW TO DO PEDIGREE WORD PROBLEMS:

1. Use circles for males and squares for females.
2. Parents are connected with horizontal lines.
3. Children are connected to their parents by drawing vertical lines down from their parents' horizontal line.
4. Shade in the circles or squares of those people who express the particular trait.
5. Write everybody's genotype inside the square or circle. It is not always possible to determine the genotype for every individual.