**Biology 9 -- Unit 6: Inheritance**

**I. Genetics**

* Genetics

-The branch of biology that studies heredity

* Heredity

-The passing on of characteristics from parents to offspring through GAMETES (sex cells created in meiosis)

* Traits

-Characteristics that are inherited from the chromosomes you receive from each parent. (Review Meiosis)

**II. Meiosis and Genetic Variety**

* Meiosis will result in the production of sex cells (gametes) which show an increase in genetic variety because of:
* Crossing over during prophase I

-Crossing over is when non-sister chromatids exchange genetic material

* Random orientation of chromosomes during metaphase I

-Random orientation is when the homologous chromosomes line up on the metaphase plate in a random order

**III. Genes in DNA**

* Gene

-The heritable factor that codes for a polypeptide chain or for an RNA chain that has a function in the organism

* Genome

-The whole genetic information of an organism

**IV. Mendel Genetics**

* Gregor Mendel

-19th century Austrian Christian Monk

-His research is the basis for our modern day notion of heredity.

-Worked with pea plants to see how different traits were passed from generation to -generation.

**V. Mendel’s Monohybrid Crosses**

* Monohybrid Cross = 1 trait that differs in parents

-Mendel created hybrids of pea plants from pure breeds

- A Pure breed is an organism with no genetic variety

-Mendel used pea plant height to determine how traits were passed on

-He crossed one pure breed tall parent and one pure breed short parent

-Each offspring had a combination of traits from each parents.

**VI. Mendel’s Results**

* P1 (parents) short pea plant X tall pea plant



* F1(generation 1 = all tall)



* F2 (generation 2 = 3 tall: 1 short)

**VI. Mendel’s Law of Independent Assortment**

* The Law of Independent Assortment states that every individual has 2 alleles for each gene (trait)

-During Meiosis, the chromosomes which carry the alleles for a trait will be randomly distributed to the newly produced gametes.

-This means that every gamete produced will be genetically unique from the other gametes.

**VII. What are alleles**

* Alleles are found directly on chromosomes.
* Alleles are different forms (types) of the same gene (trait)

-Ex. Gene for height= H/h

* You have two alleles for each trait

-1 from your mother and 1 from your father

* 3 different allele combinations can be possible:

-HH / hh / Hh

**VIII. Examples of Alleles**

* Dominant

-Trait that shows up and will hide the recessive allele

-Examples: HH & Hh = Tall

* Recessive

-Trait that can be hidden by the dominant allele

-Must have two recessive allele to show recessive trait

-Examples: hh = short

* Phenotype- What the organism looks like
* Genotype- The allele combination an organism contains. [HH or Hh or hh]

**IX. Combination of Alleles**

* Homozygous Dominant

-Having 2 dominant alleles

-Example: HH

* Heterozygous

-Having 1 dominant allele and 1 recessive allele

-Example: Hh

* Homozygous Recessive

-Having 2 recessive alleles

-Example: hh

**X. Monohybrid Punnett square**

* Monohybrid Punnett Square Set Up:

-Both parents are heterozygous for being tall

-Monohybrid cross is Hh x Hh

* Genotype: HH = 1/4 or 25%, Hh = 2/4 or 50% & hh = 1/4 or 25%
* Phenotype: Tall = 3/4 or 75% and short 1/4 or 25%

Possible Alleles individual Sperm cells have from Father



Possible Alleles individual Egg cells have from Mother

Possible offspring and the Alleles each offspring could receive