**Alleles**

**alternate forms or varieties of a****gene**.   The alleles for a trait occupy the same locus or position on homologous chromosomes and thus govern the same trait.  However, because they are different, their action may result in different expressions of that trait.

**Amino acids**

**small molecules that are the components of****proteins****.**  There are 20 different kinds of amino acids in living things.  Proteins are composed of different combinations of amino acids assembled in chain-like molecules.  Amino acids are primarily composed of carbon, oxygen, hydrogen, and nitrogen.

**Chromosomes**

**thread-like, gene-carrying bodies in the nucleus of a cell.**  Chromosomes are composed primarily of DNA and protein.  They are visible only under magnification during certain stages of cell division.  Humans have 46 chromosomes in each somatic cell and 23 in each sex cell.

**Dominant allele**

**an****allele****that masks the presence of a****recessive allele****in the****phenotype**.   Dominant alleles for a trait are usually expressed if an individual is homozygous dominant or heterozygous.

**DNA     (deoxyribonucleic acid )**

**a large organic molecule that stores the genetic code for the synthesis of****proteins****.**  DNA is composed of sugars, phosphates and bases arranged in a double helix shaped molecular structure.  Segments of DNA in chromosomes correspond to specific genes.

**F1 generation**

**the first offspring (or filial) generation.**   The next and subsequent generations are referred to as f2, f3, etc

**Genes**

**units of inheritance usually occurring at specific locations, or loci, on a****chromosome****.**  Physically, a gene is a sequence of DNA bases that specify the order of amino acids in an entire protein or, in some cases, a portion of a protein.  A gene may be made up of hundreds of thousands of DNA bases.  Genes are responsible for the hereditary traits in plants and animals.

**Genetics**

**the study of gene structure and action and the patterns of inheritance of traits from parent to offspring.**  Genetic mechanisms are the underlying foundation for evolutionary change.  Genetics is the branch of science that deals with the inheritance of biological characteristics.

**Genome**

**the full genetic complement of an individual (or of a species).** In humans, it is estimated that each individual possesses approximately 2.9 billion base units in his or her DNA.  See Human Genome Project.

**Genotype**

**the genetic makeup of an individual.** Genotype can refer to an organism's entire genetic makeup or the alleles at a particular locus.  See phenotype.

**Heterozygous**

**a****genotype****consisting of two different****alleles****of a gene for a particular trait (Aa).**   Individuals who are heterozygous for a trait are referred to as heterozygotes.  See homozygous.

**Homologous chromosomes**

**chromosomes****that are paired during the production of of sex cells in****meiosis****.**  Such chromosomes are alike with regard to size and also position of the centromere.  They also have the same genes, but not necessarily the same alleles, at the same locus or location.

**Homozygous**

having the same allele at the same locus on both members of a pair of homologous chromosomes.  Homozygous also refers to a genotype consisting of two identical alleles of a gene for a particular trait.  An individual may be homozygous dominant (AA) or homozygous recessive (aa).  Individuals who are homozygous for a trait are referred to as homozygotes.  See heterozygous.

**Hybrids**

offspring that are the result of mating between two genetically different kinds of parents--the opposite of purebred.

**Mendelian genetics**

inheritance patterns which can be explained by simple rules of dominance and recessiveness of genes.

**Phenotype   the observable or detectable characteristics of an individual organism--the detectable expression of a****genotype**

**Principle of independent assortment Gregor Mendel's second principle of genetic inheritance.** It states that different pairs of genes are passed to offspring independently so that new combinations of genes, present in neither parent, are possible.  In other words, the distribution of one pair of alleles does not influence the distribution of another pair.  The genes controlling different traits are inherited independently of one another.

**Principle of segregation Gregor Mendel's first principle of genetic inheritance.**  It states that, for any particular trait, the pair of genes of each parent separate (during the formation of sex cells) and only one gene from each parent passes on to an offspring.  In other words, genes occur in pairs (because chromosomes occur in pairs).  During gamete production, the members of each gene pair separate, so that each gamete contains one member of each pair.  During fertilization, the full number of chromosomes is restored, and members of gene pairs are reunited.

**Probability the likelihood that a specific event will occur.**   Probability is usually expressed as the ratio of the number of actual

**Punnett square**

**a simple graphical method of showing all of the potential combinations of offspring****genotypes****that can occur and their probability given the parent genotypes.**  See example below.  Punnett squares are commonly used by genetics counselors to predict the odds of a couple passing on particular inherited traits.



**Purebred**

**offspring that are the result of mating between genetically similar kinds of parents--the opposite of****hybrid****.**  Purebred is the same as true breeding.

**Recessive allele an allele that is masked in the phenotype by the presence of a dominant allele.** Recessive alleles are expressed in the phenotype when the genotype is homozygous recessive (aa).

**Zygote**

**a "fertilized"****ovum****.**  More precisely, this is a cell that is formed when a sperm and an ovum combine their chromosomes at conception.  A zygote contains the full complement of chromosomes (in humans 46) and has the potential of developing into an entire organism.