TRAITS

Genetics is the study of how genes interact and how traits are passed down from parent to offspring. A large part of how you look is determined by genetics. The passing of traits from one generation to the next is **heredity**. Gregor Mendel, Austrian scientist and monk, first person to study genetics. He studied pea plants and how the traits were passed on.

A **gene** is a section of DNA. Genes come in pairs called **Alleles**, a specific pattern of a gene. For example:

Gene: determines the hair color

Allele: brown hair

Mendel's Main Ideas

- 1) Each Trait is controlled by two genes called alleles.

  2) An allele can be either dominant or recessive.

  <u>**Dominant Allele**</u>: represented by a capital letter and it's the allele (gene) that is always expressed. (TT).

  <u>**Recessive Allele**</u>: represented by a lower case and its allele or gene is masked by the dominant allele (tt). Recessive allele is expressed only when both alleles are in the recessive form.

  3) Offspring gets one allele from each parent

  4) When chromosomes separate during reproduction each sex cell gets an allele for a trait. SO when the sex cells of the parents combine, the offspring randomly gets one allele from each parent.

Genotype: the genes an organism has, inherited trait (Bb)

Phenotype: the traits it expresses (physical appearance)- way it looks and behaves

You can't observe an organisms genotype, but can its phenotype.

For example:

genotype: (Bb)

Phenotype: brown hair

Mendel's Laws

- 1**) Law of Segregation**: an offspring receives one unit of inheritance from each parent

- 2) **Law of Independent Assortment**: different traits are inherited independently of each other.

- 3) **Law of Dominance**: one form of the trait will appear in the offspring.

Homozygous: an organism that has two of the SAME allele (bb) (BB)
Heterozygous: an organism that has different alleles- one dominant and one recessive (Bb)
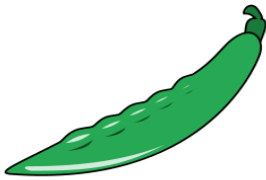
- When an organism has two of the same allele, like two dominant or two recessive that is called a homozygous for that trait. (RR) (rr)

- When an organism has two different alleles (one recessive, and one dominant) it is called heterozygous. (Rr)

- Incomplete dominance: parts of both traits are expressed in an offspring. (wavy hair)

- Co-dominate trait: neither trait is dominate over the other, some sort of blending. (pink flower, AB blood type)

Some traits are inherited (color of hair), some are learned (bike), some are acquired (scar)

Punnett Square: is a tool to figure out the probability that an offspring will express a certain trait.

The alleles of each parent are written across the top and outside of a square. It doesn't matter which parents is on the side or top. Each of the boxes represents the possible alleles of an offspring.
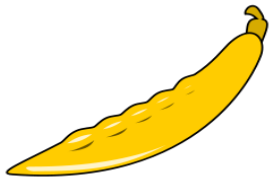
The **Punnett square** is a diagram that is used to predict an outcome of a particular cross or breeding experiment. It is named after Reginald C. **Punnett**, who devised the approach. The diagram is used by biologists to determine the probability of an offspring having a particular genotype.

	y	y
Y	Yy	Yy
y	yy	yy

To Review

- **The Basics**

  A few things you should know about genes and inheritance:

  Gene - Inside the DNA molecule are sections of information called genes. Each gene tells the cell how to make a certain protein which may determine a trait such as the color of the eyes.

  Allele - While the section of DNA is called a gene, a specific pattern in a gene is called an allele. For example, the gene would determine the hair color. The specific pattern of the hair color gene that causes the hair to be black would be the allele.

  Dominant and Recessive Genes

  Each child inherits two genes for each trait from their parents. Some genes are more dominant than others. For example, brown eyes are dominant over blue eyes. If someone has a brown eyed gene and a blue eye gene, they will have brown eyes. They will only have blue eyes if both genes are blue.

  The brown eyed gene is called the ***dominant*** gene and the blue eyed gene is the ***recessive*** gene.