Gene - unit of heredity (a segment of DNA)

Allele - different forms of a gene

- Punnett Square - tool for predicting probability of offspring with different allele combinations
- Dominant trait - An allele that expresses its phenotypic effect even when heterozygous with a recessive allele (the big guy always wins)
- Recessive trait - allele that does not express a characteristic effect when present with a dominant allele. Expresses only when 2 recessive alleles present. (little guy is rarer)

Phenotype - the set of observable characteristics of an individual resulting from the interaction of its genotype with the environment. (Physical appearance)

Genotype - genetic makeup of a cell, an organism, or an individual usually with reference to a specific characteristic under consideration. Must include 2 alleles.

- Homozygous - a genotype with two alleles that are the same (TT or tt)
- Heterozygous - a genotype with two different alleles (Tt)

Phenotypes and Genotypes

<table>
<thead>
<tr>
<th>Phenotype</th>
<th>Genotype</th>
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<tbody>
<tr>
<td>Smooth pods</td>
<td>SS</td>
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<tr>
<td>Smooth pods</td>
<td>Ss</td>
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<tr>
<td>Pinched pods</td>
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</tbody>
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There are 23 pairs of homologous chromosomes with the 23rd pair showing the sex chromosomes (XX=female; XY=male)

This karotype shows 3 chromosomes at the 21 pair spot (trisomy 21). This karotype shows the chromosome arrangement of a male with Down syndrome.
- **Incomplete dominance**: one allele does not completely dominate another allele. The heterozygous genotype will result in a “blending” of the two alleles. (mixing paint)

- **Co-dominance**: A heterozygous combination in which both alleles are fully expressed in the phenotype. (“Co” = Together)

- **X-linked traits**: gene causing the trait or the disorder is located on the X chromosome. (ie. Color blindness or hemophilia)

- **Pedigree**: a tool used to show how a characteristic might be inherited from generation to generation
  - Determining between Autosomal or X-linked pedigrees
    - **Autosomal**: male & females are usually affected equally
    - **X-linked**: male are affected more frequently than females
  - Determining between Dominant or Recessive pedigrees
    - **Dominant**: trait is observed in most generations; cannot be inherited from unaffected parents.
    - **Recessive**: trait seems to “skip” generations; can be inherited from unaffected parents.