

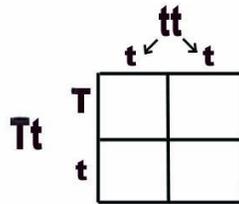
## Notes\_Punnett Squares

### A Summary of Mendel's Principles:

- The inheritance of biological traits is determined by genes. Genes are passed from parents to their offspring.
- In cases in which 2 or more forms (alleles) of a gene exist for a single trait, some forms of the gene may be dominant and others may be recessive.
- In most sexually reproducing organisms, each adult has 2 copies of each gene - one from each parent. These genes are separated from each other when sex cells are formed.

### Punnett Square Example:

Let's say that the ability to roll one's tongue is dominant (T) to the inability to roll one's tongue (t). The Punnett square below shows the cross between a parent who is Tt and a parent who is tt. Fill in the Punnett square.



1. What is the phenotype of the Tt parent?
2. What is the phenotype of the tt parent?
3. What is the genotypic ratio for the offspring of this cross?
4. What is the phenotypic ratio for the offspring of this cross?

### Punnett Square Problems with Simple Dominance

For each problem do the following:

- (1) Write the genotypes of the parents
- (2) Make a Punnett square showing the cross of the parents
- (3) Determine the genotypic ratio of the offspring
- (4) Determine the phenotypic ratio of the offspring

***In pea plants, green pods are dominant (G) to yellow (g).***

1. Cross two plants that are heterozygous for green pods.
  
  
  
  
  
  
  
  
  
  
2. Cross a homozygous dominant green plant with a yellow plant.
  
  
  
  
  
  
  
  
  
  
3. Cross a heterozygous plant with a homozygous dominant green plant.

***In cats short hair (H) is dominant to long hair (h).***

4. Cross a heterozygous short hair cat with a heterozygous short hair cat.
  
  
  
  
  
  
  
  
  
  
5. Cross a homozygous dominant short hair cat with a long hair cat.
  
  
  
  
  
  
  
  
  
  
6. Cross a heterozygous short hair cat with a dominant short hair cat.

**In dihybrid crosses, we are working with two different pairs of homologous chromosomes. Remember Mendel's Law of Independent Assortment? Therefore, we will be using two different sets of letters to denote the alleles/genes.**

1. State the kinds of gametes that would be produced by organisms with the following genotypes. Remember that each gamete must contain  $\frac{1}{2}$  the number of genes that the original cell contained for each trait.
  - a. Aabb \_\_\_\_\_
  - b. AABB \_\_\_\_\_
  - c. aaBB \_\_\_\_\_
  - d. AaBb \_\_\_\_\_
2. Black coat is dominant to chestnut in horses, and trotting gait is dominant to a pacing gait. Stage the genotypes for the following:
  - a. Black trotter heterozygous for both traits \_\_\_\_\_
  - b. Homozygous black pacer \_\_\_\_\_
  - c. Black pacer whose mother was a chestnut \_\_\_\_\_
  - d. Chestnut with a pacing father \_\_\_\_\_
3. Cross a heterozygous black (B) and a heterozygous short (S) haired guinea pig with a heterozygous black and heterozygous short haired guinea pig. Give genotype and phenotype ratios.
