

Name: _____ Date: _____

Horse Genetics - Crosses Involving Two Traits

A horse's gaits are influenced by whether the animal inherited one, two, or no mutated copies of *DMRT3*, the so-called "gait-keeper" gene. Horses without the mutation generally show the regular gaits of walk, trot, and canter.

Heterozygous horses have received the normal gene from one parent and the mutation from the other parent; these horses can still produce regular gaits.

Homozygous horses have received mutated genes from both parents. These "gaited" horses can usually walk and canter, and may be able to trot, but most are likely to pace. The pace is a lateral two-beat gait. In the pace, the two legs on the same side of the horse move forward together, unlike the trot, where the two legs diagonally opposite from each other move forward together. In both the pace and the trot, two feet are always off the ground.

(Source: <https://ker.com/equine/news/genetic-patterns-influence-horse-gait-quality/>)



The **flaxen gene** is a trait which causes the **mane** and **tail** of **chestnut-colored** horses to be noticeably lighter than the body coat color, often a golden **blonde** shade. It is thought to be recessive (**f**) but may be controlled by multiple genes.

Trotter (T) is dominant over pacer (t).

Flaxen manes (f) are recessive, with dominant manes having a darker color (F)

What are the genotypes and phenotypes possible in horses? (Make a chart.)

-- For each of the problems below, use the MATHEMATICAL METHOD to determine ratios. --
- SHOW YOUR WORK-

1. A flaxen pacer horse is mated to one who is homozygous dominant for both traits. What is the phenotype of the offspring? What is their genotype?

2. If you have two horses that are both heterozygous for both traits. What phenotypic ratios would be expected in the offspring?

3. A trotter, flaxen maned horse ($Tt ff$) is crossed with one that is a pacer and has a dark mane. ($tt Ff$). How many offspring will have a flaxen mane and be a trotter?

4. A trotter, dark mane horse ($TT Ff$) is crossed with one that is a pacer with a flaxen mane ($tt ff$). What are the phenotypic ratios of the offspring?

5. A flaxen pacer horse is mated to one who is heterozygous for both traits. What are the phenotypic ratios of the offspring?

