Punnett Squares – Dihybrid Crosses

Background
Punnett Square are used to predict the possibility of different outcomes. When looking at one trait at a time it is called a monohybrid cross. You completed these last year. Complete the review problem below.

Review: Cross a heterozygous male for tallness with a homozygous recessive female for tallness. Then give the genotype and phenotype ratios.

Dihybrid crosses involve tracking two traits simultaneously. For example, we can predict the outcome for offspring as the traits for both height and color are concerned.

Example 1: (Dihybrid Cross)
In garden peas, tallness (T) is dominant to shortness (t) and axillary flowers (A) are dominant to terminal flowers (a). What are the expected genotypes and phenotypes of the offspring if a heterozygous tall, heterozygous axillary plant is crossed with a heterozygous tall, terminal plant? Give your answers in probabilities (%).

Parents: Male = TtAa; Female = Ttaa

F1 Offspring: Genotype Percents and Ratios =

> **Meiotic Distribution of Alleles**
>
> 1. Purpose: to distribute the parental alleles into gametes (eggs and sperm or pollen and ovum) as would be predicted by meiosis.
> 2. Use the FOIL method from the binomial distributive property of multiplication.
> 3. ex: gamete distribution for AaBb
>
>   AB   Ab   aB   ab

Phenotypes Percents and Ratios =

• Dihybrid Cross Problems

1. In horses, the coat color black is dominant (B) over chestnut (b). The trotting gait is dominant (T) over the pacing gait (t). If a homozygous black pacer is mated to a homozygous chestnut, heterozygous trotter, what will be the probabilities for genotype and phenotype of the F_1 generation?

F1 Offspring: Genotype Percents and Ratios =

            Phenotypes Percents and Ratios =

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2. In rabbits, the coat color black dominant (B) over brown (b). Short hair is dominant (S) over long (s). In a cross between a homozygous black short-haired male and a brown homozygous long-haired female, what would be the probabilities for genotype and phenotype of the F_1 generation?

F1 Offspring: Genotype Percents and Ratios =

Phenotypes Percents and Ratios =

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3. Imagine that a couple is planning to have children. The male is heterozygous for tongue rolling and homozygous dominant for unattached earlobes. The female is homozygous recessive for tongue rolling and heterozygous for unattached earlobes. The couple is curious about the possibility and probability of their offspring inheriting these traits. The ability to roll ones tongue is dominant (R) over the "non-rolling" condition (r.) Unattached earlobes (U) are dominant over attached earlobes (u) Complete a Punnett square for this cross and record the probabilities for genotypes and phenotypes of the offspring as ratios.

F1 Offspring: Genotype Percents and Ratios =

Phenotypes Percents and Ratios =

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