***Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Per:\_\_\_***

***Introduction to Punnet Squares***

Punnet squares are diagrams that help geneticists or students to predict the genotypic and or phenotypic ratio/probabilities of a generation. The simplest punnet squares look at a single trait or gene. Diploid individuals like us, carry two copies of each gene. We can carry ***two recessive alleles***, or ***two dominant alleles*** or one of each allele ***a dominant and a recessive***.

Let us look at the gene for flower color in plants. We will call this gene the Red gene since the dominant allele yields red colored flowers. The dominant allele is always written with the uppercase letter in this case “R”, and the recessive allele is always written with the lowercase letter in this case “r” When writing them in pairs we write the dominant allele first. Each flower contains their two copies of the flower color gene so different flowers can be represented by RR, Rr or \_\_\_\_\_depending on whether they have the homozygous dominant, homozygous recessive or heterozygous genotype.

The genotype is what is written on the genes. The phenotype is what you actually see! Lets practice!

Uppercase R= Red Flowers Lowercase r = White flowers

Parents: Homozygous Dominant for Red flowers X Homozygous recessive for Red flowers

1. Write the genotypes for the parents above (must have 2 letters) : \_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_

Describe their phenotypes\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_X\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fill out the following Punnet Square for the parents in 1 above, using the correct genotypes.

|  |  |
| --- | --- |
|  |  |
|  |  |

List the new genotypes formed and give the percent of each eg RR=25%.

Give the percentage of each Phenotype eg. Red Flowers=75%.

2. On your own show the following crosses. List the new genotypes formed and give the percent of each eg RR=50%. List the phenotypes and give the percentage of each eg. Red= 50%

Homozygous recessive X Heterozygous Heterozygous X Heterozygous

|  |  |
| --- | --- |
|  |  |
|  |  |

|  |  |
| --- | --- |
|  |  |
|  |  |

List the steps to make a Punnett Square.

**Punnett Square Practice Problems**

Complete the following crosses: draw a Punnett square and list the probabilities of the offspring.

**Example:**

A green pea plant (GG) is being crossed with a green pea plant (Gg).

|  |
| --- |
| **Genotype:**  GG \_\_\_\_\_\_ %  Gg \_\_\_\_\_\_%  gg \_\_\_\_\_\_%  **Phenotype:**  Green \_\_\_\_\_%  Yellow \_\_\_\_\_% |

**G G**

|  |  |
| --- | --- |
| GG | GG |
| Gg | Gg |

**G**

**g**

1. **A green pea plant (Gg) is crossed with a yellow pea plant (gg).**

|  |
| --- |
| **Genotype:**  GG \_\_\_\_\_\_ %  Gg \_\_\_\_\_\_%  gg \_\_\_\_\_\_%  **Phenotype:**  Green \_\_\_\_\_%  Yellow \_\_\_\_\_% |

|  |  |
| --- | --- |
|  |  |
|  |  |

1. **A tall plant (TT) is crossed with a tall plant (Tt).**

|  |
| --- |
| **Genotype:**  TT \_\_\_\_\_\_ %  Tt \_\_\_\_\_\_%  tt \_\_\_\_\_\_%  **Phenotype:**  Tall \_\_\_\_\_%  Short \_\_\_\_\_% |

|  |  |
| --- | --- |
|  |  |
|  |  |

1. **A tall plant (Tt) is crossed with a short plant (tt).**

|  |
| --- |
| **Genotype:**  TT \_\_\_\_\_\_ %  Tt \_\_\_\_\_\_%  tt \_\_\_\_\_\_%  **Phenotype:**  Tall \_\_\_\_\_%  Short \_\_\_\_\_% |

|  |  |
| --- | --- |
|  |  |
|  |  |

1. A homozygous dominant brown mouse is crossed with a heterozygous brown mouse (tan is the recessive color).
2. Two heterozygous white (brown fur is recessive) rabbits are crossed.
3. Two heterozygous red flowers (white flowers are recessive) are crossed.

4. A homozygous tall plant is crossed with a heterozygous tall plant (short is recessive ).

1. A heterozygous white rabbit is crossed with a homozygous black rabbit.