Name: Period:

**Easter Egg Genetics**

**#1**

**Directions:**

1. Each person in the group will choose 2 eggs, but DO NOT open them yet!
2. Each egg represents the cross of two parent chickens. So, each half of the egg represents the phenotype and genotype of one parent.
3. The phenotype (physical trait) of each ½ of the egg is the color. In the spaces provided, fill out the phenotype for both halves of one of your eggs.
4. Next use the “Genotype Table” to identify the genotype (the alleles) for each ½ of the same egg you recorded the phenotype for. Fill in the spaces for the genotypes of both halves.

**Genotype Table**:

|  |  |  |  |
| --- | --- | --- | --- |
| Phenotype | Genotype | Phenotype | Genotype |
| Purple | PP | Blue | BB |
| Orange | Pp | Green | Bb |
| Pink | pp | Yellow | bb |

1. Use the Punnett Square to determine what the genotype and phenotype of the offspring will be.
2. Once you have filled out the Punnett Square, open your egg. Do your results match the results inside the egg?

Phenotypes of 2 parents (each represented by ½ the egg):



Genotypes of 2 parents:

X

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**#2**

**Directions:**

Repeat the same steps that you followed for the first egg for your second egg.

**Genotype Table**:

|  |  |  |  |
| --- | --- | --- | --- |
| Phenotype | Genotype | Phenotype | Genotype |
| Purple | PP | Blue | BB |
| Orange | Pp | Green | Bb |
| Pink | pp | Yellow | bb |

Phenotypes of 2 parents (each represented by ½ the egg):



Genotypes of 2 parents:

X

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**Questions:**

1. An individual with 2 different alleles (Pp or Bb) is called a heterozygous. For each egg, what proportion of the offspring is heterozygous?
2. For each egg, what is the probability that the parents would produce 4 heterozygote offspring (Pp or Bb)?
3. If you opened an egg, and found 15 offspring—4 blue, 7 green, and 4 yellow—predict what the genotypes of the parents were.

(Hint: Remember that in real life, proportions are not always perfect. Start by calculating what proportion of the eggs are blue, then green, then yellow. Round these fractions to the nearest ¼ and then fill in the Punnett Square)

**CHALLENGE QUESTION:**

Many times geneticists are interested in more than one trait. We have seen how Punnett Squares can be used to predict genotypes for one trait. Let’s use Punnett Squares to predict the genotypes for two traits. Genes are independently passed on from parents to offspring. So, the probability that offspring will inherit Trait “A” is independent from the probability that the offspring will inherit Trait “B”. Since these traits are independent of each other, we can set up two separate Punnett Squares. We find the probability that the offspring will have each of the traits that we want, and then we multiply those probabilities.

Here is the problem:

Red roses are dominant to white and tall plants are dominant to short plants. If we cross a short white rose bush (genotype: rrtt) with a tall red rose bush (genotype: RrTt), what proportion of the offspring would be a short red rose bush genotype: Rrtt or RRtt)?

(Hint: These are independent events.)

**Red roses = RR or Rr Tall plants = TT or Tt**

**White roses = rr Short plants = tt**

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