**How Can Punnett Squares Predict Traits Of Offspring?**

**I. Introduction**

 The Punnett square is a diagram that is used to predict an outcome of a particular cross or breeding experiment. It is named after [Reginald C. Punnett](http://en.wikipedia.org/wiki/Reginald_Punnett), who devised the approach, and is used by [biologists](http://en.wikipedia.org/wiki/Biology) to determine the [probability](http://en.wikipedia.org/wiki/Probability) of an offspring's having a particular [genotype](http://en.wikipedia.org/wiki/Genotype). The Punnett square is a tabular summary of every possible combination of one maternal [allele](http://en.wikipedia.org/wiki/Allele) with one paternal allele for each gene being studied in the cross. These tables give the correct probabilities for the genotype outcomes of independent crosses where the probability of inheriting copies of each parental allele is [independent](http://en.wikipedia.org/wiki/Probability#Independent_probability). The Punnett Square is visual representation of [Mendelian inheritance](http://en.wikipedia.org/wiki/Mendelian_inheritance).

 In this investigation, you will explore how Punnett squares are used to predict the outcome of monohybrid genetic crosses.

**II. Procedure**

 1. Go to the following website :

 [http://glencoe.mcgraw-hill.com/sites/0078759864/student\_view0/unit3/chapter10/virtual\_labs.html#](http://glencoe.mcgraw-hill.com/sites/0078759864/student_view0/unit3/chapter10/virtual_labs.html)

 2. Click on the TV and view the Punnett Square tutorial.

 3. Close out the tutorial and click on the notebook with the Punnett square.

 4. Click on the reset button until you find Scenario 1.

 1. Following the directions in the yellow box for Scenario 1.

 2. Click on Parent 1 and choose the correct parent.

 3. Click on Parent 2 and choose the correct parent.

 4. Click on Check Parents. If incorrect, choose a different parent.

 5. If correct, drag the correct fruit fly on to the cross in each box.

 6. Click on Check Offspring. If incorrect, drag off flies and replace flies.

 7. If correct, drag the correct genotypes to the boxes (below the flies).

 8. Record your data.

 5. Repeat Step 4 for all 10 scenarios.

**Scenario #1**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

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**Scenario #2**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

**Scenario #3**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

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**Scenario #4**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

**Scenario #5**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

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**Scenario #6**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

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 **Genotypic Ratio** : **Phenotypic Ratio** :

**Scenario #7**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

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**Scenario #8**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

**Scenario #9**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

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**Scenario #10**

 **Parent Genotypes** : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Parent Phenotypes** :

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **Genotypic Ratio** : **Phenotypic Ratio** :

**III. Analysis & Conclusions**

 **1. For one of the monohybrid crosses you performed in this Investigation, describe how**

 **to use the phenotype ratios to determine the percentage of offspring displaying each**

 **trait.**

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 **2. Can the genotype for a gray-bodied fly be determined? Why or why not? Describe**

 **all of the possible genotypes for a fly with that phenotype.**

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 **3. Explain why an organism with a homozygous dominant genotype has the same**

 **phenotype as an organism with a heterozygous genotype.**

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 **4. What genetic information can be obtained from a Punnett square? What genetic**

 **information cannot be determined from a Punnett square?**

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