Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Period \_\_\_\_\_\_\_\_\_\_

**Monohybrid Crosses and the Punnett Square**

Introduction

Scientists use a grid-like tool (Punnett Square) to make predictions about various problems. The Punnett Square shows only the probability of what might occur and not the actual results. Probability is the chance of something occurring. If one wants to flip a coin 100 times, since there are 2 sides to the coin, he would expect 50 heads and 50 tails. But, you could get 60 heads & 40 tails. Prediction is one thing, and actually getting the predicted results is another. The Punnett Square only shows the chances of what might occur each time the event is undertaken.

Objective

In this investigation, you will use a Punnett Square to predict the possible genotypes and phenotypes and their ratios from a monohybrid cross.

Procedure

1. Each group of 2 students will pick up 2 paper bags filled with 15 red (R) beans and 15 white (r) beans. This represents 2 heterozygous parents (Rr x Rr).
2. One student in the group will be in charge of the male bag and the other student will be in charge of the female bag.
3. At the same time, each student will reach into their bag and pull out one of the beans. The only possibilities that can be made from this selection are: RR (homozygous red), Rr (heterozygous red), or rr (homozygous white). Mark the resulting genotype and phenotype in the data table.
4. Return the beans back into the bag and conduct the same process 19 more times (20 total trials).

Data Table

|  |  |  |
| --- | --- | --- |
| **Trial** | **Offspring’s Genotype** | **Offspring’s Phenotype** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |
| 11 |  |  |
| 12 |  |  |
| 13 |  |  |
| 14 |  |  |
| 15 |  |  |
| 16 |  |  |
| 17 |  |  |
| 18 |  |  |
| 19 |  |  |
| 20 |  |  |

Analysis and Conclusions

1. Look at the data you collected. What is the ratio of genotypes?

\_\_\_\_\_\_\_\_% RR \_\_\_\_\_\_\_\_\_% Rr \_\_\_\_\_\_\_\_\_\_\_% rr

1. Look at the data you collected. What is the ratio of phenotypes?

\_\_\_\_\_\_\_\_\_% red \_\_\_\_\_\_\_\_\_\_\_% white

1. What is the dominant trait? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. How do you know it is dominant? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What are the genotypes of the parents? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_X\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What are the phenotypes of the parents? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_X\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Fill in the Punnett Square below using the parents given in the procedure:

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

1. What is the genotypic ratio based on the Punnett Square?

\_\_\_\_\_\_\_\_\_\_% RR \_\_\_\_\_\_\_\_\_\_\_\_% Rr \_\_\_\_\_\_\_\_\_\_\_\_\_% rr

1. What is the phenotypic ratio based on the Punnett Square?

\_\_\_\_\_\_\_\_\_% red \_\_\_\_\_\_\_\_\_\_\_\_% white

1. a. Do the numbers from #8 & #9 match #1 & #2? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Why or why not? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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