# Pre-Lab Information

Purpose Conduct an investigation to explore the use of Punnett squares to predict genotypes and phenotypes of offspring.

Time Approximately 45 minutes

Question How are Punnett squares used to predict phenotypes?

Summary You will create a parent creature by tossing a coin to determine the genotype for several different characteristics. You will then work with a partner to determine the possible genotypes of the offspring of two parent creatures and fill in Punnett squares. Another coin toss will determine the genotype of one creature offspring. Finally, you will construct a creature based on the phenotypes of your offspring.

# Safety

* Behavior in the lab needs to be purposeful.
* Use caution when cutting with scissors.
* Be aware of your surroundings when flipping coins.
* Report all accidents—no matter how big or small—to your teacher.

# Lab Procedure

1. **Gather materials.**

|  |  |  |
| --- | --- | --- |
| * Coin
* Craft supplies
 |  |  |

1. **Create a parent creature.**
	1. Flip the coin once to determine the first allele for body color. Use the Characteristics Table to look up which alleles are dominant or recessive. Heads represents the recessive trait, yellow. Tails represents the dominant trait, blue.
	2. Record the allele in the “Allele 1” column in Table A.
	3. Flip the coin a second time to determine the second allele for body color. Heads represents the recessive trait, yellow. Tails represents the dominant trait, blue.
	4. Record the allele in the “Allele 2” column in Table A.
	5. Repeat steps 2a–2d five more times for each of the other characteristics. Heads will always represent the recessive traits and tails will always represent the dominant traits.
	6. Record the genotype for each characteristic in Table A.
	7. Determine the phenotype for each characteristic by reading the Characteristics Table below and record the phenotype in Table A.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Characteristic** | **Coin** | **Dominant Trait** | **Dominant Allele** | **Coin** | **Recessive Trait** | **Recessive Allele** |
| **Body color** | Tails | Blue | B | Heads | yellow | b |
| **Hair** | Tails | None | H | Heads | Present | h |
| **Ears** | Tails | Pointy | E | Heads | Droopy | e |
| **Eyes** | Tails | Large and round | R | Heads | Small and narrow | r |
| **Tail** | Tails | Long and slender | T | Heads | Short and thick | t |
| **Wings** | Tails | None | F | Heads | Present | f |

**Characteristics Table**

1. **Mate two creatures.**
	1. Work with a partner assigned to you by your teacher.
	2. Write the body color alleles for both your parent creature and your partner’s parent creature in the Body Color Punnett Square.
	3. Determine the possible body color genotypes of the offspring and fill in the Body Color Punnett Square.
	4. Repeat steps 3b–3c for each of the other five characteristics.
2. **Determine the genotype and phenotype of offspring.**
	1. Flip a coin to determine which column of the Body Color Punnett Square to refer to. Heads refers to the left column. Tails refers to the right column.
	2. Flip a coin again to determine which row of the Body Color Punnett Square to refer to. Heads refers to the top row. Tails refers to the bottom row.
	3. Record the genotype indicated by the coin tosses in Table B.
	4. Repeats steps 4a–4c for each of the remaining five characteristics.
	5. Use the Characteristic Table to determine the phenotype that will be expressed by the genotypes and record it in Table B.
3. **Create your creature offspring.**
	1. Use a variety of craft materials to create the creature offspring.
4. **Clean up your area.**
	1. Return unused materials and dispose of any trash according to your teacher’s directions.

# Data

Record your data either in your lab notebook or in the space below.

**Table A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Characteristic** | **Allele 1** | **Allele 2** | **Genotype** | **Phenotype** |
| **Body color** |  |  |  |  |
| **Hair** |  |  |  |  |
| **Ears** |  |  |  |  |
| **Eyes** |  |  |  |  |
| **Tail** |  |  |  |  |
| **Wings** |  |  |  |  |

**Body Color Punnett Square**

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

**Hair Punnett Square**

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

**Ears Punnett Square**

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

**Eyes Punnett Square**

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

**Tail Punnett Square**

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

**Wings Punnett Square**

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

**Table B**

|  |  |  |
| --- | --- | --- |
| **Characteristic** | **Genotype** | **Phenotype** |
| **Body color** |  |  |
| **Hair** |  |  |
| **Ears** |  |  |
| **Eyes** |  |  |
| **Tail** |  |  |
| **Wings** |  |  |

# Follow-Up Questions

Answer the following questions:

1. Which of your offspring’s traits are homozygous? Heterozygous?
2. If two creatures with droopy ears mate, can their offspring have pointy ears? Explain your answer.
3. If two creatures without wings mate, can their offspring have wings? Explain your answer.