**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Create a Baby Lab….. turned into a Baby Book 4C’s Project☺**

**Purpose**: To demonstrate the principles of Mendelian genetics and sex determination, including the concepts of allele, phenotype, genotype, dominant, recessive, codominant, homozygous and heterozygous by creating a simulated baby

**Materials**: Two pennies, pencils, paper, colored pencils, white paper

**Procedure**:

1) Working with a partner, determine the genotype of the baby by flipping pennies. "Mom" flips one penny to choose an allele for her egg and "Dad" flips the other to choose an allele for his sperm. (Note that the gender of the baby is a special case and is determined by dad alone. Boys are XY and girls are XX. Mom can give only an X but dad can give either an X or a Y.)

2) Record the alleles which resulted from the coin flips, and put "sperm and egg" together. (You cannot pick the traits you want; life doesn't work that way!) Write down baby's genotype for each trait in Table 1. Heads represents allele #1 and tails represents allele #2.

3) Record the baby's phenotype in Table 1 by looking up the genotype on the Genotype/Phenotype Reference Sheet. Note: Dominant alleles are written with an uppercase letter and recessive alleles are written as lowercase letters. Dominant alleles mask the expression of recessive ones. Co-dominant alleles are written as uppercase letters with a subscript. Co-dominant alleles result in a phenotype in which both alleles are expressed.

4) Repeat steps 1, 2, and 3 for all traits. Then draw, color, and name your creation (on the back of Table 1). Remember that you are drawing a baby's face that represents the traits you got - not a child's or an adult's (no tattoos, no mustaches, no piercings, etc., and not too much hair!)

**Concluding Questions: Day One**

1. Why is the coin flip used to represent the selection of alleles?
2. Why did the male flip the coin for the sex of the child and not both mother and father?
3. Would you expect the other pairs of students in your class to have an offspring similar to yours? Explain.
4. If a man who has long eyelashes (LL) marries a woman who has long eyelashes (Ll) , what are the possible genotypes and phenotypes of their children? Show all Punnett squares
5. What are the possible genotypes of the parents of a child who has wavy hair (Hh)? Show your Punnett squares
6. Is this the “perfect” child? Explain your answer.
7. Can the ACTUAL traits of an offspring be determined by knowing the traits of the parents? Explain your answer.

**Day Two**

1. What traits in the investigation showed incomplete dominance?
2. Why are hair color and eye color polygenic traits?

**Results**: **Table 1**:

|  |  |  |
| --- | --- | --- |
| Mom's Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Dad's Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Baby's Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Trait** | **Heads** | **Tails** | **Allele from Mom** | **Allele from Dad** | **Genotype** | **Phenotype** |
| Gender | X | Y | \_\_\_\_\_\_X\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Face Shape | R | r | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Chin Shape | N | n | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Chin Dimple | A | a | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Freckles | F | f | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Cheek Dimples | D | d | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Lip Thickness | T | t | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Eye Brows | B | b | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Eye Shape | W | w | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Eyelashes | L | l | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Ear Shape | R | r | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Ear Lobes | F | f | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Widow's Peak | W | w | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **STOP HERE!!!! Day Two** |  |  |  |  |  |  |
| Hair Curliness | C1 | C2 | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Eyebrow Color | D1 | D2 | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Eye Width | W1 | W2 | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Eye Size | S1 | S2 | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Mouth Size | M1 | M2 | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Nose Size | P1 | P2 | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Birth Mark | B1 | B2 | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Skin Tone | S1 | S2 | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Polygenic Trait** | (4 coin flips) | **Alleles from Mom** | **Alleles from Dad** | **Genotype** | **Phenotype** |
| Hair Color | A, B | a, b | #1\_\_\_\_ #2\_\_\_\_ | #1\_\_\_\_ #2\_\_\_\_ | \_\_ \_\_ /\_\_ \_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Eye Color | A, B | a, b | #1\_\_\_\_ #2\_\_\_\_ | #1\_\_\_\_ #2\_\_\_\_ | \_\_ \_\_ /\_\_ \_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |