Introduction

Why do people, even closely related people, look slightly different from each other? The reason for these differences in physical characteristics (called **phenotype**) is the different combination of **genes** possessed by each individual.

To illustrate the tremendous variety possible when you begin to combine genes, you and a classmate will establish the genotypes for a potential offspring. Your baby will receive a random combination of genes that each of you, as genetic parents, will contribute. Each normal human being has 46 chromosomes (23 pairs&endash;**diploid**) in each body cell. In forming the gametes (egg or sperm), one of each chromosome pair will be given, so these cells have only 23 single chromosomes (**haploid**). In this way, you contribute half of the genetic information (**genotype**) for the child; your partner will contribute the other half.

Because we don't know your real genotype, we'll assume that you and your partner are **heterozygous** for every facial trait. Which one of the two available alleles you contribute to your baby is random, like flipping a coin. In this lab, there are 36 gene pairs and 30 traits, but in reality there are thousands of different gene pairs, and so there are millions of possible gene combinations!

Procedure

Record all your work on each parent's data sheet.

• First, determine your baby's gender. Remember, this is determined entirely by the father. The mother always contributes an X chromosome to the child.

Heads = X chromosome, so the child is a GIRL

Tails = Y chromosome, so the child is a BOY

Fill in the results on your data sheet.

• Name the child.

• Determine the child's facial characteristics by having **each** parent flip a coin.

Heads = child will inherit the first allele (example: B or N1) in a pair

Tails = child will inherit the second allele (example: b or N2) in a pair

On the data sheet, circle the allele that the parent will pass on to the child and write the child's genotype.

• Using the information in this guide, look up and record the child's phenotype and draw that section of the face where indicated on the data sheet.

• Some traits follow special conditions, which are explained below.

6. **HAIR COLOR**: Determined by 4 gene pairs.

8 dominant - black
7 dominant - very dark brown
6 dominant - dark brown
5 dominant - brown
4 dominant - light brown
3 dominant - brown mixed w/blonde
2 dominant - blond
1 dominant - very light blond
0 dominant - silvery white

7. **RED COLOR TINTS IN THE HAIR**: This trait is only visible if the hair color is light brown or lighter (4 or less dominant alleles for hair color).

Dark red tint (L1L1) Light red tint (L1L2) No red tint (L2L2)

8. **HAIR TYPE**:

Curly (M1M1) Wavy (M1M2) Straight (M2M2)

9. **WIDOW'S PEAK**:

Present (OO, Oo) Absent (oo)

10. **EYE COLOR**:

PPQQ = BLACK	PpQq = BROWN	ppQQ = GREEN
PPQq = DARK BROWN	PPqq = VIOLET	ppQq = DARK BLUE
PpQQ = BROWN WITH GREEN TINTS	Ppqq = GRAY BLUE	ppqq = LIGHT BLUE

11. **EYE DISTANCE**:

Close (R1R1) Average (R1R2) Far apart (R2R2)

12. **EYE SIZE**:

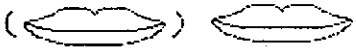
Large (S1S1) Medium (S1S2) Small (S2S2)

20. **LIP THICKNESS:**

Thick (CC, Cc) Thin (cc)

21. **DIMPLES:**

Present (DD, Dd) Absent (dd)



22. **NOSE SIZE:**

Large (E1E1) Medium (E1E2) Small (E2E2)

23. **NOSE SHAPE:**

Rounded (FF, Ff) Pointed (ff)

24. **NOSTRIL SHAPE:**

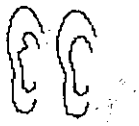
Rounded (GG, Gg) Pointed (gg)

25. **EARLOBE ATTACHMENT:**

Free (HH, Hh) Attached (hh)

26. **DARWIN'S EARPOINT:**

Present (II, Ii) Absent (ii)



27. **HAIRY EARS:**

Present (KK, Kk) Absent (kk)

28. **FRECKLES ON CHEEKS:**

Present (LL, Ll) Absent (ll)

29. **FRECKLES ON FOREHEAD:**Present (MM, Mm) Absent