Variations of the Human Face

PURPOSE

The purpose of this activity will be to recognize the relationship between and individual's genotype and phenotype and to also recognize the role of polygenic traits and probability in genetics.

BACKGROUND

Gregor Mendel determined that hereditary traits, or genes, are passed from generation-to-generation with predictable outcomes. In this investigation, you will illustrate the genetic concepts of the principle of dominance, segregation, genotype, phenotype, polygenic inheritance and incomplete dominance when you and your partner produce a baby.

What would your baby look like if you and your partner (your "spouse") both have one dominant gene and one recessive gene for each of the following features of the face?

MATERIALS

Coins, paper, colored pencils

PROCEDURE

1. To determine the genotype for each trait listed, each partner will flip their coin.
   Heads will denote the gamete for the **dominant trait**
   Tails will denote the gamete for the **recessive trait**
2. In the data table, record the allele(s) contributed by each parent to determine the genotypes of ALL the traits.
3. With ALL the genotypes completed, refer back to this sheet and fill in the phenotypes on your data table.
4. When you have determined ALL the genotypes & phenotypes, use colored pencils to draw a picture of your baby with the correct features.
5. Complete the above steps for another baby.
6. Complete the conclusion questions.

Sex of the Child: Because it is the father's sperm that determines the sex of the child, only the father will flip the coin to determine the sex of this child.

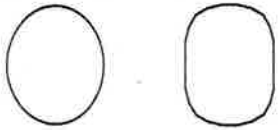
Heads = Boy **Tails = Girl**

Give your child a name.

TRAITS

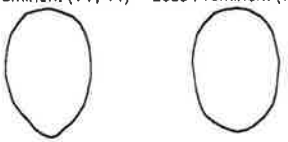
1. Face Shape

Round (RR, Rr) Square (rr)



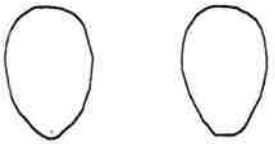
2. Chin

Very Prominent (VV, Vv) Less Prominent (vv)



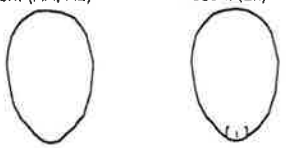
3. Chin Shape (*Only* flip coins for this trait if Chin genotype = VV or Vv)

Round (RR, Rr) Square (rr)



4. Cleft Chin

Absent (AA, Aa) Present (aa)



5. Ear Size

Large (LL) Medium (Ll) Small (ll)

6. Ear Lobes

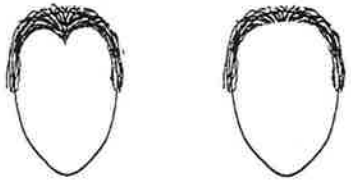
Free (FF, Ff) Attached (ff)

7. Hair Body

Curly (CC) Wavy (Cc) Straight (cc)

8. Widow's Peak

Present (WW, Ww) Absent (ww)



9. Hair Color

Dark color is dominant over light. To determine the color of the baby's hair, assume that there are 2 genes (4 alleles) involved. Flip your coins the first time to determine the first allele pair (HH, Hh or hh), and then flip your coins again to determine the second allele pair (CC, Cc or cc). Use the chart below to determine your baby's hair color.

Genotype	Phenotype
HHCC	Black
HHCc	Black
HHcc	Red
HhCC	Dark Brown
HhCc	Brown

Genotype	Phenotype
Hhcc	Regular Blond
hhCC	Dark Blond
hhCc	Regular Blond/Brown
hhcc	Light Blond (pale yellow)

10. Eyebrow Thickness

Bushy (BB, Bb) Fine (bb)

11. Eyebrow Separation

Not Connected (SS, Ss) Connected (ss)

12. Eyebrow Color

Darker than Hair (HH) Same Color as Hair (Hh) Lighter than Hair (hh)

13. Eye Distance Apart

Close Together (EE) Average Distance (Ee) Far Apart (ee)

14. Eye Size

Large (LL) Medium (Ll) Small (ll)

15. Eye Shape

Almond or Wide (AA, Aa) Round or Narrow (aa)

16. Eye Slantedness

Horizontal Slant (HH, Hh) Upward Slant (hh)

17. Eye Color

Dark eyes are dominant over light colored eyes. To determine the color of the baby's eyes, assume that there are 2 genes (4 alleles) involved. Flip your coins the first time to determine the first allele pair (EE, Ee or ee) that codes for the color in front of the iris. Flip your coins again to determine the second allele pair (CC, Cc or cc) for the color behind the iris. Use the chart below to determine your baby's eye color.

Genotype	Phenotype
EECC	Dark Brown
EECc	Dark Brown
EEcc	Brown w/ Green Flecks
EeCC	Brown
EeCc	Green w/ Brown Flecks

Genotype	Phenotype
Eecc	Gray-Blue
eeCC	Green
eeCc	Dark Blue
eecc	Light Blue

18. Eyelashes

Long (LL, Ll) Short (ll)

19. Mouth

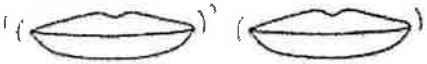
Long (LL) Average(Ll) Short (ll)

20. Lips

Thick (TT, Tt) Thin (tt)

21. Dimples

Present (DD, Dd) Absent (dd)



22. Nose

Big (NN) Medium (Nn) Small (nn)

23. Freckles If your baby has freckles, place small dots across the bridge of the nose.

Freckles (FF, Ff) No Freckles (ff)

Variations of the Human Face

Parents' Names_____ Date_____ Period___

#	Trait	Allele(s)
1	Face Shape	R
2	Chin	V
3	Chin Shape	R
4	Cleft Chin	A
5	Ear Size	L
6	Ear Lobes	F
7	Hair body	C
8	Widow's Peak	W
9	Hair Color	HC
10	Eyebrow Thickness	B
11	Eyebrow Separation	S
12	Eyebrow Color	H
13	Eye Distance Apart	E
14	Eye Size	L
15	Eye Shape	A
16	Eye Slantedness	H
17	Eye Color	EC
18	Eyelashes	L
19	Mouth	L
20	Lips	T
21	Dimples	D
22	Nose	N
23	Freckles	F

Baby 1 Sex: Name:		
Dad	Mom	
Genotype		Phenotype

Baby 2 Sex: Name:		
Dad	Mom	
Genotype		Phenotype

Analysis:

1. Draw pictures of your babies on the back of this lab sheet.

2. Answer the following questions on the back.
   a) Are your two babies identical in looks? Why not?

   b) How does this lab illustrate the law of independent assortment?

   c) Which traits are polygenic?

   d) Which traits display incomplete dominance?