Integrated Natural Science II SCI 2620

Name:_____ Course Section:_____

Make A Baby Genome Lab Activity

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, art supplies, paper, punnett square sheets.

Procedure:

1. Working with a partner, determine your own Phenotype first by using the catalog below. You may mark right on the catalog! Once your Phenotype is determined, extrapolate your Genotype for each Phenotype. If you do not know the exact nature of your dominant Genotype, flip coins. (e.g. Heads = 2^{nd} allele is dominat; Tails = 2^{nd} allele is recessive)

2. Working with a partner (of the opposite sex... well, duh?), determine the genotype of the baby by using your own genotype as a guide. When you have a “purebred” genotype, no action is necessary since both allels are the same and you can give either one to the baby. If your genotype is “hybrid”, then you must employ the flipping of the coins one more time to randomly determine which of the two alleles will be given to the baby. "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.)

3. Record the alleles which resulted from the coin flips, and put "sperm and egg" together. (You cannot pick the traits you want when your genotype trait is “hybrid”!) Write down baby's genotype for each trait in Table 1.

4. Record the baby's phenotype in Table 1. 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 that is blended.

5. Repeat steps 1, 2, and 3 for all traits and then draw, color, and name your creation. Remember that you are drawing a baby's face - not a child's or an adult's (not too much hair!)

Preparation:

1. Define the following terms:

allele-

phenotype-

genotype-

dominant-

recessive-

codominant-

homozygous-

heterozygous-

chromosome-

locus-

gene-

Results:

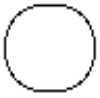
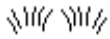
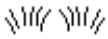
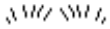
My Gender: □ Male □Female

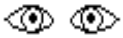
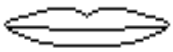
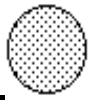
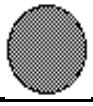
Mom's Name: _____ Dad's Name _____ Baby's Name: _____

Trait	Allele from Mom	Allele from Dad	Genotype	Phenotype
Gender	_____X_____	_____	_____	_____
Face Shape	_____	_____	_____	_____
Chin Shape	_____	_____	_____	_____
Chin Dimple	_____	_____	_____	_____
Freckles	_____	_____	_____	_____
Cheek Dimples	_____	_____	_____	_____
Lip Thickness	_____	_____	_____	_____
Eye Brows	_____	_____	_____	_____
Eye Shape	_____	_____	_____	_____
Eyelashes	_____	_____	_____	_____
Ear Shape	_____	_____	_____	_____
Ear Lobes	_____	_____	_____	_____
Widow's Peak	_____	_____	_____	_____
Hair Curliness	_____	_____	_____	_____
Eyebrow Color	_____	_____	_____	_____
Eye Width	_____	_____	_____	_____
Eye Size	_____	_____	_____	_____
Mouth Size	_____	_____	_____	_____
Nose Size	_____	_____	_____	_____
Birth Mark	_____	_____	_____	_____
Skin Tone	_____	_____	_____	_____
Polygenic Trait	**Alleles from Mom**	**Alleles from Dad**	**Genotype**	**Phenotype**
Hair Color	#1____ #2____	#1____ #2____	__ __ /__ __	_____
Eye Color	#1____ #2____	#1____ #2____	__ __ /__ __	_____

Show Punnett Square Probabilities for each trait on a separate piece of paper!!!

Genotype/Phenotype Reference Sheet

TRAIT	Genotype / Phenotype Homozygous - Allele #1	Genotype / Phenotype Heterozygous	Genotype / Phenotype Homozygous - Allele #2
Face Shape	RR round 	Rr round 	rr square 
Chin Shape	NN noticeable 	Nn noticeable 	nn less noticeable 
Chin Dimple	AA absent 	Aa absent 	aa present 
Freckles	FF present 	Ff present 	ff absent 
Cheek Dimples	DD present 	Dd present 	dd absent 
Lip Thickness	TT thick 	Tt thick 	tt thin 
Eye Brows	BB bushy 	Bb bushy 	bb fine 
Eye Shape	WW wide (narrow) 	Ww wide (narrow) 	ww round 
Eyelashes	LL long 	Ll long 	ll short 
Ear Shape	RR long 	Rr long 	rr round 
Ear Lobes	FF free 	Ff free 	ff attached 
Widow's Peak	WW present 	Ww present 	ww absent 
Hair Curliness	C_1C_1 curly 	C_1C_2 wavy 	C_2C_2 straight 

TRAIT	Genotype / Phenotype Homozygous - Allele #1	Genotype / Phenotype Heterozygous	Genotype / Phenotype Homozygous - Allele #2
Eyebrow Color	D_1D_1 darker than hair 	D_1D_2 same as hair 	D_2D_2 lighter than hair 
Eye Width	W_1W_1 close together 	W_1W_2 average 	W_2W_2 far apart 
Eye Size	S_1S_1 large 	S_1S_2 medium 	S_2S_2 small 
Mouth Size	M_1M_1 wide 	M_1M_2 medium 	M_2M_2 narrow 
Nose Size	P_1P_1 small 	P_1P_2 medium 	P_2P_2 large 
Birth Mark (mole)	B_1B_1 left cheek 	B_1B_2 absent 	B_2B_2 right cheek 
Skin Tone	S_1S_1 light 	S_1S_2 medium 	S_2S_2 dark 
Hair Color	AABB = Black AABb = Black AAbb = red	AaBB = Dark Brown AaBb = Light Brown Aabb = Dark Blonde	aaBB = Blonde aaBb = Blonde aabb = White (Albino)
Eye Color	AABB = Deep Brown AABb = Deep Brown AAbb = Brown	AaBB = Greenish Brown AaBb = Light Brown Aabb = Grey - Blue	aaBB = Green aaBb = Blight Blue aabb = Pink

DRAW THE FACE OF YOUR BABY IN THE SPACE BELOW USING THE PHENOTYPES ESTABLISHED ABOVE!

Punnett Square For Genotype / Phenotype Probability Analysis

