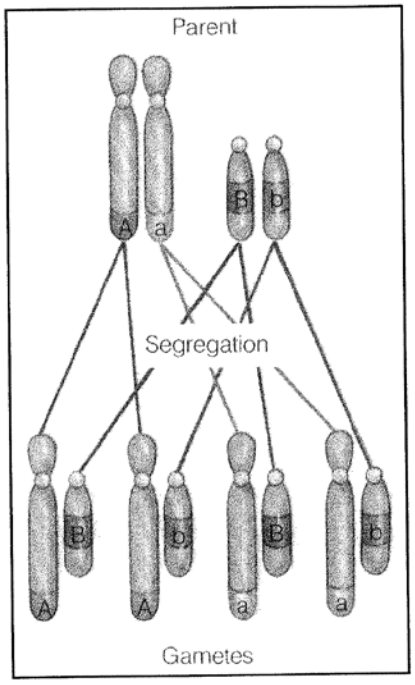
Name: _____ Date: _____
SHS Living Environment

Lab # _____ Beaker Babies

Background Information:

Heredity is the passing on of traits, or characteristics, from parent to offspring. The units of heredity are called ***genes***. Genes are found on the chromosomes in the cell nucleus. For each gene (instructions for a trait) an individual inherits ***2 alleles***, one from the ***mother*** and one from the ***father***. The combinations for each trait occur by ***chance***.



When one allele is stronger than the other allele, the trait of the weaker one is masked or hidden. The stronger allele is the ***dominant*** one and its trait is always seen in the individual. The allele that is masked is the ***recessive*** allele. The ***dominant*** allele is written as a ***capital*** letter and the ***recessive*** allele is written as a ***lower case*** letter. If both alleles in a gene pair are the same, the trait is said to be ***homozygous*** or pure. If the alleles are different, the trait is said to be ***heterozygous*** or hybrid. Sometimes alleles are neither dominant nor recessive. The result of such a situation is a blending of traits.
The genetic makeup of an individual is known as its ***geneotype***. The observable physical characteristics of an individual that are the results of its geneotype are known as its ***phenotype***. In humans, the sex of an individual is determined by the particular combination of the two sex chromosomes. Individuals that have two X chromosomes (XX) are females, whereas those with an X and Y chromosome (XY) are males.

Purpose:

In this activity you will observe how the results of different gene combinations produce certain traits and investigate the process of independent assortment in gamete formation.

Procedure:

Get together with your "spouse" at your lab station. *Note: There should be one 'male' and one 'female' for each pair. If you are in a group with two females or two males, decide on one person to play to the opposite gender.*	
3 Beakers:	Use the masking tape and a pen to label the beakers at your lab station as **MALE** and **FEMALE** and **BABY**.
Table 1 (***Your Phenotype and Genotype***):	1. Determine your personal phenotype by circling the appropriate square for each trait. 2. Record the genotype that you circled (letters in the square) in the last column.
Table 2 (***Your Chromosomes***):	1. Record your genotype in the chromosome columns (one letter per box). 2. Cut along the lines of the white boxes to produce your alleles. Place your alleles into the appropriate beaker (**MALE** for male parent and **FEMALE** for female parent).
Beakers:	Shake the beakers to mix the alleles. Randomly draw alleles from the **MALE** beaker. Place the alleles in the **BABY** beaker.
Table 3 (***Your Child***):	1. Record the alleles drawn from the **MALE** beaker in appropriate column. *If you draw a repeat allele (letter), record the first allele drawn for that trait.* 2. Repeat with the alleles from the **FEMALE** beaker. Place the alleles in the **BABY** beaker
Figure 1 (***Your Child***):	Dump out the alleles from the **BABY** beaker and arrange them into **homologous** pairs. This is the genotype of your baby. Draw a **detailed** and **colored picture** of your offspring. This drawing should be based on the traits from **Table 3** (***Your Child***). Use arrows to label all 12 traits of your offspring. Neatness counts.

Table 1. Your Phenotype and Genotype

Circle your own personal phenotype and genotype on the chart below. Write the alleles (genotype) in the last column.

*Example: if you are female, circle **XX = female** and write **XX** in the last column.*

Trait	Homozygous Dominant	Heterozygous	Homozygous Recessive	Your Genotype (case sensitive)
(X) Sex	XX female	XY male		
(B) Hair color	BB black	Bb brown/red	bb blond	
(C) Hair curl	CC curly	Cc wavy	cc straight	
(D) Dimples	DD present		dd absent	
(E) Eye color	EE brownish	Ee greenish	ee blue	
(F) Earlobes	FF free		ff attached	
(H) Finger hair	HH hair on mid-section		hh no hair on mid-section	
(L) Toe length	LL longer 2nd toe		ll shorter 2nd toe	
(N) Nose	NN convex		nn straight or concave	
(P) Hair line	PP widow's peak		pp straight	
(R) Tongue roll	RR roller		rr non-roller	
(T) Thumb	TT bent back		tt straight	

Table 2. Your Alleles

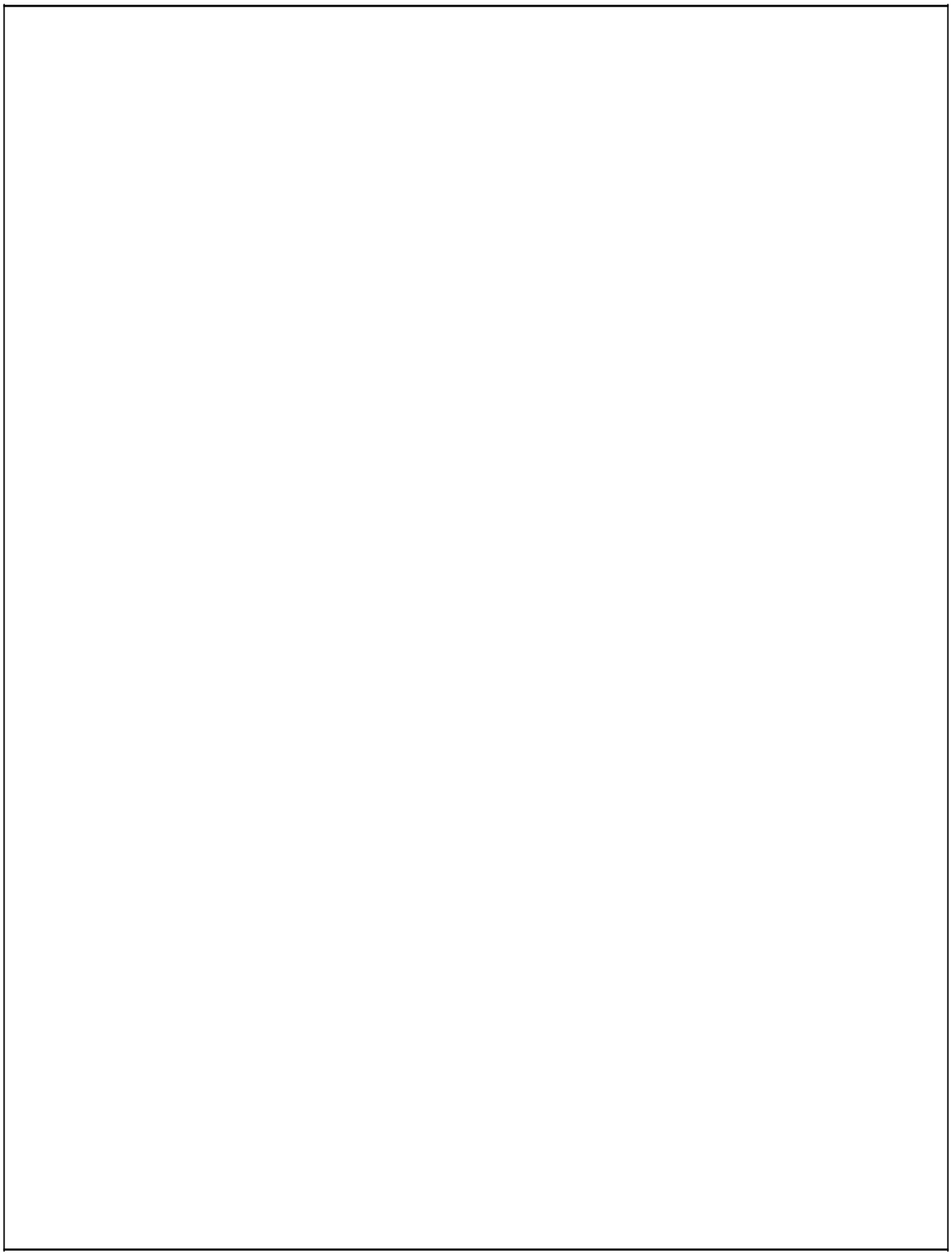
Trait	Genotype*	
	Chromosome 1	Chromosome 2
(X) Sex		
(B) Hair color		
(C) Hair curl		
(D) Dimples		
(E) Eye color		
(F) Earlobes		
(H) Finger hair		
(L) Toe length		
(N) Nose		
(P) Hair line		
(R) Tongue roll		
(T) Thumb		

****After you have completed the Genotype columns, cut along the dashed lines***

Table 3. Your Child

Trait	Genotype		Phenotype
	Male Beaker	Female Beaker	
(X) Sex			
(B) Hair color			
(C) Hair curl			
(D) Dimples			
(E) Eye color			
(F) Earlobes			
(H) Finger hair			
(L) Toe length			
(N) Nose			
(P) Hair line			
(R) Tongue roll			
(T) Thumb			

Figure 1. Your Child.



Analysis and Conclusion Questions:

1. Is it possible to express a trait in the phenotype if neither of your parents show it in their phenotype.

_____

Why or why not?

_____

_____

2. Can your genetic traits be similar to your grandparents?

_____

Why or why not?

_____

_____

3. There have been cases in history where a king divorced his queen because she produced only daughters. Using your knowledge of genetics, explain why this was an incorrect move.

_____

_____

4. List the numbers of traits that were homozygous in your baby

_____

5. List the numbers of traits that were heterozygous in your baby

_____

6. a) Were there any homozygous recessive traits that were present in your baby? If so, list the numbers and traits.

_____

_____

_____

b) Of the total 12 traits in your baby, what percentage of the traits were homozygous recessive?

_____

7. a)Why is it important that parent chromosomes split in half?

_____

b) What would happen if they didn't?

_____

8. a) How do all of the babies compare? Do they look alike?

_____

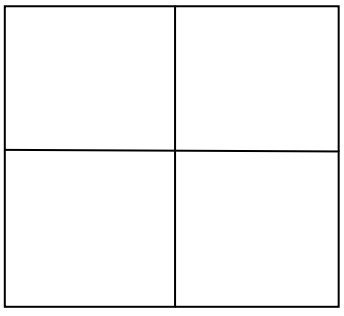
b) Even if they look alike, does that mean their genetic makeup is exactly the same? Explain why or why not.

_____

9. Out of the 12 traits, choose 1 and construct a Punnet Square using the alleles present in the parents to predict the probability of the genotype and phenotype of the offspring for that trait.

State the Key

Do the Cross



Phenotype:

Genotype: