Name _____

Genetics with a Smile

Purpose: To distinguish between dominant and recessive traits and make predictions about possible outcomes of various genetic combinations of inherited characteristics

Background Information: Genes are the material that control which traits are expressed in an organism. There are two copies of each gene, one from the mother and one from the father. These genes can take different forms called alleles. For example, there is a gene for the height of a pea plant. The gene has two alleles, one for tall and one for short. Genes are located on chromosomes in the nucleus of a cell. Genes come in pairs and offspring inherit one copy of each gene from each parent.

A dominant allele is one whose trait always shows up, even when only one of the two alleles is in the dominant form. A dominant allele is shown by a capital letter. A recessive allele is one that is hidden when the other copy of the gene contains the dominant allele. A recessive allele shows up only when there is no dominant allele present.

When offspring inherit two dominant genes, (one dominant gene from each parent) they are said to be homozygous dominant.
When offspring inherit two recessive genes, (one recessive gene from each parent) they are said to be homozygous recessive.
When offspring inherit one dominant gene and one recessive gene, they are said to be heterozygous dominant.

Some traits do not follow the dominant-recessive pattern. When an organism has two different alleles for a gene that does not follow the pattern, it shows a trait that is a blend of the traits represented by the two alleles. For example, the gene for the color of some flowers has one allele for red and one for white. When both alleles are present, neither is dominant, and the flower color is pink. This is called co – dominance or incomplete dominance.

The probability of certain traits being shown can be figured by using Punnett Squares. A Punnett Square is a chart that shows all the possible combinations of alleles that can result when genes are crossed.

Procedure:

Part A: Smiley Face Traits

(1) Obtain two coins from your teacher. Mark one coin with a “F” and the other with a “M” to represent each of the parents. The parents are heterozygous for all the Smiley Face traits.

(2) Flip the coins for parent for each trait. If the coin lands with heads up, it represents a dominant allele. A coin that lands tails up indicates a recessive allele.

(3)Record the result for each person by circling the correct letter.

(4)Use the results and the Smiley Face Traits page to determine the genotype and phenotype for each trait.

Trait	Female	Male	Genotype	Phenotype
Face Shape	C c	C c		
Eye Shape	E e	E e		
Hair Style	S s	S s		
Smile	T t	T t		
Ear Style	V v	V v		
Nose Style	D d	D d		
Face Color	Y y	Y y		
Eye Color	B b	B b		
Hair Length	L l	L l		
Freckles	F f	F f		
Nose Color	R Y	R Y		
Ear Color	P T	P T		

Part B: Is it a boy or girl?

To determine the sex of your smiley face, flip the coin for the male parent. Heads would represent X, while tails would be Y.

	Female	Male	Genotype	Phenotype
Sex	X	X Y		

Part C: Create Your Smiley Face!

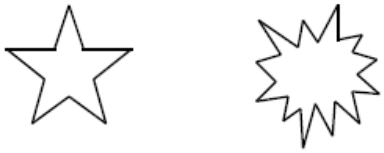
Use the Smiley Face Traits chart and your results from Part A to create a sketch of your smiley face in the box. Don't forget to give your smiley face a name!

Smiley Face Traits

Face Shape
Circle (C) Oval (c)

Nose Style
Down (D) Up (d)

Eye Shape
Star (E) Blast (e)



Face Color
Yellow (Y)
Green (y)

Eye Color
Blue (B)
Red (b)

Hair Style
Straight (S) Curly (s)

Hair Length
Long (L)
Short (l)

Freckles
Present (F)
Absent (f)

(more traits on next page)

Smile

Thick (T)

Thin (t)

Nose Color

Red (RR)
Orange (RY)
Yellow (YY)

Ear Color

Hot Pink (PP)
Purple (PT)
Teal (TT)

Ear Style

Curved (V)

Pointed (v)

Sex

To determine the sex, the flip the coin for the male parent. Heads equals X and tails equals Y.

XX - Female - Add pink bow in hair
XY - Male - Add blue bow in hair

My Smiley_____

Questions:

How does your smiley face compare to the ones created by your classmates? Pick two smiley faces that are displayed near your smiley face and compare each of the 12 traits. Indicate the phenotype for each smiley face for each trait in the chart.

Trait	My Smiley Face	Smiley by	Smiley by
Face Shape			
Eye Shape			
Hair Style			
Smile			
Ear Style			
Nose Style			
Face Color			
Eye Color			
Hair Length			
Freckles			
Nose Color			
Ear Color			

Questions:

1. Which smiley face has the most dominant traits? _____ How many? _____ traits

2. Which smiley face has the most recessive traits? _____ How many? _____ traits

3. Which traits were a result of incomplete dominance?

4. What is the probability that a smiley face will have a green face? _____ out of _____ or ____ %

5. How many smiley faces have a green face, which is a recessive trait? _____ out of _____ or ____ %

6. How does your predicted probability for a green face (#5) compare to the actual results (#6)? Explain your answer.

7. What is the probability that a smiley face will have an orange nose? _____ out of _____ or ____ %

8. How many smiley faces have an orange nose? _____ out of _____ or ____ %

9. How does your predicted probability for an orange nose (#7) compare to the actual results (#8)? Explain your answer.

10. Why did you only need to flip the male parent coin to determine the sex of your smiley face?