

## Bikini Bottom Genetics

Name \_\_\_\_\_

Scientists at Bikini Bottoms have been investigating the genetic makeup of the organisms in this community. Use the information provided and your knowledge of genetics to answer each question.

1. For each genotype below, indicate whether it is a heterozygous (He) OR homozygous (Ho).

TT \_\_\_\_\_ Bb \_\_\_\_\_ DD \_\_\_\_\_ Ff \_\_\_\_\_ tt \_\_\_\_\_ dd \_\_\_\_\_  
 Dd \_\_\_\_\_ ff \_\_\_\_\_ Tt \_\_\_\_\_ bb \_\_\_\_\_ BB \_\_\_\_\_ FF \_\_\_\_\_

Which of the genotypes in #1 would be considered purebred? \_\_\_\_\_

Which of the genotypes in #1 would be hybrids? \_\_\_\_\_

2. Determine the phenotype for each genotype using the information provided about SpongeBob.

Yellow body color is dominant to blue.

YY \_\_\_\_\_ Yy \_\_\_\_\_ yy \_\_\_\_\_

Square shape is dominant to round.

SS \_\_\_\_\_ Ss \_\_\_\_\_ ss \_\_\_\_\_

3. For each phenotype, give the genotypes that are possible for Patrick.

A tall head (T) is dominant to short (t).

Tall = \_\_\_\_\_ Short = \_\_\_\_\_

Pink body color (P) is dominant to yellow (p).

Pink body = \_\_\_\_\_ Yellow body = \_\_\_\_\_

4. SpongeBob SquarePants recently met SpongeSusie Roundpants at a dance. SpongeBob is heterozygous for his square shape, but SpongeSusie is round. Create a Punnett square to show the possibilities that would result if SpongeBob and SpongeSusie had children. HINT: Read question #2!


- A. List the possible genotypes and phenotypes for their children.

B. What are the chances of a child with a square shape? \_\_\_\_ out of \_\_\_\_ or \_\_\_\_%

C. What are the chances of a child with a round shape? \_\_\_\_ out of \_\_\_\_ or \_\_\_\_%

5. Patrick met Patti at the dance. Both of them are heterozygous for their pink body color, which is dominant over a yellow body color. Create a Punnett square to show the possibilities that would result if Patrick and Patti had children. HINT: Read question #3!


- A. List the possible genotypes and phenotypes for their children.

B. What are the chances of a child with a pink body? \_\_\_\_ out of \_\_\_\_ or \_\_\_\_%

C. What are the chances of a child with a yellow body? \_\_\_\_ out of \_\_\_\_ or \_\_\_\_%

6. Everyone in Squidward's family has light blue skin, which is the dominant trait for body color in his hometown of Squid Valley. His family brags that they are a "purebred" line. He recently married a nice girl who has light green skin, which is a recessive trait. Create a Punnett square to show the possibilities that would result if Squidward and his new bride had children. Use B to represent the dominant gene and b to represent the recessive gene.


A. List the possible genotypes and phenotypes for their children.

B. What are the chances of a child with light blue skin? \_\_\_\_%

C. What are the chances of a child with light green skin? \_\_\_\_%

D. Would Squidward's children still be considered purebreds? Explain!

7. Assume that one of Squidward's sons, who is heterozygous for the light blue body color, married a girl that was also heterozygous. Create a Punnett square to show the possibilities that would result if they had children.


A. List the possible genotypes and phenotypes for their children.

B. What are the chances of a child with light blue skin? \_\_\_\_%

C. What are the chances of a child with light green skin? \_\_\_\_%

8. Mr. Krabbs and his wife recently had a Lil' Krabby, but it has not been a happy occasion for them. Mrs. Krabbs has been upset since she first saw her new baby who had short eyeballs. She claims that the hospital goofed and mixed up her baby with someone else's baby. Mr. Krabbs is homozygous for his tall eyeballs, while his wife is heterozygous for her tall eyeballs. Some members of her family have short eyes, which is the recessive trait. Create a Punnett square using T for the dominant gene and t for the recessive one.


A. List the possible genotypes and phenotypes for their children.

B. Did the hospital make a mistake? Explain your answer.

# Genetics with a Smile

Name \_\_\_\_\_

## 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. Record the result for each person by circling the correct letter. 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		

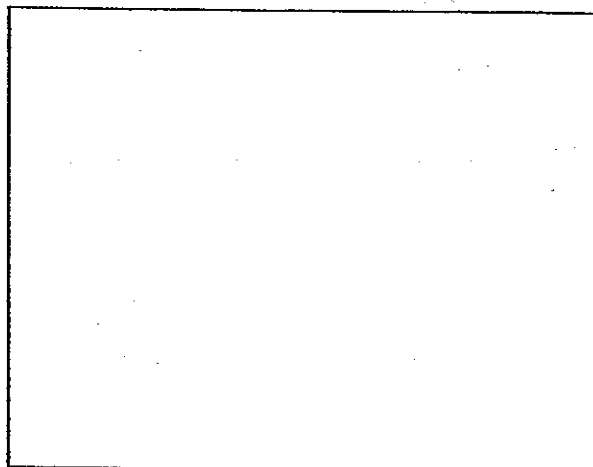
## Part C: Create Your Smiley Face!

Use the Smiley Face Traits chart and your results from Part A to create a sketch of your smiley face in the box. Once you have completed the sketch, use the drawing tools in Microsoft Word to create your smiley face!

Two things to remember ...

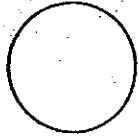
✓ Do not add color on the computer! Print a black and white copy and then use crayons or colored pencils to finish it.

✓ Don't forget to give your smiley face a name! You will also need to include your name as parent and your class hour.



## Smiley Face Traits

**Face Shape**  
Circle (C)



Oval (c)



**Nose Style**  
Down (D)



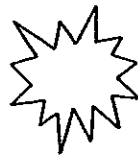
Up (d)



**Eye Shape**  
Star (E)



Blast (e)



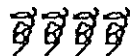
**Face Color**  
Yellow (Y)  
Green (y)

**Eye Color**  
Blue (B)  
Red (b)

**Hair Style**  
Straight (S)



Curly (s)



**Hair Length**  
Long (L)  
Short (l)

**Freckles**  
Present (F)  
Absent (f)

**Smile**  
Thick (T)



Thin (t)



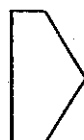
**Nose Color**  
Red (RR)  
Orange (RY)  
Yellow (YY)

**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

# Genetics with a Smile

## Wrapping It Up!

Name \_\_\_\_\_

(1) 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			

- (2) Which smiley face has the most dominant traits? \_\_\_\_\_ How many? \_\_\_\_\_ traits
- (3) Which smiley face has the most recessive traits? \_\_\_\_\_ How many? \_\_\_\_\_ traits
- (4) Which traits were a result of incomplete dominance?
- (5) What is the probability that a smiley face will have a green face? \_\_\_\_\_ out of \_\_\_\_\_ or \_\_\_\_\_ %
- (6) How many smiley faces have a green face, which is a recessive trait? \_\_\_\_\_ out of \_\_\_\_\_ or \_\_\_\_\_ %
- (7) How does your predicted probability for a green face (#5) compare to the actual results (#6)? Explain.
- (8) What is the probability that a smiley face will have an orange nose? \_\_\_\_\_ out of \_\_\_\_\_ or \_\_\_\_\_ %
- (9) How many smiley faces have an orange nose? \_\_\_\_\_ out of \_\_\_\_\_ or \_\_\_\_\_ %
- (10) How does your predicted probability for an orange nose (#8) compare to the actual results (#9)? Explain.

- (11) Why did you only need to flip the male parent coin to determine the sex of your smiley face?
- (12) How would the smiley faces change if one of the parents were homozygous dominant for all the traits while the other was heterozygous?
- (13) How would the smiley faces change if one of the parents were recessive for all the traits while the other was heterozygous?
- (14) Uncle Smiley, who is heterozygous for a yellow face, married a woman with a green face. Both of them have always wanted a large family! If they were to have 12 children, what is the probability that the children would have yellow faces? How many would have green faces? Create a Punnett square to help you find your answers.
- (15) Grandma and Grandpa Smiley are heterozygous for the star eye shape. If one of their heterozygous children married a girl with blast-type eyes, what percentage of their grandchildren should have starry eyes? What percent would have blast-type eyes? Create a Punnett square to help you find your answers.
- (16) Baby Smiley has curly hair, but neither of her parents do! Is this possible? Create a Punnett square to help you find your answer.
- (17) Aunt Smiley has the cutest pointed ears and would love to have children with pointed ears! What type of ears would her husband need to have in order for her to get her wish? Give the genotype and phenotype as part of your answer.