

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.

Bikini Bottom Genetics 2

Name _____

Use your knowledge of genetics to complete this worksheet.

1. Use the information for SpongeBob's traits to write the phenotype (physical appearance) for each item.

Trait	Dominant Gene	Recessive Gene
Body Shape	Squarepants (S)	Roundpants (s)
Body Color	Yellow (Y)	Blue (y)
Eye Shape	Round (R)	Oval (r)
Nose Style	Long (L)	Stubby (l)

- (a) LL- _____ (e) Rr- _____
 (b) yy- _____ (f) ll- _____
 (c) Ss- _____ (g) ss- _____
 (d) RR - _____ (h) Yy - _____

2. Use the information in the chart in #1 to write the genotype (or genotypes) for each trait below.

- (a) Yellow body - _____ (e) Stubby nose - _____
 (b) Roundpants - _____ (f) Round eyes - _____
 (c) Oval eyes - _____ (g) Squarepants - _____
 (d) Long nose - _____ (h) Blue body - _____

3. Determine the genotypes for each using the information in the chart in #1.

- (a) Heterozygous round eyes - _____ (c) Homozygous long nose - _____
 (b) Purebred squarepants - _____ (d) Hybrid yellow body - _____

4. One of SpongeBob's cousins, SpongeBillyBob, recently met a cute squarepants gal, SpongeGerdy, at a local dance and fell in love. Use your knowledge of genetics to answer the questions below.

(a) If SpongeGerdy's father is a heterozygous squarepants and her mother is a roundpants, what is her genotype? Complete the Punnett square to show the possible genotypes that would result to help you determine Gerdy's genotype.

What is Gerdy's genotype? _____

(b) SpongeBillyBob is heterozygous for his squarepants shape. What is his genotype? _____

(c) Complete the Punnett square below to show the possibilities that would result if Billy Bob & Gerdy had children.

(d) List the possible genotypes and phenotypes for the kids.

(e) What is the probability of kids with squarepants? _____ %

(f) What is the probability of kids with roundpants? _____ %

5. SpongeBob's aunt and uncle, SpongeWilma and SpongeWilbur, have the biggest round eyes in the family. Wilma is believed to be heterozygous for her round eye shape, while Wilbur's family brags that they are a pure line. Complete the Punnett square to show the possibilities that would result if Wilma and Wilbur had children.

(a) Give the genotype for each person. Wilma - _____ Wilbur - _____

(b) Complete the Punnett square below to show the possibilities that would result if they had children.

(c) List the possible genotypes and phenotypes for the kids.

(d) What is the probability that the kids would have round eyes? _____ %

(e) What is the probability that the kids would be oval eyes? _____ %

6. SpongeBob's mother is so proud of her son and his new wife, SpongeSusie, as they are expecting a little sponge. She knows that they have a 50% chance of having a little roundpants, but is also hoping the new arrival will be blue (a recessive trait) like SpongeSusie and many members of her family. If SpongeBob is heterozygous for his yellow body color, what are the chances that the baby sponge will be blue? Create a Punnett square to help you answer this question.

7. SpongeBob's aunt is famous around town for her itty, bitty stubby nose! She recently met a cute squarepants fellow who also has a stubby nose, which is a recessive trait. Would it be possible for them to have a child with a regular long nose? Why or why not? Create a Punnett square to help you answer this question.

8. If SpongeBob's aunt described in #7 wanted children with long noses, what type of fellow would she need to marry in order to give her the best chances? Create a Punnett square to help you answer this question.

Bikini Bottom Genetics
Incomplete Dominance

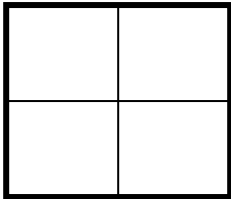
Name _____

SpongeBob loves growing flowers for his pal Sandy! Her favorite flowers, Poofkins, are found in red, blue, and purple. Use the information provided and your knowledge of incomplete dominance to complete each section below.

1. Write the correct genotype for each color if R represents a red gene and B represents a blue gene.

Red - _____ Blue - _____ Purple - _____

2. What would happen if SpongeBob crossed a Poofkin with red flowers with a Poofkin with blue flowers. Complete the Punnett square to determine the chances of each flower color.



(a) Give the genotypes and phenotypes for the offspring.

(b) How many of the plants would have red flowers? _____%

(c) How many of the plants would have purple flowers? _____ %

(d) How many of the plants would have blue flowers? _____ %

3. What would happen if SpongeBob crossed two Poofkins with purple flowers? Complete the Punnett square to show the probability for each flower color.



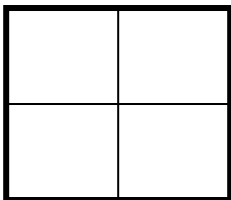
(a) Give the genotypes and phenotypes for the offspring.

(b) How many of the plants would have red flowers? _____%

(c) How many of the plants would have purple flowers? _____ %

(d) How many of the plants would have blue flowers? _____ %

4. What would happen if SpongeBob crossed a Poofkin with purple flowers with a Poofkin with blue flowers? Complete the Punnett square to show the probability for plants with each flower color.



(a) Give the genotypes and phenotypes for the offspring.

(b) If SpongeBob planted 100 seeds from this cross, how many should he expect to have of each color?

Purple flowers - _____ Blue flowers - _____ Red flowers - _____

SpongeBob and his pal Patrick love to go jellyfishing at Jellyfish Fields! The fields are home to a special type of green jellyfish known as Goobers and only really great jellyfishermen are lucky enough to catch some on every trip. Many of the jellyfish are yellow (YY) or blue (BB), but some end up green as a result of incomplete dominance. Use this information to help you complete each section below.

5. What would happen if SpongeBob and Patrick crossed two “goobers” or green jellyfish? Complete the Punnett square to help you determine the probability for each color of jellyfish.

(a) Give the possible genotypes and phenotypes for the offspring.



(b) What percentage of the offspring would be yellow? _____%

(c) What percentage would be blue? _____ %

(d) What percentage would be “goobers” (green)? _____ %

6. What would happen if they crossed a yellow jellyfish with a goober? Complete the Punnett square to help you determine the probability for each color of jellyfish.

(a) Give the possible genotypes and phenotypes for the offspring.



(b) What percentage of the offspring would be yellow? _____%

(c) What percentage would be blue? _____ %

(d) What percentage would be “goobers” (green)? _____ %

7. What would happen if they crossed a blue jellyfish with a yellow jellyfish? Complete the Punnett square to help you answer the questions.



If 100 jellyfish were produced from this cross, how many would you expect for each?

Yellow - _____ Blue - _____ Goobers - _____

8. What would happen if they crossed a blue jellyfish with a goober? Complete the Punnett square to help you answer the questions.



If 100 jellyfish were produced from this cross, how many would you expect for each?

Yellow - _____ Blue - _____ Goobers - _____

Bikini Bottom – Dihybrid Crosses

Name _____

Use the chart to identify the genotypes of the following traits:

- Heterozygous round eyes, blue body _____
- Hybrid eye shape, purebred roundpants _____
- Purebred roundpants, heterozygous long nose _____

Trait	Dominant Gene	Recessive Gene
Body Shape	Squarepants (S)	Roundpants (s)
Body Color	Yellow (Y)	Blue (y)
Eye Shape	Round (R)	Oval (r)
Nose Style	Long (L)	Stubby (l)

4. SpongeBob’s aunt, who is a roundpants, has a cute stubby nose. She has finally found the sponge of her dreams and is ready to settle down. Her fiancé always comments on how adorable her nose is (he says it reminds him of his mother’s – aww, how sweet!). They wonder what the chances are of that trait being passed on. Her fiancé is a purebred squarepants and is a hybrid for his long nose.

A. Identify the genotypes of the aunt and her fiancé.

Aunt = Roundpants, Stubby Nose = _____ Fiancé = Purebred Squarepants, Long Nose = _____

B. What are the possible gamete combinations for each person?

Aunt = _____ Fiancé = _____

C. What are the possible genotypes for their children? _____

5. As we know, SpongeBob is heterozygous for his yellow body color and his squarepants, while his wife SpongeSusie is blue and has roundpants. Use this information to answer the following questions.

A. Give the genotypes for each.

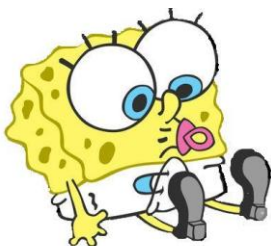
SpongeBob = _____ SpongeSusie = _____



B. What are the possible gamete combinations for each person?

SpongeBob = _____ SpongeSusie = _____

C. Complete the Punnett square based on the information provided in #5.



D. Answer the questions based on your Punnett square.

What is the chance of a blue baby? _____

What is the chance of a blue squarepants? _____

What is the chance of a squarepants? _____

What is the chance of a purebred recessive for both traits? _____

6. In starfish, pink body color (P) is dominant to orange (p), and thick eyebrows (T) are dominant over thin (t) ones. Patrick, who is heterozygous for body color but purebred for thick eyebrows, has met Patti, who is recessive for both traits.



- A. What is Patti's phenotype? _____
- B. Is it possible for the new couple to have offspring that resemble their mother? Explain.

- C. Before Patrick commits to this relationship, he would like to guarantee that his offspring would have his thick eyebrows as he thinks they make him smarter! You need to provide evidence for or against the marriage with regards to eyebrows ONLY.

7. While Squidward's family boasts about being a purebred line for dominant light blue skin color, they are also purebred for a less distinguished trait: the recessive trait of baldness. Lack of hair causes Squidward some self-esteem issues that he does not want his children to face. He would like to ensure that his offspring have hair AND with his blue skin color. What traits should he look for in a bride?



- A. Must she have hair? Explain. _____

- B. Must she be blue? Explain. _____

Squidward Traits:
Skin Color
 Blue = B, Green = b
Hair
 Hair = H, Bald = h

C. Squidward has found a potential bride prospect with the green squid Octavia. While Octavia has _____ hair, her father does not. Determine the chances of their child being blue and having hair.

Squidward's Genotype = _____ Octavia's Genotype = _____

D. Use the genotypes in above to complete the Punnett square below and then answer the questions.

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- E. Answer these questions based on your Punnett square.
- For which traits, if any, is it possible for their offspring to be purebred?
- What is the probability of their children being heterozygous for both traits? _____