

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

Answer Key

1. $\begin{matrix} \text{Ho} & \text{He} \\ \text{He} & \text{Ho} \end{matrix}$ $\begin{matrix} \text{Ho} & \text{He} \\ \text{He} & \text{Ho} \end{matrix}$ $\begin{matrix} \text{Ho} & \text{Ho} \\ \text{Ho} & \text{Ho} \end{matrix}$

Purebreds - TT, DD, BB, FF, ff, dd, bb, tt

Hybrids - Dd, Bb, Ff, Tt

2. $\begin{matrix} \text{Yellow body} \\ \text{Square shape} \end{matrix}$ $\begin{matrix} \text{Yellow body} \\ \text{Square shape} \end{matrix}$ $\begin{matrix} \text{Blue body} \\ \text{Round shape} \end{matrix}$

3. Tall - TT or Tt Short - tt
Pink - PP or Pp Yellow - pp

4. $\begin{matrix} & s & s \\ S & Ss & Ss \\ s & ss & ss \end{matrix}$ A. SS - square shape, Ss - square shape, and ss - round shape
B. 2 out of 4 or 50%
C. 2 out of 4 or 50%

NOTE: Some of your students may feel that the roundpants gene should be the dominant trait as SpongeBob's TV parents are both roundpants. However, these are only his parents on the TV show and his real parents are both heterozygous for squarepants.

5. $\begin{matrix} & P & p \\ P & PP & Pp \\ p & Pp & pp \end{matrix}$ A. PP - pink body, Pp - pink body, and pp - yellow body
B. 3 out of 4 or 75%
C. 1 out of 4 or 25%

6. $\begin{matrix} & B & b \\ B & BB & Bb \\ b & Bb & bb \end{matrix}$ A. Bb - light blue skin
B. 100%
C. 0%
D. Squidward's children would not be considered purebred, since each would have a gene pair made up of a dominant gene and a recessive gene.

7. $\begin{matrix} & T & t \\ T & TT & Tt \\ T & TT & Tt \end{matrix}$ A. TT - tall eyeballs or Tt - tall eyeballs
B. The hospital must have made a mistake, since the genotype "tt" would not be possible based on the genotypes of Mr. and Mrs. Krabbs.
NOTE: Students may come up with other possible scenarios, such as Mr. Krabbs not really a homozygous tall-eyed crab or a mutation. A few of my students suggested that Mr. Krabbs might not be the father!

NOTE: Some of your students may comment that Mr. Krabbs had a whale as a daughter. However, this was only for the TV show. He is happily married to a beautiful crab in real life and has beautiful crab children. (Ok, so it's not "real" life!)

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 2

Answer Key:

1. A - long nose, B - blue body, C - squarepants, D - round eyes, E - round eyes, F - stubby nose, G - roundpants, h - yellow body

2. A - Yy & YY, B - ss, C - rr, D - LL & Ll, E - ll, F - RR & Rr, G - SS & Ss, H - yy

3. A - Rr, B - SS, C - LL, D - Yy

4A - See square at right, Gerdy's genotype = Ss,

4B - BillyBob's genotype = Ss

4C - SS & Ss = squarepants and ss = roundpants

4D - 75%

4E - 25%

5A - Wilma = Rr, Wilbur = RR

5B - See square at right

5C - RR & Rr = round eyes

5D - 100%

5E - 0%

6. The Punnett square shows that they would have a 50% chance (2 out of 4) for a little sponge with a blue body color.

7. Since both people are recessive, the Punnett square shows that they have 0% chance for a child with a long nose.

8. SpongeBob's aunt would have to marry a purebred long nosed man (LL) in order to have the best chances for long-nosed children.

4A

	S	s
s	Ss	ss
s	Ss	ss

4C

	S	s
S	SS	Ss
s	Ss	ss

5

	R	r
R	RR	Rr
R	RR	Rr

Y

	y	Y
Y	Yy	YY
y	Yy	yy

l

	l	l
l	ll	ll
l	ll	ll

L

	L	L
L	LL	LL
L	LL	LL

Bikini Bottom Genetics
Incomplete Dominance

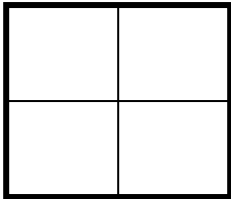
Name _____

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.



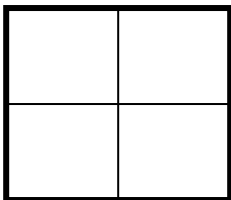
(a) Give the genotypes and phenotypes for the offspring.

(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.



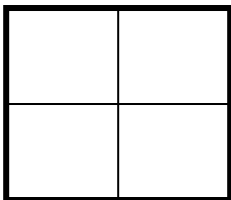
(a) Give the genotypes and phenotypes for the offspring.

(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.



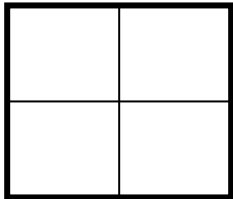
(b) What percentage of the offspring would be yellow? _____%

(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)? _____ %

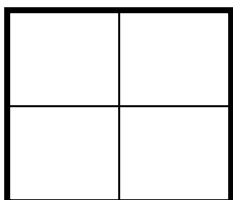
7. What would happen if they crossed a blue jellyfish with a yellow jellyfish? Complete the Punnett square to help you answer the questions.



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 - _____

SpongeBob - Incomplete Dominance

ANSWER KEY:

1. Red - RR, Blue - BB, Purple - RB

2A. RB - purple

2B. 0%

2C. 100%

2D. 0%

3A. RR - red, BB- blue, RB - purple

3B. 25%

3C. 50%

3D. 25%

4.A. RB - purple, BB - blue

4B. Purple - 50 plants, Blue - 50 plants, Red - 0

5A. YY -yellow, BB - blue, YB - green

5B. 25%

5C. 25%

5D. 50%

6A. YY - yellow, YB - green

6B. 50%

6C. 0%

6D. 50%

7A. YB - green

7B. Yellow - 0, Blue - 0, Goobers - 100

8A. YB - green, BB - blue

8B. Yellow - 0, Blue - 50, Goober - 50

SpongeBob Genetics Quiz

Name _____

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

TT _____ Pp _____ dd _____ Ff _____ Tt _____ FF _____

Which of the genotypes listed above would be considered purebred? _____

2. In Squidward's family, a blue body color (B) is dominant to green (b). Determine the phenotype for each genotype below based on this information.

BB _____ Bb _____ bb _____

3. If tall eyeballs (T) are dominant to short eyeballs(t), give the genotypes that are possible for members of Mr. Krabbs' family.

Tall eyeballs = _____ Short eyeballs = _____

4. SpongeBob is known for his big round eyes (R), which is dominant over an oval eye shape (r). If he is heterozygous for his round eye shape and marries a woman with oval eye shape, what type of eyes might the kids have?

A. List the genotypes for each:

Heterozygous round eyes - _____ Oval eyes - _____

B. Complete the Punnett square to show the possibilities that would result if SpongeBob had children with an oval-eyed woman.

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

D. What are the chances of a child with a round eye shape? ____%

E. What are the chances of a child with an oval eye shape? ____%

5. Patrick recently married Patti, a cute girl he met at a local dance. He is considered a purebred for his tall head shape (T), which is dominant over a short head (t). If Patti is a short-headed woman, what type of heads would their children have?

A. List the genotypes for each: Patrick - _____ Patti - _____

B. Complete the Punnett square to show the possible offspring.

C. Which type of head is most likely: tall or short? Explain.

D. Would the children be considered purebreds? Explain.

SpongeBob Genetics Quiz

Answer Key:

1. Ho - TT, dd, FF; He - Pp, Ff, Tt; Purebred = TT, dd, FF
2. BB - blue, Bb - blue, bb - green
3. Tall eyeballs - TT, Tt; short eyeballs - tt
4. A. Heterozygous round = Rr, Oval = rr
B. See square at right
C. Rr - round & rr - oval
D. 50%
E. 50%
5. A. Patrick - TT, Patti = tt
B. See square at right
C. Tall head is most likely, since all genotypes that result would represent a tall head (100%).
D. The children would not be considered purebreds, since they would each have a dominant gene and a recessive gene.