Bikini Bottom Genetics

Answer Key

1. Ho He Ho He Ho Ho
   He Ho He Ho Ho Ho

Purebreds - TT, DD, BB, FF, ff, dd, bb, tt
Hybrids - Dd, Bb, Ff, Tt

2. Yellow body Square shape | Yellow body Square shape | Blue body Round shape

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

4.

	s	s
S	Ss	Ss
s	ss	ss

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.

	P	p
P	PP	Pp
p	Pp	pp

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.

	b	b
B	Bb	Bb
B	Bb	Bb

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.

	T	t
T	TT	Tt
T	TT	Tt

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 was married to a whale. However, this was only for the TV show and he is happily married to a beautiful crab in real life. (Ok, so it's not "real" life!)

Bikini Bottom Genetics 2

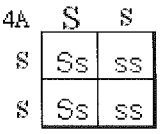
Answer Key:

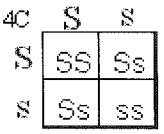
1. A - long nose, B - blue body, C - squarepants, D - round eyes, E - round eyes, F - stubby nose, G - roundpants, h - yellow body

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

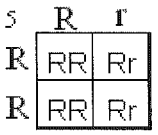
3. A - Rr, B - SS, C - LL, D - Yy

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%

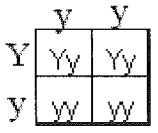




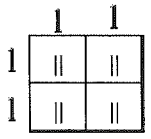
5A - Wilma = Rr, Wilbur = RR
5B - See square at right
5C - RR & Rr = round eyes
5D - 100%
5E - 0%



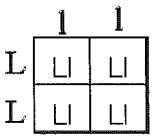
6. The Punnett square shows that they would have a 50% chance (2 out of 4) for a little sponge with a blue body color.



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.



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

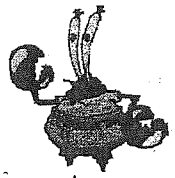
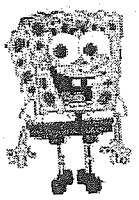
5A. YY -yellow, BB - blue, YB - green
5B. 25%
5C. 25%
5D. 50%

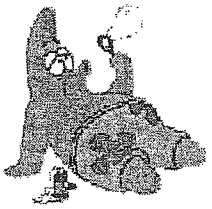
6A. YY - yellow, YB - green
6B. 50%
6C. 0%
6D. 50%

7A. YB - green
7B. Yellow - 0, Blue - 0, Goobers - 100

8A. YB - green, BB - blue
8B. Yellow - 0, Blue - 50, Goober - 50

KEY



SpongeBob Genetics: Blood Types & Sex-Linked Traits

Co- Co Dominant

Part A – Blood Types Review

1. Tell whether the following blood genotypes are homozygous (Ho) or heterozygous (He).

AA Ho OO Ho BO He BB Ho AB CO AO He

Which would be considered purebred? Ho

Which would be considered hybrid? He

2. Determine the blood type phenotype for each genotype:

AA A AO A OO O BB B BO B AB AB

3. For each blood type phenotype, give the genotypes possible:

Type A: AA, AO Type B BB, BO Type O OO Type AB AB

4. Sandy Squirrel met Stewart Squirrel at the water chestnut festival. They fell in love. Sandy is blood type AB & Stewart is blood type O.

Sandy Squirrel's genotype: AB

Stewart Squirrel's genotype OO

Make a Punnett square to show the possible blood genotypes of heir children

	A	B
O	AO	BO
O	AO	BO

What is the possibility of a baby squirrel with blood type O? 0 out of 4 or 0 %

What is the possibility of a baby squirrel with blood type AB? 0 out of 4 or 0 %

What is the possibility of a baby squirrel with blood type A? 2 out of 4 or 50%

What is the possibility of a baby squirrel with blood type B? 2 out of 4 or 50 %

5. Pearl the whale had a horrible accident at cheerleading practice and needed a blood transfusion. So she needed to find out her possible blood type. Her dad, Mr. Krabbs is homozygous for blood type A and her mom is heterozygous for blood type B.

Mr. Krabbs genotype: AA

Mrs. Krabbs genotype: BB

Make a Punnett square to show Pearl's possible blood type(s)

	A	A
B	AB	AB
B	AB	AB

What is the possibility of Pearl having blood type O? 0 out of 4 or 0 %

What is the possibility of Pearl having blood type AB? 4 out of 4 or 100 %

What is the possibility of Pearl having blood type A? 0 out of 4 or 0 %

What is the possibility of Pearl having blood type B? 0 out of 4 or 0 %

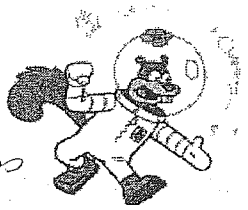
Part B – Sex Linked Traits

1. Tell whether or not the following carry or show the sex-linked recessive krabby-blindness trait. Also tell whether the individuals are male or female.

Remember that since most sex-linked traits are recessive, the person who shows the trait can have no X's with big superscripted letters. So, if a male carries the trait, he must also show the trait.

	X^KX^k	X^kX^k	X^KY	X^KX^K	X^kY
Carrier? (Y or N)	Y	N	N	N	N
Has Trait? (Y or N)	N	Y	N	N	Y
Male or Female	Female	Female	Male	Female	male

2. Circle the following genotypes show sex-linked traits: I^AI^B, (X^RX^R), (X^rY), Hb^AHb^A, (X^CX^C)



3. How can a female inherit colorblindness?
Yes, if her mother is a carrier & father has colorblindness

4. Fathers do not pass sex-linked traits to their sons. Why?
The trait is on the X chromosome and to get a son the father donates the Y which does not carry that trait.

5. Under what conditions is it possible for both a father & his son to have hemophilia?
They both had to have mothers that are carriers.

6. Why are there more colorblind males than females?
Females get 2 X chromosomes and both would have to have the colorblind Allele for the colorblindness to show.

7. A krabby-blind whale has married Pearl who has normal vision. One of their two sons is also colorblind. What are the genotypes of the parents?
Father X^kY Pearl X^K X^k

8. In Sandy Squirrel's family her parents do not have hemophilia, but one of her brothers has hemophilia. Who was the carrier for hemophilia? Her mother

Before you begin the problems, remember that you set up the problems with the mom & dad sex chromosomes, and then give them the appropriate superscripts, depending on their genotypes.

9. In sponges, there exists a sex-linked recessive disorder that causes a sponge to have tiny pores. (X^P = normal pores, X^p = recessive small pores). SpongeBob & his true love SpongeSusie are planning to have baby sponges. SpongeBob has the disorder & Susie is a carrier.

SpongeBob's genotype: X^pY
SpongeSusie's genotype: X^PX^p
Make a Punnett square to show the possible genotypes of their children.
What percentage of their sons will have the disorder? 50%
What percentage of their sons will be normal? 50%
What percentage of their daughters will have the disorder? 50%
What percentage of their daughters will be normal but carriers? 50%
What percentage of their daughters will be normal non-carriers? 0%

	X^P	X^p
X^p	X^PX^p	X^pX^p
Y	X^PY	X^pY

10. In squid, eye color is a sex-linked trait. Red eyes (R) are dominant over white eyes (r). Squidward (white eyes) has fallen head over heels for a red-eyed beauty, Squidonna. Squidonna also was smitten with Squidward as he was very different from her parents who both had red eyes & she would like to have white eyed children.

Squidward's genotype: X^rY
Squidonna's genotype: X^RX^R or X^RX^r
Make a Punnett square to show the possible genotypes of their children.
What percentage of their sons will have white eyes? 25%
What percentage of their sons will have red eyes? 75%
What percentage of their daughters will have red eyes? 75%
What percentage of their daughters will have white eyes but be carriers for red eye trait? 0%
What percentage of their daughters will be white eyed non-carriers? 25%

	X^R	X^R
X^r	X^RX^r	X^RX^r
Y	X^RY	X^RY

	X^R	X^r
X^r	X^RX^r	X^rX^r
Y	X^RY	X^rY