Bikini Bottom – Dihybrid Crosses –Answer Key

1. Heterozygous round eyes, blue body _Rryy_____

2. Hybrid eye shape, purebred roundpants _Rrss_____

3. Purebred roundpants, heterozygous long nose _ssLl_____

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)

	ys
___YS_____	YySs
___Ys_____	Yyss
yS	yySs
	yyss
__Bh_____	bH
	BbHh
_____	bh
_____	Bbhh

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 = __ssll_____ Fiancé = Purebred Squarepants, Long Nose = _SSLl_____

B. What are the possible gamete combinations for each person?
  Aunt = _sl_____   Fiancé = ___SL; Sl_____

C. What are the possible genotypes for their children? __SsLl; Ssll_____50% chance of stubby nose offspring ___

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 = _YySs_____   SpongeSusie = _yyss_____

B. What are the possible gamete combinations for each person?
  SpongeBob = _YS; Ys; yS; ys_____   SpongeSusie = _ys_____

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

D.

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)

	ys			
___YS_____	YySs	_____	_____	_____
___Ys_____	Yyss			
___yS_____	yySs			
vs	vvss			
	bH		bh	_____
__Bh_____	BbHh		Bbhh	

Answer the questions based on your Punnett square.
What is the chance of a blue baby? _50%____

What is the chance of a blue squarepants? _25%____
What is the chance of a squarepants? 50%_____
What is the chance of a purebred recessive for both traits? _25%____

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? __pptt_____

B. Is it possible for the new couple to have offspring that resemble their mother? Explain.
___No. Patrick's genotype is PpTT.   Although 50% of offspring would be expected to look orange, 0% will be able to have thin eyebrows. _____

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.

  100% Thick eyebrows……..Her recessive genes will be masked…..MARRY HER!!!!!

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. _Yes…..but that is not a guarantee, she must not be a carrier for baldness!_____
Squidward Traits
Skin Color
Blue = B, Green = b
Hair
Hair = H, Bald = h

_____
B. Must she be blue? Explain. _No.   His Purebred Dominant alleles will ensure that._____
_____

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.

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)

	bH	**bh**		
Bh	BbHh	Bbhh		
Bh	BbHh	Bbhh		
Bh	BbHh	Bbhh		
Bh	BbHh	Bbhh		

Squidward's Genotype = _BBhh_____ Octavia's Genotype = _bbHh_____
| Bh | bH | bh |
| BbHh | BbHh | Bbhh |

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? **Bald (hh) 50% could be purebred homozygous recessive**
  What is the probability of their children being heterozygous for both traits? _50%_____