ACTIVITY: Bikini Bottom Genetics

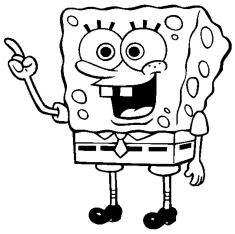
Instructions: Scientists at Bikini Bottoms have been investigating the genetic makeup of the organisms in this community. Use the information provided and your knowledge of genetics to answer each question.

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.

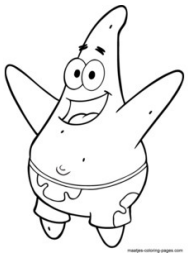


Yellow body color is dominant to blue.
YY _____ Yy _____ yy _____

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 claims they are "purebred" for light blue skin. 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.

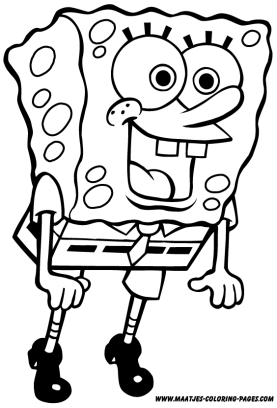
B. Did the hospital make a mistake? Explain your answer.

Part II:

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

(a) LL-_____ (e) Rr-_____

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



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

2. Use the information in the chart above 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 above.

(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 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 claims they are purebred for round eyes. Complete the Punnett square to show the possibilities that would result if SpongeWilma and SpongeWilbur had children.

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

(b) Complete the Punnett square 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.

9. 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.

PART III: Incomplete Dominance

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.

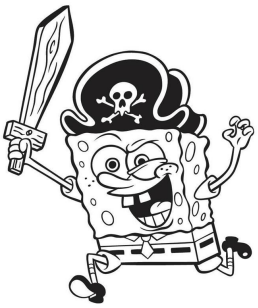
(a) Give the genotypes and phenotypes for the offspring.

(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)? _____ %

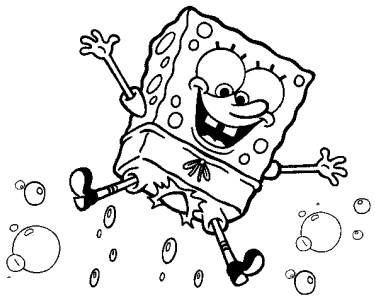
7. What would happen if they crossed a blue jellyfish with a yellow jellyfish? Complete the Punnett square to help you answer the questions.

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

(b) 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.



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

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

Yellow - _____ Blue - _____ Goobers - _____