Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_

**SpongeBob Genetics**

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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.

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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.

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

D. Would the children be considered purebreds? Explain.

**Use your knowledge of genetics to complete these questions:**

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

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| **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-\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (b) yy-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 (c) Ss-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 (d) RR - \_\_\_\_\_\_\_\_\_\_\_\_\_

(e) Rr-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(f) ll- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
(g) ss- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
(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 \_\_\_\_\_\_\_\_\_\_

(b) Homozygous Long Nose \_\_\_\_\_\_\_\_\_\_

(c) 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.

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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.

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(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.

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(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**

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 r 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 (**yy**), 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.

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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.

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

 Yellow - \_\_\_\_\_\_\_ Blue - \_\_\_\_\_\_\_ Goobers - \_\_\_\_\_\_\_\_

**Bikini Bottom - Dihybrid Practice**

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

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| **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 |

1. Heterozygous round eyes, blue body \_\_\_\_\_\_\_\_\_\_

2. Hybrid eye shape, purebred roundpants \_\_\_\_\_\_\_\_

3. Purebred roundpants, heterozygous long nose \_\_\_\_\_\_\_\_

 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 – Isn't that sweet!). They wonder what the chances are of that trait being passed on. Her fiancé is a purebred squarepants and has purebred long nose.

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

Aunt - Roundpants, Stubby Nose = \_\_\_\_\_\_\_\_

Fiancé - Purebred Squarepants, Long Nose = \_\_\_\_\_\_\_\_

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

 Aunt - \_\_\_\_\_\_\_\_ Fiancé - \_\_\_\_\_\_\_\_

6. What are the possible genotypes for their children?

7. What are the genotypes of SpongeBob, who is heterozygous for his yellow body color and his squarepants, and his wife SpongeSusie, who is blue and has roundpants?

SpongeBob = \_\_\_\_\_\_\_\_ SpongeSusie = \_\_\_\_\_\_\_\_

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

SpongeBob = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ SpongeSusie = \_\_\_\_\_\_\_\_

9. Complete the Punnett square based on the information provided in #7-8 and then answer the questions.

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What is the chance of a blue baby? \_\_\_\_\_\_\_\_

What is the chance of a squarepants? \_\_\_\_\_\_\_\_

What is the chance of a blue squarepants? \_\_\_\_\_\_\_\_

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

10. 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.

What is Patti’s phenotype? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is it possible for the new couple to have offspring that resemble their mother? Explain.

11. Before Patrick commits to this relationship, he would like to guarantee that his offspring would have his thick eyebrows. (He thinks they make him smarter!) You need to provide evidence for or against the marriage. This question regards eyebrows ONLY.

12. 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?

|  |
| --- |
| Squidward's Traits |
| Skin Color | Blue B | Green b |
| Hair | Has Hair H | Bald h |

Must she have hair? Explain.

Must she be blue? Explain.

13. 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 = \_\_\_\_\_\_\_\_ Octavia = \_\_\_\_\_\_\_\_

14. Use the genotypes in #13 to complete the Punnett square below and then answer the questions.

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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?