GENETICS WEBQUEST

People have always been intrigued by questions related to who they are and where they come from. How does a new individual come to be? How do we acquire the characteristics we possess? Are there ways to explain and predict human traits? This web quest is designed to begin to answer some of those questions by looking at the seminal work performed in genetics.

Gregor Mendel is considered by many to be the "Father of Genetics". It is his carefully designed and documented experiments with pea plants that have given us many of the fundamental principles of heredity. While our knowledge of genetics has figuratively "exploded" in recent decades, understanding Mendel's research is critical to understanding other genetics concepts. In the first part of this assignment you will briefly examine Mendel's life and his work. Visit the following websites in order to answer the questions below:

http://library.thinkquest.org/19037/idfog.html
http://www.sonic.net/~nbs/projects/anthro201/
http://biology.about.com/od/mendeliangenetics/ss/lawofsegregation.htm
http://www.experiment-resources.com/law-of-segregation.html
http://www.merriam-webster.com/

1. Why did Mendel become a monk?

2. What did Mendel notice about pea plants?

3. What does “true bred” or “true breeding” mean?

4. Describe his cross involving height.

5. What were his results when he tested for height in the F1 generation?

6. F2 results? What was the ratio of tall to short in the F2?

7. What did Mendel conclude from his cross involving height?

8. What are the dominant and recessive forms for the traits he studied?

9. Summarize Mendel's laws of independent assortment and segregation.

10. What about pea plants make them particularly good subjects for genetic research?

11. Make index cards for the following definitions: gene, allele, homozygous, heterozygous, genome, genotype, phenotype, dominant, recessive, trait, genetics, purebred, cross, Punnett square, monohybrid cross, testcross, and dihybrid cross.

In this second part of the activity you will practice completing Punnett squares. Refer to the Website below to help you learn how to work through the Punnett squares.

http://www.hobart.k12.in.us/jkousen/Biology/psquare.htm

Bikini Bottom Genetics 2 *T. Trimpe 2003 http://sciencespot.net/*

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

Chart 1 Characteristic 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) 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 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? _____ %

Characteristic	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)

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 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.

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.