Hardy Weinberg Practice Problem Set

1. View the Dragons below. The winged trait is dominant.

q^2 (aa) = _____

q (a) = _____

p (A) = _____

p^2 (AA) = _____

2pq (Aa) = _____

What is the frequency of heterozygote dragons in your population?

_____

2. You have sampled a population in which you know that the percentage of the homozygous recessive genotype (aa) is 36%. Using that 36%, calculate the following:

A. The frequency of the "aa" genotype.
B. The frequency of the "a" allele.
C. The frequency of the "A" allele.
D. The frequencies of the genotypes "AA" and "Aa."
E. The frequencies of the two possible phenotypes if "A" is completely dominant over "a."

3. There are 100 students in a class. Ninety-six did well in the course whereas four blew it totally and received a grade of F. Sorry. In the highly unlikely event that these traits are genetic rather than environmental, if these traits involve dominant and recessive alleles, and if the four (4%) represent the frequency of the homozygous recessive condition, please calculate the following:

A. The frequency of the recessive allele.
B. The frequency of the dominant allele.
C. The frequency of heterozygous individuals.

4. Within a population of butterflies, the color brown (B) is dominant over the color white (b), and 40% of the butterflies are white. Given this information calculate the following:

A. The percentage of butterflies in the population that are heterozygous.
B. The frequency of homozygous dominant individuals.

5. After graduation, you and 19 of your closest friends (lets say 10 males and 10 females) charter a plane to go on a} round-the-world tour. Unfortunately, you all crash land (safely) on a deserted island. No one finds you and you start a new population totally isolated from the rest of the world. 2 of your friends carry the recessive cystic fibrosis allele (f)

(i.e. are heterozygous)

Assuming that the frequency of this allele does not change as the population grows, what will be the incidence of cystic fibrosis on your island? _____

6. Cystic fibrosis is a recessive condition that affects about 1 in 2,500 babies in the Caucasian population of the United States. Please calculate the following:

A. The frequency of the recessive allele in the Caucasian population. _____
B. The frequency of the dominant allele in the Caucasian population. _____
C. The percentage of heterozygous individuals (carriers) in the Caucasian population. _____

7. This is a data set on wing coloration in the scarlet tiger moth (*Panaxia dominula*). Coloration in this species is controlled by a single-gene, two-allele system with incomplete dominance. Data for 1612 individuals are given below:

White-spotted (AA) =1469   Intermediate spotting (Aa) = 138   Little spotting (aa) =5

Calculate the allele frequencies (p and q)

8. A species of rare snakes live on one of the remote islands of Galapagos. 98 out of 200 individuals in the population express the recessive phenotype of yellow stripes (rr) opposed to having red stripes (caused by the dominant R allele). **Calculate the allele frequencies for this population.**

9. Your original population of 200 was hit by a tidal wave and 100 snakes were wiped out, leaving 36 snakes that are homozygous recessive out of the 100 survivors. If we assume that all individuals were equally likely to be wiped out, how did the tidal wave affect the predicted frequencies of the alleles in the population? NOTE: assume the new population is at equilibrium -- AFTER the event - so you are comparing two populations what are at equilibrium to look for changes in allele frequencies.