1. 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. **.04 = q2; therefore q = .2**

B. The frequency of the dominant allele. **p = .8; therefore p2 = .64**

C. The frequency of heterozygous individuals. **2pq = .32**

2. Within a population of butterflies, the color brown (B) is dominant over the color white (b). And, 40% of all butterflies are white. Given this simple information, which is something that is very likely to be on an exam, calculate the following:

A. The percentage of butterflies in the population that are heterozygous.

**.4 is the frequency of white (bb) butterflies. This is q2 taking the square root of .4 gives you q = .63**

**1-.63 = .37; this is p**

**2pq = .47 (number of heterozygotes) 47%**

B. The frequency of homozygous dominant individuals. **p2 = .14**

3. This is a classic data set on wing coloration in the scarlet tiger moth (Panaxia dominula). Coloration in this species had been previously shown to behave as a single-locus, two-allele system with incomplete dominance. Data for 1612 individuals are given below:

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

1. Calculate the allele frequencies ( p and q )

5/1612 = .003 = (q2)

**q = .05**

**p = .95**

1. Give the percentage of each genotype in the population

**If starting with p2 you should get: P2 = 91% 2pq = 9.5% q2 = .25%**

**Due to rounding it is over**

**If you started with q2 you should get: p2= 89% 2pq = 11% q2 = .31%**

**Again with rounding it is slightly over**

**If did with the numbers given:**

**1469/1612 = 91% 138/1612 = 8.6% 5/1612 = .31% and it is little less than 100%**

4. The allele for a widow's peak (hairline) is dominant over the allele for a straight hairline. In a population of 500 individuals, 25% show the recessive phenotype. How many individuals would you expect to be homozygous dominant and heterozygous for the trait?

**.25x500 = 125 homozygous dominant individuals**

**.50x500 = 150 heterozygous individuals**

5. The allele for a hitchhiker's thumb is recessive compared to straight thumbs, which are dominant. . In a population of 1000 individuals, 510 show the dominant phenotype. How many individuals would you expect for each of the three possible genotypes for this trait.

**Homozygous Dominant: .64 x 1200 = 768**

**Heterozygous: .32 x 1200 = 384**

**Homozygous Recessive: .04 x 1200 = 48**