Calculate answers to the following population genetics problems. Show your work and set-ups.

1. The frequency of two alleles in a gene pool is 0.3 (A) and 0.7 (a). What is the percentage of heterozygous individuals in the population, assuming that the population is in Hardy-Weinberg equilibrium?

2. Allele (B) for white wool is dominant over allele (b) for black wool. In a sample of 1800 sheep, 1782 are white and 18 are black. Estimate the allelic frequencies in this sample, assuming the population is in equilibrium.

BB_____ Bb_____ bb_____

3. In a population that is in Hardy-Weinberg equilibrium, the frequency of the recessive homozygote genotype of a certain trait is 0.49. What is the percentage of individuals homozygous for the dominant allele?

4. In *Drosophila*, the allele for normal length wings is dominant over the allele for vestigial wings. In a population of 1000 individuals, 360 show the recessive phenotype. How many individuals would you expect to be homozygous dominant and heterozygous for this trait?

5. The allele for the ability to roll one's tongue is dominant over the allele for the lack of this ability. In a population of 5000 individuals, 35% show the recessive phenotype. How many individuals would you expect to be homozygous dominant and heterozygous for this trait?

6. In humans, Rh positive blood is produced by a dominant gene (R) while Rh negative blood is produced by the recessive allele (r). In a population that is in Hardy-Weinberg equilibrium, if 94% of the individuals are Rh positive, what are the frequencies of the two alleles?

7. In corn, yellow kernel color is governed by a dominant allele; white by its recessive allele. A random sample of 5,000 kernels from a population that is in equilibrium reveals that 4000 are yellow and 1000 are white. What are the frequencies of the alleles in this population? What is the percentage of heterozygote kernels?

8. A rare disease due to a recessive allele which is lethal when homozygous occurs with a frequency of one in a million. How many individuals in a town of 60,000 can be expected to carry this allele?

9. In certain African countries, 9% of the newborn babies have sickle-cell anemia, which is a recessive trait. Out of a random population of 400 newborn babies, how many would you expect for each of the three possible genotypes?

10. One pirate and four Polynesian beauties settled on a uninhabited island. All of the females have brown eyes as it true for 100% of their relatives. However the man has blue eyes.

What was the frequency of B_____ and b_____?

If you assume Hardy-Weinberg equilibrium for eye color alleles (admittedly very improbable), how many people would you expect to have blue eyes when the population of the island reaches 3,000?

If the number of blue-eyed individuals differs greatly from the answer above, what factors could account for the difference?