

MORE POPULATION GENETICS PROBLEMS

1. The frequency of two alleles in a gene pool is 0.1 (A) and 0.9 (a). What is the percentage in the population of heterozygous individuals? of homozygous recessives?

$$2pq = 2(.9)(.1)$$

$$= .18$$

$$= 18\%$$

$$q^2 = .9^2$$

$$= .81$$

$$= 81\%$$

2. Allele B , for white wool, is dominant over allele b , for black wool. In a sample of 900 sheep, 891 are white and 9 are black. Estimate the allelic frequencies in this sample.

$$q^2 = \frac{9}{900}$$

$$= .01$$

$$q = \sqrt{.01}$$

$$q = .1$$

$$p + q = 1 \quad p = 1 - q$$

$$= 1 - .1$$

$$p = .9$$

3. In a population that is in Hardy-Weinberg equilibrium, the frequency of the recessive homozygote genotype of a certain trait is 0.09. What is the percentage of individuals homozygous for the dominant allele?

$$q^2 = .09$$

$$q = \sqrt{.09}$$

$$q = .3$$

$$p + q = 1 \quad p = 1 - q$$

$$= 1 - .3$$

$$p = .7$$

$$p^2 = .7^2$$

$$= .49$$

$$= 49\%$$

4. In a population that is in Hardy-Weinberg equilibrium, 36 percent of the individuals are recessive homozygotes for a certain trait. For the same trait, what is the percentage in this population of homozygous dominant individuals? of heterozygous individuals?

$$p^2 = .4^2$$

$$= .16$$

$$= 16\%$$

$$36\% = .36 = q^2$$

$$\sqrt{.36} = q$$

$$.6 = q$$

$$p + q = 1 \quad p = 1 - q$$

$$= 1 - .6$$

$$p = .4$$

$$2pq = 2(.4)(.6)$$

$$= .48$$

$$= 48\%$$

