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| 1. | 1. Define the term “genetic variation.” 2. If a gene or locus has two alleles (A and a) in a population, what are all the possible genotypes? 3. If the frequency of (A) allele = p, and the frequency of (a) allele is q, what is the frequency of all possible genotypes in this population? |
| 2. | 1. What is the Hardy-Weinberg equilibrium? 2. In a population, a locus A has two alleles (A) and (a). The frequency f of (A) is f (A) = 0.6; what is the f (a)? 3. Using these frequencies, calculate the frequencies of all possible genotypes in a population in Hardy-Weinberg equilibrium. |
| 3. | 1. In a population (Z), the frequencies of genotypes of a two allele locus (B and b) are f(BB) = 0.3, f(bb) = 0.6, f (Bb) = 0.1. Calculate the frequencies of both alleles. 2. Using the allele frequencies calculated in a., calculate the frequencies of all possible genotypes at this locus in a population after one generation of random mating. 3. Is the population (Z) in part a above in Hardy-Weinberg equilibrium? The population size is 1000. |
| 4. | 1. Describe how you would use the Hardy-Weinberg equilibrium to calculate genotype frequencies of a locus with three alleles. 2. If the f(D) of an X-linked gene in a population = 0.8, what is the f(d) of the other allele at this locus? 3. What is the frequency of females’ homozygous for d allele (XdXd)? 4. What is the frequency of males’ hemizygous for the d allele (XdY)? |
| 5. | 1. Explain why more males present with X-linked recessive diseases. Show your reasoning. 2. Why must the five assumptions/criteria apply to a population before we can say it is in Hardy-Weinberg equilibrium? 3. Take any one of these assumptions and explain in detail how it could disrupt the Hardy-Weinberg equilibrium for a particular gene locus. |