What is Population Genetics?

Worksheet

Population genetics is the study of allele and genotype frequency distributions within populations; the Hardy-Weinberg equation p + 2pq + q = 1 predicts these frequencies when no evolutionary forces are acting.

p^2 + 2pq + q^2 = 1

Questions

1. What is the Hardy-Weinberg equation?

A) p + 2pq + q = 1
B) p + q + r = 1
C) p q = 1
D) 2p + 2q = 1

2. If q = 0.4, what is p?

A) 0.4
B) 0.6
C) 0.16
D) 1.4

3. Which term in the Hardy-Weinberg equation represents heterozygotes?

A) p
B) q
C) 2pq
D) p + q

4. Which of these is NOT a Hardy-Weinberg assumption?

A) Random mating
B) No mutation
C) Genetic drift occurs
D) No natural selection

5. In a population, the recessive allele frequency is q = 0.3. Find p and the genotype frequencies p, 2pq, and q.

6. 9% of a population shows a recessive phenotype (q = 0.09). Find the allele frequencies p and q.

7. In a population of 1000 people with p = 0.6, how many are expected to be heterozygous carriers?

8. Define: What is the Hardy-Weinberg equation?

9. Define: What are the five Hardy-Weinberg assumptions?

10. Define: What does 'allele frequency' mean?

Answer Key

1. A) p + 2pq + q = 1 - This equation describes genotype frequencies in a non-evolving population.

2. B) 0.6 - Since p + q = 1, p = 1 0.4 = 0.6.

3. C) 2pq - 2pq is the frequency of heterozygous individuals.

4. C) Genetic drift occurs - Hardy-Weinberg assumes NO genetic drift, which requires an infinitely large population.

5. p = 1 q = 1 0.3 = 0.7 p = 0.7 = 0.49 2pq = 2 0.7 0.3 = 0.42 q = 0.3 = 0.09

6. q = 0.09 = 0.3 p = 1 q = 1 0.3 = 0.7

7. 2pq = 2 0.6 0.4 = 0.48 Expected carriers = 0.48 1000 = 480 people

8. p + 2pq + q = 1, where p and q are allele frequencies (p + q = 1).

9. No mutation, no migration, random mating, no natural selection, and infinitely large population size.

10. The proportion of a specific allele among all alleles for a gene in a population.