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Hardy Weinberg Equation What is the frequency of heterozygotes Aa in a randomly mating population in which the frequency of all dominant phenotypes is 0.19? Here (dominant phenotypes) $p^2 + 2pq = 0.19$ applying the Hardy-Weinberg Equation, $p^2 + 2pq + q^2 = 1$ $q^2 = 1 - 0.19$ $q^2 = 0.81$ $q = 0.9$ we know that $p + q = 1$, then $p = 1 - q$ here $p = 1 - 0.9$ $p = 0.1$
Frequency of heterozygotes Aa ($2pq$) = $2 \times 0.1 \times 0.9$ $2pq = 0.18$ is an autosomal recessive disorder of man. The frequency of affected newborn infants is about 1 in 14,000. Assuming random mating, what is the frequency of heterozygotes? Here $q^2 = 1/14,000$ $q^2 = 0.000071428$ $q = \text{square root of } 0.000071428$ $q = 0.0085$ we know that $p + q = 1$, then $p = 1 - q$
 $p = 1 - 0.0085$ $p = 0.9915$ Frequency of heterozygotes i.e., $2pq = 2 \times 0.9915 \times 0.0085$ $2pq = 0.017$ In a plant species the ability to grow in soil contaminated with nickel is determined by a dominant allele. (i) If 60% of the seeds in a randomly mating population are able to germinate in contaminated soil, what is the frequency of the resistance allele? (ii) Among plants that germinate, that proportion are homozygous? Answer: (i) Here frequency of all dominant phenotypes, $(p^2 + 2pq) = 60\% = 60/100 = 0.6$ then applying the Hardy - Weinberg Equation, $p^2 + 2pq + q^2 = 1$ here $p^2 + 2pq = 0.6$ then $q^2 = 1 - (p^2 + 2pq)$ $q^2 = 1 - 0.6$ $q^2 = 0.4$ $q = \text{square root of } 0.4$ $q = 0.63$ Frequency of resistance allele $p = 1 - q$
 $p = 1 - 0.63$ $p = 0.37$ (ii) Frequency of plants that germinate ($p^2 + 2pq$) = 0.6 Frequency of homozygous plant that germinate (p^2) = $(0.37)^2 = 0.14$ Frequency of homozygous plants among plants that germinate = $p^2 / (p^2 + 2pq) = 0.14 / 0.6 = 0.23$

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