Solutions for Hardy-Weinberg Practice Problems, Biology 1407

1. A lethal recessive condition is responsible for the death of 1 out of every 20,000 babies born in South America.

a. What is the frequency of homozygous recessive individuals in the population?

$q^2 = 1/20{,}000 = 0.00005$

b. What is the frequency of the recessive allele in the population?

$q = \text{sqrt } 0.00005 = 0.007$

c. How many people, out of 1,000 individuals in this population, would carry the recessive allele?

$p = 1 - q = 1 - 0.07 = 0.993$

$2pq = 2 \times 0.993 \times 0.007 = 0.014$

So: 0.014 x 1,000 individuals ~ 14 people out of 1,000 carry the recessive allele

2. In snapdragons, R is dominant for red flowers and r is recessive for white flowers. Snapdragons exhibit incomplete dominance. In a population of 100 snapdragons, 50 have pink flowers and 25 have white flowers.

a. What is the frequency of heterozygous individuals?

$2pq = 50/100 = ½$ or 0.5

b. What is the frequency of the dominant allele in the population?

$p^2 = 25/100 = 0.25$

$p = \text{sqrt } 0.25 = 0.5$

c. What is the frequency of the recessive allele in the population?

$q = 1 - p = 1 - 0.5 = 0.5$

d. What is the frequency of homozygous recessive individuals in the population?

$q^2 = 0.25$

e. What is the frequency of homozygous dominant individuals in the population?

$p^2 = 0.5^2 = 0.25$