

Hardy-Weinberg Practice Problems

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

$$\text{and } p + q = 1$$

- 1) A population of ducks is either white or brown. Brown ducks, the dominant phenotype make up 51 % of the population. Calculate the frequencies of BB, Bb, and bb.
- 2) When a white rat is mated to a brown rat offspring are either all brown or one-half brown and one-half white. When a white rat is mated to another white rat all offspring are white. In a population of 100 rats 36% are brown. Calculate AA, Aa, and aa.
- 3) In a population of goldfish 84% show the dominant gold color. The others are black. what is the frequency of the recessive allele? What percent of the total population is homozygous dominant? What percent is heterozygous?

Chi-Squared Practice Problems

Chi-square is a statistical tool that helps us to decide if the observed ratio is close enough to the expected ratio to be acceptable. Chi-square analysis can be used in any area, not just genetics. Whenever you have to determine if an expected ratio fits an observed ratio, you can use the Chi-square.

$$X^2 = \frac{\sum (O-E)^2}{E}$$

Chi Square Significance Table

Degrees of Freedom (n)	5% Probability Value (P)
1	3.84
2	5.99
3	7.81
4	9.49

- 4) A high school, students can choose to enter one of three doors. Custodians noticed that door #3 was always getting broken and suggested that more students use that door because it has a hands-free opener. AP Biology students counted the number of students entering each door to see if the custodians were right. Were the custodians right?

Door #1 had 60 students enter | Door #2 had 66 students enter | Door #3 had 80 students enter.

- 5) A scientist predicts that the kittens born with a congenital birth defect will be 25% based on the hypothesis that it is caused by a recessive gene in that breed of cat. After surveying several litters, he found that 44 out of 124 kittens had the defect. Is his hypothesis correct?