

CHAPTER 19	Sample Problem 1: Albinism in a Snake Population	BLM 19.1.4
OVERHEAD		

In a randomly mating population of snakes, one out of 100 snakes counted is albino, a recessive trait. Determine the theoretical percentage of each of the genotypes in the population.

What Is Required?

To determine the values for p^2 , $2pq$, and q^2 , which represent the frequencies of the AA , Aa , and aa genotypes in the population

What Is Given?

The value of q^2 : The proportion of snakes that are albino and thus have the aa genotype is $\frac{1.00}{100.00}$.

$$p + q = 1.00$$

Plan Your Strategy

Change the value of q^2 to a decimal.

Take the square root of the value of q^2 to find the value of q .

Subtract q from 1.00 to find the value of p .

Find the values of p^2 and $2pq$.

Express p^2 and $2pq$ as percents.

Act on Your Strategy

Step 1

$$\begin{aligned} q^2 &= \frac{1.00}{100.00} \\ &= 0.0100, \text{ or } 1.00\% \end{aligned}$$

Step 2

$$\begin{aligned} \sqrt{q^2} &= \sqrt{0.0100} \\ q &= 0.100 \end{aligned}$$

Step 3

$$\begin{aligned} p + q &= 1.00 \\ p &= 1.00 - q \\ &= 1.00 - 0.100 \\ &= 0.900 \end{aligned}$$

Step 4

$$\begin{aligned} p^2 &= (0.900)(0.900) \\ &= 0.810, \text{ or } 81.0\% \\ 2pq &= 2(0.900)(0.100) \\ &= 0.180, \text{ or } 18.0\% \end{aligned}$$

The theoretical percentages of the genotypes are 81.0 percent AA , 18.0 percent Aa , and 1.00 percent aa .

Check Your Solution

$$\begin{aligned} p^2 + 2pq + q^2 &= 1.00, \text{ or } 100\% \\ 81.0\% + 18.0\% + 1.00\% &= 100\% \\ 100\% &= 100\% \end{aligned}$$