

# Hardy-Weinberg Problems

$$p + q = 1$$

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

$$\text{dominant} = p$$

$$\text{recessive} = q$$

Solve these problems on your own paper...

1. You have sampled a population to find the percentage of the homozygous recessive genotype (aa) is 36%. Calculate the following:

The frequency of the "aa" genotype.

The frequency of the "a" allele.

The frequency of the "A" allele.

The frequencies of the genotypes "AA" and "Aa."

The frequencies of the two possible phenotypes (dominant v. recessive).

2. If 9% of an African population is born with a severe form of sickle-cell anemia (ss), what percentage of the population will be more resistant to malaria because they are heterozygous (Ss) for the sickle-cell gene? What are the genotypic, allele and phenotypic frequencies?

3. Out of 100 students in a class, 96 did well on a test whereas four blew it and received an F. Sorry. In the highly unlikely event that this was the result of genetic traits (rather than environmental factors)... if the four (4%) represent the frequency of the homozygous recessive condition (ff), please calculate the genotypic and allele frequencies. (... And study for the test).

4. In *Drosophila* (fruit flies), the allele for normal wing length is dominant over the allele for short wings (dd). In a population of 1000 individuals, 490 show the recessive phenotype. What is the frequency of the two possible phenotypes? How many individuals would you expect to be homozygous dominant for the trait? What would be the frequency of alleles?

5. The allele for a widow's peak (pointed hairline) is dominant over the allele for a straight hairline. In a population of 500 individuals, 25% show the recessive phenotype (hh). What are the genotypic and allele frequencies? How many individuals would you expect to be homozygous dominant for the trait?

## UnNatural History



Darwin said it is, "Survival of the Fittest."