CONCEPT: HARDY-WEINBERG

● **Hardy-Weinberg** is a formula used to measure the frequencies of _____ and genotypes in a population

□ **Allelic frequencies** are the frequency of alleles in a population

- $p + q = 1$, where p = dominant alleles and q = recessive alleles

- **Gene pool** is the sum of all alleles in the breeding member of a population at a specific time

□ **Genotypic frequencies** are the frequency of genotypes (homozygotes or heterozygotes) in a population

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

- p^2 are dominant homozygotes, 2pq are heterozygotes, and q^2 are recessive homozygotes

□ Genes or genotype frequencies do not change from one generation to the next

- Why? *SAMIR*

EXAMPLE:

1. A recessive disease has a frequency of 1:1100 in the population. Assuming Hardy-Weinberg principles, calculate q^2, p^2, 2pq, q, and p.

● To use the Hardy-Weinberg formula, five _____ have to be met (**SAMIR)**

□ **S:** No **S**election

- All genotypes have equal viability and equal ability to mate and be passed onto the next generation

□ **A:** No new **A**lleles

- No new alleles are created or converted from one allele to another (no mutations)

□ **M:** No **M**igration (gene flow)

- Individuals do not migrate out of or into the population

- There are no subpopulations that are genetically isolated

□ **I:** The population is **I**nfinitely large

- No *genetic drift* occurs

□ **R: R**andom mating occurs

- Mates are chosen completely at random, and are not influenced by the gene in question

PRACTICE:

1. Which of the following is NOT an assumption made when using the Hardy-Weinberg formula?
    a. No Selection
    b. New Alleles
    c. No Migration
    d. Infinitely large population
    e. Random Mating occurs

2. Which of the following formulas can be used to calculate heterozygote frequency in a population?
    a. p^2
    b. q^2
    c. 2pq
    d. p-q

3. In a random mating population of *Drosophila,* 5% of the flies have black bodies (encoded by recessive b) and 95% have brown bodies (encoded by B). Assuming Hardy-Weinberg equilibrium what is the allele frequency of B in the population?
    a. 0.77
    b. 0.60
    c. 0.50
    d. 0.95

4. In a random mating population of *Drosophila,* 5% of the flies have black bodies (encoded by recessive b) and 95% have brown bodies (encoded by B). Assuming Hardy-Weinberg equilibrium what is the genotypic frequency of BB in the population?
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