Biology 101 Study Guide for test #4


**DNA Technology** -- Restriction enzymes. Gel electrophoresis. Relationship between fragments and bands in gel electrophoresis. How genetic testing works. DNA fingerprinting (STRs and how they are detected with gel electrophoresis). Applications of DNA fingerprinting in paternity testing and forensics. Cloning genes. Uses of cloned genes: production of therapeutic proteins (e.g., insulin), genetic modification of organisms: human gene therapy, transgenic organisms in agriculture).

**Evolution** -- Evolution is a characteristic of populations and species, not individuals. Microevolution by natural selection. Definitions of microevolution and macroevolution. Natural selection as a mechanism of adaptive evolution.

**The Hardy-Weinberg equation.** Know the meaning of all the variables and terms of the Hardy-Weinberg equation. Know the assumptions of the Hardy-Weinberg equation (large pop., random mating, and no natural selection). Uses of the Hardy-Weinberg Equation: Identify populations that are undergoing microevolution, and calculating the frequency of the heterozygous genotype in a population given the pop. size and the number of individuals with the recessive trait..

Bring a calculator to the test.

The Hardy-Weinberg Equations:

\[ p^2 + 2pq + q^2 = 1 \]

\[ p + q = 1 \]

- \( p \) = the frequency of the dominant allele in a pop.
- \( q \) = the frequency of the recessive allele in a pop.
- \( p^2 \) = the frequency of the homozygous dominant genotype in a pop.
- \( 2pq \) = the frequency of the heterozygous genotype in a pop.
- \( q^2 \) = the frequency of the homozygous recessive genotype in a pop.