

DESIGNER GENES (2004)

Note: This event may be run as stations but it need not be. It is a very different event when run as paper pencil. The best competition is still as stations using process skills and problem solving.

MENDELIAN GENETICS

monohybrid cross

dihybrid cross

Punnett Squares - genotype & phenotype frequencies

Probability

MODERN GENETICS

multiple alleles

multifactorial traits

Incomplete dominance

Codominance as blood types

Pleiotrophy

Variable expressivity

sex-linkage

Barr bodies

Calico cats

epistasis

pedigree analysis

nondisjunction

transposable elements

karyotype analysis

MOLECULAR GENETICS

DNA structure & replication - Okazaki fragments

Kinds of RNA - transcription, exon & interons

Translation - amino sequence

Plasmids and restriction enzymes

BIOTECHNOLOGY

DNA analysis technologies

sequencing

fingerprinting

PCR

Gene therapy

Human genetic disorders

Chromosome mapping

Crossover frequency

Causes of mutations

Applications of recombinant DNA

Genome Project

BIOETHICS - Major concerns concerning safety and ethics of recombinant DNA technology.

Genomic Imprinting

Trinucleotide repeats

Mitochondrial Inheritance

Hardy Weinberg principle

population genetics

Sample Molecular Genetics/ biotechnology problems:

- * Using Hardy-Weinberg equilibrium theory and data derived from gel electrophoresis and PCR, determine allele frequencies in a population.
- * Interpreting data from DNA fingerprinting studies.
- * Interpreting DNA analysis data + comparing RFLP and PCR forensic testing and analysis
- * Analyzing blood chemistry, blood typing and blood cell genetic information.
- * Analyzing and interpreting chromosome maps and karyotypes
- * Understanding and interpreting the uses of restriction enzymes