

Section 5: Mendelian Genetics

- Gregor Mendel: Stated the principle of dominance and the principle of segregation
- Self-pollinating plants vs. cross-pollination
- Punnet squares: monohybrid and dihybrid crosses and probabilities
- Genotypes vs. Phenotypes
- Homozygous vs. Heterozygous
- Principle of independent assortment
- Types of dominance: Incomplete, co-dominance, polygenic traits, multiple alleles
- Pedigree charts: Used to trace a trait over several generations of a family
- Sex-linked genes: how do they affect inheritance patterns?
- Sex-linked chromosomal disorders: colour-blindness, hemophilia, muscular dystrophy

Section 6: Genetic Engineering

- Types of transgenic organisms and their uses.
- DNA analysis techniques: DNA probes, DNA fingerprinting (gel electrophoresis and polymerase chain reactions)
- Gene therapy: Why? Dangers?
- Cloning: Why?

Practice questions:

1. Using the following information, create Punnet Squares designed to find the required probabilities:
Brown Hair: H Brown eyes : E
Blond Hair: h Blue eyes: e
 - a) What is the probability of having blue eyes if your mother is homozygous dominant and your father is homozygous recessive?
 - b) What is the probability of having blond hair if your father is heterozygous and your mother is homozygous recessive?
 - c) What is the probability of have brown hair and blue eyes if your mother is heterozygous for both traits and your father is homozygous recessive for both traits?
 - d) What is the genotype of a homozygous dominant individual (both traits)?
 - e) What is the phenotype of a heterozygous individual (both traits)?
 - f) What is the genotype and phenotype of a person who is homozygous recessive for hair colour but heterozygous for eye colour?
2. What is the principle of dominance? How does it relate to genetic inheritance?
3. What is the principle of segregation? How does it relate to genetic inheritance?
4. What is the principle of independent assortment? How does it relate to genetic inheritance?
5. How can DNA be used to identify criminals? Describe the process.
6. How do sex-linked chromosomes affect inheritance patterns? Can a daughter inherit a sex-linked chromosomal disorder (such as colour-blindness) from her father?
7. Distinguish between phenotype and genotype.
8. Compare and contrast incomplete dominance and co-dominance.
9. Define the following terms:
 - a. True breeding plant
 - b. Hybrid
 - c. F₁, F₂ and P generations
 - d. Genes
 - e. Alleles