Class 10 Science – Chapter: Heredity (Complete Notes)

1. Introduction
Heredity: Transmission of traits from parents to offspring.
Variation: Differences among individuals of the same species.

Importance:
• Heredity ensures continuity of species.
• Variation ensures survival and evolution.

2. Basic Terms
Trait – Characteristic of an organism.
Gene – Unit of inheritance controlling a trait.
Alleles – Different forms of a gene (T/t).
Genotype – Genetic makeup (TT, Tt, tt).
Phenotype – Observable feature (Tall or dwarf).
Dominant allele – Expressed when one copy present.
Recessive allele – Expressed only in homozygous state.
Chromosomes – Thread-like structures carrying genes.
DNA – Chemical basis of heredity.
Sex chromosomes – Determine sex (XX female, XY male).

3. Mendel's Experiments
Mendel studied pea plants with contrasting traits (tall/dwarf, round/wrinkled).
• Monohybrid Cross: TT × tt → F1: all Tt (Tall); F2: 3 Tall : 1 Dwarf.
• Dihybrid Cross: RRYY × rryy → F2 ratio: 9:3:3:1.

Mendel's Laws:
1. Law of Dominance – One allele dominates the other.
2. Law of Segregation – Alleles separate during gamete formation.
3. Law of Independent Assortment – Alleles of different traits assort independently.

4. Sex Determination in Humans
Father (XY) + Mother (XX).
• X (father) + X (mother) = XX (female).
• Y (father) + X (mother) = XY (male).
Father determines child's sex.

5. Inherited vs Acquired Traits
Inherited: Passed via genes (eye color).
Acquired: Developed during life (muscles).

6. DNA – Carrier of Heredity
DNA found in nucleus; carries genetic code using A, T, G, C bases.
Functions: Stores information, controls protein synthesis, ensures inheritance.

7. Variation
Caused by crossing over, mutations, random fertilization, environment.
Importance: Leads to evolution and adaptation.

8. Heredity and Evolution Link
Beneficial variations → survival → evolution.

9. Sex-linked Traits
Genes on sex chromosomes (e.g., color blindness, haemophilia). Common in males.

10. Important Ratios
Monohybrid F2: 3:1
Dihybrid F2: 9:3:3:1
Genotypic (mono): 1:2:1

11. Key Diagrams to Practice
• Monohybrid and dihybrid crosses
• Sex determination in humans
• Structure of DNA

12. Summary
Heredity = transfer of traits
Genes on DNA control traits
Mendel explained inheritance
Sex determined by father
Variation drives evolution