Tips & Tricks Questions (2025-2026)

Class-XII

Subject: Biology

Chapter Name : Principles of Inheritance and Variation (Chapter-04)

1. **Master Mendel's Crosses (Very High Weight-age)**
   - Learn one base cross (monohybrid & dihybrid) and derive others from it.
   - Always write:
     - P generation
     - Gametes
     - Punnett square
     - Genotypic & phenotypic ratio
   - Trick:
     - Monohybrid phenotypic ratio → 3 : 1
     - Dihybrid phenotypic ratio → 9 : 3 : 3 : 1
       CBSE checks steps, not just the final ratio, don't use short forms
2. **Understand, Don't Simply Memorize Laws of Inheritance**
   - Law of Dominance → Monohybrid cross
   - Law of Segregation → Purity of gametes
   - Law of Independent Assortment → Dihybrid cross
     Link law → experiment → ratio
3. **Pedigree Analysis**
   - Square = male, Circle = female
   - Shaded = affected
   - Autosomal dominant → appears in every generation
   - Autosomal recessive → may skip generations
   - X-linked recessive → more males affected
     Trick :"Only males suffer and females are carriers → X-linked"
4. **Linkage & Recombination**
   - More distance between genes → more recombination
   - Linked genes ≠ independent assortment
     Remember : Morgan's experiments proved linkage, not Mendel
5. **Practice Numerical Problems**
   - Blood group inheritance
   - Sex-linked inheritance (haemophilia, colour blindness)
   - Test cross vs back cross
     Remember : Test cross ALWAYS involves homozygous recessive
6. **NCERT Diagrams Are Mandatory**
   - Meiosis (segregation of alleles)
   - Pedigree charts
   - Chromosomal theory of inheritance

MENDELIAN DISORDERS

- Due to mutation in a single gene
- Autosomal Recessive→ **"PAST"**
  Phenylketonuria, Albinism, Sickle cell anaemia, Thalassemia
  Trick: These disorders often "hide" and appear when both parents are carriers.

- Autosomal Dominant → **"H"**
  Huntington's disease
  Trick: Dominant = appears in every generation
- X-Linked Recessive → **"He Cares"**
  Haemophilia, Colour blindness
  Trick: More males are affected, females are usually carriers

Gene Location Trick

- X-linked → sex chromosomes
- Autosomal → chromosome 1–22
  Trick: If males suffer more → X-linked

CHROMOSOMAL DISORDERS

- Due to abnormal number or structure of chromosomes

Delhi To Kolkata

- Down's syndrome
- Turner's syndrome
- Klinefelter's syndrome

Remember by Chromosome Formula

Disorder	Chromosome Number	Memory Trick
Down's syndrome	Trisomy 21	
Turner's syndrome	XO (45)	Turner = Only One X
Klinefelter's	XXY (47)	Extra X in male

- Turner's → only females; Klinefelter's → only males
- Down's syndrome → nondisjunction
- Turner's / Klinefelter's → sex chromosome nondisjunction

COMMON ERRORS

× Calling Down's Syndrome a Mendelian disorder
× Writing haemophilia as autosomal
× Forgetting chromosome number (45/47/21)
× Saying dominant = more common in population
× Writing Ratio Without Showing Cross
× Confusing Genotype & Phenotype
× Mixing Up Mendel & Morgan

Mendel	Morgan
Pea plant	Drosophila
Independent assortment	Linkage
Phenotypic ratios	Gene mapping

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