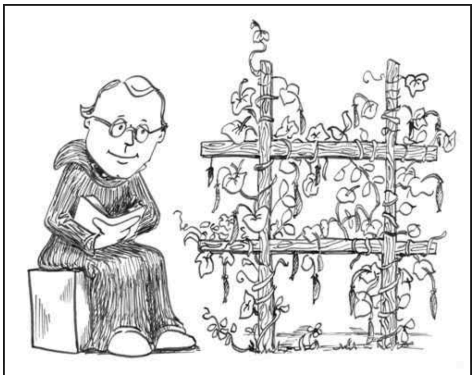
Key Terms:

Addition Rule
Allele
Autosomes
Bivalents
Chiasma
Chromatids
Codominance
Crossing Over
Dominant Allele
Dihybrid Cross
Diploid
Epistasis
F_1 Generation
F_2 Generation
Fertilization
Gametes
Genes
Genetics
Genotype
Haploid
Heredity
Heterozygous
Homologous Chromosomes
Homozygous
Hybrid
Incomplete Dominance
Karyotype
Locus
Law of Independent Assortment
Law of Segregation
Maternal
Meiosis
Multiple Alleles
Multiplication Rule
Monohybrid Cross
Nondisjunction
P Generation
Paternal
Pedigree
Phenotype
Pleiotropy
Polygenic Inheritance
Punnett Square



Key Concepts

-Meiosis is a reduction division and is essential sexual reproduction.
-Sexual reproduction introduces variation in the offspring: the raw material for natural selection.
-The dominance of alleles can be inferred from the genetic outcomes of crosses.
-The inheritance of some traits is dependent on gender.
-Alterations of chromosome number or structure cause some genetic disorders.
-Some inheritance patterns are exceptions to standard Mendelian inheritance.

Essential Knowledge:

Meiosis (3.A.2)

□ Know that **meiosis**, like mitosis, involves DNA replication during interphase in the parent cell, but this is followed by two cycles of nuclear division.
□ Know that **meiosis** is a **reduction division** and explain what that means.
□ Summarize the principal events in meiosis and their significance including:
- **Synapsis** and formation of **bivalents.**
- **Chiasma** formation and exchange of genetic material between **chromatids** in the first division.
- Separation of **chromatids** and production of **haploid** cells.

□ Describe the behavior of **homologous chromosomes** during meiosis and **fertilization** with reference to:
- The recombination of segments of **maternal** and **paternal** homologous chromosomes in **crossing over**.
- The **independent assortment** of maternal and paternal chromosomes.
- The random fusion of **gametes** during **fertilization**.

Chromosomal Basis of Inheritance (3.A.3)

□ Recall the role of meiosis and fertilization in generating variation. Understand segregation and independent assortment of genes on different chromosomes and explain their importance to our understanding of heredity and evolution.
□ Explain how the rules of probability are applied to solving genetic problems.
□ Demonstrate the use of terms commonly used in inheritance studies: **allele, locus, trait, heterozygous, homozygous, genotype, phenotype, cross, test cross, carrier, offspring, F_1 generation, F_2 generation.**
□ Solve problems involving monohybrid and dihybrid inheritance of unlinked autosomal genes with a simple dominant-recessive pattern.
□ Describe and explain inheritance involving codominance, incomplete dominance, multiple alleles, and lethal alleles.
□ Using examples, explain how certain human disorders can be attributed to the inheritance of single gene traits or to specific chromosomal changes such as non-disjunction.
□ Discuss ethical, social, and medical issues surrounding human genetic disorders. Describe the use of pedigree analysis to illustrate the inheritance of traits in a family tree.

Key Terms:

Recessive Allele
Sex Chromosomes
Sex-Linked Traits
Sexual Reproduction
Somatic Cells
Synapsis
Trait
Variation
Zygote

Genetic Disorders to Know:

Nondisjunction =
Down Syndrome
Turner Syndrome
Jacob Syndrome
Klinefelter Syndrome
Triplo-X

Autosomal Dominant =
Neurofibromatosis
Huntington's Disease

Autosomal Recessive =
Sickle Cell Anemia
Cystic Fibrosis
Tay-Sachs
PKU

Sex-Linked =
Color Blindness
Hemophilia
Muscular Dystrophy

Non-Mendelian Inheritance (3.A.4)

□ Recognize that the inheritance of many traits is not explained by simple Mendelian genetics. Using the inheritance of polygenic traits (multiple alleles) as an example, explain how non-Mendelian patterns of inheritance can be identified.

□ Distinguish sex chromosomes from autosomes. Describe examples and solve problems involving **sex-linked genes** (e.g. color blindness or hemophilia).