Genetics IB/AP Biology
Reading and Objectives

Objectives

1. Recognize Mendel's experiments and their role in the scientific discovery of genetic principles.
2. Identify Mendel's Laws of Genetics.
3. Recognize the use and application of probability in genetics.
4. Recognize the basic Mendelian crosses and genetic terminology.
5. Recognize various extensions of Mendelian genetics and their effect on inheritance patterns.
6. Identify human traits that exhibit Mendelian inheritance patterns.
7. Recognize methods used in genetic screening and counseling.

I. Theoretical Genetics, Crosses *Ch 14

3.1.4 Define gene, allele and genome. 1
3.3.1 Define: genotype, phenotype, dominant allele, recessive allele, codominant alleles, locus, homozygous, heterozygous, carrier and test cross. 1
3.3.2 Construct a Punnett grid. 3
3.3.3 Construct a pedigree chart. 3
3.3.4 State that some genes have more than two alleles (multiple alleles). 1
3.3.5 Describe ABO blood groups as an example of codominance and multiple alleles. 2

Phenotype	Genotype
O	ii
A	I^AI^A or I^Ai
B	I^BI^B or I^Bi
AB	I^AI^B

8.2.1 Calculate and predict the genotypic and phenotypic ratios of offspring of dihybrid crosses involving unlinked autosomal genes. 2, 3
8.2.2 Identify which of the offspring in dihybrid crosses are recombinants.2
8.4.1 Define polygenic inheritance.1
8.4.2 Explain that polygenic inheritance can contribute to continuous variation using two examples. One example must be human skin colour. 3
8.2.3 Outline the use of the chi-squared test in analysing monohybrid and dihybrid crosses using given values. 2

➔ How did Mendel's work lay the foundation of modern genetics?
➔ What the principle patterns of inheritance?

Objectives

1. Recognize the relationships between Mendelian Inheritance patterns and chromosomes.
2. Identify linked genes and their effect on inheritance patterns.
3. Recognize the chromosomal basis of recombination in unlinked and linked genes.
4. Recognize how crossover data is used to construct a genetic map.
5. Identify the chromosomal basis of sex in humans.
6. Recognize examples of sex-linked disorders in humans.
7. Identify X-inactivation and its effect in females.
8. Recognize sources and examples of chromosomal alterations in humans.
9. Identify examples of abnormalities in sex chromosome number in humans.
10. Recognize the basis and effects of parental imprinting of genes in human inheritance patterns.
11. Recognize the basis and effect of extranuclear inheritance on genetic inheritance patterns.

II. Chromosomal Basis of Inheritance *Ch 15

- 8.3.1 State the difference between autosomes and sex chromosomes.1
- 8.3.2 Explain how crossing over in prophase I (between non-sister chromatids of a homologous pair) can result in an exchange of alleles. 3
- 8.3.3 Define linkage group. 1
- 8.3.4 Explain an example of a cross between two linked genes.3
- 8.3.5 Identify which of the offspring in such dihybrid crosses are recombinants. 2
- 3.3.6 Outline how the sex chromosomes determine gender by referring to the inheritance of X and Y chromosomes in humans. 2
- 3.3.7 State that some genes are present on the X chromosome and absent from the shorter Y chromosome in humans. 1
- 3.3.8 Define sex linkage. 1
- 3.3.9 State two examples of sex linkage. 1
- 3.3.10 State that a human female can be homozygous or heterozygous with respect to sex-linked genes. 1
- 3.3.11 Explain that female carriers are heterozygous for X-linked recessive alleles.3
- 3.3.12 Calculate and predict the genotypic and phenotypic ratios of offspring of monohybrid crosses involving any of the above patterns of inheritance. 2, 3
- 3.3.13 Deduce the genotypes or phenotypes of individuals in pedigree charts. 3
- 8.1.4 Define recombination. 1

➔ In what ways can genetic information be altered?
➔ What are some effects of these alterations?