

Basic Genetics Unit

Essential

BE.1 - Describe basic genetic principles and predict genotypic and phenotypic ratios of offspring.

Level 3 Description	Recognizes or recalls specific terminology such as: gene, trait, dominant, recessive, punnett square, genetics, phenotype, genotype, Predict the genotypic and phenotypic ratios of offspring resulting from monohybrid crosses for both autosomal and sex-linked traits using Punnett squares Create a Punnett square for a dihybrid cross of an autosomal trait. Explain complex inheritance patterns, e.g. multiple alleles, polygenic, sex influenced, multifactorial
Level 4 Description	Recognizes or recalls specific terminology such as: allele, heredity, homozygous, heterozygous, codominance, incomplete dominance Define the principle of segregation and law of independent assortment. Describe the possible combinations of offspring in a genetic cross involving codominance or incomplete dominance for a single trait. Use a Punnett square to predict the genotypic and phenotypic ratios of offspring resulting from a dihybrid cross of an autosomal trait. Explain and differentiate between simple Mendelian and complex inheritance patterns, e.g. multiple alleles, polygenic, sex influenced, multifactorial

Supporting

BS.1 - Use a pedigree to explain and predict inheritance of traits.

Level 3 Description	Draw a pedigree. Use a pedigree to predict the mode of inheritance for an autosomal trait. Use the concepts of statistics and probabilities to explain the variation of expressed traits in a population.
Level 4 Description	Use a pedigree to predict the mode of inheritance for an autosomal trait and a sex-linked trait. Use the concepts of statistics and probabilities to explain and predict the variation of expressed traits in a population.

BS.2 - Make and defend a claim based on evidence that genetic variations may result from both genetic and environmental factors.

Level 3 Description	Explain how a human genetic disorder may be caused by a dominant gene, recessive gene, or a chromosomal abnormality and the effects caused by those abnormalities Explain that environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors Explain a source of genetic variation like: recombination or mutations
Level 4 Description	In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. DNA replication errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.