Sample Assessment Schedule – 2025

Chemistry and Biology: Demonstrate understanding of genetic variation in relation to an identified characteristic (92022)

Assessment Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrating understanding of genetic variation in relation to an identified characteristic involves: • describing the source and the nature of genetic variation using an identified characteristic • describing a purpose for identifying genetic relationships through the use of a gene tracking methodology.	*Explaining genetic variation in relation to an identified characteristic* involves: • explaining how and why the genetic variation occurs using an identified characteristic • explaining how the purpose for identifying genetic relationships through the use of a gene tracking methodology is met.	*Evaluating genetic variation in relation to an identified characteristic* involves: • evaluating findings when genetic variation has been identified and tracked for the purpose of identifying genetic relationships.

Sample Evidence

Question One	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	DNA carries the (hereditary) genetic information as a base code. The CCR5 gene is a section of DNA that codes for either a resistance or non-resistance (to the HIV infection) trait. A mutation will cause a permanent change in the sequence of DNA bases, which leads to a new (or different) version of the gene called an allele. The new allele will now code for the phenotype "resistance to HIV". An individual must possess two copies of the resistant allele to have the "resistant to HIV" phenotype – they must be homozygotes. [M]	Defines: • mutation • genes, alleles, phenotype, and genotype. Describes: • chromosomes or DNA • gametes • fertilisation • meiosis.	Explains: • DNA coding for resistance, including the relationship between DNA, chromosomes, genes, alleles, genotype, and phenotype using HIV resistance as a context • the effect of CCR5 mutation • inheritance of allele in a parent's gamete passed on following fertilisation.	Links the phenotypical advantage (HIV resistance) to inheriting or "developing" (in gamete) the mutation WITH a higher chance of surviving to reproductive age and therefore potentially passing the mutation on to offspring.
(b)	If the mutation (mutated CCR5 allele) occurs in the gametes (sperm / egg cell), it can be passed down in the DNA from either parent during fertilisation. If the mutation occurs in the somatic cells, then it has no change of being passed on to the next generation. [A] Each parent will have two sets of chromosomes from each cell. The gametes produced in sexual reproduction will be combined with another parent and this will make a unique individual during the process of fertilisation. [A] If a parent has the mutation (either as a homozygote or heterozygous carrier), then there is a chance that this can be passed to the offspring. [A] The new / mutated allele will be passed to the offspring if it is in the gamete that is fertilised. [M] If a mutation occurs in the somatic cell, it does have a chance to get passed on and thus does not contribute to variation within the population. However, if the mutation occurs in the gametic cell, and that gametic cell has a chance of getting fertilised, this can contribute to genetic variation within the population. [M] Genetically varied / unique individuals (such as those with the mutant CCR5 allele) will have a higher chance of surviving the HIV infection, as they will be able to survive to reproducing age and therefore pass on those alleles to their offspring. This will help the survival of the human population, as future generations will inherit the resistant allele and increase the genetic fitness of the population. [E]			