2025 NCEA Assessment Report

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Subject: Chemistry and Biology

Level: 1

Achievement standard(s): 92022, 92023

Report on individual achievement standard(s)

Achievement standard 92022: Demonstrate understanding of genetic variation in relation to an identified characteristic

Assessment

This assessment was an external examination consisting of three questions. This was a change from previous years, where the assessment was a report consisting of two questions.

Candidates were required to respond to all three questions in the examination.

The questions required candidates to demonstrate their understanding of genetic variation in relation to an identified characteristic. The questions included:

- discussing the source of genetic variation for an individual, including mutation and sexual reproduction (in the context of the CFTR gene)
- tracking an allele and identifying genetic relationships using a pedigree chart and Punnett squares
- explaining the continuation of an allele in a population due to meiosis, non-random mating, and sexual reproduction.

Commentary

Candidates who applied their biological knowledge to the stimulus material and synthesised ideas into coherent responses achieved more highly than those who relied on copying from the stimulus. Candidates who attempted all three questions had more opportunity to demonstrate their understanding.

Accurate, precise use of biological vocabulary is a requirement for higher levels of achievement.

Candidates who explained how sexual reproduction may cause carriers to pass a recessive allele to offspring explained the role of meiosis in generating gametes with unique combinations of alleles in offspring, or wrote about how non-random mating in small populations could lead to a higher chance of the allele being passed on in the population gained higher achievement.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- defined key biological terms (e.g. DNA, mutation, gene, allele) accurately but rarely included examples
- used “gene” and “allele” incorrectly or interchangeably, limiting higher-level marks
- identified genotypes in pedigree charts and Punnett squares, especially for unaffected individuals, and understood basic inheritance patterns
- provided simple, surface-level explanations in Question Three (e.g. meiosis produces gametes, each parent passes on one allele)
- demonstrated basic understanding of carriers, allele inheritance, and the idea that two carriers can have affected offspring
- answered with brief or general statements.

Candidates who were awarded **Achievement with Merit** commonly:

- demonstrated developing use of scientific language and linked genetic concepts
- incorporated examples into explanations but sometimes used examples unrelated to cystic fibrosis
- explained several components of Question One clearly and with detail
- explained why a family might track the cystic fibrosis allele and related inheritance patterns to specific individuals
- described logical scenarios for changes in the f-allele frequency and showed general understanding of non-random mating
- provided partial explanations for crossing over, independent assortment, and how these processes increase genetic variation
- applied genetic terminology accurately and interpreted pedigree charts correctly but did not fully explain how gene differences affect fitness.

Candidates who were awarded **Achievement with Excellence** commonly:

- provided consistently clear, detailed, and well-structured explanations
- linked concepts accurately and used biological vocabulary throughout their responses
- explained how the f allele could change in frequency without an increase in the cystic fibrosis phenotype, most commonly by discussing heterozygous carriers masking the recessive allele
- explained inheritance patterns across multiple generations and justified genotypes using evidence from pedigree information
- considered broader implications such as future generations, mating decisions, and the purpose of gene tracking
- evaluated alternative genotype possibilities and avoided unsupported assumptions when genotypes could not be confirmed
- explained meiosis, sexual reproduction, and natural selection in-depth, clearly linking these processes to allele frequency changes
- justified why the recessive f allele can remain in populations and connected multiple genetic concepts in context-based explanations.

Candidates who were awarded **Not Achieved** commonly:

- mixed up key definitions and provided incorrect or irrelevant explanations
- confused genotype with phenotype
- confused non-random mating with inbreeding
- left questions blank or wrote unrelated information that did not address what was asked
- restated the question or stimulus material without adding any meaningful response
- misused core biological vocabulary such as genotype, phenotype, heterozygous, gene, allele, and carrier
- struggled to link DNA, chromosomes, and alleles, and did not recognise that genotypes contain two alleles
- showed difficulty applying genetic concepts to human populations.

Achievement standard 92023: Demonstrate understanding of how the physical properties of materials inform their use

Assessment

This examination focused on the properties of materials and their uses. It consisted of three questions, requiring candidates to demonstrate their understanding of how the physical properties of materials inform their use. The questions covered various materials, including:

- polymers
- covalent networks
- metallic solids
- ionic and molecular substances
- alloys.

Candidates were required to respond to all three questions in the examination.

Commentary

Candidates who attempted all three questions had more opportunity to demonstrate their understanding.

Candidates who clearly specified the type of bonding or structure, rather than using general terms such as “intermolecular forces” or “strong bonds”, achieved more highly. Similarly, linking structure and bonding to observable properties (rather than relying on vague descriptors such as “strong”, “light”, or “hard”) led to higher achievement.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- listed simple physical properties of polymers, including basic bonding features and how these influenced their behaviour
- had a basic understanding of metallic bonding, recognising the role of particles and bonding in shaping common metal properties
- understood the difference between the forces involved in water and those in ionic compounds, showing awareness of how these differing interactions affect properties.

Candidates who were awarded **Achievement with Merit** commonly:

- explained how the properties of LDPE and graphite influenced their behaviour and the suitability of each material
- explained in more detail how delocalised electrons operate in metals and how different-sized atoms affected the metallic lattice
- linked the structure of ions in NaCl to their general properties, described how water interacted with solid NaCl, and connected material properties in the floating-bottle context to why certain materials floated.

Candidates who were awarded **Achievement with Excellence** commonly:

- displayed in-depth knowledge of how the properties of a polymer directly related to and influenced its practical use
- demonstrated in-depth knowledge of the properties of different metals and explained how the density of these metals related to their suitability for particular uses
- demonstrated in-depth knowledge of the bonding and physical properties of ionic substances, including how they dissolved in water, and compared how density affected the behaviour of different substances in salt water (floating or sinking).

Candidates who were awarded **Not Achieved** commonly:

- identified properties without linking them to how the material would be used
- gave informal explanations with little or no reference to structure or bonding
- used incorrect material classifications, such as confusing ionic substances with metallic ones
- repeated information from the question without adding any meaningful explanation.