National Certificate of Educational Achievement

2011 Assessment Report

Science Level 3

90729 Describe genetic processes

90730 Describe selected organic compounds and their uses

90731 Describe geological processes affecting New Zealand

90732 Describe selected properties and applications of EMR, radioactive decay, sound and ultrasound

COMMENTARY

Candidates who read questions thoroughly and attempted all parts of questions were more likely to produce answers that gained credit. Those who were clearly using the bullet points in the questions to structure their answers were more likely to reach Merit or Excellence, particularly in 90729, Describe Genetic Processes. In all standards, the use of labelled diagrams helped candidates develop logical in-depth explanations.

STANDARD REPORTS

90729 Describe genetic processes

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- showed an understanding of the overall function of genetic processes
- provided basic facts about the structure or function of RNA, and the process of translation and transcription
- demonstrated an understanding of the cause of genetic mutations
- described the basic processes of genetic profiling without going into details.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- gave “rote” answers describing transcription and translation rather than answering the question describing the structure and function of the three forms of RNA
- did not differentiate between point mutations and chromosome mutations
- did not make the link between mutations and the overall effect on the protein produced
- did not describe the processes involved with genetic profiling
- did not appear to understand the question and provided irrelevant answers.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- demonstrated an understanding of the different forms of RNA and their role in protein synthesis by written or visual text
- understood the intent of the questions and did not give a “rote” answer describing protein synthesis
- wrote clear answers and/or drew diagrams that showed an understanding of point mutations and their effect on the DNA code
- explained some of the processes involved in a DNA profile and how they were used in the context of the question
- wrote fluent, clear answers using appropriate technical language.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- demonstrated that they had read the question thoroughly and were able to give both the structure and the function of the three forms of RNA and how they interacted in the process of protein synthesis
- demonstrated in-depth understanding of the effect of point mutations, especially those that had very little or no effect on the overall protein produced
- made links between point mutations, codons, amino acids, and the final protein produced
- demonstrated clear understanding of the processes involved with DNA profiling and were able to link these together in a coherent answer
- drew clearly labelled diagrams to support their written answers.

OTHER COMMENTS

Many learners gave rote-learnt answers about the process of protein synthesis describing transcription then translation. This was sufficient to meet the criteria for Achievement but not to reach higher levels.

90730 Describe selected organic compounds and their uses

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- named reactants and the ester product for esterification without stating that water is also a product
- drew the correct ester molecule but named it incorrectly
- identified an alkene functional group and stated that fats do not interact with water
- drew a labelled structure of a detergent
- identified branching in low-density polythene, and the type of reaction to form polythene from the monomer ethene.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- described the ester catalyst as sulphuric acid without stating that the acid must be concentrated
- did not describe the interaction between an alkene and fats
- described limonene as a detergent that breaks the bonds in fats
- incorrectly labelled a detergent molecule
- identified oil from the oil slick as a triglyceride
- drew hydrogen atoms at the end of a section of polymer molecule.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- drew the structure of an ester; gave the equation (including water) and identified reflux, or concentrated sulphuric acid, as a way to improve the yield
- described the structure of a triglyceride and identified its interaction with an alkene
- explained the detergent action of micelles
- identified the monomer, identified and drew a polymerisation reaction, and identified the difference in the properties of LDPE and HDPE as due to the branching of polymer chains.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- maintained the focus of each question in their response to the question
- discussed the reason concentrated sulphuric acid is used in esterification, including a description of an equilibrium reaction
- discussed the polarity of alkenes, fats, and water and identified the key structures of each
- discussed how detergent works in terms of micelles, surfactants and dispersal of these micelles by sea currents
- discussed properties of LDPE and HDPE in terms of intermolecular bonding.

90731 Describe geological processes affecting New Zealand

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- provided facts
- attempted to demonstrate understanding using diagrams
- expressed ideas directly
- showed knowledge of geological processes, plate tectonics, and earthquakes.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- provided rote-learnt answers
- misunderstood the meaning of key words in questions (e.g. geothermal)
- misunderstood the focus of the question
- confused the Alpine Fault with the plate boundary.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- constructed responses that were logical
- supported written responses with the use of labelled diagrams
- showed an in-depth knowledge of geological processes, plate tectonics, and earthquakes.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- maintained the focus of each question in their responses to the question
- constructed responses requiring a comparison that were coherent and well reasoned
- supported written responses with the use of comprehensive, well-labelled diagrams.

OTHER COMMENTS

Some candidates demonstrated an in-depth knowledge of parts of the standards e.g. plate tectonics but did not provide an answer for all questions such as geothermal activity or earthquakes.

Many candidates did not show understanding of the key idea that geothermal activity is dependent on the heating of underground water.

90732 Describe selected properties and applications of EMR, radioactivity, sound and ultrasound

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- used sound terminology in describing the properties of waves
- used annotated diagrams to describe wave behaviour in a variety of media
- understood the carbon cycle and related this to absorption of 14C
- understood when radiation is dangerous and when it is not
- wrote accurate equations for decay of isotopes
- calculated half-lives for radioactive isotope decay
- used correct ideas of reflection of waves to describe the behaviour of waves in a variety of media
- used the words frequency, wave length, and speed in context, correctly when describing wave behaviour.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- used incorrect lay person ideas that lacked scientific substance when describing the dangers of radio waves
- did not recognise that current use of ultrasound imaging of the unborn baby is safe
- showed a lack of knowledge of the carbon cycle and described carbon dioxide as the gas breathed in and used by animals rather than used by plants in photosynthesis
- had limited understanding of the decay process of carbon isotopes and thus were unable to write a correct equation
- drew incorrect diagrams to show compression of waves according to the Doppler concept of wave behaviour
- answered only one or two questions
- did not use the bullet point scaffolding ideas as a guide for answering questions.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- explained everyday concepts such as carbon dating, Doppler radar, and ultrasound imaging and by explaining wave behaviour in a variety of media
- recognised that the speed of sound in air is constant but will change in different media
- explained radioactive decay in terms of half-lives and calculated correct age of tissue according to the 14C content of a specimen
- demonstrated ability to apply knowledge of the behaviour of waves in a wide range of contexts
- explained the concept of interference as waves from different directions meet and how this impacts on technological use of waves in recording aspects in everyday life
- related the ideas of the effect of different media for wave travel as acoustic impedence and how this relates to wave travel in various media
- explained the constants in wave equations.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- evaluated the accuracy of technological tools that use waves to record data in everyday situations
- compared and contrasted the behaviour of waves in a variety of media
- applied science concepts to radio use to prove, using equations, that wave behaviour can be predicted
- discussed variations of applications of wave recording scenarios within the context of the question asked
- evaluated variances when wave length, frequency, medium, or speed were altered.

OTHER COMMENTS

Many candidates made sound observations in one question but did not gain Achievement because they did not attempt all questions.