

# **National Certificate of Educational Achievement**

## **2012 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

This was the final year for examinations to assess these achievement standards.

Candidates who clearly used the bullet points in the questions to structure their answers were more likely to reach Merit or Excellence. 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:**

- used the bullet points to structure their answers
- wrote coherently and fluently
- drew diagrams to support their answers
- understood the basic process of transcription
- demonstrated a basic understanding of point mutations of insertion, substitution and deletion
- described general genetic techniques including restriction enzymes, ligation, polymerase chain reaction.

#### 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:**

- wrote “rote” answers on the types of RNA without actually answering the question on transcription
- did not understand the difference between transcription and translation in protein synthesis
- did not differentiate the difference between the different types of point mutations
- did not make the link between point mutations and the effect on the protein produced
- did not describe the main techniques of gene therapy
- did not use the bullet points provided to structure their 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:**

- described the process of transcription including the base pairing rule
- explained why it is necessary for DNA to remain in the nucleus during protein synthesis
- demonstrated understanding of the effect of the different types of point mutations on the codon and therefore the resulting amino acids
- explained the effect of frame shift mutations on the order of amino acids in a protein
- recognised the importance of using viruses in gene therapy due to their structure and function

- explained the biological implications of gene therapy (not ethical, social or economic implications)
- wrote fluent and coherent answers using the language of the subject
- drew simple clear diagrams (labelled/annotated) to support their answers.

### **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 they had read the question carefully and described both the structure and function of mRNA, the overall process of transcription and its importance to protein synthesis, using appropriate technical language
- recognised the three types of point mutations, how these impacted on the codons and therefore the amino acids coded for and linked this to the overall function of the protein with reference to specific shape of the protein
- demonstrated clear understanding of the overall processes of polymerase chain reaction, ligation and restriction enzymes, and the use of viral vectors in gene therapy
- recognised the biological implications of gene therapy; both positive and negative
- used the bullet points provided to structure their answers coherently and wrote fluently using correct technical language
- provided annotated or labelled diagrams to support their answers.

### **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:**

- drew structures of organic compounds correctly
- described canola oil as unsaturated and canola margarine as unsaturated
- described conditions of ester formation
- identified the functional group of an ester
- drew the correct structure of the ester produced
- stated the higher iodine number, the higher the unsaturation.

#### **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:**

- drew an alcohol instead of an alkane
- described canola oil as saturated
- identified the carboxylic acid functional group as an ester group
- did not include the word 'concentrated' when describing the use of sulfuric acid
- linked the iodine number to the mineral iodine
- described the function of the sardine oil as keeping the fish warm by burning fat.

## **ACHIEVEMENT WITH MERIT**

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

- linked chemical structure to packing of molecules and resultant strength of intermolecular force and related to the context of the question
- wrote a complete equation for ester formation
- explained the reason for the use of one condition
- explained unsaturation linked to double bonds and drew a diagram to show how iodine adds across the double bonds.

## **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:**

- linked chemical structure to packing of molecules, resultant strength of intermolecular force and the amount of heat needed to melting, and related this to the context of the question
- wrote a complete and balanced equation for ester formation and explained the reason for both conditions
- explained unsaturation linked to double bonds and drew a diagram to show how iodine adds across the double bonds AND linked the high level of unsaturation in sardine oil to the movement of the fish in cold water.

## **90731 Describe geological processes affecting New Zealand**

### **ACHIEVEMENT**

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

- showed a knowledge of the Alpine Fault, earthquakes at plate boundaries and volcanoes
- provided basic facts
- used diagrams
- interpreted the information given in both written form and diagrams
- demonstrated knowledge of the type of volcano (as given in the photos) magma type, and features.

### **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-learned responses by writing answers not related to the specific question asked
- confused the Alpine Fault with the Plate Boundary in their answers.
- misinterpreted the photos of the volcanoes specifically that Mt Ngauruhoe was a shield volcano.
- showed no evidence that the resource material was understood.

## **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 diagrams that supported their written answer
- wrote responses to the questions that explained and linked some aspects of the question asked
- maintained the focus of each question in their response to the question.

## **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:**

- drew well labelled and annotated diagrams that supported their written response
- wrote well integrated responses to the questions linking key information
- demonstrated understanding of the resource materials and made reference to it in their responses.

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

### **ACHIEVEMENT**

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

- used correct decay equations to describe decay of cobalt - 60
- used a labelled diagram to describe amplitude and wavelength of EMR waves.
- knew the difference between properties of beta and gamma waves
- described aspects of sound; reflection, absorption, loudness, interference
- knew that wavelength of EMR waves impacts on their behaviour
- described the relationship between materials and the impact they make on reflection and absorption of sound waves.

### **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:**

- confused sound and radio waves
- used ideas that suggested that alpha, beta and gamma rays are all strong ionisers
- used ideas that contradicted with the resource material provided
- gave numerical answers without supporting descriptions
- drew diagrams but failed to label them.

### **ACHIEVEMENT WITH MERIT**

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

- related the properties of EMR waves to their mechanism of action as sterilants of micro-organisms
- related properties of EMR waves to their wavelength

- related properties of sound waves to the way they behave in an enclosed auditorium
- used resource material to support their explanations of concepts of wave behaviour
- explained lifespan of radioactive material.

## **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:**

- linked the use of radioactive materials to their role in sterilising organic materials
- showed working for the calculation of useful lifespan of radioactive materials
- recognised that radioactive decay is a non-linear process
- related the properties of EMR waves to their usefulness in producing images on film or using electronic imagery
- related the behaviour of sound waves to the design of an acoustically well-appointed auditorium
- recognised that EMR waves travel at the speed of light and that an object in deep space will be thousands of light years away and thus need emissions of radio waves in order to be sufficiently detected.