

National Certificate of Educational Achievement

2011 Assessment Report

Science Level 2

- 90764 Describe the nature and life cycle of stars**
- 90766 Describe the chemical properties and effects of fertilisers**
- 90767 Describe New Zealand's geological history**
- 90768 Use physics concepts and principles to describe the behaviour of light**
- 90772 Describe the factors and processes involved in the evolution of New Zealand's plants and animals**

COMMENTARY

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

STANDARD REPORTS

90764 Describe the nature and life cycle of stars

ACHIEVEMENT

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

- described the life cycle of the Sun
- used a Hertzsprung-Russel diagram to describe characteristics of stars
- described how a supernova forms and what will happen to a supernova
- described why Sirius A would wobble.

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:

- did not use a Hertzsprung-Russel diagram to describe characteristics of stars
- did not give types of star that undergo supernova
- did not identify stages or outcome of a supernova forming
- did not describe why Sirius A wobbled
- did not describe correctly how brown dwarfs formed.

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 the life cycle of the Sun
- explained the steps that formed a brown dwarf
- explained fuel use in regards to either temperature, or brightness of the stars
- explained why Sirius A wobbled.

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:

- discussed the conditions required for formation of the Sun
- discussed the formation of a brown dwarf
- discussed the fuel use of Sirius A and Sirius B and linked it to the brightness, temperature, and star type
- discussed the reason for the wobble of Sirius A
- discussed what occurs during and after a supernova
- explained and linked the stages of an original star type undergoing supernova.

OTHER COMMENTS

Candidates often provided rote-learned responses with regards to the life cycle of a star, but did not specifically answer the question asked. Candidates often referred inappropriately to the Hertzsprung-Russel diagram in their answers, leading to inaccurate or incomplete answers.

90766 Describe the chemical properties and effects of fertilisers

ACHIEVEMENT

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

- described how riparian strips reduced excess nutrients in a waterway, or described an effect of excess nutrients in a waterway
- described the concentration of H^+ ions as being high when pH is low
- recognised that insoluble blood and bone was a slow release fertiliser.

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:

- did not describe the role of a riparian strip and often incorrectly linked riparian strips to holding soil on banks near the waterway and drawing nutrients out of the waterway
- did not state the concentration of H^+ ions at low pH
- stated how slow release fertilisers were better for the environment but did not address the question.

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 what riparian strips were used for and how they improved water quality. They explained the general effects of excess nutrients in waterways
- stated how blood bone is used by plants after breaking down by microorganisms/worms etc.
- referred incorrectly to N-fixing bacteria
- made the link between pH level in soil and availability of Co^{3+} to plants.

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:

- discussed the effects of excess nutrients on a waterway with the process of eutrophication explained correctly and linked to water quality
- linked the charge of the soil particles to the fact that hydrogen ions will be held onto thus releasing, and making available to plants, the cobalt ions

- showed clear linkages between insolubility and the need for blood and bone to be broken down over time into nitrates that can be absorbed.

90767 Describe New Zealand's Geological History

ACHIEVEMENT

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

- recognised the slip/slide nature of the Alpine fault
- described the origins of the material that formed greywacke and limestone
- related mountain building to plate collision and subduction
- described landforms that came about from glacial action
- described the process of weathering and erosion in relation to landscape.

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:

- incorrectly classified rocks e.g. greywacke as igneous
- described valley formation in mountain ranges as the result of divergent plate activity
- described ophiolite separation as the result of mountain uplift
- showed a lack of understanding of geological time in relation to the events in the questions
- misunderstood what a peneplain is and the time involved in its formation
- incorrectly associated certain landforms with glacial movement.

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 the role fault line types play in relation to mountain building and land movement
- explained the process for the formation of sedimentary rocks from the original material
- explained possible reasons for the likely origin of ancient rock formations
- linked correct plate names and terminology to the corresponding mountain building episodes
- showed an understanding of the length of deposition periods prior to mountain building episodes
- explained landforms in the Southern Alps in relation to mountain building of the Kaikoura orogeny and glaciation periods.

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 current landforms such as the formation separation of the Dun Mountain ophiolites with geological time
- identified mineral content with rock types
- discussed the role of convection currents in the magma with mountain building episodes and fault line movement
- made links to the cyclic nature of rock formation e.g. deposition compaction, uplift, erosion
- linked geological processes on Gondwana to New Zealand's eventual formation
- discussed the role of climate change and sea level change in the glaciation periods.

OTHER COMMENTS

Candidates who used illustrated and annotated diagrams provided clarity in their answers and tended to gain higher grades than those who did not.

90768 Use physics concepts and principles to describe the behaviour of light

ACHIEVEMENT

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

- drew a simple ray diagram to show Total Internal Reflection (TIR)
- described the nature of an image from a concave mirror accurately
- understood that filters allowed certain colours through, and absorbed others.

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:

- did not use the bullet points associated with a question
- drew an incorrect ray diagram for a concave mirror
- did not show an understanding of coloured filters and how they work.

ACHIEVEMENT WITH MERIT

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

- could explain TIR and why it was occurring in terms of the angle of incidence
- linked the colours transmitted and absorbed by a secondary filter to the colours formed on a screen due to reflection.

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:

- used the question and bullet points to formulate their answers
- discussed TIR in the water and linked it to seeing two fish at long range and only one fish at short range. Linked their answer to the original question
- explained why the lamp was at C and linked the image and object to increased light being available on the screen
- explained how filters could transmit and absorb primary colours, linked this to colours seen on the screen, and knew that an absence of colour would be seen as black on the screen.

90772 Describe the factors and processes involved in the evolution of New Zealand's plants and animals

ACHIEVEMENT

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

- structured their answers using the bullet points provided
- were familiar with basic biological terms e.g. founder effect
- identified that environmental conditions would cause natural selection
- showed an awareness that environment conditions vary between locations.

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:

- showed a lack of knowledge of the environments in the questions
- focussed on the effect of mutations in evolution
- used unrelated examples in their responses
- restated information of their own, or from the question
- identified humans as a main factor in natural selection of organisms in New Zealand.

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 how specific environment conditions would affect evolution
- demonstrated an understanding of what causes genetic isolation and how this affects allele frequency
- read the questions thoroughly and referred to the context within their responses.

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 environmental factors to the process of natural selection and the final outcome
- were aware of the timeframe required for evolution of a species
- related adaptations to the environment and discussed possible advantages of the adaptations that would result in the organism's reproductive success.

OTHER COMMENTS

Candidates who read the question and linked their answer to the context of the question using the language of the standard tended to gain higher grades.