

2025 NCEA Assessment Report

Subject:	Physics, Earth and Space Science
Level:	1
Achievement standard(s):	92046, 92047

General commentary

There were two standards in the Level 1 Physics, Earth and Space Science assessment. Candidates were encouraged to practise unpacking and developing an understanding of the context and requirements of the questions based on the images and information provided. Planning answers helps candidates to provide clear responses that communicate their understanding and knowledge of the topics in relation to the contexts provided in the assessment.

Report on individual achievement standard(s)

Achievement standard 92046: Demonstrate understanding of the effect on the Earth of interactions between the Sun and the Earth-Moon system

Assessment

The assessment consisted of a paper-based examination, containing three questions. Question One tested candidates' knowledge on how the temperature and daylength changes in Wellington throughout a year. Question Two tested candidates on changes in the Moon's appearance throughout its orbit as well as the infrequent occurrence of a super full moon. Question Three focussed on how latitude affects daylength and shadow length.

Commentary

Most candidates demonstrated a solid understanding of basic concepts, particularly describing the monthly temperature changes in Wellington. Those who gained Merit explained why the Southern Hemisphere experiences four seasons, how the height of the Sun changes and how shadows changed in either Dunedin or the Equator. Excellence candidates discussed why Wellington's temperature changes throughout the year by linking it to changes in amounts of solar radiation. Furthermore, they were able to discuss differences in daylength between Auckland and Invercargill by linking it to their latitude.

Candidates were awarded points for even annotating diagrams. For example, simply annotating the diagrams of a Moon phases picture would have provided evidence for an achieved point. Correct scientific description should be used while describing why summer is warmer than winter. Numerous responses said that this was due to increased sunlight. However, it is due to increased solar radiation and candidates were awarded points if they described that it is due to heat or insolation.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- stated the tilt and orbit of the Earth
- described that summer is hotter than winter
- described why we experience day and night
- named 3 out of 5 moon phases
- stated the length of the Moon's orbit.
- defined equinox and solstice
- left one or more questions unattempted
- answered only some part of each question
- missed Merit because they did not explain why the Southern Hemisphere experiences four seasons or how the shape of the orbit affects the appearance of the Moon.

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

- explained why the Southern Hemisphere experiences the seasons and linked it to differences in solar radiation
- explained the changes in the Moon's appearance during its orbit by linking it to perigee and apogee
- explained how the shadows change at either Dunedin or the Equator and linking it differences in the angle of the Sun throughout a year
- missed out on excellence because their responses did not discuss the temporal or latitudinal variations in temperature, daylength or shadow length.

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

- discussed why Wellington's average monthly temperature changes throughout the year, linking it to solar radiation
- Used the movement of the Earth and Moon to discuss the infrequent occurrence of a super full moon
- related the differences in shadow length to changes in latitude between Dunedin and the Equator.

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

- labelled the seasons in the correct order
- described that summer is warmer than winter
- stated the length of the Moon's orbit
- either drew or named 4 out of 5 Moon phases
- described the shadow differences between the Equator and Dunedin.

Achievement standard 92047: Demonstrate understanding of a physical system using energy concepts

Assessment

The assessment consisted of a paper-based one-hour examination, containing three questions. Question One tested candidates' knowledge on energy changes with aspects of gravitational potential energy, kinetic energy, and thermal energy. Question Two tested candidates on electrical power, the effect of changing the current on thermal energy, and an understanding of convection

currents. Question Three tested candidates on their ability to analyse an experiment, to improve this experiment, and to calculate specific heat capacity.

Commentary

Candidates demonstrated varied understanding of energy concepts and physical systems. While many applied formulas correctly, confusion persisted around heat capacity units, temperature difference versus absolute temperature, and convection diagrams that were appropriately labelled. Many candidates did not identify the equation they were using, just writing the numbers or the final answer. When using an equation to explain a concept, candidates are encouraged to show which variables change and which ones remain unchanged.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- performed single-step calculations using the correct formula
- described basic energy loss but did not recognize that at halfway down the building the pot had both E_p and E_k
- describe gravitational potential energy also changes to thermal energy due to friction or air resistance as the pot is dropping
- selected the correct equation to calculate electrical power
- drew a labelled diagram to illustrate a convection current
- selected the correct equation to calculate specific heat capacity
- suggested a simple improvement to an experiment.

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

- performed multi-step calculations and could link relationships using equations. Candidates would often show complete working to these calculations including correct formula, correct substitution of values, finishing with the correct calculation and correct unit
- explained heat loss and conservation methods in terms of air resistance
- described convection currents in terms of changes to density but did not explain that the change in density arose from particles moving further apart due to an increase in particle motion
- provided developed explanations, though links between science concepts and the situation involved in the question.

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

- linked multiple ideas and related these to the question
- performed multi-step calculations with correct units, or used two formulae to come up with the correct answer
- evaluated improvements to an experiment in terms of heat transfer
- explained exactly where the thermal energy came from in a pot that was falling
- linked particle motion to particles moving further apart and hence becoming less dense and closer together to become denser
- provided answers that were well-structured, used precise terminology, and showed depth and insight consistent with Excellence-level understanding.

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

- skipped questions or attempted very few questions across the whole paper
- wrote sentences instead of equations, or performed calculations but did not acknowledge the formulae used

- incorrectly rearranged equations
 - confused energy concepts, often talked about objects falling when the question stated that the object was being lifted
 - had a poor understanding of convection diagrams, often confusing convection with conduction
 - talked about heat as if it were a substance
 - could identify some data from a temperature versus time graph
 - confused the concept of power with energy or voltage.
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