

2024 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.

During the assessment, candidates are encouraged to practise unpacking and developing an understanding of the context and requirements of the questions. 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. Candidates are required to know the various formulae and the correct application to various contexts.

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

This standard was administered as a submission standard, managed by individual schools. Candidates were provided with prompts from various contexts and were expected to provide answers using their own knowledge in reference to the context provided in the prompts.

Commentary

This assessment had three questions. Most candidates demonstrated a solid understanding of basic concepts, particularly in Question One, which focused on the apparent changing height of the Sun's path each day and how the length of shadows changed. Those who gained Merit provided deeper explanations and linked key concepts, particularly in Question Three, linking the moon phases to the position of the Sun, Moon, and Earth for both the solar and lunar eclipses. Excellence candidates showed critical thinking, fully discussing concepts such as link between the spin of the Earth and the change of the height of the Sun for Question One, linking the tilt of the Earth to day length in Scott Base for Question Two, and analysing why solar and lunar eclipses last different lengths of time and why they don't occur every month.

Candidates are advised to annotate diagrams, wherever possible. Some candidates used diagrams as an effective way to support their answers.

Candidates are reminded to provide specifics, e.g. stating that the Sun gets higher in Question One, rather than that the Sun's height changes.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- described how shadow length changes with the Sun height and how shadow directions change throughout the day
- linked the tilt of the Earth's axis to the change in daylength
- defined the equinox and solstice
- correctly identified the Sun, Earth, and Moon positions in the solar and lunar eclipse
- provided the facts of the answers without any explanation of how they related to the question, e.g. which way shadows moved throughout the day but not why
- left one or more questions unattempted
- answered only some part of each question
- missed Merit in the first two questions by incorrectly using wrong latitudes.

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

- explained why the length of shadow changes throughout the day and how the direction of shadows change
- did not explain how the spin of the Earth causes the Sun to change its height during the day
- explained the difference between solstices and equinoxes and how the Sun's path appears to change throughout the year
- stated the positions of the Sun, Moon, and Earth for both the solar and lunar eclipse and the moon phase for each eclipse.

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

- discussed the day length between Scott Base and Christchurch
- explained the angle of isolation well in the answers
- explained how the angle of isolation caused different seasons
- provided detailed explanations of the relationship of the observed effect to the cause
- explained both why lunar and solar eclipses don't occur every month
- integrated the data and the different parts of the question into a single coherent answer
- identified the relationships between the different parts of the question and data provided in the context prompt
- showed full understanding of the concepts and contexts of the questions, and submitted a cohesive answer that explained how the angle of the Earth and its spin affected the sunlight hours and the average temperatures of certain places used in the context of the question, and linked this to other aspects of the question.

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

- attempted the assessment task and left answers halfway through
- provided very basic understanding of the effect on the Earth and of the interactions between the Sun and the Earth-Moon system.
- included incorrect concepts (e.g. the distance between the Earth and Sun affected shadows / seasons)
- failed to recognise the type of eclipse
- used incorrect terminology
- confused the information in the resource material between questions (e.g. included information relevant for one question into the answer for another)

- talked around the information required, but lacked the specific information needed for basic Achieved points
 - made significant errors that showed a lack of understanding of key concepts (e.g. the Sun rotating around the Earth makes the shadows change lengths).
-

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 and aspects of gravitational potential energy and kinetic energy. Question Two tested candidates on thermal energy. Question Three tested candidates on electrical circuits and power.

Commentary

Many candidates left many blanks in their papers which affected their overall grade. Some candidates talked about heat as if it were a substance rather than a type of energy. Many candidates incorrectly stated that water in a solid state is denser than water in a liquid state.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- carried out simple calculations that did not require rearranging
- stated energy transformations
- defined latent heat
- identified one heat transfer method
- calculated the resistance of a wire with its unit
- provided limited explanations of science phenomena.

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

- provided partial explanations to excellence answers
- missed reading the requirement for assumptions to be explained in Q1(e)
- linked the ideas of energy loss due to air resistance or friction
- explained that water changes state without changing temperature
- linked only two features of a Thermos with methods of heat transfer
- recognised that voltmeters need to be connected in parallel in a circuit
- completed some two-part calculations that required the subject of the equation to be changed.

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

- linked ideas together and applied them to the stated context
- linked air resistance to friction of air particles against a falling ball
- explained latent heat in terms of intermolecular forces
- performed multi-step calculations correctly, showing the correct equation with working and include the correct unit
- comprehensively linked how the total voltage is fixed but varies across components within a circuit in proportion to the resistance.

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

- did not complete the paper
 - could not identify the correct equations in each context
 - were unable to identify energy transformations
 - described incorrectly that latent heat was a temperature at which water changes state
 - could not identify a method of heat transfer
 - could not describe the relationship between resistance, voltage, and current.
-