

This assessment report is based on assessments for 2023. It may not reflect achievement standards that have been updated.

2023 NCEA Assessment Report

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

General commentary

The assessments for the two standards were completed by several participating pilot schools in 2023. AS 92046 was a school-managed digital submission attempted by candidates during Term 3 of the academic year, while AS 92047 was an examination, attempted at the end of the year.

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 three parts in the form of a scaffolded report. Candidates were supplied with a resource booklet to use for reference to be guided to answer each part of the submitted report. Candidates were expected to show their understanding of how interactions between the Sun and the Earth-Moon system affects the Earth. Each part of the report covered a different aspect of the interactions. Candidates were expected to use specific evidence from the resources provided and integrate it with their own knowledge to complete the report.

Commentary

Candidates struggled with Part 1 on the Moon, particularly around why we see the different phases during the lunar cycle. Responses to Parts 2 and 3 relating to the tides and seasons were attempted and answered much better than the phases of the Moon.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- identified that the Moon's orbit around the Earth causes phases
- stated that it takes the Moon 27.3 days to orbit the Earth
- described why New Moon to New Moon takes 29.5 days
- stated that the Moon rises at different times
- stated that spring and neap tides occur every 14 days due to phases of the Moon
- stated that the Moon exerts gravitational pull-on the Earth causing the bulge
- described the formation of high and low tides
- described how the Earth's tilt, orbit and variation in amount of radiation causes seasons

- stated that summer and winter occur in two hemispheres in the same month
- stated that temperature variation is smaller at the Equator (or greater in New Zealand).

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

- explained why New Moon to New Moon takes 29.5 days
- explained why the Moon rises at different times
- explained why the Earth experiences two high and two low tides a day
- explained why we experience spring and neap tides
- explained that there is summer in the southern hemisphere while it is winter in the northern hemisphere (or opposite) because of orbit or radiation
- explained one season in detail referring to position and tilt of the Earth.

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

- linked the time of the Moon rising to its orbit relative to the Sun and Earth's spin
- discussed differences in the frequency of high, spring, and neap tides
- discussed how the relationship between the Earth and Sun, in terms of orbit and tilt, cause variation in radiation and seasons.

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

- did not recognise that the Moon rises at different times
- did not correctly identify that the Moon's orbit around the Earth causes phases
- did not recognise that spring and neap tides occur every 14 days because of the phase of the Moon
- did not identify that the Moon exerts gravitational pull on the Earth, causing the bulge
- stated that summer and winter occur in the same hemisphere in the same month.

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

Assessment

The examination consisted of three questions, of which the candidates were required to respond to all three. Each question related to a specific context and focused on mechanical energy, thermal energy, and electrical energy. Candidates were expected to respond to graphs, calculate mathematical formulae, and produce descriptive answers including using annotated diagrams.

Commentary

In general, candidates were well prepared and made use of the question scaffolding to assist their responses.

Candidates who achieved higher grades:

- made appropriate use of specific physics language to support their responses
- were familiar with the correct symbols and units for physical quantities
- could change the subject of formulae and used their calculators effectively to find appropriate numerical answers for the given contexts
- linked their explanations to the question and the given context.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- calculated quantities using formulae that did not require rearranging
- had difficulty converting units of time to seconds
- confused temperature (T) with time (t)
- stated an energy transformation occurring in the given context
- were able to identify the type of circuit in the given context.

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

- applied given formulae correctly in calculations and converted to appropriate units of time for their calculations
- were able to change the subject of the formulae as required to make calculations
- explained energy changes in given situations
- identified the type of electrical circuit given and explained what was happening in the system
- explained when work is being done in given situations in terms of $W = Fd$ but many failed to link this with changes in KE and GPE
- explained mechanisms of heat transfer in given contexts.

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

- applied given formulae correctly in calculations, including changing the subject of the formula as required
- converted to appropriate units of time for all their calculations
- analysed energy changes in given situations
- identified the type of electrical circuit given and explained what was happening in the system
- explained when work is being done and examined implications of the changes to the given situations in terms of $W = Fd$, explaining both displacement and resultant forces and / or linking with changes in KE / GPE
- analysed mechanisms of heat transfer.

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

- were unable to identify the correct physical quantities to use in a formula or select the correct formula to apply in the given context
 - were unable to convert units of time to seconds
 - confused temperature (T) with time (t)
 - were unable to state energy transformations occurring in each context
 - were unable to identify the type of circuit in the given context.
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