

National Certificate of Educational Achievement

2012 Assessment Report

Earth and Space Science Level 2

- 91191 Demonstrate understanding of the causes of extreme Earth events in New Zealand**
- 91192 Demonstrate understanding of stars and planetary systems**
- 91193 Demonstrate understanding of physical principles related to the Earth System**

COMMENTARY

Candidates' answers frequently showed insufficient depth for Level 7 of the New Zealand Curriculum in this new subject. Annotated diagrams that accompanied answers were beneficial to candidates and candidates who used these were able to show their understanding more clearly. Moderation best practice workshops outline the curriculum requirements for internal assessed standards at Level 7. These can be used to help support understanding of the expectations for the externally assessed standards at Level 7.

Candidates who answered all the questions showed that they were familiar with the standard requirements and also benefited in the Grade Score Marking environment. Some candidates did not appear to understand that the bullet points are intended to help them develop their answers and should not be used as though they are separate questions in themselves.

It is important to note that each of the standards requires candidates to show understanding. Although underlying knowledge is key to this understanding recall alone is not sufficient to reach achievement.

STANDARD REPORTS

91191 Demonstrate understanding of the causes of extreme Earth events in New Zealand

ACHIEVEMENT

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

- showed understanding of plate tectonic processes that influence New Zealand
- showed understanding of the shape and explosiveness of volcanoes
- showed understanding of how landslides are formed and applied this to the example given
- showed understanding of how tsunamis are formed and applied this to the example given.

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 the direction and type of plate tectonic movements and did not name the tectonic plates
- misinterpreted the resource material presented in the questions
- misunderstood the different types of volcano shapes that can be formed from basaltic magma
- misunderstood that tsunami may be formed from a landslide going into the sea
- addressed individual bullet points without addressing the overall 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 subduction and linked it to earthquake formation
- explained shape and/or explosiveness of a volcano
- understood the link between landslide entering water and a resulting tsunami.

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:

- integrated resource material into their answers
- linked all aspects of the bullet points in the questions in a clear and concise manner to fully answer the original question
- discussed the concept of subduction and linked the associated ideas to location and composition
- expanded the concept of the volcano formation and related this to their shapes
- were able to apply information in less familiar contexts.

OTHER COMMENTS

Candidates required clearly labeled/annotated diagrams to support their answers in this standard. It is acceptable for candidates to use abbreviations but they should define their abbreviations the first time they use them in answers.

Writing in complete sentences rather than separate points allows a candidate to make links and be more assured of higher grades for their responses. When dealing with complex ideas candidates should consider planning their thoughts as bullet points, and then writing developed answers.

91192 Demonstrate understanding of stars and planetary systems

ACHIEVEMENT

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

- described the life cycle of a Sun-like star, often in a rote-like manner
- gave characteristics of two stars using a provided Hertzsprung-Russell diagram
- stated how either Earth's moon or Mars's moons were formed.

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:

- could not describe the life cycle of a star
- compared characteristics of stars to the Sun
- could not describe how moons were 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 (birth, life and death) of a sun-like star in terms of fuel, mass, gravity or energy changes
- Compared stars (Adhara and Sirius A) to each other in terms of characteristics from Hertzsprung-Russell diagram provided
- explained the formation of the moons of Earth and Mars.

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:

- explained in detail the life cycle of a sun-like star in terms of fuel, mass, gravity and/or energy changes.
- explained the contrasts between stars (Adhara and Sirius A) and related these to their characteristics from the Hertzsprung-Russell diagram provided
- compared the formation of Earth's moon to that of Mars's moon using the differences in planetary orbits and gravitational pull.

OTHER COMMENTS

Candidates who answered questions successfully used the resources provided as stimulus material and coped well when presented with less familiar contexts.

91193 Demonstrate understanding of physical principles related to Earth System

ACHIEVEMENT

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

- distinguished between the ability of light and dark surfaces to absorb and radiate infra-red (heat) radiation
- described how cloud cover can reflect and trap heat to affect the Earth's temperature
- showed knowledge of the visible spectrum of sunlight and component wavelengths
- described how blue light is scattered by the atmosphere and how red/orange light can pass through the atmosphere.

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 methods of heat transfer and how things are heated
- reported that the mirage was caused by heat waves or, commonly, evaporating water
- confused the relationship between wavelength and frequency
- stated that clouds blocked the sun's energy from reaching Earth's surface
- stated that earth's atmosphere was heated through convection currents from the core

- stated that the colour change at sunset due to atmospheric effects but gave no reasoning
- stated that scattering of red light could only cause red sunsets.

ACHIEVEMENT WITH MERIT

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

- showed an understanding of how the Sun's radiated heat is absorbed and radiated by black bodies
- explained how heat transfer from the road to the air above can create convection currents.
- explained that heated air creates changes in air density resulting in warmer less dense air rising and linked this to the heat radiated from the road
- linked the effect of cloud's albedo effect to the temperature of Earth's atmosphere
- explained how emitted heat radiation from Earth's surface could be reflected or trapped by lower level cloud
- linked transmission of longer wavelength radiation through clouds to the warming of Earth's atmosphere
- explained what was meant by the term Rayleigh scattering and the resultant effect on the colour of the sky
- gave an explanation of a blue daytime sky that related to the scattering of blue wavelengths and the unhindered transmission of red and orange wavelengths.
- developed an explanation for the scattering of light caused by molecules and dust particles in Earth's atmosphere.

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 changing air densities to changes in optical densities of the media causing changes in light's speed
- referred to the changes in optical densities changing direction (creating refraction) of light waves
- discussed how when the angle of vision is low, i.e. less than the critical angle, internal reflection results in the creation of a mirage
- differentiated between the effects of high and low level clouds on the transmission and reflection of incoming solar radiation (heat and light)
- expanded on how scattering of light results from the collisions between short wavelengths of light with gas molecules and dust particles in the atmosphere.
- expanded on how the increase in scattering in the shorter visible light wavelengths resulted in the appearance of a red sunset and sky as the visible light had further to travel through the atmosphere when the sun was low in the sky.