National Certificate of Educational Achievement

2014 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 who attempted all the questions and incorporated clearly labelled diagrams as part of their answers, were more likely to show understanding of extreme Earth events and frequently achieved higher grades as a result.

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 commonly:

- described the cause(s) of an earthquake
- described a tsunami and its cause(s)
- showed understanding of the plate tectonic boundaries in New Zealand
- used labelled diagrams as part of their response.

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 commonly:

- provided one answer but failed to attempt the remaining questions
- repeated information provided in the question
- could not describe subduction, or a tsunami
- misunderstood the meaning of submarine in a “submarine landslide”.

ACHIEVEMENT WITH MERIT

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

- linked (through labelled diagrams and/or words)
  - description of magma viscosity to trapped gas or explosiveness
  - subduction to magma formation
  - a build up of sediment to submarine landslides.

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 commonly:

- through words and/or labelled diagrams, linked reasoned explanations of:
  - the formation of dacite to the explosiveness of a volcano
  - the causes of the Chatham Islands tsunami and justified the likely cause of the tsunami
  - the effect of Seddon/Lake Grassmere earthquake on surrounding land.

OTHER COMMENTS

A map was provided to show candidates the location of areas referred to in the questions. This helped support candidates' knowledge of New Zealand and its continental shelf area. Candidates entering for this examination must be familiar with the location and nature of tectonic plate boundaries in New Zealand.

91192 Demonstrate understanding of stars and planetary systems

ACHIEVEMENT

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

- described the common characteristics of stars and their life cycle
- described the origin of the inner or outer moons of Saturn
- described how a Kepler 62-f could have formed from a protoplanetary disk
- described how Kepler 62-f could be habitable.

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 commonly:

- could not interpret characteristics from the provided Hertzsprung Russell diagram
- could not identify the origins of the inner or outer moons of Saturn
- could not describe how a planet was formed.

ACHIEVEMENT WITH MERIT

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

- explained characteristics of stars or explained why Procyon B was initially the larger star
- explained the origins of the inner or outer moons of Saturn
- explained the role of gravity or rare higher boiling point elements in the formation of Kepler 62-f or explained how Kepler-62f could be habitable.

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 commonly:

- could compare the two stars in terms of their characteristics
- explained in detail the origin of the inner and/or outer moons of Saturn and could link the shape and orbit of the moons to their origin
- explained in detail how a habitable, terrestrial planet could form.

OTHER COMMENTS

Candidates who had an understanding of **both** Stars and planetary systems were well prepared for this examination.

91193 Demonstrate understanding of physical principles related to the Earth System

ACHIEVEMENT

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

- described the effect of polar ice cap on reflecting solar radiation and ability of oceans to absorb heat energy and the subsequent effects on climate (earth's temperature)
- described nuclear fusion and gave this as source of sun's energy
- described how season's result from the Earth being tilted on its axis and how the seasonal temperatures occur due to the area of land being heated by the sun's energy
- described the heating of the air above the land by the sun
- described convection currents and how an inversion layer works.

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 commonly:

- misunderstood the meaning of key vocabulary for this standard
- could not describe how the Earth is heated by solar radiation
- misunderstood the negible role of distance from the Sun in determining seasons
- could not describe convection currents or inversion layers.

ACHIEVEMENT WITH MERIT

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

- used key vocabulary correctly
- explained how albedo of polar ice leads to reflection of solar radiation into space and provides a control of the Earth's temperature
- explained how fusion from Sun leads to heating of the Earth
- explained seasons in terms of area of land being heated in the northern and southern hemispheres
- explained convection currents
- explained how an inversion layer affects air currents and hence temperature in a location.

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 commonly:

- compared the levels of albedo of ice, water and land and integrated this with the ability of ice, water and land to absorb or transmit infra red/solar radiation and related this comparsion to Earth's temperature
- linked Earth's tilted axis to heating from the sun via radiation of a differing amount of energy per square metre.
- integrated the concepts of heat transfer via radiation, conduction and convection to explain in detail how convection currents are formed in the air above the surface of the land during the day and night and related this information to how an inversion layer

would act as a barrier to rising warm air and prevent polluted air from escaping into higher levels of the atmosphere.

OTHER COMMENTS

Candidates who followed the suggestion to use labelled diagrams in 91191 and 91193 were at a distinct advantage in answering the questions in these papers. In all papers candidates must apply learned concepts in the context of the question in order to show understanding consistent with the standards.