

# Assessment Report

## Level 3 Earth and Space Science 2016

### Standards [91413](#) [91414](#)

#### Part A: Commentary

In general, candidates attempted all questions although the length of candidate's responses did not relate to the grade they achieved.

Most candidates made a fair attempt at all questions, however, it was very clear that some candidates had studied up past questions and then reproduced the answers even though they were not related to the current question.

Candidates need to read the question more carefully and not restate information that has been provided in the question.

Diagrams were used by many candidates to help answer the question, though many were unrelated to the actual question asked. Candidates should be encouraged to fully annotate diagrams if they are using them to support their answer.

#### Part B: Report on Standards

### 91413: Demonstrate understanding of processes in the ocean system

Candidates who were awarded **Achievement** commonly:

- described the properties of each layer of the ocean
- described ways that salinity and density can change in the mixed layer of the ocean
- stated that when water cools its density increases leading to downwelling
- described how land, wind, and the Coriolis effect contributed to the formation of gyres.

Candidates who were assessed as **Not Achieved** commonly:

- stated the percentage composition of each of the layers of the ocean
- linked concepts not related to the question in their answer, for example, explaining the adaptations of animals in different layers of the ocean
- did not identify East and West on the geographical maps provided
- confused deep water circulation with surface currents.

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

- explained the properties of each layer of the ocean
- explained why the poles do not have a mixed layer or pycnocline linked to ice formation and/or melting
- explained how the Gulf stream released energy as it moves towards the poles, warming the land, causing the water to cool and increase in density leading to downwelling
- explained how water moves to the poles in terms of expansion of water due to thermal heating and the effect of gravity on this
- explained that wind transfers energy to water via friction forming ocean surface currents.

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

- explained the difference in density of layers at different latitudes, or different seasons, by linking reasons for the increase/decrease density
- explained the transfer of energy to the atmosphere around Europe and the formation of the Thermohaline current by linking thermal expansion and gravity to the movement north of warm water from the equator
- explained the accumulation of matter in gyres by linking wind, land masses and the Coriolis effect.

### Standard-specific comments

Many candidates showed a lack of understanding of the basic principles related to how the ocean transfers energy and matter.

Candidates who gained the higher grades were able to link more than one concept related to oceans to explain the context of the question.

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## 91414: Demonstrate understanding of processes in the atmosphere system

Candidates who were awarded **Achievement** commonly:

- described the science behind the climatic information provided in the resource materials
- explained the essential relationship between the Earth's rotational tilt and climate

- described the link between latitude and climate across the Earth
- gave simple explanations of how mountain ranges in the South Island of New Zealand affect the climate
- described the relationship between increasing altitude and air density/pressure
- described how water vapour in the atmosphere would form clouds through the process of condensation
- described the effect of clouds on incoming and outgoing solar radiation.

Candidates who were assessed as **Not Achieved** commonly:

- lacked understanding of difference between weather and climate
- could not correctly interpret the resource materials provided
- provided written descriptions of the resource material provided
- incorrectly described the location on the mountains of orographic cloud formation and rainfall
- did not recognise the Kelvin temperature scale
- confused the term density and pressure as applied to the atmosphere
- described the water cycle
- confused the role of low and high level clouds in respect to their roles in heat transfer between the Sun and the Earth
- incorrectly used the concept of sunlight and/or ultraviolet light to explain heat transfer.

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

- used annotated diagrams to explain orographic rainfall and rain shadows with respect to mountain ranges
- explained how latitude affects the climate at particular locations
- explained how the Earth's tilt affects climate in terms of solar heating over an area of the surface
- explained how pressure and density in atmospheric layers related to the number of particles decreasing with altitude
- explained the difference in heating of the troposphere and stratosphere
- explained cloud formation in terms of the role of aerosols, water evaporation, dew point, and condensation
- explained the role of clouds in trapping or reflecting solar radiation in terms of heat energy.

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

- explained more than one factor that would affect the climate with reference to a specific area of New Zealand
- explained the role of the Southern Alps of New Zealand in determining the different climates on the east and west coast of the South Island
- explained the reasons for the different trends in temperature, pressure and density in terms of air particles within the different layers
- explained the link between cloud formation and the movement of heat energy around the Earth
- compared the role of low and high level clouds in the control of the atmospheric temperature.

## Standard-specific comments

Candidates are expected to apply their knowledge of the scientific concepts in this standard to the context stated in each question. Many candidates provided answers which were unrelated to the question's context.

Candidates should avoid simply describing resource material provided and instead give information related to the material and question stated.

## [Science subject page](#)

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