

# 2015 NCEA Assessment Report

Earth and Space Science Level 3 91413, 91414

## Part A: Commentary

Comment on the overall response of candidates to 2015 examinations for all achievement standards covered by this report.

Candidates who read the questions carefully and used the resource material to attempt all questions generally achieved by demonstrating understanding of the processes involved in the ocean and / or atmosphere.

The use of annotated diagrams by candidates was more frequent but candidates need to make sure their diagrams are well-labelled to support their answer.

Candidates should be encouraged to plan their answers focusing on the context of the question and applying physical principles. Using the correct scientific terminology makes answers clearer.

Higher grades were awarded to students who were able to link concepts and apply their understanding to the context posed in the question, rather than just recalling information. Candidates should remember to use the bullet points where provided but to always refer back to the question.

## Part B: Report on standards

### 1. Assessment Report for 91413: Demonstrate understanding of processes in the ocean system

<b>Achieved</b>	<p>Candidates who were assessed as Achieved commonly:</p> <ul style="list-style-type: none"> <li>described density in terms of temperature or salinity</li> <li>described solar radiation as the cause for the heating of seawater causing changes in its density</li> <li>described the three layers of the ocean</li> <li>described upwelling as the bringing up of nutrients to the surface</li> <li>wrote an equation for the carbon solubility pump</li> <li>described photosynthesis by phytoplankton as a method through which carbon dioxide enters the ocean system.</li> </ul>
<b>Not Achieved</b>	<p>Candidates who were assessed as Not Achieved commonly:</p> <ul style="list-style-type: none"> <li>repeated the same information throughout a question</li> <li>re-wrote information given within the question</li> <li>linked temperature and salinity</li> <li>described how carbon is cycled on Earth without specific reference to the ocean</li> <li>stated that carbon dioxide is 'absorbed' by water.</li> </ul>
<b>Achieved with Merit</b>	<p>Candidates who were assessed as Achieved with Merit commonly:</p> <ul style="list-style-type: none"> <li>linked density to particle arrangement</li> <li>explained how ice formation and evaporation changed the density of seawater</li> <li>explained why the thermocline moves deeper at Peru during an El Nino year</li> <li>explained how the biological pump stores carbon dioxide in the ocean.</li> </ul>
<b>Achieved with Excellence</b>	<p>Candidates who were assessed as Achieved with Excellence commonly:</p> <ul style="list-style-type: none"> <li>linked the density of water to temperature and salinity changes to explain the thermohaline circulation</li> <li>explained how the thermocline is a physical barrier controlling the upwelling of nutrients</li> <li>explained fully the effects of normal versus El Nino conditions on the ocean layers and currents</li> <li>explained how both the physical and biological pumps store carbon and what could happen if ocean temperatures increased.</li> </ul>

<b>Standard specific comments</b>	<p>Most candidates made a fair attempt at all questions, however, it was very clear that candidates had studied up past questions and some then reproduced the answers even though they were not related to the current question. As an example many candidates discussed surface ocean circulation instead of thermohaline circulation and others wrote out the answer for the El Nino question of 2014.</p> <p>Candidates should avoid simply describing any diagrams given and instead give information related to the diagram and question stated.</p> <p>The use of annotated diagrams is improving and candidates should be encouraged to use these where appropriate, making sure annotations are as detailed as possible.</p>
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## 2. Assessment Report for 91414: Demonstrate understanding of processes in the atmosphere system

<b>Achieved</b>	<p>Candidates who were assessed as Achieved commonly:</p> <ul style="list-style-type: none"> <li>• described the formation of convection cells (including annotated diagrams)</li> <li>• described the causes of surface winds and gave the correct location and direction of the Polar Easterlies and Trade winds</li> <li>• described the effect of carbon dioxide and / or water vapour on incoming and outgoing heat radiation</li> <li>• stated the link between carbon dioxide increase, and water vapour increase, with the increase in atmospheric temperature</li> <li>• described the formation and location of the Hadley, Ferrel and Polar cells</li> <li>• described how a convection cell transports heat.</li> </ul>
<b>Not Achieved</b>	<p>Candidates who were assessed as Not Achieved commonly:</p> <ul style="list-style-type: none"> <li>• incorrectly linked the movement of air mass from low to high pressure zones or associated high air temperature with high surface air pressure</li> <li>• described the Coriolis effect but gave incorrect wind directions or were ambiguous with their use of terminology</li> <li>• identified the Coriolis effect with the Earth's tilt</li> <li>• stated that carbon dioxide interacted with the ozone layer to create the Greenhouse effect</li> <li>• described the role of the biological carbon cycle with regard to the addition and removal of carbon dioxide to the Earth's atmosphere</li> <li>• defined climate and climate change as being ocean level increase, ice cap melting and changes in land use and habitats, as well as disease outbreaks</li> <li>• stated that the source of heat energy for the Earth was visible light or UV radiation</li> <li>• described the Ferrel cell as a closed cell.</li> </ul>
<b>Achieved with Merit</b>	<p>Candidates who were assessed as Achieved with Merit commonly:</p> <ul style="list-style-type: none"> <li>• explained how the Trade winds and Polar Easterlies are formed and their direction determined by the Earth's rotation</li> <li>• linked the increase in water vapour in the atmosphere to the increase in carbon dioxide and subsequent increase in the atmospheric temperature</li> <li>• explained how atmospheric temperature is increased by the loss of heat energy to the environment</li> <li>• linked the increase in water vapour in the atmosphere to possible future climatic events</li> <li>• explained the formation of the Hadley and Polar cells and linked these to the air movement in the open Ferrel cell</li> <li>• linked the movement of air masses around the hemisphere with the circulation cells.</li> </ul>
<b>Achieved with Excellence</b>	<p>Candidates who were assessed as Achieved with Excellence commonly:</p> <ul style="list-style-type: none"> <li>• contrasted the differing nature and formation of the Polar Easterlies and the Trade Winds along with their similarities</li> <li>• explained the rotational effect of Earth on the surface winds at the equator and poles with reference to the conservation of momentum and / or wind speed or strength</li> </ul>

	<ul style="list-style-type: none"> <li>• explained in detail the 'feedback loop' between increased carbon dioxide and water vapour in the atmosphere</li> <li>• linked the conservation of energy with the increase in atmospheric temperature due to evaporation and condensation of water</li> <li>• explained how the circulation cells interact to transport heat energy around each hemisphere.</li> </ul>
<p><b>Standard specific comments</b></p>	<p>Candidates need to make sure that they are using the correct scientific terminology when answering questions. For example, candidates should refer to solar or electromagnetic radiation rather than 'visible light' when describing the heating of the Earth by the Sun.</p> <p>Candidates should use annotated diagrams to supplement, or form the basis of their answers. A redrawn resource diagram offers little without relevant annotations.</p>