

SUPERVISOR'S USE ONLY

91193



Level 2 Earth and Space Science, 2013

91193 Demonstrate understanding of physical principles related to the Earth System

2.00 pm Tuesday 26 November 2013 Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of physical principles related to the Earth System.	Demonstrate in-depth understanding of physical principles related to the Earth System.	Demonstrate comprehensive understanding of physical principles related to the Earth System.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–13 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

You are advised to spend 60 minutes answering the questions in this booklet.

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QUESTION ONE: HOT SPRINGS

New Zealand is home to numerous hot springs where the water temperature can reach boiling point.

Explain in detail how a hot spring forms.

In your answer, you should include:

- an explanation of how the earth's core gives off heat
- an explanation of how heat is transferred through the geosphere
- an explanation of how the water that forms the hot spring is heated by the magma

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answer is available on the next page.	

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QUESTION TWO: TEMPERATURE OF THE EARTH'S SURFACE

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A large volcanic eruption, such as Mount Pinatubo in the Philippines in 1991, can affect the temperature of the Earth in the years following the eruption.

Discuss how Mount Pinatubo erupting ash and the greenhouse gases of carbon dioxide and sulfur dioxide, can affect the temperature of the Earth's surface.

In your answer, you should explain:

- how the ash particle size, and whether or not the ash remains in particular parts of the atmosphere, affect the amount of solar radiation hitting the surface of the Earth
- how the carbon dioxide and sulfur dioxide from the volcano can affect the temperature on the surface of the Earth
- the overall effect on the average temperature of the Earth's surface in the years following a large volcanic eruption.

A labelled diagram may assist your answer.				

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QUESTION THREE: THE GULF STREAM

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The Gulf Stream is a fast-moving ocean current that carries warm water from the tropics, north past Scotland.

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Adapted from www.earthlyissues.com/gulfstream.htm

Using the diagram, explain in detail how the Gulf Stream keeps Stornoway in Scotland warmer than Hopedale in Canada, even though they are at similar latitudes.

In your answer you should include:

- reasons why the Gulf Stream originates between the Equator and the Tropic of Cancer.
- an explanation of why the Gulf Stream is a warm current
- a detailed explanation of heat transfer from the ocean to the atmosphere and the land
- an explanation of the relative temperatures in Hopedale and Stornoway.

a labelled diagram may assist your answer.				

More space for this answer is available on the next page.
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