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Level 2 Earth and Space Science, 2018

91193 Demonstrate understanding of physical principles related to the Earth System

9.30 a.m. Thursday 8 November 2018
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 room for any answer, use the extra space provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–12 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

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QUESTION ONE: ARCTIC SEA ICE

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Arctic sea ice in 1984 and 2012.

https://toolkit.climate.gov/image/916

The Arctic is home to the North Pole, and over time the sea ice around the Arctic (Arctic ice cap) has reduced in size.

It is often stated that polar ice acts as a temperature regulator on Earth due to its high reflective ability (albedo).

Explain how the Arctic ice cap works to help maintain a stable temperature on Earth.

In your answer, you should:

- describe how solar radiation is absorbed, transmitted, and reflected by ice and water
- explain how the high reflective ability (albedo) of polar ice acts as a temperature regulator
- explain the effect that any reduction of the Arctic ice cap could have on the Earth's temperature.

You may draw an annotated diagram in the box below to assist your answer.

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

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QUESTION TWO: METHANE

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The graph below shows the increasing concentration of the greenhouse gas methane in the Earth's atmosphere from 1984.

GLOBAL MONTHLY AVERAGE METHANE (CH_4)

Source: www.esrl.noaa.gov/gmd/webdata/ccgg/trends/ch4_trend_all_gl.pdf

Explain in detail how the average temperature of the Earth will be affected by increasing numbers of methane gas molecules in the atmosphere.

In your answer, you should include:

- how heat is transferred from the Earth through the atmosphere
- how a methane molecule transfers heat
- how increasing numbers (higher concentration) of methane molecules will affect the Earth's temperature.

You may draw an annotated diagram in the box below to assist your answer.

More space for this answer is available on the following pages.

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QUESTION THREE: HOT POOLS

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Steam rising from hot pools.

Source: http://activeadventures.com/blog/2014/08/welcome-flat-hot-pools-copland-track/

There are many naturally formed hot pools in the New Zealand bush. The water in these pools can get very hot.

Explain how these hot water pools can form from heat within the Earth.

In your answer, you should include:

- an explanation of how the Earth's core gives off heat
- how this heat is transferred through the layers of the Earth
- how this heat results in the heating of groundwater to make the water in the pool hot.

You may draw an annotated diagram in the box below to assist your answer.

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

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Extra paper if required.
Write the question number(s) if applicable.

QUESTION NUMBER

ASSESSOR'S USE ONLY

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Write the question number(s) if applicable.

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