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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

# Level 2 Earth and Space Science, 2014

## 91193 Demonstrate understanding of physical principles related to the Earth System

9.30 am Monday 1 December 2014
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 2–10 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: THE POLAR ICE CAPS

Polar ice covers around 10% of the Earth's surface and is slowly reducing over time. It is often stated that polar ice acts as a temperature regulator on Earth due to its high reflective ability (albedo).

*For copyright reasons, this resource cannot be reproduced here.*

Antarctica 2005.

Source (adapted): http://memepix.com/z58qc

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Arctic 1979. Arctic 2012.

Source (adapted): www.sciencenews.org/article/taking-antarcticas-temperature

Explain how both polar ice caps (Antarctica and Arctic) work to help regulate the Earth's temperature.

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 polar ice could have on the Earth's temperature.

Fill in the table below to help you develop your answer.

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| Solar Radiation | Ice | Water |
|---|---|---|
| **absorbed** | | |
| **transmitted** | | |
| **reflected** | | |

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

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**The examination continues on the following page.**

## QUESTION TWO: TEMPERATURES OF SEASONS

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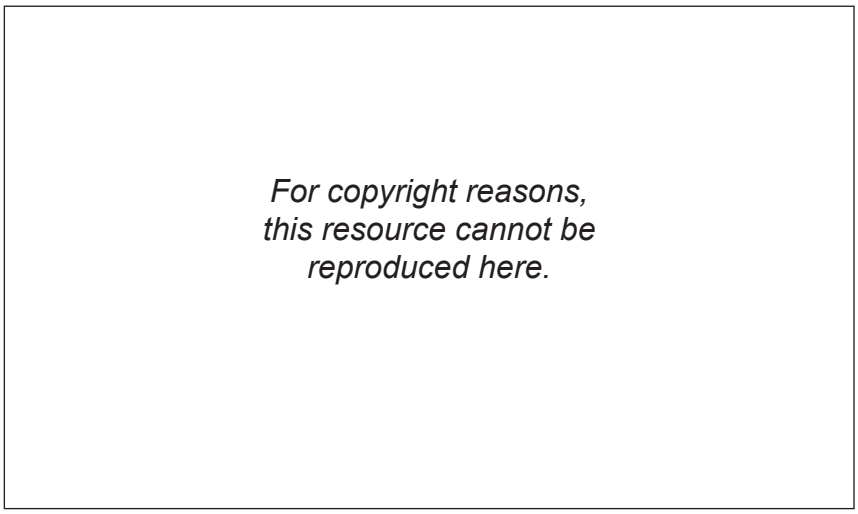
The same pond is shown on the left in summer, and on the right, in winter.

The distance from the Earth to the Sun does not change significantly throughout the seasons.




Source: http://piximus.net/others/summer-vs-winter

Explain in detail why winter temperatures are cooler than summer temperatures.

In your answer you should:

- describe why winter and summer occur on Earth
- explain how the Sun generates energy
- explain how the Sun's energy heats land in winter and summer
- explain the differences in average temperatures between the seasons of winter and summer.

*An annotated diagram or sketch may assist your answer.*

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## QUESTION THREE: WINTER AIR POLLUTION

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Source: http://5newsonline.com/2013/09/09/garretts-blog-chemical-weapons-and-weather/

Each winter, air pollution is common in various parts of New Zealand due to pollutants from fires, vehicles, and factories combining with the presence of an inversion layer (see above diagram).

Explain in terms of heat energy how the inversion layer contributes to the air pollution.

In your answer you should:

- describe why the ground gives off heat energy later in the day
- explain how the ground heats up the air above it
- explain the normal situation for the ground releasing heat energy (use the diagram above to aid your explanation)
- explain what an inversion layer is in terms of heat energy, and how this leads to air pollution.

*An annotated diagram or sketch may assist your answer.*

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

QUESTION NUMBER

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