

91193



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

2

SUPERVISOR'S USE ONLY

# Level 2 Earth and Space Science, 2012

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

2.00 pm Tuesday 27 November 2012  
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 2–8 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

ASSESSOR'S USE ONLY

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

**QUESTION ONE: WATER ON A DRY ROAD?**

<http://www.weatherscapes.com/photo.php?cat=optics&id=w-364-04>

Explain in detail why a **dry** road can have the illusion of looking wet on a very hot, still day.

In your answer you should include:

- how the dry hot road is heated
- what happens to the heated hot air
- a labelled diagram showing light rays
- why the illusion of water on the dry road is observed.

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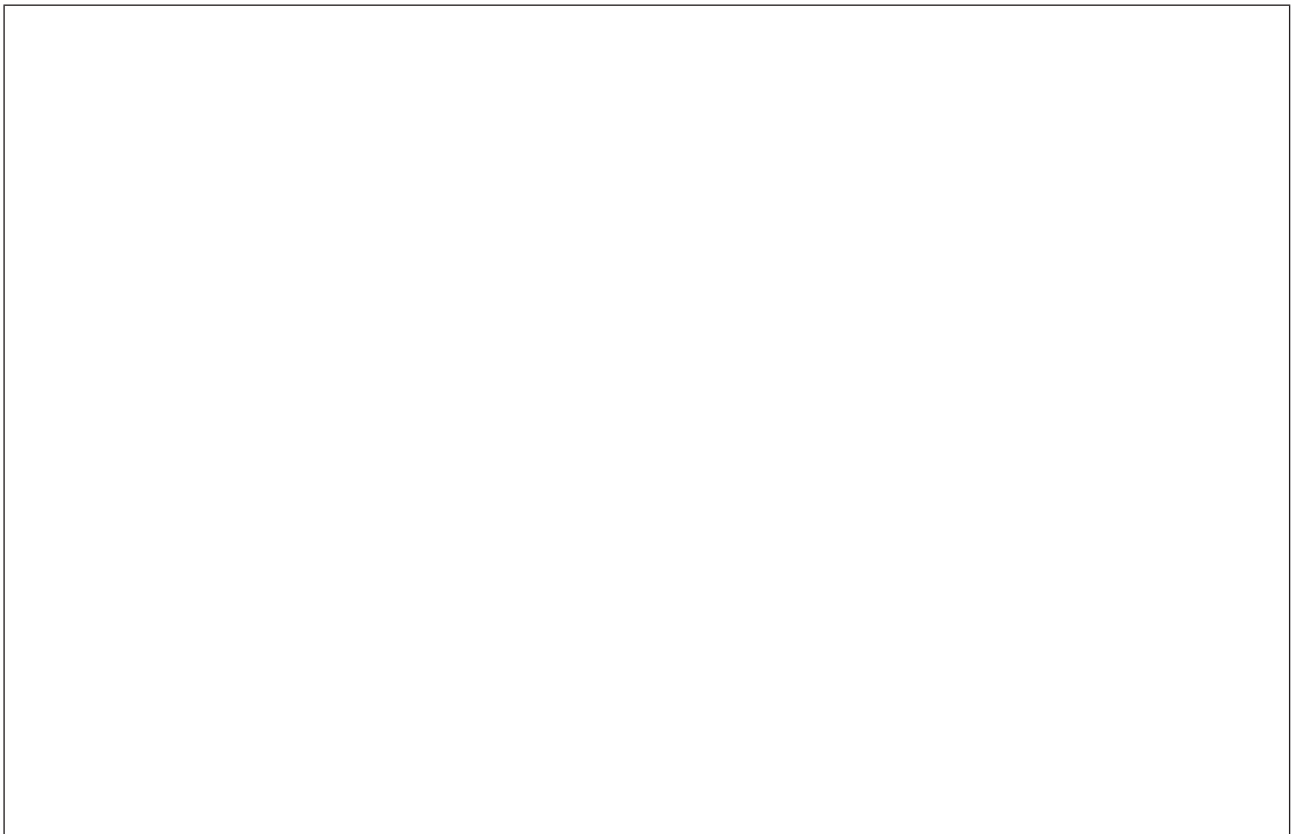
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**QUESTION TWO: HOW DO CLOUDS AFFECT HEAT EXCHANGE?**

Cloud cover affects the surface temperature of the Earth in two different ways.

Firstly, clouds reflect light and heat from the sun back into space, and secondly, they trap heat radiated from the Earth's surface.

Discuss the statement:

*An increase in cloud cover in different areas of the atmosphere (upper and lower) will affect the Earth's surface temperature.*

In your answer you should refer to:

- the position of clouds in the upper and lower atmosphere
- the absorption, transmission and reflection of radiation
- short and long wave radiation.

You may wish to use a labelled diagram in your answer.

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**QUESTION THREE: WHY ARE SUNSETS RED?**

Sunlight that reaches the Earth from the sun is white light made up of three primary colours: red, green and blue.

Explain why this white light may be seen as a red glow on the horizon when the sun sets.

In your answer, you should consider

- the relative wavelengths of the primary colours of light
- how light behaves in the atmosphere when the sun is nearly setting
- the composition (make-up) of our atmosphere
- the transmission, absorption and reflection of light.

You may wish to include a labelled diagram in your answer.

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

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USE ONLY

QUESTION  
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