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Level 2 Earth and Space Science, 2017

91193 Demonstrate understanding of physical principles related to the Earth System

9.30 a.m. Thursday 30 November 2017
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.

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

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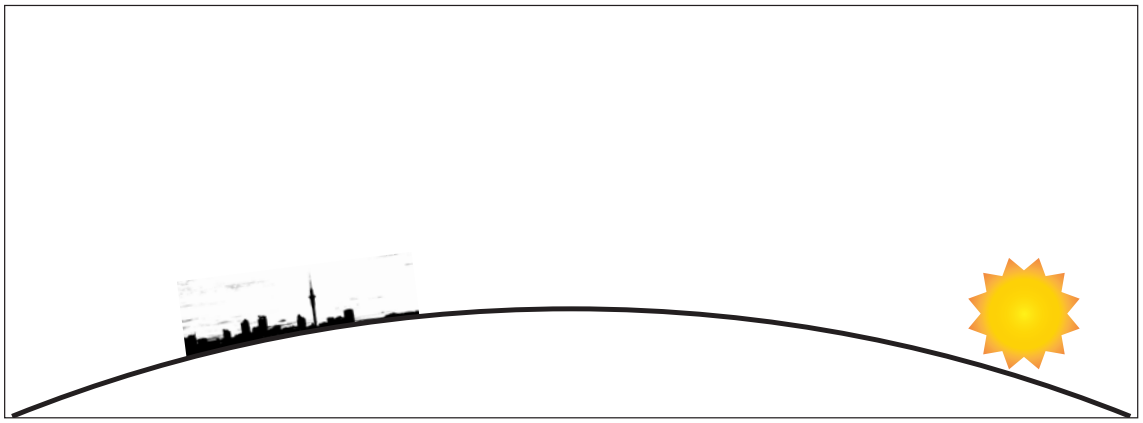
www.tvnz.co.nz/one-news/new-zealand/auckland-named-world-s-friendliest-city-6050029



The radiation from the Sun contains all the wavelengths of visible light, but at sunrise the light can appear red.

Why is white light from the Sun seen as a red colour at sunrise?

In your answer you should include:

- the colours and the relative wavelengths of white light
- how light is transmitted, reflected, absorbed, and scattered as it travels through the atmosphere
- how the Earth's atmosphere affects light passing through it.

You may wish to label the above diagram to assist your answer.

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

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QUESTION TWO

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Major volcanic eruptions can emit lava, greenhouse gases (water vapour, carbon dioxide, and sulfur dioxide), as well as large amounts of ash high into the atmosphere during an eruption.

How can a major eruption affect the average temperature of the Earth in the period following an eruption?

In your answer you should include:

- how an increase of greenhouse gases in the atmosphere could affect heat absorption and transmission
- how the erupted volcanic particles affect heat absorption and reflection.

You may wish to draw and label a diagram in the box below as part of your answer .

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

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QUESTION THREE

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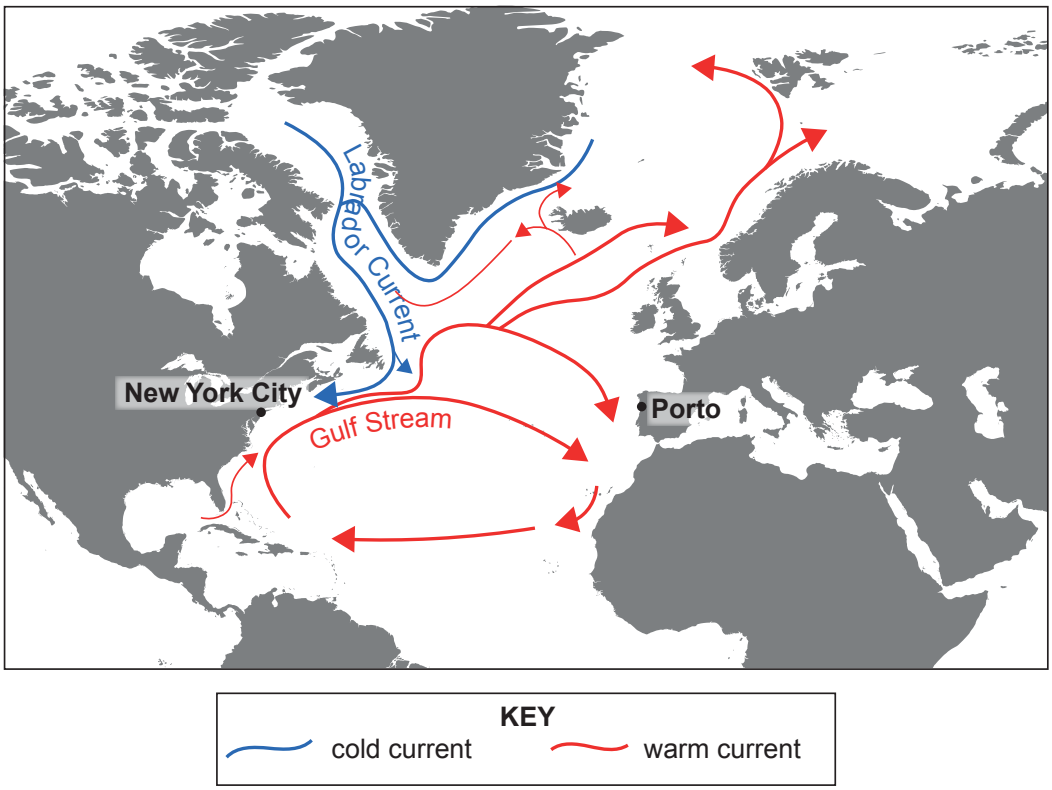

New York City (NYC) in the United States is the same latitude as Porto in Portugal across the Atlantic Ocean, but Porto experiences warmer winter temperatures than NYC.

Why does the Gulf Stream keep Porto warmer in winter than NYC?

In your answer you should include:

- the origin and movement of the Gulf Stream
- how this current can lead to a warmer winter in Porto.

You may wish to annotate the above diagram or draw another diagram in the box below as part of your answer.

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