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SUPERVISOR'S USE ONLY

NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Scholarship 2013
Earth and Space Science

9.30 am Tuesday 3 December 2013
Time allowed: Three hours
Total marks: 24

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

Pull out Resource Booklet 93104R from the centre of this booklet.

You should answer 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.

Check that this booklet has pages 2–15 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.

Question	Mark
ONE	
TWO	
THREE	
TOTAL	/24

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QUESTION ONE: NEW ZEALAND AND THE GLOBAL CARBON CYCLE

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New Zealand and the surrounding ocean contribute between 1% and 2% of the global sediment, and therefore play a part in the long-term cycling of carbon.

Discuss how relevant geological, oceanic and atmospheric processes on and around New Zealand contribute to the global carbon cycle.

In your answer, consider the role of:

- the interaction of atmosphere and ocean
- geological processes such as tectonic activity, weathering and erosion
- the role of carbon cycling in the maintenance of a stable temperature range.

Note: a detailed discussion of climate is not required here.

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QUESTION TWO: TECTONIC ACTIVITY ON MARS

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Use the information provided on pages 2 and 3 of your Resource Booklet to answer this question.

Until recently, scientists thought that there had never been any plate tectonic activity on Mars. It was assumed that because Mars has only 10.7% the mass of Earth, it lost internal heat from its formation quickly and the crust grew too strong for plate tectonic activity. Also, a substantial amount of water is probably needed to lubricate plate motion.

Discuss and evaluate the evidence for plate tectonic activity on Mars using the features shown in the photos and magnetic field evidence on pages 2 and 3 of your Resource Booklet.

In your answer, consider:

- whether the evidence from key Martian features is strengthened by the similarity to certain features on Earth
- whether plate tectonic activity was present in the early history of Mars
- whether plate tectonic activity could be occurring today on Mars
- what other evidence would need to be gathered to strengthen the evidence for plate tectonic activity
- the presence and physical state of water
- the thin, carbon dioxide rich atmosphere of Mars.

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QUESTION THREE: THE ANTHROPOCENE – A NEW GEOLOGICAL EPOCH

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Use the information provided on page 4 of your Resource Booklet to answer this question.

Discuss and analyse probable characteristics of a geological layer representing the Anthropocene epoch, as would be examined in the future in a sediment core, trench or road cutting.

In your answer, consider:

- how the geological layer could be dated
- the likely distinctive markers of the Anthropocene epoch in the geological record
- the implications for the geological record of certain species being distributed widely around the world
- possible evidence for climate change and ocean acidification.

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

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