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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

Scholarship 2017
Earth and Space Science

9.30 a.m. Thursday 30 November 2017
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 2–16 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: THE ROLE OF PHYTOPLANKTON

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

Phytoplankton are an essential part of two major interacting cycles: the carbon cycle and the rock cycle. A warming ocean, and ocean acidification, threaten the variety and amount of phytoplankton in the ocean.

Considering how the carbon and rock cycles interact, discuss in detail the role that phytoplankton play in maintaining and connecting these cycles. Critically analyse the long term consequences of a warming ocean and ocean acidification.

Well labelled diagrams may assist your answer.

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QUESTION TWO: MONITORING THE ANTARCTIC CIRCUMPOLAR CURRENT

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Use the information provided on pages 4 and 5 of your resource booklet to answer this question.

The deep, cold, strong Antarctic Circumpolar Current (ACC) is found in the Southern Ocean and is both a surface current and part of the thermohaline circulation (THC). This current is very important in global ocean circulation and climate.

South of New Zealand is the Macquarie Ridge, an underwater mountain range about 2000 – 3000 m high, which stretches for 1400 km towards Antarctica. The ACC squeezes through gaps between the underwater mountains, making this site ideal for research on the ACC.

Between 1924 and 2008, eleven shallow earthquakes, ranging from 7.2 to 8.1 magnitude, occurred along the Macquarie Ridge.

Considering the conditions that make the ACC such a strong, cold current, and the global importance of the ACC, discuss fully why research in the Macquarie Ridge area is both important and challenging.

Well labelled diagrams may assist your answer.

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QUESTION THREE: USING ALBEDO TO INVESTIGATE EXOPLANETS

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Use the information provided on pages 6 to 8 of your resource booklet to answer this question.

The knowledge gained from understanding how surface features and processes of known planets and moons determine their albedo, can be applied when investigating exoplanets (planets found around stars other than our Sun).

Analyse how the application of this knowledge can be used to deduce possible surface features and processes of exoplanets. Discuss fully the implications of information obtained from such deductions.

Well labelled diagrams may assist your answer.

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

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