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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Scholarship 2018
Earth and Space Science

9.30 a.m. Wednesday 7 November 2018
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: VENUS AND MARS

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

In the early days of the Solar System, Venus, Earth, and Mars probably all had liquid water and similar climates, and were geologically active. Over time, the three planets have become very different from each other, which cannot be entirely explained by their relative distances from the Sun.

Critically analyse why Venus became hot and dry with a very thick atmosphere compared with Mars, which became cold and dry with a very thin atmosphere.

Integrate relevant aspects of the greenhouse effect, the presence of water, the carbon cycle, and volcanism in your answer.

Note: You may refer to the conditions on Earth to assist your answer, but a detailed discussion of Earth, or the effect of possible life, is not required.

Well labelled diagrams may assist your answer.

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QUESTION TWO: THE WESTERLY WIND BELT

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

The southern part of New Zealand lies under a belt of westerly winds (WWB) that extends between the middle latitudes (40–50°S), where New Zealand lies, and higher latitudes (50–70°S), over the Southern Ocean and Antarctic sea ice. Changes in the position and width of the WWB cause changes in the wind and storm activity over New Zealand.

Lake Ohau, at 44°S, is at the northern boundary of the WWB and on the drier, eastern side of the Southern Alps. Large amounts of sediment are deposited on the lake floor each year. This sediment has been accumulating for about 18 000 years, and contains a record of the climate over that time.

Discuss fully how variations in the position of the WWB are recorded in the sediment layers on the floor of Lake Ohau by considering relevant atmospheric, hydrological, and geological processes.

Evaluate how data from Lake Ohau and other selected places could provide evidence about changes in the position of the WWB.

Well labelled diagrams may assist your answer.

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QUESTION THREE: RENEWABLE ENERGY FROM THE SEA

Use the information provided on pages 6 and 7 of your resource booklet to answer this question.

In the future, as much as 20% of New Zealand's electricity could be generated from marine energy sources such as waves and tidal currents.

Discuss fully whether tidal and wave energy will be environmentally sound and reliable sources of renewable energy.

In your answer, consider how tides and waves are formed, and the areas around New Zealand that may be suitable for harnessing energy from tides and waves.

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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