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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 2 Earth and Space Science, 2013

91192 Demonstrate understanding of stars and planetary systems

2.00 pm Tuesday 26 November 2013
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of stars and planetary systems.	Demonstrate in-depth understanding of stars and planetary systems.	Demonstrate comprehensive understanding of stars and planetary systems.

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 2–10 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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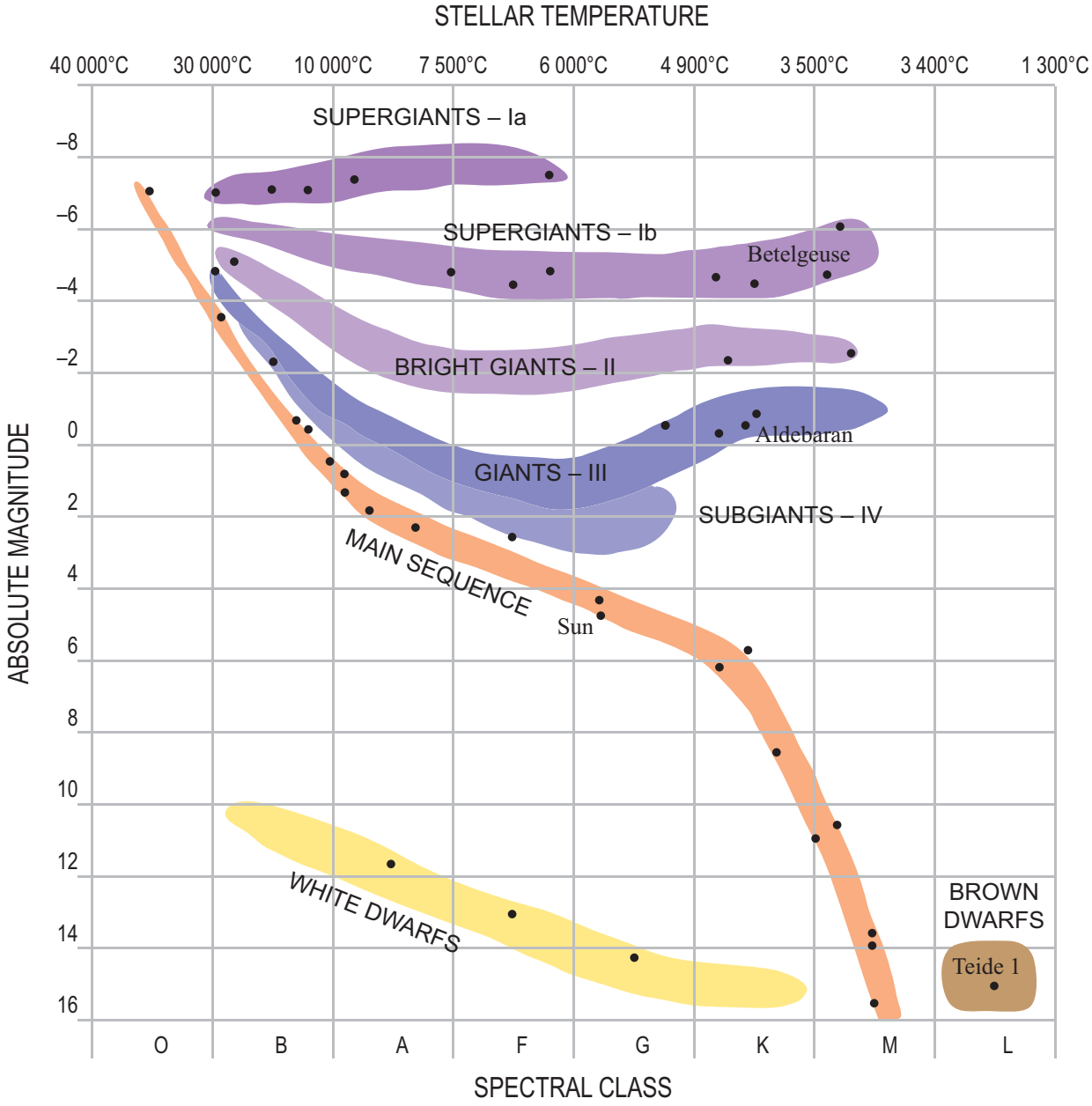
You are advised to spend 60 minutes answering the questions in this booklet.

RESOURCE

Hertzsprung-Russell (HR) diagram



QUESTION ONE: ALDEBARAN: A RED GIANT STAR

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Aldebaran is a large red giant star approximately 40 times the size of the Sun.

Use the HR diagram on page 2 to help explain in detail each of the life stages (birth, life, and death) in the life cycle of Aldebaran.

In your answer, you should refer to:

- gravity
- mass
- fuel source and use
- energy changes.

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http://www.janis.or.jp/users/kitahara/sww/e-arude-z.html

More space for this answer is available on the next page.

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The examination continues on the following page.

QUESTION TWO: THE FORMATION OF ROCKY PLANETS COMPARED WITH THE FORMATION OF GAS GIANT PLANETS

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Mercury

http://astro-observer.com/solarsystem/mercury/img/mercury.jpg

Jupiter

http://thebigfoto.com/jupiter-from-space

Discuss why Mercury is a rocky, terrestrial planet, whereas Jupiter is a gas giant planet, by comparing the formation of these two planets.

In your comparison, you should:

- explain in detail the stages in the formation of planets including protoplanetary disks
- explain the effect of solar winds on planet formation
- explain the effect of temperature on the presence and / or absence of volatile gases.

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QUESTION THREE: BETELGEUSE AND TEIDE 1

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Betelgeuse is a red supergiant star, whereas Teide 1 is a brown dwarf star.

Use the HR diagram on page 2 to compare and contrast each of the life stages of the birth, life, and death of Betelgeuse and Teide 1.

In your answer you should **compare** the two stars, beginning with their positions on the HR diagram, and considering relevant features of both stars including:

- mass
- gravity
- fuel source and use
- energy changes.

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

QUESTION NUMBER

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