

93104R



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Scholarship 2013 Earth and Space Science

9.30 am Tuesday 3 December 2013

RESOURCE BOOKLET

Refer to this booklet to answer the questions for Scholarship Earth and Space Science 93104.

Check that this booklet has pages 2–4 in the correct order and that none of these pages is blank.

YOU MAY KEEP THIS BOOKLET AT THE END OF THE EXAMINATION.

Resource for**QUESTION TWO: TECTONIC ACTIVITY ON MARS**

Use these photos and images to help you answer Question Two on page 6 of your Exam Booklet.

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Coloured relief map showing key features on the surface of Mars.
(Note that the blue colour does **not** represent water.)

Source (adapted): <http://en.wikipedia.org/wiki/File:PIA02820.jpg>

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View of the central segment of Mars's Valles Marineris.
This canyon system extends for 4000 km and is up to 10 km deep in places.

Source (adapted): <http://newsroom.ucla.edu/portal/ucla/srp-view.aspx?id=184016>

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Map of magnetic fields as detected in the surface rocks. Red and blue stripes represent magnetic fields with opposite directions. Darker colours represent more intense magnetic fields. Note that the map of these fields is superimposed on a map of the entire surface of Mars. Also, Alba Mons is called Alba Patera here.

http://www.nasa.gov/images/content/135896main_pnas_102_42_connerney_fig1.tif

Resource for**QUESTION THREE: THE ANTHROPOCENE – A NEW GEOLOGICAL EPOCH**

Use this information to help you answer Question Three on page 10 of your Exam Booklet.

A small section of the geological time scale for the past 250 million years

ERA	PERIOD	EPOCH	AGE mya
CENOZOIC	Quaternary	Holocene	0.01
		Pleistocene	
	Tertiary	Pliocene	1.8
		Miocene	5.3
		Oligocene	23.8
		Eocene	33.7
		Paleocene	55
			65
MESOZOIC	Cretaceous		145
	Jurassic		200
	Triassic		251

Adapted from: <http://www.teara.govt.nz/en/diagram/8294/geological-time-scale>

New geological ages are characterised by changes in global environmental conditions and large-scale changes in the types of species. Currently we are in the Holocene epoch. However, some geologists say that Earth has entered into a new geological age, called the Anthropocene epoch (anthropo = man and cene = new).

Humans have become a geophysical force with a similar effect on our planet as a large asteroid or an erupting super-volcano. The planet's surface is being dramatically changed, and a unique layer from this time will be left in the geological record. Geologists will be able to identify this layer by distinctive markers. An example of such a marker is the traces of iridium left by an asteroid impact that helps define the boundary between the Cretaceous and Tertiary periods, marking the time when the large dinosaurs became extinct.

Some of these changes caused or accelerated by humans are:

- certain species have been distributed widely around the planet
- widespread extinction of many other species
- widespread deforestation, resulting in monocultural crops and pasture
- increased sediment from human activities such as mining and intensive land use
- fossil-fuel burning has increased the ratio of C-12 to C-13 in the atmosphere
- new and resistant chemicals have been put into the environment, such as PCBs (highly toxic organo-chlorides), CFCs (chlorofluorocarbons), plastics, and radioactive isotopes from nuclear bomb testing
- some materials have become much more common, such as aluminium (which doesn't naturally occur as an element) and nitrates (from fertiliser production and fossil-fuel burning)
- an increase of greenhouse gases in the atmosphere
- sea-level rises and ocean acidification.