

91191



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

2

SUPERVISOR'S USE ONLY

Level 2 Earth and Space Science, 2019

91191 Demonstrate understanding of the causes of extreme Earth events in New Zealand

9.30 a.m. Wednesday 27 November 2019
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of the causes of extreme Earth events in New Zealand.	Demonstrate in-depth understanding of the causes of extreme Earth events in New Zealand.	Demonstrate comprehensive understanding of the causes of extreme Earth events in New Zealand.

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 room for any answer, use the extra space provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–16 in the correct order and that none of these pages is blank.

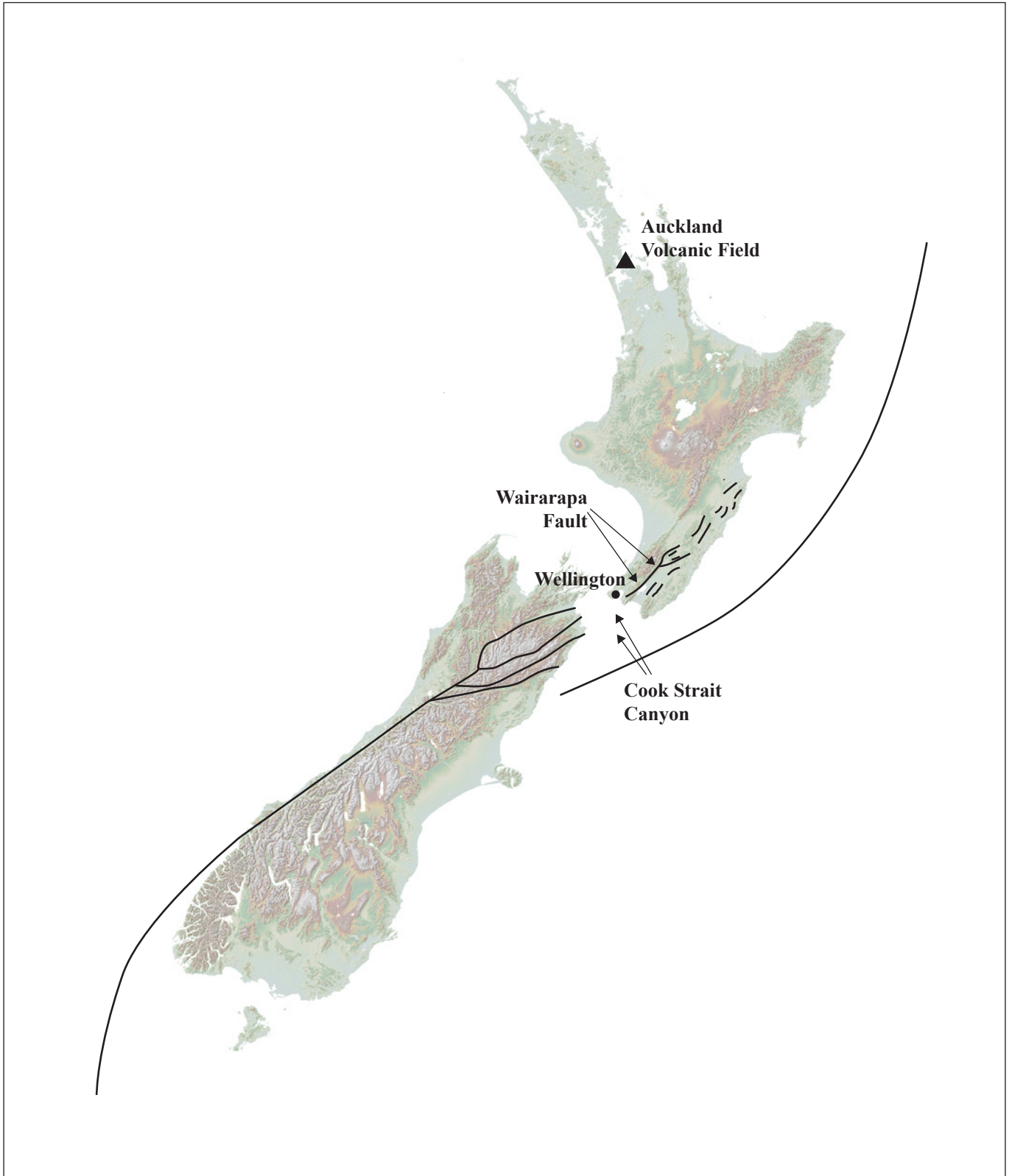
YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

ASSESSOR'S USE ONLY

**This page has been deliberately left blank.
The examination starts on the following page.**

Regional Map Showing Locations Referred to in this Paper



QUESTION ONE: AUCKLAND VOLCANIC FIELD



Adapted from: www.sciencelearn.org.nz/images/716-auckland-volcanic-field


Auckland sits over an active volcanic field, which includes more than 50 volcanoes. While scientists don't expect any of these existing volcanoes to erupt again, they are almost certain that more eruptions are likely to take place at some time in the future. The type of eruption that occurs may depend upon whether the eruption meets water as it rises through the crust.

Explain in detail how possible future eruptions in the Auckland Volcanic Field may be formed, and their likely characteristics.

In your answer, you should refer to:

- the processes within the upper mantle and crust that may cause an eruption within the Auckland Volcanic Field
- the type of magma that is likely to erupt in this area, and the characteristics of this type of magma
- the likely phases of an eruption in this area, and the features that may form from this type of eruption.

A diagram may assist your explanation.



More space for this answer is available on the following pages.

QUESTION TWO: WAIRARAPA EARTHQUAKE 1855ASSESSOR'S
USE ONLY

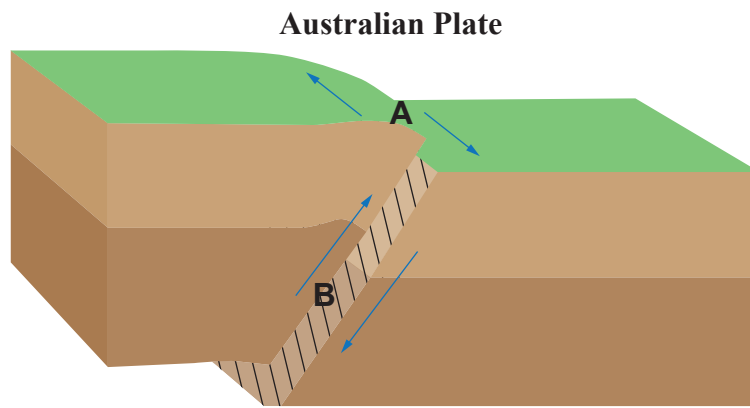
Source: www.nzgeo.com/stories/the-day-the-earth-shifted/

In 1855, the most severe earthquake in New Zealand's recent history occurred along the Wairarapa Fault. The depth was shallow, and it was recorded as a magnitude 8.2–8.3.

Explain in detail how a rupture along this fault could lead to a large-magnitude earthquake.

In your answer, you should consider:

- the types of faults represented by letters A and B on the block diagram opposite
- the tectonic plate movements that may have resulted in this fault
- the cause of this large magnitude earthquake
- the effects seen on the land (**do not include tsunami effects**).



Labelling the diagram may assist your answer.

**More space for this
answer is available on
the following pages.**

QUESTION THREE: WELLINGTON TSUNAMI 1855

ASSESSOR'S
USE ONLY

The 1855 Wairarapa Fault rupture triggered uplift of the Australian Plate and a series of landslides into the Cook Strait Canyon. This resulted in a number of tsunamis, up to 11 metres high, reaching Wellington.

Explain in detail how tsunami could have formed as a result of the sea floor uplift and landslides into the Cook Strait Canyon.

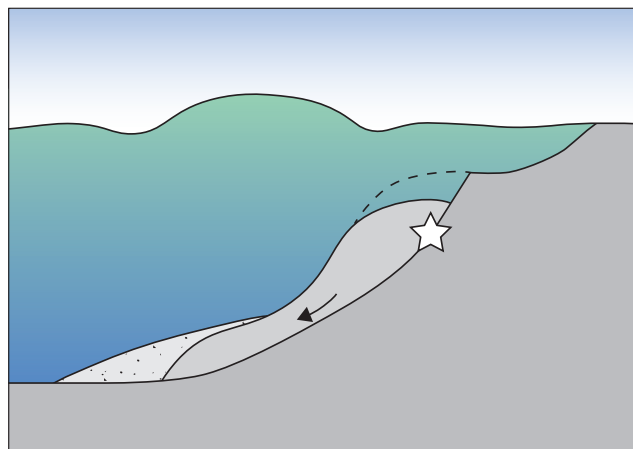
In your answer, you should:

- annotate the diagrams below, showing how tsunami are produced
- explain, in detail, how sea floor uplift in the Cook Strait AND underwater landslides into the Cook Strait Canyon can generate tsunami
- explain, in detail, the energy transfers that occur in each type of tsunami formation
- explain, in detail, the factors which may affect the size of the Wellington tsunami.

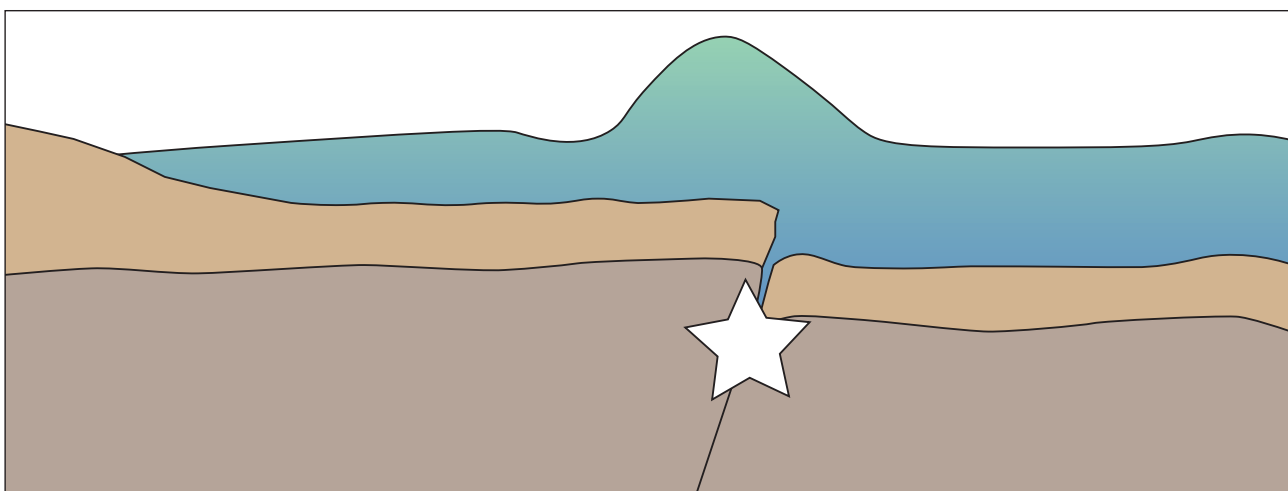


<https://teara.govt.nz/en/map/5604/underwater-canyon>

Tsunami caused by underwater landslide



Tsunami caused by seafloor uplift



**More space for this
answer is available on
the following pages.**

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

ASSESSOR'S
USE ONLY

QUESTION
NUMBER

91191
