Level 2 Earth and Space Science: practice paper 2026

AS 91191 Demonstrate understanding of the causes of extreme Earth events in New Zealand · Vertex Academy practice paper, not an NZQA paper

Attempt ALL the questions. Show ALL working. Write your answers on lined paper, or in the space under each question.

QUESTION ONE

(a) On 14 November 2016, just after midnight, a magnitude 7.8 earthquake struck North Canterbury. The rupture began about 15 km below the surface near Culverden, then travelled north for about 170 km, across more than 20 faults.
Describe the focus and the epicentre of this earthquake, and describe how its energy reached Kaikōura.

(b) The Kaikōura earthquake had one magnitude, 7.8, but the shaking people felt was violent near the faults that ruptured and much weaker in Auckland.
Explain the difference between the magnitude and the intensity of an earthquake, and explain why the intensity changed from place to place.

(c) The Kaikōura earthquake triggered more than 10,000 landslides across North Canterbury and Marlborough. Many of them fell into valleys and blocked rivers, forming landslide dams.
Discuss why this earthquake caused so many landslides, and discuss the hazards the landslide dams created for people downstream in the months after.

QUESTION TWO

(a) Ruapehu, in the central North Island, sits above a plate boundary.
Describe the plate boundary beneath the North Island. Name the two plates, describe the type of crust on each side of the boundary, and describe how the plates move.

(b) Ruapehu erupts andesitic magma.
Explain how subduction beneath the North Island produces the andesitic magma that erupts at Ruapehu.

(c) Ruapehu is an andesitic stratovolcano with a crater lake at its summit. On 24 December 1953 a dam of volcanic ash holding back the crater lake collapsed. A lahar raced down the Whangaehu River and wrecked the rail bridge at Tangiwai just before a passenger train reached it. 151 people died. Discuss how subduction beneath the North Island led to the lahar hazard at Ruapehu.

QUESTION THREE

(a) Describe a tsunami, and describe how it is different from an ordinary wave made by the wind.

(b) A large earthquake on the Hikurangi subduction zone, off the east coast of the North Island, could cause a tsunami.

In the open ocean, 4000 m deep, a tsunami travels at about 700 $\frac{\text{km}}{\text{h}}$ and may be less than 1 m high.

Near the shore, 10 m deep, it slows to about 36 $\frac{\text{km}}{\text{h}}$.

Explain why the tsunami slows down and why it gets taller as it reaches the coast.

(c) GNS Science says a tsunami from a large Hikurangi subduction zone earthquake could reach parts of the east coast of the North Island about 10 minutes after the earthquake. A tsunami from a large earthquake off South America takes many hours to reach New Zealand.
The official advice is: "Long or strong, get gone."
Discuss why a local tsunami is more dangerous than a distant one, and why people on the east coast are told to move to high ground as soon as they feel a long or strong earthquake.

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