

pAssessment Schedule – 2012

Earth and Space Science: Demonstrate understanding of the causes of extreme Earth events in New Zealand (91191)

Evidence Statement

QUESTION ONE			
Expected Coverage	Achievement	Merit	Excellence
<p>The oceanic Pacific Plate is subducting under the continental Australian Plate.</p> <p>They collide; at an angle, rather than head on, this leads to a subduction zone under Hawke’s Bay. Subduction is happening because of the different densities of the plates. Pacific Plate is oceanic and mostly basalt so is denser than Australian Plate. It is dragged down under the Australian Plate by gravity. Above this zone is region of Hawke’s Bay. Hawke’s Bay is on the Australian Plate but west of Hikurangi Trough, which is where subduction occurs.</p> <p>This subduction is not smooth, friction between the plates leads to pressure build-up. Eventually pressure is released as an earthquake.</p> <p>Because Hawke’s Bay is directly above this zone it experiences lots of earthquakes. These earthquakes are often shallow because the subduction zone is close to earth’s surface and so they are felt as large magnitude quakes in Hawke’s Bay.</p>	<p>Describes the causes of the earthquakes in Hawke’s Bay.</p> <ul style="list-style-type: none"> • Pacific plate subducts under the Australian plate, • Pacific Plate is dense and Australian Plate is less dense, • Pacific Plate is (oceanic) and Australian Plate is (continental). • Pacific plate is made out of basalt. • Friction between tectonic plates builds up. • Pressure is released as an earthquake. 	<p>Explains the causes of the earthquakes in the Hawke’s Bay:</p> <ul style="list-style-type: none"> • The denser, oceanic Pacific Plate subducts under the less dense, continental Australian Plate. • The tectonic plate movement produces friction and so many earthquakes occur due to pressure release. 	<p>Explains comprehensively the cause of large magnitude earthquakes in the Hawke’s Bay area:</p> <ul style="list-style-type: none"> • Hawke’s Bay is on the Australian Plate, where the denser, basaltic Pacific Plate, subducts under the less dense Australian Plate. • As the plates do not move past each other easily, friction between the tectonic plates causes a build-up in pressure, which when released leads to an earthquake. • Because Hawke’s Bay is directly above this subduction zone Hawke’s Bay experiences high magnitude earthquakes.

Not Achieved			Achievement		Achievement with Merit		Achievement with Excellence	
NØ	N1	N2	A3	A4	M5	M6	E7	E8
NØ = no evidence or no relevant evidence	N1 = 1 partial point, eg one definition	N2 = 1 point from Achievement	A3 = 2 points	A4 = 3 points	M5 = partial answer	M6 = full answer	E7 = partial answer	E8 = full answer

QUESTION TWO			
Expected Coverage	Achievement	Merit	Excellence
<p>Lake Pupuke formed when the hot basalt came in contact with the cold sea water, the eruption became very violent forming steam. Material was blasted out of the volcano, which formed a tuff ring.</p> <p>Mount Eden has a scoria cone, which is created by lumps of hot lava thrown out of the volcano in a molten state due to gases trapped in the magma (fire fountain). The magma cools quickly in the air forming Scoria, which contains vesicles due to the trapped gases. The scoria builds up to form steep sided cones</p> <p>Both volcanoes are formed by hot spots where magma from the mantle rises towards the surface and forces its way through the overlying crust. These volcanoes do not have a magma chamber. They are produced from the same magma (formed from melted mantle) that has come from great depths and has the same chemical composition. The basalt lava has low viscosity and low silica hence the lava is more free flowing than other lava types.</p>	<p>Describes a volcano in terms of:</p> <ul style="list-style-type: none"> • Lake Pupuke is more explosive than Mt Eden. • Mt Eden’s slope is steeper than Lake Pupuke. • Mt Eden is cone-shaped. • Describes general idea of hotspot formation. • Steam was created from the hot magma. • Scoria would have been made and this would have cause a low ring to form around the crater. • Rate of cooling of the lava. • Less silica means the lava has low viscosity. 	<p>Explains the shape or explosiveness or formation of Lake Pupeke or Mt Eden.</p> <p>Eg:</p> <ul style="list-style-type: none"> • Lake Pupuke formed when the hot basalt came in contact with the cold sea water. • The eruption became very violent due to the production of steam causing the formation of a tuff ring. 	<p>Explains the similarities or differences between the two volcanoes.</p> <ul style="list-style-type: none"> • Both volcanoes are formed by hot spots where magma from the mantle rises towards the surface and forces its way through the overlying crust. These volcanoes do not have a magma chamber. They are produced from the same magma, which has the same chemical composition. • Lake Pupuke formed when the hot basalt came in contact with the cold sea water, the eruption became very violent; due to the production of steam. On the other hand Mount Eden is less explosive.

Not Achieved			Achievement		Achievement with Merit		Achievement with Excellence	
NØ	N1	N2	A3	A4	M5	M6	E7	E8
NØ = no evidence or no relevant evidence	N1 = 1 partial point, eg one definition	N2 = 1 point from Achievement	A3 = 2 points	A4 = 3 points	M5 = partial answer	M6 = full answer	E7 = partial answer	E8 = full answer

QUESTION THREE			
Expected Coverage	Achievement	Merit	Excellence
When the earthquake occurred off the coast of the South Island, due to plate movement between the Australian and the Pacific Plates, a large earthquake was generated. This caused the nearby fiords to shake and triggered sections of the mountains to slip into the sea. This landslide movement caused water to be displaced and formed a wave of water, which travelled away from the landslide as a tsunami. A tsunami is a large wave. The tsunami transmits energy generated from the earthquake via water waves. The water is displaced (in this case by the landslide going into the fiord) and sucked back into a large wave and that wave travels forward and away from the zone of displacement (the landslide). The tsunami formed is localised and small.	<p>Describes what a tsunami is and how and it can be triggered by a landslide, or by an earthquake.</p> <ul style="list-style-type: none"> • Describes that the Australian plate subducts under the Pacific plate. • Describes what a landslide is. • Describes water displacement. • Describes what a tsunami is. • Landslide movement caused water to be displaced. • Size of the tsunami. 	<p>Explains either how the landslide causes the tsunami in terms of water displacement.</p> <p>OR</p> <p>How the earthquake waves releasing energy cause the landslide, due to energy transmission.</p>	Explains comprehensively how an earthquake releases energy, which is transferred to a landslide, which displaces water in the fiord, leading to a tsunami.

Not Achieved			Achievement		Achievement with Merit		Achievement with Excellence	
NØ	N1	N2	A3	A4	M5	M6	E7	E8
NØ = no evidence or no relevant evidence	N1 = 1 partial point, eg one definition	N2 = 1 point from Achievement	A3 = 2 points	A4 = 3 points	M5 = partial answer	M6 full answer	E7 = partial answer	E8 = full answer

Judgement Statement

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 6	7 – 12	13 – 17	18 – 24