



NH2 Tectonic Hazards

AQA 8035 · Calculator allowed · about 65 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 This question is about basic tectonic vocabulary.

(a) State what is meant by a tectonic plate. (1)

(b) State what is meant by the focus of an earthquake. (1)

(c) State what is meant by the epicentre of an earthquake. (1)

(d) State what is meant by magma. (1)

(Total for Question 1 is 4 marks)

2 For each statement below, state whether it is TRUE or FALSE.

(a) At a constructive plate boundary, two plates move apart from each other. (1)

(b) At a destructive plate boundary, two plates move apart from each other. (1)

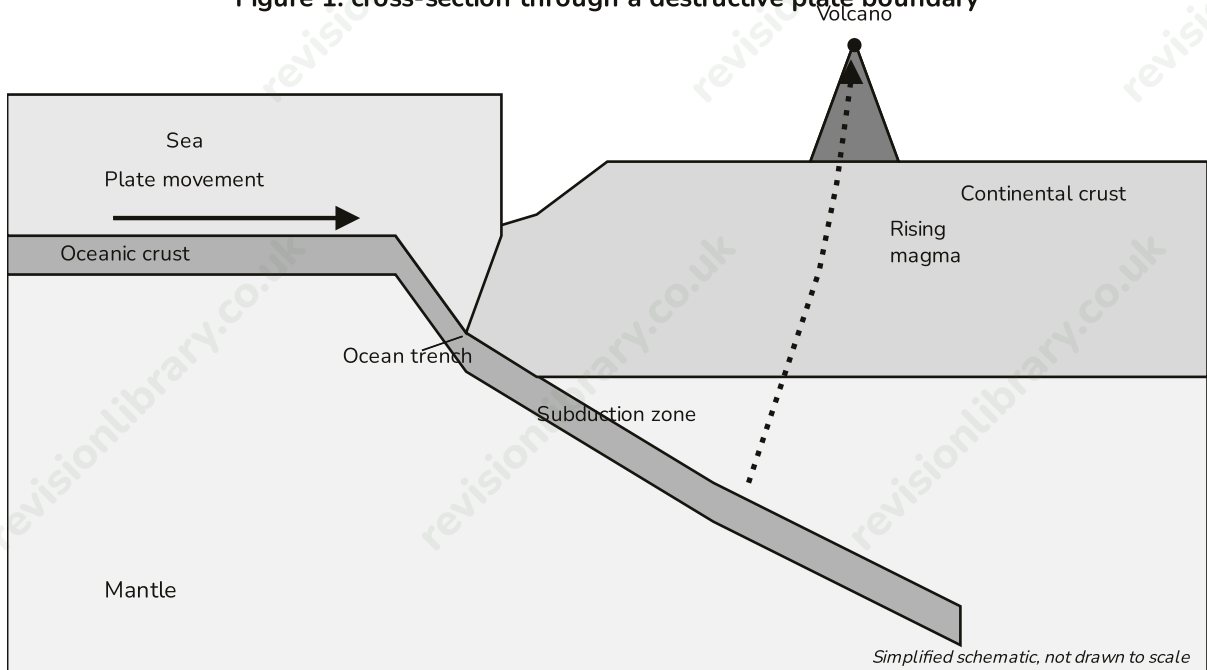
(c) At a conservative plate boundary, two plates slide past each other. (1)

(d) Volcanoes are commonly found at conservative plate boundaries. (1)

(Total for Question 2 is 4 marks)

- 3** Figure 1 shows a cross-section through a destructive plate boundary, where an oceanic plate and a continental plate are colliding.

Figure 1: cross-section through a destructive plate boundary



- (a) Name the process by which the oceanic plate sinks beneath the continental plate at this boundary. (1)
- (b) Using Figure 1, describe what happens to the oceanic plate as it moves towards the trench and beyond. (2)
- (c) Using Figure 1, explain why a volcano forms above the subduction zone. (3)

(Total for Question 3 is 6 marks)

- 4** State whether each effect of an earthquake below is a **PRIMARY** effect (caused directly by the ground shaking) or a **SECONDARY** effect (occurs as a result of the primary effects, often after a delay).
- (a)** Buildings and bridges collapse. **(1)**
 - (b)** A tsunami floods coastal areas. **(1)**
 - (c)** The ground shakes and cracks appear in roads. **(1)**
 - (d)** Disease spreads due to a lack of clean water and damaged sewers. **(1)**

(Total for Question 4 is 4 marks)

- 5** State whether each response to an earthquake below is an **IMMEDIATE** response (in the hours/days after) or a **LONG-TERM** response (over the following months/years).
- (a)** Search and rescue teams pull survivors from collapsed buildings. **(1)**
 - (b)** Damaged roads and buildings are rebuilt to a higher standard. **(1)**
 - (c)** Emergency food, water and shelter are provided to survivors. **(1)**
 - (d)** Building codes are updated and enforced for future construction. **(1)**

(Total for Question 5 is 4 marks)

- 6** Explain one reason why people continue to live in areas at risk from tectonic hazards, despite the danger.

(Total for Question 6 is 3 marks)

- 7** Explain how monitoring and prediction can reduce the risk to people from a volcanic eruption.

(Total for Question 7 is 4 marks)

- 8** Explain how building design can reduce the risk to people from an earthquake.

(Total for Question 8 is 3 marks)

- 9** State what is meant by 'hazard risk', and state TWO factors that can affect the level of risk from a tectonic hazard.

(Total for Question 9 is 3 marks)

10 The scales used to measure earthquake magnitude are logarithmic. This means that each whole number increase in magnitude represents about 10 times more ground shaking. An earthquake has a magnitude of 5. A second earthquake causes about 100 times more ground shaking than this one.

(a) Calculate the magnitude of the second earthquake. (2)

(Total for Question 10 is 2 marks)

11 State one difference between a shield volcano and a composite (strato) volcano.

(Total for Question 11 is 2 marks)

12 On 25 April 2015, a major earthquake struck Nepal, a low-income country (LIC), with its epicentre near the town of Gorkha, west of the capital Kathmandu.

(a) State the name and date of this earthquake, and its approximate magnitude. (2)

(b) Describe TWO effects of this earthquake. (4)

(Total for Question 12 is 6 marks)

- 13** The table below compares the Nepal earthquake (2015) with the Christchurch, New Zealand earthquake (2011).

Feature	Nepal (2015)	Christchurch, New Zealand (2011)
Level of development	LIC	HIC
Magnitude	7.8	6.3
Deaths	almost 9,000	185
Homes and buildings	hundreds of thousands of homes destroyed or damaged	severe damage in the city centre, including many businesses, mainly due to liquefaction

- (a) Using the table, describe TWO differences between the effects of the two earthquakes. (4)

- (b) Suggest TWO reasons why the death toll from the Nepal earthquake was much higher than from the Christchurch earthquake, even though Nepal's earthquake was not much larger. (3)

(Total for Question 13 is 7 marks)

-
- 14** Explain how community education and evacuation planning can reduce the risk from tectonic hazards.

(Total for Question 14 is 3 marks)

15 Use the case studies of the Nepal earthquake (2015) and the Christchurch, New Zealand earthquake (2011) that you have studied in this pack, and any others you know, to answer this question.

'The effects of, and responses to, a tectonic hazard depend mainly on the level of development of the country affected.' Assess the extent to which you agree with this statement.

(Total for Question 15 is 8 marks)

Mark scheme · NH2 Tectonic Hazards

Question 1

- (a) **B1** a large section of the Earth's rigid outer layer (the lithosphere), oe
- (a) **Answer: A large section of the Earth's rigid outer layer (the lithosphere).**
- (b) **B1** the point underground where the earthquake originates (where the rocks fracture), oe
- (b) **Answer: The point underground where the earthquake originates.**
- (c) **B1** the point on the Earth's surface directly above the focus, oe
- (c) **Answer: The point on the Earth's surface directly above the focus.**
- (d) **B1** molten (liquid) rock found beneath the Earth's surface, oe
- (d) **Answer: Molten (liquid) rock found beneath the Earth's surface.**

Question 2

- (a) **B1** True
- (a) **Answer: True**
- (b) **B1** False
- (b) **Answer: False**
- (c) **B1** True
- (c) **Answer: True**
- (d) **B1** False
- (d) **Answer: False**

Question 3

- (a) **B1** subduction
- (a) **Answer: Subduction.**
- (b) **B1** it is forced/subducted down beneath the (less dense) continental plate, oe
- (b) **B1** it sinks into the hot mantle and melts, oe
- (b) **Answer: It is forced down beneath the continental plate because it is denser, and it melts as it sinks into the mantle.**
- (c) **B1** the subducted oceanic plate melts in the mantle, forming magma, oe
- (c) **B1** the magma is less dense than the surrounding rock, so it rises, oe
- (c) **B1** it rises through the continental crust and erupts at the surface, forming a volcano, oe
- (c) **Answer: Magma forms as the subducted plate melts; being less dense than the surrounding rock, it rises through the continental crust and erupts to form a volcano.**

Question 4

- (a) **B1** primary effect
- (a) **Answer: Primary effect.**
- (b) **B1** secondary effect
- (b) **Answer: Secondary effect.**
- (c) **B1** primary effect
- (c) **Answer: Primary effect.**
- (d) **B1** secondary effect
- (d) **Answer: Secondary effect.**

Question 5

- (a) **B1** immediate response
- (a) **Answer: Immediate response.**
- (b) **B1** long-term response
- (b) **Answer: Long-term response.**
- (c) **B1** immediate response
- (c) **Answer: Immediate response.**
- (d) **B1** long-term response
- (d) **Answer: Long-term response.**

Question 6

- **B1** identifies a reason, e.g. volcanic soil is very fertile for farming, oe
- **B1** links this to why people stay, e.g. many people rely on the land for their livelihood/income, oe
- **B1** recognises the risk is accepted, e.g. a major eruption or earthquake may not seem imminent, so people weigh the benefits against a risk that feels low or distant, oe
- **Answer: For example, the volcanic soil around many volcanoes is very fertile, so people farm there for their livelihoods and accept the risk because a major eruption may not seem imminent.**

Question 7

- **B1** scientists use seismometers to detect small earthquakes (tremors) caused by rising magma, oe
- **B1** they measure ground deformation/tilt, which can show the ground swelling as magma rises, oe
- **B1** they monitor gas emissions (e.g. sulfur dioxide), which can increase before an eruption, oe
- **B1** if these signs suggest an eruption is becoming likely, the area can be evacuated in advance, saving lives, oe
- **Answer: Scientists monitor tremors, ground deformation and gas emissions; if these show an eruption is becoming likely, the area can be evacuated in time to save lives.**

Question 8

- **B1** buildings can be designed with a flexible frame/cross-bracing that can absorb and dissipate the shaking, oe
- **B1** buildings can be built on base isolators (large rubber/shock absorbers), which reduce the shaking transferred from the ground to the building, oe
- **B1** this reduces the chance of the building collapsing, reducing deaths and injuries, oe
- **Answer: Buildings can be designed with flexible frames or base isolators that absorb or reduce the ground shaking, making them less likely to collapse.**

Question 9

- **B1** hazard risk is the probability/chance that people will be negatively affected by a hazardous event, oe
- **B1** factor 1, e.g. the level of development of the country/area, oe
- **B1** factor 2, e.g. the population density or degree of urbanisation in the hazard zone, oe
- **Answer: Hazard risk is the probability that people will be affected by a hazardous event; it is affected by factors such as a country's level of development and the population density of the area at risk.**

Question 10

- (a) **M1** recognises that 100 times more shaking = 2 whole-number steps up the scale, since $10 \times 10 = 100$, oe
- (a) **A1** magnitude 7 cao
- (a) **Answer: Magnitude 7.**

Question 11

- **B1** shield volcanoes have gently sloping sides, built from thin, runny lava that flows a long way before it sets, oe
- **B1** composite volcanoes have steep sides, built from alternating layers of thick, sticky lava and ash, which do not flow far before they set, oe
- **Answer: Shield volcanoes have gentle slopes from thin, runny lava; composite volcanoes have steep sides built from alternating layers of thick lava and ash.**

Question 12

- (a) **B1** the Nepal (Gorkha) earthquake, 25 April 2015
- (a) **B1** magnitude 7.8
- **(a) Answer: The Nepal (Gorkha) earthquake, 25 April 2015, magnitude 7.8.**
- (b) **B1** effect 1 named, e.g. almost 9,000 people were killed, oe
- (b) **B1** detail on effect 1, e.g. around 22,000 people were also injured, oe
- (b) **B1** effect 2 named, e.g. hundreds of thousands of homes were destroyed or damaged, oe
- (b) **B1** detail on effect 2, e.g. leaving many people homeless, OR the earthquake triggered an avalanche on Mount Everest and landslides in the Langtang valley, oe
- **(b) Answer: For example: almost 9,000 people were killed and about 22,000 injured; and hundreds of thousands of homes were destroyed or damaged, leaving many people homeless.**

Question 13

- (a) **B1** difference 1 identified, e.g. Nepal's earthquake killed far more people (almost 9,000) than Christchurch's (185), oe
- (a) **B1** supported with data from the table, oe
- (a) **B1** difference 2 identified, e.g. Nepal had the larger magnitude (7.8 compared with 6.3), oe
- (a) **B1** supported with data from the table, oe
- **(a) Answer: For example: Nepal's earthquake killed far more people (almost 9,000) than Christchurch's (185); and Nepal had the larger magnitude of the two earthquakes (7.8 compared with 6.3).**
- (b) **B1** Nepal is an LIC, with fewer resources for earthquake-resistant building design and less strict enforcement of building codes, oe
- (b) **B1** Nepal's mountainous, rural terrain made rescue and aid delivery slower and harder to reach, oe
- (b) **B1** Christchurch (a HIC) had stricter building codes, more insurance coverage and better-resourced emergency services, which reduced deaths, oe
- **(b) Answer: Nepal is a lower-income country with fewer resources for earthquake-resistant buildings and building-code enforcement, and its mountainous, rural terrain made search, rescue and aid delivery much slower than in the wealthier, more accessible city of Christchurch.**

Question 14

- **B1** communities can be educated on what to do during a hazard, e.g. through earthquake drills in schools and workplaces, oe
- **B1** authorities can prepare emergency supply stockpiles (food, water, first aid) in advance, oe
- **B1** designated evacuation routes and safe zones/assembly points can be planned and signposted in advance, so people know where to go quickly, oe
- **Answer: Education (e.g. earthquake drills) teaches people what to do; pre-planned evacuation routes, safe zones and emergency supply stockpiles mean people can respond quickly and safely when a hazard strikes.**

Question 15

- **Level 4** (7-8): A detailed, well-balanced assessment that uses accurate, detailed reference to named examples; reaches a clear, justified conclusion about the extent to which development level explains the differences in effects and responses, while also considering other relevant factors (e.g. magnitude, depth, distance from population centres).
- **Level 3** (5-6): A clear assessment that uses accurate reference to at least one named example in some detail; a conclusion is reached, though the balance of the argument (development versus other factors) may be less developed.
- **Level 2** (3-4): Some relevant comparison is made, with limited or generalised use of named examples; a simple conclusion is given with little justification.
- **Level 1** (1-2): One or two isolated relevant points about tectonic hazards are made, with little or no use of named examples or comparison.
- **Level 0** (0): No relevant content.
- **Indicative content:**
 - Nepal (2015, LIC): almost 9,000 deaths and hundreds of thousands of homes destroyed or damaged; mountainous terrain and limited resources slowed rescue and aid delivery.
 - Christchurch, New Zealand (2011, HIC): 185 deaths despite severe city-centre damage; strict building codes, insurance and well-resourced emergency services limited the death toll.
 - Supports the statement: development strongly affects building quality, code enforcement, emergency response capacity, and how quickly aid and rescue can reach people.
 - Challenges the statement: Nepal's earthquake (magnitude 7.8) was much larger than Christchurch's (magnitude 6.3), and factors like depth and distance from population centres also affect the outcome, not just development.
 - Christchurch still took years to rebuild fully because of funding and insurance disputes, showing that even HICs face long-term recovery challenges.
 - A well-balanced answer weighs development level against these other physical factors before reaching a supported judgement.