Rewarding Learning

General Certificate of Secondary Education
2019

Geography

Unit 1

Understanding Our Natural World

[GGY11]

TUESDAY 21 MAY, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCSE Geography.

Candidates must show they are able to:

AO1 Demonstrate geographical knowledge and understanding of:

- Places, environments, processes and concepts; and
- The inter-relationships between places, environments and processes;

AO2 Apply knowledge and understanding to analyse, interpret and evaluate geographical information and issues and to make judgements; and

AO3 Select, adapt and use a variety of skills and techniques to investigate questions and issues and communicate findings.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If the answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range of any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Marking calculations

In marking answers involving calculations, examiners should apply the 'own figure rule' so that candidates are not penalised more than once for a computational error.

Types of mark schemes
Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the 'best fit' bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- **Threshold performance:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- **Intermediate performance:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.
- **High performance:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication
Quality of written communication is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level 1: Quality of written communication is basic.
Level 2: Quality of written communication is good.
Level 3: Quality of written communication is excellent.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below.

Level 1
Spelling, punctuation and the rules of grammar are used with some accuracy so that meaning is reasonably clear. Candidates present some relevant information in a form and using a style of writing which suits its purpose. The text is reasonably legible. A limited range of specialist terms is used appropriately.

Level 2
Spelling, punctuation and the rules of grammar are used with considerable accuracy so that meaning is clear. Candidates present relevant information in a form and using a style of writing which suits its purpose. The text is legible. A good range of specialist terms is used appropriately.

Level 3
Spelling, punctuation and the rules of grammar are used with almost faultless accuracy so that meaning is clear. Candidates present, and organise effectively, relevant information in a form and using a style of writing which suits its purpose. The text is fluent and legible. A wide range of specialist terms is used skilfully and with precision.

Theme A: River Environments

AVAILABLE MARKS

1 (a) Study the Ordnance Survey extract of part of the North East of Scotland and answer the questions which follow.

(i) Complete **Table 1** by naming the land use found at the grid references given.

Table 1

Grid Reference	Land use
362730	**campsite, caravan site**
345665	**Coniferous Woodland/ Coniferous Wood/ Forestry Commission land/Coniferous forest/ Coniferous**

[2]

(ii) Name **one** loch found on the Ordnance Survey map.

Any valid loch,
e.g. Loch of Lomashion, Black Loch, Loch of Auckengill, Lint Lochs [1]

(iii) State the meaning of the term **drainage basin**.

Award [0] for a response not worthy of credit

Award [1] for a partial definition,
e.g. Where water comes from into a river.

Award [2] for a full definition,
e.g. The total area of land drained by a river and its tributaries. [2]

(b) Study **Fig. 1** which is a sketch map of part of the Ordnance Survey map.

(i) Complete the sketch map by labelling the characteristics of the drainage basin shown in the boxes provided. One has been completed for you.

A = TRIBUTARY [1]

B = CONFLUENCE [1]

C = MOUTH [1]

D = WATERSHED [1]
(4 × [1]) [4]

(ii) Name the main river shown in the sketch map.

Gill Burn [1]

(iii) Underline the direction of flow of the main river.

South-east [1]

AVAILABLE MARKS

(c) Describe and explain the changes in load shown in **Table 2**.

Award [0] for a response not worthy of credit.

Level 1 ([1]–[2])
A basic statement relating to the changes in load size or shape. The answer may be a brief description or explanation,
e.g. The load gets smaller [1] due to erosion/erosion [2]
The load changes in size from 13.6 cm at site 1 to 3.6 cm at site 3 [2]
The load becomes smaller and more rounded [2]

Level 2 ([3]–[4])
A limited description including figures or explanation of the changes with no figures. If the candidate only describes or explains the changes (in size or shape) then max [3]. To access [4] both shape and load must be addressed with some description and explanation,
e.g. The load gets smaller from site 1 to 3. It decreases by 10 cm. This is due to erosion [3]
e.g. The load becomes smaller and more rounded due to erosion/attrition/abrasion [3]
e.g. The load size gets smaller from site 1 to 3. It decreases by 10 cm. The shape also changes from being very angular at site 1 to very rounded at site 3 as we travel downstream. This is due to erosion [4]
e.g. The load size gets smaller from site 1 to 3. It decreases by 10 cm. The shape becomes more rounded as we travel downstream. The shape changes from 60% very angular at site 1 to 70% very rounded at site 3 due to erosion [4]

Level 3 ([5]–[6])
A detailed description and explanation of the changes in load size and shape using specialist vocabulary,
e.g. The load size gets smaller from site 1 to 3. It decreases by 10 cm. The shape becomes more rounded as we travel downstream. The shape changes from 60% very angular at site 1 to 70% very rounded at site 3. This is due to erosion, mostly attrition and abrasion [5]. Attrition is when the rocks collide with each other, making them smaller. [6] (Abrasion also occurs as the stones smash and grind on the river bed and bank making them smaller and rounded. [6]) [6]

(d) For a named river outside the British Isles which you have studied, evaluate the sustainability of the river management strategy used to manage its floods.

Award [0] for a response not worthy of credit or e.g. a coastal strategy.

Note: no mark for name of river. Max Level 1 if UK river/or no named river.

Level 1 ([1]–[2])
Candidates provide a basic description of the strategy used on a named river outside the British Isles,
e.g. Levees were built along stretches of the Mississippi [1] and meanders were straightened [2].

Spelling, punctuation and the rules of grammar are used with some accuracy so that meaning is reasonably clear. Candidates present some relevant information in a form and using a style of writing which suits its purpose. The text is reasonably legible. A limited range of specialist terms is used appropriately.

Level 2 ([3]–[5])
Candidates provide a limited description of the strategy used or may refer to only one method used on a named river outside the British Isles with limited evaluation of the extent to which the strategy can be considered sustainable, e.g. They have tried to control the Mississippi by building or strengthening levees and straightening meanders. Major flooding in 1993 shows this strategy has not worked [3]. Both methods required continual maintenance [4]. To achieve [5] need additional detail, e.g. 15 m levees/or how they work

Spelling, punctuation and the rules of grammar are used with considerable accuracy so that meaning is clear. Candidates present relevant information in a form and using a style of writing which suits its purpose. The text is legible. A good range of specialist terms is used appropriately.

Level 3 ([6]–[8])
More than one engineering method is needed for Level 3. Candidates provide a detailed description of the river management strategy used on a river outside the British Isles. There is clear evaluation of the sustainability of the strategy in managing the floods,
e.g. The Mississippi River in the USA has been managed for over 100 years to improve navigation and prevent flooding. The levees were raised to 15 metres along 3000 km of the river and meanders were straightened over a 1750 km stretch allowing much of the Mississippi floodplain to be developed for farming, trade and the growth of urban areas such as New Orleans. 106 dams have also been constructed on the Mississippi to hold back floodwaters. However, these methods are not sustainable as they are very expensive and require regular maintenance. [6] Recently the US Conservation Service has spent $25 million buying farmland prone to flooding and converting it to natural conditions which do not require any maintenance and have no obvious negative environmental impacts [7]. Overall hard engineering methods are more suitable/better at controlling river floods in the short term [8].

Spelling, punctuation and the rules of grammar are used with almost faultless accuracy so that meaning is clear. Candidates present and organise effectively relevant information in a form and using a style of writing which suits its purpose. The text is fluent and legible. A wide range of specialist terms is used skillfully and with precision. [8]

AVAILABLE MARKS

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AVAILABLE MARKS

2 **(a)** Study the Ordnance Survey extract of part of the coast of North East Scotland and answer the questions which follow.

(i) State the height of the land shown by the triangulation pillar at the top of Warth Hill, GR 3769.

124 m [1]

(ii) State the straight line distance from the viewpoint at Duncansby Head GR 405734 to Black Loch GR 373704.

Answer = 4.25 km
4.2–4.4 km [2]
4.1–4.19 or 4.41–4.5 km [1] [2]

(iii) State the direction of Ness Head GR 3866 from St. John's Point GR 3175.

South East [1]

(iv) Estimate the area of the mixed wood at GR 3370. Underline your answer in the list below.

0.2 km^2 [1]

(b) There is a wave cut platform along the coastline from St. John's Point to Duncansby Head. Complete **Table 3** below by placing the statements in numerical order to show how a wave cut platform is formed. One has been completed for you.

Table 3

Statement	Order
The notch is widened by erosion	**3**
Waves attack the base of a cliff	**1**
Eventually the cliff collapses and retreats leaving a wave cut platform	**5**
Over time the cliff begins to be undercut	**4**
A wave cut notch is formed	**2 (given)**

(4 x [1]) [4]

AVAILABLE MARKS

(c) Study **Photograph 1**, which shows the Stacks of Duncansby, located south of Duncansby Head.

Explain how stacks such as these are formed.

Award [0] for a response not worthy of credit.

Level 1 ([1])
A basic response relating to the process or some of the stages involved in the formation of stacks,
e.g. Caves are eroded (on a headland) and become a stack.

Spelling, punctuation and the rules of grammar are used with some accuracy so that meaning is reasonably clear. Candidates present some relevant information in a form and using a style of writing which suits its purpose. The text is reasonably legible. A limited range of specialist terms is used appropriately.

Level 2 ([2]–[3])
A limited explanation which refers both to the stages or the processes,
e.g. Caves are formed on either side of a headland because a notch is eroded at the foot of a cliff. The caves are eroded right through the headland to make an arch which collapses and leaves a stack.[3]

Spelling, punctuation and the rules of grammar are used with considerable accuracy so that meaning is clear. Candidates present relevant information in a form and using a style of writing which suits its purpose. The text is legible. A good range of specialist terms is used appropriately.

Level 3 ([4]–[5])
A detailed explanation of all stages and named processes, indicating clear understanding that a stack is a pinnacle of rock left behind when a headland is eroded. One erosional process named for Level 3,
e.g. Caves are formed on either side of a **headland** because a notch is eroded by hydraulic pressure/corrasion/abrasion. The caves are eroded right through the headland to make an arch; the roof of the arch becomes unstable and collapses, leaving a stack or pinnacle of rock. [5]

Spelling, punctuation and the rules of grammar are used with almost faultless accuracy so that meaning is clear. Candidates present and organise effectively relevant information in a form and using a style of writing which suits its purpose. The text is fluent and legible. A wide range of specialist terms is used skilfully and with precision. [5]

(d) Many experts believe that some coastal areas are under threat and need to be protected. Explain **one** possible impact of climate change on a coast.

AVAILABLE MARKS

Award [0] for a response not worthy of credit.

Award [1] for a basic statement,
e.g. Climate change will lead to a rise in sea levels.
e.g. More coastal defences needed.

Award [2] for a statement with a consequence,
e.g. It is believed that climate change will lead to a rise in sea levels. This would result in flooding of low-lying coastal areas.
e.g. It is believed that climate change will lead to a rise in sea levels so defences need to be put in place.

Award [3] for a statement and consequence with elaboration on the possible impact of climate change on the coastline,
e.g. Climate change will lead to an increase in the temperature of seawater and rise in sea levels causing flooding of many low-lying coastal areas, e.g. islands in the Pacific ocean.
e.g. It is believed that climate change will lead to a rise in sea levels. This would result in flooding of low-lying coastal areas so defences need to be put in place where necessary to protect the coastline
e.g. As seawater becomes warmer, the volume of water increases. This will lead to an average rise in sea levels of 48 cm causing flooding of many low-lying coastal areas/cities, e.g. Amsterdam.
e.g. Climate change will lead to rising sea levels and potential flooding of low-lying coastal areas. For example, the World Bank estimates that a 1 m rise in sea levels would flood half of Bangladesh's rice fields and force the migration of millions of people. [3]

(e) Evaluate the sustainability of the coastal management strategy used to protect a named coastline in the British Isles.

AVAILABLE MARKS

Award [0] for an answer not worthy of credit, e.g. a river strategy.
Maximum Level 1 if no named coastline.

Reference to only one coastal management method in very good detail with facts and figures and good evaluation max Level 2. [5]

Level 1 ([1]–[2])
A basic account of a coastal management strategy. The answer may not make reference to a specific coastline in the British Isles. No evaluation or reference to sustainability,
e.g. A sea wall was built to stop the sea eroding the coastline. Groynes and gabions are also used.

Level 2 ([3]–[5])
A limited account of a coastal management strategy for a named coastline in the British Isles. The answer must evaluate the strategy so there must be analysis of both positive and negative aspects of the strategy. The emphasis of the answer must be on how sustainable the strategy is. Possible answers may have:

- Good detail on one strategy used for coastal management but no evaluation of sustainability [3]
- Reference in good depth about the strategy used with a basic attempt to evaluate either the good or bad aspects of the strategy [4]
- Answer with some limited evaluation but lacking in factual detail [4]
- Good depth of information in a detailed answer but one which is one-sided and deals with the positive aspects **or** the negative aspects [5],

e.g. In Newcastle Co. Down there have been a number of developments over the years which have been part of a strategy to manage the coast. The main method was the building of a sea wall. In 2007 a new Newcastle promenade development was built which included a sea wall which was built 1 metre higher than the old sea wall. The programme cost £4 million and it was designed to stop the sea from flooding the town. Groynes and gabions have also been used to good effect. [4]

Level 3 ([6]–[8])
A detailed response based on a coastal management strategy for a named case study in the British Isles. The answer has an evaluation which clearly analyses the ways that this strategy has attempted to be sustainable. Differentiation in this level is based on the breadth of evaluation in relation to sustainable development. The answer will also include a full evaluative comment and conclusion,
e.g. In Newcastle Co. Down there have been a number of developments to sustainably manage the coast in Newcastle. The main feature has been the building of a sea wall. In 2007 a new promenade was built which included a sea wall 1 metre higher than the old sea wall. The programme cost £4 million and it was designed to stop the sea from flooding the town. The sea wall is a long-term hard engineering solution. It is hoped that it will last 50 years and will require minimal maintenance but many people consider this unsustainable due to the cost. In addition, gabion cages, rock armour and groynes are used in sensitive areas to reduce the impact of the waves and to help the beach build up deposited material. The promenade was designed to fit in with the character of the local area. However, some local people are concerned that the changes to the beach front have had an impact on animal life along the shore. Overall the programme has been successful, although it cost a lot of money. [8]

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Theme C: Our Changing Weather and Climate

AVAILABLE MARKS

3 (a) Complete **Table 4** by writing the correct answers in the blank boxes

Table 4

Weather instrument	Name of instrument	Weather element recorded
	Anemometer	**Wind Speed**
	**Digital thermometer**	Temperature
	Rain gauge	**Precipitation**

(3 x [1]) [3]

AVAILABLE MARKS

(b) Study **Fig. 2** which gives information about some factors that can affect the climate of a place.

Complete **Fig. 2** by drawing a line to join each factor with its correct description. One has been completed for you.

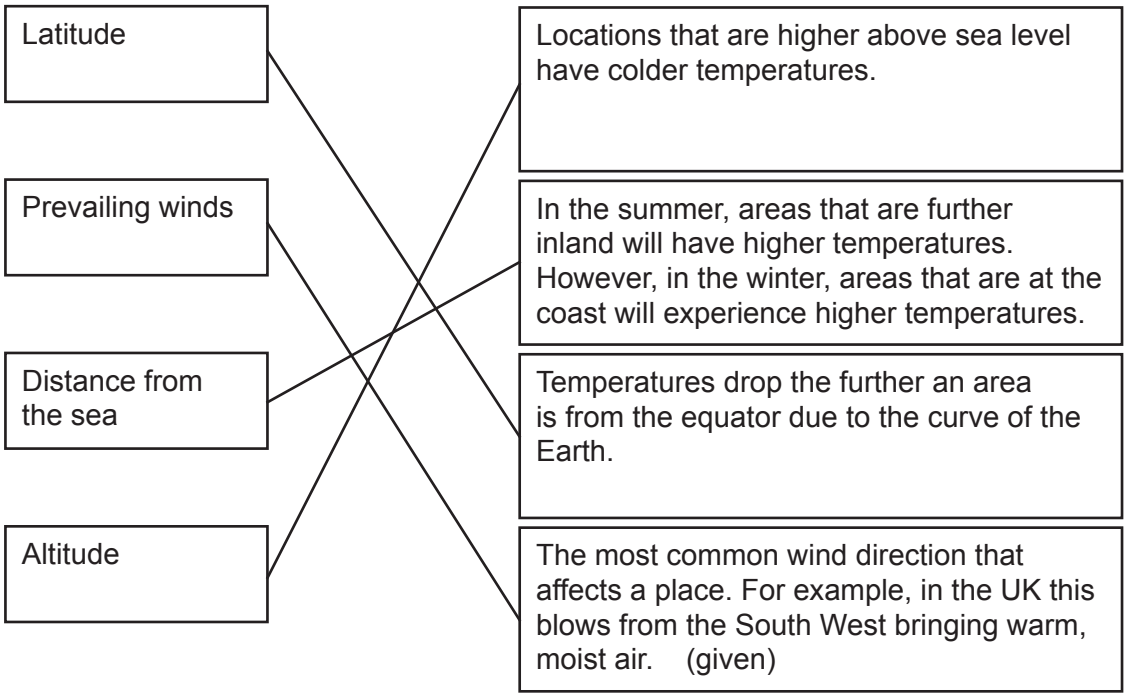

Fig. 2

(3 × [1]) [3]

(c) Name **two** types of cloud and describe one way they are different from each other.

Award [0] for a response not worthy of credit.

Award [1] for naming two clouds or naming one cloud with a basic description,
e.g. Stratus, cirrus [1]
e.g. Cirrus are high [1]

Award [2] naming two clouds plus a description of one cloud type,
e.g. Stratus and cirrus. Cirrus are high.

Award [3] naming two clouds plus a description relating to a difference between both clouds,
e.g. Stratus clouds are low and cirrus clouds are high. [3]

AVAILABLE MARKS

(d) Study **Fig. 3** which shows a synoptic chart for a day in November.

(i) Name the type of weather system shown in **Fig. 3**.

Low pressure/ Depression [1]

(ii) Using **Fig. 3** complete **Table 5** to show the three weather conditions experienced at Edinburgh.

Table 5

Cloud cover	$\frac{4}{8}$/4 oktas
Wind speed	3–7 knots
Wind direction	SW

(3 × [1]) [3]

(iii) Explain how and why rainfall and temperature will change at Edinburgh over the next 24 hours.

This question is asking **how** and **why** the conditions controlling rainfall and temperature might change. Candidates should show an understanding the depression is passing over Edinburgh and will bring different conditions.

Level 1 ([1]–[2])
A basic description of one or both changes. Alternatively, a basic explanation or both changes have been attempted at a basic level,
e.g. The temperature is likely to get colder [1].
e.g. The temperature is likely to get colder and the amount of rainfall will increase. [2]
e.g. It will get colder as the cold front arrives [2]

Level 2 ([3]–[4])
A limited explanation that will have some elaboration. Candidates should explain in detail how and why one weather element changes or they might explain both but require further detail. If both described with a brief explanation [3],
e.g. The temperature is likely to get colder as the warm sector passes over Edinburgh and gives way to the cold front. The temperature will drop as the cold air moves in [3]. There will be an increase in the amount of rainfall as the cold front causes air to rise [4].

Level 3 ([5]–[6])
A detailed explanation that covers all aspects of the question. Answers clearly set out how any why both rainfall and temperature are likely to change,
e.g. The temperature is likely to get colder as the warm sector passes over Edinburgh and gives way to the cold front. The temperature will drop as the polar maritime air moves in. There will be an increase in the amount of rainfall as the cold front causes air to rise. Cold air from the polar maritime air mass will undercut the warm air and will force it quickly upwards [5] potentially causing heavy thunderstorms and heavy rain showers. [6] [6]

(e) With reference to your case study of an extreme weather event outside the British Isles, describe the impacts this had on people.

AVAILABLE MARKS

The extreme weather event can be a case study relating to any one of the following:

- drought
- tornado
- hurricane

Do not credit answers which outline a flooding event/tsunami/earthquake. Award maximum Level 1 if no case study is named or if the case study relates to the British Isles.

Level 1 ([1]–[2])
A basic description of the extreme weather event with general impacts on people,
e.g. Hurricanes can cause tidal surges that can flood the land and cause people to drown.

Spelling, punctuation and the rules of grammar are used with some accuracy so that meaning is reasonably clear. Candidates present some relevant information in a form and using a style of writing which suits its purpose. The text is reasonably legible. A limited range of specialist terms is used appropriately.

Level 2 ([3]–[4])
A limited description which addresses at least two impacts on people in some depth,
e.g. Hurricane Katrina was a Category 5 storm that hit Louisiana, USA on 29 August 2005. Over 1836 people were killed as a result of the storm. 500 000 people were left homeless and 27 300 people had to be housed in emergency shelters for at least 3 years after the event. Many of the poor people who lived in the worst affected areas could not afford to leave and had to put up with poor living conditions.

Spelling, punctuation and the rules of grammar are used with considerable accuracy so that meaning is clear. Candidates present relevant information in a form and using a style of writing which suits its purpose. The text is legible. A good range of specialist terms is used appropriately.

Level 3 ([5]–[6])
A detailed description which covers at least two well developed impacts on people or three (or more) less well developed impacts on people,
e.g. Hurricane Katrina was a Category 5 storm that hit Louisiana, USA on 29 August 2005. Over 1836 people were killed as a result of the storm. 500 000 people were left homeless and 27 300 people had to be housed in emergency shelters for at least 3 years after the event. Many of the poor people who lived in the worst affected areas could not afford to leave and had to put up with poor living conditions. A massive 8.5 m storm surge caused a lot of flooding in the city of New Orleans and flooded 80% of the city. This caused over 230 000 job losses as businesses could not return to work quickly. In fact, many people remained unemployed over 10 years later.

Spelling, punctuation and the rules of grammar are used with almost faultless accuracy so that meaning is clear. Candidates present and organise effectively relevant information in a form and using a style of writing which suits its purpose. The text is fluent and legible. A wide range of specialist terms is used skilfully and with precision. [6]

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AVAILABLE MARKS

4 (a) (i) Describe the world distribution of fold mountains shown on **Fig. 4**, referring to named places in your answer.

Award [0] for a response not worthy of credit

Level 1 ([1])
A basic statement or one named location,
e.g. Fold mountains are along plate boundaries [1]
e.g. Fold mountains are found on the west side of North America [1] or a list of places with no mention of plate boundaries, e.g. in Europe and in North and South America. [1]
e.g. on plate boundaries [1]
e.g. on collision boundaries [1]
e.g. exceptions [1]

Level 2 ([2]–[3])
A limited statement with accurate named locations (where two named plates meet) [2] and reference to plate boundaries for full Level 2 [3],
e.g. Fold mountains are found along either plate boundaries such as the west sides of N. and S. America. There is an east/west belt through the Mediterranean Sea into Asia and N. India (Himalayan Mts). There are very few fold mountains in Africa except on the NW Coast where the African plate meets the Eurasian plate and none in Australia.

Level 3 ([4])
A detailed statement with accurate named locations and reference to either the type of plate boundaries – (collision or a destructive plate boundary) or the exceptions,
e.g. Fold mountains are found along either a destructive or a collision plate boundary such as the west sides of N. and S. America (Rockies and Andes mountain ranges). There is an east/west belt through the Mediterranean Sea into Asia and N. India (Himalayan Mts). There are very few fold mountains in Africa except on the NW Coast where the African plate meets the Eurasian plate and none in Australia. [4]

(ii) Fold mountains are often made of sedimentary rocks.
Explain how sedimentary rocks were formed.

Award [0] for a response not worthy of credit

Award [1] for a basic statement relating to the formation of sedimentary rocks,
e.g. Sediments build up in layers.

Award [2] for a limited explanation which refers to deposition of layers of sediment on the seabed and sediments being squeezed,
e.g. Sediments which have been eroded are deposited on the sea bed and are compressed so they build up in layers.

Award [3] for a detailed explanation which refers to the deposition of layers of sediment building up on the seabed and being compressed and compacted under their weight over time to form layered rock [answer may also refer to fossil shells etc being trapped in the layers],
e.g. Sediments which have been eroded from the rocks on the land are carried into the sea by rivers and are deposited on the seabed; these sediments are compressed and compacted under their own weight so air and moisture are squeezed out and so over a long time will build up in layers forming solid rock. [3]

AVAILABLE MARKS

(b) What is the **difference** between the focus and the epicentre of an earthquake?

Award [0] for a response not worthy of credit

Award [1] for a basic statement which is accurate about one of the two terms,
e.g. The focus is where an earthquake occurs.

Award [2] for a limited statement which accurately describes the **difference**,
e.g. The focus of an earthquake is where it happens underground but the epicentre is on the surface of the ground.

Award [3] for a detailed description of the **difference** between the focus and the epicentre,
e.g. The focus is the point at which the earthquake happens underground; the epicentre is the point on the earth's surface directly above the focus where the effects of shaking are strongest. [3]

(c) One consequence of an earthquake is a tsunami. State the meaning of the term **tsunami**.

Award [0] for a response not worthy of credit

Award [1] for a partial definition,
e.g. A tsunami is a **big wave** in the sea, e.g. a tsunami is caused by an earthquake.
e.g. A tsunami is caused by plate movement [1]

Award [2] for a full definition,
e.g. A tsunami is a big wave in the sea caused by an earthquake (occurring under the sea). [2]

AVAILABLE MARKS

(d) Explain why volcanoes are often located along constructive plate boundaries.

Award [0] for a response not worthy of credit.

Credit answers relating to volcanoes at the sides of a rift valley where continental crust is pulling apart

Level 1 ([1])
A basic statement relating to the location of volcanoes,
e.g. Volcanoes are found where plates pull apart.
e.g. Volcanoes are found where magma rises and escapes as lava.

Level 2 ([2]–[3])
A limited explanation which shows some understanding of why volcanoes are found at a constructive boundary,
e.g. Volcanoes are found where plates are pulled apart and magma rises to the surface through cracks in the seabed [2]; the rising magma forms a line of volcanoes [3]

Level 3 ([4])
A detailed explanation which shows understanding of why volcanoes occur at constructive plate boundaries,
e.g. Volcanoes are found where plates are pulled apart due to convection currents. Magma rises to the surface through cracks in the seabed; the rising magma along a mid-ocean ridge creates new crust/volcanoes. [4]

(e) Complete **Table 6** below by using a tick (✓) to show the three characteristics which are true of supervolcanoes.

Table 6

Characteristic of supervolcanoes	Tick (□) only three correct statements
It erupts violently from a large magma chamber	✓
It has a wide cone with gentle slopes	
It forms from a collapsed caldera	✓
It is caused by pressure building up over a long time	✓
It has a high cone made of layers of ash and lava	

[3]

Note:
If 5 are ticked, deduct [2]
If 4 are ticked, deduct [1]

	AVAILABLE MARKS

(f) Study **Fig. 5**, a satellite image and photograph of the supervolcano Campi Flegrei area in Italy. Answer the questions which follow.

(i) Name the town which is in the supervolcano area.

Pozzuoli [1]

(ii) The city of Naples is under threat from the supervolcano. Outline **one** potential impact on the people of Naples if this supervolcano were to erupt.

Award [1] for a basic statement relating to a potential impact,
e.g. People will die.

Award [2] for a sound outline of a potential impact,
e.g. People in Naples may die from burning lava or inhaling ash from the eruption. [2]

(iii) Discuss **one** potential global impact on the environment of a named supervolcano eruption which you have studied.
Examples of supervolcanoes: – Yellowstone National Park/Campi Flegrei, Italy/Lake Toba, N Sumatra/Pacana Caldera, Chile

Possible impacts of a supervolcano eruption include:

- change in pressure could alter frictional forces, making the plates more unstable so they start to move more
- CO_2 emissions from fumaroles could cause plumes of gas which lead to more climate change
- explosions the size of 1000 atomic bombs could destroy landscape and an ash layer of only 1cm deep could change habitats
- pumic ash and aerosols could destroy everything within 100 km of the eruption and destroy the landscape to an extent of 7800 km^2
- release of sulphur gases could transform into acid aerosols which block UV light from the sun
- ash clouds 50 km wide could rise into the atmosphere and block sunlight lowering temperatures by 11°, creating cold conditions as in 1538 or sea surface temperatures could fall by –3°C

Award [0] for a response not worthy of credit or an answer relating to a human impact
No named supervolcano – award [1]
Local environmental impact discussed – [1]

Award [1] for a basic statement of an environmental impact,
e.g. The release of SO_2 gas could make temperatures fall.

Award [2] for a limited statement which accurately describes one potential impact of the eruption of a named supervolcano,
e.g. The release of SO_2 gas which would occur if Campi Flegrei, Italy supervolcano was to erupt, could make temperatures fall and create a global winter.

Award 3 [3] for a detailed discussion of one potential environmental impact of the eruption of a named supervolcano,
e.g. The release of SO_2 gas which may occur if the Campi Flegrei, Italy supervolcano was to erupt, could make sea surface temperatures fall by –0.4°C; this would cause cooling leading to the destruction of habitats. [3]

	25
Total	**100**