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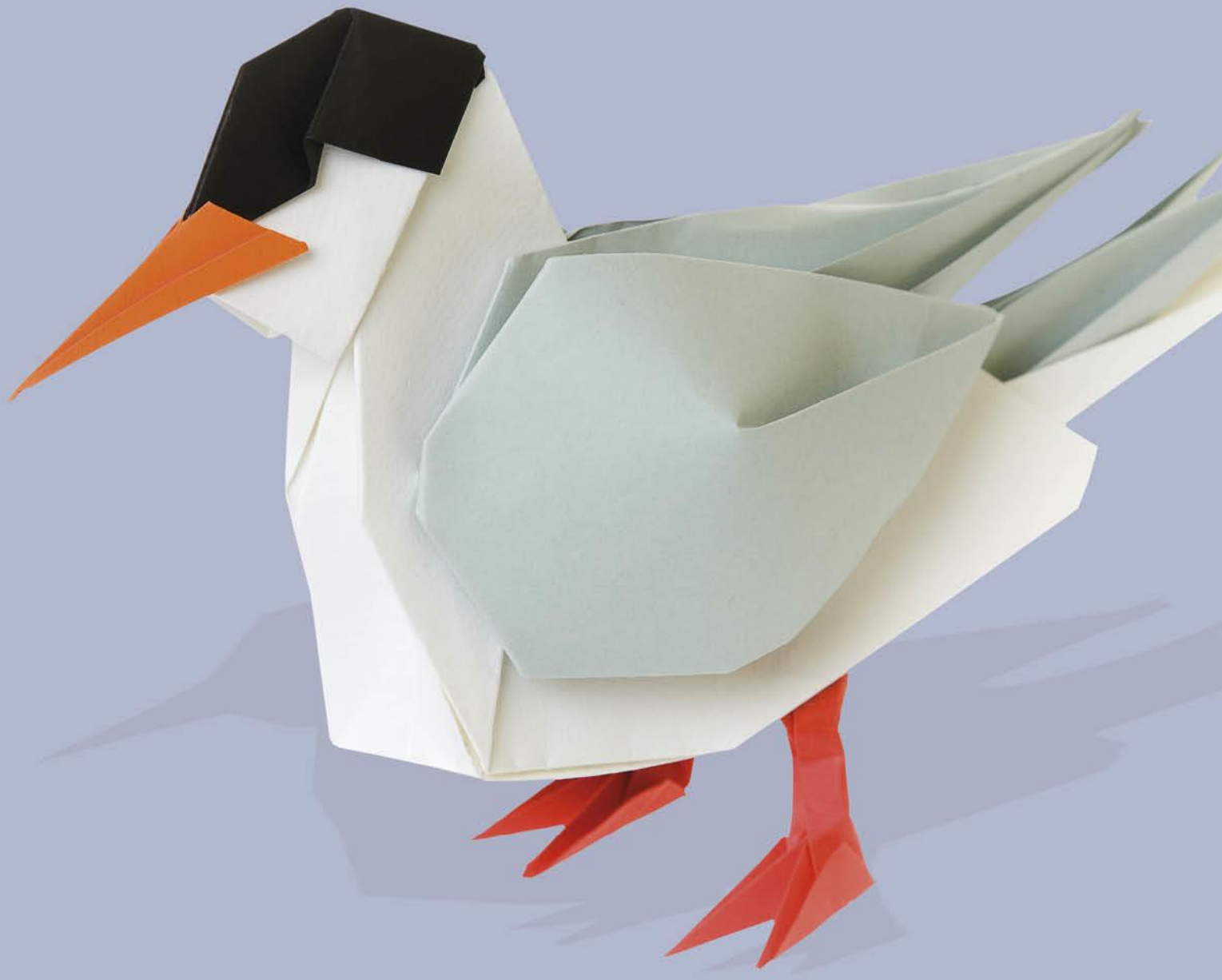
A Level Geography Examiner Marked Student Responses

Paper 1



Pearson Edexcel Level 3 Advanced GCE in Geography (9GE0)

ALWAYS LEARNING

PEARSON

A Level Geography Examiner Marked Student Responses

Contents

Introduction

This guide has been created using student responses to our sample assessment materials in A level Geography Paper 1 (9GEO/01). The answers and examiner commentaries in this guide can be used to show the standards in the A level Geography assessment.

Paper 1 assesses the physical geography topics in the A level Geography specification and is split into 3 sections:

Section A: Students answer all question parts
Question 1: Tectonic Processes and Hazards

Section B: Students answer **either** Question 2 **or** Question 3
Question 2: Glaciated Landscape and Change
Question 3: Coastal Landscape and Change

Section C: Students answer all question parts
Question 4: The Water Cycle and Water Insecurity and The Carbon Cycle and Energy Security

The exam duration is 2 hours and 15 minutes. The paper is marked out of 105 marks and is worth 30% of the qualification.

The exam paper will include open response, calculation and resource-linked questions and calculators will be required. The marks per question item increase throughout each question so that each question will culminate with an extended open response question. Question 1 will culminate in a 12 mark extended open response question. Questions 2, 3 and 4 will culminate in a 20 mark extended open response question.

Our command words are defined in our specification, please see page 95, and will remain the same for the lifetime of the specification. Questions will only ever use a single command word and command words are used consistently across question types and mark tariffs. Our AS and A level Geography Getting Started Guide contains more information about the command words and mark tariffs used for different types of questions.

9GE0/01 Paper 1

SECTION A: TECTONIC PROCESSES AND HAZARDS

Example 1 – Question 1 (b)

1 Study Figure 1 in the Resource Booklet.

The following resource relates to Question 1.

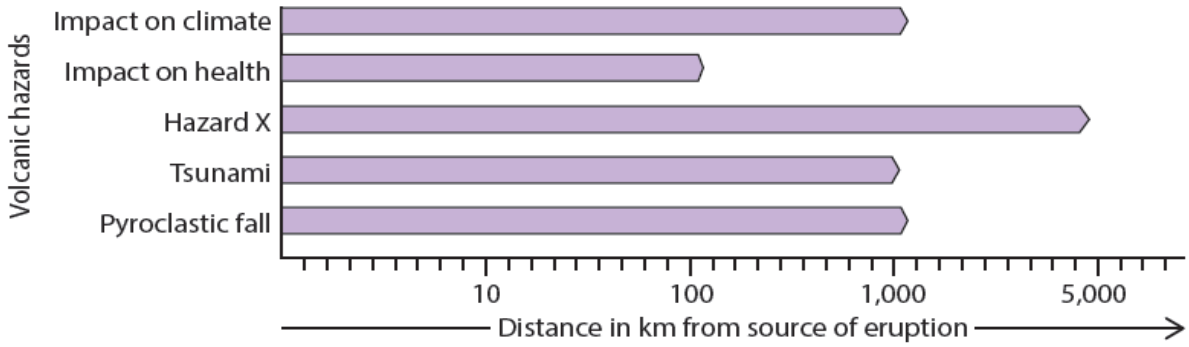


Figure 1

A graph showing the areal extent of selected volcanic hazards

(b) Assess the importance of governance in the successful management of tectonic mega-disasters.

(12)

Mark scheme

Question number	Indicative content
1(b)	**AO1 (3 marks)/AO2 (9 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:

AO1

- mega-disasters are large-scale disasters on either an areal scale or in terms of their economic and human impact
- they pose serious problems for successful management to minimise impact and mitigate the impact of the disaster
- they need often require international management both short term and longer term

AO2

- extreme events are likely to pose serious challenges for any governance, however well-planned, e.g. the 2011 Japanese tsunami
- extreme events are by their nature unpredictable (1- in a 1000-year events) and so prediction is difficult and prevention is impossible, sometimes secondary and tertiary outcomes occur, e.g. Fukushima
- disaster management, pre-, during and after the event, can have a significant impact on losses, e.g. comparison of Japanese tsunami with Indian Ocean, Boxing Day tsunami
- strong governance can lead to very effective management of immediate disaster recovery, e.g. Sichuan earthquake in China, as well as the development of longer-term education and community preparation strategies
- however, management is expensive and with long return intervals there are strains on budgets that may affect levels of investment, e.g. San Francisco and 'the big one'
- democratic governance is also often driven by short-term budgetary constraints which make saving money on management measures very tempting, given that it is expensive
- governance is important but it has limitations such as the affordability of prediction and prevention measures, especially in the management of mega-disasters immediately after the event, e.g. Haiti, therefore, other factors such as level of development are likely to be more important.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–4	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical information/ideas, making limited logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited relevance and/or support. (AO2) • Applies knowledge and understanding of geographical information/ideas to make unsupported or generic judgements about the significance of few factors, leading to an argument is unbalanced or lacks coherence. (AO2)
Level 2	5-8	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas logically, making some relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial but coherent interpretation that is mostly relevant and supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to make judgements about the significance of some factors, to produce an argument that may be unbalanced or partially coherent. (AO2)
Level 3	9-12	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas logically, making relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is relevant and supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to make supported judgements about the significance of factors throughout the response, leading to a balanced and coherent argument. (AO2)

Student answers to 1 (b)

Governance plays a very important role in successful management of mega-disasters, for example if a very corrupt government is receiving aid and money from foreign countries to help those affected it is unlikely that the aid will reach the majority of those who need it. Also how organised the government is plays a very big part as if the government hasn't made steps to modify loss, modify the event, or modifying resilience and vulnerability of the population then there will be bigger losses. An example of this is found in the Tohuku tsunami and earthquake and the Haiti earthquake. Both were mega-disasters with 230,000 dying in the Haiti disaster and just 12,000 dying in the Tohuku disaster despite it being a more serious and powerful event. This difference in deaths was due to two governments having different amounts of success in managing the disasters. The Japanese government had evacuated its population, trained its army to deal with this disaster, performed extensive risk assessments, and implemented plans in the event of a disaster. All of these management strategies were successful and it was due to the governance. However in the Haiti earthquake very little was done by the government both in the preparation for an event and to modify loss afterwards, this was mostly done by some NGOs afterwards. However it is possible that the different loses of the two events is due to their different levels of development as Japan can afford technology and other things in a disaster.

In conclusion governance plays a very important role in successful management of tectonic mega-disasters. However it is not the only role as a country's development is also another factor.

Examiner´s comments

This response is awarded 9 marks.

The candidate starts by making an unsubstantiated point on how poor governance (corruption) would not successfully manage tectonic mega-disasters. Although the candidate is getting AO2 marks here it would have been better to use a named example – perhaps using the Izmit earthquake as a possible exemplar.

The candidate then went on to explain how good governance through preparation and response limited the damage caused by the Japanese 2011 tsunami resulting from the Tohoku earthquake compared to the Haiti 2010 earthquake. The candidate did, however, evaluate the role of governance by examining the role of different levels of economic development in causing the differences in the impacts between these two mega-disasters.

This allows the candidate to access Level 3 as the answer shows some of the AO2 characteristics namely:

• Applies knowledge and understanding of geographical information/ideas logically, making relevant connections/relationships. (AO2)

• Applies knowledge and understanding of geographical information/ideas to make supported judgements about the significance of factors throughout the response, leading to a balanced and coherent argument. (AO2)

The candidate could have developed their answer further into Level 3 by examining the issues caused by long return intervals as well as short-term budgetary constraints. This would have meant the candidate was secure in AO2 characteristic:

• Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is relevant and supported by evidence. (AO2)

A mega-disaster is where 2500 people were killed and the GDP of that country was reduced by 5% for a year. Before a disaster occurs, early warning systems can be put in place to alert people before a disaster strikes. This allows people to escape safely via evacuation plan routes. Also the government can invest in hazard proof infrastructure, which stops building from collapsing which reduces the impact of the disaster. Also they can allocate a budget for repair. This budget will cover most items in order to return to a good quality of life. Also people can insure possessions in case they get broke or destroyed during a natural disaster. A stable government will rebuild fast and recover fast but also build to a higher quality of life than before. However, an unstable government will take longer to rebuild but also to a lower quality of life than before due to insufficient funding. If highly invested in natural disaster strategies, it will reduce the overall impact of the hazard. However if not prepared against, the hazard will have a greater effect. Often, if a hazard is left unprepared it will leave the country in a state of total poverty.

Examiner´s comments

This response is awarded 7 marks.

The candidate discusses a variety in ways (which can be considered as examples) in which the impacts of tectonic hazards can be reduced, but as there are no named exemplars used these management strategies are rather generic to tectonic hazards and not to tectonic mega-disasters. They are also not clearly linked to governance. The candidate then assesses the need for governance by examining the likely impacts of not having any governance. As a result it was thought that the candidate demonstrated Level 2 AO1 as they showed:

- Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1)

To obtain Level 3 the candidate could have used named examples to support the discussion of management strategies. The candidate could have also used mega-disaster examples.

The candidate also demonstrated Level 2 AO2 as the response showed:

- Applies knowledge and understanding of geographical information/ideas logically, making some relevant connections/relationships. (AO2)
- Applies knowledge and understanding of geographical information/ideas to produce a partial but coherent interpretation that is mostly relevant and supported by evidence. (AO2)
- Applies knowledge and understanding of geographical information/ideas to make judgements about the significance of some factors, to produce an argument that may be unbalanced or partially coherent. (AO2)

To obtain a higher mark the candidate should ensure that the answer is focused on what constitutes successful management and how governance plays a role in it.

Park's model is used to show the quality of life over time after a hazard event takes place. The advantages of this are that the curves can be drawn on the same graph, as well as showing the development. However, the disadvantages are that it is general and does not show the different levels of development. Another way is to build the resilience a community has to a mega-disaster. This could be done by changing the way a building is constructed to prevent it from falling. As well as making adaptations to a community to increase the resilience so that it is able to live in an active tectonic site. However increasing the resilience can also be hard to do because many disasters can be hard to predict and to reduce the vulnerability and increase the resilience, changes must be made before the disaster take place.

Also the amount of money that is put into the management can also determine how successful it is. More money can be spent on management in a MEDC, such as America and Japan, which means there will be a higher chance of the management being successful. This is the opposite to the money spent on management in Asia and countries surrounding the Indian Ocean. As well as there being no money to put into management in LEDCs, there may also be corruption in the government which stops the money that's meant to be spent on management being spent on something else.

This therefore increases the vulnerability that that country has to the disasters.

Examiner´s comments

This response is awarded 4 marks.

The candidate starts by evaluating the Parks model of how a country responds to a tectonic event and so is not focused on the question. The candidate then examines whether the resilience of a community can be improved but lacks exemplars as well as a clear link to governance and mega-disasters. The candidate then examines the role of the level of economic development but again is not focused on the key words of the essay - what constitutes successful management and how governance plays a role in it.

It therefore demonstrates Level 1 AO1 namely:

- Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1)

It therefore also demonstrates Level 1 AO2 namely:

- Applies knowledge and understanding of geographical information/ideas, making limited logical connections/relationships. (AO2)
- Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited relevance and/or support. (AO2)
- Applies knowledge and understanding of geographical information/ideas to make unsupported or generic judgements about the significance of few factors, leading to an argument is unbalanced or lacks coherence. (AO2)

SECTION B: LANDSCAPE SYSTEMS, PROCESSES AND CHANGE

Example 2 – Question 2 (a)

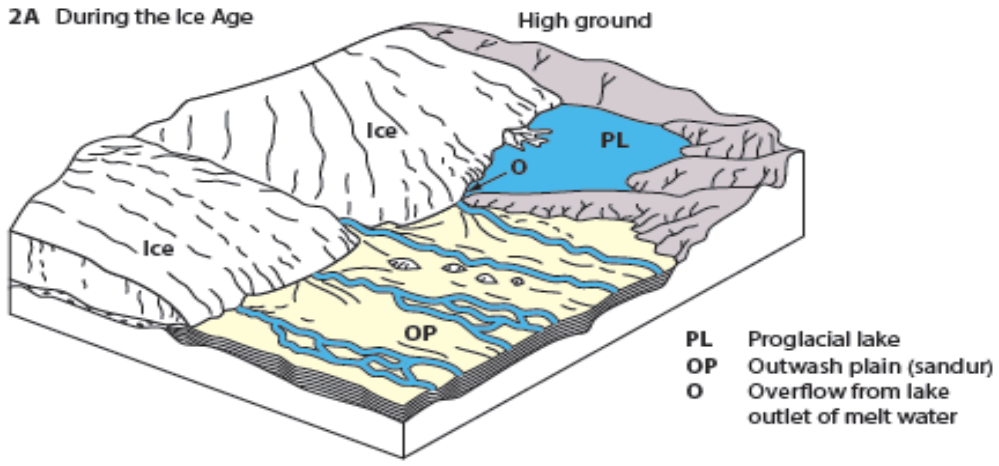
2 Study Figure 2 shows a lowland glaciated landscape during and after glaciation.

Figure 2 shows a lowland glaciated landscape during and after glaciation.

(a) Study Figure 2A.

Explain how meltwater has contributed to the formation of the proglacial features shown.

(6)

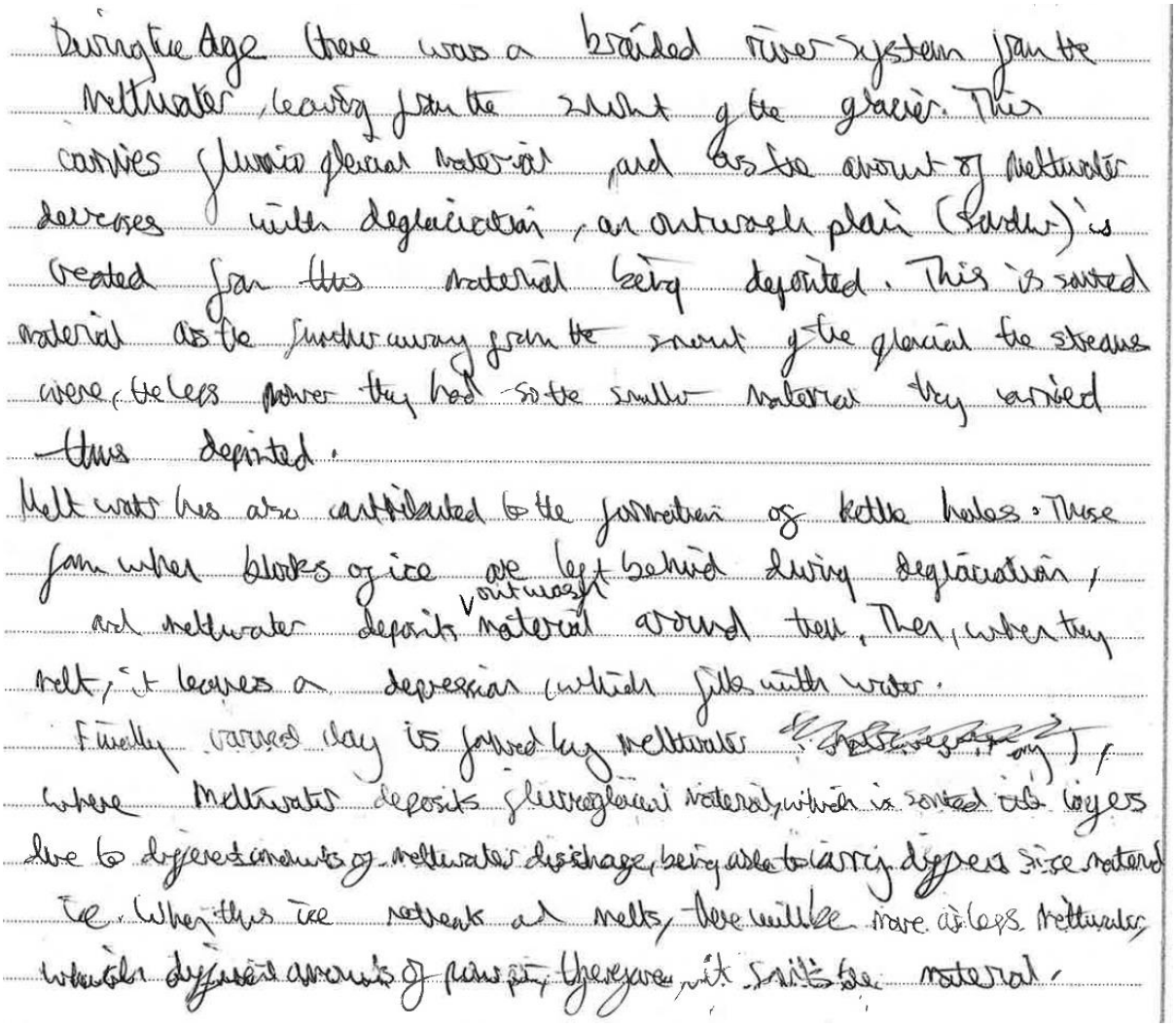


Mark scheme

Question number	Answer
2(a)	**AO1 (3 marks)/AO2 (3 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • meltwater creates both erosional features and depositional features • depositional features dominate and tend to produce plains of outwash material, as water slows down and deposits its load • the features are inevitably complex and mixed with glacial features which are frequently modified by meltwater **AO2** • the meltwater from the proglacial lake may spill through the lower ground between ice front and higher ground carving a meltwater channel • the layers of material on the lake floor will be varved deposits as alternate winter and summer melting leads to banded deposits forming on the lake floor – little deposition in winter, much more in summer • The proglacial lake's shoreline may have kames and terraces where it juxtaposes higher ground • There are signs of a kame delta where the ice front is in contact with the proglacial lake • There are discreet lumps of ice partially buried in the Outwash Plain when these melt they will form kettle holes which become kettle lakes in post-glacial times • The extensive proglacial flat area or outwash; plain is also known as sandur is formed from coarser, sandy deposits carried outwards from the edge of an ice sheet by anastomosing/braided meltwater streams that will have highly variable discharge and capacity

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
Level 2	3–4	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
Level 3	5–6	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Student answers to 2 (a)



During the Age there was a braided river system from the meltwater, leaving from the snout of the glacier. This carries fluvio glacial material and as the amount of meltwater decreases with deglaciation, an outwash plain (Sandur) is created from this material being deposited. This is sorted material as the further away from the snout of the glacial the streams were, the less power they had so the smaller material they carried was deposited.

Melt water has also contributed to the formation of kettle holes. These form when blocks of ice are left behind during deglaciation, and meltwater deposits outwash material around them. Then, when they melt, it leaves a depression which fills with water.

Finally, varved clay is formed by meltwater [illegible], where meltwater deposits glaciogenic material, which is sorted into layers due to differences of meltwater discharge, being able to carry different size material. When the ice retreats and melts, there will be more or less meltwater which different amounts of power, therefore will sort the material.

Examiner´s comments

This response is awarded 6 marks.

The candidate starts by explaining the formation of a sandur. The candidate obtains AO1 marks by describing the braided river system but then obtains AO2 marks by linking the meltwater to the sorted nature of the sandur. Similarly the candidate is obtaining AO1 by describing kettle holes and varves and AO2 by linking the formation of these features with meltwater.

The answer was therefore thought to be very secure in Level 3 as it showed the attributes of a Level 3 answer namely:

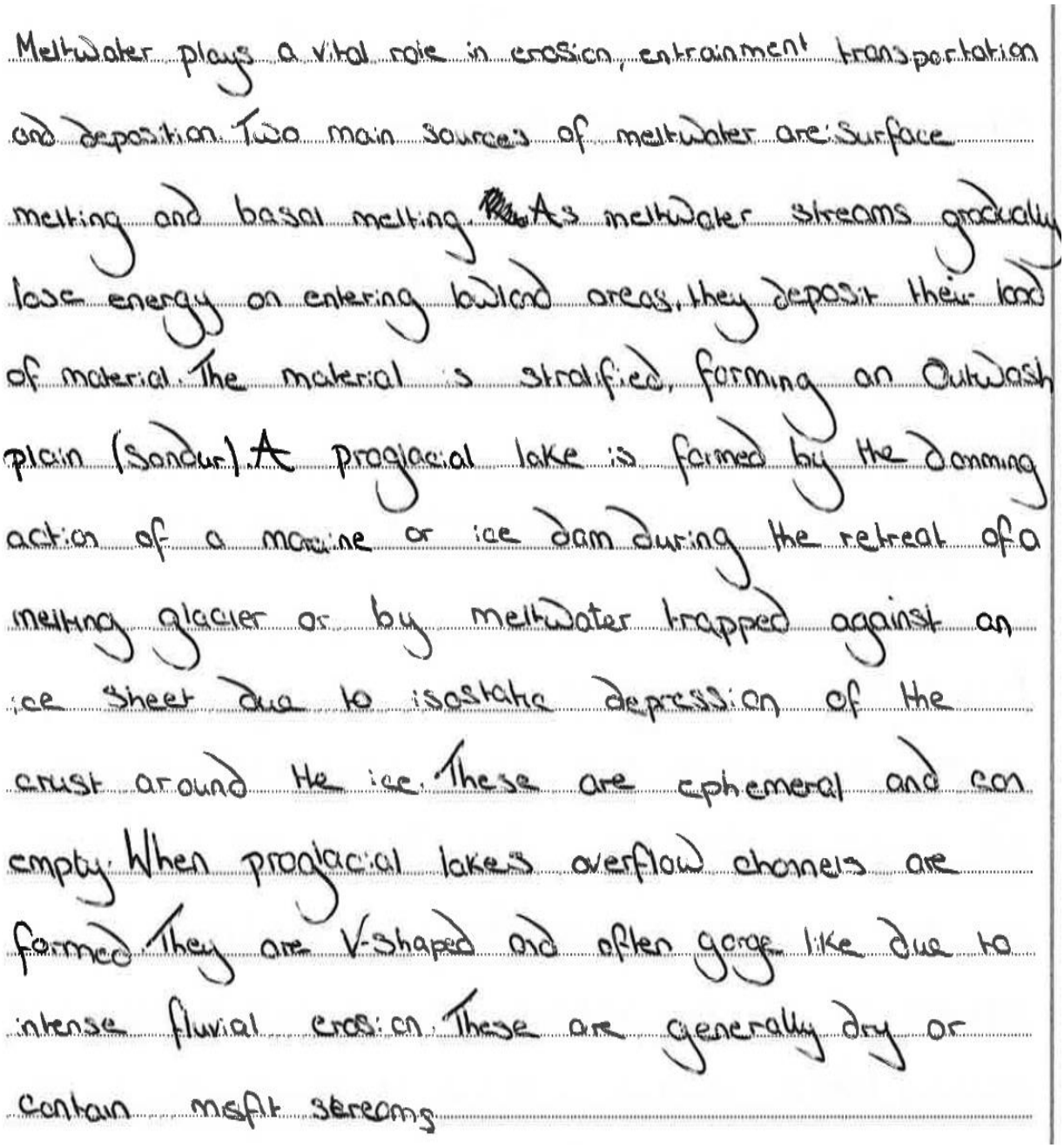
- Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1)
- Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Meltwater frequently contributes towards the formation of proglacial features. Kettle holes are an example. Large peices of ice detatch from the glacier and sink into the sediment. As it melts it leaves a large hole full of meltwater. The outwash plain is also effected by meltwater contributing towards its formation. An out wash plain is a flat expense of land. The sediment is sorted with larger debris towards the snout of the glacier or high up the mountain and smaller debris towards the bottom. This is due to meltwater carrying smaller sediment further. The gourge was formed by meltwater as it eroded the walls and base deeper and wider. During deglaciation the rate of flow of meltwater increases, increasing the rate of erosion of the gourge.

Examiner´s comments

This response is awarded 6 marks.

This answer was also thought to be secure in Level 3. The candidate explains the formation of a sorted outwash plain and so gains AO2 marks. The candidate also explains how the gorge was formed due to increases in erosion also gaining AO2 marks. Although there was some misunderstanding of kettle holes the answer was still thought to demonstrate most of the characteristics of a Level 3 answer and so it was decided that this was worth Level 3 6 marks. This is an example of positive marking where even though one part of the answer wasn't fully correct, there was still enough AO2 material in the answer to obtain 6 marks.



Meltwater plays a vital role in erosion, entrainment transportation and deposition. Two main sources of meltwater are: Surface melting and basal melting. As meltwater streams gradually lose energy on entering lowland areas, they deposit their load of material. The material is stratified, forming an Outwash plain (Sandur). A proglacial lake is formed by the damming action of a moraine or ice dam during the retreat of a melting glacier or by meltwater trapped against an ice sheet due to isostatic depression of the crust around the ice. These are ephemeral and can empty. When proglacial lakes overflow channels are formed. They are V-shaped and often gorge like due to intense fluvial erosion. These are generally dry or contain misfit streams.

Examiner´s comments

This response is awarded 4 marks.

Although the candidate has explained the formation of the sandur and so obtains AO1 marks. They have not however explained the likely stratification that would occur, which would have secured higher AO2 marks. In addition, the explanation of the pro-glacial lake is not explicitly linked to the diagram (where it has been created by a tongue of high land) and instead there is 'text book' explanation. It is important to stress to students that Level 3 has to have 'fully relevant connections' to the stimulus material. In this case it was thought that the answer only showed 'some relevant connections.

This answer is thought therefore to be secure in Level 2. This is because it displays the characteristics of the Level 2 descriptors:

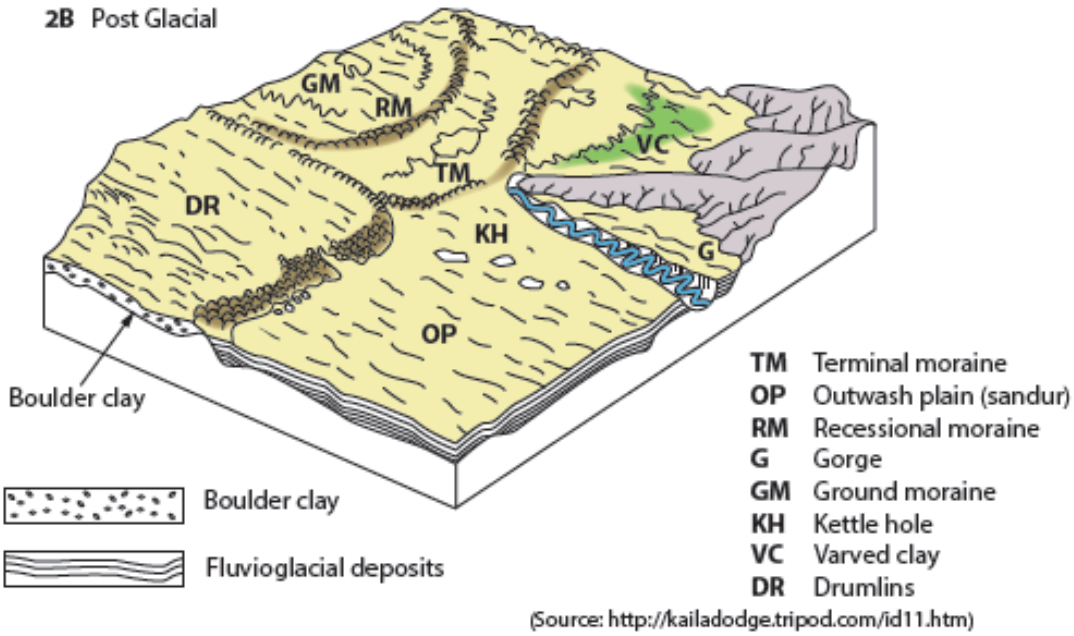
- Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1)
- Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)

Example 3 – Question 2 (b)

(b) Study Figure 2B.

Explain how the landforms shown in Figure 2B can be used to help reconstruct ice movement.

(6)



(Source: http://kailadodge.tripod.com/id11.htm)

Figure 2

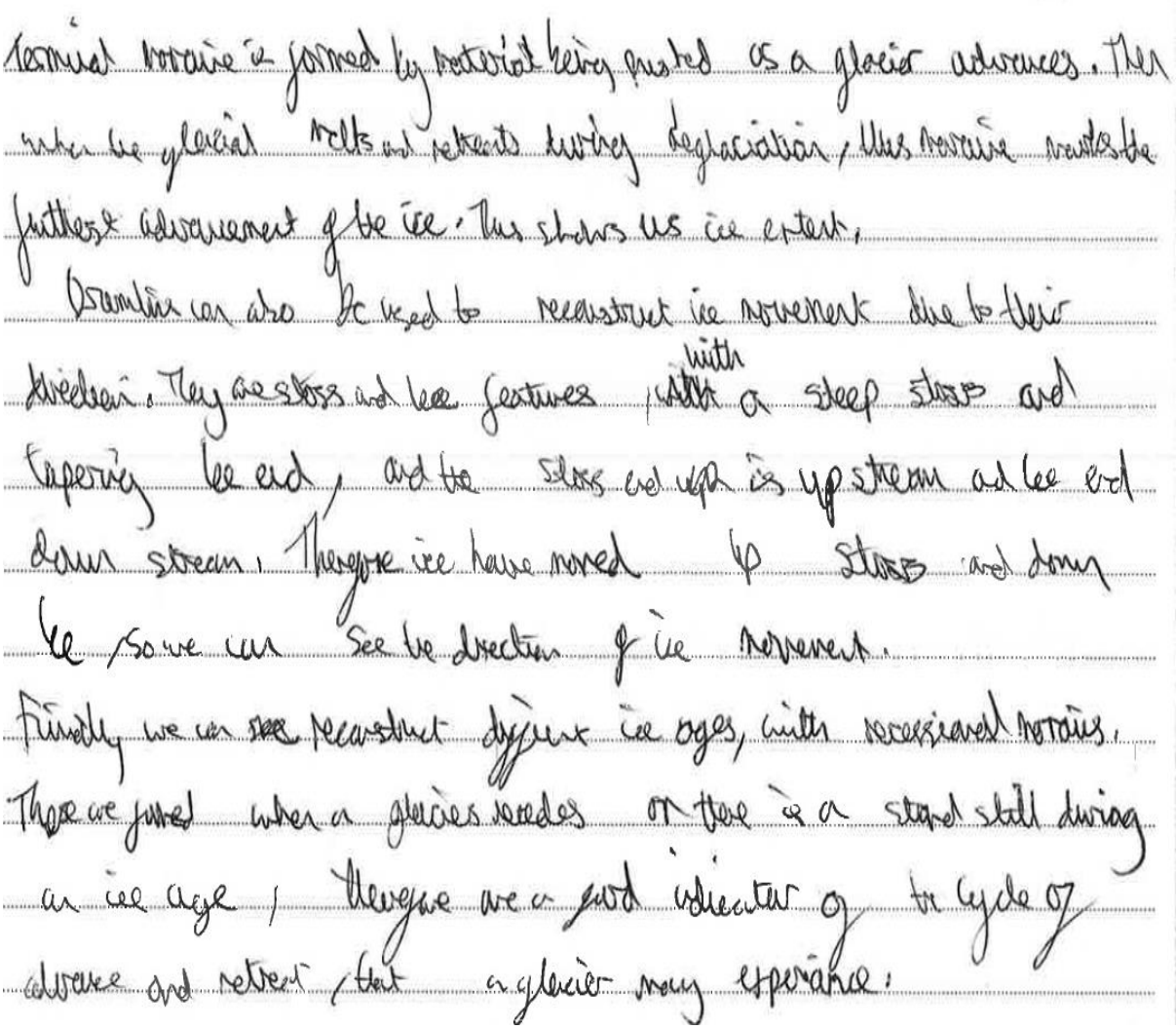
Two diagrams of a glaciated lowland during and after the Ice Age

Mark scheme

Question number	Answer
2(b)	**AO1 – (3 marks)/AO2 – (3 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • till fabric analysis reveals details both of ice direction and the provenance of the ice through the presence of erratics • the alignment of drumlins and other sub-glacial features reveals evidence of the speed and direction of ice flow • the position of marginal fluvioglacial (kames) and glacial (lateral moraines) affords evidence of ice thickness via trim lines • micro-features such as chatter marks and rock striations give important evidence of ice direction and speed • distinctions between ablation and lodgement till give evidence of ice speed and direction **AO2** • recessional and terminal moraines in Figure 2B shows the history of ice extent and retreat on this landscape • ground moraine on Figure 2B made up of till is widely distributed wherever ice has been • drumlin 'field' on Figure 2B also made up of till and extent limited by terminal moraine marking limit to impact of moving ice • fluvioglacial landforms, e.g sandur on Figure 2B can give evidence of the direction of meltwater, as the material is horizontally sorted with the largest deposits at the snout.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
Level 2	3–4	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
Level 3	5–6	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Student answers to 2 (b)



Terminal moraine is formed by material being pushed as a glacier advances. Then when the glacial melts and retreats during deglaciation, this moraine marks the furthest advancement of the ice. Thus shows us ice extent.

Drumlins can also be used to reconstruct ice movement due to their shapes. They are stoss and lee features with a steep stoss and tapering lee end, and the stoss end is up stream and lee end down stream. Therefore ice have moved up stoss and down lee so we can see the direction of ice movement.

Finally we can also reconstruct different ice ages, with recessional moraines. These are formed when a glaciers recedes or there is a stand still during an ice age. Therefore are a good indicator of the cycle of advance and retreat that a glacier may experience.

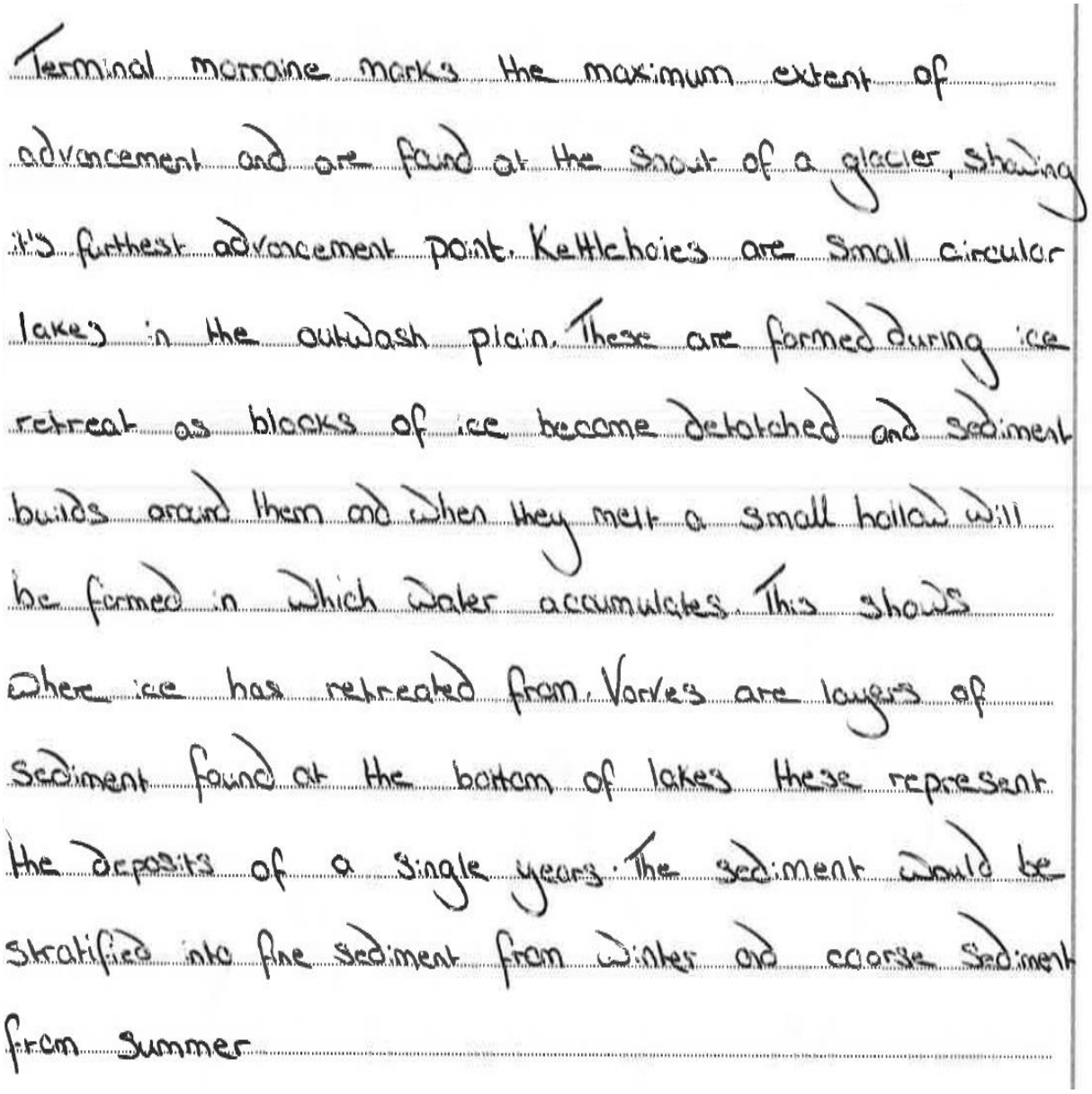
Examiner´s comments

This response is awarded 6 marks.

The candidate starts by describing the formation of terminal moraines and so obtains AO1 marks. The candidate then has descriptions (AO1 marks) and explanations (AO2 marks) of how drumlins and recessional moraines can help reconstruct ice movement, which are good as they clearly indicated how the direction of ice movement is related to the characteristics of the features i.e. 'Therefore ice has moved up stoss…'.

Although some of the explanations are not always accurate (there is some confusion over terminal and push moraines), it was thought that this answer was secure in Level 3 and was awarded 6 marks. This is because it displays the requirements of Level 3 which are:

- Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1)
- Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)



Terminal morraine marks the maximum extent of advancement and are found at the snout of a glacier, showing it's furthest advancement point. Kettlehoies are small circular lakes in the outwash plain. These are formed during ice retreat as blocks of ice became detatched and sediment builds around them and when they melt a small hollow will be formed in which water accumulates. This shows where ice has retreated from. Varves are layers of sediment found at the bottom of lakes these represent the deposits of a single years. The sediment would be stratified into fine sediment from winter and coarse sediment from summer

Examiner´s comments

This response is awarded 3 marks.

This answer starts correctly in partially explaining how the use of terminal moraines can be used to reconstruct ice movement and so obtains AO2 marks. The candidate also describes the formation of kettle holes obtaining AO1 marks but has only a partial explanation of how they can be used to reconstruct ice movement. The candidate is then diverted into explaining varves which is not creditworthy.

This answer was thought therefore to be Level 2 (3 marks) as it has some AO2 marks. This is because it displays the characteristics of Level 2 namely:

- Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1)
- Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)

Terminal moraines show the extent to which the ice advanced to before deglaciation occured. Recessional moraines show the rate at which the glacier retreated due to warmer temperatures. Some periods may have been warmer so a longer gap between recessional moraines is present as the glacier retreated further. Drumlins can help reconstruct ice movement. They show the direction of movement due to the long sloped lee side.

Examiner´s comments

This response is awarded 2 marks.

In contrast this candidate struggles to obtain AO2 marks. The candidate obtains AO1 marks by explaining the formation of recessional moraines, but as there was no explanation of how to date the moraines their response does not obtain AO2 marks. Although the candidate does obtain AO1 marks for the description of a drumlin they do not gain AO2 marks as their description is not linked to reconstructing ice movement. Both of these elements of the answer are indicative of a key part of the Level 1 descriptor:

- Applies knowledge and understanding to geographical information inconsistently.

This answer was thought therefore to be top of Level 1 (2 marks). This is because it displays the characteristics of Level 1 namely:

- Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1)
- Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)

Example 4 – Question 2 (c)

(c) Explain how the glacial mass balance concept contributes to an understanding of glacial systems.

(8)

Mark scheme

Question number	Answer
2 (c)	**AO1 – (8 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: • systems consist of inputs, stores and outputs • inputs include accumulation from direct snowfall and other precipitation, blown snow and avalanches • store is the quantity of glacier ice that can be transferred down valley to the snout • outputs result from ablation by melting, sublimation and calving • mass balance results from the gains and losses in the ice store and is the difference between inputs and outputs • in a positive net balance, inputs are greater than outputs and in a negative net balance, outputs are greater than inputs • short-term, mass balances vary over a year and their cumulative impact longer term will determine whether the store will increase and the glacier advance or whether the store will decrease and the glacier decrease in size/retreat • systems help the understanding of glacier behaviour.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas, which lack detail. (AO1)
Level 2	3–5	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)
Level 3	6–8	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Student answers to 2 (c)

The glacial system can be defined as the inputs, transfers, stores and outputs of ice + meltwater. The glacial mass balance concept contributes to our understanding of glacial systems as it can be defined as the gains + loses (or inputs + outputs) of ice store in the glacial system. Therefore, helping us understand how the glacial system is continuous. Accumulation is the 'input' and is a result of snowfall and other precipitation, drawn snow and avalanches falling from slopes above the glacier surface. Ablation is the 'output' and this is where snow and ice is lost to the system by melting, evaporation & calving (breaking away of ice blocks + ice bergs). This contributes to our understanding of glacier systems as they are driven by the inputs and outputs assessed of the glacier mass balance (concept.) The mass balance concept contributes to our learning as when the glacial system is adjusting to changes (ie in temperature), this is reflected by variations in the mass balance. For example, in winter when accumulation usually exceeds ablation it results in a positive regime where the mass balance causes the glacier to grow + advance. It is the opposite in the summer when ablation exceeds accumulation and the glacier begins to shrink + retreat. These variations and characteristics of the glacier mass balance concept aid our understanding of the glacier system.

Examiner´s comments

This response is awarded 8 marks.

The answer starts well by defining what the candidate understands to be a glacial system. This is a good approach to 8 mark knowledge and understanding questions as it focuses the remainder of the answer on glacial systems as opposed to a description of the glacial mass balance. The student also clearly links the glacial mass balance to the glacial system. The student then clearly links the variations in a glacial balance to corresponding variations in the glacial system.

This was thought to be very secure in Level 3 and so was awarded 8 marks as it displays the characteristics of a Level 3 answer namely:

- Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1)
- Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

As with the exemplars for Q2a and Q2b it is important to remember that although the response might also have included a consideration of temporal as well as altitudinal variations in the mass balance of a glacier, and how this might aid our understanding of a glacial system, there was still enough AO1 information in the answer to award Level 3 8 marks.

The glacial mass balance concept is the description that explains the glacial systems and on a basic level some of the reasons and effects for retreat or advance of a glacier. The concept splits the glacier in half by the zone of equilibrium which is the balance between the rate of accumulation to the rate of ablation and when one is higher than the other then there will be a ~~mo~~ retreat or advance of the glacier meaning the zone of equilibrium will change. Processes that add to the accumulation zone are ~~snow or~~ avalanches from valley sides and snowfall. The outputs in the ablation zone can occur as meltwater adding to rivers and streams or even direct evaporation from the glacier. This glacial ~~system concept~~ mass balance can help understanding of overall glacial systems. It can be

understood that the more accumulation usually in winter then there is more mass for the glacier and it gets larger and advances. If there is more ablation then the opposite happens and the glaciers mass decreases and it shrinks. Understanding the glacial systems is helped here as people would understand that the glacial system has inputs and outputs that have effect and also that along as equilibrium is maintained there will be no change.

Examiner´s comments

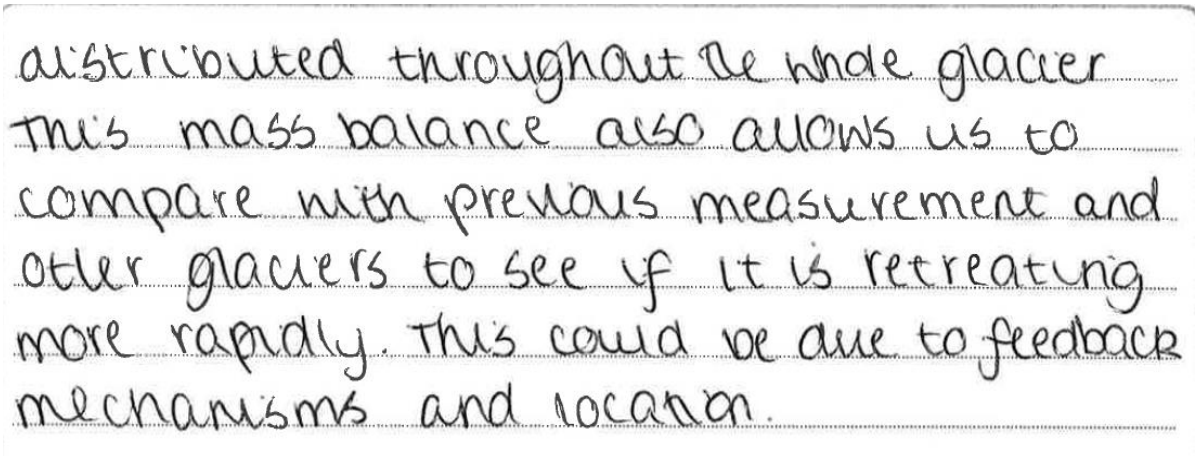
This response is awarded 5 marks.

In contrast to the previous answer this candidate has focused on the concept of mass balance and then implicitly linked it to the glacial system. Their response could have been improved by explicitly linking the last sentence to how variations in the mass balance aids our understanding of the glacial system.

This was thought to be high Level 2 as it displayed the characteristics of Level 2 namely:

- Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies.(AO1)
- Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)

The glacial system recieves snow and ice through accumulation, this is from direct precipitation, avalanches and windblown snow. Glaciers lose mass through ablation due to surface melt. The glacial mass balance is the accumulation minus ablation and this can show us periods of extend and retreat throughout seasons within the year, and will show additions or loses


distributed throughout the whole glacier
This mass balance also allows us to
compare with previous measurement and
other glaciers to see if it is retreating
more rapidly. This could be due to feedback
mechanisms and location.

Examiner´s comments

This response is awarded 2 marks.

The candidate has not focused on the question as, unlike the other two answers, it has no links (explicitly or implicitly) to how the glacial mass balance concept contributes to an understanding of glacial systems. Instead their response is an explanation of the mass balance of a glacier.

This answer was therefore thought to be Level 1 (2 marks) as it displayed the characteristic of a Level 1 answer namely:

- Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1)
- Understanding addresses a narrow range of geographical ideas, which lack detail. (AO1)

Example 5 – Question 2 (d)

(d) Evaluate the extent to which periglacial landscapes are more vulnerable to climate change than glaciated landscapes.

(20)

Mark scheme

Question number	Answer
2(d)	**AO1 (5 marks)/AO2 (15 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. • Level 4 AO1 performance: 4–5 marks.

Indicative content guidance

The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:

AO1

- periglacial landscapes both active and relict are widely distributed and include substantial areas of permafrost
- glaciated landscapes both active and relict include both upland and lowland landscapes formed by a variety of ice mass
- both periglacial and glaciated landscapes can occur as active and relict environments
- climate change will lead to increases in temperature and changes in precipitation, which will impact on both the size and movement of active glaciers and the occurrence of permafrost

AO2

- vulnerability suggests change – in this context, shorter term change over time
- all landscapes change over time without environmental change, simply through the long-term operation of denudational processes
- there is a wide variety of both glaciated and periglacial landscapes that will be subject to change, to a greater or lesser degree
- the degree of change can be related not only to the type of landscape but also to the scale and pace of climate change
- the impacts of climate change are difficult to predict and there are significant regional variations that will impact on these landscapes accordingly, with some of the most significant impacts occurring in both Polar and Alpine environments
- mountain landscapes are inherently more fragile than lowland landscapes simply through gravity, so will be more sensitive to changes in climate than lowland regions
- short-term climate changes are less likely to affect relict glacial and periglacial landscapes in the sense that there will be modifications rather than dramatic change, such as periglacial processes

- active periglacial and active glacial areas will show much more substantial landscape changes although in the case of periglacial landscapes, these will not translate into such dramatic surface changes.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–5	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical ideas, making limited and rarely logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited coherence and support from evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2)
Level 2	6–10	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)
Level 3	11–15	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2)
Level 4	16–20	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

Student answers to 2 (d)

periglacial environments (and climates) are located outside the margins of past and present ice sheets but are responding to similar climate forcings, they are thus more sensitive to climate change.

The candidate starts by defining periglacial landscapes and then asserts that they are more sensitive to climate change. In this way the candidate is obtaining AO1 marks but could have developed their answer by indicating the likely effects of climate change on both periglacial and glacial relict and active landscapes, which would then become the focus of their answer as indicated in the indicative content in the mark scheme shown below:

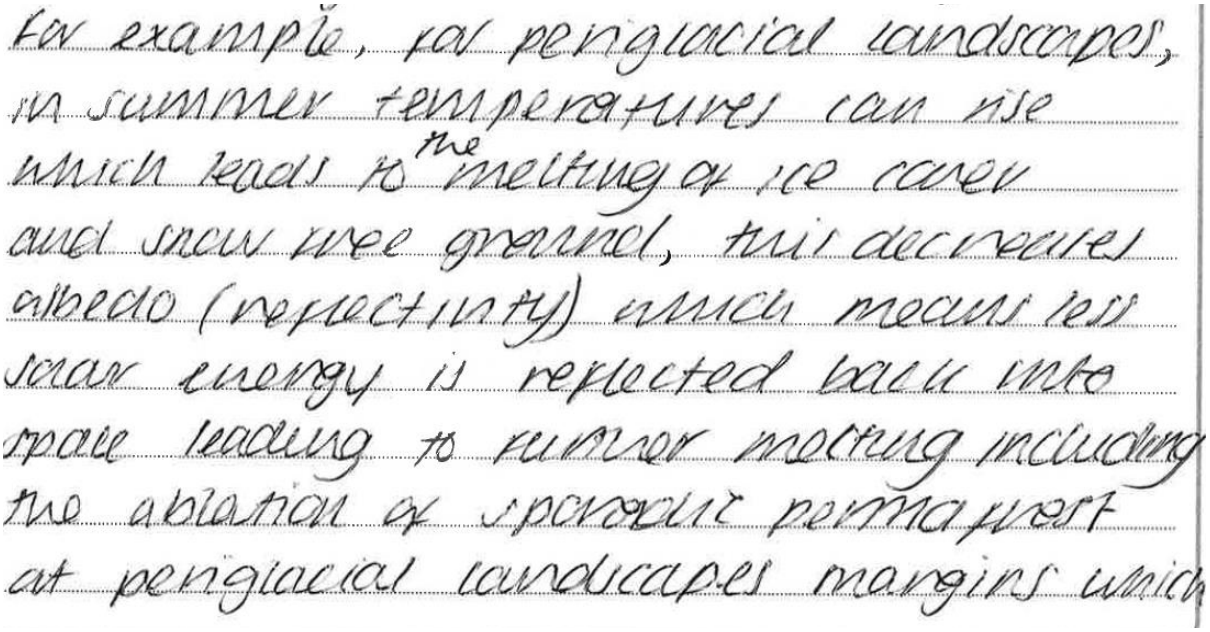
AO1

Periglacial landscapes both active and relict are widely distributed and include substantial areas of permafrost

Glaciated landscapes both active and relict include both upland and lowland landscapes formed by a variety of ice mass both periglacial and glaciated landscapes can occur as active and relict environments

Climate change will lead to increases in temperature and changes in precipitation, which will impact on both the size and movement of active glaciers and the occurrence of permafrost

Where periglacial (and ice) ~~landscape~~ area, sporadic permafrost lies at its margins and is usually very fragmented and only a few metres thick. Periglacial landscapes are affected by positive feedback mechanisms which make the area prone to climate change. A positive feedback mechanism is a feed back effect that can amplify a small change and make it larger.


for example, for periglacial landscapes, in summer temperatures can rise which leads to the melting of ice caves and snow over ground, this decreases albedo (reflectivity) which means less solar energy is reflected back into space leading to further melting including the ablation of sporadic permafrost at periglacial landscapes margins which

It is thought that this part of the answer would gain Level 2 AO1 marks. This is because there is only limited AO1 detail which could have been improved through the use of place locations, predicted rises in temperature and rates of melting and predicted losses of permafrost areas. The answer therefore demonstrates Level 2 AO1 criteria namely:

- Demonstrates geographical knowledge and understanding which is occasionally relevant

The answer is also obtaining Level 2 AO2 marks through explaining why periglacial landscapes are vulnerable to climate change, by linking rising temperatures to increased melting and therefore the subsequent absorption of more solar radiation, leading to further losses. This means that the answer is thought to have demonstrated the following AO2 characteristic:

- Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2)

The answer could have been improved by adding more AO1 knowledge which would have allowed the candidate to access higher level AO2 marks as it would have allowed the answer to produce an interpretation as well as allowing some on-going evaluation. This would therefore meet the other two criteria of the level namely:

- Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2)

and

- Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)

emit the harmful greenhouse gas methane into the atmosphere all leading to higher temperatures, less snow/ice cover, decreased albedo and in general, more climate change.

The answer is then side tracked into explaining how the melting of permafrost areas might lead to further increases in temperature due to the release of methane, a powerful greenhouse gas. Whilst this is true it does not explain why periglacial areas are more or less vulnerable to climate change than glaciated areas.

However, in contrast, glaciated landscapes are less vulnerable to climate change despite still being affected by positive feedback mechanisms. The change For example, the vast amount of ice cover in glaciated areas leads to an increased surface albedo which means more solar energy is reflected back into space, leading to less exposure to greenhouse gases and further cooling is amplified whereas the climate change in glaciated landscapes is diminished. Therefore, periglacial landscapes are more vulnerable to climate change than glaciated landscapes.

(Total for Question 2 = 40 marks)

It is thought that this part of the answer would also gain Level 2 AO1 marks. As with the first part of the answer, there is only limited AO1 detail. The answer could be improved through the use of widely quoted information on glacial retreat in Alpine areas, as well as the predicted temperature changes in high latitudes. The answer therefore demonstrates Level 2 AO1 marks as it:

- Demonstrates geographical knowledge and understanding which is occasionally relevant

There is a misunderstanding of the importance of the role of the albedo effect in upland areas with regards to climate change. The answer suggests that there will be less ablation as there is a greater mass of ice reflecting the solar radiation back. Whilst this may be a factor in the predicted rate of retreat of some upland glacial areas, the impacts of changing temperatures and precipitation levels are expected to play a far greater part in future changes in glaciated areas than a consideration of the (lack of) change of the albedo in such areas.

There is a conclusion that is based on the evidence provided and so the answer displays the characteristics of a Level 2 AO2 answer namely:

- Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2)
- Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2)
- Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)

Examiner´s summative comments

This response is awarded 10 marks.

The answer could have been improved by considering:

Temporal considerations particularly shorter term change over time compared to long term changes as all landscapes change over time without environmental change, simply through the long-term operation of denudational processes. The degree of change can therefore be related to the scale and pace of climate change.

There are also spatial considerations as there are significant regional variations that will impact on these landscapes accordingly, with some of the most significant impacts occurring in both Polar and Alpine environments. Mountain landscapes are inherently more fragile than lowland landscapes simply through gravity, so will be more sensitive to changes in climate than lowland regions.

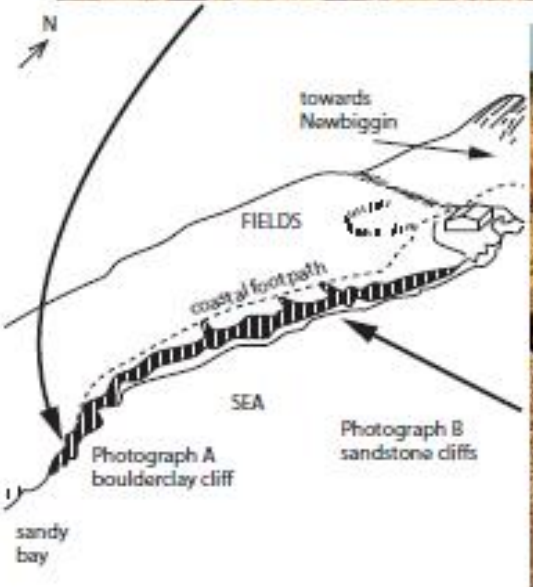
Example 6 – Question 3 (a) (i) & (ii)

3 Study Figure 3.

(a) (i) Explain the formation of the cliff profile shown in photograph 3A.

(6)

Photograph 3A



Photograph 3B

(Source: Photos – Sue Warn)

Figure 3

Two photos and a diagram showing contrasting coastal features in the north of England

Mark scheme

Question number	Answer
3(a)(i)	**AO1 (3 marks)/AO2 (3 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • cliff profiles are a consequence of wave attack, subaerial processes and the nature of the material • wave action undercuts cliffs through abrasion and hydraulic action • softer and more jointed rocks will erode more rapidly because of lower levels of physical strength and cohesion and smaller surface areas • beaches can act as 'shock absorbers' to dissipate wave energy and protect cliff lines **AO2** • this cliff is low – about 6 metres and low angled, suggesting rapid erosion rates • the boulder clay shown is a soft and relatively easily eroded material • the impact of abrasion employing the large boulders, seen in the photograph, that are a consequence of erosion, will make cliff erosion very rapid • there are clear signs of rotational slumping on the cliffs, suggesting that subaerial processes are significantly de-stabilised by wave action at the cliff base.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
Level 2	3–4	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
Level 3	5–6	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Student answers to 3 (a) (i)

The cliffs at 3A are low lying and have a shallow gradient due to its lithology. It is made of soft clay. Clay is more susceptible to marine erosion than hard rock, therefore the cliff is more likely to collapse and recede due to corrosion, corrasion, attrition, wave pounding and hydraulic action and so the sea undercuts the cliff causing it to slump. Alternatively, clay is also less resistant to weathering than hard rock, therefore the cliff is also attacked from the top by physical, biological and chemical weathering, and so further weakening the cliff system and causing the rock to be low and collapsing. Also the clay is easily susceptible to chemical weathering as it is more permeable than hard rock, therefore absorbs water and chemicals and so becomes denser, causing the cliff to slump under its own weight to form the coast.

Examiner´s comments

This response is awarded 4 marks.

The candidate starts strongly with good use of terminology such as 'lithology' as well the use of erosional processes such as corrosion and corrasion (abrasion) gaining the candidate AO1 marks. The candidate also recognizes the importance of sub-aerial processes in the development of the cliff profile and explains a plausible weathering process.

The candidate is obtaining AO2 marks for linking the rock type (clay) with resistance to erosion and subsequent collapse leading to the cliff profile shown in photograph 3A.

The candidate, however, confuses the concepts of porosity and permeability and could have used the data on the resource (6m high cliff) as well as explaining the role of mass movement processes that are clearly occurring on this cliff face, which have an important influence on the cliff profile.

As a result it though that the candidate demonstrated the attributes Level 2 namely:

- Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1)
- Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)

The cliff shown in figure A is made up of clay, a soft rock. This means that the cliff isn't very high or very steep due to it being easily eroded. The beach beneath the cliff is made up of boulders. There is evidence of slumping in the figure as towards the base of the cliff the rock has started to move. This is due to both marine erosion and chemical weathering. Clay is a very

permeable rock and will soak up water. When acid rain attacks the cliff, the water will soften the rock causing it to slide downwards. The erosion processes of corrosion, corrasion, attrition, wave pounding and hydraulic action will weaken the base of the cliff, causing higher rock to slump. The boulders at the base of the cliff on the beach have been worn away and have become smooth.

Examiner´s comments

This response is awarded 3 marks.

The candidate starts by identifying that the rock is clay and so 'soft' gaining AO1 marks. There is, however, less terminology than the previous candidate. The candidate also recognizes the importance of sub-aerial processes in the development of the cliff profile and explains a plausible mass movement process, but again lacks terminology expected at A level. This does however gain AO2 marks as the candidate is linking the mass movement process (slumping) to the eventual cliff profile. There is then some use of terminology such as the use of erosional processes such as corrosion/corrasion also gaining AO1 marks.

The candidate, however, also has a slight misunderstanding of the concept of porosity and permeability and could have used the data on the resource (6m high cliff) as well as explaining the role of erosion in starting the cliff retreat process.

The candidate demonstrates some attributes of Level 2 but is not as secure in AO2 as the previous candidate and so obtains 3 marks.

(ii) Explain the influence of rock structure and lithology on the physical features shown in photograph 3B.

(6)

Mark scheme

Question number	Answer
3(a)(ii)	**AO1 (3 marks/AO2 (3 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:

AO1

- structure involves the disposition of rock and its bedding planes which determines its strength and the surface area exposed to wave erosion and subaerial processes
- structure involves the jointing of rocks which will also impact on surface area and the physical resistance of rocks to erosion
- lithology is the hardness or rock strength/make up
- rock hardness affects its resistance to wave processes
- lithology will also determine the porosity of rocks

AO2

- photograph suggests that sandstone is relatively resistant – high cliffs (12 metres)
- the cliffs shown are steep/quasi-vertical, suggesting resistance
- the large, flat-slabbed boulders on beach suggest both high strength and limited jointing
- the photograph suggests that sandstone is horizontally bedded
- the variation of the profile (notch) shown suggests impact of differential erosion either because of the contrasting geology and/or wave action.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
Level 2	**3–4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
Level 3	**5–6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Student answers to 3 (a) (ii)

The rock's lithology must be hard because the picture shows high cliff faces (12 m), therefore only hard rock could hold its own weight as part of a cliff face and not slump (like soft rock). Also, the rocks structure contributes to the amount of material eroded/collapsed and what shape it tends to fall as. In the picture, the material along the beach tends to be large blocks of hard rock, therefore are less likely to be created by general erosion and cliff recession and more likely to be created due to faulting, which means the rock's structure contains weaknesses. Alternatively the bedding planes create weaknesses to be exploited by erosion, therefore mass movement of rock tends to be a large collapse of cliff rather than general recession of soft rock.

Examiner´s comments

This response is awarded 4 marks.

The candidate starts well by using the resource (12m) to compare the two cliff profiles. The candidate also correctly identifies that a key factor in determining the physical features in the photograph is the resistance of the rock (lithology). The candidate is therefore gaining AO2 marks by linking the lithology to resistance to the cliff features shown in photograph 3B.

The candidate also recognises that the talus found at the foot of the cliff was the result of mass movement gaining both AO1 and AO2 marks.

The candidate, however, has a misunderstanding of the concepts of geological structure as well as the role of faulting and should have also explained how it is alternating bands of rock that also has a key role in determining the physical features shown.

The candidate demonstrated the attributes Level 2 namely:

- Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1)
- Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)

The rock shown in figure 3B is hard rock as it has a height of 12 m and the cliff is quite steep. This causes the rock to erode quite slowly and unevenly, hence the jagged surface. There is also a few bedding planes shown in the rock which would act as weak points in the cliff and could erode into a wave cut notch. The cracks and faults in the cliff would cause the rock to break apart in chunks and would collect at the bottom, as shown in figure 3B - a wave cut platform.

Examiner´s comments

This response is awarded 3 marks.

The candidate starts well by using the resource (12m) to explain how hard rock makes the cliff steep gaining AO1 marks. The candidate also correctly identifies that there appears to be differential rates of cliff retreat due to the bedding planes gaining the candidate AO2 marks as they are linking lithology to the physical features as well as explaining how the bedding planes would also influence the features shown in photograph 3B.

The candidate, however, also has a misunderstanding of the concepts of geological structure and faulting and should have explained how it is the alternating bands of rock that have a key role in determining the physical features shown.

The candidate demonstrates some attributes of Level 2 but is not as secure in AO1 marks as the previous candidate and so obtains 3 marks.

Example 7 – Question 3 (b)

(b) Explain how the sediment cell concept contributes to the understanding of coastal systems.

(8)

Mark scheme

Question number	Answer
3(b)	**AO1 (8 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: • the processes of erosion, transportation and deposition within the coastal margin is largely contained in sediment cells or littoral cells • so coastal systems are largely self-contained • there are both onshore and offshore processes which contribute to the sediment cells, influencing the size of store • there are 11 large sediment cells in England and Wales • a sediment cell is generally thought to be a closed system, which suggests that no sediment is transferred from one cell to another • the boundaries of sediment cells are determined by the topography and shape of the coastline, with a major role played by peninsulas • these act as natural barriers that prevent the transfer of sediment from one cell to another • in reality, however, it is unlikely that sediment cells are fully closed with variations in wind direction and tidal currents, meaning that there is some transfer between cells. Fine material is most likely to be transported between sediment cells • there are also many sub-cells of a smaller scale existing within the major cells.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas, which lack detail. (AO1)
Level 2	3–5	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)
Level 3	6–8	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Student answers to 3 (b)

A coastal system will have inputs, throughputs and outputs to transport material along the coast. The inputs will be from erosion and weathering which breaks down material from the cliffs along the coast. Longshore drift will then deposit material elsewhere. The sediment cell concept suggests that the output of one area of the coastline will become the input of another area, where material will be deposited. This is shown in East Anglia - sediment cell 3. Coastal defenses in places along the coast trap sediment preventing longshore drift to output the material. This then deprives other areas of input and encourages erosion. This shows how sediment is transported along a coastline and the input and output of material can be affected.

Examiner´s comments

This response is awarded 4 marks.

The candidate correctly identifies that a coastal system has inputs, throughputs and outputs and is therefore well focused. The candidate then continues to identify the coastal processes involved in such as system, explain a key concept of the sediment cell and names a sediment cell from the UK. The candidate then explains that within a sediment cell human activities can disrupt the movement of sediment within the cell.

The candidate could have explained that there are both onshore and offshore processes which contribute to sediment cells and influence the size of stores. The candidate could have emphasised that a sediment cell is generally thought to be a closed system, which suggests that no sediment is transferred from one cell to another. This is a result of topography and shape of the coastline, with a major role played by peninsulas. Yet, it is unlikely that sediment cells are fully closed with variations in wind direction and tidal currents, meaning that there is some transfer between cells.

As a result it was thought that the candidate demonstrated the characteristics of Level 2 namely:

- Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies.(AO1)
- Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)

A system is a series of processes which (cumulatively) coordinate the input, throughout and output of a coast.

Coastal systems rely on the sediment cell it is within. Therefore one coastal system is linked to a chain of other systems because of their existence within one sediment cell. For instance, the output of one coastal system is the input of another coastal system. The direction of which coastal systems 'feed' off one another is determined by the general direction of material transportation across the sediment cell. Therefore the understanding of longshore drift, marine erosion and weathering, storages and land formations of a coastal system relies on an understanding of that systems place within its cell. An example of this is east Anglian coast - sediment cell 11 - where coastal systems like Great Yarmouth feed into Southwold according to the direction of the cell it's in (from the wash to The Thames).

Examiner´s comments

This response is awarded 3 marks.

The candidate identifies that a sediment cell has a series of processes within it, but unlike the other candidate, does not correctly link the system and coastal processes. The candidate also correctly identifies a sediment cell and identifies movement of sediment within this system.

Unfortunately the candidate does not explain clearly the processes acting within a cell and instead links processes to other 'coastal systems'.

The candidate could have explained that there are both onshore and offshore processes which contribute to sediment cells and influence the size of stores.

The candidate should have also emphasised that a sediment cell is generally thought to be a closed system, which suggests that no sediment is transferred from one cell to another. This is a result of topography and shape of the coastline, with a major role played by peninsulas. Yet, it is unlikely that sediment cells are fully closed with variations in wind direction and tidal currents, meaning that there is some transfer between cells.

As a result the candidate demonstrated some aspects of Level 2 and was awarded 3 marks.

Example 8 – Question 3 (c)

(c) Evaluate the contribution that changes in sea level make to the formation of coastal landscapes.

(20)

Mark scheme

Question number	Answer
3(c)	**AO1 (5 marks)/AO2 (15 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. • Level 4 AO1 performance: 4–5 marks. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:

	AO1 • coastal landscapes are made up of an assemblage of landforms that have developed over time – some in the short term, e.g. beach cusps, some over a much longer term, e.g. headland and bays • coastal landscapes are affected by the nature of the coastline before sea-level change, e.g. whether it is glaciated or not, which will affect the rate of erosion and deposition • the topography of the coastline is important – steep as opposed to low-lying coastal regions • the disposition of rocks, concordant or discordant, will affect the development of particular landforms • the direction of sea-level change (i.e. positive or negative) will have significant impact on the type of landscape that develops **AO2** • submergence of coasts results from a relative rise in sea level and results is a variety of flooded valleys changing the shape and form of coastlines and, inevitably the landforms • emergence of coasts results from a relative fall in sea level, resulting in a variety of features such as offshore bars, raised beaches and fossil cliff lines. • coastal landscapes are a consequence of a complex history of relative change so both emergent and submerged features can be found in the same areas, e.g. Scotland with fjords and raised beaches • sea-level change is both short term and long term with short-term changes involving a tidal range, e.g. between spring and neap tides, that has a significant impact on landform formation. Short-term sea-level changes create daily changes to some coastal landforms, especially beaches • storm surges will also increase sea levels in the short term and have a significant impact on the creation of landforms, which can be dramatic, e.g. Hurricane Katrina • longer-term changes are a result of a complex combination of eustatic,
	isostatic and sometimes tectonic movements which result in landscape changes, e.g. post-glacial sea-level rise • sea-level changes both short term and long term suggest that coastal landforms are in dynamic equilibrium with the processes that create them.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–5	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical ideas, making limited and rarely logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited coherence and support from evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2)
Level 2	6–10	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)
Level 3	11–15	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2)
Level 3	16–20	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

Student answers to 3 (c)

Coastal landscapes are made up of an assemblage of landforms that have developed over time – some in the short term such as beach cusps and some over a much longer term such as headland and bays. Coastal landscapes are influenced by many factors such as the topography of the coastline as well as the lithology and the disposition of rocks such as whether they are concordant or discordant. Sea level change is another factor that can influence the formation of coastal landscapes. Sea level change is the change in the relative levels of the sea and the land. Major causes of sea level change include eustatic, isostatic and tectonic movements. This creates landforms of both emergence and submergence.

A key contribution that changes in sea level make to the formation of coastal landscapes are through eustatic changes. These occur on a global scale and are due to changes in the volume of water in the ocean. During the last glacial period water was in a frozen state in ice caps and glaciers and so caused a fall in global sea levels. Subsequent melting of the ice has meant sea levels have risen by 120m. Recently there has been the thermal expansion of the oceans caused by global warming but this is on a far smaller scale – since 1900 it is estimated that sea levels have risen by 20cm. Eustatic changes therefore contribute to coastlines of emergence where sea levels fall and submergence where sea levels rise. In submergent coastlines such as the SW England the impact of rising sea levels creates what drowned river valleys called rias due to the process of marine transgression'. As sea levels rise the pre-existing drainage pattern becomes submerged and flooded with sea water. This creates broad but shallow inlets with often steep valley sides a winding profile which reflects the original route of the river and a fairly uniform depth such as the River Dart and Dartmouth. It is important to remember, however, that the coastal landscapes of SW England are not just the result of sea level change. Rather these changes are imposed upon other pre-existing influences such as lithology and topology. SW England can be thought of as a rocky coast with outcrops of resistant rock types such as granite and sandstones. As much as sea level change these also contribute to the resulting coastal landscape of rias but with rocky headlands and cliffs.
Similarly, the topology is a key factor in forming the Dalmatian coast in the Adriatic sea. This has a coastal landscape of long, narrow inlets with a chain of islands parallel to the coast. This is as a result of the fact that before sea level rise there was a longitudinal coast where mountains run parallel or concordant to the coast. The submergence of the coastline and the subsequent marine transgression created elongated islands which were the

crests of the former ranges and the narrow sounds were the former longitudinal valleys.

Furthermore, it can also be the case that the impacts of sea level change are combined with other non-marine processes. In Norway glaciation created long deep narrow U shaped valleys. After the ice melted these became flooded due to sea level rise and long thin but deep (over 1000m) inlets called fjords are created. These are straighter than a ria glacial erosion has planned off the interlocking spurs found in the pre-glacial river valley. Overall it is clear that eustatic sea level changes can significantly contribute to the formation of coastal landscapes but often are imposed upon pre-existing coastline shaped by other factors such as by rock type and lithology or moulded by processes such as glaciation.

This demonstrates Level 4 AO1 marks. It is accurate and relevant and supported by accurate geographical information about the causes of eustatic changes and examples of the coastlines created by eustatic changes:

- Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1)

In addition it demonstrate Level 4 AO2 marks. This is because the answer:

- Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2)

These AO2 marks are gained as the candidate links sea level changes to the resultant coastline such as the formation of ria's in the south west of the UK.

- Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2)

These AO2 marks are gained when the candidate details that the ria's of the south west of the UK are also affected by the lithology and topology of the coastline as well as the impact of glaciation on the creation of fjords in the west Norwegian coastline.

- Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

These AO2 marks are gained as the candidate provides an ongoing evaluation.

In comparison to eustatic changes which are global, isostatic are often regional and are the movement of the land relative to the sea. These can occur when during glaciation the extra weight of the ice on the land forces the earth to tilt down into the magma below. This is then corrected after the ice has melted. It is estimated that areas of Scotland are still rebounding by up to 7mm per year due to isostatic uplift. As a result of this rebounding coastlines of raised beaches and fossil cliffs are often found. At Dougarie on the Isle of Arran raised beaches are created when the sea level was much higher. As the sea level has dropped, it has left this beach as a raised beach. At the back of the beach are the fossil cliffs often with a wave cut notch where the raised beach meets the fossil cliff caused by historic wave erosion as well as a cave and stack. Yet it is not only sea level change that has created these features. The raised beach is a product of deposition and so low energy conditions had to prevalent. In addition both the wave cut notch, the fossil cliff and the stack were originally caused through the process of erosion and so sea level change appears to be only one process that has created this coastline. Overall it is clear that isostatic sea level changes can significantly contribute to the formation of coastal landscapes but are as dependent upon other contemporary processes such as low energy environments as well as erosional processes in creating these coastlines.

This paragraph also demonstrates Level 4 AO1 marks. It is accurate and relevant and supported by accurate geographical information on the causes of isostatic changes (7m per year of uplift) and examples of the coastlines (Dougarie on the Isle of Arran) created by isostatic changes and therefore demonstrates the characteristics of a Level 4 answer namely:

- Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1)

In addition it is worthy of Level 4 AO2 marks. This is because the answer:

- Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2)

These AO2 marks are gained as the candidate links sea level changes to the resultant coastline such as the formation of raised beaches and fossil cliffs in Scotland.

- Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2)

These AO2 marks are gained when the candidate details that the raised beaches are also affected by the low energy environment that must have existed 11,500 years ago.

- Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

These AO2 marks are gained as the candidate again provides an ongoing evaluation.

Sea level change need not be over such a long term as eustatic and isostatic appear to be. Short term changes such as tides can also influence coastal landforms and so coastal landscapes. The changes between spring and neap tides can create a series of berms on shingle beaches that indicate the highest point of the breaking waves. Yet these berms are temporary and can be modified by the next spring tide depending upon the wave size and type which in turn is dependent upon the prevailing meteorological as opposed to climatological conditions. Overall it appears therefore that coastal the influence of sea level change on coastal landscapes is also dependent upon the temporal scale of the changes as much as the processes causing sea level change.

This paragraph demonstrates Level 3 AO1 knowledge yet it also displays Level 4 AO2 knowledge particularly in the ongoing evaluation on the temporal scale of sea level change.

In conclusion sea level change can be seen as a key influences on the formation of coastal landscapes but is not the only process nor factor that influences the development of coastal landscapes. Rather sea level change often imposes a variety of distinctive landforms such as rias and raised beaches on a pre-existing coastal landscape. In some cases such as the Dalmatian coast sea level change is the most significant influence on the resulting coastal landscape. On others such as the SW Devon coast or the

Isle Arran, sea level change is only one of many factors that influence the formation of the coastal landscape highlighting the fact that in many coastal landscapes the coastal landforms that create the resultant coastal landscape are in dynamic equilibrium with the processes and factors that create them.

This final paragraph ensures that the answer is secure in Level 4. There has been ongoing evaluation throughout the answer and this conclusion shows the attributes of Level 4 AO2 namely:

- Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

It is substantiated by referring back to examples already cited in the answer and has a balanced by comparing the Dalmatian coast, where sea level change is thought to be the dominant factor, to south west Devon and the Isle of Arran, where sea level change is only one factor/process in forming these coastlines.

This response is awarded 20 marks. The response has strong evidence of AO1 (even though this is not always Level 4 AO1) and continually strong evidence of AO2 with ongoing evaluation and a substantiated conclusion.