GCE AS MARKING SCHEME

SUMMER 2025

AS
GEOGRAPHY - COMPONENT 1
B110U10-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

Component 1: Changing Landscapes

Mark Scheme

Guidance for Examiners

Positive marking

It should be remembered that learners are writing under examination conditions and credit should be given for what the learner writes, as opposed to adopting an approach of penalising him / her for any omissions. It should be possible for a very good response to achieve full marks and a very poor one to achieve zero marks. Marks should not be deducted for a less than perfect answer if it satisfies the criteria of the mark scheme.
The mark scheme for this component includes both point-based mark schemes and banded mark schemes.

Point-based mark schemes

For questions that are objective or points-based the mark scheme should be applied precisely. Marks should be awarded as indicated and no further subdivision should be made. Each creditworthy response should be ticked in red ink. Annotations must reflect the mark awarded for the question. The targeted assessment objective (AO) is also indicated.

Banded mark schemes

For questions with mark bands the mark scheme is in two parts.
The first part is advice on the indicative content that suggests the range of concepts, processes, scales and environments that may be included in the learner's answers. These can be used to assess the quality of the learner's response. This is followed by an assessment grid advising on bands and the associated marks that should be given in responses that demonstrate the qualities needed in the three AOs, AO1, AO2 and AO3, relevant to this component. The targeted AO(s) are also indicated, for example AO2.1c.
Banded mark schemes are divided so that each band has a relevant descriptor. The descriptor for the band provides a description of the performance level for that band. Each band contains marks. Examiners should first read and annotate a learner's answer to pick out the evidence that is being assessed in that question. Once the annotation is complete, the mark scheme can be applied. This is done as a two stage process.

Assessment Objective	Strands	Elements
AO1 Demonstrate knowledge and understanding of places, environments, concepts, processes, interactions and change, at a variety of scales.	N/A	This AO is a single element.
AO2 Apply knowledge and understanding in different contexts to interpret, analyse and evaluate geographical information and issues.	N/A	1a - Apply knowledge and understanding in different contexts to analyse geographical information and issues.
		1b - Apply knowledge and understanding in different contexts to interpret geographical information and issues.
		1c - Apply knowledge and understanding in different contexts to evaluate geographical information and issues
AO3 Use a variety of relevant quantitative, qualitative and fieldwork skills to: • investigate geographical questions and issues • interpret, analyse and evaluate data and evidence • construct arguments and draw conclusions.	1 - investigate geographical questions and issues	N/A
	2 - interpret, analyse and evaluate data and evidence	
	3 - construct arguments and draw conclusions	

Banded mark schemes Stage 1 – Deciding on the band

Beginning at the lowest band, examiners should look at the learner's answer and check whether it matches the descriptor for that band. Examiners should look at the descriptor for that band and see if it matches the qualities shown in the learner's answer. If the descriptor at the lowest band is satisfied, examiners should move up to the next band and repeat this process for each band until the descriptor matches the answer.

If an answer covers different aspects of different bands within the mark scheme, a 'best fit' approach should be adopted to decide on the band and then the learner's response should be used to decide on the mark within the band. For instance if a response is mainly in band 2 but with a limited amount of band 3 content, the answer would be placed in band 2, but the mark awarded would be close to the top of band 2 as a result of the band 3 content.

Examiners should not seek to mark candidates down as a result of small omissions in minor areas of an answer.

Banded mark schemes Stage 2 – Deciding on the mark

Once the band has been decided, examiners can then assign a mark. During standardising (marking conference), the qualities of each mark band will be discussed in detail. Examiners will then receive examples of answers in each mark band that have been awarded a mark by the Principal Examiner. Examiners should mark the examples and compare their marks with those of the Principal Examiner.

When marking, examiners can use these examples to decide whether a learner's response is of a superior, inferior or comparable standard to the example. Examiners are reminded of the need to revisit the answer as they apply the mark scheme in order to confirm that the band and the mark allocated is appropriate to the response provided.

Indicative content is not exhaustive, and any other valid points must be credited. In order to reach the highest bands of the mark scheme a learner need not cover all of the points mentioned in the indicative content but must meet the requirements of the highest mark band. Where a response is not creditworthy, that is contains nothing of any significance to the mark scheme, or where no response has been provided, no marks should be awarded.

The mark scheme reflects the layout of the examination paper. Mark questions 1 and 2 or 3 and 4 in Section A, all questions in Section B and all questions in Section C. If the candidate has responded to all questions in Section A, mark all these responses. Award the higher marks attained; further, possible rubric infringements will be discussed at the marking conference.

Be prepared to reward answers that give **valid and creditworthy** responses, especially if these do not fully reflect the 'indicative content' of the mark scheme.

Section A: Coastal or Glacial Landscapes

Either: Coastal Landscapes

1. (a) Use **Figure 1** in the **Resource Folder** to: (i) State the six-figure grid reference of the nature reserve. (ii) Identify and locate, using four-figure grid references, **two** different landforms that indicate coastal deposition has taken place. Content: 1.1.2 Skills: 1.2, 6.3	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					5		**5**

Indicative content

(i) 988 797 (tolerance + or -1 for the third and sixth number)

(ii) Examples:
Marsh 9879
Spit 9980, 9979 or 9879
Mud flats 9879, 9880, 9979, 0079
Beach 0079, 9777
Sand dunes 9879

Credit any other landforms that are correctly located. Award 1 mark for naming the landform and 1 mark for the 4-figure grid reference (no tolerance).

1. (b) Examine the relative importance of longshore drift in the formation of **one or more** landforms of coastal deposition. Content: 1.1.5	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	7			3			**10**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1
Candidates should demonstrate knowledge and understanding of one or more landforms of coastal deposition and the role of longshore drift (LSD) and other processes in their formation. The main landforms related to longshore drift are:

- Drift-aligned **beaches** occur where waves arrive at an oblique angle and considerable longshore drift occurs
- **Spits** are linear deposits of sand and shingle, attached to the land at the proximal end but free at the distal end. They are found where the coast has an abrupt change of direction, where there is a ready supply of sediment and where longshore drift is active
- **Tombolos** develop where longshore drift joins an island onto either the mainland or a larger island
- **Bars** are elongated deposits of sand and shingle formed by longshore drift and usually lie parallel to the coastline. At a larger scale, bars are known as barrier beaches or barrier islands
- Cuspate forelands are triangular projections, with an apex pointing out to sea. Cuspate forelands are present where sediment, moved by longshore drift, becomes trapped when an equilibrium is reached between sediment inputs and the energy available to move it
- Longshore drift plays an important role in creating **sand dunes** by transporting sand along the coastline, which then gets deposited in areas where wind can pick it up and form dunes; essentially, longshore drift provides the necessary sand supply for dune formation
- While longshore drift doesn't directly create **tidal flats**, it plays an important role in their formation by depositing sediment in sheltered areas e.g. behind spits, which are created by longshore drift, leading to the development of **mudflats** and **salt marshes.**

Candidates may also demonstrate knowledge and understanding of other processes/factors that may influence the formation of depositional landforms including aeolian processes and prevailing wave conditions.

Candidates should use located and appropriate example(s) with a clear demonstration of knowledge and understanding of the processes at work.

AO2
Candidates demonstrate an application of knowledge and understanding through an examination of the role that LSD plays in the formation of a range of coastal depositional landforms.
Expect candidates to argue that LSD plays a direct and significant role in the formation of beaches, spits and tombolos and a lesser role in the formation of dunes and salt marshes. The role of LSD is minor in the formation of features such as swash-aligned beaches.

Responses may include and examination of:
- the relative importance of longshore drift in the formation of different depositional landforms
- the importance of longshore drift in relation to other processes e.g. wind, geology, sediment supply in the development of one or more depositional landforms
- the changing role of longshore drift over time in relation to the landform e.g. in relation to changing sediment supply or human intervention.

Marking guidance

Some responses may use annotated diagrams which should be credited. Credit any relevant case study location.

Award the marks as follows:		
	AO1 (7 marks)	**AO2.1c (3 marks)**
Band	*Demonstrates knowledge and understanding of LSD and other processes in the formation of depositional landforms.*	*Applies knowledge and understanding to examine the role of LSD in the formation of depositional landforms.*
3	**5-7 marks** Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples. Demonstrates detailed and accurate knowledge and understanding of LSD and other relevant processes. Demonstrates detailed and accurate knowledge and understanding of the links between LSD and the depositional landforms identified. Well annotated sketches / diagrams / maps may also be used and should be credited.	**3 marks** Applies knowledge and understanding to produce a thorough and coherent examination that is supported by evidence. Applies knowledge and understanding to produce a thorough and coherent examination of the role of LSD in the formation of one or more depositional landforms.
2	**3-4 marks** Demonstrates partial knowledge and understanding through the use of appropriate examples. Demonstrates partial knowledge and understanding of LSD and other relevant processes. Demonstrates partial knowledge and understanding of the links between LSD and the depositional landforms. Sketches / diagrams / maps may also be used and should be credited.	**2 marks** Applies knowledge and understanding to produce a coherent but partial examination that is supported by some evidence. Applies knowledge and understanding to produce a coherent but partial examination of the role of LSD in the formation of depositional landforms.
1	**1-2 marks** Demonstrates limited knowledge and understanding through a limited number of undeveloped examples. Demonstrates limited knowledge and understanding of LSD and other relevant processes. Demonstrates limited knowledge and understanding of the links between LSD and the depositional landforms identified. Basic sketches / diagrams / maps may be used and can be credited.	**1 mark** Applies knowledge and understanding to produce an examination with limited coherence and support from some evidence. Applies knowledge and understanding to produce a limited examination of the role of LSD in the formation of depositional landforms.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

2. (a) Use **Figure 2** to analyse the pattern of projected serious coastal flooding. Skills: 1.2, 6.3	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					5		**5**

Indicative content

There are patterns that can be identified but spatial awareness is needed for band 3, i.e. an overall sense of significant regional variation in coastal flooding experienced on different coastlines.

- The map evidence suggests that the overall pattern of a north/south split
- The greater the risk is in the south, such as Spain, Italy and NW France with a projection of a high frequency of flooding events
- There is a cluster of high frequency flooding events in NW France, Southern Spain and SW UK
- The north, e.g. Finland, Sweden has a lower frequency of projected flooding events
- Anomaly in NE Italy.

Credit any other valid points.

Award the marks as follows:		
Band	**Marks**	
3	**4-5**	Clear analysis of patterns of projected flood events identified. Clear reference made to evidence from the resource to support the analysis. Not all features of the resource need to be referenced to reach this band.
2	**2-3**	Partial identification of patterns of larger and smaller projections. Partial use of the resource as source of data to support the analysis.
1	**1**	Limited statements made with limited understanding of the pattern shown in the resource. Limited use of the resource as a source of data.
	0	No valid comment.

2. (b) To what extent can coastal systems be managed successfully? Content: 1.1.1, 1.1.8, 1.1.9	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	7			8			**15**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1
Candidates should demonstrate knowledge and understanding of the processes that lead to the need for management and the varying management strategies that can be utilised. Knowledge and understanding may include:

- Coastal processes affecting coastlines (waves, tides, erosion, transportation etc.).
- Cost benefit analysis
- Eustatic and isostatic sea level change.
- Hard and soft engineering strategies to manage processes
- The development of management strategies in low and/or high energy environments.

Expect to see stronger focus on high energy environments with links to erosional coastlines and those at risk of flooding.

AO2
Candidates demonstrate application of knowledge and understanding through synthesis (relationships and connections) and evaluation. This may include an evaluation of the extent to which:

- Some coastlines and processes can be managed more successfully than others e.g. Happisburgh v's Mappleton, Netherlands v's Maldives. Happisburgh has isostatic changes that are combining with a eustatic rise in sea level to create significant risk of flooding and erosion. Also, local geology is adding to the issue as the rocks are easily eroded. Added to this, both areas are relatively close to sea level, just a few metres above – arguably impossible to manage effectively
- Some coastlines are coping well with destructive coastal processes. Estuaries such as the Thames, with considerable financial investment in flood and erosion defence schemes, is well protected against the natural processes threatening it
- Temporal change is having an impact and which processes pose more of a challenge to effective management now and in the future e.g. mass movement
- The inter-related nature of coastal management means that the impacts of management in one area may prove to have a negative impact elsewhere.

Some may take the view that the majority of locations will suffer sea level rise and managed retreat may be the only sustainable option in the long term. Some may engage in a debate around the value of intervention. Responses are likely to consider the challenges of defending coastal locations in a financial climate of scarce resources. Policy dilemmas, associated cost and options such as with managed retreat are likely to feature. This may be linked to the 'knock-on effects' of intervention in natural processes. Some candidates may reflect on why the management of coastal systems is complex e.g. land use, population, erosion, climate change

Marking guidance

Those that score well will evaluate both pros and cons in their chosen coastal environments. In Band 3 (AO2) there will be a substantiated conclusion that links clearly to the question.

Award the marks as follows:		
	AO1 (7 marks)	**AO2.1c (8 marks)**
Band	*Demonstrates knowledge and understanding of the processes operating in coastal systems and associated management strategies.*	*Applies knowledge and understanding to evaluate the extent to which coastal systems can be managed successfully.*
3	**5-7 marks** Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples. Demonstrates detailed and accurate knowledge and understanding of the coastal processes and management strategies at play. Well annotated sketches / diagrams / maps may also be used and should be credited.	**6-8 marks** Applies knowledge and understanding to produce a thorough and coherent discussion that is supported by evidence. Applies knowledge and understanding to produce a thorough and coherent discussion on the extent to which coastal systems can be managed. A substantiated conclusion will be evident.
2	**3-4 marks** Demonstrates partial knowledge and understanding through the use of appropriate examples. Demonstrates partial knowledge and understanding of some of the coastal processes and management strategies at play. Sketches / diagrams / maps may also be used and should be credited.	**3-5 marks** Applies knowledge and understanding to produce a coherent but partial discussion that is supported by some evidence. Applies knowledge and understanding to partially discuss the extent to which coastal systems can be managed.
1	**1-2 marks** Demonstrates limited knowledge and understanding through a limited number of underdeveloped examples. Demonstrates limited understanding of some the coastal processes and management strategies at play. Sketches / diagrams / maps may be used and can be credited.	**1-2 marks** Applies knowledge and understanding to produce a discussion with limited coherence and support from some evidence. Applies knowledge and understanding to produce a limited discussion on the extent to which coastal systems can be managed.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

Or: Glaciated Landscapes

3. (a) Use **Figure 3** in the **Resource Folder** to: (i) State the six-figure grid reference of the visitor centre. (ii) Identify and locate, using four-figure grid references, two different landforms that indicate glacial erosion has taken place. Content: 1.2.5 Skills: 1.2, 6.3	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					5		**5**

Indicative content

(i) 609 542 (tolerance + or -1 for the third and sixth number)
(ii) Examples:
Arête 6155, 6255, 6154, 6054
Pyramidal peak 6054
Corrie 6153, 6154, 5954, 6253
Truncated spur 6354
Glacial trough 6356
Tarn 6254

Credit any other landforms that are correctly located. Award 1 mark for naming the landform and 1 mark for the four-figure grid reference (no tolerance).

Marking guidance

Credit any other valid points.

3. (b) Examine the relative importance of weathering in the formation of **one or more** landforms of glacial erosion. Content:1.2.5	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	7			3			**10**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1
Candidates should demonstrate knowledge and understanding of processes of weathering e.g. freeze-thaw (and other processes) associated with relevant landforms of glacial erosion. Freeze-thaw weathering is the dominant form of weathering in glacial environments, occurring when water repeatedly freezes and thaws in rock cracks, eventually breaking the rock apart. Erosional landforms significantly impacted by weathering include:

- **Cirques:** (also known as corries or cwms): Freeze-thaw weathering plays a crucial role in their formation by breaking down rocks on the back wall, causing it to retreat and deepen the hollow
- **Pyramidal Peaks**: Weathering processes, particularly freeze-thaw, help shape these pointed mountain tops as multiple cirques erode the surrounding rock
- **Arêtes:** These narrow, knife-edge ridges are formed when two corries develop side by side, with freeze-thaw weathering contributing to their sharpness
- **U-shaped valleys:** While primarily formed by glacial erosion, weathering processes contribute to the breakdown of rock material along valley sides
- **Roches moutonnée:** These resistant rock outcrops on valley floors are affected by freeze-thaw weathering, which can cause rock falls and debris accumulation on glaciers

Candidates may also demonstrate knowledge and understanding of other processes/factors that may influence the formation of erosional landforms including erosion and transportation processes, mass movement and underlying geology.

Candidates should use located and appropriate example(s) with a clear demonstration of knowledge and understanding of the processes at work.

AO2
Candidates demonstrate an application of knowledge and understanding through a thorough assessment of the role weathering plays in the formation of one or more erosional landforms.

Expect candidates to argue that weathering, particularly in the form of freeze-thaw weathering, plays a crucial role in the formation of glacial landforms like corries (cirques) by loosening rock fragments on the mountainside, making them more susceptible to plucking by the moving glacier, ultimately shaping the characteristic bowl-shaped depression; however, while weathering initiates the process, the primary erosive forces in glacial landscapes are still considered to be the glacial processes of abrasion and plucking, which actively transport and remove the loosened rock debris, making weathering a significant but secondary contributor to the overall landform formation.

Responses may include an examination of:
- The relative importance of glacial weathering in the formation of different erosional landforms e.g. striations are micro-scale landforms of glacial erosion primarily formed through abrasion, with the importance of weathering limited to the provision of the glacial material used in abrasion
- The importance of weathering in relation to other glacial processes (e.g. erosional process such as plucking and abrasion) in the development of one or more erosional landforms e.g. in the formation of roches moutonnées, freeze-thaw weathering and plucking are concentrated on the lee (down valley) side, with abrasion dominant on the stoss (up valley) side, forming an asymmetric landform with a smooth stoss side and a steeper, rougher lee side; in the formation of cirques, freeze-thaw

weathering plays a significant role in the formation of headwalls (combined with rapid mass movement and plucking: interdependence) whilst cirque floors are dominantly formed by abrasion

- The relative importance of other processes and factors involved in the formation of glacial erosional landforms e.g. underlying geology e.g. where rocks are more jointed and faulted, weathering and the erosional process of plucking are more effective in landform formation
- The relative importance of postglacial processes in the modification of the landform. e.g. although critical to the formation of U-shaped valleys, freeze-thaw weathering continues to operate in the postglacial phase and is therefore more important than abrasion and plucking in their subsequent postglacial development.

Marking guidance
Some responses may use annotated diagrams which should be credited. Credit any relevant case study location.

Award the marks as follows:

	AO1 (7 marks)	**AO2.1c (3 marks)**
Band	*Demonstrates knowledge and understanding of the role of weathering and other factors/processes in the formation of one or more landforms of glacial erosion.*	*Applies knowledge and understanding to appraise through an examination of weathering in the formation of one or more landforms of glacial erosion.*
3	**5-7 marks** Demonstrates detailed and accurate knowledge and understanding of the influence of weathering and other factors/processes in the formation of one or more landforms of glacial erosion. Demonstrates detailed and accurate knowledge and understanding using appropriate, accurate and well-developed examples. Well-annotated sketches / diagrams may be used and should be credited.	**3 marks** Applies knowledge and understanding to construct a thorough and coherent examination that is supported by evidence. Applies knowledge and understanding to produce a thorough and coherent examination of the influence of weathering and other factors/processes in the formation of one or more landforms of glacial erosion.
2	**3-4 marks** Demonstrates partial knowledge and understanding of the influence of weathering and other factors/processes in the formation of one or more landforms of glacial erosion. Demonstrates partial knowledge and understanding using appropriate examples. Sketches / diagrams may be used and should be credited.	**2 marks** Applies knowledge and understanding to produce a coherent but partial examination that is supported by some evidence. Applies knowledge and understanding to produce a coherent but partial examination of the influence of weathering and other factors/processes in the formation of one or more landforms of glacial erosion.
1	**1-2 marks** Demonstrates limited knowledge and understanding of the influence of weathering and other factors/processes in the formation of one or more landforms of glacial erosion. Demonstrates limited knowledge and understanding using limited examples. Basic sketches / diagrams may be used and should be credited.	**1 mark** Applies knowledge and understanding to produce an examination with limited coherence and support from some evidence. Applies knowledge and understanding to produce a limited examination of the influence of weathering and other factors/processes in the formation of one or more landforms of glacial erosion.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

4. (a) Use **Figure 4** to analyse the pattern of ice sheet velocity. Skills: 1.1, 1.4, 1.5	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					5		**5**

Indicative content

- The overall pattern is of higher velocity (between 51 and 100 metres per year) on the coast and in the west (along the 50˚W line of longitude)
- The lower velocities are predominantly inland and in the north of Greenland / mainly within the Arctic Circle at between 0 and 5 metres per year
- Higher velocity on the west coast compared to the east and north
- SE and N have clusters of higher velocity, reaching 100m per year 75 N & 50 W
- Velocity increases from the centre towards the coastline in all directions.

Credit any other valid points and accurate use of information provided in the resource.

Award the marks as follows:

Band	Marks	
3	**4-5**	Clear analysis of patterns of ice sheet velocity identified. Clear reference made to evidence from the resource to support the analysis. Not all features of the resource need to be referenced to reach this band.
2	**2-3**	Partial identification of patterns of ice sheet velocity. Partial use of the resource as source of data to support the analysis.
1	**1**	Limited statements made with limited understanding of the pattern shown in the resource. Limited use of the resource as a source of data.
	0	No valid comment.

4. (b) Evaluate the relative importance of different timescales in the formation of **one or more** glacial landforms. Content: 1.2.2, 1.2.8	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	7			8			**15**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1
Candidates should demonstrate knowledge and understanding of different timescales (from seconds to millennia) and their impact on glacial landforms. Landforms of glacial erosion, glacial deposition and periglacial landforms are acceptable. The timescales discussed will depend upon the landform(s) chosen and may include knowledge and understanding of:

- The formation of landscapes over millennia – the development of landforms by processes to form landforms such as glacial troughs, cirques, hanging valleys, roches moutonnée etc.
- The formation of landscapes over years/decades – the development of landforms by processes to form landforms such as scree slopes and recessional moraines
- The formation of landscapes over seasons – the development of landforms by processes to form landforms such as outwash channels and varves
- The formation of landscapes over seconds – processes such as avalanches or rock fall affecting the glacial valley cross profile
- The formation of landscapes over geological timescales – the development of landforms due to other factors such as pre-existing river valleys reflecting geology or the crag and tail of Edinburgh reflecting volcanic activity long ago.

AO2
Candidates will apply knowledge and understanding in order to evaluate the relative importance of different timescales in the formation of one or more glacial landforms. Responses may include an evaluation of:

- The relative importance of different timescales within a located glaciated environment. e.g. in the formation of varves, each layer is indicative of processes occurring over a seasonal timescale, however a set of varves will be the result of processes operating over millennia
- The relative importance of time in the operation of glacial processes –e.g. in the British Isles many cirques developed during the Younger Dryas, a brief cold spell (stadial) which occurred over a relatively short period of geological time at the end of the most recent glacial (the Devensian). This relatively short period of about one millennium explains the relatively small size of cirques that formed in comparison with larger cirques that developed over many millennia
- The relative importance of time interacting with different factors influencing glacial processes e.g. rock jointing, ice thickness e.g. in a given timescale, the formation of landforms of glacial erosion is faster under debris-laden, warm-based ice masses moving at high velocities over densely jointed, permeable bedrock prepared by previous weathering but extremely limited under cold-based ice moving over relatively resistant bedrock.

Marking guidance

Those that score well will evaluate the relative importance of timescales on their chosen glacial landform. In band 3 (AO2) there will be a substantial conclusion that links clearly to the question.

Award the marks as follows:		
	AO1 (7 marks)	**AO2.1c (8 marks)**
Band	*Demonstrates knowledge and understanding of the impact of different timescales in the formation of one or more glacial landforms.*	*Applies knowledge and understanding to evaluate the relative importance of different timescales in the formation of one or more glacial landforms.*
3	**5-7 marks** Demonstrates detailed and accurate knowledge and understanding using appropriate, accurate and well-developed examples. Demonstrates detailed and accurate knowledge and understanding of the importance of different timescales in the formation of one or more glacial landforms. Well annotated sketches / diagrams may be used and should be credited.	**6-8 marks** Applies knowledge and understanding to produce a thorough and coherent evaluation that is supported by evidence. Applies knowledge and understanding to produce a thorough and coherent evaluation of the importance of different timescales in the formation of one or more glacial landforms. A substantiated conclusion will be evident.
2	**3-4 marks** Demonstrates partial knowledge and understanding of the importance of different timescales in the formation of one or more glacial landforms. Demonstrates partial knowledge and understanding using appropriate examples. Sketches / diagrams may be used and should be credited.	**3-5 marks** Applies knowledge and understanding to produce a coherent but partial evaluation that is supported by some evidence. Applies knowledge and understanding to partially evaluate the importance of different timescales in the formation of one or more glacial landforms.
1	**1-2 marks** Demonstrates limited knowledge and understanding of the importance of different timescales in the formation of one or more glacial landforms. Demonstrates limited knowledge and understanding using limited examples. Basic sketches / diagrams may be used and should be credited.	**1-2 marks** Applies knowledge and understanding to produce an evaluation with limited coherence and support from some evidence. Applies knowledge and understanding to produce a limited evaluation of the importance of different timescales in the formation of one or more glacial landforms.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

Section B: Tectonic Hazards

5. (a) Use **Figure 5** to describe the pattern of earthquake intensity Content: 1.3.4	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					5		**5**

Indicative content

Overview statements may include:

- Overall, the pattern is of the most severe intensity to the SE of the tectonic plate boundary between the Anatolian and Arabian plates (East Anatolian fault)
- The further away from the fault line the intensity decreases in all directions
- The intensity of the earthquake remains strong within 100km (minimum) of the epicentres in all directions.

Specific descriptive statements may include:

- The strongest intensities exist north and south of the fault line where the epicentres are located.
- Strong intensity was experienced for over 300km west to east and north to south.
- Both Türkiye and Syria have experienced strong intensity.
- Highly populated locations such as Aleppo, Gaziantep have experienced strong and very strong intensity respectively.
- West Iraq, 75km approx. across the border with Syria experienced some moderate earthquake intensity, as did NE Lebanon.

Credit any other valid points.

Award the marks as follows:

Band	Marks	
3	**4-5**	Detailed description of the pattern with specific overview statements. Clear reference made to evidence from the resource to support the description. Not all features of the resource need to be referenced to enter this band.
2	**2-3**	Partial description of the pattern of earthquake intensity. Partial use of the resource as source of data to support the description.
1	**1**	Limited statements made with limited understanding of the pattern shown in the resource. Limited use of the resource as a source of data.
	0	No valid comment.

5. (b) Use **Figure 6** to describe the short-term responses to the earthquake. Content: 1.3.6	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					5		**5**

Indicative content

The short-term responses discussed may include:

- Deployment of emergency services to evacuate residents
- Deployment of emergency services and volunteers to search through debris
- The transportation and setting up of emergency shelters and camps
- Distributing aid such as blankets, drinking water and food.

Credit any other valid points.

Marking guidance

There are a wide variety of short-term responses that could be accepted but they should be evident in the resource and related to the immediacy of the earthquake. Be wary of students overly commenting on longer term responses e.g. mitigation measures.

Award the marks as follows:

Band	Marks	
3	**4-5**	Detailed description of two or more short-term responses. Clear reference made to evidence from the resource to support the description. Not all features of the resource need to be referenced to enter this band.
2	**2-3**	Partial description of short-term responses could focus on one response alone. Partial use of the resource as source of data to support the description.
1	**1**	Limited statements made with limited understanding of the short-term responses shown in the resource. Limited use of the resource as a source of data.
	0	No valid comment.

5. (c) (i) Use **Figure 7** to identify the country with the highest ratio of tsunamis over 1m to all tsunamis occurring between 1900 to 2020. Skills: 2.4	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					1		**1**

Indicative content

Correct answer: Indonesia

5. (c) (ii) Use **Figure 7** to analyse tsunami occurrence. Skills: 3.6	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					4		**4**

Indicative content

Statements may include:

- Japan has by far the highest occurrence of tsunamis at 163, this is more than double the number of tsunamis received by the USA, which has the second highest number of tsunamis
- Indonesia has the highest occurrence of tsunamis over 1m (38 tsunamis) despite only experiencing 69 tsunamis during the entire period
- Chile, Solomon Islands and Philippines experienced a similar number of tsunamis during the period with a similar ratio of tsunamis over 1m to total number
- Over a third of the tsunamis experienced by the USA were over 1m
- A large proportion of tsunamis are experienced on the continent of Asia.

Credit any other valid points.

Award the marks as follows:

Band	Marks	
2	**3-4**	Partial analysis of the patterns of tsunami occurrence. Partial use of the resource as source of data to support the analysis.
1	**1-2**	Limited statements made with limited understanding of the patterns shown in the resource. Limited use of the resource as a source of data.
	0	No valid comment.

5. (d) (i) Use **Figure 8** and the data in the formula below to calculate the value of r_s to **two** decimal places. Show your working in the space provided. Skills: 2.14	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					3		**3**

Indicative content

Award 1 mark each for any two of the correct workings shown below:

6*118 = **708** (1 mark)
708 / 990 = **0.71515152** (1 mark)
Completed formula top and/or bottom layers (2 marks).

Award 1 mark for the correct answer below:
1 - 0.71515152 = **0.28** (1 mark)

Marking guidance

Award 1 mark only for the correct answer where no workings are shown.

5. (d) (ii) Use the table below to interpret the statistical significance of the calculated value of r_s. Skills: 2.14	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	2						**2**

Indicative content

A weak positive correlation exists (1), as the r_s value does not meet the confidence level of 95% or 99% (1).

5. (e) Explain why some tectonic processes occur away from plate margins. Content: 1.3.1	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	5						**5**

Indicative content

Whilst most tectonic activity is focused on plate margins; it is possible for earthquakes and volcanoes to occur far from the edges of tectonic plates. The causes of intraplate earthquakes are not fully understood. Some are associated with pre-existing weaknesses in plates which can become reactivated.

- **Hotspots/intraplate volcanic eruptions** - form over exceptionally hot regions in the mantle. Mantle rock in those extra-hot regions is more buoyant than the surrounding rocks, so it rises through the mantle and crust to erupt at the surface. Successive oceanic volcanoes are formed and move away from a hotspot because tectonic plates move over the hotspot, which remains stationary and forms volcanic islands / chain of atolls e.g. Hawaii
- **The movement of tectonic plates** - faults and weaknesses within and across the plate leading to intraplate earthquakes e.g. India 2001
- **Seismic waves** - can travel great distances and sometimes trigger tectonic hazards away from the plate boundary, e.g. landslides or tsunami waves.

Credit other valid points.

Award the marks as follows:

Band	Marks	
3	**4-5**	Detailed explanation of several processes. Specialist terminology used with development of points made.
2	**2-3**	Partial explanation of the processes but may lack development. Some specialist terminology used.
1	**1**	Limited statements made with limited understanding of the processes.
	0	No valid comment.

5. (f) Examine the relative importance of physical processes in explaining the impacts of volcanic eruptions. Content: 1.3.2, 1.3.3, 1.3.7	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	10			5			**15**

Indicative content:

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1

Candidates should demonstrate knowledge and understanding of physical (and other processes) that explain the impacts of volcanic eruptions. Candidates may take a comparative approach using examples. Knowledge and understanding may include:

- Different types of plate boundary and the processes that create volcanic eruptions. These processes impact on the magnitude and type of volcanic eruption
- Volcanic eruptions produce different hazards including lava flows, pyroclastic flows, ash falls, gas eruptions, and secondary hazards (lahars, jökulhlaups) which may have differing impacts.
- Hazard profiles (magnitude, speed of onset and areal extent, duration, frequency, spatial predictability) are important in understanding hazard impacts.
- Volcanic events in differing contexts e.g. developed, emerging and developing countries to show the interaction of physical factors and the significance of context in influencing the impact of the hazard.
- Other processes (other than physical) which can explain the impacts of volcanic eruptions e.g. quality of governance, population density.

AO2

Candidates should demonstrate an application of knowledge and understanding to examine the relative importance of physical processes. Responses may include an examination of:

- Destructive (convergent) plate boundaries generally create higher intensity volcanic eruptions than constructive (divergent) or hot spots. This often produces lava with a higher silica content and a higher percentage of volatile gases. These therefore create more violent eruptions at destructive plate margins as opposed to constructive plate margins where the rising magma is more basic in nature. Thus, hazards are potentially greater for volcanic eruptions in Indonesia than for Hawaii, for example
- The context of the plate boundary. Eruptions associated with island arcs often have partial wet melts and are more explosive as a result. Water-bearing sediments are subducted into mantle and as temperatures rise water is released and the number of volatiles is increased so increasing the scale of the hazard event such as at Montserrat
- The type of lava. The tectonic eruption of Mount Merapi in Indonesia created significant volumes of pyroclastic flows (due to its andesitic lava) increasing the potential hazard impacts
- How some human factors e.g. population density can influence the impacts positively or negatively
- How impacts can be amplified through poor management or reduced through effective management.

Expect candidates to conclude that the key factor affecting impacts is the type of plate margin but these impacts may be amplified by other contextual factors both physical and human.

Marking guidance

For band 3 (AO2) candidates should sustain a clear analysis that is developed and convincing with detailed examination offering secure judgements. There may be a conclusion that links clearly to the question. Credit information relating to volcanic eruptions only.

Award the marks as follows:		
	AO1 (10 marks)	**AO2.1c (5 marks)**
Band	*Demonstrates knowledge and understanding of the relative importance of physical and other factors and processes in explaining the impacts of volcanic eruptions.*	*Applies knowledge and understanding to examine the relative importance of physical factors and processes in explaining the impacts of volcanic eruptions.*
3	**8-10 marks** Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples. Demonstrates detailed and accurate knowledge of type of physical factors and processes in explaining the impacts of volcanic eruptions. Well annotated sketches / diagrams / maps may also be used and should be credited.	**4-5 marks** Applies knowledge and understanding to produce a thorough and coherent examination that is supported by evidence and case study examples. Applies strong examination of the relative importance of physical factors and processes in explaining the impacts of volcanic eruptions.
2	**4-7 marks** Demonstrates accurate knowledge and understanding through the use of appropriate and developed examples. Demonstrates accurate knowledge and understanding of the physical factors and processes in explaining the impacts of volcanic eruptions. Sketches / diagrams / maps may also be used and should be credited.	**2-3 marks** Applies knowledge and understanding to produce a coherent but partial examination that is supported by some evidence. Applies knowledge and understanding to produce a partial examination of the relative importance of physical factors and processes in explaining the impacts of volcanic eruptions.
1	**1-3 marks** Demonstrates limited knowledge and understanding through a limited number of underdeveloped examples. Demonstrates limited understanding of physical factors and processes in explaining the impacts of volcanic eruptions. Sketches /diagrams / maps may be used and can be credited.	**1 mark** Applies knowledge and understanding to produce an examination with limited coherence and support from some evidence.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

6. (a) Examine the human impacts of **two** contrasting earthquake events. Content: 1.3.6, 1.3.7	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	8			7			**15**

Indicative content:

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1
Candidates should demonstrate knowledge and understanding of two earthquake events and a variety of human impacts at differing scales from local to global. The impacts of the earthquake events will vary with the examples chosen but knowledge and understanding will likely include:

- Demographic impacts – mortality, migration, population structure changes etc.
- Economic impacts – costs of losses and recovery effort etc.
- Social impacts– health and well-being, loss of infrastructure etc.
- Primary impacts – in that they are the immediate and direct consequences of the event
- Secondary impacts - in that they are indirect consequences of the event.

Candidates may choose to compare two events in differing locations or in the same geographical location but at different time periods.

AO2
Candidates should demonstrate application of knowledge and understanding through an examination of the impacts of the two events. A thorough examination will require identification of differences / contrasts between the impacts of the two events chosen. Responses may include an examination of:

- The differing scale of the impacts on humans (linked to magnitude and areal extent or nature of hazards experienced)
- The importance of level of economic development and / or investment in preparedness leading to greater or lesser impacts on humans over time
- The importance of other contributing factors involved e.g. time of day leading to greater or lesser impacts on humans.

Candidates may conclude that the scale / magnitude of the earthquake may not be the overarching deciding factor in the scale of the impacts e.g. Haiti 2010 vs Japan 2011.

Marking guidance

Near the lower end, there may be limited contrasts between the exemplars chosen. For band 3 (AO2) candidates should sustain a clear analysis that is developed and convincing with detailed examination offering secure judgements. There may be a conclusion that links clearly to the question. Credit information relating to earthquake examples only.

Award the marks as follows:		
	AO1 (8 marks)	**AO2.1c (7 marks)**
Band	*Demonstrates knowledge and understanding of the human impacts of two earthquake events.*	*Applies knowledge and understanding to examine the contrasting human impacts of two earthquake events.*
3	**6-8 marks** Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples. Demonstrates detailed and accurate knowledge and understanding of the human impacts of two earthquake events Well annotated sketches / diagrams / maps may also be used and should be credited.	**6-7 marks** Applies knowledge and understanding to produce a thorough and coherent examination that is supported by evidence. Applies knowledge and understanding to produce a thorough and coherent examination of the human impacts of two contrasting earthquake events.
2	**4-5 marks** Demonstrates partial knowledge and understanding through the use of appropriate and developed examples. Demonstrates partial knowledge and understanding of the human impacts of two earthquake events Sketches / diagrams / maps may also be used and should be credited.	**4-5 marks** Applies knowledge and understanding to produce a coherent but partial examination that is supported by some evidence. Applies knowledge and understanding to partially examine the human impacts of two contrasting earthquake events.
1	**1-3 marks** Demonstrates limited knowledge and understanding through a limited number of under developed examples. Demonstrates limited understanding of the human impacts of earthquake events. Basic sketches / diagrams / maps may be used and can be credited.	**1-3 marks** Applies knowledge and understanding to produce an examination with limited coherence and support from some evidence. Limited application of knowledge and understanding to examine how earthquake impacts vary.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

6. (b) Evaluate the success of responses to tectonic events? Content: 1.3.7, 1.3.8, 1.3.9	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	10			10			**20**

Indicative content

The indicative content is not prescriptive, and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

Evaluating the success of responses to tectonic events will depend on the candidate's interpretation of 'success'. Candidates may consider various factors such as preparedness, response time, effectiveness of mitigation measures, and the extent of damage and loss. Expect candidates to compare the responses to several tectonic events (as well as a range). For example, earthquakes are much less predictable than either volcanoes or tsunamis, but 'success' will rely on preparedness and level of economic development to a certain extent. Or candidates may approach this by evaluating based on the intensity or magnitude of the given hazard e.g. as measured by Richter, Mercalli, MMI and VEI etc.

AO1

Candidate responses may include knowledge and understanding of:

- **Management strategies and preparedness:** this includes infrastructure resilience, early warning systems, public education, and emergency response plans. For example, Japan 2011 vs Türkiye 2023 which provides a contrast to building codes and land use regulations enforced to minimise vulnerability and ensure a reduction in loss of life (success)
- **Response time**: how quickly authorities can respond has been proven to reduce loss of life and minimise damage e.g. Japan 2011, as has effective co-ordination between local, regional and national emergency response agencies e.g. Sichuan 2008
- **Effectiveness of mitigation measures:** Mitigation measures, such as retrofitting buildings, constructing tsunami barriers, or implementing evacuation plans, reducing the impact of the event. Consideration of lessons learned from previous events that informed the implementation of mitigation measures and reduced loss e.g. Sichuan 2008
- **Extent of damage and loss:** The scale of damage to infrastructure, including buildings, roads, bridges, and utilities; the loss of life and injuries resulting from the event and the economic impact, including the cost of reconstruction and disruption to livelihoods
- **Humanitarian response:** The humanitarian efforts, including providing shelter, food, water, and medical assistance to affected populations
- **Long-term recovery and resilience:** The efforts to rebuild infrastructure and communities in a more resilient manner. The initiatives to improve disaster preparedness and response capabilities based on lessons learned from the event e.g. Sichuan 2008
- **Community engagement and participation:** The involvement of local communities in preparedness, response, and recovery efforts; the communication strategies in disseminating information and mobilising support.

AO2

Candidates should demonstrate application of knowledge and understanding through an evaluation of:

- The impact of the response on the economic and wider human impacts, including the cost of reconstruction and disruption to livelihoods at different scales
- The relative importance of the speed of the response and its impact in reducing 'loss' (success) at different scales (regional, national)
- The relative importance of the impact of mitigation measures (response) in reducing the impact of the event (social, economic, environmental) and possible improving success over time
- The vulnerability of different regions, particularly the differences between more and less economically developed areas, and possible contrasts between urban and rural environments
- The capacity to respond and degree of outside agency support in differing contexts.

Marking guidance

Expect candidates to largely conclude that it is possible to be 'successful' to a certain extent, however lower income countries are not able to prepare for or manage tectonic events in the same way that higher income countries can. Expect comparative case study references with higher income countries more likely to suffer higher economic impacts than social impacts, such as deaths and therefore invest more in warning systems (Japan) and infrastructure development. Candidates may 'rank success in so much as reducing the death rate as being more evidence of 'success' than the infrastructure costs e.g. Christchurch. An earthquake in Türkiye does not have the same cost in financial terms as one in Japan, but higher social costs, partly due to a lack of planning and preparedness for such events, this may be viewed as less successful. Tectonic events in lower income countries often have a longer recovery period, with aid needed. However, if California suffers an earthquake, federal aid is almost always immediately available, but the 'success' or 'effectiveness' of this aid will very much depend on the scale of the event. Success of responses will also depend on the nature of the event and its magnitude as well as mitigation measures put in place at a variety of scales.

Award the marks as follows:		
AO1 (10 marks)		**AO2.1c (10 marks)**
Band	*Demonstrates knowledge and understanding of differing responses to tectonic events.*	*Applies knowledge and understanding to evaluate the extent to which the responses to tectonic events have been successful in reducing impacts.*
3	**7-10 marks** Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples. Demonstrates detailed and accurate knowledge and understanding of the tectonic events and the associated responses. Well annotated sketches / diagrams / maps may also be used and should be credited.	**7-10 marks** Applies knowledge and understanding to produce a thorough and coherent evaluation that is supported by evidence. Applies knowledge and understanding to produce a thorough and coherent evaluation of the extent to which the responses to tectonic events have been successful in reducing impacts. A substantiated conclusion will be evident.
2	**4-6 marks** Demonstrates partial knowledge and understanding through the use of appropriate examples. Demonstrates partial knowledge and understanding of the tectonic events and the associated responses. Sketches / diagrams / maps may also be used and should be credited.	**4-6 marks** Applies knowledge and understanding to produce a coherent but partial evaluation that is supported by some evidence. Applies knowledge and understanding to produce a partial evaluation of the extent to which the responses to tectonic events have been successful in reducing impacts.
1	**1-3 marks** Demonstrates limited knowledge and understanding through a limited number of undeveloped examples. Demonstrates limited understanding of the tectonic events and the associated responses. Basic sketches / diagrams / maps may be used and can be credited.	**1-3 mark** Applies knowledge and understanding to produce an evaluation with limited coherence and support from some evidence. Limited application of knowledge and understanding to evaluate the extent to which the responses to tectonic events have been successful in reducing impacts.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

Section C: Challenges in the 21st Century

7. To what extent are the challenges faced by places a result of human innovation?	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	**Total**
				10			**10**

Indicative content

Within the answer to question 7, candidates may use **Figures 9a, 9b** and **9c** together with appropriate knowledge and understanding of the connections between different aspects of this area across the whole specification in order to develop a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.

Much will depend on how the candidate defines 'challenges'. This could take several approaches e.g. economic change, social change, physical change, tectonic processes etc. or a combination of several factors.

Figure 9a:
Shows the artificial islands built off Dubai's coastline as it attempts to diversify its economy (traditionally oil) by using tourism on the coast. This will provide potential stimulus for discussion around sustainable use of its coastline and the environmental consequences (excessive use of natural resources, the slow decline of biodiversity, along with the extinction of wildlife and vegetation). These consequences are hidden by extensive propagandising of the innovative accomplishment, and by the lavish lifestyle of the "City of Gold" shown all over social media. As a result, the future challenges of Dubai have been created by its interference with natural processes on the coast which will require heavy investment to maintain and the externality of ecological damage. Expect candidates to argue that halting coastal processes in order to 'protect' the artificial islands will be costly and potentially unsuccessful in the long term (sustainability).

Figure 9b:
Shows Marchlyn Mawr reservoir, a high level lake in Snowdonia behind Elidir Fawr mountain. It is used as the high level water source for Dinorwig power station, a closed-loop pumped storage hydroelectric generating facility. Among water and energy security issues that many countries face and utilising glaciated landscapes to build manmade structures in these unique landscapes. Expect commentary around higher levels of investment afforded by higher income countries and the possible negative impacts on the glacial environment as well as the associated processes. Whilst some may argue the short-term positive benefits of job creation and tourism, the longer-term view around sustainability and scale may provide challenges notwithstanding the impact on the physical environment which took thousands of years to be created which ultimately may have the opposite e.g. tourist numbers declining. The inability of lower income countries to afford this investment and technology would also enhance the 'wealth' gap, with many glaciated landscapes lying in LICs.

Figure 9c:
Shows that technical innovations in disaster prevention and mitigation continue to advance in Japan. Among natural disasters, earthquakes are the most difficult to predict in advance and this may provide stimulus for discussion around Japan's high-rise structures, in part due to the natural environment and a high development level, and its continuous commitment to investment in ways to withstand earthquakes whilst reducing impacts for the future. Tall structures are not the only things that benefit from advances in earthquake countermeasures. Technical innovations progress daily to ensure the earthquake-readiness of the country, such as protecting its infrastructure e.g. the high-speed rail that links cities throughout Japan. Expect commentary around the higher level of development enabling more capital, technology and skills being made available to mitigate in anticipation of future 'challenges' as well as recover post event. This would only be possible through human innovation afforded through high levels of development and sustaining this level of investment may be a 'challenge'.

Potential synoptic areas (a combination/depth of required to enter band 3):

- Change over time – loss/gain of identity and meaning
- Timescales – short and long term
- Scale – use of examples
- Social and economic factors considered equally
- Future – Economic and social sustainability, coastal protection investment, tourism.

Expect candidates to conclude that challenges are likely to increase as a result of human innovation and that the wealth 'gap' will widen lessening lower income countries ability to cope with extreme physical processes that the future may hold e.g. sea level change, coastal erosion.

Marking guidance

Accept any 'human innovation' and do not limit to the photographs given.
Candidates may use the resources but it is not essential, they will look to discuss the possible social, environmental and economic challenges at a variety of scales.

Award the marks as follows:

Band	Marks	AO2.1b (10 marks)
3	7-10	Applies knowledge and understanding from across the specification to produce a thorough and coherent evaluation that is supported by evidence. Well-developed synthesis of geographical ideas, concepts and issues from the resources provided and from across the specification and in different contexts, in order to make well-judged connections. Applies knowledge and understanding from across the specification to suggest how challenges may change in the future due to the influence of human innovation. Uses accurate and well-developed examples from across the specification.
2	4-6	Applies knowledge and understanding from across the specification to produce a coherent but partial evaluation that is supported by some evidence. Partial synthesis of geographical ideas, concepts and issues from the resources provided and from across the specification and in different contexts, in order to make partial connections. Applies knowledge and understanding from across the specification to partially suggest how challenges are affected by human innovation between places and uses mostly appropriate and developed examples from across the specification.
1	1 - 3	Applies knowledge and understanding from across the specification to produce an evaluation with limited coherence and support from some evidence. Limited synthesis of geographical ideas, concepts and issues from the resources provided and from across the specification and in different contexts, making limited connections. Limited application of knowledge and understanding from across the specification to suggest how the challenges faced by places are a result of human innovation. The response draws upon a limited number of under developed examples from across the specification.
	0	Response not creditworthy or not attempted.