

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.

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: Changing Landscapes

Either: Coastal Landscapes

1. (a) Use <i>Figure 1</i> to describe the relationship between cliff height and the rate of cliff retreat.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
					5		5

Indicative content

- Although variable, the overall relationship is that the higher the cliff, the lower the annual rate of cliff retreat
- Maximum cliff height of 160m corresponds with a very low rate of cliff retreat of around 0.05 to 0.12 m/yr with the lowest rate of cliff retreat (around 0.025 m/yr) corresponding with a cliff height of 135m at around 6900m from Cuckmere Haven
- Lowest cliff height of around 15m corresponds with very high rates of cliff retreat of 0.7 m/yr at around 3500 m from Cuckmere Haven
- Between 2700m – 3750m from Cuckmere Haven where cliffs are below 60m there are the highest rates of cliff retreat > 0.65 m/yr
- Anomalies include similar cliff heights of 80m (at 250m and 4700m from Cuckmere Haven) with different rates of cliff retreat (around 0.3 m/yr and 0.1m/yr respectively)

Credit any other valid points.

Award the marks as follows:

Band	Marks	
3	4-5	Clear description of the relationship between cliff height and the rate of cliff retreat. Wide use of the resource as source of data to support the description.
2	2-3	Some identification of the relationship between cliff height and the rate of cliff retreat. Partial use of the resource as source of data to support the description.
1	1	Simple statements of the relationship between cliff height and the rate of cliff retreat. Limited use of the resource as source of data.
	0	Response not creditworthy or not attempted.

1. (b) Assess the importance of biotic processes in the formation of either sand dunes or coral reefs.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
	7			3			10

This question requires candidates to demonstrate their ability to develop a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.

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

AO1 content encompasses knowledge and understanding of biotic processes as seen in the formation of either sand dunes or coral reefs. Biotic processes derive from living organisms; the biotic factors in an environment include the organisms competition for food resources and symbiotic relationships.

This may include:

For sand dunes

- Colonising plants may provide shelter and trap sand blown inland which will build sand dunes
- Sand builds up to form an embryo dune
- Wind diverted to allow accumulation of sediment in areas with decreased wind velocity
- Roots of marram bind sand which accumulates to form sand dunes
- Organic matter increases fertility of soil which encourages growth of plants to trap wind-blown sand
- Bigger plants established which increase shelter and so increasing dune size
- Burrowing fauna can expose sediment which is eroded by wind and thus blow outs form

For coral reefs

- Free-swimming coral larvae attach to submerged rocks or attach to other hard surfaces along the edges of islands or continents
- Corals grow and expand, reefs take on one of three major characteristic structures – fringing, barrier or atoll
- Fringing reefs form borders along shorelines and surrounding islands
- Barrier reefs also border shorelines at a greater distance – separated from their adjacent land mass by a lagoon of open water
- Atolls are usually circular or oval, with a central lagoon
- Slow accumulation and deposition of calcium carbonate (limestone) extracted from seawater
- After the individual organisms die, they leave behind their limestone skeletons
- Accumulation of minerals in skeletal remains build up to form the large structures
- Other reef builders such as sponges provide extra sediment which builds the reef structure

AO2

Candidates demonstrate application of knowledge and understanding through an assessment of the importance of biotic processes in the formation of either sand dunes or coral reefs. Relevant responses may include:

- The importance of the biotic processes such as where organic matter increases fertility of soil which encourages growth of plants to trap wind-blown sand
- Recognition that sand dunes can initially form without biotic processes
- Assessment of the importance of different plants or corals
- Assessment of the importance of biotic processes at different stages of formation of dunes and reefs

Near the lower end, there will be limited assessment of the relationships or role of other processes.

Credit any other valid points.

Award the marks as follows		
	AO1 (7 marks)	AO2.1c (3 marks)
Band	<i>Demonstrates knowledge and understanding of biotic processes and formation of sand dunes or coral reefs</i>	<i>Applies knowledge and understanding to assess the importance of biotic processes</i>
3	<p>5-7 marks</p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples</p> <p>Demonstrates detailed and accurate knowledge and understanding of biotic processes</p> <p>Demonstrates detailed and accurate knowledge and understanding of the link between biotic processes and the formation of sand dunes or coral reefs</p> <p>Demonstrates detailed and accurate knowledge and understanding of the link between other processes (aeolian / chemical / marine) and the formation of sand dunes or coral reefs</p> <p>Well annotated sketches / diagrams / maps may also be used and should be credited</p>	<p>3 marks</p> <p>Applies knowledge and understanding to produce a thorough and coherent assessment that is supported by evidence</p> <p>Applies knowledge and understanding to produce a thorough and coherent assessment of the importance of biotic processes in the formation of sand dunes or coral reefs</p>
2	<p>3-4 marks</p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples</p> <p>Demonstrates accurate knowledge and understanding of biotic processes</p> <p>Demonstrates accurate knowledge and understanding of link between biotic processes and the formation of sand dunes or coral reefs</p> <p>Sketches / diagrams / maps may also be used and should be credited</p>	<p>2 marks</p> <p>Applies knowledge and understanding to produce a coherent but partial assessment that is supported by some evidence</p> <p>Applies knowledge and understanding to produce a coherent but partial assessment of the importance of biotic processes, in the formation of sand dunes or coral reefs that is supported by some evidence</p>

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1	<p style="text-align: center;">1-2 marks</p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples</p> <p>Demonstrates limited knowledge and understanding of biotic processes</p> <p>Demonstrates limited link between biotic processes and the formation of sand dunes or coral reefs</p> <p>Basic sketches / diagrams / maps may be used and can be credited</p>	<p style="text-align: center;">1 mark</p> <p>Applies knowledge and understanding to produce an assessment with limited coherence and support from some evidence</p> <p>Applies knowledge and understanding to produce a limited assessment of the importance of biotic processes in the formation of sand dunes or coral reefs that is supported by some evidence</p>
	<p style="text-align: center;">0 marks</p> <p>Response not creditworthy or not attempted</p>	<p style="text-align: center;">0 marks</p> <p>Response not creditworthy or not attempted</p>

2. (a) Use <i>Figure 2</i> to compare the coastal landscapes before and after the passage of Hurricane Isaac.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
					5		5
<p>Indicative content</p> <p>In order to compare the coastal landscapes, both similarities and differences should be highlighted.</p> <p>Similarities include:</p> <ul style="list-style-type: none"> Both landscapes are low energy coastal environments of deposition Both landscapes are comprised of sand/sediment deposits <p>Differences include</p> <ul style="list-style-type: none"> More extensive, continuous and wider area of sand/sediment deposits in the foreground pre-Isaac compared to discontinuous, fragmented and smaller area of sand/sediment deposits post-Isaac Extensive seaward-facing areas of marshland vegetation pre-Isaac compared to the absence of marshland vegetation post-Isaac Lagoons to west pre-Isaac compared to loss/absence of lagoons post-Isaac Limited offshore deposition beyond islands pre-Isaac compared to more, but discontinuous offshore deposition in area beyond main island post-Isaac <p>Presence of island to east in foreground pre-Isaac compared to destruction of island in east post-Isaac</p> <p>Marking guidance</p> <p>Answers that score well provide detailed comparative comment of the similarities and differences between the two landscapes, including factual detail. Near the lower end, answers will be limited in their comparative comment.</p> <p>Credit any other valid points.</p>							
Award the marks as follows:							
Band	Marks						
3	5-6	Clear comparison of similarities and differences between the coastal landscapes, identifying a range of distinctive features, including factual detail. Wide use of the resource as source of data to support the description.					
2	3-4	Some comparison of similarities and differences between the coastal landscapes, identifying several distinctive features, including some factual detail. Partial use of the resource as source of data to support the description.					
1	1-2	Simple statements of similarities and/or differences between the coastal landscapes. Limited use of the resource as source of data.					
	0	Response not creditworthy or not attempted.					

2. (b) Evaluate the extent to which <i>one</i> coastal management strategy has been successful.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
	7			8			15

This question requires candidates to demonstrate their ability to develop a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.

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

AO1 content encompasses knowledge and understanding of one coastal management strategy. The content will depend upon the management strategy that is chosen but there are a number of threads that will be common for credit.

For whichever strategy is chosen there should be knowledge and understanding of the characteristics of the strategy and how it is used to manage coastal processes, which could be erosional or depositional. This may include:

- An outline of the reasons why a management strategy is required such as high rates of cliff or beach erosion, deposition of sediment in inappropriate places
- An outline of the characteristics of the management strategy which could include physical structures and operations
- An outline of the operation of the management strategy
- An outline of the strategy to demonstrate how the management strategy modifies coastal processes
- A geographical context for the management strategy

AO2

Candidates demonstrate application of knowledge and understanding through an evaluation of the extent to which one coastal management strategy has been successful. Relevant responses may include:

- The extent to which modification of the erosional or depositional processes operating in a coastal environment has been successful
- Whether the reduction of impacts of erosion on human activity such as farming, industry, infrastructure and settlement has been successful
- Whether there has been improvement or reduction in the aesthetic character of the coast
- The extent to which there has been an improvement of the coast as an amenity
- The extent to which the management of port access via sediment dredging has been successful
- The extent to which there has been a changing focus of coastal erosion as sediment is trapped by groynes

Those that score well will evaluate inter-relationships in the coastal environment and include how the strategy has a positive or negative impact. There could be reference to the success in reducing risk in coastal areas or improving the resilience of coastal activities. Evaluation may refer to success in one location having an impact on other places. Near the lower end, there will be limited evaluation with little reference to risk or resilience.

Credit any other valid points.

Award the marks as follows:		
	AO1 (7 marks)	AO2.1c (8 marks)
	<i>Demonstrates knowledge and understanding of one coastal management strategy</i>	<i>Applies knowledge and understanding to appraise / judge through evaluating the success of the selected strategy</i>
Band		
3	<p>5-7 marks</p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples</p> <p>Demonstrates detailed and accurate knowledge and understanding of one coastal management strategy</p> <p>Demonstrates detailed and accurate knowledge and understanding of the operation of the selected strategy</p> <p>Well annotated sketches / diagrams / maps may be used and should be credited</p>	<p>6-8 marks</p> <p>Applies knowledge and understanding to produce a thorough and coherent evaluation that is supported by evidence</p> <p>Applies knowledge and understanding to produce a thorough and coherent evaluation of the inter-relationships in the coastal environment and includes how the strategy has a positive or negative impact</p> <p>Balanced evaluation of the success in terms of reducing risk in coastal areas or improving the resilience of coastal activities</p>
2	<p>3-4 marks</p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples</p> <p>Demonstrates accurate knowledge and understanding of one coastal management strategy</p> <p>Demonstrates accurate knowledge and understanding of the operation of the selected strategy</p> <p>Sketches / diagrams / maps may be used and should be credited</p>	<p>3-5 marks</p> <p>Applies knowledge and understanding to produce a coherent but partial evaluation that is supported by some evidence</p> <p>Applies knowledge and understanding to produce a coherent but partial evaluation of how the strategy has a positive or negative impact</p> <p>Partial evaluation of the success in terms of reducing risk in coastal areas or improving the resilience of coastal activities</p>
1	<p>1-2 marks</p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples</p> <p>Demonstrates limited knowledge and understanding of one coastal management strategy</p> <p>Demonstrates limited knowledge and understanding of the operation of the selected strategy</p> <p>Basic sketches / diagrams / maps may be used and should be credited</p>	<p>1-2 marks</p> <p>Applies knowledge and understanding to produce an evaluation with limited coherence and support from some evidence</p> <p>Limited application of knowledge and understanding to evaluate how the strategy has a positive or negative impact</p> <p>Limited application of knowledge and understanding to evaluate in terms of success in reducing risk in coastal areas or improving the resilience of coastal activities</p>
	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>

Or: Glaciated Landscapes

3. (a) Use <i>Figures 3a and 3b</i> to describe the relationship between relief and the distribution of drumlins in Nova Scotia.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
					5		5

Indicative content

- Although variable, the overall relationship is that drumlins are concentrated in areas of lower relief
- Drumlins are almost always found in areas between 0 - 300m
- An almost continuous linear pattern of drumlins concentrated along the east coast of Nova Scotia corresponds with areas of low relief (<100m)
- A drumlin 'swarm' is concentrated in the coastal lowland of south west Nova Scotia where the relief is <100m
- Two broad belts of drumlins extending east-west across southern areas of Nova Scotia correspond with altitudes of between 0 - 300m
- The area with the highest relief of >700m in the north west of Nova Scotia is devoid of drumlins
- Drumlins are nearly always absent from areas > 300m in altitude

Credit any other valid points.

Marking guidance

Answers that score well will identify distinctive features of the relationship between relief and the distribution of drumlins and give a full description including factual detail.

Near the lower end, there will be limited identification and description of the relationship between relief and the distribution of drumlins.

Award the marks as follows:

Band	Marks	
3	5-6	Clear description of the relationship between relief and the distribution of drumlins. Wide use of the resource as source of data to support the description.
2	3-4	Some identification of the relationship between relief and the distribution of drumlins. Partial use of the resource as source of data to support the description.
1	1-2	Simple statements of the relationship between relief and the distribution of drumlins. Limited use of the resource as source of data.
	0	Response not creditworthy or not attempted.

3. (b) Assess the impact of human activity on permafrost at both the local and global scales.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
	7			3			10

This question requires candidates to demonstrate their ability to develop a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.

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

AO1 content encompasses knowledge and understanding of the various impacts of human activity on permafrost. This may include:

- The establishment of settlement which includes the dissemination of heat from buildings and waste disposal which leads to thermokarst
- The development of infrastructure which absorbs heat and thaws permafrost
- The impacts of global climate change which changes temperature regimes so that summer thawing lasts for longer and the active layer becomes more mobile
- The effects of human activity such as localised thawing, destruction of ice wedges, shrinking of surface
- The impact on erosion of coasts due to global sea-level rise.

AO2

Candidates demonstrate application of knowledge and understanding through an assessment of the impact of human activity on permafrost at both the local and global scales. Relevant responses may include:

- An assessment of which scale is the most important; local or global
- An assessment of impacts in a named locality
- An assessment which human impacts are most damaging
- An assessment of the magnitude of impacts
- An assessment of the resilience of permafrost to human impacts

Answers that score well will give a developed assessment of the impact of human activity on permafrost at both the local and global scales. Some answers may refer to feedback in the form of climate change and the increasing impact that human activity has over a wide scale. These answers may also look at thresholds in the periglacial system.

Near the lower end, there will be limited assessment of the impact of human activity on permafrost at different scales.

Credit any other valid approaches.

Award the marks as follows:		
	AO1 (7 marks)	AO2.1c (3 marks)
	<i>Demonstrates knowledge and understanding of human activity and its impacts on permafrost at the local and global scales</i>	<i>Applies knowledge and understanding to assess the links between human activity on permafrost at the local and global scales</i>
Band		
3	<p>5-7 marks</p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples</p> <p>Demonstrates detailed and accurate knowledge and understanding of human activity and its impacts on permafrost at both global and local scales</p> <p>Well annotated sketches / diagrams / maps may be used and should be credited</p>	<p>3 marks</p> <p>Applies knowledge and understanding to produce a thorough and coherent assessment that is supported by evidence</p> <p>Applies knowledge and understanding to produce a thorough and coherent assessment of the impact of human activity on permafrost at the local and global scales</p> <p>Balanced assessment of the impact of human activity on permafrost in terms of scale, location, magnitude, type of human activity and resilience to impacts</p>
2	<p>3-4 marks</p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples</p> <p>Demonstrates accurate knowledge and understanding of human activity and its impacts on permafrost with some reference to different scales</p> <p>Sketches / diagrams / maps may also be used and should be credited</p>	<p>2 marks</p> <p>Applies knowledge and understanding to produce a coherent but partial assessment that is supported by some evidence</p> <p>Applies knowledge and understanding to produce a coherent but partial assessment of the impact of human activity on permafrost at the local and global scales</p> <p>Partial assessment of the impact of human activity on permafrost in terms of scale, location, magnitude, type of human activity or resilience to impacts</p>
1	<p>1-2 marks</p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples</p> <p>Demonstrates limited knowledge and understanding of human activity and its impacts on permafrost with limited reference to different scales</p> <p>Basic sketches / diagrams / maps may be used and should be credited</p>	<p>1 mark</p> <p>Applies knowledge and understanding to produce an assessment with limited coherence and support from some evidence</p> <p>Limited application of knowledge and understanding to produce an assessment of the impact of human activity on permafrost at the local and global scales</p> <p>Limited assessment of the impact of human activity on permafrost in terms of scale, location, magnitude, type of human activity or resilience to impacts</p>
	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>

4. (a) Suggest how <i>Figure 4</i> indicates a permanent decline in the mass of the Greenland ice sheet.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
						5	5
<p>Indicative content</p> <ul style="list-style-type: none"> • Becoming more severe in recent years • Threshold has been reached • 2009 an anomaly – may indicate that it is not a permanent decline • New high in 2012 • Quantification <p>Credit any other valid points.</p> <p>Marking guidance</p> <p>Answers that score well interpret the data and evidence to suggest how Figure 4 indicates that there has been a permanent decline, making specific reference to the resource.</p> <p>Near the lower end, there will be limited interpretation of the resource and its indications of permanent decline.</p>							

Award the marks as follows:		
Band	Marks	
3	4-5	Well-developed interpretation of the extent of permanent decline. Wide use of the resource as source of data to support the description.
2	2-3	Partial interpretation of the extent of permanent decline. Partial use of the resource as source of data to support the description.
1	1	Limited interpretation of the pattern shown by the graph. Limited use of the resource as source of data.
	0	Response not creditworthy or not attempted.

4. (b) Evaluate the extent to which erosional processes are the main factor in the formation of the characteristic features of glacial troughs.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
	7			8			15

This question requires candidates to demonstrate their ability to develop a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.

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

AO1 content encompasses knowledge and understanding of erosional processes in the formation of the characteristic features of glacial troughs. The content will depend upon the examples chosen but there are a number of threads that will be common for credit. Answers should identify a number of characteristic features of glacial troughs. This could include:

- The overall shape of the trough with the over-deepened and parabolic section
- Hanging valleys, rock bars, small-scale features such as roche moutonees and striations
- Answers may pick out features that may involve the input of other processes such as deposition of moraines or post-glacial mass movement to form ribbon lakes
- Sea-level changes to produce fjords
- Identification and description of the major erosional processes and comment on the way in which they operate to produce the features of glacial troughs
- Comment on the way in which geomorphic processes operate to produce the features of glacial troughs

AO2

Candidates demonstrate application of knowledge and understanding through an evaluation of the extent to which erosional processes are the main factor in the formation of the characteristic features of glacial troughs. Relevant responses may include:

- Evaluation of the role of erosional processes compared to other glacial processes
- Evaluation of the role of erosional processes compared to post glacial processes such as mass movement and fluvial action
- Evaluation of the role of erosion between different glacial troughs
- Evaluation of the role of erosion in different parts of glacial troughs - more important in the upstream sections than lower down where deposition can be more evident

Answers that score well will evaluate the importance of erosional processes in the formation of the features of glacial troughs. Other answers will recognise that there are a variety of other inputs into the glacial system, one of which is pre-glacial landscape which may direct the flow of ice and also geology. This may impact upon the rate of erosion and over-deepening of troughs.

Near the lower end, there will be limited evaluation of the importance of erosional processes.

Credit any other valid approaches.

Award the marks as follows:		
	AO1 (7 marks)	AO2.1c (8 marks)
	<i>Demonstrates knowledge and understanding of the characteristics and formation of glacial troughs</i>	<i>Applies knowledge and understanding to appraise / judge through evaluating the relative importance of erosional processes</i>
Band		
3	<p>5-7 marks</p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples</p> <p>Demonstrates detailed and accurate knowledge and understanding of glacial erosional processes and their link to landforms</p> <p>Demonstrates detailed and accurate knowledge and understanding of other glacial processes and their link to landforms</p> <p>Demonstrates detailed and accurate knowledge and understanding of non-glacial processes and their link to landforms</p> <p>Well annotated sketches / diagrams / maps may be used and should be credited</p>	<p>6-8 marks</p> <p>Applies knowledge and understanding to produce a thorough and coherent evaluation that is supported by evidence</p> <p>Applies knowledge and understanding to judge the extent to which erosional processes are the main factor in the formation of the characteristic features of glacial troughs</p> <p>Balanced evaluation of the relative role of different appropriate and relevant factors in the formation of the characteristic features of glacial troughs</p>
2	<p>3-4 marks</p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples</p> <p>Demonstrates accurate knowledge and understanding of glacial erosional processes and their link to landforms</p> <p>Demonstrates accurate knowledge and understanding of other glacial processes and their link to landforms</p> <p>Demonstrates accurate knowledge and understanding of non-glacial processes and their link to landforms</p> <p>Sketches / diagrams / maps may be used and should be credited</p>	<p>3-5 marks</p> <p>Applies knowledge and understanding to produce a coherent but partial evaluation that is supported by some evidence</p> <p>Applies knowledge and understanding to partially judge the extent to which erosional processes are the main factor in the formation of the characteristic features of glacial troughs</p> <p>Partial evaluation of the relative role of different factors in the formation of the characteristic features of glacial troughs</p>

<p>1</p>	<p style="text-align: center;">1-2 marks</p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples</p> <p>Demonstrates limited knowledge and understanding of glacial erosional processes and their link to landforms</p> <p>Demonstrates limited knowledge and understanding of other glacial processes and their link to landforms</p> <p>Demonstrates limited knowledge and understanding of non-glacial processes and their link to landforms</p> <p>Basic sketches / diagrams / maps may be used and should be credited</p>	<p style="text-align: center;">1-2 marks</p> <p>Applies knowledge and understanding to produce an evaluation with limited coherence and support from some evidence</p> <p>Limited application of knowledge and understanding to evaluate the extent to which erosional processes are the main factor in the formation of the characteristic features of glacial troughs</p> <p>Limited evaluation of the relative role of different factors in the formation of the characteristic features of glacial troughs</p>
	<p style="text-align: center;">0 marks</p> <p>Response not creditworthy or not attempted</p>	<p style="text-align: center;">0 marks</p> <p>Response not creditworthy or not attempted</p>

Section B: Tectonic Hazards

5. (a) (i) Use <i>Figures 5a and 5b</i> to describe the distribution of severe earthquake risk areas in Pakistan.			AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
							6		6
Indicative content									
<ul style="list-style-type: none"> • Concentrations are in a number of areas • In the south risk is along coast – SE and SW • Western border of Balochistan / Afghanistan • North has two areas affected in Gilgit and Kashmir • Largest area is in Balochistan • Quantification e.g. area given in kilometres squared 									
Marking Guidance									
Near the upper end, answers that score well will identify distinctive features of the distribution of areas of severe earthquake risk and give a full description including factual detail.									
Near the lower end, answers that score weakly will be limited in their identification and description of the distribution of areas of severe earthquake risk.									
Credit any other valid points.									
Award the marks as follows:									
Band	Marks								
3	5-6	Clear description of the distribution of severe earthquake hazard. Wide use of the resource as source of data to support the description.							
2	3-4	Some description of the distribution of severe earthquake hazard. Partial use of the resource as source of data to support the description.							
1	1-2	Simple description of the distribution of severe earthquake hazard. Limited use of the resource as source of data.							
	0	Response not creditworthy or not attempted.							

5. (a) (ii) Use <i>Figure 5c</i> to compare the impacts of the 2013 earthquake on buildings in Awaran and Kech.			AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
Credit 1 mark per point and allow 1 mark for quantification, up to maximum of 4 marks								4	4
<ul style="list-style-type: none"> • Higher percentage of homes destroyed in Kech (1 mark) • Lower percentage of damaged houses in Kech (1 mark) • Higher percentage of damaged / destroyed schools in Kech (1 mark) • Quantification e.g. both suffered over 60% school damage (1 mark) 									
Credit any other valid points and responses relating any of the above points to Awaran rather than Kech.									

5. (b) (i) Calculate the chi-squared value by completing the missing figures in the column headed $(O-E)^2/E$ in <i>Figure 5d</i> . Show workings in your answer.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
					2		2
<p>Indictative content</p> <p>The missing values in the table are: 16.21 for Gishkor/Awaran and 5.99 for Teertaj/Awaran</p> <p>Chi-squared value is 321.14</p> <p>Marking Guidance</p> <p>Correct chi-squared-value (1) workings showing how the two missing values were calculated (1) by dividing the figures in the column headed $(O-E)^2$ by the expected figure ($E= 90.25$) for the rows for Gishkor/Awaran and Teertaj/Awaran</p>							

5. (b) (ii) Using the degrees of freedom in the table below, interpret the result of the chi-squared test calculated in 5 (b) (i).	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
						2	2
<p>Indicative content</p> <p>As the calculated chi-squared value of 321.14 is above the tabulated figure at the 99% confidence level at degrees of freedom 3 (n-1) of 11.34, it can be stated with 99% confidence that there is a statistically significant difference between the observed data and the expected data.</p> <p>Marking Guidance</p> <p>Correct confidence level (99%) selected at degrees of freedom 3 (1). Correct interpretation of the chi-squared result that the null hypothesis can be rejected and the alternative hypothesis accepted. This means that there is a statistically significant difference in the number of injured between the four districts and that there is some factor other than chance that is responsible for this (1).</p>							

5(b) (iii) Use Figure 5e to select and justify one graphical and one cartographical technique that could be used to interpret variations in food security in earthquake affected areas	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
					6	6	6
<p>Indicative content</p> <p>Graphical methods could include:</p> <ul style="list-style-type: none"> • Bar graphs to display rows or columns • Composite bars for each district • Pie charts to show each district • Proportional circles • Dial graphs <p>Cartographical methods could include:</p> <ul style="list-style-type: none"> • Choropleth mapping of selected statistics from the table • Proportional symbols (circles, squares, bars) of selected statistics superimposed on a base map • Pie or bar graphs of selected statistics superimposed on a base map <p>Credit any other valid points.</p> <p>Marking Guidance</p> <p>Answers that score well will select and justify through evaluating one appropriate graphical technique and one appropriate cartographical technique that enable interpretation of variations in food security with justification of why the choice of techniques is appropriate.</p> <p>Near the lower end, there will be one graphical and one cartographical selected with limited justification of why they were selected.</p>							
Award the marks as follows:							
Band	Marks						
3	5-6	<p>Selection of one graphical and one cartographical technique with clear reference and application of the techniques to the resource</p> <p>Demonstrates a clear and well-developed justification of the selection of techniques</p> <p>Demonstrates justification of selected techniques through evaluation of why other possible techniques are not as appropriate, with clear reference to the resource</p> <p>Demonstrates the use of fieldwork skills to interpret, analyse and evaluate data to construct well-developed and balanced arguments, supported by evidence</p> <p>Well annotated sketches / diagrams / maps may be used and should be credited</p>					

2	3-4	<p>Selection of one graphical and one cartographical technique and some reference and application of the techniques to the resource</p> <p>Demonstrates partial justification of the selection of techniques</p> <p>Demonstrates partial justification of selected techniques through partial evaluation of why other possible techniques are not as appropriate, with partial reference to the resource</p> <p>Demonstrates the use of fieldwork skills to partially interpret, analyse and evaluate data to construct partially developed or an unbalanced answer that has band 3 qualities for either the graphical or cartographical method, supported by mostly appropriate evidence</p> <p>Sketches / diagrams / maps may be also be used and should be credited</p>
1	1-2	<p>Selection of one graphical and one cartographical technique with limited or no reference and application of the techniques to the resource</p> <p>Demonstrates limited justification of the selection of techniques</p> <p>Demonstrates the limited use of fieldwork skills to interpret, analyse and evaluate data to construct an unbalanced answer for either the graphical or cartographical method</p> <p>Basic sketches / diagrams / maps may be used and should be credited</p>
	0	Response not creditworthy or not attempted.

5. (b) (iv) Use Figures 5 a - e and your own knowledge to analyse the appropriateness of possible short-term responses that could mitigate the effects of earthquakes in Balochistan.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
	5	7					12

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

AO1 content encompasses knowledge and understanding of the short-term responses which occur in the first weeks and months after the earthquake. The content will depend upon the responses chosen but there are a number of threads that will be common for credit. This may include:

- Search and rescue responses that can address destruction and damage to homes
- Provision of food and shelter that can address possible starvation and exposure to elements
- Supply of first aid and medical provisions that can address injuries and disease
- Clearing of infrastructure that can allow access
- Water and emergency aid from national and international agencies

Answers may refer to the characteristics of the responses and give detail on how the responses function.

Structural, for example:

- Infrastructure clearance and improvement to allow emergency services, rescue services, food supplies to be provided for the affected population
- Provision of shelter for the population whose houses have been destroyed or badly damaged. This can be linked to the nature of the location

Non-structural, for example:

- Provision of funds to allow authorities and NGOs to manage the impacts of the earthquake
- Social and community services to work with survivors

AO2

Candidates demonstrate application of knowledge and understanding through an analysis of the appropriateness of possible short-term responses that could mitigate the effects of earthquakes in Balochistan. Relevant responses may include:

- The analysis of possible short-term responses should comment on the appropriateness and link them to the mitigation of the impacts of the earthquake
- Measures should be given context as required in the question so responses should be directed at Balochistan and provide issues of location, access, possible support from neighbouring countries, spatial variation in effects and support from neighbouring countries, degree of and spatial variation in vulnerability of the population in terms of lack of shelter, equipment, fuel and food - characteristics that are evident from the resources

Answers that score well will analyse the application of different short-term responses in the context of the resources provided. To demonstrate analysis of application, responses may include:

- Analysis of the need to prioritise certain types of responses (shelter, fuel, essential supplies and food) given the vulnerability of the population shown in Figures 5c and 5e
- Analysis of the need to prioritise certain areas given the spatial variation in vulnerability of the population shown in Figures 5c and 5e (impacts on shelter greater in Kech compared to Awaran in 5e and Hoshab has the highest % of households with no food of 92%)
- Analysis of the difficulties with implementing responses given the scale of the Balochistan shown in Figure 5a
- Analysis of the variation in response times of mitigation strategies given the distances involved and remoteness of some areas from major cities shown in Figure 5a
- Analysis of the difficulties with accessing aid from surrounding countries of Iran and Afghanistan given their levels of development and political instability
- Analysis of the spatial variations in the need for specific mitigation strategies such as medical care (variations in the number of injuries shown in Figure 5d)

Credit any other valid points.

Award the marks are follows:		
	AO1 (5 marks)	AO2.1a (7 marks)
	<i>Demonstrates knowledge and understanding of short term responses</i>	<i>Applies knowledge and understanding to analyse different short-term responses in the context of the place</i>
Band		
3	<p>4-5 marks</p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples</p> <p>Demonstrates detailed and accurate knowledge and understanding of short term responses that could mitigate against effects in Balochistan</p> <p>Well annotated sketches / diagrams / maps may be used and should be credited</p>	<p>5-7 marks</p> <p>Applies knowledge and understanding to produce a thorough and coherent analysis that is supported by evidence</p> <p>Applies knowledge and understanding to produce a thorough and coherent analysis of a range of short-term responses, well linked to the resources provided</p> <p>Applies knowledge and understanding to make thorough and coherent links regarding the mitigation of effects</p>
2	<p>2-3 marks</p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples</p> <p>Demonstrates accurate knowledge and understanding of short term responses that could mitigate against effects in Balochistan</p> <p>Sketches / diagrams / maps may be used and should be credited</p>	<p>3-4 marks</p> <p>Applies knowledge and understanding to produce a coherent but partial analysis that is supported by some evidence</p> <p>Applies knowledge and understanding to produce a coherent but partial analysis of a number of short-term responses with some linkage to the resources provided</p> <p>Applies knowledge and understanding to make partial or unbalanced links regarding mitigation of effects</p>
1	<p>1 mark</p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples</p> <p>Demonstrates limited knowledge and understanding of short term responses that could mitigate against effects in Balochistan</p> <p>Basic sketches / diagrams / maps may be used and should be credited</p>	<p>1-2 marks</p> <p>Applies knowledge and understanding to produce an analysis with limited coherence and support from some evidence</p> <p>Limited application of knowledge and understanding to analyse a limited number of possible short-term responses</p> <p>Applies knowledge and understanding to make limited links regarding the mitigation of effects</p>
	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>	<p>0 marks</p> <p>Response not creditworthy or not attempted.</p>

5. (c) Explain why earthquakes produce landslides and tsunamis.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
	8						8

Indicative content

Tsunami

A huge wave caused by either volcanic or earthquake activity on the sea floor under the ocean from sudden movement of tectonic plates. The activity on the sea floor from shock waves radiating from the epicentre displaces the sea bed which creates a wave deep in the ocean, moving towards land. When the wave reaches shallower water the wave height increases and waves get closer. When these hit land they cause huge flooding e.g. Indian Ocean 2004, affecting India, Sri Lanka, Indonesia and Thailand and Japan in March 2011, affecting north east Japan.

Landslides

Landslides are the result of vibrations generated by earthquakes. The P and S waves produced during an earthquake act upon slopes. Landslides occur in a variety of situations from solid rock through to unconsolidated sands – these require different threshold strengths to trigger movement. Landslides have different features – rockfall, rockslides, debris flows etc. affecting, for example, California annually, Sri Lanka in 2003, south west China in 2012 and Ecuador in 2014.

Marking guidance

Answers that score well will give an accurate and developed account of the link between earthquakes and tsunamis and landslides. There will be clear factual detail in the explanation of process, both in the generation of the hazard and the hazard itself.

Near the lower end, there will be limited explanation of process.

Credit any other valid points.

Award the marks as follows:

Band	Marks	
3	6-8 marks	<p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples</p> <p>Demonstrates detailed and accurate knowledge and understanding through clear explanation and balanced treatment of why earthquakes produce both landslides and tsunamis</p> <p>Well annotated sketches / diagrams / maps may be used and should be credited</p>
2	3-5 marks	<p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples</p> <p>Demonstrates accurate knowledge and understanding through explanation of why earthquakes produce both landslides and tsunamis</p> <p>Sketches / diagrams / maps may be used and should be credited</p>

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1	1-2 marks	Demonstrates limited knowledge and understanding through a limited number of undeveloped examples Demonstrates limited knowledge and understanding through simple explanation of why earthquakes produce both landslides and tsunamis. Explanation may focus only on landslides or tsunamis rather than both Basic sketches / diagrams / maps may be used and should be credited
	0 marks	Response not creditworthy or not attempted

6. (a) To what extent is magnitude the most important factor in the level of impact of tectonic hazards?	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
	10			5			15

This question requires candidates to demonstrate their ability to develop a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.

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

AO1 content encompasses knowledge and understanding of magnitude as a factor in the level of impact of tectonic hazards. The content will depend upon the factors chosen but there are a number of threads that will be common and creditworthy. This may include:

- Magnitude could be defined with reference to scales such as Richter, Mercalli and VEI. There should be an understanding of how the strength and character of tectonic processes change with magnitude
- Accept detail of the different tectonic processes
- As magnitude increases there will be a greater possibility of more severe impacts
- There may be comment on the idea that at greater magnitudes the ability to overcome mitigation strategies is increased
- Events of smaller magnitude can be more easily managed

Answers may also give detail on how other factors may influence the level of impact could include physical elements of the hazard such as:

- Speed of onset where rapid onset gives less time for preparation
- Duration of the event where extended duration of events such as earthquake vibration leads to more damage
- Geographical characteristics of the location where events that occur in urban areas or high relief areas can cause more damage

Or human aspects such as:

- Level of development where low income countries are not able to manage the after effects or high income countries receive higher economic damage
- Level of preparation where areas that have prepared by earthquake resistant structures or education of population can have receive less severe impacts

AO2

Candidates demonstrate application of knowledge and understanding through an evaluation of the extent to which magnitude is the most important factor in the level of impact of tectonic hazards. Relevant responses may include:

- The relative importance of other factors, such as, onset, duration, levels of development and preparedness. They will also show clear appreciation that magnitude is not the only factor that dictates the level of impact
- The extent to which magnitude varies in importance in different tectonic events
- The extent to which impact of magnitude may change over time with improving technology

Near the lower end, there will be limited evaluation of the relative importance of other factor(s).

Credit any other valid points.

Award the marks as follows:

	AO1 (10 marks)	AO2.1c (5 marks)
	<i>Demonstrates knowledge and understanding of magnitude and other factors</i>	<i>Applies knowledge and understanding to evaluate the essential elements of the factor and judge its importance</i>
Band		
3	<p>7-10 marks</p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples</p> <p>Demonstrates detailed and accurate knowledge and understanding of magnitude and a broad range of other factors</p> <p>Well annotated sketches / diagrams / maps may be used and should be credited</p>	<p>4-5 marks</p> <p>Applies knowledge and understanding to produce a thorough and coherent evaluation that is supported by evidence</p> <p>Applies knowledge and understanding to produce a thorough and coherent evaluation of the essential elements of the named factor and judge its importance</p> <p>Balanced evaluation of the relative importance of other factors</p>
2	<p>4-6 marks</p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples</p> <p>Demonstrates accurate knowledge and understanding of magnitude and other factors</p> <p>Sketches / diagrams / maps may be used and should be credited</p>	<p>2-3 marks</p> <p>Applies knowledge and understanding to produce a coherent but partial evaluation that is supported by some evidence</p> <p>Applies knowledge and understanding to evaluate the essential elements of the named factor and judge its importance</p> <p>Partial evaluation of the relative importance of other factors</p>
1	<p>1-3 marks</p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples</p> <p>Demonstrates limited knowledge and understanding of magnitude and other factors</p> <p>Basic sketches / diagrams / maps may be used and should be credited</p>	<p>1 mark</p> <p>Applies knowledge and understanding to produce an evaluation with limited coherence and support from some evidence</p> <p>Limited application of knowledge and understanding to evaluate the essential elements of the named factor and judge its importance</p> <p>Limited evaluation of the relative importance of other factors</p>
	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>

6. (b) Analyse the impacts of similar volcanic events on contrasting locations.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
	10	10					20

This question requires candidates to demonstrate their ability to develop a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.

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

AO1 content encompasses knowledge and understanding of the impacts of similar volcanic events on contrasting locations. The content will depend upon the volcanic events chosen but there are a number of threads that will be common and creditworthy. This may include:

The structure of answers will probably focus on:

- Demographic impacts to include mortality, migration and impacts on population structure. Some may deal with medical aspects here and this should be allowed
- Social impacts to include homelessness, trauma, infrastructure problems, disease, culture, politics etc.
- Economic impacts to include loss of production, cost of repair, insurance, loss of earnings etc
- Environmental impacts to include destruction of flora and fauna, changing landscape, climate change etc.
- Impacts should provide accurate supporting evidence within the context of the chosen volcanic events

AO2

Candidates demonstrate application of knowledge and understanding through an analysis of the overall impacts of similar volcanic events on appropriate and contrasting locations. Analysis may take a variety of formats. Relevant responses include:

- Analysis of the different elements of damage e.g. demographic versus social
- Analysis of the variations in the magnitude of impacts in a given category e.g. economic
- Analysis of the variations in the scale of impacts (local, regional, global)
- Analysis of variations in impacts over time e.g. climate change in the longer-term
- Analysis of the interdependence of impacts e.g. social impact of unemployment linked to economic impact of loss of production
- Analysis of the human characteristics such as demography, levels of preparedness, mitigation, level of economic development within and between countries etc.

Near the lower end, there will limited analysis of impacts of two or more volcanic events.

Credit any other valid points.

Award the marks as follows:		
	AO1 (10 marks)	AO2.1a (10 marks)
	<i>Demonstrates knowledge and understanding of the impacts of similar volcanic events on contrasting locations</i>	<i>Applies knowledge and understanding to analyse the impacts of similar volcanic events on contrasting locations</i>
Band		
3	<p>7-10 marks</p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples</p> <p>Demonstrates detailed and accurate knowledge and understanding of the impacts of similar volcanic events on appropriate contrasting locations</p> <p>Well annotated sketches / diagrams / maps may be used and should be credited</p>	<p>7-10 marks</p> <p>Applies knowledge and understanding to produce a thorough and coherent analysis that is supported by evidence</p> <p>Applies knowledge and understanding to produce a thorough and coherent analysis of the overall impacts of similar volcanic events on appropriate and contrasting locations</p> <p>Balanced analysis of the impacts of similar volcanic events in terms of category, magnitude and scale of impact and characteristics of locations affected</p>
2	<p>4-6 marks</p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples</p> <p>Demonstrates accurate knowledge and understanding of impacts of similar volcanic events on appropriate contrasting locations</p> <p>Sketches / diagrams / maps may be used and should be credited</p>	<p>4-6 marks</p> <p>Applies knowledge and understanding to produce a coherent but partial analysis that is supported by some evidence</p> <p>Applies knowledge and understanding to produce a partial analysis of the overall impacts of similar volcanic events in appropriate and contrasting locations</p> <p>Partial analysis of the impacts of similar volcanic events in terms of category, magnitude and scale of impact or characteristics of locations affected</p>
1	<p>1-3 marks</p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples</p> <p>Demonstrates limited knowledge and understanding of impacts of similar volcanic events</p> <p>Basic sketches / diagrams / maps may be used and should be credited</p>	<p>1-3 marks</p> <p>Applies knowledge and understanding to produce an analysis with limited coherence and support from some evidence</p> <p>Limited application of knowledge and understanding to analyse the overall impacts of similar volcanic events in contrasting locations focusing on either similarities or differences</p> <p>Limited analysis of the impacts of similar volcanic events in terms of category, magnitude and scale of impact or characteristics of locations affected</p>
	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>	<p>0 marks</p> <p>Response not creditworthy or not attempted</p>

Section C: Challenges in the 21st Century

7. To what extent are economic factors the most significant driver of change in central urban places?	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	Total
				10			10

Within the answer to question 7, candidates should use the photographs in *Figures 6a, 6b and 6c*, 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.

Indicative content

Answers will probably focus on a number of changes that occur in central urban areas.

Figure 6a - economic factors shown in the photograph are linked to gentrification and the renovation of older areas of urban centres. Economic drivers can be in the form of cheap rents in declining areas. At a later stage rising costs force out traditional populations and alter land uses. Changes may also arise from the policies of agencies such as local government. Other economic factors may be given such as the causes of decline of town centres and the subsequent policies used in their revitalisation.

Figure 6b - physical changes can be identified in the destruction of the central area of Christchurch by tectonic activity. However there could also be reference to other physical factors that may cause damage such as coastal flooding and glacial lake outbursts.

Figure 6c - a combination of physical changes after the earthquake and clearance of buildings and the economic need to keep retail services to service the population of Christchurch.

The command 'to what extent' requires candidates to give possible explanations for and against the view expounded in the question. Answers that score well will put forward clear plausible and informed ideas based on Figures 6a, 6b and 6c and on their wider geographical knowledge and understanding from across the course. Such answers will demonstrate an understanding of the variety of factors that generate change in central urban places.

Answers that score well could:

- Argue the case for economic factors being the main drivers as central urban places are areas where retail and financial services are concentrated
- Argue that change is frequently driven by the need for profit so central areas are changed as a result - gentrification often seeks to take advantage of economic opportunities
- Argues that national and local government often provide the economic capacity for change
- Argue that in certain cities physical factors are important in change such as tectonic reasons in 6b Also change occurs in response to physical threats such as land use planning to mitigate the impacts of hazards or rebuilding after hazards
- Argue that the relative importance may differ from city to city

Near the lower end, there will be limited interpretation of Figures 6 a-c and limited knowledge, understanding of change and applied understanding of the driving factors taken from across the specification.

Credit any other valid points. Candidates should be credited for use of examples drawn from across the specification.

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Award the marks as follows:		
Band	Marks	
3	7-10	<p>Applies knowledge and understanding from across the specification to produce a thorough and coherent evaluation that is supported by evidence</p> <p>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</p> <p>Applies knowledge and understanding from across the specification to judge the extent to which economic factors drive change in central urban areas through the use of appropriate, accurate and well-developed examples from across the specification</p> <p>Applies knowledge and understanding of the factors that have caused change in central urban areas</p>
2	4-6	<p>Applies knowledge and understanding from across the specification to produce a coherent but partial evaluation that is supported by some evidence</p> <p>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</p> <p>Applies knowledge and understanding from across the specification to partially judge the extent to which economic factors drive change in central urban areas through the use of appropriate and well-developed examples from across the specification,</p> <p>Partially applies knowledge and understanding of the factors that have caused change in central urban areas</p>
1	1-3	<p>Applies knowledge and understanding from across the specification to produce an evaluation with limited coherence and support from some evidence</p> <p>Limited synthesis of geographical ideas, concepts and issues from the resources provided and from across the specification and in different contexts, making limited connections</p> <p>Limited application of knowledge and understanding from across the specification to make limited judgements on the extent to which economic factors drive change in central urban areas through the use of a limited number of undeveloped examples from across the specification</p> <p>Limited application of knowledge and understanding of the factors that have caused change in central urban areas</p>
	0	Response not creditworthy or not attempted