GCE

Geography

H481/01: Physical systems

Advanced GCE

Mark Scheme for November 2020

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
	Highlight
	Off page comment
^	Omission
?	Indicates a whole answer for which there is no credit
R	Rubric error (place at start of Question not being counted)
L1	Level 1
L2	Level 2
L3	Level 3
A1	A01 point made
A2	A02 point made
DEV	Development of a point
IRRL	Irrelevant; a significant amount of material that does not answer the question
SEEN	Point has been seen and noted
PLC	Place specific detail
	Highlighting an issue e.g. irrelevant paragraph. Use in conjunction with another stamp e.g IRRL
BP	Must be used on all blank pages where there is no candidate response
✔	Correct – for objective points based mark schemes
BOD	Benefit of the Doubt

Subject Specific Marking Instructions

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper and its rubrics
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

USING THE MARK SCHEME

Please study this Mark Scheme carefully. The Mark Scheme is an integral part of the process that begins with the setting of the question paper and ends with the awarding of grades. Question papers and Mark Schemes are developed in association with each other so that issues of differentiation and positive achievement can be addressed from the very start.

This Mark Scheme is a working document; it is not exhaustive; it does not provide 'correct' answers. The Mark Scheme can only provide 'best guesses' about how the question will work out, and it is subject to revision after we have looked at a wide range of scripts.

The Examiners' Standardisation Meeting will ensure that the Mark Scheme covers the range of candidates' responses to the questions, and that all Examiners understand and apply the Mark Scheme in the same way. The Mark Scheme will be discussed and amended at the meeting, and administrative procedures will be confirmed. Co-ordination scripts will be issued at the meeting to exemplify aspects of candidates' responses and achievements; the co-ordination scripts then become part of this Mark Scheme.

Before the Standardisation Meeting, you should read and mark in pencil a number of scripts, in order to gain an impression of the range of responses and achievement that may be expected.

In your marking, you will encounter valid responses which are not covered by the Mark Scheme: these responses must be credited. You will encounter answers which fall outside the 'target range' of Bands for the paper which you are marking. Please mark these answers according to the marking criteria. Please read carefully all the scripts in your allocation and make every effort to look positively for achievement throughout the ability range. Always be prepared to use the full range of marks.

LEVELS OF RESPONSE QUESTIONS:

The indicative content indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance.

Using 'best-fit', decide first which set of level descriptors best describes the overall quality of the answer. Once the level is located, adjust the mark concentrating on features of the answer which make it stronger or weaker following the guidelines for refinement.

Highest mark: If clear evidence of all the qualities in the level descriptors is shown, the HIGHEST Mark should be awarded.

Lowest mark: If the answer shows the candidate to be borderline (i.e. they have achieved all the qualities of the levels below and show limited evidence of meeting the criteria of the level in question) the LOWEST mark should be awarded.

Middle mark: This mark should be used for candidates who are secure in the level. They are not 'borderline' but they have only achieved some of the qualities in the level descriptors.

Be prepared to use the full range of marks. Do not reserve (e.g.) highest level marks 'in case' something turns up of a quality you have not yet seen. If an answer gives clear evidence of the qualities described in the level descriptors, reward appropriately.

Quality of extended response will be assessed in questions marked with an (*). Quality of extended response is not attributed to any single assessment objective but instead is assessed against the entire response for the question.

	AO1	**AO2**	**AO3**	**Quality of extended response**
Comprehensive	A wide range of detailed and accurate knowledge that demonstrates fully developed understanding that shows full relevance to the demands of the question. Precision in the use of question terminology.	Knowledge and understanding shown is consistently applied to the context of the question, in order to form a: Clear, developed and convincing analysis that is fully accurate. Clear, developed and convincing interpretation that is fully accurate. Detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based.	Quantitative, qualitative and/or fieldwork skills are used in a consistently appropriate and effective way and with a high degree of competence and precision.	There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.
Thorough	A range of detailed and accurate knowledge that demonstrates well developed understanding that is relevant to the demands of the question. Generally precise in the use of question terminology.	Knowledge and understanding shown is mainly applied to the context of the question, in order to form a: Clear and developed analysis that shows accuracy. Clear and developed interpretation that shows accuracy. Detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence.	Quantitative, qualitative and/or fieldwork skills are used in a suitable way and with a good level of competence and precision.	There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.

	AO1	AO2	AO3	Quality of extended response
Reasonable	Some sound knowledge that demonstrates partially developed understanding that is relevant to the demands to the question. Awareness of the meaning of the terms in the question.	Knowledge and understanding shown is partially applied to the context of the question, in order to form a: Sound analysis that shows some accuracy. Sound interpretation that shows some accuracy. Sound evaluation that offers generalised judgments and conclusions, with limited use of evidence.	Quantitative, qualitative and/or fieldwork skills are used in a mostly suitable way with a sound level of competence but may lack precision.	The information has some relevance and is presented with limited structure. The information is supported by limited evidence.
Basic	Limited knowledge that is relevant to the topic or question with little or no development. Confusion and inability to deconstruct terminology as used in the question.	Knowledge and understanding shows limited application to the context of the question in order to form a/an: Simple analysis that shows limited accuracy. Simple interpretation that shows limited accuracy. Un-supported evaluation that offers simple conclusions.	Quantitative, qualitative and/or fieldwork skills are used inappropriately with limited competence and precision.	The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.

Question			Answer	Mark	Guidance

1	(a)		**Explain the influence of climate change on raised beaches.**
			
			Level 3 (6-8 marks)
			Demonstrates **thorough** knowledge and understanding of how climate change influences raised beaches (AO1).
			
			This will be shown by including **well-developed** ideas with a **clear** appreciation of how climate change influences raised beaches.
			
			Level 2 (3-5 marks)
			Demonstrates **reasonable** knowledge and understanding of how climate change influences raised beaches (AO1).
			
			This will be shown by including **developed** ideas with **some** appreciation of how climate change influences raised beaches.
			
			Level 1 (1-2 marks)
			Demonstrates **basic** knowledge and understanding of how climate change influences raised beaches (AO1).
			
			This will be shown by including **simple** ideas with **no** or **limited** appreciation of how climate change influences raised beaches.
			
			0 marks
			No response or no response worthy of credit.
				8
				AO1 x8
					Indicative content:
					AO1 – 8 marks
					Knowledge and understanding of how climate change could influence raised beaches could potentially include:
					• The influence of past climate;
					  o during inter-glacial periods the raised beach would have been a shore platform being eroded by abrasion at high tide and weathered by organic acids from molluscs at low tide
					  o as sea level dropped when global temperatures lowered, abrasion would be less influential as the depth of water and power of the waves also reduced until even at high tide, the shore platform was no longer covered and a raised beach was formed
					  o eustatic/isostatic change as climate changes over the centuries
					• The influence of present climate;
					  • higher seasonal temperatures would encourage greater rates of chemical weathering; Van't Hoff's Law
					  • precipitation would enable organic acids to weather the rock if vegetated.
					  • if the raised beach was exposed, salt crystallisation would weather it slowly, although this is most effective in temperatures of 26-28°C
					• The influence of future climate change could also be relevant

1	(b)	(i)	**Study Fig. 1 in the Resource Booklet, which shows a GIS satellite image of Anacapa Island, California, USA.** **Measure the distance from A to B.** Use of the scale to accurately measure the distance between the points. 530m – 550m or 0.53 – 0.55km. Accept either unit.	1 AO3 x1	**AO3 – 1 marks** 1 x 1 (✓) for accurate measurement using the scale on the resource book.
1	(b)	(ii)	**Name landform C.** Following the identification of an error in Q2bii, this question will be discounted from the question paper. Please credit [1] mark for all candidates, irrespective of whether they have correctly answered the question, incorrectly answered the question, or offered no response.	1 AO3 x1	**AO3 – 1 marks** 1 x 1 (✓)
1	(b)	(iii)	**Explain three advantages of this data presentation technique.** • Can see a large geographical area and see wider influences on this landscape (✓) • On programs such as Google Earth can measure distances, label places, add photographs or graphs to enhance the data presentation (✓) • There might be access to older satellite images to be able to assess changes or rates of change over time (✓) • Easy to see changes in relief as using programs such as Google earth can access 3D view giving a better understanding of the landscape (✓)	3 AO3 x3	**AO3 – 3 marks** 3 x 1 (✓) for appropriate explained point(s)

1	(c)		**Study Fig. 2 in the Resource Booklet, Eastbourne, Sussex, UK.** **Using Fig. 2, suggest how management strategy D could influence the coastal landscape.** • Beach length increased and height increased with rainbowing from tanker. • Recharge provides more material to be moved by longshore drift, protecting the beach • Wave energy absorbed by growing beach reduce rates of erosion • More sediment provided for longshore drift, which might reduce risk of cliff collapse or mass movement further down drift, however presence of groynes might limit this movement • The gradient of the beach may be changed	**4** **AO2 x4**	**AO2 – 4 marks** 4 x 1 (✓) for analysing Fig. 2 to explain the effect of management strategy A (beach recharge) on the coastal landscape.
1	(d)*		**Using a case study, assess the extent to which landforms within a low energy coastal environment are inter-related.** **AO1** **Level 3 (6-8 marks)** Demonstrates **comprehensive** knowledge and understanding of how landforms within a low energy coastal environment are inter-related. The answer should include **accurate place-specific** detail. **Level 2 (3-5 marks)** Demonstrates **thorough** knowledge and understanding of how landforms within a low energy coastal environment are inter-related.	**16** **AO1 x8** **AO2 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of how landforms within a low energy coastal environment are inter-related could potentially include: • Long shore drift redistribute sediment changing size and shape of sediment and therefore landforms as well as creating new landforms • Inter-related landforms could include discussion of spits, bars, salt marsh, delta lobes, off-shore bars • Some landforms less inter-related due to unique features of the system e.g. protection from wind or waves limiting sediment supply • Credit annotated maps of regions showing flows, processes and landforms as well as inter-related aspects

The answer should include **place-specific** detail which is **partially accurate**.

Level 1 (1-2 marks)
Demonstrates **basic** knowledge and understanding of how landforms within a low energy coastal environment are inter-related.

There is an attempt to include **place-specific** detail but it is **inaccurate**.

0 marks
No response or no response worthy of credit.

AO2
Level 3 (6-8 marks)
Demonstrates **comprehensive** application of knowledge and understanding to provide clear and developed analysis that shows accuracy to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence, of the extent to which landforms within a low energy coastal environment are inter-related.

Level 2 (3-5 marks)
Demonstrates **thorough** application of knowledge and understanding to provide sound analysis that shows some accuracy to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence, of the extent to which landforms within a low energy coastal environment are inter-related.

Level 1 (1-2 marks)
Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows limited accuracy to provide an un-supported evaluation

- Place study examples could include Nile delta, Mississippi, Humber estuary

AO2 – 8 marks

Apply knowledge and understanding to analyse and evaluate the extent to which landforms within a low energy coastal environment are inter-related could potentially include:
- For example; Nile Delta
- Seasonal changes in inter-relations e.g. summer winds from NW move more sediment through suspension from Nile delta to longshore drift currents to create curved barrier bars e.g. from Rosetta distributary to Port Said
- New landforms being created e.g. curved barrier bars and relating lagoon at the north of the Manzala distributary which will continue to change over time as it is filled with sediment
- Seasonal changes of the strength of inter-relations e.g. in winter winds are much stronger leading to more erosive waves which remove sediment from the front of the delta to create underwater sand bars
- Some landforms less inter-related e.g. to the West of Abu Qir headland, crescentic bar systems on the beaches influenced by local rip currents rather than longshore drift which is a stronger factor in linking the coastal system together. In comparison to the East of the same headland longshore bars are strongly influenced by eastward longshore drift currents
- Arguments related to other factors that influence the strength of the inter-relationships may be relevant

that offers simple conclusions of the extent to which landforms within a low energy coastal environment are inter-related.

0 marks
No response or no response worthy of credit.

Quality of extended response

Level 3
There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

Level 2 There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.

Level 1 The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.

Question			Answer	Mark	Guidance
2	(a)		**Explain the influence of climate change on kames.** **Level 3 (6-8 marks)** Demonstrates **thorough** knowledge and understanding of how climate change influences kames (AO1). This will be shown by including **well-developed** ideas with a **clear** appreciation of how climate change influences kames. **Level 2 (3-5 marks)** Demonstrates **reasonable** knowledge and understanding of how climate change influences kames (AO1). This will be shown by including **developed** ideas with **some** appreciation of how climate change influences kames. **Level 1 (1-2 marks)** Demonstrates **basic** knowledge and understanding of how climate change influences kames (AO1). This will be shown by including **simple** ideas with **no** or **limited** appreciation of how climate change influences kames. **0 marks** No response or no response worthy of credit.	8 AO1 x8	**Indicative content:** **AO1 – 8 marks** Knowledge and understanding of how climate change influences kames could potentially include: - A kame is formed by glacial meltwaters causing stratified sand and gravel to form a hill / hummock - Two types of kames; delta and terraced kames - Terraced kames form due to differential specific heat capacity of the valley and glacier, leading to supraglacial streams which deposit material along the valley side - Delta kames formed in two ways through en-glacial streams losing energy at the base of a glacier or a supraglacial stream losing energy as it enters a static lake - Past climate changes - As climate warmed increased melting would lead to increased deposition of stratified material which is sorted and rounded as well as increased exposure of the kames - Cycle of retreat and advance over years would modify kames as erosion rates increase - Present climate changes - Growing season for vegetation increases as temperatures rise - Kames colonised by mosses, lichens before grasses, plants and shrubs develop. Increased rates of chemical weathering as well as biological e.g. chelation

2	(b)	(i)	**Study Fig. 3 in the Resource Booklet, which shows a GIS satellite image of Rodman Glacier, Alaska, USA.** **Measure the distance from E to F.** Use of the scale to accurately measure the distance between the points. 1100m – 1300m or 1.1 – 1.3km. Accept either unit.	**1** **AO3 x1**	**AO3 – 1 marks** 1 x 1 (✓) for accurate measurement using the scale on the resource book.
2	(b)	(ii)	**Name landform G.** Following the identification of an error in Q2bii, this question will be discounted from the question paper. Please credit [1] mark for all candidates, irrespective of whether they have correctly answered the question, incorrectly answered the question, or offered no response.	**1** **AO3 x1**	**AO3 – 1 marks** 1 x 1 (✓)
2	(b)	(iii)	**Explain three advantages of this data presentation technique.** • Can see a large geographical area and see wider influences on this landscape (✓) • On programs such as Google Earth can measure distances, label places, add photographs or graphs to enhance the data presentation (✓) • There might be access to older satellite images to be able to assess changes or rates of change over time (✓)	**3** **AO3 x3**	**AO3 – 3 marks** 3 x 1 (✓) for appropriate explained point(s)

			• Easy to see changes in relief as using programs such as Google earth can access 3D view giving a better understanding of the landscape (✓)		
2	**(c)**		**Study Fig. 4, Aklavik, Canada.** **Using Fig 4, suggest how human activity H could influence the periglacial landscape.** • The heat released by the building could lead to the thawing of permafrost • Increased solifluction and creep are likely which will lead to formation of solifluction lobes • Patterned ground and stone garlands may be covered with increased vegetation as rate of chemical and biological weathering increase due to the increased temperature from the house • Increased thawing around the house may lead to increased flooding which would increase rates of erosion, and modify or create small streams eroding the thin soil and increasing run off • Increased heating will lead to modification of the permafrost resulting in thawing and development of thermokarst	**4** **AO2 x4**	**AO2 – 4 marks** 3 x 1 (✓) for analysing Fig. 4 to explain the effect of human activity B (housing) on the periglacial landscape.
2	**(d)***		**Using a case study, assess the extent to which landforms within a valley glacier system are inter-related.** **AO1** **Level 3 (6-8 marks)**	**16** **AO1 x8** **AO2 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of how landforms within a valley glacier system are inter-related could potentially include: • Inter-related landforms could include discussion of corries, arêtes, truncated spurs, glacial troughs

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Demonstrates **comprehensive** knowledge and understanding of how landforms within a valley glacier system are inter-related.

The answer should include **accurate place-specific** detail.

Level 2 (3-5 marks)
Demonstrates **thorough** knowledge and understanding of how landforms within a valley glacier system are inter-related.

The answer should include **place-specific** detail which is **partially accurate**.

Level 1 (1-2 marks)
Demonstrates **basic** knowledge and understanding of how landforms within a valley glacier system are inter-related.

There is an attempt to include **place-specific** detail but it is **inaccurate**.

0 marks
No response or no response worthy of credit.

AO2
Level 3 (6-8 marks)
Demonstrates **comprehensive** application of knowledge and understanding to provide clear and developed analysis that shows accuracy to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence, of the extent to which landforms within a valley glacier system are inter-related.

Level 2 (3-5 marks)

- Variations in global temperatures have changed the way and extent to which landforms inter-relate e.g. during glaciation landforms inter-relate through erosion, transportation and deposition, however during inter-glacial periods landforms can inter-relate through weathering however most landforms would inter-relate less during this season
- Some landforms less inter-related due to unique features of the system e.g. they are more isolated through the physical environment itself or the nature of the landform
- Credit annotated maps of regions showing flows, processes and landforms as well as inter-related aspects

AO2 – 8 marks

Apply knowledge and understanding to analyse and evaluate the extent to which landforms within a valley glacier system are inter-related could potentially include:
- For example, Lake District, Cumbria, UK
- Helvellyn is closely inter-related to Striding Edge and the corrie Red Tarn and Nethermost Cove. These landforms form together and affect one another. Plucking and abrasion at the back wall of Red Tarn and Nethermost Cove contributed to the creation of Striding Edge (arête). Helvellyn is not a pyramidal peak although many claim it is, as there are not three inter-relating corries that form the mountain peak
- The ice from Red Tarn flowed into Glenriding Valley creating a glacial trough, and forming a

Demonstrates **thorough** application of knowledge and understanding to provide sound analysis that shows some accuracy to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence, of the extent to which landforms within a valley glacier system are inter-related.

Level 1 (1-2 marks)
Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows limited accuracy to provide an un-supported evaluation that offers simple conclusions of the extent to which landforms within a valley glacier system are inter-related.

0 marks
No response or no response worthy of credit.

Quality of extended response

Level 3
There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

Level 2 There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.

Level 1 The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.

glacial meltwater lake at the end of the glacial period; Ullswater. These landforms are closely related however their relationships change according to the inter or glacial period that is currently occurring

- Landforms associated with deposition and glacial meltwater are closely inter-related to erosional features as the material transported from these erosional features creates the depositional ones
- Glacial troughs e.g. Seathwaite U shaped valley creates the conditions (once temperatures rise and glaciers melt) for misfit streams to form as well as truncated spurs and hanging valleys to be clearly seen
- During inter-glacial periods these landforms have fewer links as transportation of eroded material reduces, and weathering predominately breaks material down but it fails to be transported and therefore doesn't link the system together over such a large area
- Erratics travelled far linking areas wider than valley glacier e.g. erratics from Shap (made of granite) found as far as the Tees Valley

| 3 | (a) | | **Explain the influence of climate change on pediments.**

Level 3 (6-8 marks)
Demonstrates **thorough** knowledge and understanding of how climate change would influence pediments (AO1).

This will be shown by including **well-developed** ideas with a **clear** appreciation of how climate change would influence pediments.

Level 2 (3-5 marks)
Demonstrates **reasonable** knowledge and understanding of how climate change would influence pediments (AO1).

This will be shown by including **developed** ideas with **some** appreciation of how climate change would influence pediments.

Level 1 (1-2 marks)
Demonstrates **basic** knowledge and understanding of how climate change would influence pediments (AO1).

This will be shown by including **simple** ideas with **no** or **limited** appreciation of how climate change would influence pediments.

0 marks
No response or no response worthy of credit. | **8**
AO1 x8 | **Indicative content:**
AO1 – 8 marks
Knowledge and understanding of how climate change would influence pediments could potentially include:
• A pediment is an erosional feature; a gentle slope at the base of a receding mountain
• Past climatic changes
  o There is debate over the formation of pediments
  o Semi-arid periods have enabled increased fluvial erosion which increases rates of erosion in mountainous dryland areas
  o Weathering and erosion have contributed to granular disintegration of rock which has enabled transportation by streams
  o A combination of the lateral fluvial erosion and mountain degradation has formed pediments e.g. Cima Dome, Mojave National Preserve
• Present climatic changes
  o Aridity has increased reducing rates of weathering, fluvial and aeolian erosion and mass movement
  o However, vegetation cover has reduced which may increase intensity of runoff, increasing rates of fluvial erosion. Generally, though, the gentle gradient of pediments protect them from gully shaped erosion
  o More intense and infrequent rainfall events increase rates of fluvial erosion through flooding |

					o Drier conditions increase rates of aeolian erosion and transportation of granular disintegration
3	(b)	(i)	**Study Fig. 5 in the Resource Booklet, which shows a GIS satellite image of Death Valley, California, USA.** **Measure the distance from I to J.** Use of the scale to accurately measure the distance between the points. 3100m – 3300m or 3.1– 3.3km. Accept either unit.	**1** **AO3 x1**	**AO3 – 1 marks** 1 x 1 (✓) for accurate measurement using the scale on the resource book.
3	(b)	(ii)	**Name landform K.** Following the identification of an error in Q2bii, this question will be discounted from the question paper. Please credit [1] mark for all candidates, irrespective of whether they have correctly answered the question, incorrectly answered the question, or offered no response.	**1** **AO3 x1**	**AO3 – 1 marks** 1 x 1 (✓)
3	(b)	(iii)	**Explain three advantages of this data presentation technique.** • Can see a large geographical area and see wider influences on this landscape (✓) • On programs such as Google Earth can measure distances, label places, add photographs or graphs to enhance the data presentation (✓) • There might be access to older satellite images to be able to assess changes or rates of change over time (✓)	**3** **AO3 x3**	**AO3 – 3 marks** 3 x 1 (✓) for appropriate explained point(s)

PMT

			• Easy to see changes in relief as using programs such as Google earth can access 3D view giving a better understanding of the landscape (✓)		
3	(c)		**Study Fig. 6 in the Resource Booklet, Nevada, USA. Using Fig. 6, suggest how management strategy L could influence the dryland landscape.** • Submergence of the valley upstream of the dam • The dam will trap sediment reducing the size of, or even causing sand bars to disappear lower downstream • Debris fans which would have been eroded by annual high flows or flooding before the dam was built would now be increasing in size • The reservoir behind the dam is now significantly larger and has a higher base level which will shorten the length of tributaries flowing into the reservoir • There will be an increase of weathering of river valley sides which could lead to slower degradation of valley sides downstream of the dam	**4** **AO2 x4**	**AO2 – 4 marks** 4 x 1 (✓) for analysing Fig. 6 to explain the effect of management strategy C (dam) on the dryland landscape.
3	(d)*		**Using a case study, assess the extent to which landforms within a low latitude desert are inter-related.** **AO1** **Level 3 (6-8 marks)** Demonstrates **comprehensive** knowledge and understanding of how landforms within a low latitude desert are inter-related.	**16** **AO1 x8** **AO2 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of how landforms within a low latitude desert are inter-related could potentially include: • Erosional landforms provide material for depositional landforms to be created through fluvial, aeolian erosional processes

The answer should include **accurate place-specific** detail.

Level 2 (3-5 marks)
Demonstrates **thorough** knowledge and understanding of how landforms within a low latitude desert are inter-related.

The answer should include **place-specific** detail which is **partially accurate**.

Level 1 (1-2 marks)
Demonstrates **basic** knowledge and understanding of how landforms within a low latitude desert are inter-related.

There is an attempt to include **place-specific** detail but it is **inaccurate**.

0 marks
No response or no response worthy of credit.

AO2
Level 3 (6-8 marks)
Demonstrates **comprehensive** application of knowledge and understanding to provide clear and developed analysis that shows accuracy to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence, of the extent to which landforms within a low latitude desert are inter-related.

Level 2 (3-5 marks)
Demonstrates **thorough** application of knowledge and understanding to provide sound analysis that shows some accuracy to provide a sound evaluation that offers generalised judgements and conclusions, with

- Inter-re;ated landforms could include pediments, inselbergs, dunes
- Seasonal changes of landforms relating to wind speed and erosive power of the wind
- Inter-relationships may change according to longer term climatic changes leading to more or less arid periods changing rates of erosion, transportation and landform creation
- Sources of sediment for landforms creation can inter-relate many landforms
- Some landforms less inter-related due to unique features of the system e.g. protection from wind, gradient of the land, or geology
- Credit annotated maps of regions showing flows, processes and landforms as well as inter-related aspects

AO2 – 8 marks

Apply knowledge and understanding to analyse and evaluate the extent to which landforms within a low latitude desert are inter-related could potentially include:
- e.g. in Namib desert landforms are inter-related through aeolian erosion. Transverse dunes at coast feed linear dunes further inland with sediment through aeolian abrasion
- In localised scale, this can also cause protection from aeolian processes reducing inter-relationship e.g. ridges formed by slower aeolian abrasion of more resistant rock provides localised shelter from SE trade winds which minimises erosion at the northern base of ridges

limited use of evidence, of the extent to which landforms within a low latitude desert are inter-related.

Level 1 (1-2 marks)
Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows limited accuracy to provide an un-supported evaluation that offers simple conclusions of the extent to which landforms within a low latitude desert are inter-related.

0 marks
No response or no response worthy of credit.

Quality of extended response

Level 3
There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

Level 2 There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.

Level 1 The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.

- All landforms within Namib desert have degree of inter-relationship as sediment is sourced from the Orange River which has over thousands of years has provided sand for what is now seen
- Inselbergs and pediments of rocky Namib desert inter-related as they were the same rock, but areas of differential jointing led to a variety of landforms. Deep jointing led to formation of inselbergs whereas dense jointing led to formation of pediments. Linked in rock type, formation as well as location as both found in rocky desert
- Namib desert experiences very low temperature range and very low annual rainfall slowing down rate of interaction of landforms and therefore extent of inter-relationship

Question			Answer	Mark	Guidance
4	(a)	(i)	**Study Fig. 7 in the Resource Booklet, the relationship between altitude and carbon content in the soil of the equatorial forest, Ecuador and significance test data.** **State the direction of the relationship shown on the graph.** • Positive correlation (✓)	1 AO3 x 1	**AO3 – 1 mark** 1 x 1 (✓) for interpretation of the scatter graph shown to suggest an appropriate relationship. Accept positive Accept idea that as altitude increases, carbon content increases
4	(a)	(ii)	**State whether the relationship is statistically significant and justify your answer.** The relationship is statistically significant (✓) because there are 20 values (DEV) and the correlation coefficient value is larger than the significance level at 0.01 (DEV).	3 AO3 x 3	**AO3 – 3 marks** 1 x 1 (✓) for recognising result is statistically significant. (✓) or that there is a 99% chance that the results did not occur by chance (✓). 2 x (DEV) for using Fig. 7 to establish the n value at 20 (DEV) **and** correctly stating the significance level (✓).
4	(a)	(iii)	**Suggest one reason for this relationship.** • Cooler temperatures at higher altitudes (✓) will reduce decomposition (DEV) and so carbon remains in the soil (DEV) • Influence of human activity through logging, deforestation or forest management (✓) which could influence carbon content as lower slopes more accessible (DEV) therefore carbon content removed (DEV)	3 AO2 x 3	**AO2 – 3 marks** 1 x 1 mark (✓) for interpretation of results to suggest an appropriate reason for the variation in data, 2 x 1 (DEV) for development of reason.
4	(b)		**Examine the extent to which an individual tree can influence the water and carbon cycles within a tropical rainforest.** **Level 3 (7-10 marks)**	10 AO1 x 6 AO2 x 4	**Indicative content** **AO1 – 6 marks** Knowledge and understanding of how an individual tree can influence the water and carbon cycle within a tropical rainforest could potentially include:

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Demonstrates **comprehensive** knowledge and understanding of the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest (AO1).

Demonstrates **thorough** application of knowledge and understanding to provide a detailed account of the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest (AO2).

This will be shown by including **well-developed** ideas of the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest.

Level 2 (4-6 marks)
Demonstrates **thorough** knowledge and understanding of the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest (AO1).

Demonstrates **reasonable** application of knowledge and understanding to provide a detailed account of the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest (AO2).

This will be shown by including **developed** ideas about the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest.

Level 1 (1–3 marks)
Demonstrates **basic** knowledge and understanding of the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest (AO1).

- Emergents in particular can be 40m in height providing a large store of carbon (around 180 tonnes C/ha above ground and 40 tonnes C/ha below ground)
- Each leaf affects the water cycle by releasing water through the stomata into the atmosphere as well as fixating carbon through photosynthesis in the leaves
- Roots will absorb water from the soil which affects organic content and carbon store
- Discussion of the influence of a tree on transpiration, interception, photosynthesis and so on are all relevant

AO2 – 4 marks
Apply knowledge and understanding to provide a detailed account of the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest could potentially include:
- Individual trees will have a significantly lower impact than the entire forest, however each tree has a small and vital role
- Level of influence relates to the size of the tree, the larger the tree, the larger the carbon store, the more leaf litter is produced which would have a larger influence on organic content of soil
- Seasonal changes in influence are limited as seasonal variations are small, however prolonger drier seasons would limit growth and cycling rates
- Rates of flow between stores of carbon is rapid due to the high average temperatures and high annual precipitation, so decomposition of leaf litter is fast and minerals quickly absorbed into the soil

			Demonstrates **basic** application of knowledge and understanding to provide an account of the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest (AO2). This will be shown by including **some** ideas about the extent to which an individual tree can influence the water and carbon cycle within a tropical rainforest **0 marks** No response or no response worthy of credit.		• Rates of transpiration high for trees, higher for emergents as leaves exposed to sunlight and able to heat quickly and transpire water effectively, although wind chill may small effect • Temporal changes in influence significant as influence of the tree much more during sunlight hours as photosynthesis, transpiration and evaporation occurring at rapid rates. During the night these rates slow although transpiration is likely to continue as stomata close
4	**(c)***		**Assess the importance of water for humans.** **AO1** **Level 3 (6–8 marks)** Demonstrates **comprehensive** knowledge and understanding of the importance of water for humans. The answer should include **accurate place-specific detail**. **Level 2 (3–5 marks)** Demonstrates **thorough** knowledge and understanding of the importance of water for humans. The answer should include **some place-specific detail which is partially accurate**. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the importance of water for humans. There is an attempt to include place-specific detail but it is inaccurate. **0 marks** No response or no response worthy of credit.	**16** **AO1 8** **AO2 8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the importance and use of water for humans could potentially include: • Use of water – domestic, industrial, agricultural, recreational • Presence of water on earth allows more complex organic structures which are essential to the evolution of life • Regulator of temperatures on earth through influence of oceans, clouds and water vapour increasing global temperatures by 15°C which enables life on earth • Role of water in biological and physical pump • 65-95% of organisms are water, and photosynthesis relies on water to occur • Enabled biological reactions and sustains flora, fauna and people • Importance of accessible water linked to Goldilocks zone **AO2 – 8 marks** Apply knowledge and understanding to analyse and evaluate the importance and use of water for humans could potentially include:

AO2
Level 3 (6-8 marks)
Application of knowledge and understanding is comprehensive. Analysis is clear, developed and convincing. Evaluation of the importance of water to humans is detailed and substantiated. Judgements are secure and evidence based leading to rational conclusions.

Level 2 (3-5 marks)
Application of knowledge and understanding is thorough. Analysis is sound with some development that is mostly relevant. Evaluation of the importance of water to humans is sound but partial. Judgements are generalised with some use of evidence leading to appropriate conclusions.

Level 1 (1-2 marks)
Application of knowledge and understanding is basic. Analysis is simple with little or no development. Evaluation of the importance of water to humans is weak or absent. Judgements, if present, are unsupported leading to simple conclusions.

0 marks
No response or no response worthy of credit.

Quality of extended response
Level 3
There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

- Importance absolute across all sections of society
- Importance of water to flora and fauna significant because of the use of these by humans directly e.g. use of timber, and need for their products in human society e.g. use in medicine
- Humans themselves unable to survive without water, being 60% water
- Need for economic growth and development essential – importance of access to clean, safe drinking water vital for development and growth, as well as water for all sections of industry
- No synthetic water available indicating their unique importance
- Expect wide range of justification, accept relevant arguments

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			Level 2 There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. **Level 1** The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		

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