GCE

Geography

H481/01: Physical systems

A Level

Mark Scheme for June 2024

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It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

MARKING INSTRUCTIONS

PREPARATION FOR MARKING
RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses.

   YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the RM Assessor messaging system, or by email.

5. **Crossed Out Responses**
   Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

   Rubric Error Responses – Optional Questions
   Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple Choice Question Responses
When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).
When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses
When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response**)
Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth **two or more marks**)
If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)
Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add a tick to confirm that the work has been seen.

7. Award No Response (NR) if:
    - there is nothing written in the answer space

Award Zero '0' if:

- anything is written in the answer space and is not worthy of credit (this includes text and symbols).

Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

8. The RM Assessor **comments box** is used by your team leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
If you have any questions or comments for your team leader, use the phone, the RM Assessor messaging system, or e-mail.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:
    a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
    b. **To determine the mark within the level**, consider the following

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

11. **Annotations**

Annotation	Meaning
SEEN	Point has been seen and noted
?	Indicates a whole answer for which there is no credit
BP	Must be used on all blank pages where there is no candidate response
DEV	Development of a point
IRRL	Irrelevant; a significant amount of material that does not answer the question
L1	Level 1
L2	Level 2
L3	Level 3
NE	No place specific detail
R	Rubric error (place at start of Question not being counted)
	Highlighting an issue e.g. irrelevant paragraph. Use in conjunction with another stamp e.g IRRL

12. **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,	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
		with some link between rational conclusions and evidence.		
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.	There 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: 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 flows of materials in the formation of a stack.** **Level 3 (6-8 marks)** Demonstrate **thorough** knowledge and understanding of the influence of flows of materials in the formation of a stack. (AO1). This will be shown by including **well-developed** ideas with a **clear** appreciation of the reasons for the influence of flows of materials in the formation of a stack. **Level 2 (3-5 marks)** Demonstrate **reasonable** knowledge and understanding of the reasons for the influence of flows of materials in the formation of a stack This will be shown by including **developed** ideas with **some** appreciation of the reasons of the influence of flows of materials in the formation of a stack. **Level 1 (1-2 marks)** Demonstrate **basic** knowledge and understanding of the reasons for the influence of flows of materials in the formation of a stack (AO1). This will be shown by including **simple** ideas and with **no** or **limited** appreciation of the reasons for the influence of flows of materials in the formation of a stack. **0 marks** No response or no response worthy of credit.	**8** **AO1 x8**	**Indicative content:** **AO1 – 8 marks** Knowledge and understanding of the reasons for the influence of flows of materials in the formation of a stack could potentially include: • Load is carried via longshore drift down coast of cliffs following erosion, rock fall or from alluvial sediment brought into the coastal sediment cell • Material is also eroded from faults and joints in the headland • The load being carried by the waves erodes the headland through abrasion, which will increase as attrition occurs making particles lighter so more are able to be thrown by the waves. Some material will be so small it contributes to solution affecting chalk and limestone headlands • Erosion of headland continues as cave and arch formed. At times e.g. formation of arch in a small space of time, a significant amount of material can be contributed to the waves increasing rates of erosion as attrition wears it down. • Material moving with gravity as roof of arch collapses very significant as this creates the stack as a separate landform An indicator of Level 3 is an answer that fully discusses the formation from start to finish in a sequential, well-developed way.

Question			Answer	Mark	Guidance
1	(b)	(i)	**Study <u>Table 1</u> which shows data a student collected during fieldwork in a coastal landscape. Using <u>Table 1</u>, calculate the median for the percentage of plastic waste.** • Ordering numbers from highest to lowest or from lowest to highest e.g. 45, 30, 25, 10, 5, 1 (✓) • (10 + 25)/2 (✓) • Median value is 17.5. (✓)	**2** **AO3 x2**	**AO3 - 2 marks** 1 x 1 (✓) for showing working. 1 x 1 (✓) for calculating the median using <u>TABLE 1</u>. Median value is halfway between value 3 and 4 (25 and 10) – if candidates have shown this working they can be credited. Final answer should be unrounded as not required to change answer in question.
1	(b)	(ii)	**Explain <u>one</u> limitation of the data set in <u>Table 1</u>.** • Small sample (✓) so not representative of the study area (DEV) • Spatial data (✓) doesn't describe how many items found or frequency of items – items could be in multiple categories, or just one large item e.g. drinking cup taking up large amount of space (DEV) • Single/short transect (✓) so covers very small area of the study area (DEV) cannot take average readings across time (DEV) • The data is given as a percentage (✓) and so you do not know how many pieces of rubbish there are (DEV) • The data is only collected every 2m (✓) and so the data set is not fully representative (DEV)	**2** **AO3 x2**	**AO3 - 2 marks** 1 x 1 (✓) for identifying limitation; 1 x 1 (DEV) for explanation.

Question			Answer	Mark	Guidance
1	(b)	(iii)	**Suggest another data presentation method that would be suitable for this data set and justify your choice.** • Stacked bar chart**s** (✓) or bar chart**s** with adjacent bar**s** for each location (✓) – can show variation along the transect (DEV), easy to read (DEV) • Line chart (✓) – easy to read (DEV), easy to compare changes (DEV) • Divided pie chart**s** along a transect line (✓), easy to compare changes (DEV)	**2** **AO3 x2**	**AO3 - 2 marks** 1 x (✓) for identifying appropriate data presentation method 1 x (DEV) for justification. Accept any appropriate data presentation method and advantage of that presentation method. Reference to pie and bar chart**s** are acceptable if it is clear the candidate would draw more than one.
	(c)		**Study <u>Fig.1</u>, a coastal landscape in the United Kingdom. Referring to <u>Fig. 1</u>, suggest <u>ONE</u> way human activity might influence geomorphic processes in the landscape system.** • Management e.g. sea wall reduces abrasion and hydraulic action of the coastline by provision of more resistant material (✓). There will be less load in the sea (DEV) and therefore less transportation by saltation, traction and suspension (DEV) • Management e.g. riprap protects against erosion (✓) by absorbing wave energy (DEV) by providing friction on the flow of water through the air spaces between the rocks (DEV) • Management e.g. riprap slows waves down with increased friction (✓), so there will be more deposition as energy for transportation is	**3** **AO2 x3**	**AO2 - 3 marks** 1 x (✓) and 2 x (DEV) for analysing <u>FIG. 1</u> to suggest <u>ONE</u> way human activity might influence geomorphic processes in the landscape system. The image shows sea wall / riprap. Naming a human activity on its own is not sufficient for a mark. A geomorphic process (e.g. weathering, erosion etc.) must be present in the answer as either a (✓) or (DEV) to achieve full marks.

Question			Answer	Mark	Guidance
			reduced (DEV) so sand will build up between the boulders over time so the waves are carrying less suspended load (DEV)		**Must have explicit reference to the figure for credit.**
1	**(d*)**		**To what extent is sea level rise the most important factor influencing coastal landscapes?** **AO1** **Level 3 (6-8 marks)** Demonstrates **comprehensive** knowledge and understanding of the influence of sea level rise **and** other factors on coastal landscapes. The answer should include **accurate place-specific** detail. **Level 2 (3-5 marks)** Demonstrates **thorough** knowledge and understanding of the influence of sea level rise **and** other factors on coastal landscapes. The answer should include **place-specific** detail which is **partially accurate**. **Level 1 (1-2 marks)** Demonstrates **basic** knowledge and understanding of the influence of sea level rise **and** other factors on coastal landscapes. 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 x8** **AO2 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the influence of sea level rise and other factors on coastal landscapes could potentially include: • Influence of sea level rise ○ rias – as sea level rises, river estuaries, and part of the lower channel and floodplain flood with sea water ○ fjords - as sea level rises, glacial valleys flood ○ shingle beaches – wave action during post glacial sea level rise pushed shingle onshore forming beaches, tombolos and bars • Influence of other factors ○ geology - rock structure, hardness and composition influence shape of coastal landforms and rates of erosion, weathering and mass wasting ○ human activity - management schemes e.g. sea walls, beach nourishment, groynes etc, or unintentional activities e.g. sand mining, tourism etc ○ climate – affecting winds and rates of erosion, as well as rates of chemical weathering with temperature rise, physical

Question			Answer	Mark	Guidance
			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 sea level rise is the most important factor influencing coastal landscapes. **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 sea level rise is the most important factor influencing coastal landscapes. **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 sea level rise is the most important factor influencing coastal landscapes. **0 marks** No response or no response worthy of credit. **Quality of extended response** **Level 3**		weathering as temperatures fluctuate around 0°C ○ sea level fall – creating emergent landforms e.g. raised beaches, abandoned cliffs **AO2 – 8 marks** Apply knowledge and understanding to analyse and evaluate to what extent is sea level rise the most important factor influencing coastal landscapes could potentially include: • Importance will vary depending on use of case study • sea level rise ○ Importance of current climatic conditions e.g. global warming causing sea levels to rise (3.6mm in last decade) which changes location of deposition and erosion, creates new landforms, amends others e.g. abandoned cliffs– very important • climate change ○ Importance of past and future climatic changes resulting in warming climate e.g. Flandrian Transgression creating rias and fjords – significant impact on landscape – both in size and length. Features are present today – although now subject to less change through weathering and erosion, so in the past more important • human activity ○ Importance of human activity both deliberate and unintentional e.g. sea walls slow rates of erosion leading to less cliff

Question			Answer	Mark	Guidance
			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.		collapse and build-up of beach, cliff drainage slows rates of mass movement, groynes restrict longshore drift which limits impact of sea level rise – so changes are smaller scale, although could argue hard engineering change landscape significantly • storm events ○ In some areas extreme storm events have larger impact e.g. Holderness coastline where 1,200 m^3 – 6,300 m^3 lost every year through mass movement as glacial till so vulnerable to erosion from North Sea – changes over time – less impact in summer, less impact on more resistant rock e.g. chalk at Beachy Head – low impact as seasonal and limited to specific geology

Question			Answer	Mark	Guidance
2	(a)		**Explain the influence of flows of materials in the formation of a corrie.** **Level 3 (6-8 marks)** Demonstrate **thorough** knowledge and understanding of the influence of flows of materials in the formation of a corrie. (AO1). This will be shown by including **well-developed** ideas with a **clear** appreciation of the reasons for the influence of flows of materials in the formation of a corrie. **Level 2 (3-5 marks)** Demonstrate **reasonable** knowledge and understanding of the reasons for the influence of flows of materials in the formation of a corrie This will be shown by including **developed** ideas with **some** appreciation of the reasons of the influence of flows of materials in the formation of a corrie. **Level 1 (1-2 marks)** Demonstrate **basic** knowledge and understanding of the reasons for the influence of flows of materials in the formation of a corrie (AO1). This will be shown by including **simple** ideas and with **no** or **limited** appreciation of the reasons for the influence of flows of materials in the formation of a corrie. **0 marks** No response or no response worthy of credit.	**8** **AO1 x8**	**Indicative content:** **AO1 – 8 marks** Knowledge and understanding of the reasons for the influence of flows of materials in the formation of a corrie could potentially include: • Load is carried via creep and basal slippage or internal deformation with ice flow • Load can be added to the glacier via freeze-thaw and frost shattering as well as some biological weathering bringing material to the surface to be exposed to further breakdown • Material is also eroded through plucking, abrasion and nivation. Once loose from the hillside, material can be transported contributing to further abrasion. • Nivation plays significant role in erosion of hollow with freeze-thaw releasing material, solifluction and creep moving material with help of meltwater • At critical depth, basal slippage and rotational movement occurs moving eroded material downslope causing abrasion and plucking of further material. This deepens the corrie base creating hollow to store melt water when temperatures rise • Debris from plucking and weathering above falls into the bergschrund moving it to the back wall, which is used for further abrasion creating the steep back wall of the corrie • The thinner ice at the front of the glacier is unable to erode with such power, so more deposition occurs causing a moraine of transported and eroded material

Question			Answer	Mark	Guidance
					An indicator of Level 3 is an answer that fully discusses the formation from start to finish in a sequential, well-developed way.
2	**(b)**	**(i)**	**Study <u>Table 2</u> which shows data a student collected during fieldwork in a glaciated landscape. Using <u>Table 2</u>, calculate the median for the percentage of plastic waste.** • Ordering numbers from highest to lowest or from lowest to highest e.g. 45, 30, 25, 10, 5, 1 (✓) • (10 + 25)/2 (✓) • Median value is 17.5. (✓)	**2** **AO3 x2**	**AO3 - 2 marks** 1 x 1 (✓) for showing working. 1 x 1 (✓) for calculating the median using <u>TABLE 2</u>. Median value is halfway between value 3 and 4 (25 and 10) – if candidates have shown this working they can be credited. Final answer should be unrounded as not required to change answer in question.
2	**(b)**	**(ii)**	**Explain <u>one</u> limitation of the data set in <u>Table 2</u>.** • Small sample (✓) so not representative of the study area (DEV) • Spatial data (✓) doesn't describe how many items found or frequency of items – items could be in multiple categories, or just one large item e.g. drinking cup taking up large amount of space (DEV) • Single/short transect (✓) so covers very small area of the landscape (DEV) cannot take average readings across wider space (DEV)	**2** **AO3 x2**	**AO3 - 2 marks** 1 x 1 (✓) for identifying limitation; 1 x 1 (DEV) for explanation.

Question			Answer	Mark	Guidance
			• The data is given as a percentage (✓) and so you do not know how many pieces of rubbish there are (DEV) • The data is only collected every 2m (✓) and so the data set is not fully representative (DEV).		
2	**(b)**	**(iii)**	**Suggest another data presentation method that would be suitable for this data set and justify your choice.** • Stacked bar chart**s** (✓) or bar chart**s** with adjacent bar**s** for each location (✓) – can show variation along the transect (DEV), easy to read (DEV) • Line chart (✓) – easy to read (DEV), easy to compare changes (DEV) • Divided pie chart**s** along a transect line (✓), easy to compare changes (DEV)	**2** **AO3 x2**	**AO3 - 2 marks** 1 x (✓) for identifying appropriate data presentation method 1 x (DEV) for justification. Accept any appropriate data presentation method and advantage of that presentation method. Reference to pie and bar chart**s** are acceptable if it is clear the candidate would draw more than one.
2	**(c)**		**Study <u>Fig. 2</u>, a periglacial landscape in Russia. Referring to <u>Fig. 2</u>, suggest <u>ONE</u> way human activity might influence geomorphic processes in the landscape system.** • Industry /buildings produces heat due to machinery/heating systems (✓) which melts permafrost (DEV) increasing rates of subsidence (DEV)	**3** **AO2 x3**	**AO2 - 3 marks** 1 x (✓) and 2 x (DEV) for analysing <u>FIG. 2</u> to suggest <u>ONE</u> way human activity might influence geomorphic processes in the landscape system. The image shows industry/buildings. Naming a human activity on its own is not sufficient for a mark.

Question			Answer	Mark	Guidance
			• With several buildings together this increases urban heat island effect (✓) so there are fewer days with temperatures fluctuating around 0°C (DEV) which reduces freeze-thaw weathering (DEV) • Removal of vegetation reduces insulation of ground ice (✓) increasing thawing (DEV) so there is a greater active layer so there is wider and deeper subsidence (DEV) • The burning of fossil fuels increases temperature (✓) due to the enhanced greenhouse effect (DEV) causing an increase of meltwater leading to possible mass movement (DEV)		A geomorphic process (e.g. weathering, mass movement etc.) must be present in the answer as either a (✓) or (DEV) to achieve full marks. **Must have explicit reference to the figure for credit.**
2	**(d*)**		**To what extent is climate change the most important factor influencing glacial landscapes?** **AO1** **Level 3 (6-8 marks)** Demonstrates **comprehensive** knowledge and understanding of the influence of climate change **and** other factors on glacial landscapes. The answer should include **accurate place-specific** detail. **Level 2 (3-5 marks)** Demonstrates **thorough** knowledge and understanding of the influence of climate change **and** other factors on glacial landscapes. The answer should include **place-specific** detail which is **partially accurate**.	**16** **AO1 x8** **AO2 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the influence of climate change and other factors on glacial landscapes could potentially include: • Influence of climate change factors ○ Kames – as temperatures rise, glacier meltwater lays down sand and gravel creating hills or hummocks ○ Eskers – as temperatures rise, subglacial streams deposit sand and gravel creating long ridges ○ Outwash plains – melt water streams caused by temperature rise, deposit material as entering lowland areas ○ Temperature change - creating periglacial landforms e.g. patterned grounds, pingos

Question			Answer	Mark	Guidance
			Level 1 (1-2 marks) Demonstrates **basic** knowledge and understanding of the influence of climate change on **and** other factors glacial landscapes. 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 climate change is the most important factor influencing glacial landscapes. **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 climate change is the most important factor influencing glacial landscapes. **Level 1 (1-2 marks)** Demonstrates **basic** application of knowledge and understanding to provide simple analysis that shows		• Influence of other factors ○ Geology – rock structure, hardness and composition influence shape of glacial landforms and rates of erosion, weathering and mass movement ○ Human activity - e.g. dams and electricity generation ○ Relief and altitude – controlling climate, relief and aspect which influence microclimates and movement of glaciers **AO2 – 8 marks** Apply knowledge and understanding to analyse and evaluate the relative importance of climate change on glacial landscapes could potentially include: • Importance will vary depending on use of case study • Climate change ○ Importance of current climatic conditions e.g. global warming causing glacial retreat as temperatures rise and glaciers melt, reducing glaciers, increasing impact of melt water / rivers on landscapes e.g. ribbon lakes, - rates increasing at 48GT/yr globally – a important factor that is having widespread impact and significant in terms of rate of change • Past climate change ○ Importance of past climatic changes resulting in glacio-fluvial landforms e.g. formation of corries during colder periods

Question			Answer	Mark	Guidance
			limited accuracy to provide an un-supported evaluation that offers simple conclusions of the extent to which climate change is the most important factor influencing glacial landscapes. **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.		which are now modified by erosion and weathering as land exposed as temperatures continues to fluctuate e.g. freeze-thaw weathering now affecting corries in winter – limited influence now – seasonal and smaller landscape changes with weathering, in the past landscape change more influential as corries cut out of hillside • Human activity ○ Importance of human activity both deliberate and unintentional e.g. increased rates of solifluction, or dams reducing river flow reducing erosion and reducing impact on landscape, although river reducing flow is a larger change but change in short space of time, longer term the influence of the river can be less as less erosive power, reduction in winter tourism as temperatures rise – reduced impact on landscape, although could lead to increased rates of footpath weathering as hills used more for hiking rather than skiing, reduced annual change as landscape no longer covered in snow

Question			Answer	Mark	Guidance
3	(a)		**Explain the influence of flows of materials in the formation of a canyon.** **Level 3 (6-8 marks)** Demonstrate **thorough** knowledge and understanding of the influence of flows of materials in the formation of a canyon. (AO1). This will be shown by including **well-developed** ideas with a **clear** appreciation of the reasons for the influence of flows of materials in the formation of a canyon. **Level 2 (3-5 marks)** Demonstrate **reasonable** knowledge and understanding of the reasons for the influence of flows of materials in the formation of a canyon This will be shown by including **developed** ideas with **some** appreciation of the reasons of the influence of flows of materials in the formation of a canyon. **Level 1 (1-2 marks)** Demonstrate **basic** knowledge and understanding of the reasons for the influence of flows of materials in the formation of a canyon (AO1). This will be shown by including **simple** ideas and with **no** or **limited** appreciation of the reasons for the influence of flows of materials in the formation of a canyon. **0 marks** No response or no response worthy of credit.	**8** **AO1 x8**	**Indicative content:** **AO1 – 8 marks** Knowledge and understanding of the reasons for the influence of flows of materials in the formation of a canyon could potentially include: • Load is supplied via mechanical weathering e.g. salt, insolation and freeze-thaw weathering as well as exfoliation. This provides material that can be transported via mass movement, or previous fluvial processes or aeolian processes e.g. creep, saltation or suspension. • Material is also eroded by deflation and corrosion, which are more frequent as attrition breaks particles down so they are lighter and easier to transport. • Fluvial material erodes vertically through abrasion steep canyon sides with coarse sediment. • Mass movement is rare as moisture is lacking so there is more friction, holding steep slopes in place An indicator of Level 3 is an answer that fully discusses the formation from start to finish in a sequential, well-developed way.

Question			Answer	Mark	Guidance
3	(b)	(i)	**Study Table 3 which shows data a student collected during fieldwork in a dryland landscape. Using Table 3, calculate the median for the percentage of plastic waste.** • Ordering numbers from highest to lowest or from lowest to highest e.g. 45, 30, 25, 10, 5, 1 (✓) • (10 + 25)/2 (✓) • Median value is 17.5. (✓)	**2** **AO3 x2**	**AO3 - 2 marks** 1 x 1 (✓) for showing working. 1 x 1 (✓) for calculating the median using TABLE 3. Median value is halfway between value 3 and 4 (25 and 10) – if candidates have shown this working they can be credited. Final answer should be unrounded as not required to change answer in question.
3	(b)	(ii)	**Explain one limitation of the data set in Table 3.** • Small sample (✓) so not representative of the study area (DEV) • Spatial data (✓) doesn't describe how many items found or frequency of items – items could be in multiple categories, or just one large item e.g. drinking cup taking up large amount of space (DEV) • Single/short transect (✓) so covers very small area of the study area (DEV) cannot take average readings across wider space (DEV) • The data is given as a percentage (✓) and so you do not know how many pieces of rubbish there are (DEV) • The data is only collected every 2m (✓) and so the data set is not fully representative (DEV).	**2** **AO3 x2**	**AO3 - 2 marks** 1 x 1 (✓) for identifying limitation; 1 x 1 (DEV) for explanation.

Question			Answer	Mark	Guidance
3	(b)	(iii)	**Suggest another data presentation method that would be suitable for this data set and justify your choice.** • Stacked bar chart**s** (✓) or bar chart**s** with adjacent bar**s** for each location (✓) – can show variation along the transect (DEV), easy to read (DEV) • Line chart (✓) – easy to read (DEV), easy to compare changes (DEV) • Divided pie chart**s** along a transect line (✓), easy to compare changes (DEV)	**2** **AO3 x2**	**AO3 - 2 marks** 1 x (✓) for identifying appropriate data presentation method 1 x (DEV) for justification. Accept any appropriate data presentation method and advantage of that presentation method. Reference to pie and bar chart**s** are acceptable if it is clear the candidate would draw more than one.
3	(c)		**Study <u>Fig. 3</u> a dryland landscape in Namibia. Referring to <u>Fig. 3</u>, suggest <u>ONE</u> way human activity might influence geomorphic processes in the landscape system.** • Dam/weir regulates water flow downstream of the dam (✓) reducing flooding (DEV) and consequent deposition of sediment on floodplain (DEV) • More fluvial erosion as sediment trapped behind dam (✓) so there is less material transported in the river (DEV), giving the flow more energy to erode (DEV) • More deposition upstream (✓) as flow rates slow due to dam (DEV) and sediment is no longer able to be carried in the same quantities due to reduced energy (DEV)	**3** **AO2 x3**	**AO2 - 3 marks** 1 x (✓) and 2 x (DEV) for analysing <u>FIG. 3</u> to suggest <u>ONE</u> way human activity might influence geomorphic processes in the landscape system. The image shows a dam / weir. Naming a human activity on its own is not sufficient for a mark. A geomorphic process (e.g. erosion, deposition etc.) must be present in the answer as either a (✓) or (DEV) to achieve full marks. **Must have explicit reference to the figure for credit.**

Question			Answer	Mark	Guidance
			• Reduced transportation by saltation, traction and suspension downstream of dam (✓) as load deposited behind dam (DEV) where it is trapped by the barrier slowing flow and reducing available energy (DEV).		
3	**(d*)**		**To what extent is climatic change the most important factor influencing dryland landscapes?** **AO1** **Level 3 (6-8 marks)** Demonstrates **comprehensive** knowledge and understanding of the influence of climate change **and** other factors on dryland landscapes. The answer should include **accurate place-specific** detail. **Level 2 (3-5 marks)** Demonstrates **thorough** knowledge and understanding of the influence of climate change **and** other factors on dryland landscapes. The answer should include **place-specific** detail which is **partially accurate**. **Level 1 (1-2 marks)** Demonstrates **basic** knowledge and understanding of the influence of climate change **and** other factors on dryland landscapes. There is an attempt to include **place-specific** detail but it is **inaccurate**.	**16** **AO1 x8** **AO2 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the influence of climate change and other factors on dryland landscapes could potentially include: • Influence of climate change factors ○ Pluvial conditions – increasing rates of freeze-thaw weathering, hydration and chemical weathering, or rates of inselberg recession, even creating permanent rivers increasing rates of fluvial processes creating alluvial fans, bajadas and canyons ○ Glacial conditions – increasing rates of frost heave, freeze-thaw weathering, gelifluction leading to greater solifluction, talus slopes, rock glaciers, blockfields or nivation hollows etc. • Influence of other factors ○ Geology – rock structure, hardness and composition influence shape of dryland landforms and rates of erosion, weathering and mass movement ○ Human activity – e.g. dams and water supply and impact on landscapes as well as unintentional human activity e.g. tourism and farming

Question			Answer	Mark	Guidance
			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 climate change is the most important factor influencing dryland landscapes. **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 climate change is the most important factor influencing dryland landscapes. **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 climate change is the most important factor influencing dryland landscapes. **0 marks** No response or no response worthy of credit. **Quality of extended response**		○ Latitude – e.g. desert formation at sub-tropical anticyclone 30°N/S equator e.g. Sahara, cold ocean currents between 15°-30° N/S equator forming hyper-arid places e.g. Namib desert ○ Altitude – temperatures fall with altitude leading to dryland areas e.g. Tibetan Plateau ○ Relief and aspect – created in rain shadow of mountain barrier with windward slopes receiving precipitation and leeward slopes facing downwind are relatively dry e.g. Patagonia **AO2 – 8 marks** Apply knowledge and understanding to analyse and evaluate the relative importance of climate change on dryland landscapes could potentially include: • Importance will vary depending on use of case study. • Climate change ○ Importance of current climatic conditions e.g. global warming causing some drylands to extend as rainfall becomes more variable e.g. north east Brazil, or western India as well as more extreme temperatures e.g. Namibia – significant importance with rate of spread and size of area affected • Past climate change ○ Importance of past climatic changes resulting in fossil landscapes e.g. inselbergs, canyons, bajadas and salt flats

Question			Answer	Mark	Guidance
			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.		– however current geomorphic processes (e.g. weathering) influence these but at a much slower rate – so less important now, significance importance at time of formation • Geomorphic processes ○ Importance of geomorphic processes very much depend on availability of water affecting rates of erosion, transportation and weathering e.g. freeze-thaw – in localised areas more significant, in very arid conditions geomorphic processes limited so much less important • Extreme events ○ Powerful but sporadic flash floods could lead to significant change of landforms with increased fluvial erosion, however short term and fleeting but could affect a significant area, whereas drier conditions lead to increased impact of Aeolian erosion which has margin of impact on landforms limiting importance, but likely to have effect over longer period of time • Human activity ○ Importance of human activity both deliberate and unintentional e.g. tourism in Utah, USA – could have significant impact in very localised area as environment as ATVs damage dunes, or dams reducing river flow – localised impact on landforms but long term, increase in water use from growing populations reducing river flows e.g. Colorado River, USA will have variable influence on landforms e.g. tourism leading

Question			Answer	Mark	Guidance
					to use of dune buggies, creating significant damage on dunes where not managed appropriately – could be argued very important, however as it can be managed, this could be argued less important.

Question			Answer	Mark	Guidance
4	(a)		**Study Fig. 4, which shows human activity in a tropical rainforest in Vietnam. Referring to Fig. 4, suggest how human activity might affect nutrient stores in the tropical rainforest.** • Farming decreases nutrient stores (✓) as there is less leaf litter (DEV) and so decomposition decreases (DEV) • Deforestation for farming causes soil erosion (✓) as the trees are not there to prevent interception (DEV) this causes surface run off to increase (DEV) and nutrients to be washed away/washed out of the soil/leached (DEV) • Farming replaces trees with crops so biomass stores are reduced (✓) leading to a lower nutrient content in the soils (DEV). If the farming is monoculture, then the same nutrients are taken up by the plants (DEV) and the land may become infertile in the future (DEV)	**4** **AO2 x4**	**AO2 – 4 marks** 1 x 1 (✓) for valid human activity that affects nutrient stores in the tropical rainforest (deforestation, farming, monoculture, polyculture) with an understanding of its effect. 3 x 1 (DEV) for explanation of the influence of human activity on nutrient stores. Or 2 x 1 (✓) with 2 x 1 (DEV) The human activity must be visible in the figure. Do not double credit the same explanations if they identify more than one human activity.
4	(b)		**Study Fig. 5, which shows variations in evapotranspiration rates over a 3-year period. Explain three limitations of using this method of data presentation to show evapotranspiration rates.** • Lack of information about the variation of evapotranspiration rates over the years (✓) • Lack of information of source or use – possible bias (✓) • Lack of global average graph (✓) • Lack of information for Oceania and Antarctica (✓)	**3** **AO3 x3**	**AO3 – 3 marks** 3 x 1 (✓) for identification of limitations of this data presentation technique (box and whisker diagrams) Allow any appropriate limitation.

Question			Answer	Mark	Guidance
			• Lack of information about how meteorological and satellite data used to create one set of data (✓) • Use of different units for y axis confusing (✓) • Scale is unclear so you can't read data from it (✓) • No source is given (✓)		
4	**(c)**		**Examine how seasonal change affects flows in the water cycle in the Arctic tundra.** **Level 3 (7-10 marks)** Demonstrates **comprehensive** knowledge and understanding of seasonal change and flows in the water cycle in the Arctic tundra (AO1). Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation of how seasonal change affects flows in the water cycle in the Arctic tundra (AO2). This will be shown by including **well-developed** ideas of the influence of seasonal change on flows in the water cycle in the Arctic tundra. **Level 2 (4-6 marks)** Demonstrates **thorough** knowledge and understanding of seasonal change and flows in the water cycle in the Arctic tundra (AO1). Demonstrates **reasonable** application of knowledge and understanding to provide a detailed evaluation of	**10** **AO1 6** **AO2 4**	**Indicative content** **AO1 – 6 marks** Knowledge and understanding of seasonal change and flows in the water cycle in the Arctic tundra could potentially include: • Seasonal change including temperature and precipitation changes between summer and winter • Flows in the water cycle in the Arctic tundra ○ Interception, stem flow, overland flow, floods, through flow, evaporation, transpiration, ablation **AO2 – 4 marks** Apply knowledge and understanding to provide a detailed evaluation of the how seasonal change affects flows in the water cycle in the Arctic tundra could potentially include: • During winter temperatures below freezing, so many flows pause until spring • During summer permafrost melts allowing through flow, surface run-off, infiltration, percolation, recharge and groundwater flow to

Question			Answer	Mark	Guidance
			how seasonal change affects flows in the water cycle in the Arctic tundra (AO2). This will be shown by including **developed** ideas of the influence of seasonal change on flows in the water cycle in the Arctic tundra. **Level 1 (1–3 marks)** Demonstrates **basic** knowledge and understanding of seasonal change and flows in the water cycle in the Arctic tundra (AO1). Demonstrates **basic** application of knowledge and understanding to provide an evaluation of how seasonal change affects flows in the water cycle in the Arctic tundra (AO2). This will be shown by including **some** ideas about the influence of seasonal change on flows in the water cycle in the Arctic tundra. **0 marks** No response or no response worthy of credit.		occur - seasonal change having a significant impact effectively turning off flows e.g. through flow for a number of months of the year • During summer there will be more surface runoff, although this will be limited by low temperatures, as infiltration is stopped by permafrost • Infiltration limited year-round due to permafrost, although as soil thaws, infiltration rates increase • Evapotranspiration limited in winter by low temperatures (below -20°C), low rates even in summer as humidity and precipitation low. Seasonal change influential as rates vary, however range of movement low
4	**(d*)**		**'Land-use changes have a greater influence than fossil fuel combustion on the carbon cycle'. Discuss.** **AO1** **Level 3 (6–8 marks)** Demonstrates **comprehensive** knowledge and understanding of land-use changes, fossil fuel combustion and carbon cycle.	**16** **AO1 8** **AO2 8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of land-use changes, fossil fuel combustion and carbon cycle could potentially include: • Human factors ○ Land use changes e.g. farming or forestry or growth in urban areas ○ Fossil fuel combustion e.g. coal, oil and natural gas

Question			Answer	Mark	Guidance

			The answer should include **accurate place-specific detail**.
			
			Level 2 (3–5 marks)
			Demonstrates **thorough** knowledge and understanding of land-use changes, fossil fuel combustion and carbon cycle.
			
			The answer should include **some place-specific detail which is partially accurate**.
			
			Level 1 (1–2 marks)
			Demonstrates **basic** knowledge and understanding of land-use changes, fossil fuel combustion and carbon cycle.
			
			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)
			Application of knowledge and understanding is **comprehensive**. Analysis is clear, developed and convincing. Evaluation of whether land-use changes influence the carbon cycle more than fossil fuel combustion is detailed and substantiated. Judgements are secure and evidence based leading to rational conclusions.
					• Carbon cycle
					  ○ Processes e.g. photosynthesis, respiration, decomposition, combustion
					  ○ Stores e.g. atmosphere, oceans, ice, soil, vegetation and groundwater
					
					AO2 – 8 marks
					Apply knowledge and understanding to analyse and evaluate whether land-use changes influence the carbon cycle more than fossil fuel combustion could potentially include:
					• Expect range of evaluation – candidates may compare over temporal or spatial scales
					• Consideration of future impacts on the carbon cycle in different areas of the world (e.g. industrialisation of LIDCs)
					• Analysis of the scale of either land use change/fossil fuel combustion, now and in the future
					• Analysis of the extent to which impacts of land use changes/fossil fuel combustion can be managed or reduced e.g. international agreements, afforestation etc. Evaluation of the potential success of these strategies (scale and time)
					• Discussion of the extent to which land use changes/fossil fuel combustion are a catalyst for altering the flows and stores in the carbon cycle

Question			Answer	Mark	Guidance
			Level 2 (3-5 marks) Application of knowledge and understanding is **thorough**. Analysis is clear, developed and shows accuracy. Evaluation of whether land-use changes influence the carbon cycle more than fossil fuel combustion is detailed. Judgements are generally secure with some link between rational conclusions and evidence. **Level 1 (1-2 marks)** Application of knowledge and understanding is **basic**. Analysis is simple with little or no development. Evaluation of whether land-use changes influence the carbon cycle more than fossil fuel combustion 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. **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		

Question			Answer	Mark	Guidance
			unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.		

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