Practice 2

A Level Geography
H481/01 Physical Systems

MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 66

Version: Practice Final

(FOR OFFICE USE ONLY)

This document consists of 32 pages

MARKING INSTRUCTIONS

PREPARATION FOR MARKING
SCORIS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris 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 scoris 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 scoris 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 scoris 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. There is a NR (No Response) option. Award NR (No Response)
   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in any way relate to the question (eg 'can't do', 'don't know')
   - OR if there is a mark (eg a dash, a question mark) which isn't an attempt at the question

   Note: Award 0 marks – for an attempt that earns no credit (including copying out the question)

8. The scoris **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 scoris 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: Not applicable in F501
    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

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.
Reasonable	Some sound knowledge that demonstrates	Knowledge and understanding shown is partially applied to the	Quantitative, qualitative and/or fieldwork skills are	The information has some relevance and is presented with

	partially developed understanding that is relevant to the demands of the question. Awareness of the meaning of the terms in the question.	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 judgements and conclusions, with limited use of evidence.	used in a mostly suitable way with a sound level of competence but may lack precision.	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)		**With reference to a case study, explain the influence of unintentional human activity on coastal landscapes.** **Level 3 (6-8 marks)** Demonstrate **thorough** knowledge and understanding of how unintentional human activity influences coastal landscapes (AO1). This will be shown by including **well-developed** ideas about the influence of unintentional human activity on coastal landscapes. The answer should include **accurate place-specific** detail. Amount of place-specific detail determines credit within the level. **Level 2 (3-5 marks)** Demonstrate **reasonable** knowledge and understanding of how unintentional human activity influences coastal landscapes (AO1). This will be shown by including **developed** ideas about the influence of unintentional human activity on coastal landscapes. The answer should include **place-specific** detail which is **partially accurate**. Amount of place-specific detail determines credit within the level. **Level 1 (1-2 marks)** Demonstrate **basic** knowledge and understanding of how unintentional human activity influences coastal landscapes (AO1).	**8** **AO1** **x8**	**Indicative content:** **AO1 – 8 marks** Reference to a case study must be included; there is no requirement for a candidate to make reference to more than one case study. Knowledge and understanding of the influence of unintentional human activity on coastal landscapes could potentially include: • Unintentional activities are likely to be associated with economic development. They could include: use of trade routes, port or tourist resort development, resource extraction, energy development. • The influence of unintentional human activity on coastal landscapes could include altering geomorphic processes (e.g. fluvial/Aeolian/wave erosion, transportation, deposition, weathering and mass movement), flows of energy and materials through the coastal system (e.g. disturbance of sediment cell balance) • Effect of influences of unintentional human activity could include modifying: landforms, sediment budgets, and physical factors themselves (resulting in feedbacks) • Inter-relationships between landforms are also likely to be modified (e.g. sediment supply between different landforms) • Further consequences of unintentional human activity on coastal landscapes could include: coastal retreat and coastal protection. • Influences occur on a range of spatial and temporal scales.

			This will be shown by including **simple** ideas about the influence of unintentional human activity on coastal landscapes. There is an attempt to include **place-specific** detail but it is **inaccurate**. **0 marks** No response worthy of credit.		
1	**(b)**	**(i)**	**Using evidence from Fig.1a and Fig. 1b, compare and contrast the characteristics of the two cliffs shown.** • **Fig. 1** has a steeper profile (✓) • **Fig. 1** likely to be more resistant rock therefore a steeper profile (✓) • Slumping and landslides have occurred on the cliff in **Fig. 2**, whereas rock fall most likely in **Fig. 1** (✓) • Debris at base of cliff in **Fig. 2**, whereas no debris at base of cliff in **Fig. 1** (✓) • **Fig. 1** has an arch, whereas **Fig. 2** has stacks (✓) • **Fig. 2** rock type is darker in colour (✓) • Both cliffs have vegetation growing on top of cliffs and on side of cliffs (✓), although **Fig. 1** has trees growing on the cliff (✓) • Biological weathering taking pace on both cliffs (✓)	**4** **AO3** **x4**	**AO3 – 4 marks** 4 x 1 mark (✓) for identifying the similarities and differences in characteristics of the cliffs. Both are required for maximum marks. Any (DEV) included should be credited as a (✓).
1	**(b)**	**(ii)**	**With reference to either Fig.1a or Fig. 1b, explain how flows of energy have shaped the cliff.** **Fig. 1a - Cathedral Cove** • vertical rock cliff – high rates of energy transfer	**3** **AO2** **x3**	**AO2 – 3 marks** 3 x 1 mark (✓) explanations linking flows of energy to shaping the cliff. Only credit reference to one cliff.

			by waves (gravitational) as wave breaks (kinetic energy in surf and beach material) (✓) • low angle sand beach - low rates of energy transfer by waves (gravitational) as wave breaks (kinetic energy in suspension and transfer of sand by swash and backwash) (✓). • trees and exposed tree roots on cliff – biological weathering direct transfer of solar insolation (heat) to biomass (chemical), tree roots break up rock (kinetic) and gravity causes weathered material to fall to base of cliff (✓). • small wavecut notch – small tidal range, gravitational energy transfer (by tidal drag in Earth moon system) cause tides (✓). • chemical weathering from salt crystal growth, wave splash (kinetic), evaporation and crystallisation (specific latent heat) (✓). **Fig. 1b - Cliff at Praia da Luz** • cliff collapse by rotational slumping and landslide – high rates of energy transfer by waves (gravitational) as wave breaks (kinetic energy in surf) removes material from the base of the landslip (✓). • vertical rock cliff with open vertical fissures – high rates of slumping (gravitational) causes unloading of cliff face and release of energy in the compressed rock by expansion (kinetic) (✓). • grass and bushes at top of cliff and on slump blocks – biological weathering direct transfer of solar insolation (heat) to biomass (chemical), tree roots break up rock (kinetic), humic acids from decomposition weaken rock (chemical) and gravity causes weathered material to fall to base of cliff (✓).		
1	**(c)**		**Calculate the maximum tidal range of the beach with the largest tidal range. You must show your**	**2** **AO3**	1 x 1 mark (DEV) calculating differences between high and low tide.

			working. Max tidal range for Beach A: 5.38 – 0.72 = 4.66 Max tidal range for Beach B: 7.20 – 2.41 = 4.79 (DEV) Largest tidal range = 4.79 (Beach B) (✓)	**x2**	1 x 1 mark (✓) for correct answer to 2 decimal places.
1	**(d)***		**'Cooling climates rather than warming climates have a more significant influence on coastal landscapes.' How far do you agree with this view?** **AO1** **Level 3 (6-8 marks)** Demonstrates **comprehensive** knowledge and understanding of how a warming and cooling climate influences coastal landscapes. **Level 2 (3-5 marks)** Demonstrates **thorough** knowledge and understanding of how a warming and cooling climate influences coastal landscapes. **Level 1 (1-2 marks)** Demonstrates **basic** knowledge and understanding of how a warming and cooling climate influences coastal landscapes. **0 marks** No response worthy of credit. **AO2** **Level 3 (6-8 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate with a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that	**16** **AO1** **x8** **AO2** **x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of how a warming and cooling climate influences coastal landscapes could potentially include: • Cooling climate led to sea levels falling • Sea level fall has created emergent landforms e.g. raised beaches, marine terraces and abandoned cliffs • Both adjustments to the climate and a steady climate can result in modifications of these landforms through geomorphic processes and more recently climate provided opportunity for human activity to modify landforms • Sea level fall also exposed previous coastlines and beaches • Warming climate lead to sea levels rising • Sea level rise created submergent landforms e.g. rias, fjords, fjards, and shingle beaches • Geomorphic processes modify these landforms • Geomorphic processes, physical factors (e.g. geology of new coastline, shape of coastline etc.), and sediment budgets may also be modified through sea level change **AO2 – 8 marks** Apply knowledge and understanding to analyse and evaluate whether cooling climates rather than warming climates have a more significant influence on coastal

			are evidence based as to whether cooling climates rather than warming climates have a more significant influence on coastal landscapes. **Level 2 (3-5 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy with a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to whether cooling climates rather than warming climates have a more significant influence on coastal landscapes. **Level 1 (1-2 marks)** Demonstrates **basic** application of knowledge and understanding with simple analysis that shows limited accuracy with an un-supported evaluation that offers simple conclusions as to whether cooling climates rather than warming climates have a more significant influence on coastal landscapes. **0 marks** 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 which has 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		landscapes could potentially include: • Assessment of the impact of climate change on modifying geomorphic processes in the landscapes e.g. eroding, transporting and depositing debris, weathering, mass movement etc. • Influences may be creating new landforms, destroying, reshaping or modifying landforms • Sediment budgets and inter-relationships between landforms may be influenced • Consideration of “how far” could include scale (both spatially and temporally), significance and/or range of changes • The influence of climate change to the landscape system as a whole

			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)		**With reference to a case study, explain the influence human activity has on periglacial landscapes.** **Level 3 (6-8 marks)** Demonstrates **thorough** knowledge and understanding of how human activity influences periglacial landscapes (AO1). This will be shown by including **well-developed** ideas about the influence of human activity on periglacial landscapes. The answer should include **accurate place-specific** detail. Amount of place-specific detail determines credit within the level. **Level 2 (3-5 marks)** Demonstrates **reasonable** knowledge and understanding of how human activity influences periglacial landscapes (AO1). This will be shown by including **developed** ideas about the influence of human activity on periglacial landscapes. The answer should include **place-specific** detail which is **partially accurate**. Amount of place-specific detail determines credit within the level. **Level 1 (1-2 marks)** Demonstrates **basic** knowledge and understanding of how human activity influences periglacial landscapes (AO1).	**8** **AO1** **x8**	**Indicative content:** **AO1 – 8 marks** Reference to a case study must be included; there is no requirement for a candidate to make reference to more than one case study. Knowledge and understanding of the influence of human activity on periglacial landscapes could potentially include: • Humans directly modify the landscape through their activities but also indirectly through global warming. • Human activities could include: resource extraction, tourism, residential and infrastructure development • The influence of human activity on periglacial landscapes could include altering geomorphic processes (e.g. freeze-thaw cycles, hydrological processes and solifluction), flows of energy and materials through the periglacial system (e.g. increased heat produced by buildings, release and burning of gas during drilling) • Effect of influences of human activity could include modifying: landforms (e.g. thawing of permafrost, collapse of pingos etc.) and physical factors themselves (resulting in feedbacks) • Consequences of human activity on periglacial landscapes could include: development of thermokarst • Inter-relationships between landforms are also likely to be modified • Influences occur on a range of spatial and temporal scales

			This will be shown by including **simple** ideas about the influence of human activity on periglacial landscapes. There is an attempt to include **place-specific** detail but it is **inaccurate**. **0 marks** No response worthy of credit.		
2	**(b)**	**(i)**	**Using evidence from Fig. 2a and Fig. 2b, compare and contrast the characteristics of the two valleys.** Valley floor: • Both valleys have flat floors (✓) • **Fig. 2a** is a straight valley, narrower in the foreground however **Fig. 2b** is also straight but can be seen to bend round to the left at the far end of the valley (✓) • **Fig. 2a** is wider further down the valley by contrast **Fig. 2b** the width is much more regular (✓) • **Fig. 2a** occupied by a settlement and some vegetation but **Fig. 2b** has large pine trees (✓) Valley sides: • Both have vegetation growing on their sides (✓) rocky outcrops (✓) and truncated spurs (✓) • **Fig. 2a** has a gentler gradient (all the way to the top) in contrast to **Fig. 2b** which has steeper sides (some vertical sections) (✓) Valley shape: • Both are U-shaped. (✓) • **Fig. 2b** is a more open U than **Fig. 2a** which is deeper and wider (at its widest point) (✓)	**4** **AO3** **x4**	**AO3 – 4 marks** 4 x 1 mark (✓) for identifying the similarities and differences in characteristics of the two valleys. Both are required for maximum marks. Any (DEV) included should be credited as a (✓).
2	**(b)**	**(ii)**	**With reference to either Fig. 2a or Fig. 2b, explain how flows of energy have shaped the valley.** **Fig. 2a - Aosta Valley, Italy** • fresh deeply incised glaciated landscape –	**3** **AO2** **x3**	**AO2 – 3 marks** 3 x 1 mark (✓) explanations linking flows of energy to shaping the valley. Only credit reference to one valley.

			evidence of multiple glacial events, changes in rate of gravitational to kinetic energy transfer causing changes in heat energy transfer to atmosphere driving mass balance changes in glaciers (✓). • fresh deeply incised glaciated landscape – glacial erosion as potential energy transferred to kinetic as ice deforms and flows down valley (✓). • flat terraced valley floor – high volumes of meltwater (solar energy, phase change ice to water, potential to kinetic energy) and isostatic uplift by unloading (kinetic to potential) (✓). • trees covered slopes and fresh landslide scar – biological weathering direct transfer of solar insolation (heat) to biomass (chemical), tree roots break up rock (kinetic) and gravity causes weathered material to slide and flow by mass wasting (✓). **Fig. 2 - Tunnel View, Yosemite** • fresh deeply incised glaciated landscape – evidence of multiple glacial events, changes in rate of gravitational to kinetic energy transfer causing changes in heat energy transfer to atmosphere driving mass balance changes in glaciers (✓). • fresh deeply incised glaciated landscape – glacial erosion as potential energy transferred to kinetic as ice deforms and flows down valley (✓). • hanging valleys and vertical valley sides – very high rates of flow (kinetic) in main valley causing higher rates of vertical erosion than in tributary valleys, channelling ice into main valley (potential to kinetic) (✓) • volume of meltwater at glacier bed (solar		

			energy, phase change ice to water, potential to kinetic energy) caused higher velocity and erosion rates (✓). • fresh scree and avalanche runouts on vegetated slopes – avalanches (potential to kinetic transfer in snow pack), (✓) rock falls form scree (solar energy and phase change in freeze thaw cycles) (✓).		
2	**(c)**		**Calculate the altitude range of the glaciated landscape with the largest altitude range. You must show your working.** Max altitude range for Alps: 4,334 – 3,330 = 1004m Max altitude range for Rockies: 3,713 – 2,641 = 1072m (DEV) Largest altitude range = 1072m (Rockies) (✓)	**2** **AO3** **x2**	1 x 1 mark (DEV) calculating differences between highest and lowest altitude. 1 x 1 mark (✓) for correct answer with unit.
2	**(d)***		**'Interglacial periods rather than glacial periods have a more significant influence on glaciated landscapes.' How far do you agree with this view?** **AO1** **Level 3 (6-8 marks)** Demonstrates **comprehensive** knowledge and understanding of how glacial and interglacial periods influence glaciated landscapes. **Level 2 (3-5 marks)** Demonstrates **thorough** knowledge and understanding of how glacial and interglacial periods influence glaciated landscapes. **Level 1 (1-2 marks)** Demonstrates **basic** knowledge and understanding of how glacial and interglacial periods influence glaciated landscapes.	**16** **AO1** **x8** **AO2** **x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the way glacials and interglacials influence glaciated landscapes could potentially include: • During glacial periods the key geomorphic processes in operation include: abrasion, plucking, nivation, mass movement, weathering, transportation of debris, and deposition of ice-contact drift • During glacial periods glaciated landscapes are shaped through the creation and subsequent modification of erosional landforms including: corries, arêtes, pyramidal peaks, troughs, roche moutonnée, striations, hanging valleys, ellipsoidal basins • Depositional landforms include: moraines, drumlins, erratics, till sheets • During interglacial periods, the key geomorphic

			0 marks No response worthy of credit. **AO2** **Level 3 (6-8 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate with a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether Interglacial periods rather than glacial periods have a more significant influence on glaciated landscapes. **Level 2 (3-5 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy with a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to whether Interglacial periods rather than glacial periods have a more significant influence on glaciated landscapes **Level 1 (1-2 marks)** Demonstrates **basic** application of knowledge and understanding with simple analysis that shows limited accuracy with an un-supported evaluation that offers simple conclusions as to whether Interglacial periods rather than glacial periods have a more significant influence on glaciated landscapes **0 marks** No response worthy of credit. **Quality of extended response** **Level 3**		processes include: deposition of moraine and outwash sediment, fluvial transportation of sediment, weathering, mass movement, fluvial erosion • Glaciated landscapes shaped through glacio-fluvial deposition e.g. kames, eskers, outwash plains • Depositional landforms also created e.g. moraines • During interglacial periods landforms are subsequently modified through erosion, weathering, mass movement and colonisation of vegetation, and more recently human activity • Processes likely to differ between alpine and lowland areas in interglacial periods due to differing climates • Distinction may be made about geomorphic processes and the climate between glacial and interglacial periods but also in the transition period between glacials and interglacials **AO2 – 8 marks** Apply knowledge and understanding to analyse and evaluate whether Interglacial periods rather than glacial periods have a more significant influence on glaciated landscapes could potentially include: • Assessment of the influence of glacial and interglacial periods on geomorphic processes e.g. eroding, transporting and depositing debris, weathering and mass movement • Influences may be changes to geomorphic processes, material and/or energy flows • Influences may be creating new landforms, destroying, reshaping or modifying landforms • Inter-relationships between landforms may be

			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 which has 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.		influenced • Consideration of "how far" could include scale (both spatially and temporally), significance and/or range of changes • The influence of geomorphic processes to the landscape system as a whole

Question			Answer	Mark	Guidance
3	(a)		**With reference to a case study, explain the influence of water supply issues on dryland landscapes.** **Level 3 (6-8 marks)** Demonstrates **thorough** knowledge and understanding of the influence of water supply issues on dryland landscapes. This will be shown by including **well-developed** ideas about the influence of water supply issues on dryland landscapes. The answer should include **accurate place-specific** detail. Amount of place-specific detail determines credit within the level. **Level 2 (3-5 marks)** Demonstrates **reasonable** knowledge and understanding of the influence of water supply issues on dryland landscapes. This will be shown by including **developed** ideas about the influence of water supply issues on dryland landscapes. The answer should include **place-specific** detail which is **partially accurate**. Amount of place-specific detail determines credit within the level. **Level 1 (1-2 marks)** Demonstrates **basic** knowledge and understanding of the influence of water supply issues on dryland landscapes. This will be shown by including **simple** ideas about the	**8** **AO1** **x8**	**Indicative content:** **AO1 – 8 marks** Reference to a case study must be included; there is no requirement for a candidate to make reference to more than one case study. Knowledge and understanding of the influence of water supply issues on dryland landscapes could potentially include: • Water supply issues occur as a result of human activities, which could include: tourist development, resource extraction, energy development, irrigation, urbanisation, recreation and leisure • Humans have reduced water supply in a number of areas resulting in altering geomorphic processes (e.g. fluvial/aeolian erosion, transportation, deposition, weathering and mass movement), flows of energy and materials through the dryland system (e.g. high rates of sediment trapping behind dams or modifying rivers to distribute and store water) • Water supply reduction could include modifying: landforms (e.g. decreased growth of wadis and disappearance of sand bars), and physical factors themselves (resulting in feedbacks) • Changes to dryland landscapes could include: reducing depositional landforms such as alluvial fans or slowing pediment development • Changes in water supply could influence the inter-relationships between landforms • Influences occur on a range of spatial and temporal scales

			influence of water supply issues on dryland landscapes. There is an attempt to include **place-specific** detail but it is **inaccurate**. **0 marks** No response worthy of credit.		
3	**(b)**	**(i)**	**Using evidence from Fig. 3a and Fig 3b, compare and contrast the characteristics of the two sand dunes shown.** • Sand colour differs between the dunes, **Fig. 3a** is a darker orange / yellow (✓) • Both dunes have sparse vegetation growing on the faces of the dune, and around the dunes (✓) • **Fig. 3a** is a star dune, **Fig. 3b** is a barchan dune (✓) • **Fig. 3a** contains multiple faces, whereas **Fig. 3b** has one windward and one slip face (✓) • **Fig. 3a** has faces at a range of angles and gradients in contrast to **Fig. 3b** (✓) • **Fig. 3a** appears a longer and wider dune (✓)	**4** **AO3** **x4**	**AO3 – 4 marks** 4 x 1 mark (✓) for identifying the similarities and differences in characteristics of the dunes. Both are required for maximum marks. Any (DEV) included should be credited as a (✓).
3	**(b)**	**(ii)**	**With reference to either Fig. 3a or Fig. 3b, explain how flows of energy have shaped the sand dune.** **Fig. 3a - Namib Desert, Namibia** • deflation surface/desert pavement/grave lag (lower central) – persistent winds (kinetic) have eroded all the loose sand but have insufficient energy to move he larger clasts (potential) (✓). • playa/silcrete surface/calcret surface (upper right grey) – high rates of evaporation (insolation/solar heat) in pluvial period cause upward groundwater movement and evaporation (latent heat) and deposition of calcrete/silcrete	**3** **AO2** **x3**	**AO2 – 3 marks** 3 x 1 mark (✓) explanations linking flows of energy to shaping the dunes. Only credit reference to one dune.

crusts (chemical) (✓).

- mega ripples/small dunes (middle left) on windward face of star dune – prevailing wind transfer kinetic energy to sand grains which saltate up slope increasing potential energy (✓).
- high angle/angle of repose/stability slip faces – sand avalanches down slip face under gravitational force transferring potential to kinetic energy (✓).
- vegetated mounds in interdune areas and base of slip slopes – direct transfer of solar insolation (heat) to biomass (chemical), shrubs increase surface roughness and friction so suspended sand deposited (kinetic to potential) (✓).

Fig. 3b - Gobi Desert, China

- small sand ripples on windward face of barchan – prevailing wind transfer kinetic energy to sand grains which saltate up slope increasing their potential energy (✓).
- high angle/angle of repose/stability slip face – sand avalanches down slip face under gravitational force transferring potential to kinetic energy (✓).
- vegetated mounds/shadow dunes/nebkah – direct transfer of solar insolation (heat) to biomass (chemical), shrubs increase surface roughness and friction so suspended sand deposited (kinetic to potential) and vegetation (chemical) increase soil moisture stabilise loose sand so higher wind speeds (kinetic) needed to cause sand to move (✓).
- deflation surface/desert pavement/grave lag – persistent winds (kinetic) have eroded all the loose sand but have insufficient energy to move the larger clasts (potential) (✓).

3	**(c)**		**Calculate the annual precipitation range of the dryland landscape with the largest precipitation range. You must show your working.** Max precipitation range for Fort Yukon: 29 - 6 = 23mm Max precipitation range for Phoenix: 24 – 3 = 21mm (DEV) Largest precipitation range = 23mm (Fort Yukon) (✓)	**2** **AO3** **x2**	1 x 1 mark (DEV) calculating differences between highest and lowest monthly precipitation. 1 x 1 mark (✓) for correct answer with unit.
3	**(d)***		**'Past climatic conditions rather than present climatic conditions have a more significant influence on dryland landscapes.' How far do you agree with this view?** **AO1** **Level 3 (6-8 marks)** Demonstrates **comprehensive** knowledge and understanding of how past and present climatic conditions influence dryland landscapes. **Level 2 (3-5 marks)** Demonstrates **thorough** knowledge and understanding of how past and present climatic conditions influence dryland landscapes. **Level 1 (1-2 marks)** Demonstrates **basic** knowledge and understanding of how past and present climatic conditions influence dryland landscapes. **0 marks** No response worthy of credit. **AO2** **Level 3 (6-8 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate	**16** **AO1** **x8** **AO2** **x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the way past and present climatic conditions influence dryland landscapes could potentially include: Polar drylands – for example previous more intense glacial conditions could include: • created many relic landforms e.g. collapsed pingos, talus slopes, cryoturbation structures, ice wedge casts, blockfields, nivation hollows, solifluction deposits and frost-shattered debris • initiated surviving permafrost and periglacial landforms • extreme aridity reduced chemical weathering • increased accumulation results in massive terminal, recessional and lateral moraines as sublimation more important than melt water processes • geomorphic processes during colder climates include: freeze-thaw weathering, frost heave, gelifluction and nivation Mid and low latitude deserts – for example previous pluvial conditions have could include: • created many relict features landforms e.g. alluvial fans, bajadas, canyons, pediments and inselbergs • influenced geomorphic processes by:

			with a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based to show whether past climatic conditions rather than present climatic conditions have a more significant influence on dryland landscapes. **Level 2 (3-5 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy with a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence to show whether past climatic conditions rather than present climatic conditions have a more significant influence on dryland landscapes. **Level 1 (1-2 marks)** Demonstrates **basic** application of knowledge and understanding with simple analysis that shows limited accuracy with an un-supported evaluation that offers simple conclusions to show whether past climatic conditions rather than present climatic conditions have a more significant influence on dryland landscapes. **0 marks** 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 which has some structure. The information presented is in the most-part relevant and supported by some evidence.		intensifying rates of weathering, mass movement and the importance of fluvial action • reduced physical weathering but increased chemical weathering rates Semi-arid environments – for example wetter or colder climate could include: • freeze-thaw weathering, frost heave, gelifluction and nivation during colder phases • chemical weathering, mass movement, fluvial and lacustrine processes during wetter phases **AO2 – 8 marks** Apply knowledge and understanding to analyse and evaluate to show whether past climatic conditions rather than present climatic conditions have a more significant influence on dryland landscapes could potentially include: Present climate is more important – could include: • modification of the pluvial/glacial landforms e,g. smoothing out of fluvial landscape in the Atacama, burial of pluvial features under sand in the Sahara • although rates of chemical weathering, mass movement and fluvial processes low physical weathering aeolian erosion and transport has intensified • chemical weathering often continues at similar rates under the surface in the soil Past climate is more important – could include: • long term rates of denudation are higher than measured rates today, however difference similar to uncertainties e.g. 0.4 $mm^{-1}yr$ Grand Canyon v 0.5-6.7 $mm^{-1}yr$ long term • desert varnish on relic landforms suggest that land forms are not being modified now

			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.		• although rates of physical weathering aeolian erosion and transport low chemical weathering, mass movement and fluvial processes were intensified • relic landforms are very important component of the landscape e.g. Lake Mega-Chad, fluvial network and Mayo Kebbi spillway, glacial features in Antarctic dry valleys Past climate and present climate are both important – could include: • long term rates of denudation are higher than measured rates today, but the difference is similar to the uncertainties e.g. 0.4 $mm^{-1}yr$ Grand Canyon v 0.5-6.7 $mm^{-1}yr$ long term • desert landscapes are a combination of features formed under different climatic conditions and constantly modified • role of fog, dew and soil moisture in weathering processes today very important • inselbergs, pedestal rocks and piedmonts are formed by multiple processes and cycles of climate change may be important including slope retreat, weathering under solid cover and geological factors (joint density, rock types – particularly granite and gneiss), t e.g. Sugarloaf in Rio de Janeiro and Mount Monadnock which are may be relic dryland landforms..

Question			Answer	Mark	Guidance
4	(a)	(i)	**With reference to Fig. 4, suggest how human activities affected the size of flows and stores in the carbon cycle.** Fossil fuel combustion increasing the amount of carbon dioxide flowing into and being stored in the atmosphere and is the most significant human activity affecting carbon flows into the atmosphere (✓). Urbanisation replaces farmland and woodland with buildings and artificial surfaces such as concrete and tarmac, this reduces the rate of photosynthesis and carbon sequestration (✓). Deforestation for farming, reduces carbon storage in the soil and vegetation increases carbon dioxide emissions into the atmosphere (✓). The loss of a forest reduces the rate of carbon fixation through photosynthesis and unlocks carbon from the biomass store (✓).	**4** **AO2** **x 4**	**AO2 – 4 marks** 4 x 1 mark (✓) for interpretation of the flow chart in Fig. 4 to suggest appropriate human activities that affected the size of flows and stores in the carbon cycle. As the question states flows AND stores, both must be included in a candidate's answer. Appropriate human activities could include: fossil fuel combustion and land use change (urbanisation, farming and forestry).
4	(a)	(ii)	**Explain three reasons why the data in Fig. 4 may be inaccurate.** The data is based on assumptions. Assumptions about flow rates from one place may not always apply to other places, for example carbon sequestration rates might be underestimated for young forests and over-estimated for ancient forests (✓). Some data might not be available in sufficient quantity; therefore estimates are used which are inaccurate (✓). Some data, such as marine sequestration by phytoplankton is difficult to collect; therefore estimates are used which are inaccurate (✓).	**3** **AO3** **x3**	**AO3 – 3 marks** 3 x 1 (✓) for three reasons why the data may be inaccurate.

			Measurements of carbon flows and stores are made at a local scale and amplified for the global scale, therefore errors could occur in the calculations (✓). It is a simplification of a complex system (✓). Global land use models take time to create, so become less accurate with time (✓).		
4	**(b)**		**Examine how physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra.** **Level 3 (7-10 marks)** Demonstrates **comprehensive** knowledge and understanding of how physical and human factors affect natural processes and stores in the water cycle of the Arctic Tundra (AO1). The answer should include **accurate place-specific** detail. Amount of place-specific detail determines credit within the level. Demonstrates **thorough** application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to how physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra (AO2). This will be shown by including **well-developed** ideas about how physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra. **Level 2 (4-6 marks)**	**10** **AO1** **x6** **AO2** **x4**	**Indicative content** **AO1 – 6 marks** Knowledge and understanding of how physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra could potentially include: • The physical factors that disturb the natural processes and stores in the water cycle in the Arctic Tundra include temperature, rock permeability and porosity and relief. These may vary due to the season. As the permafrost melts and exposes darker land and water surfaces, these surfaces reflect less sunlight (lower albedo) and more solar radiation is absorbed causing the surface to warm and more ice to melt (positive ice-albedo feedback). • In areas without permafrost, rates of infiltration, percolation and groundwater recharge can increase. • Porous and permeable rocks may not allow water through if they are frozen, therefore water percolation and groundwater flow/recharge is more likely in the summer months when ground ice melts. • With a deeper active layer, there is more water available to run-off into rivers and cause flooding,

			Demonstrates **thorough** knowledge and understanding of how physical and human factors affect natural processes and stores in the water cycle of the Arctic Tundra (AO1). The answer should include some **place-specific** detail which is **partially accurate**. Amount of place-specific detail determines credit within the level. Demonstrates **reasonable** application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to how physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra (AO2). This will be shown by including **developed** ideas about how physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra. **Level 1 (1–3 marks)** Demonstrates **basic** knowledge and understanding of how physical and human factors affect natural processes and stores in the water cycle of the Arctic Tundra (AO1). There is an attempt to include **place-specific** detail but it is **inaccurate**. Demonstrates basic application of knowledge and understanding to provide un-supported evaluation that offers simple conclusions as to how physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra (AO2). This will be shown by including **simple** ideas about how		particularly during early summer when snow and lake ice also melts. • Vegetation cover can insulate the permafrost, if this is removed it can cause melting. • As the active layer thaws and summer temperatures are not as cold, more plants can grow for longer, adding more litter to the soil adding to the ice-albedo feedback. • The human factors that disturb the natural processes and stores in the water cycle in the Arctic Tundra include the oil and gas industry and associated developments such as ice roads, infrastructure and settlements. Each of these causes more heat and increased ice melting. Infrastructure, including gas and oil pipelines, and settlements directly heat Arctic ice (with heat escaping directly from heated homes and poorly-insulated pipelines) adding to the ice-albedo feedback. Roads do not provide additional heat, however as they are dark in colour they do add to the ice-albedo feedback. **AO2 – 4 marks** Apply knowledge and understanding to provide a detailed account of how physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra could potentially include: • As temperatures warm due to climate change (indirect human factor), a greater amount of water once locked up as ground ice/snow melts. This increases the depth of the active layer and the size of meltwater pools, wetlands and lakes. As the scale of these changes can be vast, they can potentially enhance natural processes on a global scale. • Once the permafrost begins to melt, it releases more methane which enhances the greenhouse

			physical and human factors disturb and enhance natural processes and stores in the water cycle of the Arctic Tundra. **0 marks** No response worthy of credit.		effect, causing further warming (negative feedback loop), melting more ice to water, changing the nature of water stores and increasing water flows, especially during the warmer summer months. • Settlements, infrastructure and oil and gas installations heat the environment. This disturbs the water cycle by causing localised melting of the permafrost year-round. • As the Arctic is a low-energy environment, any disruption to the environment can be long lasting.
4	**(c)** *		**To what extent can global management strategies be used to reverse long-term changes in the water and carbon cycles?** **AO1** **Level 3 (6–8 marks)** Demonstrates **comprehensive** knowledge and understanding of the global management strategies that protect the water and carbon cycles. **Level 2 (3–5 marks)** Demonstrates **thorough** knowledge and understanding of the global management strategies that protect the water and carbon cycles. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the global management strategies that protect the water and carbon cycles. **0 marks** No response worthy of credit. **AO2** **Level 3 (6–8 marks)** Demonstrates **comprehensive** application of	**16** **AO1** **x8** **AO2** **x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the global management strategies that protect the water and carbon cycles could potentially include: • Management strategies to reduce our water and carbon footprint include afforestation, sustainable agricultural practices, wetland restoration, as well as legislation including water conservation management, river laws such as the Helsinki Rules and climate change legislation. The burning of fossil fuels and food production for a large global population affect flows and stores in the carbon and water cycles. • Planting trees can reduce and slow overland flow – controlling rapid run-off, hold soil in place (with tree roots) and reduce flood risk. Wetland restoration increases the size of surface stores of water, reducing downstream flow and making flood events less 'flashy' in nature. Afforestation can change the local climate (with greater humidity, evapotranspiration rates, clouds and precipitation, stabilising the local water cycle) and increase the amount of carbon and water stored in vegetation and ground stores. • Sustainable agricultural practices may include

			knowledge and understanding to provide clear, developed and convincing analysis that is fully accurate with a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based to show the extent to which global management strategies can be used to reverse long-term changes in the water and carbon cycles. **Level 2 (3–5 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that shows accuracy with a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence to show the extent to which global management strategies can be used to reverse long-term changes in the water and carbon cycles. **Level 1 (1–2 marks)** Demonstrates **basic** application of knowledge and understanding with simple analysis that shows limited accuracy with an un-supported evaluation that offers simple conclusions to show the extent to which global management strategies can be used to reverse long-term changes in the water and carbon cycles. **0 marks** 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 which has some structure. The information presented is in the most-part relevant		limiting water abstraction from aquifers, efficient irrigation practices, the use of grey water and water agreements to maintain groundwater stores. Sustainable agricultural practices may also involve terracing, contour ploughing, bunding and polycropping to make the best use of the water that is available. • Wetland restoration contain a third of the terrestrial pool, converting pasture to wetlands can increase the amount of carbon sequestered relatively quickly. Management initiatives such as the International Convention on Wetlands (Ramsar) are helping to establish more wetlands. • Protection through legislation can help to prevent degradation to forests and minimise changes to flows and stores in the water and carbon cycles. This might include cap and trade, international agreements and the UN's Reducing Emissions from Deforestation and Forest Degradation (REDD) programme, water management such as the Helsinki Laws and the Paris Agreement (2016) which aims to strengthen the global response to the threat of climate change (by cutting carbon emissions from human activities). **AO2 – 8 marks** Apply knowledge and understanding to analyse and evaluate the extent to which global management strategies can be used to reverse long-term changes in the water and carbon cycles and could potentially include: • Afforestation, wetland restoration and sustainable agricultural practices can be used to reverse long-term changes in the water and carbon cycles, the scale of these practices and period of active management will affect the outcome. If multi-national governance is in place, the scheme and impact on carbon and water cycles might be

			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.		greater than for more local schemes. • Controls on greenhouse gas emissions can be used to reverse long-term changes in the carbon cycle. Agreements and laws might be in place, however, people may ignore the rules/laws therefore changes in the water and carbon cycle are not reversed. • Human activity might attempt to mitigate long-term changes in the water and carbon cycles, however the scale of activities could be too little or too late to make a difference. • The extent of success of global management strategies will depend on the scale of the management (i.e. global or national legislations), the length of time it is continued and the state of the environment to begin. The carbon and water cycles of a severely degraded rainforest may never return to that of a virgin rainforest, whereas damage to a small clearing within a forest could ultimately be reversed. • No management strategy can reverse the long-term changes to places such as the Arctic caused by climate change. Once tipping points are reached, there is no return. • Consideration of the 'extent' could include scale, significance and/or range of the global management strategies which have been used to reverse long-term changes in the water and carbon cycles, for example the Paris Agreement (2015) is a more significant management strategies for the reduction of carbon dioxide emissions than the 'Meat-free Monday' campaign.