OCR
Oxford Cambridge and RSA

Accredited

A Level Geography
H481/01 Physical systems
Sample Question Paper

Date – Morning/Afternoon
Time allowed: 1 hour 30 minutes

You must have:
- the Resource Booklet
- the OCR 12-page Answer Booklet
  (OCR 12 sent with general stationary)

You may use:
- a ruler (cm/mm)
- a piece of string
- a scientific or graphical calculator

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Section A: Choose **one** option and answer **all** parts of the question in the option.
- Section B: Answer **all** questions.
- Write your answer to each question in the Answer Booklet.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.
- The separate Resource Booklet will be found inside this document.

INFORMATION
- The total mark for this paper is **66**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended response will be assessed in questions marked with an (*).
- This document consists of **8** pages.

Section A – Landscape Systems

Answer **all** questions from **one** option.

Option A – Coastal landscapes

1 (a) Explain the influence of sea level rise and geomorphic processes in the formation of rias.

[8]

(b) Study **Table 1,** which shows wave height off the coast in the United Kingdom on 28th November 2015.

Time	0100	0300	0500	0700	0900	1100	1300	1500	1700	1900	2100	2300
Wave height (m)	3	3	2	2	3	5	4	4	5	5	6	6

Table 1 Wave height off the coast in the United Kingdom on 28th November 2015

(i) Calculate the mean wave height for the data shown in **Table 1**.
You must show your working.

[2]

(ii) Calculate the standard deviation for the data shown in **Table 1**.
You must show your working and give your answer to 2 decimal places.

[4]

(c) Study **Fig. 1**, a coastal landscape in the United Kingdom.

With reference to **Fig. 1**, explain which geomorphic processes are the most influential in forming landform **A**.

[3]

(d)* 'Human activity influences coastal landscape systems more than physical factors'. To what extent do you agree with this statement?

[16]

Option B – Glaciated landscapes

2 **(a)** Explain the influence of climate changes and geomorphic processes in the formation of eskers.

[8]

(b) Study **Table 2**, which shows monthly precipitation for a glaciated landscape in Norway.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation (cm)	4	4	5	4	4	7	8	10	9	9	6	2

Table 2 Monthly precipitation for a glaciated landscape in Norway

(i) Calculate the mean monthly precipitation for the data shown in **Table 2**.
You must show your working.

[2]

(ii) Calculate the standard deviation for the data shown in **Table 2**.
You must show your working and give your answer to 2 decimal places.

[4]

(c) Study **Fig. 2**, a glaciated landscape in Norway.

With reference to **Fig. 2**, explain which geomorphic processes are the most influential in forming landform **B**.

[3]

(d)* 'Human activity influences glaciated landscape systems more than physical factors'. To what extent do you agree with this statement?

[16]

Option C – Dryland landscapes

3 **(a)** Explain the influence of pluvial conditions and geomorphic processes in the formation of inselbergs.

[8]

(b) Study **Table 3**, which shows monthly average wind speed for a dryland landscape in Algeria.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed (knots)	3	3	6	1	6	7	5	9	9	8	2	1

Table 3 Monthly average wind speed for a dryland landscape in Algeria

(i) Calculate the mean monthly wind speed for the data shown in **Table 3**.
You must show your working.

[2]

(ii) Calculate the standard deviation for the data shown in **Table 3**.
You must show your working and give your answer to 2 decimal places.

[4]

(c) Study **Fig. 3**, a dryland landscape in Algeria.

With reference to **Fig. 3**, explain which geomorphic processes are the most influential in forming landform **C**.

[3]

(d)* 'Human activity influences dryland landscape systems more than physical factors'. To what extent do you agree with this statement?

[16]

Section B – Earth's Life Support Systems

Answer **all** questions

4 **(a)** Study **Fig. 4**, atmospheric CO_2 changes 1700-2015.

Suggest how the changing CO_2 concentrations shown in **Fig. 4** influence global management strategies for the carbon cycle.

[4]

(b) Explain **three** benefits of mapping rates of deforestation using Geographical Information Systems (GIS).

[3]

(c) Examine the significance of the role of vegetation in linking the water and carbon cycles.

[10]

(d)* "Human factors affect the water cycle more significantly in the tropical rainforest than in the Arctic tundra". Discuss.

[16]

END OF QUESTION PAPER

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OCR
Oxford Cambridge and RSA

…day June 20XX – Morning/Afternoon

A Level Geography

H481/01 Physical systems

SAMPLE MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 66

This document consists of 36 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 **required number** of standardisation responses.

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

TRADITIONAL

Before the Standardisation meeting you must mark at least 10 scripts from several centres. For this preliminary marking you should use **pencil** and follow the **mark scheme**. Bring these **marked scripts** to the meeting.

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 50% 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, email or via the scoris messaging system.

5. Work crossed out:
   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

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 (e.g. 'can't do', 'don't know')
   - OR if there is a mark (e.g. 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 telephone, email or the scoris messaging system.

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. **Annotations**

Annotation	Meaning

11. **Subject-specific Marking Instructions**

INTRODUCTION

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

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

You should ensure that you have copies of these materials.

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

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

USING THE MARK SCHEME

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

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

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

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

In your marking, you will encounter valid responses which are not covered by the Mark Scheme: these responses must be credited. You will encounter answers which fall outside the 'target range' of Bands for the paper which you are marking. Please mark these answers according to the marking criteria.

Please read carefully all the scripts in your allocation and make every effort to look positively for achievement throughout the ability range. Always be prepared to use the full range of marks.

LEVELS OF RESPONSE QUESTIONS:

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

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

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

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

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

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

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

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

Reasonable	Some sound knowledge that demonstrates partially developed understanding that is relevant to the demands of 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 judgements and conclusions, with limited use of evidence.	Quantitative, qualitative and/or fieldwork skills are used in a mostly suitable way with a sound level of competence but may lack precision.	The information has some relevance and is presented with limited structure. The information is supported by limited evidence.
Basic	Limited knowledge that is relevant to the topic or question with little or no development. Confusion and inability to deconstruct terminology as used in the question.	Knowledge and understanding shows limited application to the context of the question in order to form a: 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	Marks	Guidance
1	(a)		**Explain the influence of sea level rise and geomorphic processes in the formation of rias.** **Level 3 (6–8 marks)** Demonstrates **thorough** knowledge and understanding of the influence of sea level rise and geomorphic processes in the formation of rias (AO1). This will be shown by including **well-developed** explanations about the influence of sea level rise and geomorphic processes in the formation of rias. **Level 2 (3–5 marks)** Demonstrates **reasonable** knowledge and understanding of the influence of sea level rise and geomorphic processes in the formation of rias (AO1). This will be shown by including **developed** explanations about the influence of sea level rise and geomorphic processes in the formation of rias. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the influence of sea level rise and geomorphic processes in the formation of rias (AO1). This will be shown by including **simple** explanations about the influence of sea level rise and geomorphic processes in the formation of rias. **0 marks** No response or no response worthy of credit.	**8** **AO1 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the influence of sea level rise and geomorphic processes in the formation of rias could potentially include: • rias are formed as sea level rises in a warming climate • the sea level change that caused the submergence of a river valley may be either eustatic or isostatic • as sea level rises, low–lying coastal environments become submerged and river valleys are drowned to form rias • they typically have gently sloping sides, variable depth and a winding plan form reflecting the original route of the river and its valley, formed by fluvial erosion within the channel and subaerial processes on the valley sides • rejuvenation in river valleys as sea level fell during an earlier, colder period may have resulted in increased valley deepening before submergence occurred • during interglacial periods, when sea levels rose, further deposition would have occurred as the rivers had less surplus energy for erosion • increased water depth in rias is likely to be associated with larger waves and greater wave energy, thereby increasing rates of erosion and further modification.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Calculate the mean wave height for the data shown in Table 1. You must show your working.

Formula to calculate the mean of the data:
$\overline{X} = \frac{\Sigma X}{n}$

$\Sigma X = 48$
$n = 12$

$\overline{x} = 48/12$ (DEV)
$\overline{x} = 4$ (✓)</td><td>2
AO3 x2</td><td>AO3 – 2 marks
1 x 1 mark (✓) for correct answer.
1 x 1 mark (DEV) for showing working of calculation.</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Calculate the standard deviation for the data shown in Table 1. You must show your working and give your answer to 2 decimal places.

Formula to calculate standard deviation of the data:
$\sigma = \sqrt{\frac{\Sigma (x-\overline{x})^2}{n}}$

<table>
<tr><th>Time</th><th>Data</th><th>Difference between data and mean</th><th>Difference squared</th></tr>
<tr><td>0100</td><td>3</td><td>-1</td><td>1</td></tr>
<tr><td>0300</td><td>3</td><td>-1</td><td>1</td></tr>
<tr><td>0500</td><td>2</td><td>-2</td><td>4</td></tr>
<tr><td>0700</td><td>2</td><td>-2</td><td>4</td></tr>
<tr><td>0900</td><td>3</td><td>-1</td><td>1</td></tr>
<tr><td>1100</td><td>5</td><td>1</td><td>1</td></tr>
<tr><td>1300</td><td>4</td><td>0</td><td>0</td></tr>
<tr><td>1500</td><td>4</td><td>0</td><td>0</td></tr>
<tr><td>1700</td><td>5</td><td>1</td><td>1</td></tr>
<tr><td>1900</td><td>5</td><td>1</td><td>1</td></tr>
</table></td><td>4
AO3 x4</td><td>AO3 – 4 marks
1 x 1 mark (DEV) calculating differences between data and mean.
1 x 1 mark (DEV) calculating the squares of the differences.
1 x 1 mark (DEV) dividing the sum of the squares of the differences by the number of values in the data set.
1 x 1 mark (✓) for correct answer to 2 decimal places.

Credit candidates for following the standard deviation calculation process using the mean that they calculated in question 1(b)(i). If the candidate calculated the incorrect mean then they should still be rewarded for the standard deviation process.</td></tr>
</table>

Question			Answer	Marks	Guidance
			<table><tr><td>2100</td><td>6</td><td>2</td><td>4</td></tr><tr><td>2300</td><td>6</td><td>2</td><td>4</td></tr></table> (DEV) (DEV) Sum of squares of differences = 22 Sum of squares of differences divided by number of values in the dataset = 22/12 = 1.833 (DEV) √1.833 = 1.35 to 2 decimal places (✓)		
	(c)		**With reference to Fig. 1, explain which geomorphic processes are the most influential in forming landform A.** Wave erosion is likely to be the most influential geomorphic process in the formation of the arch in the photograph as waves breaking on the exposed headland are able to concentrate their energy on the resistant rock causing corrasion/pounding/hydraulic action (✓). The roof of the arch in the photograph is highly susceptible to weathering via freeze-thaw and salt crystallisation as this section of hard rock is exposed, mass movement of the weakened material would all be expected to influence the formation of the arch (✓). Tidal cycles of wetting and drying (hydration) leads to water layer weathering, creating this arch. Weathering targets weaknesses in the headland through horizontal rock strata (joints) and vertical cracks as seen in the photograph and then create this arch (✓).	**3** **AO2 x3**	**AO2 – 3 marks** 3 x 1 (✓) for analysing Fig. 1 to explain which geomorphic processes are the most influential in forming landform A (the arch)

Question	Answer	Marks	Guidance
(d*)	**'Human activity influences coastal landscape systems more than physical factors'. To what extent do you agree with this statement?** **AO1** **Level 3 (6–8 marks)** Demonstrates **comprehensive** knowledge and understanding of the influence of human activity and physical factors in coastal landscape systems. The answer should include **accurate place-specific** detail. Amount of place-specific detail determines credit within the level. **Level 2 (3–5 marks)** Demonstrates **thorough** knowledge and understanding of the influence of human activity and physical factors in coastal landscape systems. The answer should include some **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 human activity and physical factors in coastal landscape systems. 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 human activity and physical factors in coastal landscape systems could potentially include: • port development or tourist resort development reducing input of sediment from coastal erosion along developed coastlines • breakwaters/harbour wall construction can reduce wave energy and obstruct longshore sediment movements • off-shore dredging to obtain gravel for the construction industry can lead to sediment imbalance off-shore • winds (speed, direction and frequency) affecting aeolian processes • waves influencing erosion, transportation and depositional processes • tides (cycles and range) influencing processes and landforms • geology (lithology and structure) influencing rates of processes • ocean currents influencing water temperature and sediment supply • credit any relevant human activities and physical factors influencing coastal landscape systems, particularly energy and material flows.

Question	Answer	Marks	Guidance
	AO2 **Level 3 (6–8 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a 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 human activity influences coastal landscape systems more than physical factors. **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 human activity influences coastal landscape systems more than physical factors. **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 human activity influences coastal landscape systems more than physical factors. **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		**AO2 – 8 marks** Application of knowledge and understanding to analyse and evaluate the extent to which human activity influences coastal landscape systems more than physical factors could potentially include: • disturbance of systems in equilibrium and the resultant positive or negative feedback • how human activity can affect the physical factors in a landscape system and this then affects the overall landscape system balance e.g. groyne installation can trap material being moved by longshore drift increasing beach width and depth but, also causes sediment starvation downdrift leading to increased erosion rates • changes to processes, material and/or energy flows and how the extent to which these are influenced by physical and human factors e.g. whether increased wave activity will affect energy flows in the landscape system as much as an offshore breaker • consideration of the "extent" could include scale, significance and/or range of the changes • the significance of the changes to the landscape system as a whole by human activity and physical factors as well as on individual flows and stores e.g. physical factors constantly influence flows when often human activity is targeted at influencing these physical factors • consideration of the differences between landscape systems with different levels of human activity and different degrees of influence from physical factors • extent of the influence of human activity and physical factors and which they would consider greater in coastal landscape systems

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

Question			Answer	Marks	Guidance
2	(a)		**Explain the influence of climate changes and geomorphic processes in the formation of eskers.** **Level 3 (6–8 marks)** Demonstrates **thorough** knowledge and understanding of the influence of climate changes and geomorphic processes in the formation of eskers (AO1). This will be shown by including **well-developed** explanations about the influence of climate changes and geomorphic processes in the formation of eskers. **Level 2 (3–5 marks)** Demonstrates **reasonable** knowledge and understanding of the influence of climate changes and geomorphic processes in the formation of eskers (AO1). This will be shown by including **developed** explanations about the influence of climate changes and geomorphic processes in the formation of eskers. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the influence of climate changes and geomorphic processes in the formation of eskers (AO1). This will be shown by including **simple** explanations about the influence of climate changes and geomorphic processes in the formation of eskers. **0 marks** No response or no response worthy of credit.	**8** **AO1 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of climate changes and geomorphic processes in the formation of eskers could potentially include: • sub-glacial meltwater streams flow during a glacial period • these are highly charged with debris due to hydrostatic pressure • sub-glacial tunnels being formed by erosion as the high velocity of the water moving under pressure helps to erode the channels in the sub-glacial till • formed at warm margins of glaciers or as glaciers are in retreat as eskers require large volumes of both sediment and water • the warming climate in a post glacial period causes the meltwater to decrease and meltwater streams to dry up • the loss of volume of water causes deposition in sub-glacial tunnels as the supply of meltwater decreases at the end of the glacial period • the meltwater streams dry up at the end of the melting period leaving over-filled channels as sinuous ridges of sediment across the valley floor • the deposits are related to both closed channel flow and open channel flow within a tunnel • material within the esker consists of sub-rounded-rounded sediment due to the influence of meltwater and the process of attrition.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Calculate the mean monthly precipitation for the data shown in Table 2. You must show your working.

Formula to calculate the mean of the data:
$\overline{X} = \frac{\Sigma X}{n}$
$\Sigma X = 72$
$n = 12$

$\overline{x}$ = 72/12 (DEV)
$\overline{x}$ = 6 (✓)</td><td>2
AO3 x2</td><td>AO3 – 2 marks
1 x 1 mark (✓) for correct answer.
1 x 1 mark (DEV) for showing working of calculation.</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Calculate the standard deviation for the data shown in Table 2. You must show your working and give your answer to 2 decimal places.

Formula to calculate standard deviation of the data:
$\sigma = \sqrt{\frac{\Sigma (x - \overline{x})^2}{n}}$

<table>
<tr><th>Month</th><th>Data</th><th>Difference between data and mean</th><th>Difference squared</th></tr>
<tr><td>January</td><td>4</td><td>-2</td><td>4</td></tr>
<tr><td>February</td><td>4</td><td>-2</td><td>4</td></tr>
<tr><td>March</td><td>5</td><td>-1</td><td>1</td></tr>
<tr><td>April</td><td>4</td><td>-2</td><td>4</td></tr>
<tr><td>May</td><td>4</td><td>-2</td><td>4</td></tr>
<tr><td>June</td><td>7</td><td>1</td><td>1</td></tr>
<tr><td>July</td><td>8</td><td>2</td><td>4</td></tr>
<tr><td>August</td><td>10</td><td>4</td><td>16</td></tr>
<tr><td>September</td><td>9</td><td>3</td><td>9</td></tr>
<tr><td>October</td><td>9</td><td>3</td><td>9</td></tr>
<tr><td>November</td><td>6</td><td>0</td><td>0</td></tr>
</table></td><td>4
AO3 x4</td><td>AO3 – 4 marks
1 x 1 mark (DEV) calculating differences between data and mean.
1 x 1 mark (DEV) calculating the squares of the differences.
1 x 1 mark (DEV) dividing the sum of the squares of the differences by the number of values in the data set.
1 x 1 mark (✓) for correct answer to 2 decimal places.

Credit candidates for following the standard deviation calculation process using the mean that they calculated in question 2(b)(i). If the candidate calculated the incorrect mean then they should still be rewarded for the standard deviation process.</td></tr>
</table>

Question			Answer	Marks	Guidance
			December | 2 | -4 (DEV) | 16 (DEV) Sum of squares of differences = 72 Sum of squares of differences divided by number of values in the dataset = 72/12 = 6 (DEV) √6 = 2.45 to 2 decimal places (✓)		
	(c)		**With reference to Fig. 2, explain which geomorphic processes are the most influential in forming landform B.** Nivation is likely to be the most influential geomorphic process in the initial formation of the corrie as nivation enlarges small hollows, and then ice moves by rotational flow under-weight and gravity (✓). Freeze thaw weathering processes and plucking loosened material from the back of the hollow are important in the landscape shown as there is a steep back wall (✓). Plucked debris from the back wall causes further erosion through abrasion and this is important in creating the distinctive nature of the corrie as it can deepen the hollow creating the armchair shaped hollow evident in the photograph (✓).	**3** **AO2 x3**	**AO2 – 3 marks** 3 x 1 (✓) for analysing Fig. 2 to explain which geomorphic processes are the most influential in forming landform B (the corrie)
	(d*)		**'Human activity influences glaciated landscape systems more than physical factors'. To what extent do you agree with this statement?** **AO1** **Level 3 (6–8 marks)** Demonstrates **comprehensive** knowledge and understanding of the influence of human activity and physical factors in glaciated landscape systems. The answer should include **accurate place-specific** detail. Amount of place-specific detail determines credit within the level.	**16** **AO1 x8** **AO2 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the influence of human activity and physical factors in glaciated landscape systems could potentially include: • resource extraction, such as the oil industry in Alaska • the removal of surface vegetation may also contribute to these changes • dam construction in glacial valleys results in trapping of sediment • increases in energy levels below dams leads to

Question	Answer	Marks	Guidance
	Level 2 (3–5 marks) Demonstrates **thorough** knowledge and understanding of the influence of human activity and physical factors in glaciated landscape systems. The answer should include some **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 human activity and physical factors in glaciated landscape systems. 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 a 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 human activity influences glaciated landscape systems more than physical factors. **Level 2 (3–5 marks)** Demonstrates **thorough** application of knowledge and understanding to provide a clear and developed analysis that		higher rates of erosion • sediment loads of rivers affected by flushing • channel contraction and drying up downstream • climate (temperature and precipitation) influencing geomorphic processes • geology (lithology and structure) influencing rates of processes and supply of material • latitude and altitude affecting climate and so, indirectly, processes • relief and aspect affecting microclimate and so, indirectly, processes and glacier movement **AO2 – 8 marks** Application of knowledge and understanding to analyse and evaluate the extent to which human activity influences glaciated landscape systems more than physical factors could potentially include: • disturbance of systems in equilibrium and the resultant positive or negative feedback • changes to processes, material and/or energy flows and how the extent to which these are influenced by physical and human factors e.g. whether increased precipitation will affect energy flows in the landscape system as much as in dam construction • consideration of the “extent” could include scale, significance and/or range of the changes • the significance of the changes to the landscape system as a whole by human activity and physical factors as well as on individual flows and stores e.g. physical factors constantly influence flows when

Question			Answer	Marks	Guidance
			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 human activity influences glaciated landscape systems more than physical factors. **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 human activity influences glaciated landscape systems more than physical factors. **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.		often human activity is targeted at influencing these physical factors. • consideration of the differences between landscape systems with different levels of human activity and different degrees of influence from physical factors • consideration of whether the extent of the changes varies in different types of glaciated landscape systems • extent of the influence of human activity and physical factors and which they would consider greater in glaciated landscape systems.

Question			Answer	Marks	Guidance
3	(a)		**Explain the influence of pluvial conditions and geomorphic processes in the formation of inselbergs.** **Level 3 (6–8 marks)** Demonstrates **thorough** knowledge and understanding of the influence of pluvial conditions and geomorphic processes in the formation of inselbergs (AO1). This will be shown by including **well-developed** explanations about the influence of pluvial conditions and geomorphic processes in the formation of inselbergs. **Level 2 (3–5 marks)** Demonstrates **reasonable** knowledge and understanding of the influence of pluvial conditions and geomorphic processes in the formation of inselbergs (AO1). This will be shown by including **developed** explanations about the influence of pluvial conditions and geomorphic processes in the formation of inselbergs. **Level 1 (1–2 marks)** Demonstrates **basic** knowledge and understanding of the influence of pluvial conditions and geomorphic processes in the formation of inselbergs (AO1). This will be shown by including **simple** explanations about the influence of pluvial conditions and geomorphic processes in the formation of inselbergs. **0 marks** No response or no response worthy of credit.	**8** **AO1 x8**	**Indicative content** **AO1 – 8 marks** Knowledge and understanding of the influence of pluvial conditions and geomorphic processes in the formation of inselbergs could potentially include: • inselberg formation is much debated, but it is thought that they are relic features from wetter climatic periods • develop over long time periods, probably over millions of years, when the climate was less arid • inselbergs are thought to have formed where jointing in the granite was more massive, creating greater resistance to deep chemical weathering which occurred on crystalline rocks below the surface • they are subsequently exposed as fluvial processes removed surface material • when there are pluvial conditions, chemical weathering is increased due to the extended periods of abundant rainfall • they may also be remnants of degraded mesas and buttes • inselbergs are rounded, isolated hills which, despite today's arid climate, continue to develop • rockfalls often occur after heavy rain when sandstones, exposed on steep slopes, absorb water and increase their mass. Thus rates of recession of inselbergs would have been more rapid during pluvial periods.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Calculate the mean monthly wind speed for the data shown in Table 3. You must show your working.

Formula to calculate the mean of the data:
$\overline{X} = \frac{\Sigma X}{n}$

$\Sigma X = 60$
$n = 12$

$\overline{x} = 60/12$ (DEV)
$\overline{x} = 5$ (✓)</td><td>2
AO3 x2</td><td>AO3 – 2 marks
1 x 1 mark (✓) for correct answer.
1 x 1 mark (DEV) for showing working of calculation.</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Calculate the standard deviation for the data shown in Table 3. You must show your working and give your answer to 2 decimal places.

Formula to calculate standard deviation of the data:
$\sigma = \sqrt{\frac{\Sigma (x - \overline{x})^2}{n}}$

<table>
<tr><th>Month</th><th>Data</th><th>Difference between data and mean</th><th>Difference squared</th></tr>
<tr><td>January</td><td>3</td><td>-2</td><td>4</td></tr>
<tr><td>February</td><td>3</td><td>-2</td><td>4</td></tr>
<tr><td>March</td><td>6</td><td>1</td><td>1</td></tr>
<tr><td>April</td><td>1</td><td>-4</td><td>16</td></tr>
<tr><td>May</td><td>6</td><td>1</td><td>1</td></tr>
<tr><td>June</td><td>7</td><td>2</td><td>4</td></tr>
<tr><td>July</td><td>5</td><td>0</td><td>0</td></tr>
<tr><td>August</td><td>9</td><td>4</td><td>16</td></tr>
<tr><td>September</td><td>9</td><td>4</td><td>16</td></tr>
<tr><td>October</td><td>8</td><td>3</td><td>9</td></tr>
</table></td><td>4
AO3 x4</td><td>AO3 – 4 marks
1 x 1 mark (DEV) calculating differences between data and mean.
1 x 1 mark (DEV) calculating the squares of the differences.
1 x 1 mark (DEV) dividing the sum of the squares of the differences by the number of values in the data set.
1 x 1 mark (✓) for correct answer to 2 decimal places.

Credit candidates for following the standard deviation calculation process using the mean that they calculated in question 3(b)(i). If the candidate calculated the incorrect mean then they should still be rewarded for the standard deviation process.</td></tr>
</table>

Question			Answer	Marks	Guidance
			<table><tr><td>November</td><td>2</td><td>-3</td><td>9</td></tr><tr><td>December</td><td>1</td><td>-4</td><td>16</td></tr></table> (DEV) (DEV) Sum of squares of differences = 96 Sum of squares of differences divided by number of values in the dataset = 96/12 = 8 (DEV) √8 = 2.83 to 2 decimal places (✓)		
	(c)		**With reference to Fig. 3, explain which geomorphic processes are the most influential in forming landform C.** Aeolion erosion is likely to be the most influential geomorphic process in the formation of the pedestal rock. Aeolian deflation may have picked up sand grains and used it in the abrasion of the base of the pedestal rocks, as shown by the narrow base of the rock in the photograph (✓). The zone of maximum erosion (up to 1 metre) at the base of the pedestal is below the height at which saltating grains are carried as can be seen by the eroded base in Figure 3 (✓). Weathering may lead to evaporation of water and case-hardening to form a duricrust of minerals on the top of the pedestal making it even more resistant to erosion and thus larger as can be seen in the photograph (✓).	**3** **AO2 x3**	**AO2 – 3 marks** 3 x 1 (✓) for analysing Fig. 3 to explain which geomorphic processes are the most influential in forming landform C (the pedestal rock)

Question	Answer	Marks	Guidance
(d*)	**'Human activity influences dryland landscape systems more than physical factors'. To what extent do you agree with this statement?** **AO1** **Level 3 (6–8 marks)** Demonstrates **comprehensive** knowledge and understanding of the influence of human activity and physical factors in dryland landscape systems. The answer should include **accurate place-specific** detail. Amount of place-specific detail determines credit within the level. **Level 2 (3–5 marks)** Demonstrates **thorough** knowledge and understanding of the influence of human activity and physical factors in dryland landscape systems. The answer should include some **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 human activity and physical factors in dryland landscape systems. 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 human activity and physical factors in dryland landscape systems could potentially include: • exposed surfaces are subjected to higher erosion rates as there is no protection against aeolian erosion or flash floods causing fluvial erosion • an increase in loose material in the system and deposition may lead to formation of alluvial fans and bajadas • eroded sediment may then be blown to marginal areas where it accumulates as loess • water abstraction and dams affect water table levels • dams trap sediment and reduce river load • a decrease in loose material in the system and may lead to degradation of alluvial fans and bajadas • climate (temperature and precipitation) influencing geomorphic processes • geology (lithology and structure) influencing rates of processes and supply of material • latitude and altitude affecting climate and so, indirectly, processes • relief and aspect affecting microclimate and so, indirectly, processes • availability of sediment influencing processes.

Question	Answer	Marks	Guidance
	AO2 **Level 3 (6–8 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a 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 human activity influences dryland landscape systems more than physical factors. **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 human activity influences dryland landscape systems more than physical factors. **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 human activity influences dryland landscape systems more than physical factors. **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		**AO2 – 8 marks** Application of knowledge and understanding to analyse and evaluate the extent to which human activity influences dryland landscape systems more than physical factors could potentially include: • disturbance of systems in equilibrium and the resultant positive or negative feedback • how human activity can affect the physical factors in a landscape system and this then affects the overall landscape system balance e.g. damage is caused to brittle, fragile cryptobiotic crusts and the sparse vegetation due to activities such as dune buggying • changes to processes, material and/or energy flows and the extent to which these are influenced by physical and human factors e.g. whether increased aeolian erosion will affect energy flows in the landscape system as much as adventure recreationalists engaging in motorised recreation • consideration of the "extent" could include scale, significance and/or range of the changes • the significance of the changes to the landscape system as a whole by human activity and physical factors as well as on individual flows and stores e.g. physical factors constantly influence flows when often human activity is targeted at influencing these physical factors • consideration of the differences between landscape systems with different levels of human activity and different degrees of influence from physical factors • extent of the influence of human activity and physical factors and which they would consider greater in dryland landscape systems

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

Question			Answer	Marks	Guidance
4	(a)		**Suggest how the changing CO2 concentrations shown in Fig. 4 influence global management strategies for the carbon cycle.** Appropriate global management strategies could potentially include: wetland restoration (✓), afforestation (✓), sustainable agricultural practices (✓) Wetland restoration could be used to act as a carbon sink as there has been a rapid increase in atmospheric CO_2 concentrations (✓). Wetlands act as a sink for carbon since their soils decompose very slowly (DEV) and can store carbon for hundreds or thousands of years (DEV). Degradation of wetlands is a significant source of emissions of carbon dioxide to the atmosphere and so wetland restoration can help limit these emissions (DEV).	**4** **AO2 x4**	**AO2 – 4 marks** 1 x 1 mark (✓) for interpretation of the graph in Fig. 4 to propose an appropriate global management strategy 3 x 1 (DEV) for justification of this global management strategy
	(b)		**Explain three benefits of mapping rates of deforestation using Geographical Information Systems (GIS).** Can visualise deforestation data at a range of scales providing opportunities to detect and quantify patterns (✓) Ability to introduce data layers to understand patterns e.g. type of soil or land use (✓) Ability to compute distances, accessibility indicators and establish relationships among the spatial features (✓) Analysis can show spatially significant clusters of high values (hot spots) and low values (cold spots) in data (✓) Analysis of changes in rates and patterns of deforestation over time and potential factors influencing these which can be mapped such as transport links and / or settlement development (✓)	**3** **AO3 x3**	**AO3 – 3 marks** 3 x 1 (✓) for three benefits of mapping rates of deforestation using Geographical Information Systems (GIS)

Question			Answer	Marks	Guidance
			Choices of base maps to enhance data understanding, such as satellite imagery (✓) Analytical tools allows for data modification to simplify patterns or to focus on specific elements of data (✓)		
	(c)		**Examine the significance of the role of vegetation in linking the carbon and water cycles.** **Level 3 (7-10 marks)** Demonstrates **comprehensive** knowledge and understanding of the role of vegetation in linking the carbon and water cycles (AO1). 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 about the significance of the role of vegetation in linking the carbon and water cycles (AO2). This will be shown by including **well-developed** ideas about the significance of the role of vegetation in linking the carbon and water cycles. **Level 2 (4-6 marks)** Demonstrates **thorough** knowledge and understanding of the role of vegetation in linking the carbon and water cycles (AO1). 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 the significance of the role of vegetation in linking the carbon and water cycles (AO2).	**10** **AO1 x6** **AO2 x4**	**Indicative content** **AO1 – 6 marks** Knowledge and understanding of the role of vegetation in linking the carbon and water cycles could potentially include: • vegetation is a store of water, held in fleshy cells • vegetation also stores carbon • changes in vegetation cover will affect both of these stores, interdependently • vegetation transfers water within the water cycles, by root uptake from the soil and by transpiration through stoma into the atmosphere • vegetation transfers carbon by absorption from the atmosphere during photosynthesis and by release into the soil during breakdown and decay by micro-organisms • changes in vegetation cover will affect all of these flows interdependently • water availability influences rates of photosynthesis, net primary productivity NPP; inputs of organic litter to soils; and transpiration • the water storage capacity of soils increases with organic content. **AO2 – 4 marks** Application of knowledge and understanding to evaluate the significance of the role of vegetation in linking the

Question			Answer	Marks	Guidance
			This will be shown by including **developed** ideas about the significance of the role of vegetation in linking the carbon and water cycles. **Level 1 (1–3 marks)** Demonstrates **basic** knowledge and understanding of the role of vegetation in linking the carbon and water cycles (AO1). Demonstrates **basic** application of knowledge and understanding to provide un-supported evaluation that offers simple conclusions about the significance of the role of vegetation in linking the carbon and water cycles (AO2). This will be shown by including **simple** ideas about the significance of the role of vegetation in linking the carbon and water cycles. **0 marks** No response or no response worthy of credit.		carbon and water cycles could potentially include: • the significance in terms of temporal and spatial scales e.g. vegetation interacts with other parts of the carbon and water cycles in different time scales from days to decades and how this short term cycling is significant to the continual functioning of the cycles • the disturbance of systems in equilibrium and the resultant positive or negative feedback e.g. reduced water input into the biosphere means that plants cannot exchange carbon with water through photosynthesis and so the plants cannot absorb carbon and grow, as decomposition is extremely slow when water is limited • to what extent interdependence is a two-way relationship e.g. if carbon cycle processes linked with vegetation, like photosynthesis and decay, stopped then the water cycle would still continue, though its balance might be upset. But if the water ceased to evaporate off of the oceans and rain down on the land, the carbon cycle would not be able to function. • consideration of whether the significance varies with different types of vegetation e.g. rates of exchange through photosynthesis varying in different types of vegetation • the extent to which the role of vegetation in linking the cycles is significant when compared to other links e.g. discussion of smaller stores (for example oceans contain 38,000 billion tonnes of carbon compared to around 2000 billion tonnes combined in living plants and animals, and plant remains and organic matter) but vital in keeping the two cycles functioning.

Question	Answer	Marks	Guidance
(d*)	**"Human factors affect the water cycle more significantly in the tropical rainforest than in the Arctic tundra". Discuss.** **AO1** **Level 3 (6–8 marks)** Demonstrates **comprehensive** knowledge and understanding of how human factors affect the water cycle in the tropical rainforest and Arctic tundra. The answer should include **accurate place-specific** detail. Amount of place-specific detail determines credit within the level. **Level 2 (3–5 marks)** Demonstrates **thorough** knowledge and understanding of how human factors affect the water cycle in the tropical rainforest and Arctic tundra. The answer should include some **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 factors affect the water cycle in the tropical rainforest and Arctic tundra. 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** Knowledge and understanding of how human factors affect the water cycle in the tropical rainforest could potentially include: • deforestation, which can reduce canopy interception and evaporation, reduces water storage, increase overland flow and reduce atmospheric humidity • afforestation, which can increase soil stability through root networks and absorption of water to create dense foliage in tropical rainforest areas • farming techniques, for example shifting cultivation which is based on small, temporary clearings where forests are re-established when yields fall to maintain balance in the water cycle • tourism, for example building golf courses means that massive amounts of water extraction is required which causes imbalances the local water cycle • management strategies, for example agroforestry which is a type of polyculture and the perennial tree crops maintain natural vegetation cover to hep recycle rainwater • other relevant activities and/or effects. Knowledge and understanding of how human factors affect the water cycle in the Arctic tundra could potentially include: • oil and gas production, which can cause localised melting of the permafrost and snow cover, thus increased run off and river discharge • oil and gas management strategies, which aim to minimise disruption to the water cycle by protecting the permafrost, for example by elevating pipelines to allow cold air to circulate beneath them and provide insulation against the heat which would otherwise melt the permafrost

Question			Answer	Marks	Guidance
			AO2 **Level 3 (6–8 marks)** Demonstrates **comprehensive** application of knowledge and understanding to provide a 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 about whether human factors affect the water cycle more significantly in the tropical rainforest than in the Arctic tundra. **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 about whether human factors affect the water cycle more significantly in the tropical rainforest than in the Arctic tundra. **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 about whether human factors affect the water cycle more significantly in the tropical rainforest than in the Arctic tundra. **0 marks** No response or no response worthy of credit.		• other relevant activities and/or effects. Application of knowledge and understanding to analyse and evaluate whether human factors affect the water cycle more significantly in the tropical rainforest than in the Arctic tundra could potentially include: • disturbance of systems in equilibrium and the resultant positive or negative feedback from different human activities in the tropical rainforest and the arctic tundra • changes may affect stores more than flows or vice versa e.g. how tourist locations in either environment put additional strains on stores and introduce different flows into the systems • consideration of the significance could include spatial scale, temporal scale, range of the changes and how these vary between tropical rainforests and the Arctic tundra and between human activities • consideration of whether the changes are the direct or indirect result of human factors • acknowledgement of how human factors may vary over time • the significance of the changes to the water cycle as a whole • the extent to which the human factors affect the water cycle more significantly in the tropical rainforest than in the Arctic tundra, such as deforestation increases overland flow / saturated overland flow and decreases infiltration and percolation.

Question			Answer	Marks	Guidance
			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.		

Assessment Objectives (AO) grid

Candidates answer either question 1, 2 or 3 **and** question 4. This has been considered in the totals indicated below.

Question	AO1	AO2	AO3	Marks
1(a)	8			8
1(b)(i)			2	2
1(b)(ii)			4	4
1c		3		3
1(d*)	8	8		16
2(a)	8			8
2(b)(i)			2	2
2(b)(ii)			4	4
2c		3		3
2(d*)	8	8		16
3(a)	8			8
3(b)(i)			2	2
3(b)(ii)			4	4
3c		3		3
3(d*)	8	8		16
4(a)		4		4
4(b)			3	3
4(c)	6	4		10
4(d*)	8	8		16
Total	30	27	9	66

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