AS
GEOGRAPHY
7036/1

Paper 1 Physical geography and people and the environment

Mark scheme

June 2019

Version: 1.0 Final

I96A7036/I/MS

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Description of Annotations

?	?
[	[
]	]
^	Omission
H Line	Underline incorrect
Highlight	Highlight examples
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
NAQ	Not answering question
Not Relevant	Not relevant
Off Page Comment	Off Page Comment
On Page Comment	On Page Comment
SEEN	Seen – every page must be annotated
Tick	Correct point
AO1	Assessment Objective 1
AO2	Assessment Objective 2
JUST	Just – partial
LF	Lift
NC	Not clear

Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the typical performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

The notes for answers provide indicative content. Students' responses may take a different approach in relation to that which is typical or expected. It is important to stress that examiners must consider all a student's work and the extent to which this answered the question, irrespective of whether a response follows an expected structure. If in doubt the examiner should contact their team leader for advice and guidance.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.

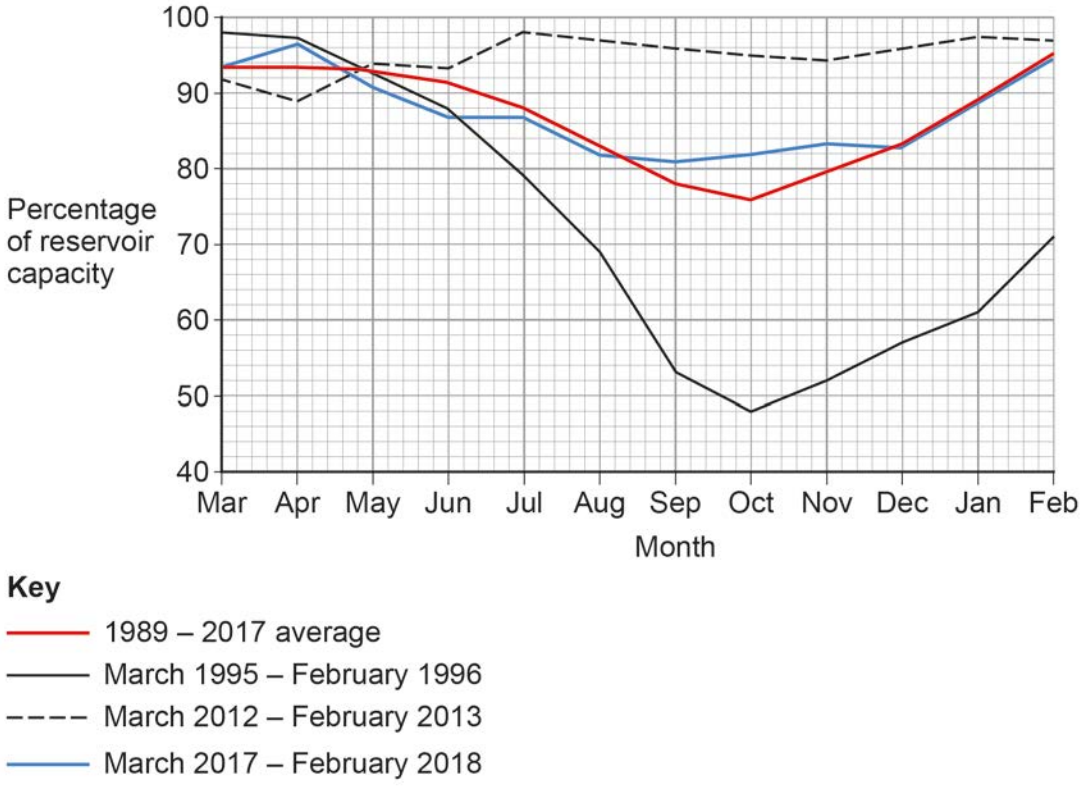
Qu	Part	Marking guidance	Total marks

Section A

01	1	**Which of the following is a human intervention in the carbon cycle designed to mitigate the impacts of climate change?** A	**1** **AO1 = 1**

01	2	**In the water cycle what is condensation?** C	**1** **AO1 = 1**

01	3	**Outline the process of infiltration as a flow of water within a drainage basin system.** <u>Point marked</u> Award one mark for each relevant point with extra mark(s) for developed points (d). For example: <u>Notes for answers</u> • This is a downwards movement of water from the ground surface into the soil (1). • The rate of this flow is affected by soil characteristics and level of soil saturation (1). • Soil porosity is a main factor controlling this flow (1). Coarse grained, sandy soils have greater porosity and allow greater flows of water (1d), OR fine grained, clay soils have lower rates of infiltration and lower flows of water (1d). • Saturated soils will limit the flow of water (1d). • Burrowing animals and plant roots create macro- and micro-channels in the soil increasing rates of this flow (1). The Notes for answers are not exhaustive. Credit any valid points.	**3** **AO1 = 3**

01	4	**Complete Figure 1 by adding the data shown below, and then analyse the data shown in the completed Figure 1.** 2 x 1 per accurate plot.  <u>Notes for answers</u> Allow 1 mark for each valid point with additional marks for developed points. • Across all time periods the amount of water stored in England and Wales' reservoirs has fluctuated (1). • In all but the 2012 to 2013 time period, reservoirs begin the period above 90% full in March, April and May then drop to their lowest levels in September or October, with water levels rising again to February the following year (1). • The level of water stored in reservoirs in 2017 to 2018 most closely follows the average levels for the whole period (1989–2017) (1). Both periods begin 94% full only dropping between 13 and 18 percentage points, before both returning to 94% full (1d). • In 2012 to 2013 the amount of water stored in reservoirs is generally the highest and most stable, remaining above the other values for all but March and April (1). • During 2012 to 2013 the level of water only varies by about 9 percentage points (1), whilst 1995 to 1996 has the greatest range in water levels of 50 percentage points (1). • 1995 to 1996 is also the year where water levels differ most to the average (1). The range in the 1989 to 2017 period is 3 times smaller than the range in water levels for 1995 to 1996 (1d). • In February 1996 reservoirs are almost a quarter less full than in all the other time periods (1). The Notes for answers are not exhaustive. Credit any valid points.	**6** **AO3=6**

01	5	**Assess the relative importance of carbon sequestration and fossil fuel combustion on major stores of carbon.** **AO1** – Knowledge and understanding of major stores of carbon. Knowledge and understanding of carbon sequestration and fossil fuel combustion. **AO2** – Application of knowledge and understanding to assess the relative importance of carbon sequestration and fossil fuel combustion on major stores of carbon. Mark scheme **Level 3 (7–9 marks)** **AO1** – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change. These underpin the response throughout. **AO2** – Applies knowledge and understanding appropriately with detail. Connections and relationships between different aspects of study are fully developed with complete relevance. Analysis is detailed and well-supported with appropriate evidence. **Level 2 (4–6 marks)** **AO1** – Demonstrates clear knowledge and understanding of concepts, processes, interactions and change. These are mostly relevant, though there may be some minor inaccuracy. **AO2** – Applies clear knowledge and understanding appropriately. Connections and relationships between different aspects of study are evident with some relevance. Analysis is evident and supported with clear and appropriate evidence. **Level 1 (1–3 marks)** **AO1** – Demonstrates basic knowledge and understanding of concepts, processes, interactions and change. This offers limited relevance with inaccuracy. **AO2** – Applies limited knowledge and understanding. Connections and relationships between different aspects of study are basic with limited relevance. Analysis is basic and supported with limited appropriate evidence. Notes for answers **AO1** • Global distribution, and size of major stores of carbon – lithosphere, hydrosphere, cryosphere, biosphere, atmosphere. • Factors driving change in the magnitude of these stores, over time and in space, including flows and transfers at plant, sere, continental and global scales. Photosynthesis, respiration, decomposition, combustion, carbon sequestration in oceans and sediments, weathering. • Systems in physical geography: systems concepts and their application to the carbon cycle inputs – outputs, energy, stores/components, flows/transfers, positive/negative feedback, dynamic equilibrium.	**9** **AO1 = 4** **AO2 = 5**

		AO2 • Carbon sequestration and fossil fuel combustion are both processes that drive change in the magnitude of major stores of carbon. • Both processes are similar in that they both operate over a range of temporal scales and can involve transfers at the plant, sere and continental scales. Responses may support with illustrative examples. • Responses are likely to suggest that carbon sequestration and fossil fuel combustion have very different impacts on major stores of carbon. • Responses should come to the view that the importance of carbon sequestration differs to fossil fuel combustion in that sequestration transfers carbon in the form of carbon dioxide from the atmosphere and oceans to be stored in solid or liquid form in the biosphere, lithosphere or hydrosphere stores. Whereas fossil fuel combustion is important in transferring carbon from the biosphere and lithosphere stores into the atmosphere, thus reducing the magnitude of the initial stores and increasing the magnitude of the latter. • The importance of carbon sequestration and fossil fuel combustion differ in that they are the result of different natural and human processes, and they differ in the nature of the impacts of those processes. Natural carbon sequestration includes processes such as organic matter falling to the ocean floor where it accumulates as carbon-rich layers of sediments that eventually lithify (increasing the lithosphere store). Human processes involving fossil fuel combustion include the burning of hydrocarbon based fuels especially for energy production (reducing the lithosphere store and increasing the atmosphere store). Whereas human processes of carbon sequestration involve capturing carbon dioxide from sources such as power stations and injecting it in liquid form to stores underground (increasing the lithosphere store), or by planting vegetation to remove CO_2 from the atmosphere and store it as organic material in the biosphere store (decreasing the atmosphere store and increasing the biosphere store). • Some responses may creditably support points with evidence of the different scales of these transfers and impacts. For example the role of human induced fossil fuel combustion in bringing atmospheric concentrations of CO_2 to over 400 parts per million, whilst the global capacity of carbon capture and storage systems is approximately 40 million tonnes of CO_2 per year. • Some responses may creditably assess the importance of the processes named in the question with respect to other processes that may also affect major stores of carbon, including those listed in AO1 above. Overall assessment can focus on any features of the importance of both processes, but overall responses should come to a clear point of view concerning the importance of the processes named in the question. Assessment of the importance of the processes on the major stores of carbon could be addressed in a number of ways. Credit any other valid assessment.	

01	6	**'Human activity has a significant impact on flows of water in tropical rainforests.'** **With reference to a tropical rainforest you have studied, to what extent do you agree with this view?** **AO1** – Knowledge and understanding of human activity in a tropical rainforest setting. Knowledge and understanding of the flows of water in a tropical rainforest setting. **AO2** – Application of knowledge and understanding to assess the extent to which human activity has a significant impact on flows of water in a tropical rainforest. <u>Notes for answers</u> **AO1** • Case study of a tropical rainforest setting to illustrate and analyse key themes in the water cycle and their relationship to environmental change and human activity. • Systems in physical geography: systems concepts and their application to the water cycle, inputs, outputs, energy, stores/components, flows/transfers, positive/negative feedback, dynamic equilibrium. • Global distribution and size of major stores of water – lithosphere, hydrosphere, cryosphere and atmosphere. • Processes driving change in the magnitude of these stores over time and in space, including flows and transfers: evaporation, condensation, cloud formation, causes of precipitation and cryospheric processes, at hill slope, drainage basin and global scales with reference to varying timescales involved. • Drainage basins as open systems – inputs and outputs, to include precipitation, evapotranspiration and runoff; stores and flows, to include: interception, surface, soil water, groundwater and channel storage; stemflow, infiltration, overland flow and channel flow. Concept of water balance. • Changes in the water cycle over time to include natural variation including storm events, seasonal changes and human impact including farming practices, land use change and water abstraction. **AO2** • Allow any potential impacts that are reasonably derived from the chosen human activities within a tropical rainforest. • There should be some recognition of the unique characteristics of the chosen case study and how human activity has/is impacting upon flows of water in this tropical rainforest. • Deforestation is likely to feature strongly in most responses. There are many impacts of this on flows of water in a tropical rainforest, these could include: - Reduced evapotranspiration from plants leading to less condensation, cloud cover and reduced precipitation levels - Reduced precipitation over continental scales reduces overall river discharge at that scale - Air warms more quickly over land in cleared areas of forest creating localised low pressure and thunderstorms so increasing precipitation	**20** **AO1 = 10** **AO2 = 10**

		rates at a local scale - Less interception by vegetation leads to increased overland flow and increased discharge (channel flow) in local rivers - Exposed soils may lead to increased rates of infiltration, percolation and soil water and ground water flows - Exposed soils may experience increased rates of soil erosion which may lead to the sedimentation of local rivers and so affecting channel capacity. Expect reference to the impact of the above on runoff variation and elements of river hydrographs. • Responses may consider the impact of the building of dams on rivers in tropical rainforests and then explore the significance of these impacts of this on flows such as evaporation, precipitation and channel flow. • Responses may consider the impact of land use changes, for example the building of settlements and the significance of these impacts on flows within the affected drainage basin hydrological system such as overland flow, infiltration and river discharge. There should be direct reference to the candidates own case study in this regard. • Responses may also consider water abstraction and other uses, such as for agriculture or other industry, and how this lowers the water table and so reduces channel flow (discharge) in local rivers. • Responses should have clear assessment of the perceived significance of specific impacts of specific human activities in named tropical rainforest settings. • Assessment should focus on the significance of these impacts. Credit any other valid approach.	

Marking grid for Question 1.6

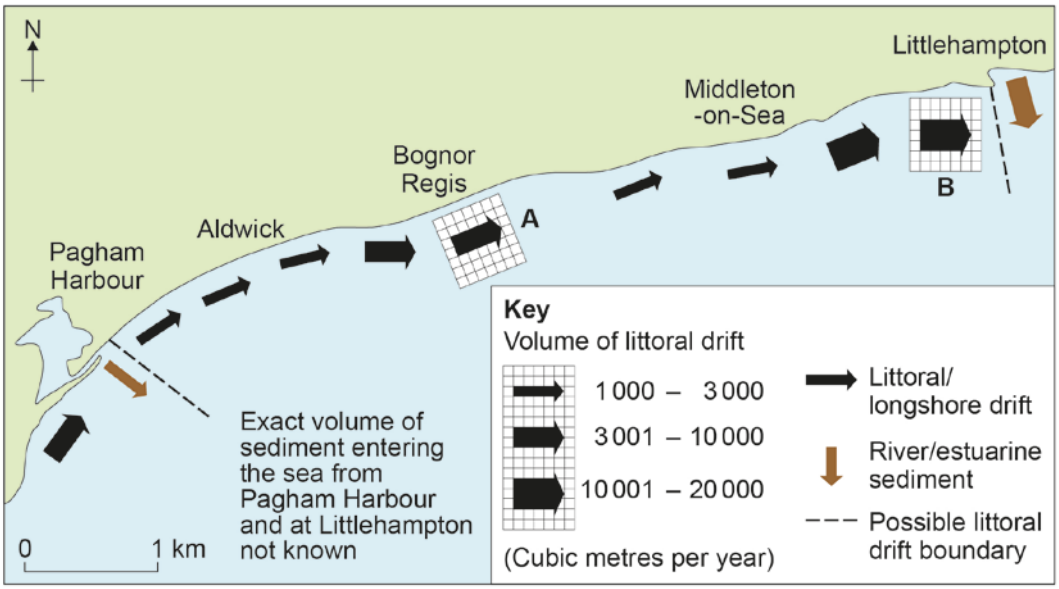
Level/ Mark range	Criteria/Descriptor
Level 4 (16–20 marks)	• Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question (AO2). • Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout (AO2). • Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout (AO1). • Full and accurate knowledge and understanding of key concepts and processes throughout (AO1). • Detailed awareness of scale and temporal change which is well-integrated where appropriate (AO1).
Level 3 (11–15 marks)	• Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question (AO2). • Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).

	• Generally clear and relevant knowledge and understanding of place(s) and environments (AO1). • Generally clear and accurate knowledge and understanding of key concepts and processes (AO1). • Generally clear awareness of scale and temporal change which is integrated where appropriate (AO1).
Level 2 (6–10 marks)	• Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question (AO2). • Some partially relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Some relevant knowledge and understanding of place(s) and environments which is partially relevant (AO1). • Some knowledge and understanding of key concepts, processes and interactions and change (AO1). • Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies (AO1).
Level 1 (1–5 marks)	• Very limited and/or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question (AO2). • Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence (AO2). • Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Very limited relevant knowledge and understanding of place(s) and environments (AO1). • Isolated knowledge and understanding of key concepts and processes. • Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies (AO1).
Level 0 (0 marks)	Nothing worthy of credit.

02	1	**What is a sediment cell?** A	**1** **AO1 = 1**

02	2	**What are sustainable approaches to flood risk and coastal erosion?** B	**1** **AO1 = 1**

02	3	**Outline characteristics of high energy coasts.** <u>Point marked</u> Allow 1 mark for each valid point with additional marks for developed points. <u>Notes for answers</u> High energy coasts: • tend to have exposure to strong and steady prevailing winds (1) that create high energy waves (1)(d) • generally have an open uninterrupted aspect with a large fetch (1) • tend to have rates of erosion greater than deposition (1) • may have greater exposure to tropical storms (1) • often have erosional landforms including headlands, cliffs and wave-cut platforms (1) • experience processes that tend to straighten the coastline (1), with material eroded from headlands being deposited as beaches that 'smooth-out' former irregularities in the coastline (1)(d). Credit any valid characteristic or feature of high energy coasts.	**3** **AO1 = 3**

02	4	**Complete Figure 2 by using the data shown below, and then analyse the data shown in the completed Figure 2.** Mark scheme 2 x 1 per accurate plot  Notes for answers Allow 1 mark for each valid point with additional marks for developed points. • Littoral/longshore drift operates from west to east along the coast (1). • The largest flows of sediment occur over the 2km west of Littlehampton with up to twice the amount of sediment flowing past both sites than at any other site (1). • Assessing the exact volumes of sediment flows is difficult due to the large ranges used for each class of data in the key (1). • Rates of sediment flow fluctuate west to east between Pagham Harbour and Littlehampton (1), supported with appropriate use of data (1d). • Flow rates passing the first three recording sites to the east of Pagham Harbour are potentially a 1/10 to a 1/3 of the flow rates at the 4th location just west of Bognor Regis (1). The pattern of flow rates repeats itself to the east of Bognor, with rates of flow in the lowest category for the next 2 recording sites, but significantly higher flow rates at the 3rd and 4th sites, between 1 and 2 km east of Middleton-On-Sea (1). • Sediment flow rates are potentially 10 to 20 times higher at the two recording sites to the west of Littlehampton than they are passing any of the other sites (1). • Even though the exact volume of sediment entering the sea at Pagham and Littlehampton is not known, the arrows suggest this is significantly lower than the volume of sediment moving along the coast between the two places (1), therefore the majority of sediment moving along the coast must be coming from other sources (1)(d). • With limited precise numerical values, points including more sophisticated elements of description may be credited as analysis, especially if they address connections between various aspects of map evidence. The Notes for answers are not exhaustive. Credit any valid points.	**6** **AO3=6**

02	5	**Assess the view that tides are the most important factor in the development of mudflats in estuarine environments.** **AO1** – Knowledge and understanding of tides and other coastal processes including winds, waves and currents. Knowledge and understanding of the development of mudflats in estuarine environments. **AO2** – Application of knowledge and understanding to assess the importance of tides compared to other coastal processes in the development of mudflats in estuarine environments. <u>Mark scheme</u> **Level 3 (7–9 marks)** **AO1** – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change. These underpin the response throughout. **AO2** – Applies knowledge and understanding appropriately with detail. Connections and relationships between different aspects of study are fully developed with complete relevance. Analysis is detailed and well-supported with appropriate evidence. **Level 2 (4–6 marks)** **AO1** – Demonstrates clear knowledge and understanding of concepts, processes, interactions and change. These are mostly relevant, though there may be some minor inaccuracy. **AO2** – Applies clear knowledge and understanding appropriately. Connections and relationships between different aspects of study are evident with some relevance. Analysis is evident and supported with clear and appropriate evidence. **Level 1 (1–3 marks)** **AO1** – Demonstrates basic knowledge and understanding of concepts, processes, interactions and change. This offers limited relevance with inaccuracy. **AO2** – Applies limited knowledge and understanding. Connections and relationships between different aspects of study are basic with limited relevance. Analysis is basic and supported with limited appropriate evidence. <u>Notes for answers</u> **AO1** • Estuarine mudflat/saltmarsh environments and associated landscapes; factors and processes in their development. • Sources of energy in coastal environments: winds, waves (constructive and destructive), currents and tides. Low energy and high energy coasts. • Sediment sources, cells and budgets. • Geomorphological processes: weathering, mass movement, erosion, transportation and deposition. • Distinctively coastal processes: marine: erosion – hydraulic action, wave quarrying, corrasion/abrasion, cavitation, solution, attrition;	**9** **AO1 = 4** **AO2 = 5**

		transportation: traction, suspension (longshore/littoral drift) and deposition; sub-aerial weathering, mass movement and runoff. • The relationship between process, time, landforms and landscapes in coastal settings. • Named mudflats in estuarine environments are likely to support responses. **AO2** • Tides should be considered as a key factor in the development of mudflats in estuarine environments, as if tidal currents are too strong deposition of sediments will not occur and so gentle tidal currents are essential. • Tides should also be considered as a key factor as they are often the agent by which sediments are transported to the coast which are then deposited forming the mudflats. • Expect responses to come to the view that tides do not operate in isolation and the development of mudflats in estuarine environments relies upon a combination of factors. • Responses should consider the combination of factors that lead to the formation of mudflats. - Wind and waves are an important factor as mudflats only develop on sheltered shorelines with gentle waves. - Tides are important as at high tide salt water covers the mudflats, whilst at low tide the surface is exposed to the atmosphere. Tides are important in shaping the character of the surface of mudflats as the generally smooth surface shows evidence of the flowing water carving or shaping the sediments. - A slow flowing river is also important. During high tide, sea water flows gently into the estuary carrying large amounts of fine sediments. This meets the equally slow flowing river with its own load of fine silts and clays. The interaction of these two flows is crucial. As they meet, the fine particles settle out of suspension by the process of flocculation. • Responses may conclude that it is a combination of factors that leads to the formation of mudflats in estuarine environments. Assessment may address connections between these factors. Although crucial, tides may be considered as just one of a number of important factors. Credit any other valid assessment.	

02	6	**'Human activity always has a negative impact on the development of landforms of coastal deposition.'** **To what extent do you agree with this view?** **AO1** – Knowledge and understanding of the development of landforms of coastal deposition. Knowledge and understanding of how human activity affects the development of landforms of coastal deposition. **AO2** – Application of knowledge and understanding to assess the extent to which human activity always has a negative impact on the development of landforms of coastal deposition.	**20** **AO1 = 10** **AO2 = 10**

Notes for answers

AO1

- Systems in physical geography: systems concepts and their application to the development of coastal landscapes – inputs, outputs, energy, stores/components, flows/transfers, positive/negative feedback, dynamic equilibrium. The concepts of landform and landscape and how related landforms combine to form characteristic landscapes.
- Origin and development of landforms and landscapes of coastal deposition. Beaches, simple and compound spits, tombolos, offshore bars, barrier beaches and islands and sand dunes; factors and processes in their development.
- Recent and predicted climatic change and potential impact on coasts.
- The relationship between process, time, landforms and landscapes in coastal settings.
- Human intervention in coastal landscapes. Traditional approaches to coastal flood and erosion risk: hard and soft engineering. Sustainable approaches to coastal flood risk and coastal erosion management: shoreline management/integrated coastal zone management.
- Geomorphological processes: weathering, mass movement, erosion, transportation and deposition. Distinctively coastal processes: marine: erosion – hydraulic action, wave quarrying, corrasion/abrasion, cavitation, solution, attrition; transportation: traction, suspension (longshore/littoral drift) and deposition; sub-aerial weathering, mass movement and runoff.
- Case study(ies) of coastal environment(s) to illustrate and analyse fundamental coastal processes, their landscape outcomes and challenges in their sustainable management.

AO2

- Candidates are free to argue in any direction in relation to the question. Some may remain neutral.
- Some may argue that human activity has a significant impact on landforms of coastal deposition. The main argument may relate to the significant impact that coastal management can have upon landforms of coastal deposition. Two approaches could be taken, that either human activity encourages or enhances the development of landforms of coastal deposition (having a positive impact), or that it leads to the disruption or removal of landforms of coastal deposition (having a negative impact). Candidates may consider the impact of a range of management strategies relating to traditional approaches including various hard and soft engineering strategies, or more sustainable approaches relating to shoreline management/integrated coastal zone management. This may be supported with evidence of more localised impacts on specific named landforms, ie the impact of groynes on a particular beach and adjacent coastline. Assessment of whether these impacts are positive or negative will depend on the content presented.
- Some responses may consider the impact of development and economic activity taking place on the coastline. This approach is valid as long as there is a clear link to how this activity is or is not having a negative impact on the development of landforms of coastal deposition.
- Other responses may explore the current and future impact associated

		with the enhanced greenhouse effect due to anthropogenic emissions of greenhouse gases. Responses may consider the impact of rising sea levels and an increase in storm activity for example on landforms of coastal deposition. Again, assessment of the extent to which the impacts of this will always be negative will depend on the evidence presented. • Some responses may explore the idea of coasts as natural systems existing in a state of dynamic equilibrium. They may suggest that if human activity disrupts part of that system in one place, having a negative impact, eg it encourages the erosion of an existing landform of coastal deposition, that natural processes will seek to adjust by transporting the eroded materials and creating new landforms of coastal deposition elsewhere, thus establishing a new state of equilibrium, and having a positive impact here. • Responses are likely to be supported by specific examples to support the position taken, ie places where human activity has had a positive impact on the development of landforms of coastal deposition by encouraging their development, or where the impacts have been negative causing their destruction, as compared to other places where human activity has had little impact on the development of landforms of coastal deposition. • The key is that there is clear assessment of the extent to which human activity does or does not have negative impacts on the development of landforms of coastal deposition. Credit any other valid assessment.	

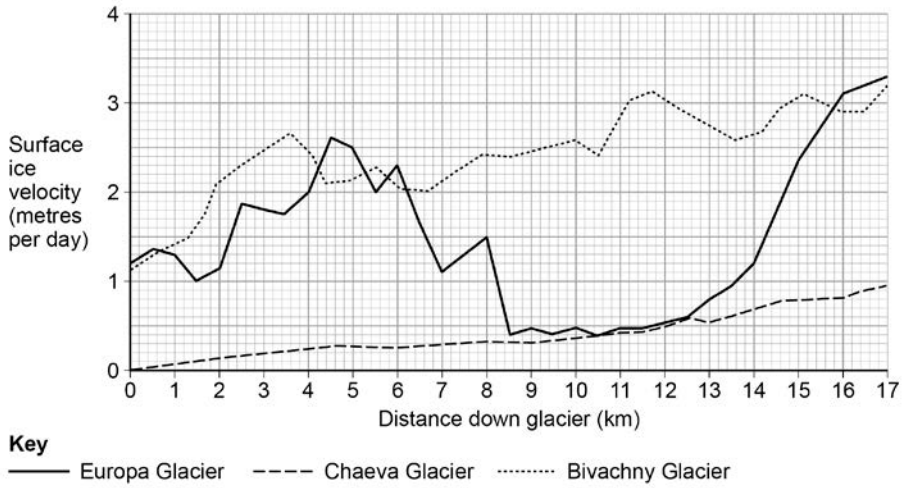
Marking grid for Question 2.6

Level/ Mark range	Criteria/Descriptor
Level 4 (16–20 marks)	• Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question (AO2). • Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout (AO2). • Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout (AO1). • Full and accurate knowledge and understanding of key concepts and processes throughout (AO1). • Detailed awareness of scale and temporal change which is well-integrated where appropriate (AO1).
Level 3 (11–15 marks)	• Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question (AO2). • Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Generally clear and relevant knowledge and understanding of place(s) and environments (AO1). • Generally clear and accurate knowledge and understanding of key concepts and processes (AO1). • Generally clear awareness of scale and temporal change which is integrated where appropriate (AO1).
Level 2 (6–10 marks)	• Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question (AO2). • Some partially relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Some relevant knowledge and understanding of place(s) and environments which is partially relevant (AO1). • Some knowledge and understanding of key concepts, processes and interactions and change (AO1). • Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies (AO1).
Level 1 (1–5 marks)	• Very limited and/or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question (AO2). • Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence (AO2). • Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Very limited relevant knowledge and understanding of place(s) and environments (AO1). • Isolated knowledge and understanding of key concepts and processes. • Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies (AO1).
Level 0 (0 marks)	Nothing worthy of credit.

03	1	**Which of the following describes inputs in a glacier system?** C	**1** **AO1=1**

03	2	**In periglacial landscapes, what is the active layer?** D	**1** **AO1=1**

03	3	**Outline the process of frost action in glacial landscapes.** Point marked Allow 1 mark for each valid point with additional marks for developed points. Notes for answers • Frost action occurs in locations where temperatures fluctuate above and below 0^{o}C (1). The regularity of the fluctuation varies from location to location, with some experiencing daily cycles and others only freezing and thawing seasonally, or even longer periods (1)(d). • Liquid water enters cracks in rocks and freezes when temperatures drop below 0^{o}C (1). As it freezes the water expands by just under 10% (1). This exerts more pressure on the surrounding rock (1)(d). • As the process repeats due to cycles of freezing and thawing the cracks in rocks are made larger and eventually pieces of rock may break off (1). • Frost action is a weathering process as it breaks down the rock in situ (1). • For maximum marks there must be some awareness of the repetitious nature of freezing and thawing in the process of frost action in glacial landscapes. Allow any valid feature of the process of frost action.	**3** **AO1 = 3**

03	4	**Complete Figure 3 by adding the data for the Europa Glacier shown below, and then analyse the data shown in the completed Figure 3.** Mark scheme 2 x 1 per accurate plot.  Notes for answers Allow 1 mark for each valid point with additional marks for developed points. For example: • the overall trend is an overall increase in the surface velocity of all three glaciers from 0km to 17km (1). • the pattern of surface velocity for the 3 glaciers differs significantly (1). Whilst the velocity of Chaeva Glacier increases almost continuously with distance down the glacier, the velocity of the Europa Glacier and Bivachny Glacier both fluctuate – the Europa glacier to a much more significant extent (1d) • the velocity of the surface of the Europa Glacier fluctuates down the glacier but is flowing nearly 3 times faster at the end than at the start (1). Whilst fluctuating less the surface ice of the Bivachny Glacier has a very similar velocity at 0km and also sees an almost 3 times increase in velocity (1d) • although it has the slowest velocity at 0km, the surface ice of the Chaeva Glacier is flowing around 10 times faster at 17km (1), but is still the slowest flowing ice of the 3 (1d) • between 0 and 4.5 km down the Europa Glacier the speed of ice flow fluctuates a little, but more than doubles to about 2.6 m/day (1), over the same distance the Bivachny Glacier increases to a peak of 2.7 m/day but falls back to 2 m/day (1) • from 4.5 to 8.5 km the velocity of the surface ice of the Europa Glacier again fluctuates, but slows significantly to its lowest velocity, about a third of the speed at the start of the glacier (1). The velocity of the ice remains below 0.5 m/day for the next 3 km down the glacier; this is the only significant stretch of glacier that remains at a relatively constant velocity (1). Over this distance the Bivachny Glacier remains above 2 m/day rising to over 3m/day, and the Chaeva Glacier continues to increase, with surface ice flowing over 4 times faster at 11km than at 0km (1d)	**6** **AO3 = 6**

		• from 12 km to 17 km down the glacier the velocity of the surface ice of the Europa Glacier increases around 6-fold with no fluctuations to about 3.3 m/day (1). Whilst the Bivachny Glacier remains higher and fluctuates between 2.5 to just over 3 m/day, also moving at over 3.2 m/day at 17km. Despite continuing to increase almost continuously over the last 6 km the velocity of the Chaeva Glacier is still 3 times slower than the others at 17 km down the glacier (1d). The Notes for answers are not exhaustive. Credit any valid points.	

03	5	**Assess the extent to which geomorphological processes, such as ice movement and erosion, differ between warm and cold based glaciers.** **AO1** – Knowledge and understanding of the characteristics of warm and cold based glaciers. **AO2** – Application of knowledge and understanding to assess the extent to which geomorphological processes differ in the characteristics of warm and cold based glaciers. <u>Mark scheme</u> **Level 3 (7–9 marks)** **AO1** – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change. These underpin the response throughout. **AO2** – Applies knowledge and understanding appropriately with detail. Connections and relationships between different aspects of study are fully developed with complete relevance. Analysis is detailed and well-supported with appropriate evidence. **Level 2 (4–6 marks)** **AO1** – Demonstrates clear knowledge and understanding of concepts, processes, interactions and change. These are mostly relevant, though there may be some minor inaccuracy. **AO2** – Applies clear knowledge and understanding appropriately. Connections and relationships between different aspects of study are evident with some relevance. Analysis is evident and supported with clear and appropriate evidence. **Level 1 (1–3 marks)** **AO1** – Demonstrates basic knowledge and understanding of concepts, processes, interactions and change. This offers limited relevance with inaccuracy. **AO2** – Applies limited knowledge and understanding. Connections and relationships between different aspects of study are basic with limited relevance. Analysis is basic and supported with limited appropriate evidence. <u>Notes for answers</u> **AO1**	**9** **AO1 = 4** **AO2 = 5**

		• Warm and cold based glaciers: characteristics and development. • Ablation and accumulation – historical patterns of ice advance and retreat. • Geomorphological processes – weathering: frost action, nivation; ice movement: internal deformation, rotational, compressional, extensional and basal sliding; erosion: plucking, abrasion; transportation and deposition. • The global distribution of cold environments. • The global distribution of past and present cold environments (polar, alpine, glacial and periglacial) and of areas affected by the Pleistocene glaciations. **AO2** • Responses will probably come to the view that geomorphological processes differ significantly between cold- and warm-based glaciers. • Responses may conclude that there are indeed significant differences in both rates and nature of ice movement. In cold-based glaciers rates of movement are extremely slow as they are often frozen to their beds, so what limited movement there is due to internal flow. Whereas warm-based glaciers have much greater rates of movement, as the large amounts of meltwater act as a lubricant allowing the whole glacier to move downslope due to gravity. Due to these differences in rates of movement cold- and warm-based glaciers have significant differences in their ability to erode, transport and deposit material. • Responses may conclude that there are indeed significant differences in the extent to which processes of erosion differ between cold- and warm-based glaciers. Many will conclude that as cold based glaciers are frozen to the bedrock, and subglacial temperatures are below the pressure melting point, there is little ice movement so there is little erosion. They may also conclude that as the base of warm-based glaciers is much closer to, or above the pressure melting point, and that there is melt water present, there is greater ice movement so greater opportunity for processes such as abrasion and plucking to occur. It is possible some responses will argue that some texts suggest that cold-based glaciers do indeed erode the bedrock, but at much slower rates than warm-based glaciers, producing larger and more angular sand-sized debris as opposed to the finer rock flour of warm-based glaciers (however, this goes beyond the scope of most AS & A-level texts). • Some responses may explore differences in other geomorphological processes as outlined in AO1 above. • The key is that there is clear assessment of the fact that there are significant differences in geomorphological processes between cold- and warm-based glaciers, simple description/comparison will not score well. Credit any other valid assessment.	

03	6	**'Fluvioglacial landscapes are dominated by processes of deposition.'** **To what extent do you agree with this view?** **AO1** – Knowledge and understanding of fluvioglacial landforms of erosion and deposition. Knowledge and understanding of characteristic fluvioglacial landscapes. **AO2** – Application of knowledge and understanding to assess the extent to which fluvioglacial landscapes are dominated by processes of deposition. <u>Notes for answers</u> **AO1** • Fluvioglacial processes: meltwater erosion, transportation and deposition. • Fluvioglacial landforms of erosion and deposition: meltwater channels, kames, eskers, outwash plains. Characteristic fluvioglacial landscapes. • The relationship between process, time, landforms and landscapes in glaciated settings: characteristic glaciated and periglacial landscapes. • Systems in physical geography: systems concepts and their application to the development of glaciated landscapes – inputs, outputs, energy, stores/components, flows/transfers, positive/negative feedback, dynamic equilibrium. The concepts of landform and landscape and how related landforms combine to form characteristic landscapes. • Reference to fluvioglacial landscapes from the UK and/or beyond. **AO2** • Candidates are free to argue in any direction in relation to the question. Some may remain neutral. • Some may argue that meltwater erosion and deposition lead to the formation of different landforms, the assemblage of which form the fluvioglacial landscape, therefore they may conclude that both processes are equally important. • Expect responses to explore a range of fluvioglacial landforms where meltwater erosion plays a dominant role. These include meltwater channels, and pro-glacial lakes and associated overflow channels. Here assessment may come to the view that processes of erosion rather than deposition play the more dominant role. • Expect responses to explore a range of fluvioglacial landforms where meltwater deposition plays a dominant role. These include eskers, kames and outwash plains. Here assessment may come to the view that processes of deposition do play the more dominant role. • Responses may suggest that due to temporal variations in the amount of meltwater that the level of importance of meltwater erosion and deposition may differ depending on other factors. For example, at times of higher temperatures and melting, larger volumes of meltwater allow more sediment to be transported to greater distances forming depositional landforms further from the ice front. Whilst flowing from	**20** **AO1 = 10** **AO2 = 10**

		the ice front the large amounts of meltwater may erode and rework previously deposited sediment, thus creating erosional features where there were once depositional features. Also, as temperatures drop and the volume of meltwater decreases the smaller amounts of sediment being transported may be deposited closer to the ice front on top of previous landforms. In this case analysis may not come to a clear assessment one way or the other with regards to the thrust of the question; this is acceptable as long as there is evidence of assessment. • Responses are likely to be evidenced/illustrated by specific examples that support the position taken ie situations where meltwater erosion is the dominant factor in shaping the fluvioglacial landscapes and others where meltwater deposition is the dominant factor. • The key is that there is clear assessment of the view that processes of deposition dominate in the formation of fluvioglacial landscapes. Credit any other valid approach.	

Marking grid for Question 3.6

Level/ Mark range	Criteria/Descriptor
Level 4 (16–20 marks)	• Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question (AO2). • Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout (AO2). • Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout (AO1). • Full and accurate knowledge and understanding of key concepts and processes throughout (AO1). • Detailed awareness of scale and temporal change which is well-integrated where appropriate (AO1).
Level 3 (11–15 marks)	• Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question (AO2). • Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Generally clear and relevant knowledge and understanding of place(s) and environments (AO1). • Generally clear and accurate knowledge and understanding of key concepts and processes (AO1). • Generally clear awareness of scale and temporal change which is integrated where appropriate (AO1).

Level 2 (6–10 marks)	• Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question (AO2). • Some partially relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Some relevant knowledge and understanding of place(s) and environments which is partially relevant (AO1). • Some knowledge and understanding of key concepts, processes and interactions and change (AO1). • Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies (AO1).
Level 1 (1–5 marks)	• Very limited and/or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question (AO2). • Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence (AO2). • Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Very limited relevant knowledge and understanding of place(s) and environments (AO1). • Isolated knowledge and understanding of key concepts and processes. • Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies (AO1).
Level 0 (0 marks)	Nothing worthy of credit.

Section B Hazards

Qu	Part	Marking guidance	Total marks
04	1	**Which of the following is a long-term response to a wildfire event?** C	**1** **AO1 = 1**
04	2	**Which of the following is not a characteristic of a tropical storm?** A	**1** **AO1 = 1**
04	3	**Outline the characteristics of liquefaction as a seismic hazard.** Point marked Allow 1 mark for each valid point with additional marks for developed points. Notes for answers • Liquefaction is a secondary impact of a seismic event (earthquake) caused by the initial shaking of the ground (1). • Liquefaction generally occurs in saturated soils (1). • As the ground shakes soils with a high water content lose their strength and original soil structure (1) and begin to behave like a fluid (1)(d). The hazard is most significant in areas with sandy soils where the water table is close to the surface (1)(d). • In some cases water/'mud' rises through the soil surface and can flow down even gentle slopes potentially causing a localised flooding hazard (1). • Where buildings are built directly on to the soil surface with shallow or no foundations they can lean, topple, sink or even collapse causing an obvious hazard for people living/working in or near them (1). • If liquefaction occurs suddenly under communications networks, and other infrastructure, there can be sudden disruption/danger to life (1). Allow (1)(d) for elaboration on specific hazards, such as traffic accidents and disruption if roads collapse. For maximum marks there must be some reference to the potential hazardous nature of liquefaction. The Notes for answers are not exhaustive. Credit any valid points.	**3** **AO1 = 3**

04	4	**Complete Figure 4, and then analyse the data shown in the completed Figure 4.** Mark scheme 2 x 1 per accurate calculation as outlined below. • for correct calculations relating to the 199 deaths: **13.80 / 190.44** • for correct standard deviation calculation: **222.45** Notes for answers Allow 1 mark for each valid point with additional marks for developed points. • There were just over 9 times more deaths between 1996–2005 than between 2006–2015 (1), **OR** the average (mean) number of deaths was 9 times higher in 1996–2005 than in 2006–2015 (1). • The range in the number of deaths is around 13 times higher between 1996-2005 than between 2006–2015 (9711 compared to 756 respectively) (1). • The huge difference in standard deviation values suggests that there was significantly more variation around the mean number of deaths between 1996–2005 than between 2006–2015 (1). **OR** the numbers of deaths between 2006–2015 were more clustered around the mean than between 1996–2005 (1). **OR** the numbers of deaths between 2006–2015 were less widely spread than the number of deaths between 1996–2005 (1). • As the standard deviation is considerably lower for 2006–2015 it suggests that there are fewer extreme values and therefore the mean is a more typical representation of the data than for 1996–2005 (1). The Notes for answers are not exhaustive. Credit any valid points.	**6** **AO3 = 6**

04	5	**With reference to a place which has experienced a recent volcanic event, assess the importance of exogenous factors (links with other places) in response to the event.** **AO1** – Knowledge and understanding of the human response to a recent volcanic event. Knowledge and understanding of the role played by exogenous in the response to the volcanic event. **AO2** – Application of knowledge and understanding to assess the level of importance of exogenous factors in a place in response to a recent volcanic event. Mark scheme **Level 3 (7–9 marks)** **AO1** – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change. These underpin the response throughout.	**9** **AO1 = 4** **AO2 = 5**

AO2 – Applies knowledge and understanding appropriately with detail. Connections and relationships between different aspects of study are fully developed with complete relevance. Analysis is detailed and well-supported with appropriate evidence.

Level 2 (4–6 marks)
AO1 – Demonstrates clear knowledge and understanding of concepts, processes, interactions and change. These are mostly relevant, though there may be some minor inaccuracy.
AO2 – Applies clear knowledge and understanding appropriately. Connections and relationships between different aspects of study are evident with some relevance. Analysis is evident and supported with clear and appropriate evidence.

Level 1 (1–3 marks)
AO1 – Demonstrates basic knowledge and understanding of concepts, processes, interactions and change. This offers limited relevance with inaccuracy.
AO2 – Applies limited knowledge and understanding. Connections and relationships between different aspects of study are basic with limited relevance. Analysis is basic and supported with limited appropriate evidence.

Notes for answers
AO1

- Impacts and human responses as evidenced by a recent volcanic event.
- Impacts: primary/secondary, environmental, social, economic, political. Short and long-term responses: risk management designed to reduce the impacts of the hazard through preparedness, mitigation, prevention and adaptation.
- Nature, forms and potential impacts of natural hazards (geophysical, atmospheric and hydrological). Hazard perception and its economic and cultural determinants. Characteristic human responses – fatalism, prediction, adjustment/adaptation, mitigation, management, risk sharing – and their relationship to hazard incidence, intensity, magnitude, distribution and level of development. The Park model of human response to hazards. The Hazard Management Cycle.
- Case study at a local scale of a specified place in a hazardous setting to illustrate the physical nature of the hazard and analyse how the economic, social and political character of its community reflects the presence and impacts of the hazard and the community's response to the risk.
- Factors contributing to the character of places:
  - Exogenous: relationships with other places.

AO2
Responses are expected to show an understanding of the nature of the response to a volcanic event. There should be clear recognition of the learning from the Changing Places unit in assessing the importance of exogenous factors on the people's response to the volcanic event. Reciting learned case study material does not constitute AO2. It is the integration of the place study ideas and concepts which allow access to

		AO2. • There are any number of recent volcanic events to which candidates can refer; therefore, their overall assessment of the importance of exogenous factors will depend on the case study provided. • When assessing the response to the recent volcanic event candidates may address concepts of fatalism, prediction, adjustment/adaptation, mitigation, management and risk sharing. • Responses may also assess the response to the volcanic event in the context of The Park model and the Hazard Management Cycle. • Responses may assess both short- and long-term responses including the level of preparedness, mitigation, prevention and adaptation. The above are legitimate elements to include in a response, but assessment must focus on the level of importance of the exogenous factors on these responses. • The nature of the exogenous factors being assessed will depend on the recent volcanic event. However, exogenous factors to be assessed could include: - in the relief phase – support in the form of emergency food, medical and other supplies; search and rescue advice, equipment and teams; financial aid - in the rehabilitation and reconstruction phases – support in rebuilding and repairing damage in the form of financial aid, equipment and materials, and volunteers; support in the form of expert advice and guidance in terms of rebuilding in ways to mitigate future risks - the role of NGOs or other governmental organisations in response to the volcanic event - other factors that could be explored could include the strength of international openness to the affected location; the level and importance of international connections of the place, ie if it is a popular tourist destination or important location for international business and trade; the level of personal external links to family and friends overseas, ie the availability of financial remittances from overseas. • Exogenous factors can operate at a range of scales. Some may refer to links with neighbouring settlements, whilst others may refer to international links. All scales are valid. • The key is that there is clear assessment of the importance of the exogenous factors on the response to the volcanic event. Credit any other valid assessment.	

04	6	**'The impacts experienced in multi-hazardous environments make them uninhabitable.'** **With reference to a multi-hazardous environment beyond the UK that you have studied, to what extent do you agree with this view?** **AO1** – Knowledge and understanding of the impacts experienced a multi-hazardous environment. Knowledge and understanding of the habitability of a multi-hazardous environment, including the human response and adaptation to the risks posed to them by the hazards they face. **AO2** – Application of knowledge and understanding to assess the extent to which the impacts experienced in a multi-hazardous environment make it uninhabitable, with assessment of the human response and adaptation to the risks posed to them by the hazards they face. <u>Notes for answers</u> **AO1** • Case study of a multi-hazardous environment beyond the UK to illustrate and analyse the nature of the hazards and the social, economic and environmental risks presented, and how human qualities and responses such as resilience, adaptation, mitigation and management contribute to its continuing human occupation. • Nature, forms and potential impacts of natural hazards (geophysical, atmospheric and hydrological). Hazard perception and its economic and cultural determinants. Characteristic human responses – fatalism, prediction, adjustment/adaptation, mitigation, management, risk sharing – and their relationship to hazard incidence, intensity, magnitude, distribution and level of development. The Park model of human response to hazards. The Hazard Management Cycle. **AO2** • There are any number of multi-hazardous environments that could be the focus of the response; this will affect the direction in which candidates argue. • There should be recognition of the unique characteristics of the chosen case study and level of habitability of the place including the level of adaptation of the local people to the risks they face. • Expect responses to assess the nature of the impacts of the hazards presented in the case study location and the extent to which these make the place more or less habitable – impacts of the hazards should include a combination of some of the following volcanic, seismic, storm or wildfire hazards. • The specification broadly includes geophysical, atmospheric and hydrological hazards as 'natural hazards', so it is acceptable that candidates may include impacts of hazards other than those listed above, for example those associated with mass-movement, such as landslides. • Expect responses to assess the nature of economic, social and environmental risk presented to the people in the chosen multi-hazardous environment, and the extent to which this makes the	**20** **AO1 = 10** **AO2 = 10**

		environment more or less habitable. • Expect responses to assess the economic, social and political character of the local population and how this affects their response to the impacts of the hazards, thus making the environment more or less habitable. • Assessment must focus on the extent to which the environment is uninhabitable; this may include discussion of the effectiveness of the local population's adaptation to the specific risks presented to them. • Assessment of the effectiveness of adaptation may address the factors outlined above that affect the nature of any adaptation. • In relation to the chosen case study assessment may come to the view that the population has adapted well to the impacts of the hazards, thus making the place less uninhabitable, whilst others may conclude that some adaptations may have been more successful than others, or others may conclude that the population has little or no successful adaptation to the impacts of the hazards, thus making the place more uninhabitable. • Responses should be illustrated by specific examples to support the position taken. Credit any other valid approach.	

Marking grid for Question 4.6

Level/ Mark range	Criteria/Descriptor
Level 4 (16–20 marks)	• Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question (AO2). • Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout (AO2). • Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout (AO1). • Full and accurate knowledge and understanding of key concepts and processes throughout (AO1). • Detailed awareness of scale and temporal change which is well-integrated where appropriate (AO1).
Level 3 (11–15 marks)	• Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question (AO2). • Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Generally clear and relevant knowledge and understanding of place(s) and environments (AO1). • Generally clear and accurate knowledge and understanding of key concepts and processes (AO1). • Generally clear awareness of scale and temporal change which is integrated where appropriate (AO1).
Level 2 (6–10 marks)	• Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question (AO2). • Some partially relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Some relevant knowledge and understanding of place(s) and environments which is partially relevant (AO1). • Some knowledge and understanding of key concepts, processes and interactions and change (AO1). • Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies (AO1).
Level 1 (1–5 marks)	• Very limited and/or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question (AO2). • Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence (AO2). • Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Very limited relevant knowledge and understanding of place(s) and environments (AO1). • Isolated knowledge and understanding of key concepts and processes. • Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies (AO1).
Level 0 (0 marks)	Nothing worthy of credit.

05	1	**What are SUDS?** D	**1** **AO1 = 1**

05	2	**Which of the following describes the process of decentralisation?** C	**1** **AO1 = 1**

05	3	**Outline what is meant by the concept of the post-modern western city.** <u>Point marked</u> Allow 1 mark for each valid point with additional marks for developed points. <u>Notes for answers</u> • The term refers to architectural, cultural and social changes in the late twentieth century that affected a small number of urban areas in parts of North America and Western Europe (1) Los Angeles is the most used example (1)(d). • Post-modern cities are often characterised by: o large urban areas composed of independent settlements, economies, cultures and societies (1) edge cities are a good example (1)(d) o economies focused on information, knowledge and service based industries rather than traditional manufacturing and other secondary industries (1) o eclectic and varied architecture inspired by a variety of artistic, cultural and historical influences (1) o the presence of spectacular flagship developments like the Guggenheim Museum in Bilbao, Spain (1) o greater ethnic diversity may be evident in population (1) but also more significant social, economic or cultural inequality and polarisation (1)(d). The Notes for answers are not exhaustive. Credit any valid points.	**3** **AO1 = 3**

05	4	**Complete Figure 5, and then analyse the data shown in the completed Figure 5.** Mark scheme 2 x 1 per accurate calculation as outlined below: • 1 mark for correct calculations relating to the urban area with 5 million people: **-1.10 / 1.21** • 1 mark for correct standard deviation calculation: **3.57** Notes for answers Allow 1 mark for each valid point with additional marks for developed points. For example: • there are 30 million more people living in the 10 largest South American urban areas than in the 10 largest EU urban areas (1) • the average (mean) number of people living in the 10 largest urban areas in EU is about 2/3 of that living in the 10 largest urban areas in the South American (1) • the range in the size of the 10 largest urban areas in the South American is 17.1 million compared to 10.7 million in the EU (1) • the standard deviation values differ suggesting that there is more variation around the mean number of people living in the 10 largest South American urban areas than in the 10 largest EU urban areas (1). **OR** the sizes of the EU urban areas are more clustered around the mean than the South American urban areas (1). **OR** the sizes of the EU urban areas are less widely spread around the mean than the South American urban areas (1) • as the standard deviation is lower for the EU urban areas it suggests that there are fewer extremes in the sizes of the urban areas and therefore the mean is a more typical representation of the data than for the South American urban areas (1) • some responses may seek to analyse data for individual urban areas. This is credit worthy. For example, Sao Paolo is at least 50% larger than any other urban area in both South America and the EU (1), with 7 million more people than the next two largest cities, Buenos Aires and London (1d) • the difference in size between the smaller urban areas listed in both South America and Europe is less significant than the difference in the larger urban areas (1). For example, Fortaleza and Porto Alegre are roughly 20% larger than Athens and Warsaw in the EU (1d). The Notes for answers are not exhaustive. Credit any valid points.	**6** **AO3 = 6**

05	5	**Assess the extent to which local weather and climate in an urban area might affect its character and/or people's lived experience.** **AO1** – Knowledge and understanding of the local climate and weather of an urban area. Knowledge and understanding of the character and/or people's lived experience of that urban area. **AO2** – Application of knowledge and understanding to assess the extent to which the local climate and weather have affected the character and/or lived experience of that urban area.	**9** **AO1 = 4** **AO2 = 5**

		Mark scheme **Level 3 (7–9 marks)** **AO1** – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change. These underpin the response throughout. **AO2** – Applies knowledge and understanding appropriately with detail. Connections and relationships between different aspects of study are fully developed with complete relevance. Analysis is detailed and well-supported with appropriate evidence. **Level 2 (4–6 marks)** **AO1** – Demonstrates clear knowledge and understanding of concepts, processes, interactions and change. These are mostly relevant, though there may be some minor inaccuracy. **AO2** – Applies clear knowledge and understanding appropriately. Connections and relationships between different aspects of study are evident with some relevance. Analysis is evident and supported with clear and appropriate evidence. **Level 1 (1–3 marks)** **AO1** – Demonstrates basic knowledge and understanding of concepts, processes, interactions and change. This offers limited relevance with inaccuracy. **AO2** – Applies limited knowledge and understanding. Connections and relationships between different aspects of study are basic with limited relevance. Analysis is basic and supported with limited appropriate evidence. Notes for answers **AO1** Case studies of an urban area to illustrate and analyse key themes, to include: • the nature and impact of physical environmental conditions • urban form and characteristics in the given setting of the case study used • the impact of urban forms and processes on local climate and weather • urban temperatures: the urban heat island effect. Precipitation: frequency and intensity. Fogs and thunderstorms in urban environments. Wind: the effects of urban structures and layout on wind speed, direction and frequency. Air quality: particulate and photo-chemical pollution • the concept of place and the importance of place in human life and experience • factors contributing to the character of places: Endogenous factors: location, topography, physical geography, land use, built environment and infrastructure, demographic and economic characteristics • people's lived experience of place in the past and present. **AO2** Responses are expected to show an understanding of the local weather and climate of an urban area. There should be clear recognition of the learning from the Changing Places unit in assessing the effect of this	

		local climate and weather on the character and/or lived experience of the people in that place. Reciting learned case study material does not constitute AO2. It is the integration of the place study ideas and concepts which allow access to AO2. Assessment will depend on the place named in the response. • Responses are likely to take a variety of approaches. Some may seek to apply knowledge of urban climates from the Contemporary Urban Environments unit to a place studied in the Changing Places unit, whilst others may apply the concepts of factors affecting character of place and/or lived experience from the Changing Places unit to a case study of urban climate studied in the Contemporary Urban Environments unit. The key is that candidates recognise how local climate and weather affects the character of place and/or lived experience of people in a place. The case study support is likely to be very varied. • Example: - Preston is a city in Central Lancashire in northwest England. During the 19th century the town expanded rapidly due to the development of the textile industries. One of the reasons for mills locating in this area on the north bank of the River Ribble close to the Irish Sea was the prevailing south-westerly winds bringing moist air inland which helped prevent fire risk from dust in the mills. By the middle of the 19th century 80% of the population depended on the mills and by 1927 there were 60 mills in the town - therefore, the local climate had a clear impact on the character of the urban environment that developed during the 19th and early 20 centuries and on the lives of people living in Preston, as it helped determine the nature of the built environment and urban form, alongside the nature of employment and housing available to Preston's residents. - much of the housing of central Preston is terraced housing built on a grid pattern. Long streets with an east-west orientation experience significant wind channelling and Venturi effect, especially on streets where 3 to 5 storey mill buildings remain. This is due to Preston's location close to the Irish Sea to the west, where prevailing south westerly winds follow the estuary inland where they are channelled along the narrow straight terraced streets. On windy days, especially in the winter, this can be quite unpleasant for residents and often results in significant amounts of litter and other debris being blown around - therefore, the lives local people have been/and are affected by the local weather conditions. Also, the character of local places is affected as some streets experience different local weather conditions - in winter Preston can experience more fog than surrounding areas, which can cause issues for traffic especially early in the morning. The fog results from warm moist air moving inland from the Irish Sea along the River Ribble, as it passes over the cooler ground condensation occurs and the fog forms in the Ribble Valley. Therefore, affecting the lives of people, especially those commuting in an out of the urban area for work - housing density is quite high in Preston, and the central urban area is usually a few degrees warmer than the surrounding rural areas on	

		clear calm nights. In winter this reduces the number of frosts people experience, but can make conditions quite uncomfortable on hot summer nights. Whatever place is chosen assessment should show understanding of the impact of local weather and climate on the character of the place and/or the lived experiences of the people in that place. Assessment of the level of connections between the different elements of the question is the key, and responses that assess past or present aspects are equally valid.	

05	6	**'The greatest challenge for mega/world cities is managing waste.'** **To what extent do you agree with this view?** **AO1** – Knowledge and understanding of the challenges of waste management in mega/world cities. **AO2** – Application of knowledge and understanding to assess the extent to which issues relating to waste management are the greatest challenge for mega/world cities. <u>Notes for answers</u> **AO1** • Contemporary characteristics of mega/world. Urban characteristics in contrasting settings. Physical and human factors in urban forms. Spatial patterns of land use, economic inequality, social segregation and cultural diversity in contrasting urban areas, and the factors that influence them. • Urban physical waste generation: sources of waste: industrial and commercial activity, personal consumption. Relation of waste components and waste streams to economic characteristics, lifestyles and attitudes. The environmental impacts of alternative approaches to waste disposal: unregulated, recycling, recovery, incineration, burial, submergence and trade. • Environmental problems in contrasting urban areas: atmospheric pollution, water pollution and dereliction. • Strategies to manage these environmental problems. • Contemporary opportunities and challenges in developing more sustainable cities. **AO2** • Expect to see reference to a wide range of mega/world cities and hence a wide range of issues relating to managing waste and other issues. • Responses should seek to address the extent to which issues associated with waste are the greatest challenge for mega/world cities, so aspect reference to other issues facing the chosen mega/world cities. • Reference to 'mega/world cities' in the question implies the response should focus on assessing the experience of large urban areas with a population of over 10 million people, and/or urban areas that act as global centres for finance, trade, business, politics and culture.	**20** **AO1 = 10** **AO2 = 10**

		• There is no prescription about which mega/world cities candidates should refer to. Some may focus on the experience of mega/world cities that are currently expanding at a fast rate, possibly in developing economies, or the experiences of currently large cities during their period of rapid expansion in the past. • Responses may assess characteristics of mega/world cities that result in waste management issues. In those that are rapidly expanding in developing economies these may include: - many cities of this sort experience very rapid population growth rates from both rural to urban migration and natural increase (Lagos in Nigeria has an annual growth rate of over 4%) - many rapidly growing megacities (especially in the poorest countries) expand haphazardly with little land use planning - building and population density rapidly increases to extremely high levels leaving little space for other infrastructure, with what infrastructure there is rapidly reaching capacity - specific details will depend on the examples used to illustrate and support the response. • Some may focus on waste management issues that have resulted in or are the experience of currently large cities during their period of rapid expansion in the past. Specific issues will relate to the chosen urban area used to illustrate the response. Some may seek to assess the extent to which managing waste is currently the greatest challenge for these cities. • Some responses are likely to assess the waste management issues that arise in many rapidly expanding mega/world cities. This might include: - keeping up with the extremely rapid increase in the volume of waste generated not only from personal consumption, but from the increasing industrial and commercial activity - ensuring there are facilities to deal with different categories of waste including residential, industrial and commercial, medical, agricultural and electronic waste - decision making on which approaches to waste disposal are most appropriate (and affordable) and dealing with issues arising from whatever approach is chosen. Approaches might include: unregulated, recycling, recovery, incineration, burial, submergence and trade - ensuring there is appropriate infrastructure to cope with the increase in human effluent resulting from such rapid increases in the number of residents, often in unplanned locations of the city. Construction of sewerage networks and waste water treatment works may lag behind economic development and population growth - large amounts of waste are unsightly and produce bad smells - dealing with large amounts of waste has a significant economic cost - poor waste management can encourage the spread of disease. • Some responses may draw on evidence from some mega/world cities where through necessity or design waste management strategies have developed that might be seen as progressive and sustainable. Many cities, especially in poorer parts of the world, have very high levels of recycling, where some of the cities' poorest inhabitants make a living from collecting, sorting and recycling waste. Some may contrast this with different waste management strategies that have been adopted in	

		more longstanding mega/world cities. • Some responses may seek to assess the extent to which other issues are more important than waste management. These issues could include those listed in AO1 above, but these are not exhaustive. • Assessment must focus on the extent to which managing waste is the greatest challenge for mega/world cities. Any view is acceptable as long as it is supported with reasoned argument and illustrative examples and evidence. Credit any other valid approach.	

Marking grid for Question 5.6

Level/ Mark range	Criteria/Descriptor
Level 4 (16–20 marks)	• Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question (AO2). • Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout (AO2). • Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout (AO1). • Full and accurate knowledge and understanding of key concepts and processes throughout (AO1). • Detailed awareness of scale and temporal change which is well-integrated where appropriate (AO1).
Level 3 (11–15 marks)	• Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question (AO2). • Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Generally clear and relevant knowledge and understanding of place(s) and environments (AO1). • Generally clear and accurate knowledge and understanding of key concepts and processes (AO1). • Generally clear awareness of scale and temporal change which is integrated where appropriate (AO1).
Level 2 (6–10 marks)	• Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question (AO2). • Some partially relevant analysis and evaluation in the application of knowledge and understanding (AO2). • Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Some relevant knowledge and understanding of place(s) and environments which is partially relevant (AO1). • Some knowledge and understanding of key concepts, processes and interactions and change (AO1). • Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies (AO1).
Level 1 (1–5 marks)	• Very limited and/or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question (AO2). • Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence (AO2). • Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2). • Very limited relevant knowledge and understanding of place(s) and environments (AO1). • Isolated knowledge and understanding of key concepts and processes. • Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies (AO1).
Level 0 (0 marks)	Nothing worthy of credit.