Mark Scheme (Results)

October 2020

Pearson Edexcel GCE
In Geography (9GE0)
Paper 1

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

October 2020
Publications Code 9GE0_01_2010_MS

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Indicative content	Mark
1 (a)	**AO3 (4 marks)**	
(i)	Award 1 mark for the sum of d^2 column (Σ) = 30	**(1)**
	Award 1 mark for the correct working of equation: $1-\frac{6 \times 30}{12^3-12}$	**(1)**
	Award 1 mark for answers that round to R = 0.90 to 2 d.p **Allow errors carrying forward**	**(1)**
(ii)	Award 1 mark for rejection of null hypothesis as t value is more than critical value at all confidence levels and the acceptance of the alternative hypothesis that there is a significant relationship between the % of silica and the % of volatile gas in these lava samples.	**(1)**

Question number	Indicative content
1(b)	**AO1 (3 marks)/AO2 (9 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: - Level 1 AO1 performance: 1 mark - Level 2 AO1 performance: 2 marks - Level 3 AO1 performance: 3 marks. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • The global distribution and causes of volcanic eruptions • Physical processes impact on the magnitude and type of volcanic eruption • Volcanoes cause lava flows, pyroclastic flows, ash falls, gas eruptions, and secondary hazards (lahars, jökulhlaups). • Hazard profiles (magnitude, speed of onset and areal extent, duration, frequency, spatial predictability) are important in understanding hazard impacts. • Contrasting hazard events in developed, emerging and developing countries to show the interaction of physical factors and the significance of context in influencing the scale of disaster. **AO2** • A key factor is the type of plate boundary as these then determines the processes that create the volcanic hazard risks. • Destructive (convergent) plate boundaries generate larger magnitude volcanic eruptions than constructive (divergent) or hot spots. This is the result of the subduction of old oceanic lithosphere back into the mantle. This often produces andesitic lava which has a higher silica content and a higher percentage of volatile gases. These therefore create more violent eruptions at destructive plate margins as opposed to constructive plate margins where the rising magma is more basic in nature. Thus hazards

Question number	Indicative content
	are potentially greater for volcanic eruptions in the Philippines than for Iceland or Hawaii. • Yet the context of the plate boundary is also important. Those which are associated with island arc's often have partial wet melts. This allows water-bearing sediments to be subducted into mantle and as temperatures rise water is released and the amount of volatiles are increased so increasing the scale of the hazard event such as at Montserrat. • Furthermore the contextual factor of the type of lava can be significant. The tectonic setting of Mount Merapi has meant that the eruptions create significant volumes of pyroclastic flows increasing the potential hazard. • Human factors can, however, increase or decrease the impact through hazard management. • The location of volcanoes are well established and the equipment used to monitor eruptions is portable and so often the impacts are not as great as the hazards created by volcanic eruptions (lava flows, pyroclastic flows, ash falls, gas eruptions, and secondary hazards such as lahars and jökulhlaups suggest that they might be. • The population density of the surrounding can also be a significant factor in explaining the impacts of volcanic eruptions. • Impacts therefore can be amplified through poor management or reduced through effective management • Overall, the key factor in affecting impacts is the type of plate margin but these impacts may be amplified by other contextual factors both physical and human. **Accept other assessments of the relative importance of physical factors and processes in explaining the impacts of volcanic eruptions.**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–4**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical information/ideas, making limited logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited relevance and/or support. (AO2) • Applies knowledge and understanding of geographical information/ideas to make unsupported or generic judgements about the significance of few factors, leading to an argument is unbalanced or lacks coherence. (AO2)
Level 2	**5-8**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas logically, making some relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial but coherent interpretation that is mostly relevant and supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to make judgements about the significance of some factors, to produce an argument that may be unbalanced or partially coherent. (AO2)
Level 3	**9-12**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas logically, making relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is relevant and supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to make supported judgements about the significance of factors throughout the response, leading to a balanced and coherent argument. (AO2)

Question number	Indicative content
2(a)	**AO1 – (3 marks)/AO2 – (3 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • A chronology of multiple glacial and interglacial periods caused by Pleistocene climate change. • The long-term factors leading to climate change: Milankovitch cycles as the primary driver. • The shorter-term role of variations in solar output, and volcanic eruptions. **AO2** • Milankovitch cycles – variations in the earth's orbit, tilt and wobble called the Milankovitch cycles can explain changes on 100,000, 41,000 and 22,000 cycles. Many of these might have caused the variations in ice volume shown. • Eccentricity - 100,000 progression of the equinoxes. As the earth orbits the sun it changes from a circle to an ellipse. Over 100,000 years this means that the amount of solar radiation received in the summer and winter equinoxes changes causing an increase in the magnitude of seasonal changes. As a result temperatures at high latitudes in the northern hemisphere decrease increasing ice volume. • This in turn sets up a positive feedback loop where increased ice in the northern hemisphere increases the albedo effect further reducing temperatures and so causes further increases in ice volume. • Obliquity – 41,000 changes in the tilt of the earth. The earth has not always had the same tilt. When the tilt is less, there are warmer winters but cooler summers and so glaciers do not melt in the summer and so advance. This then reflects more of the incoming solar radiation further cooling the planet and so causes the variations in ice volume shown. • Precession – a 22,000 wobble of the earth on its axis means that the north pole points both towards and away from the sun increasing the variation in the irradiation of the northern hemisphere. Simialrly to obliquity this variations causes variation in summer and winter temperatures and so causes the variations in ice volume shown. • Other possible cause of the changes in relative global ice volume are volcanic events as well as sun spot cycles which cool the planet and so causes the shorter term variations in the ice volume shown.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
Level 2	**3–4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
Level 3	**5–6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Question number	Answer
2(b)	**AO1 (3 marks)/AO2 (3 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • Distribution of past and present periglacial landscapes • These consist of continuous, and discontinuous areas • There are also areas of sporadic permafrost with a seasonally active layer. **AO2** • Continuous permafrost is found north of the -6.5 C isotherm. This is where temperatures are low and so there is no melting. • South of the permafrost is a band of discontinuous permafrost and then a band of sporadic permafrost. This is in warmer areas where there is surface melting. • This distribution is a result of a broad relationship with temperatures with permafrost forming where temperatures are between -6.5C to 1.5C. • There is an anomaly with permafrost south of the 1.5 C isotherm • This could be the result of the development of high pressure in winter as well as coastal mountain ranges stopping maritime air masses reaching this area. • It is also possible that some of this permafrost may be relict and so reflects a previous colder climate. • There is also an anomaly as there are greater amounts of permafrost west of Hudson Bay than east. • This could be due to there being larger levels of snowfall to the east of Hudson Bay than to the west which provides insulation and so reduces the extent of permafrost. • Thawing and Freezing Indexes are also used to explain the distribution of permafrost. • Credit those candidates that discuss the fact that the resource shows mean annual temperatures and not the range/extremes in temperatures. • Credit those candidates who relate the areas of mountain permafrost with any of the three ranges of the Rocky Mountains. **Accept other explanations of the distribution of permafrost**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
Level 2	**3–4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
Level 3	**5–6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Question number	Answer
2 (c)	**AO1 – (8 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • The mapping of cirques/corries through cirque/corrie orientation and size can show both ice extent and to some extent ice movement • The mapping of glacial troughs both in orientation and size can also show both ice extent and to some extent ice movement • Accept that micro features such as striations and chattermarks can also be used to study former ice extent and movement. • The formation of ice contact depositional features (medial, lateral, recessional and terminal moraines and drumlins). • The assemblage of landforms can be used to reconstruct former ice extent and movement and for provenance (erratics, moraines, crag and tail, drumlin orientation). • The alignment of drumlins and other sub-glacial features reveals evidence of the speed and direction of ice flow. • The position of lateral moraines affords evidence of ice thickness via trim lines • Till fabric analysis reveals details both of ice direction and the provenance of the ice through the presence of erratics such as the examination of till in North Wales showing the different sources of ice (Irish Sea and Snowdonia). • Distinctions between ablation and lodgement till give evidence of ice speed and direction Accept other explanations of how upland glacial landforms can be used to study former ice extent and movement.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas, which lack detail. (AO1)
Level 2	**3–5**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)
Level 3	**6–8**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Question number	Answer
2(d)	**AO1 (5 marks)/AO2 (15 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. • Level 4 AO1 performance: 4–5 marks. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • Different stakeholders (conservationists, local and regional government, global organisations, NGOs) are involved in managing the challenges posed by glaciated landscapes • A spectrum of approaches from protection through to sustainable management and multiple economic use are used • Legislative frameworks are used to protect and conserve landscapes by conservation and management at a variety of scales. • Climate warming is a context risk, meaning that successful management of these unique and fragile landscapes is increasingly challenging, with a need for coordinated approaches at global, national and local scale. **AO2** • A key global management strategy that has successfully managed an active glaciated landscape is the Antarctic Treaty System (ATS). Through a global agreement the threats to this landscape have been effectively reduced by stopping any resource exploitation as well as freezing all sovereignty claims. • Furthermore the treaty has also managed the threat of tourism in this active glaciated landscape. Although there are 40,000 visitors to Antarctica per year, due to protocols adopted in 1966 and subsequently added to in the Antarctic Treaty System there is now a framework to manage tourism in Antarctica reducing the potential for damage to the landscape. Furthermore, strict protocols have meant that all waste is removed from this area, even waste water, and so any damage is being minimized. • However, there are concerns as the tourism is both spatially and temporally concentrated in Antarctica with concerns raised over the impact on the Patriot Hills area where heated tents and a runway are constructed every year. • Another key global treaty that attempts to manage the threats to glaciated areas is the Paris Agreement Climate change accord. As a result of there

Question number	Answer
	being no legally binding obligations as well as the fact that all signatories have pledged to reduce carbon emissions it avoids a key criticism of the Kyoto protocol that allowed some of the world's biggest polluters to avoid having to reduce their carbon emissions. • Many countries have therefore initiated plans to reduce carbon emissions and so meet the agreement. This will therefore reduce the contextual threat of global warming. • However, the agreement has been criticized as recent studies have shown that none of the major industrialized nations were implementing the policies they had envisioned and have not met their pledged emission reduction targets. • Furthermore it has also been reported that even if all signatories kept to their pledges it would not keep temperature rise below 2C. This is as a result of self reinforcing feedback mechanisms which might inevitably cause temperatures to rise by 4-5 C. This would therefore have a negative impact on the mass balance of glaciers and cause both Arctic and Antarctic melting. • Yet many active and relict areas have also been successfully managed at a regional level. **The Alpine Convention** is an international agreement between the Alpine countries (Germany, France, Italy, Liechtenstein, Monaco, Austria, Switzerland and Slovenia) and the EU for sustainable development and the protection of the Alps. The convention has set out concrete steps for the protection and sustainable development of the Alp in terms of tourism, energy, soil protection and traffic amongst others. • It is proving successful for the protection of this active landscape as the signatories are also either part of the EU or have treaties with the EU and so have experience of inter-country cooperation • However, other active glaciated such as the Andes and the Himalayas have not as yet managed to develop such multiparty agreements and so threats to these active landscapes remain. • Reward candidates who develop an argument on which criteria should be used when judging success – such as the impact on biodiversity or the impact of local communities. • As a result of the difficulties of global and regional management strategies many areas particularly in relict glaciated areas are initiating very successful local management plans. The Fix the Fells project is a partnership of six organisations lead by the National Trust. It maintains and repairs the upland paths preventing further erosion. This is vital work without which access to the fells would be limited with severe impacts on the tourism industry. • Reward those candidates that identify the threats and those that develop their response by considering how success could be judged. **Accept other evaluations that the threats to glaciated landscapes can only be successfully managed at a global scale**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–5**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical ideas, making limited and rarely logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited coherence and support from evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2)
Level 2	**6–10**	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)
Level 3	**11–15**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2)
Level 4	**16–20**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

Question number	Answer
3(a)	**AO1 (3 marks)/AO2 (3 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • Longer-term sea level changes result from a complex interplay of factors both eustatic (ice formation/melting, thermal changes) and isostatic (post glacial adjustment, subsidence, accretion) and tectonics. • Sea level change has produced emergent and submergent coastlines . • Contemporary sea level change from global warming or tectonic activity is a risk to some coastlines. **AO2** • The map shows a varied pattern of sea level change but there is some evidence to suggest that the south of the British Isles are experiencing relative sea level rise whilst the north of the British Isles are experiencing relative sea level fall. • isostatic changes refers to when crustal material is forced down into the mantle changing the relative sea level. • In particular the resource shows that it is likely that post glacial adjustment is causing Scotland to be rebounding upwards and so relative sea levels have fallen in Scotland leading to the sea level falls noted in the resource. • It is also likely to be adding to the relative sea level rise experienced in the south of England. • It is also likely that subsidence/accretion is also contributing to the changes shown with large river such as the Thames increasing the accumulation of sediment in the Thames basin causing the land to subside into the mantle causing relative sea levels to rise. **Accept other explanations than the role of isostatic factors in causing changes in sea level**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
Level 2	**3–4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
Level 3	**5–6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Question number	Answer
3(b)	**AO1 (3 marks/AO2 (3 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • Transportation and deposition processes produce distinctive coastal landforms (beaches, recurved and double spits, offshore bars, barrier beaches and bars, tombolos and cuspate forelands), which can be stabilised by plant succession. • Sediment transportation is influenced by the angle of wave attack, tides and currents and the process of longshore drift. • Vegetation is important in stabilising sandy coastlines through dune successional development on sandy coastlines and salt marsh successional development in estuarine areas. **AO2** • The map shows a spit with a salt marsh behind. Accept that there may be sand dunes present on the spit. • The spit has been created through sediment transport caused by the process of longshore drift. They form due to the presence of a surplus of sediment combined with the process of longshore drift, the dominance of constructive waves and an appropriate coastal configuration – presence of an estuary or a change in direction of the coast. • There are other processes at work particularly the role of vegetation in stabilizing the spit. • In addition as well as sediment transport by the sea there is also sediment transport by the river bringing sediment down which is deposited in the low energy environment formed behind the spit • There would also be the process of flocculation causing the sediment to settle in this area. Vegetation succession in the form of halosere succession is also important in contributing to the development of the landscape shown. **Responses which focus on the development of one landform as opposed to the development of the landscape are likely to be level 2.** **Accept other explanations of the role of sediment transport in the development of this landscape stimulated by the resource.**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
Level 2	**3–4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
Level 3	**5–6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Question number	Answer
3(c)	**AO1 (8 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • Sustainable management is designed to cope with future threats (increased storm events, rising sea levels) but its implementation can lead to local conflicts in many countries. • Hard engineering approaches (groynes, sea walls, rip rap, revetments, offshore breakwaters) can be considered as protecting some settlements for the long term and so can be considered as 'sustainable'. However, as these directly alter physical processes and systems they can cause local conflicts. • Soft engineering approaches (beach nourishment, cliff re-grading and drainage, dune stabilisation) attempt to work with physical systems and processes to protect coasts and manage changes in sea level. • These policy decisions can lead to conflicts between different players (homeowners, local authorities, environmental pressure groups) with perceived winners and losers in countries at different levels of development (developed and developing or emerging countries) • The use of strategic realignment at such as at Medmerry Beach Selsey has caused conflicts between the perceived winners (environmentalists) and perceived losers (landowners). • The use of a No Active Intervention such as on the Undercliff on the Isle of Wight has also created conflicts between homeowners and the local authorities who have closed the Undercliff road. • Yet in some cases such sustainable approaches do not cause conflicts. The dune regeneration on the Hinge at East Head has not only protected the valuable salt marsh ecosystem behind East Head spit but has also reduced the erosion risk for properties facing East Head across this salt marsh. Furthermore it has encouraged tourism in the area as the spit is now more accessible to tourists from the West Wittering Estate car park. **Reward those candidates that focus on local as opposed to generic conflicts** **Accept other explanations of how the use of sustainable management approaches to managing the risks associated with coastal recession and flooding may lead to local conflicts**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas, which lack detail. (AO1)
Level 2	**3–5**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)
Level 3	**6–8**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Question number	Answer
3(d)	**AO1 (5 marks)/AO2 (15 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. • Level 4 AO1 performance: 4–5 marks. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • Bedrock lithology (igneous, sedimentary, metamorphic) and unconsolidated material geology are important in understanding rates of coastal recession. • Differential erosion of alternating strata in cliffs (permeable/impermeable, resistant/less resistant) produces complex cliff profiles and influences recession rates. • Geological structure (jointing, dip, faulting, folding) is an important influence on coastal morphology and erosion rates, and also on the formation of cliff profiles and the occurrence of micro-features, e.g. caves. • Weathering (mechanical, chemical, biological) is important in sediment production and influences rates of recession whilst mass movement (blockfall, rotational slumping, landslides) is important on some coasts with weak and/or complex geology. • Different wave types (constructive/destructive) influence beach morphology and beach sediment profiles. **AO2** • Geological factors can refer to lithology, geological structure as well as geological strata. • Lithology refers to the physical characteristics such as colour, texture, grain size, or composition. • Sedimentary rocks such as chalk, limestone, sandstones and clays are rocks which are created by the deposition of sediments. They generally are not resistant to coastal recession. • Igneous rock such as granite and basalt are formed through the cooling of magma either above ground (basalt) or below ground (granite). They are more resistant to erosion than sedimentary rocks but often have lines of weakness called joints created during the cooling process which can create opportunities for both marine and sub aerial processes. • Metamorphic rocks are those sedimentary and igneous rock which are deformed through heat and pressure to form new rocks – ie Clay to Slate,

Question number	Answer
	granite to gneiss. These are the most resistant to coastal recession as they do not have bedding planes such as sedimentary rock and rarely have joints as igneous rocks. • Unconsolidated material are formed in the Quaternary geologic era and consist of Pleistocene and Holocene deposits. These are very susceptible to coastal recession as seen on the Holderness coast and in North Norfolk. • Geological structure refers to the changes to rocks brought about by stress and strain such as jointing, dip, folding and faulting. All of these processes create weaknesses in the rock which makes them more susceptible to coastal recession. • As well as the bedrock lithology being a key factor in influencing coastal recession rates, alternating strata in cliffs also influences recession rates. This is where one rock type rests on another. Knock Cliff on the Isle of Wight has a rapid rate of cliff retreat as a result of a layer of permeable rock overlying a layer of impermeable gault clay. When it rains water percolates through the sandrock but cannot percolate through the gault clay. As a result there is a lubrication slip plain created between the two rocks which leads to rotational slumping and so a high rate of coastal recession. • Wave type can also be key. There are two main wave types – destructive and constructive. Destructive waves such as those at Freshwater Bay have High wave height a short wave length and often produce plunging breakers where the backwash is greater than the swash. This all means that areas that receive destructive waves will have a higher rate of coastal recession than those that receive mainly constructive waves. • Wave size is also important. Large waves have more destructive power if they have a long fetch, are generated in large water bodies, are formed by strong prevailing wind and are not interfered with by other wave patterns. On the IOW, Freshwater Bay and Compton Bay are exposed to the full fury of the waves generated by the prevailing SW winds. The potential fetch reaches the USA and there is little interference from other wave patterns. This makes the erosive capabilities of the waves particularly strong at both of these locations. At Sandown Bay the bay is sheltered by the cliffs at Knock Cliff and as a result the waves have far less power leading to lower rates of coastal recession. • A beach is the most effective way to dissipate the energy of waves. Where there is no beach and the waves impact directly upon the shore there can be far higher rates of coastal recession than where there is a beach. • Conversely deep water can cause clapotis – where the waves hit the cliff face without breaking as the depth of water is too great. This then reflects the wave back out to sea and as a result there are often low levels of coastal recession. • As well as physical processes effecting the rate of coastal recession there are also human factors. The building of offshore breakwaters, the beach renourishment and other cliff foot defences at Monks Bay has reduced the coastal recession being suffered at this part of the Undercliff, but the construction of a sea wall at the extreme eastern end has merely deflected the erosive power of the sea to Steel Bay where there has been considerable land slipping.

Question number	Answer
	• Reward those candidates who evaluate whether the rate of coastal recession is largely controlled by geological factors by assessing the extent to which other factors and processes may be more important. **Accept other evaluations of factors that affect the rate of coastal recession**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–5**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical ideas, making limited and rarely logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited coherence and support from evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2)
Level 2	**6–10**	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)
Level 3	**11–15**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2)

Level	Mark	Descriptor
Level 4	**16–20**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

Question number	Answer	Mark
4(a)	**AO1 – 2 marks/AO2 – 1 marks** Award **1 AO2 mark** for analysing the resource to identify a change in the climate during an El Nino event and a further **2 AO1 marks** expansion up to a maximum of 3 marks to explain the impact of the hydrological system. For example: • Precipitation levels will drop in north east Brazil during an El Nino event **(1).** This reduction will lead to lower river flows **(1)** as well as lower soil moisture levels **(1)**. • Precipitation levels will increase in California during an El Nino event **(1).** This will lead to higher levels of surface runoff **(1)** - and possibility of flood events as river flow exceeds bankful capacity **(1)**. **Accept other explanations of the** impacts of an El Nino event on hydrological system	**(3)**

Question number	Answer
4(b)	**AO1 (6 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: • Storm hydrographs shape depends on physical features of drainage basins (size, shape, drainage density, rock type, soil, relief and vegetation) • The key shapes of the hydrograph are the steepness of the rising limb, the nature of the peak discharge as well as the characteristic of the falling limb. • The size of the drainage basin will affect the shape of a storm hydrograph as smaller drainage basins will mean that overland flow will more quickly reach the river and so create a steeper rising limb and a shorter lag time. • The shape of drainage basin will affect the shape of a storm hydrograph as more rounded drainage basins will mean that overland flow will more quickly reach the river and so create a steeper rising limb and a shorter lag time. • The drainage density of the drainage basin will affect the shape of a storm hydrograph as drainage basins with a high drainage density will mean that overland flow will more quickly reach the river and so create a steeper rising limb and a shorter lag time. • The rock type of the drainage basin will affect the shape of a storm hydrograph as drainage basins with impermeable rocks such as granite will mean that overland flow will more quickly reach the river and so create a steeper rising limb and a shorter lag time. • The soil type of the drainage basin will affect the shape of a storm hydrograph as drainage basins with soils with a low infiltration rate such as clay soils will mean that overland flow will more quickly reach the river and so create a steeper rising limb and a shorter lag time. • The topography of the drainage basin will affect the shape of a storm hydrograph as drainage basins with steep slopes will mean that overland flow will more quickly reach the river and so create a steeper rising limb and a shorter lag time. • The vegetation type and amount of the drainage basin will affect the shape of a storm hydrograph as drainage basins with sparse vegetation will mean that overland flow will more quickly reach the river and so create a steeper rising limb and a shorter lag time. • The levels of antecedent soil moisture will affect the shape of the storm hydrograph as saturated soils will mean that overland flow will more quickly reach the river and so create a steeper rising limb and a shorter lag time. **Accept other explanations of how the physical features of drainage basins affects the shape of storm hydrographs**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate. (AO1) • Understanding addresses a narrow range of geographical ideas. (AO1) • Understanding of geographical ideas lacks detail. (AO1)
Level 2	**3–4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas. (AO1) • Understanding of geographical ideas is not fully detailed and/or developed. (AO1)
Level 3	**5–6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas. (AO1) • Understanding of the geographical ideas is detailed and fully developed. (AO1)

Question number	Answer
4(c)	**AO1 (8 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: • The U.N. defines water security as: The capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters. • The causes of human water insecurity include over abstraction from rivers, lakes and groundwater aquifers, water contamination from agriculture and industrial water pollution. • Water resources also face pressures from rising anthropogenic demand caused by increasing population, improving living standards, and developments in industrialisation and agriculture). • Over extraction such as in Rajastan in India where the use of water for soft drink production has contributed to drops in ground water levels and so causes increases in water insecurity for the local population. • Industrial pollution - Due to the rapid industrialisation of Mexico City some 7000 factories are located in Mexico City. There were uncontrolled discharges of toxic waste and so water courses such as the Grand Canal have become unfit for human use and so causes increases in water insecurity for the local population. • Sewage disposal – Mumbai in India - In Mumbai the high levels of rural to urban migration mean that the city authority cannot cope with all the people who need housing. The result is that newly arrived migrants cannot afford to live in the housing that is available and so end up living in shanty towns. There is no clean running water and no sewers and so raw sewage is put into the streets and so contaminates the water supply. This leads to outbreaks of cholera and so increases water insecurity. • The nutrition transition in many developing countries is increasing the water needed for raising livestock (1kg of meat requires 10X the amount of water than 1kg of rice) and so has led to increasing water insecurity. • Water management can increase water insecurity for some at the expense of others – the Gibe 3 dam in Ethiopia has reduced river flow to downstream users and so has increased water insecurity. **Accept other how human actions increase water insecurity.**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas, which lack detail. (AO1)
Level 2	**3–5**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)
Level 3	**6–8**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Question number	Answer
4(d)	**AO1 (3 marks)/AO2 (9 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • Re-balancing the carbon cycle could be achieved through mitigation (carbon taxation, renewable switching, energy efficiency, afforestation, carbon capture and storage) but this requires global scale agreement and national actions both of which have proved to be problematic. • Renewable and recyclable energy (nuclear power, wind power and solar power) could help decouple fossil fuel from economic growth; these energy sources have costs and benefits economically, socially, and environmentally and in terms of their contribution they can make to energy security. • Radical technologies, including carbon capture and storage and alternative energy sources (hydrogen fuel cells, electric vehicles) could reduce carbon emissions but uncertainty exists as to how far this is possible. • Biofuels are an alternative energy source that are increasing globally; growth in biofuels however has implications for food supply as well as uncertainty over how 'carbon neutral' they are. **AO2** • According to the IEA renewables are predicted to account for 36% of the total reduction in CO2 emissions if the UN sustainable development (Goal 13) is to be met therefore showing that the use of renewables is a key element in the implementation COP21 agreed in Paris 2015 which aims to rebalance the carbon cycle by cutting global emissions to below 20 Gt per year by 2040 and so reduces the risks of further planetary warming. • In particular renewables have a vital role to play in the creation of low carbon electricity with recent developments of solar photovoltaics (PV) allowing renewables to account for two-thirds of global new net electricity capacity additions thus reducing the contribution of fossil fuels to the world's increasing demand for electric power. • Furthermore renewables also play a vital role on the switch to electric vehicles as the CO2 emissions saved by using such vehicles can only be

Question number	Answer
	realised if the electricity used to recharge the vehicles is itself obtained from carbon free sources. • Renewables also have a key role to closing the electrification gap in developing Asia and sub-Saharan Africa with renewables being increasingly used in off-grid capacity from industrial applications, solar home systems (SHSs), and minigrids which will allow basic electricity services to delivered and therefore reduce the use of traditional cooking and lighting fuels thereby reducing carbon emissions and so reducing the risks of further planetary warming. • Despite these key roles energy efficiency and other sources will deliver far more of the carbon reduction needed to keep the temperature of the earth well below 2C than the treaty envisages. • Indeed, this already proved to have been key in reducing the rate of rising emissions as since 2000 energy emissions have been responsible for as reduction of 12% of CO2 emissions had not such efficiencies been in place. Crucially CO2 energy intensity is set to decline at a rate of over 2 % per year and so will allow continued economic development whilst meeting the COP21 targets. • The use of biofuels which are expected to represent over 90% of total energy consumption for vehicles not using fossil fuels by the end of the target date as in contrast to VHHD countries where electricity charging stations are being developed, in other LHD and HMHD it will be simpler to replace fossil fuels such as petrol and diesel with bioethanol and biodiesel. • In addition it also seems clear that if these reduction in CO2 are to be achieved as well as the use of renewables, efficiency and biofuels there will also be the need for the addition of carbon sinks. All players recognise the need for afforestation as well as CCS technology to be developed alongside renewables if COP21 is to be met which therefore reduces the risks of further planetary warming. • Furthermore renewables will only be able to reduce the levels of CO2 emitted – there are other anthropogenic emissions that are leading to the degradation of the carbon cycle such as methane and carbon monoxide that the use of renewables will have a limited impact upon. In addition renewables still account for only just above 10% of final energy consumption and the energy sector remains dominated by fossil fuels. • Overall the use of renewables is a key component of the ways in which governments can meet their pledges to the COP21 and and so reduce the risks of further planetary warming. It is however just one of the many steps to take if global warming is to be kept below 2C. **Accept other assessments of the importance of renewable energy in reducing the risks of further planetary warming.**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–4**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate. (AO1) • Applies knowledge and understanding to geographical information/ideas, making limited logical connections/relationships. (AO2) • Applies knowledge and understanding to geographical information/ideas to produce an interpretation that is not relevant and/or supported by evidence. (AO2) • Applies knowledge and understanding to geographical information/ideas to produce an unbalanced argument that lacks coherence and makes judgements that are generic and/or unsupported by evidence. (AO2)
Level 2	**5–8**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information/ideas logically, making some relevant connections/relationships. (AO2) • Applies knowledge and understanding to geographical information/ideas to produce a partial but coherent interpretation that is mostly relevant and supported by evidence. (AO2) • Applies knowledge and understanding to geographical information/ideas to produce an unbalanced, partially-supported argument that is drawn together with some coherence in order to make judgements. (AO2)
Level 3	**9–12**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information/ideas logically, making relevant connections/relationships. (AO2) • Applies knowledge and understanding to geographical information/ideas to produce a full and coherent interpretation that is relevant and supported by evidence. (AO2) • Applies knowledge and understanding to geographical information/ideas to produce a balanced, fully-supported argument that is drawn together coherently in order to make rational judgements. (AO2)

Question number	Answer
4(e)	**AO1 (5 marks)/AO2 (15 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate only AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. • Level 4 AO1 performance: 4–5 marks. Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • The process of fossil fuel combustion has altered the balance of carbon pathways and stores with implications for climate, ecosystems and the hydrological cycle. • Ocean and terrestrial photosynthesis play an important role in regulating the composition of the atmosphere. Soil health is influenced by stored carbon, which is important for ecosystem productivity. • Ocean acidification, as a result of its role as a carbon sink, is increasing due to fossil fuel combustion and risks crossing the critical threshold for the health of coral reefs and other marine ecosystems that provide vital ecosystem services. • Threats to ocean health pose threats to human wellbeing, especially in developing regions that depend on marine resources as a food source and for tourism and coastal protection. • Forest loss has implications for human wellbeing but there is evidence that forest stores are being protected and even expanded, especially in countries at higher levels of development (environmental Kuznets' curve model). • Climate change affects inputs and outputs within the hydrological cycle: trends in precipitation and evaporation. • Climate change affects stores and flows, size of snow and glacier mass, reservoirs, lakes, amount of permafrost, soil moisture levels as well as rates of runoff and stream flow. • Climate change and global warming increase the uncertainty in the system; this causes concerns over the security of water supplies. • Climate change, resulting from the enhanced greenhouse effect, may increase the frequency of drought due to shifting climate belts. **AO2** • Changes in the carbon cycle will have impacts on the health of soils with major threats to ecosystem productivity. However, communities in VHDD

	will be able to use agrochemicals to maintain ecosystem productivity but communities in LHD will face increasing food insecurity as ecosystem productivity drops as soil health deteriorates due to changes in the carbon cycle. • Changes to the carbon cycle will also impact upon ocean acidification, as a result of its role as a carbon sink. Ocean acidification is increasing due to fossil fuel combustion and risks crossing the critical threshold for the health of coral reefs and other marine ecosystems that provide vital ecosystem services. • Ocean acidification will have major impact on the health of coral reefs with die backs of up to 80% predicted. This will then cause threats to those communities reliant on the coral reefs for a range of goods and services. • Tourism could be badly affected and areas such as the Great Barrier Reef Marine Park which attracts 1.9 million annually could be threatened by a loss of tourism so a reduction to the Australian economy. • Coral reefs also protect shorelines from the destructive action of storm surges and cyclones which are particularly important for Pacific island nations. This protective function of reefs prevents loss of life, property damage, and erosion, and has been valued at US$9 billion per year • Other shoreline communities particularly those located in polar seas as well as those based on areas of marine upwelling will also face increasing threats as these regions are expected to acidify faster than temperate or tropical regions. Ocean acidification will threaten the fishing industries based on molluscs such as clams, oysters, mussels and scallops. It has been estimated that by 2100, the global annual costs of mollusc loss from ocean acidification could be over US$100 billion for a business-as-usual (RCP8.5) CO_2 emissions pathway. • Commercial fishing in VHHD will also be hit as ocean acidification will affect habitats and food supplies with catches being predicted to fall. • The health of wetland ecosystems are also likely to deteriorate and could suffer irreversible damage. This will threaten LHD communities reliant on such ecosystems increasing both food insecurity. • Similarly the health of forests is also predicted to deteriorate as changes to the carbon cycle increase water stress. Forest loss has implications for human wellbeing as communities particularly in LHD who are reliant on forests for fuel, medicines ect will lose vital ecosystem services. • Yet there will also be changes to the water cycle as degradation of the carbon cycle will affect precipitation, river regimes, water stores and so water security. This will cause threats to all societies and communities and so will affect both LHD and VHHD countries. • This will mean that communities in both LHD and VHHD will need to adapt to the implications caused by changes to the water cycle. • Yet VHHD will be able to cope better with the threats to water security by developing storage, increasing water transfers and developing water conservation. • Many LHD, however, will not be able to cope with such changes and although they will adopt some adaptation strategies it is likely that in some areas the threats to water security caused by changes in the water cycle will cause significant. • Similarly changes to the cryosphere will have a deleterious effect on those communities reliant on such water sources. In the case of some

	communities such as those in the Andes it will be difficult to adapt to a change in their water security and as a result the threats of the changes to the cycle will be particularly significant. • Changes to the water cycle will also include the increase in flood events with both LHD and VHHD communities being effected. Changes to the water cycle is also likely to increase drought events affecting both LHD and VHHD communities. • Yet VHDD are more likely to be able to cope with such increased frequency of such hazards and so the threats are more tangible for communities in LHD than in VHHD. • Overall both changes to the carbon cycle and the water cycle will threaten communities both in LHD and in VHHD. Yet communities in VHHD will be able to cope with these threats particularly the short term local threats caused by changes to the water cycle through implementing adaptation strategies. However for both LHD and VHDD the long term global threats caused by the changes to the carbon cycle that are likely to be of the greatest concern. Furthermore changes to the carbon cycle will also change the water cycle and so overall the threats to the changes in the carbon cycle are greater than changes to the water cycle. **Accept other evaluations of why changes to the carbon cycle pose more threats to people than changes to the water cycle.** **NB Accept other impacts such as rising sea levels, increases in tropical storm events or heat waves derived from other areas of the specification.**

Indicative content		
Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–5	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical information/ideas, making limited and rarely logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited relevance and/or support. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2)
Level 2	6-10	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)
Level 3	11-15	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2)
Level 4	16-20	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom