



Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCE
In Geography (8GE0)
Paper 1: Dynamic Landscapes

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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.

Paper 1 Mark scheme

| Question number | Identify the type of plate margin shown at Y. Answer | Mark |
|------------------------|--|-------------|
| 1(a) (i) | <p style="text-align: center;">AO1 (1 mark)</p> <p>Award 1 mark for the correctly identified plate margin:</p> <ul style="list-style-type: none">• Destructive / Convergent ❶. | (1) |

| Question number | Describe the plate movement shown in Figure 1a and 1b. Answer | Mark |
|------------------------|---|-------------|
| 1(a)(ii) | <p style="text-align: center;">AO3 (2 marks)</p> <p>Award 1 mark for each correctly described movement of plates:</p> <ul style="list-style-type: none">• The Somalian plate has moved East / North-East ❶ by approximately 55° ❶.• The Indo-Eurasian plate seems to have rotated / is moving West ❶.• The Somalian plate has collided with the Indo-Eurasian plate / India ❶.• There is likely to be subduction / uplift ❶.• The Somalian and African plates are moving away from each other ❶.• The Indonesia and Somalian plate are sliding past each other (in figure 1b) ❶. <p>Accept any other correct description based on figures 1a and 1b.</p> | (2) |

| Question number | Suggest one way plate tectonic theory helps explain the changing position of these plates. Answer | Mark |
|-----------------|--|------------|
| 1(a)(iii) | <p style="text-align: center;">AO1 (2 marks)/AO2 (1 mark)</p> <p>Award 1 mark for analysing the resource to suggest a reason for the involvement of plate tectonics, and a further 2 marks for justifying the possible reason, for example:</p> <ul style="list-style-type: none"> • Continental drift is happening / the movement of the Somalian plate / plates moving together on the map suggests that plates float on mantle ❶ and are moved by convection currents ❶ because of the heat of the earth's core / causing them to collide with other plates / creating new oceans / explanation of causes of convection currents ❶. • Collision / Subduction might be apparent where (the Somalian) plate meets / converges with the Indo Eurasian plate / diverges away from the African plate ❶ because of mantle convection currents / slab pull ❶ because of gravity / heat of the core / which allows the destruction of ocean crust at the plate margin / sedimentary rock is folded upwards ❶. • Fossil evidence would be apparent / sea floor spreading is happening / the 'jigsaw fit' of continents / Paleomagnetism evidence would be apparent at the Western edge of the Somalian plate ❶ because mantle convection currents / ridge push cause plates to move position / the plates are causing continents to be separated / allowing the formation of new igneous rock at the margin ❶ because of convection currents / slab-pull and ridge push ❶. <p>Accept any other appropriate response based on figure 1.</p> | (3) |

| Question number | For a named location, explain two reasons it can be considered a multiple hazard zone. Answer | Mark |
|-----------------|--|--------------|
| 1(b) | <p style="text-align: center;">AO1 (4 marks)</p> <p>For each reason an area is a multiple hazard zone, award 1 mark for explaining the significance of one hazard and a further 1 mark for developing that explanation to explain why that impact contributes towards a disaster, for example:</p> <ul style="list-style-type: none"> • Earthquakes and volcanoes are found in the Philippines / Cyclones / tropical storms are found in the Philippines ❶ because it is on multiple / destructive plate boundaries / in the tropics / one type of hazard creates the conditions for another to be triggered / triggers tsunamis / heavy rain can trigger landslides ❶. • Some multiple hazard zones are in coastal areas / low lying areas ❶ increasing the chances of secondary hazards e.g. tsunami ❶. • Heavy rain from typhoons / thunderstorms ❶ mixes with volcanic ash, then large lahars might kill many people ❶. • Heavy rainfall events trigger mudslides and landslides ❶. which makes rescue from tectonic hazards difficult / is particularly an issue if vegetation has been removed by lava from volcanoes / slope strength has been reduced by earthquake activity ❶. • Megacities are often found in multiple hazard zones ❶ increasing vulnerability / changing the environment to make secondary hazards more likely ❶. • Multiple hazards over time increase vulnerability in densely populated areas / megacities like Manilla ❶ reducing capacity to cope ❶. • Multiple hazards can destroy crop yields and transport infrastructure ❶ and prevent crops being planted in saturated ground, as well as stored crops damaged by floods ❶. • Extreme weather events in California can trigger drought and forest fires that destroy vegetation (e.g. from El-Nino) and excess rainfall and flooding (e.g. from La Nina) ❶ and these might leave a population more vulnerable to tectonic disasters ❶. <p>Accept any other appropriate response. For an unnamed place, the response is unlikely to score maximum marks.</p> | (4) (2+2) |

| Question number | <p>Explain how the Pressure and Release model helps to explain human vulnerability to hazards.</p> <p>Answer</p> |
|-----------------|--|
| 1(c) | <p style="text-align: center;">AO1 (6 marks)</p> <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • The Pressure and Release model is an overarching model that explores the complex inter-relationships between the hazard and its wider context. In particular it helps to explain why some communities are more vulnerable to hazards than others. • Root causes are overarching political / power / economy which are the result of how power is distributed in society / determines how much the government is able to support / recognises the needs of different / marginalised groups of people in society. • Dynamic pressures create unsafe conditions in particular areas / particular times because there are more people / less training / less press freedom / rapid city growth / deforestation etc. • Unsafe conditions are specific ways that people are vulnerable because of where buildings are built / unsafe hill slopes / informal settlements / lack of health and safety / poor education / poor infrastructure. • Repeated hazards that might be climate related / tectonically (such as flooding, storm surges, sea-level rise, drought, heat) might cause societies to be hazard-fatigued and not able to respond appropriately. <p>If no examples named, the answer is unlikely to go out of level 2 for AO1. Likely examples might include those in developing countries, e.g. Bam in 2012 or Kashmir in 2005. However a really detailed exploration of 2+ named aspects of PAR would also show accurate and relevant GKU instead.</p> <p>Level 3 answers might not cover all aspects of the PR model, but there must always be an explanation of why the factors change the level of vulnerability. However, do expect strong Level 3 answers to name at least one of the terms associated with the model.</p> |

| Level | Mark | Descriptor |
|---------|------|---|
| | 0 | No rewardable material. |
| Level 1 | 1–2 | <ul style="list-style-type: none"> • 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 | 3–4 | <ul style="list-style-type: none"> • 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 | 5–6 | <ul style="list-style-type: none"> • 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 | <p>Assess the view that earthquakes always have greater impacts than volcanic eruptions.</p> <p>Answer.</p> |
|-----------------|--|
| 1(d) | <p style="text-align: center;">AO1 (3 marks)/AO2 (9 marks)</p> <p>Marking instructions</p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Responses that demonstrate only AO1 without any AO2 should be awarded marks as follows:</p> <ul style="list-style-type: none"> • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. <p>Indicative content guidance</p> <p>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:</p> <p>AO1</p> <ul style="list-style-type: none"> • Earthquake waves (P, S and L-waves) cause crustal fracturing, ground shaking and secondary hazards (liquefaction and landslides) • Volcanoes cause lava flows, pyroclastic flows, ash falls, gas eruptions and secondary hazards (lahars, jokhullaups) • The magnitude and intensity of tectonic hazards is measured using different scales (Mercalli, Moment Magnitude Scale (MMS) and Volcanic Explosivity Index (VEI)). • Comparing the characteristics of earthquakes, volcanoes and tsunamis (magnitude, speed of onset and areal extent, duration, frequency, spatial predictability) through hazard profiles. • Profiles of earthquake, volcano and tsunami events, showing the severity of social and economic impact in develop, emerging and developing countries. <p>AO2</p> <p>Earthquakes have a greater impact</p> <ul style="list-style-type: none"> • The speed of onset for earthquakes is usually much quicker than volcanoes – which makes it hard for people to predict timing / evacuate. On the other hand, countries with good education / training / monitoring systems have developed forecasting techniques / practice earthquake drills to reduce the loss of life. • The difficulties of earthquake prediction mean forecasting plays a bigger role, and in wealthier the high proximity of buildings on fault lines justifies significant investment in USGS research and consequent seismic retro-fitting to buildings. On the other hand, not all countries can afford these modifications, and the location of fault lines can sometimes go undetected (e.g. Christchurch). • Very high magnitude earthquakes can overwhelm the most effective of building designs resulting in significant economic cost (e.g. Japan, 2011) – on the other hand, indigenous local design can withstand earthquake shaking in the most remote locations (E.g. Dhajji Dewari design in Pakistan) • The secondary impacts of earthquakes tend to include landslide or tsunamis. Both are likely to affect buildings and infrastructure to the same degree as volcanoes. Like volcanoes, people can evacuate the area. However, the time to evacuate can be much lower. • On the other hand volcanic hazards are generally more localised in direct/primary impact on people and their property. |

- On some faultlines, the relatively high frequency of earthquake activity means it is not cost effective to have insurance against earthquakes – particularly when property prices are high (e.g. California). On the other hand, low income communities situated next to volcanoes, no matter how infrequently, may not be able to afford insurance.

Volcanoes have a greater impact

- While some volcanoes are generally more localised in their primary impacts, other eruptions can have a very high areal extent, with ash and other gases escaping into the atmosphere causing temperatures to fall and crops to fail in countries around the world. On the other hand, earthquakes, whilst local, can damage key piece of infrastructure in the global economy.
- Volcanic eruptions can interact with other physical systems to create extensive secondary impacts that can be very costly to the global economy (E.g. Eyjafjallajokull). On the other hand, it depends on the type of volcano (e.g. shield vs. composite) and therefore VEI magnitude.
- The reaction to the lack of warning seems to have caused some damage to the reputation of the USGS. However, access to social media aids communication from the organisation to local people – an apology / transparency. In other countries, the actions of affected communities can belie a lack of track in governance, leading to a break down of law-order, e.g. Haiti 2003.

Other factors affect the impact

- The level of development affects the level of response provided by different community groups – both emergency, short- and long-term aid can be provided far more effectively in developed, rather than developing countries.
- The level of rurality affects the level of support and aid that can be provided. On the other hand, the prevalence of social media means multi-lateral aid and charity donations are likely to be raised in the worst situation – with countries deploying technology to overcome physical barriers.

Judgements will be based around whether earthquakes have a greater impact on people and places than volcanoes. Most will probably note that areal extent and magnitude of the tectonic hazard makes the biggest difference, and neither hazard can claim to have a greater impact. However when issues regarding strategies to modify vulnerability and modify loss have been considered, it is likely that the higher frequency and speed of onset associated with earthquakes means many are likely to conclude that the statement is generally true. Higher marks are likely to be awarded to candidates who structure their reasoning around elements of the Hazard Profile.

| Level | Mark | Descriptor |
|----------------|-------------|---|
| | 0 | No rewardable material. |
| Level 1 | 1–4 | <ul style="list-style-type: none"> • 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 judgments about the significance of few factors, leading to an argument is unbalanced or lacks coherence. (AO2) |
| Level 2 | 5–8 | <ul style="list-style-type: none"> • 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 judgments about the significance of some factors, to produce an argument that may be unbalanced or partially coherent. (AO2) |
| Level 3 | 9–12 | <ul style="list-style-type: none"> • 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 judgments about the significance of factors throughout the response, leading to a balanced and coherent argument. (AO2) |

| Question number | State one piece of evidence used to reconstruct former ice extent. Answer | Mark |
|-----------------|--|------------|
| 2 (a) | <p style="text-align: center;">AO1 (1 mark)</p> <p>Award 1 mark for a correctly identified piece of evidence:</p> <ul style="list-style-type: none"> • Recessional moraine ❶ • Terminal moraines ❶ • Ground moraine ❶ • Lateral moraines ❶ • The position of fluvioglacial landforms (kames / eskers / kame terraces) ❶ • The position of pro glacial features – sandurs / kettleholes ❶ • The alignment of drumlins / other sub-glacial features ❶ • Till fabric analysis ❶ • Micro-features such as rock striations ❶ • The distinction between ablation and lodgement till ❶. <p>Allow any other reasonable response.</p> | (1) |

| Question number | Calculate the interquartile range of glacial retreat from 2000-2007. Answer | Mark |
|-----------------|---|------------|
| 2 (b) (i) | <p style="text-align: center;">AO3 (2 marks)</p> <p>Allow up to 2 marks for correctly calculating the interquartile range of the data.</p> <p>Method</p> <ul style="list-style-type: none"> • Find middle value (median) $Q2 = 20$ • So $Q1 = 15$ • $Q3 = 44$ • * $44 - 15$ • Or formula $Q1 = (n+1/4)$ <p>Result</p> <ul style="list-style-type: none"> • Accept either *$44 - 15$ ❶ or 29 ❶. <p>Allow 1 mark for error on calculating lower and upper quartiles carried forward into the final calculation.</p> <p>Allow 2 marks even if no method is included, but the right answer has been given.</p> | (2) |

| Question number | Suggest one reason people might be concerned about the data shown in Figure 2. Answer | Mark |
|-----------------|---|------------|
| 2(b)(ii) | <p style="text-align: center;">AO1 (2 marks)/AO2 (1 mark)</p> <p>Award 1 mark for suggesting a reason to be concerned about the data presented in figure 2 with a further 2 extension marks to explain why this concern is worth considering:</p> <ul style="list-style-type: none"> • The data shows the recent rate of glacier retreat is higher ❶ which is a by-product of changing balance of ablation / accumulation / the glacier is not maintaining equilibrium ❶ possibly as a result of climate change / climate changes could induce positive feedback cycles causing even more melting ❶. • There seems to be an increased rate of glacial melting ❶ which could have consequences for rates of downstream meltwater / sea-level rise ❶ leading to flooding / long term deterioration of the supply of freshwater / loss of land ❶. <p>Accept any other appropriate response.</p> | (3) |

| Question number | There is a spectrum of approaches used to manage glaciated landscapes. Explain two different approaches that are used. Answer | Mark |
|-----------------|---|------------|
| 2 (c) | <p style="text-align: center;">AO1 (4 marks)</p> <p>For each approach, award 1 mark for explaining the purpose for managing that glaciated landscapes and a further mark expansion explaining why this approach might be used, or is effective, up to a maximum 2 marks each. For example:</p> <ul style="list-style-type: none"> • Protection recognises the value of the landscape for vulnerable stakeholders ❶ and expects compromise by other stakeholders, so the landscape is protected ❶. • Sustainable management reduces exploitation of the environment / less walkers / fewer dams ❶ but allows specialist stakeholders to continue using the environment to survive, e.g., winter ski industry / GPS systems in the Nunavut region ❶. • Multiple economic use / building more dams and infrastructure allows different stakeholders to make money from the landscape ❶ because the population in the region is high / there is a long tradition of managing / conserving the landscape, e.g., Swiss Alpine Valleys ❶. • Legislative frameworks help some stakeholders see that action is required to preserve the landscape ❶ perhaps because others see it as sacred / easily disrupted / essential for the future ❶. <p>Accept reference to the Global Treaty / Antarctic Treaty. Accept any other reasonable response.</p> | (4) |

| Question number | Explain how proglacial landforms are formed by glacial meltwater. Answer |
|-----------------|---|
| 2(d) | <p style="text-align: center;">AO1 (6 marks)</p> <p>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.</p> <p>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:</p> <p>Proglacial landforms are the result of water that flows in front of the glacier or ice sheet – i.e. they are the byproduct of changes made to landscapes by fluvio-glacial processes. They are distinctive because there continues to be a permanent snow or ice field where melting occurs throughout the summer months whenever it is warm enough: so peak runoff will be delayed until late July or early August. For example:</p> <ul style="list-style-type: none"> • Sandurs / sandars – a large outwash plain with many channels of water and glacial debris. A catastrophic flood event might cause it, and certainly is likely to show marked variation in water discharge • Proglacial lakes – when the meltwater is blocked by (terminal) moraine • Meltwater channels are created by water flowing from the glacier or ice sheet – either into ice, the valley floor or any other moraine deposited either by the glacier or meltwater. • Kettleholes form when blocks of dead ice, left behind as a glacier retreats, cause the deposition of sediment being carried by meltwater. The sediment buries the ice, which subsequently melts, leaving a depression in the landscape. Lakes can fill these depressions. <p>Allow other reasonable explanations.</p> |

| Level | Mark | Descriptor |
|----------------|------------|---|
| | 0 | No rewardable material. |
| Level 1 | 1–2 | <ul style="list-style-type: none"> • 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 | 3–4 | <ul style="list-style-type: none"> • 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 | 5–6 | <ul style="list-style-type: none"> • 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 | Assess whether latitude is the main factor influencing the present-day distribution of ice cover. Answer |
|-----------------|--|
| 2(e) | <p style="text-align: center;">AO1 (3 marks)/AO2 (9 marks)</p> <p>Marking instructions</p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Responses that demonstrate only AO1 without any AO2 should be awarded marks as follows:</p> <ul style="list-style-type: none"> • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. <p>Indicative content guidance</p> <p>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:</p> <p>AO1</p> <ul style="list-style-type: none"> • The definition of and importance of the cryosphere – classification of ice masses by scale and location – ice sheets, ice caps, cirque and valley glaciers, and ice fields) and polar and temperate environments. • Location refers to both high-latitude ice sheets and the spatial extent of ice sheets in both northern and southern hemispheres including by altitude where smaller-scale ice masses are more likely to be located. • The present-day distribution of high latitude ice sheets and evidence for Pleistocene ice sheet extent. • Long-term climate change is caused by Milankovitch cycles leading to altered seasons, which could be exacerbated by solar output variations (sunspots) and volcanic eruptions on a shorter timescale, leading to cooling contributing to ice advance. <p>AO2</p> <p>Variation in latitude plays a big role</p> <ul style="list-style-type: none"> • Global and local temperatures affect rates of accumulation and ablation – and locations at higher latitudes are colder because of lower solar radiation for much of the year. However, in the Northern Hemisphere is a greater variation in the pattern of land mass, so the impact of latitude is more complicated in contrast to Antarctica and the Southern Ocean which is more uniform. • Low annual temperatures at higher latitudes reduce the amount of time for ablation, leading to continuous positive mass balance as glaciers grow and join up to form ice sheets (e.g. Antarctica and Greenland). On the other hand, during the Pleistocene, there were also two other ice sheets over Scandinavia / Britain, and another over North America (Laurentide) – suggesting latitudinal barriers change with global climate. • Ice sheets have high albedo, so what limited solar energy does arrive is reflected – so the land and air never become warm enough for ablation to occur. On the other hand, this means melting ice can start a positive feedback cycle that accelerates the melting of ice sheets in a faster way at higher latitudes. • Ice sheets and ice caps are large enough to bury existing relief – these are non-valley glacial landforms that form in high latitudes. On the other hand, they flow downhill under the influence of gravity, where calving can occur as icebergs float away on the surface of the ocean. • Thinning ice is only speeding up the flow of glaciers at this stage e.g. in Antarctica. On the other hand, this is partly the by-product of tectonic activity. |

There are other reasons:

- Valley glaciation features (for example valley and cirque glaciers) are found at high altitudes, flowing downhill under gravity. On the other hand, the amount of accumulation and ablation can still depend on micro-climatology, e.g. the orientation towards the sun.
- The reason for high altitude locations is the by-product of tectonic activity – e.g. Alps / Southern Alps / Patagonia). On the other hand, these landforms influence ocean currents and precipitation patterns, which themselves are the by-product of global atmospheric circulation (i.e. latitude) and precipitation and ablation depend on weather conditions.
- Long-term climate change also means some areas have been subject to sequences of ice ages so will have seen landscapes changed or removed by new glacial flows. Relict environments show the extent of past glaciations e.g. the UK.
- Variations linked to Milankovitch cycles work on different timescales (Orbit: 100k years, Tilt: 41K years, and Wobble (25K years) to alter temperatures and cause changes to glacial budgets with accumulation and spread of glacial conditions, or more ablation. On the other hand, shorter-term variations cause similar changes – these are the result of solar output changes (sunspots) and volcanic eruptions. These may exacerbate the impacts of Milankovitch cycles.
- Change happens on different spatial scales – e.g. glacial surges after the Tambora eruption are unlikely to make much change to existing landscapes. However long-term changes associated with Loch Lomond stadial might substantially alter the distribution of landscapes because of sea-level rise/fall / expansion of ice sheets across Northern Europe.

Some might compare recent changes in climate leading to a retreat of glacial landscapes to high latitudes and polar regions.

Judgements should be based around whether latitude is the most important factor that shapes where different kind of ice masses are located. Some candidates might note that in these landscapes there are many other factors that influence the ablation / accumulatio processes, and indeed the removal of glaciers leads to positive/negative feedback cycles that is changing the location of different features. Most are likely to judge that climate change linked to Milankovitch cycles is the main factor that explains distribution of glacial landscapes, the size and scale of ice mass features is likely to still be the result of latitude (ice sheets are only covering high latitude locations at present).

| Level | Mark | Descriptor |
|----------------|-------------|---|
| | 0 | No rewardable material. |
| Level 1 | 1–4 | <ul style="list-style-type: none"> • 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 judgments about the significance of few factors, leading to an argument is unbalanced or lacks coherence. (AO2) |
| Level 2 | 5–8 | <ul style="list-style-type: none"> • 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 judgments about the significance of some factors, to produce an argument that may be unbalanced or partially coherent. (AO2) |
| Level 3 | 9–12 | <ul style="list-style-type: none"> • 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 judgments about the significance of factors throughout the response, leading to a balanced and coherent argument. (AO2) |

| Question number | Identify one reason to use an OS map like this. Answer | Mark |
|-----------------|--|------------|
| 3(a)(i) | <p style="text-align: center;">AO3 (1 mark)</p> <p style="text-align: center;">Award 1 mark for the correctly identified reason that is linked to the scenario presented.</p> <ul style="list-style-type: none"> • To identify a walking route / how far to walk / how steep the walk will be / how to walk there safely ❶. • The contour lines help identify the location of cirques / moraines / their orientation ❶. <p>Accept any other reasonable response. Do not accept generic ideas, e.g. 'it is easy to read' / 'there are contour lines'.</p> | (1) |

| Question number | Identify the orientation of the cirque marked X. Answer | Mark |
|-----------------|--|------------|
| 3(a)(ii) | <p style="text-align: center;">A03 (1 mark)</p> <p style="text-align: center;">Award 1 mark for the correctly identified direction.</p> <ul style="list-style-type: none"> • B: North-West ❶. • A, C and D are not correct because the arrow does not point in that direction. | (1) |

| Question number | Calculate the difference in altitude between the waterfall from Sannox to Cir Mohr. Answer | Mark |
|-----------------|---|------------|
| 3(a)(iii) | <p style="text-align: center;">A03 (1 mark)</p> <p style="text-align: center;">Award 1 mark for the correctly calculated difference between the two heights.</p> <ul style="list-style-type: none"> • $799 - 50 = 749\text{m}$ ❶. | (1) |

| Question number | Suggest one reason why the students should plan to use the recommended footpath up to Cir Mohr. Answer | Mark |
|-----------------|--|------------|
| 3(a)(iv) | <p style="text-align: center;">A03 (2 marks)</p> <p>Award 1 mark for analysing the resource to suggest a reason displaying walking routes, and a further 1 mark for justifying the possible reason, for example:</p> <ul style="list-style-type: none"> • Walkers are directed to the safest route ❶ so emergency rescue services are not required ❶. • It is a circular route ❶ which means an efficient use of time ❶. • The high altitude of the summits is likely to be a hazardous environment / a less steep route is likely to be better / other people have walked this route ❶ so the routes make the journey safer / free from landscapes / scree slopes ❶. • Walkers are directed to a particular route to prevent widespread footpath erosion ❶ so restoration efforts can be focussed on accessible sections / habitat loss doesn't occur ❶. • The route will take them past cirques ❶ in a way that allows them good visibility / able to take measurements / to answer their hypothesis ❶. <p>Accept any other reasonable response.</p> | (2) |

| Question number | Explain two ways students could use ICT. Answer | Mark |
|-----------------|---|------------|
| 3(a)(v) | <p style="text-align: center;">AO3 (4 marks)</p> <p>Award 1 mark for explaining a way ICT can be used for this fieldwork scenario and a further expansion of up to a maximum of 2 marks each.</p> <ul style="list-style-type: none"> • Students could take photos of corries / other landforms on a digital device / use Survey123 to enter data about orientation ❶ so that they had a record of their findings to review later / the data collection tools were not so exposed to the weather / are less likely to get lost or damaged ❶ . • Students could use a spreadsheet to collate their measurements / angles of the landform orientation ❶ so they can do statistical analysis on the data / quickly analyse the data later / easily edit the data if there are errors ❶ . • Students could create radar charts / graphs / diagrams / annotate photos to process the information / presented their data in ArcGIS / visualised the data in GoogleEarth ❶ so they can decide what the dominant direction of landform is ❶ . • Students might have used secondary data to compare results / make more sense of their collected data / printed a resource to plot their data on ❶ in reaching a conclusion / validate / evaluate reliability of their own data ❶ . <p>Accept any other appropriate response, but note the focus of the question is on managing, collating and processing information, rather than collection per se.</p> <p>NB – The command word 'Explain' in this context requires reference to the fieldwork scenario.</p> | (4) |

| Question number | Assess the value of the data collection methods used in your primary fieldwork. Answer |
|-----------------|--|
| 3(b) | <p style="text-align: center;">AO3 (9 marks)</p> <p>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.</p> <p>Indicative content guidance <i>Please remember that the descriptor provides guidance as to the appropriate level. Bullet points covering the indicative content do not translate directly into marks.</i></p> <p>Content depends on students' choice of research question, but might include</p> <ul style="list-style-type: none"> • Fieldwork techniques • Sampling Strategies <p>Links between fieldwork techniques and the resulting geographical enquiry question should be clear</p> <ul style="list-style-type: none"> • Design of sampling: number of sites, spacing, sample sizes, sampling method may, or may not have been appropriate given the context, the fieldwork hypothesis, and the specific methods of data collection • Data collection techniques: these will depend on specific methods chosen but evaluation might include the equipment used, operator error; success of recording sheets / tallies for collecting data that helped, or not, to answer the geographical enquiry question. |

| | |
|--|--|
| | <ul style="list-style-type: none"> • Appropriate data analysis and whether the data collected could be easily collated and analysed or was generated in a form that made this stage problematic. • Accuracy refers to the absence of errors in the final data. This could arise from instrumental error in the form of calibration, user error in terms of making the same quantifiable mistake each time (i.e. repeatable but imprecise), the degree of precisions of measurements (number of decimal points), and whether the correct variable was actually being measured (e.g. which part of the corrie wall was being measured). For example, an iPad clinometer app might be more accurate than using an actual clinometer. • Reliability refers to the likelihood that a repeated pieces of data collection would yield the same result. This might be because of sampling strategies (systematic / random / stratified) or the timing of the measurements (e.g. are measurements being made in summer vs. winter when the number of tourists might naturally expect to be different). • Inaccessibility of sites / lack of ability collect data due to time of day, seasons, or unanticipated hazards such as bad weather – which may, or may not, have hindered ability to collect sufficient / sufficiently high quality data to answer the hypothesis. • Ethical and socio-political implications could be considered e.g. appropriateness of questionnaire questions. This impacts on both the range and quality of data and in turn has effects upon the accuracy of the results and the validity of conclusions • Conclusions could be referred to if data collection yielded unusual / unexpected / anomalous results which affected the reliability / validity of conclusions. <p>All judgements are likely to be partial and tentative given the limited range of primary sources used.</p> <p>Do not accept fieldwork contexts for Regenerating Places and Diverse Places.</p> |
|--|--|

| Level | Mark | Descriptor |
|----------------|------------|--|
| | 0 | No rewardable material. |
| Level 1 | 1–3 | <ul style="list-style-type: none"> • Shows evidence that fieldwork investigation skills used may not have been fully appropriate or effective for the investigation of the geographical questions/issue. (AO3) • Considers the fieldwork investigation process/data/evidence, with limited relevant connections and/or judgements. (AO3) • Argument about the investigation is simplistic and/or generic. (AO3) |
| Level 2 | 4–6 | <ul style="list-style-type: none"> • Shows evidence that fieldwork investigation skills used were largely appropriate and effective for the investigation of the geographical questions/issue. (AO3) • Critically considers the fieldwork investigation process/data/evidence in order to make some relevant connections and valid judgements. (AO3) • Argument about the investigation may have unbalanced consideration of factors, but is mostly coherent. (AO3) |
| Level 3 | 7–9 | <ul style="list-style-type: none"> • Shows evidence that fieldwork investigation skills used were appropriate and effective for the investigation of the geographical questions/issue. (AO3) • Critically considers the fieldwork investigation process/data/evidence in order to make relevant connections and judgements that are supported by evidence. (AO3) • Argument about the investigation includes balanced consideration of factors and is fully developed and coherent. (AO3) |

| Question number | Evaluate the extent to which tectonic and glacial processes create more opportunities than challenges in Sangay National Park. Answer |
|-----------------|--|
| 4 | <p style="text-align: center;">AO1 (4 marks)/AO2 (12 marks)</p> <p>Marking instructions</p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Responses that demonstrate only AO1 without any AO2 should be awarded marks as follows:</p> <ul style="list-style-type: none"> • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks • Level 4 AO1 performance: 4 marks <p>Indicative content guidance</p> <p>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:</p> <p>AO1</p> <ul style="list-style-type: none"> • Volcanoes cause lava flows, pyroclastic flows, ash falls, gas eruptions and secondary hazards. • Glacial processes cause erosion (abrasion, quarrying, plucking, crushing and basal melting) combined with subaerial free thaw and mass movement. • Glacial processes lead to the formation of landforms such glacial troughs and hanging valleys. • Glaciated landscapes are important economically (farming, mining, hydroelectric power, tourism, forestry). • Legislative frameworks are used to protect and conserve landscapes by conservation and management at a variety of scales. <p>AO2</p> <p>They create more opportunities:</p> <ul style="list-style-type: none"> • The Andes Mountains are formed because of tectonic activity at a destructive plate boundary. However, the high altitude of the mountain range creates ideal conditions for high precipitation unique landscapes that are created are the by-product of subsequent glacial processes. • The mountain range is created by tectonic activity, but the combination of 3 unique landscapes is the by-product of altitude zones, some of which are created by glacial processes. • There is considerable / frequent ongoing tectonic activity causing pyroclastic flows and ash fall that results in rich soils at the base of the volcano. On the other hand, there are very few deaths and injuries – and ash fall creates rich soils at the base of the volcanoes. • The main source of economic activity is likely to come from tourists climbing the volcanoes and the HEP opportunities in the valley. The former is threatened by increased tectonic activity, whilst the latter only exists because of the altitude of the mountains (caused by tectonics), the valley itself is the by-product of glacial erosion. • There are no significant management concerns about impact of, or on, tectonic processes. |

They create more challenges

- The most significant hazards in Sangay National Park seemed to be caused by debris flows, resulting from crater lake walls collapsing due to glacial erosion processes on different timescales. On the other hand, the existence of the steep crater lake wall is due to tectonic activity.
- Glacial valleys have created spectacular scenery (hanging valleys), most of which are characterised by steep slopes that are vulnerable to collapse. The most serious impacts on human life have come from debris flows. On the other hand, the impacts are constrained to the mid-altitude zone.
- The management plan seems to depend on increased economic activity: but some of this is likely to come from HEP (rather than tectonic activity), which itself is a threat to national park.
- Climate Change is identified as a threat, however the impacts are probably limited to species migrating.

It depends on which altitude zone:

- In the high-altitude zone tectonic processes dominate.
- In the mid-latitude zone, glacial processes dominate but this is also the zone where most management is needed because of both glacial hazards (debris flows), but also the simultaneous threat/opportunity posed by the development of HEP to both fund the management of the Park.
- Human life and ecosystem diversity is high in the low-altitude zone because of tectonic activity (ashfall), but equally is the most at risk from climate change.

Judgements and conclusions might be based around whether tectonics or glaciation cause the most change in the Sangay National Park. Many candidates might choose to examine the balance in the context of each altitudinal zone. Ultimately, both tectonics and glaciation operate together, whilst human activity and climate creating the more manageable threat.

| Level | Mark | Descriptor |
|----------------|--------------|---|
| | 0 | No rewardable material. |
| Level 1 | 1–4 | <ul style="list-style-type: none"> • 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, 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) • Limited synthesis of geographical ideas from across the course of study. (AO2) |
| Level 2 | 5–8 | <ul style="list-style-type: none"> • 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 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) • Argument partially synthesises some geographical ideas from across the course of study, but lacks meaningful connections. (AO2) |
| Level 3 | 9–12 | <ul style="list-style-type: none"> • 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 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) • Argument synthesises some geographical ideas from across the course of study, making some meaningful connections. (AO2) |
| Level 4 | 13–16 | <ul style="list-style-type: none"> • 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 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) • Argument comprehensively and meaningfully synthesises geographical ideas from across the course of study throughout the response. (AO2) |

| Question number | State one piece of evidence showing that sea levels have changed. Answer | Mark |
|-----------------|---|------------|
| 5(a) | <p style="text-align: center;">AO1 (1 mark)</p> <p>Award 1 mark for correctly identifying a piece of evidence.</p> <ul style="list-style-type: none"> • Emergent coastline / raised beach / fossil cliffs ①• • Submergent coastline / Ria / Fjords ①• • Inundation / flooding of low-lying coastlines / islands ①• • High tides reach higher than they used to / more storm surges ①• <p>Do not accept references to the melting of glaciers and sea-ice.</p> | (1) |

| Question number | Calculate the interquartile range of the rate of coastal retreat from 1873-2005. Answer | Mark |
|-----------------|---|------------|
| 5 (b) (i) | <p style="text-align: center;">AO3 (2 marks)</p> <p>Allow up to 2 marks for correctly calculating the interquartile range of the data.</p> <p>Method</p> <ul style="list-style-type: none"> • Find middle value (median) $Q_2 = 11$ • So $Q_1 = 3$ • $Q_3 = 64$ • $* 64 - 3$ • Or formula $Q_1 = (n+1/4)$ <p>Result ①•</p> <ul style="list-style-type: none"> • Accept either $*64 - 3$ ① or 61 ① • *Please note that $64 - 3$ is sufficient for the method mark but also the answer is required to achieve 2 marks. <p>Allow 1 mark for error on calculating lower and upper quartiles carried forward into the final calculation.</p> <p>Allow 2 marks even if no method is included, but the right answer has been given.</p> | (2) |

| Question number | Suggest one reason why people might be concerned about the rate of retreat shown in Figure 5. Answer | Mark |
|-----------------|--|------------|
| 5(b)(ii) | <p style="text-align: center;">AO1 (2 marks)/AO2 (1 mark)</p> <p>Award 1 mark for suggesting a reason to be concerned about the data presented in Figure 5 with a further 2 extension marks to explain why this concern is worth considering:</p> <ul style="list-style-type: none"> • The data shows the recent rate of coastal retreat is higher ❶ which is a by-product of storm occurrence / weather systems ❶ possibly as a result of climate change / seasonal climate ❶. • There seems to be an increased rate of coastal erosion ❶ which could create danger for human activity at the top of the cliff ❶ leading to expensive repairs / protection measures being implemented to manage the change ❶. • Over 100 years, a large amount of land has been lost in some places / more and more houses are unsellable ❶ which means damage to lifestyle / economic activity / decline in house prices ❶ which requires compensation / long-term changes to quality of life / results in significant financial problems ❶. <p>Accept any other appropriate response.</p> | (3) |

| Question number | Explain two different policy decisions that are made. Answer | Mark |
|-----------------|---|------------|
| 5(c) | <p style="text-align: center;">AO1 (4 marks)</p> <p>For each reason, award 1 mark for explaining how a policy decision might be needed to manage the coast and a further mark expansion for explaining why this policy decision might be made, up to a maximum of 2 marks each. For example:</p> <ul style="list-style-type: none"> • Active intervention / Hold the line / hard engineering / soft engineering disrupts the threat from coastal processes / recession ❶ because of the recognises the high economic value of the land being protected / protects settlements ❶. • Managed retreat / moving people and assets away / purposefully flooding an area of land / land use zoning / strategic realignment / recognises a need to protect geodiversity / biodiversity ❶ because it is not worth protecting the land / allowing the land to flood / become a salt marsh / return to it's natural state would be a more effective way to protect valuable land behind it ❶. • Building land in the sea / beach replenishment to advance the line / advance the line recognises opportunities to exploit the coastline e.g. beach resorts ❶ because tourist / economic activity is key / the physical processes are gentle / it makes a political statement about wealth and technology ❶. • No Active Intervention recognises coastal defences are not cost-effective ❶ perhaps because of the low-value economic activity / the high rate of threat from recession or coastal flooding ❶. <p>Accept any other reasonable responses.</p> | (4) |

| Question number | Explain how local factors increase flood risk on some low-lying coasts. Answer |
|-----------------|---|
| 5(d) | <p style="text-align: center;">AO1 (6 marks)</p> <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • Height means some islands are only just 2-3 metres above sea level / low-lying coastal nations have flat land. Water is more likely to encroach / cover a large spatial area quickly / harder for people to escape / if winter storm waves are 5-7m high then land will be inundated. • Mid-latitude locations / low-pressure weather systems / typhoons in tropical locations and latitudes. These cause sea water to bulge / produce stronger storm waves / break coral reefs / and inundate low-lying land. • Natural subsidence occurs because of the compaction of sediment under its weight, and this increases the chances of inundation. • Porous geology / coral means water rises through the ground reducing the space for people to live in that environment. • If subsidence is higher (perhaps from river accretion, or buildings then saltwater intrusion is more likely ruining freshwater aquifers and crops that depend on them. • Removal of mangroves / vegetation removal means protective natural barriers have gone. This means that destructive wave energy might not be dissipated. • Locations found along plate boundaries might be susceptible to tsunamis or coastal subsidence because of subduction / water extraction / buildings / isostatic change / melting ice in other parts of the continent. • Shape of landscapes / funnelled topography will concentrate the effect of locally-increase sea-level. • Local decisions about coastal management might make more populations more vulnerable, perhaps because of a lack of political commitment, or economic resources. <p>Accept any other reasonable response.</p> |

| Level | Mark | Descriptor |
|----------------|------------|---|
| | 0 | No rewardable material. |
| Level 1 | 1–2 | <ul style="list-style-type: none"> • 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 | 3–4 | <ul style="list-style-type: none"> • 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 | 5–6 | <ul style="list-style-type: none"> • 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 | Assess whether geology is the main factor influencing the rate of coastal recession. Answer |
|-----------------|--|
| 5(e) | <p style="text-align: center;">AO1 (3 marks)/AO2 (9 marks)</p> <p>Marking instructions</p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Responses that demonstrate only AO1 without any AO2 should be awarded marks as follows:</p> <ul style="list-style-type: none"> • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. <p>Indicative content guidance</p> <p>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:</p> <p>AO1</p> <ul style="list-style-type: none"> • 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. • 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. <p>AO2</p> <p>Rates are largely controlled by geological factors</p> <ul style="list-style-type: none"> • Sedimentary rocks such as chalk, limestone, sandstones and clays are generally not resistant to coastal recession. Igneous rock is more resistant to erosion than sedimentary rocks. Metamorphic rocks are the most resistant to coastal recession. On the other hand, the formation of these igneous and sedimentary rocks introduces faults / joints / lines of weakness which can create opportunities for both marine and sub aerial processes. Metamorphic rocks they tend to not have faultlines. ○ Some coastlines are made out of unconsolidated material which are very susceptible to coastal recession, e.g. North Norfolk coast. On the other hand, relative sea level rise is helping to contribute to increased contact with water and subsequent erosion. • Rocky coastlines are mainly found along convergent plate boundaries or volcanic islands, because uplift exposes rock to be eroded. On the other hand, plate tectonics can also create landscapes where sandy coastlines form, as eroded sediment is deposited. ○ Jointing, dip, folding and faulting all create weaknesses in the rock which makes them more susceptible to coastal recession. On the other hand, dip can also expose old (and therefore harder) sedimentary rock to marine processes – which in turn results in complex cliffs, e.g., North Antrim Coast |

- Alternating strata in cliffs also influences recession rates – e.g., Knock Cliff on the Isle of Wight. On the other hand, cliff collapse can result in debris at the bottom of the cliff that absorbs wave energy, whilst the development of a wave cut platform can also absorb energy, resulting in a coastline in equilibrium.

There are other reasons

- Wave type (destructive and constructive) can influence coastal recession. On the other hand, high/low energy wave environments can be created by wave refraction around headlands and into bays, e.g., Start Bay.
- Wave size / wave fetch can cause high rates of coastal recession if waves form in large water bodies / not interceded by other wave patterns, e.g., south coast of Iceland where the erosive power of waves is particularly high. On the other hand, the reason there is a little interference is the land of land mass along the Mid Atlantic Ridge.
- On the other hand, the power of the sea, rain and wind in mid-latitude climates can be significantly higher, eroding even the hardest of rock – e.g. Cape Peninsular.
- Beaches are effective way to dissipate wave energy – often deposited in low energy environments or bays. On the other hand, bays are the result of weaker rock. Equally, SLR can cause the sea to begin removing the deposited material and accentuate the headland bay characteristics (e.g., Cork coastline) – a process exacerbated by fluvial erosion.
- Coastal management can influence the rate of coastal recession, e.g., offshore breakwaters / beach renourishment and other hard engineering defences, e.g. Torcross. On the other hand, within sediment cells coastal management always has consequences downdrift (e.g. terminal groyne syndrome).
- On a macro-scale, isostatic readjustment can explain the formation of an emergent or submergent coastline, for example, the relative sea-level rise around New Orleans and the Mississippi Delta. On the other hand, the existence of the Delta and direction of the river is the by-product of variations in geology that shaped the location of river basin itself.

Judgements might be based around whether climate change is the most significant factors affecting flooding and coastal recession. Some candidates might reflect on other factors that influence the rate of these processes and conclude that these are more important (e.g. mitigation / defence). However, most are likely to conclude that climate change causes some irreversible changes that ultimately leads to it being the most significant threat.

| Level | Mark | Descriptor |
|----------------|-------------|--|
| | 0 | No rewardable material. |
| Level 1 | 1–4 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | Identify one reason to use this map of the sediment cells. Answer | Mark |
|-----------------|---|------|
| 6(a)(i) | <p style="text-align: center;">AO1 (1 mark)</p> <p>Award 1 mark for a correctly identified reason linked to the scenario presented.</p> <ul style="list-style-type: none"> • It shows the physical processes / human factors / factors that might change / affect the fieldwork ❶. • It shows sources of sediment / inputs into the cell ❶. • It shows transfer / transport / deposition / longshore drift / net movement of sediment within / boundaries of the cell ❶. • It shows where different types of management are done / are needed ❶ • It has clear information about distances ❶. <p>Accept any other reasonable response. Do not accept:</p> <ul style="list-style-type: none"> • It shows the coastline. • Comments about the quality of drawing, e.g. easy to read / it has a key unless they develop the response to show that's useful for the investigation. | (1) |

| Question number | Identify the direction of longshore drift at location X. Answer | Mark |
|-----------------|--|------|
| 6(a)(ii) | <p style="text-align: center;">AO1 (1 mark)</p> <p>Award 1 mark for the correctly identified direction.</p> <ul style="list-style-type: none"> • B: North West ❶ • A, C and D are not correct because the arrow is not pointing in those directions. | (1) |

| Question number | Calculate the difference in the rate of sediment moved per year at locations X and Y. Answer | Mark |
|-----------------|---|------|
| 6(a)(iii) | <p style="text-align: center;">AO3 (1 mark)</p> <p>Award 1 mark for the correctly calculated difference between the two rates of sediment movement.</p> <ul style="list-style-type: none"> • $20,000 - 3,000 = 17,000 \text{ m}^3/\text{yr}$ ❶. | (1) |

| Question number | Suggest one reason why students should plan ahead before visiting locations X and Y. Answer | Mark |
|-----------------|---|------------|
| 6(a)(iv) | <p style="text-align: center;">A03 (2 marks)</p> <p>Award 1 mark for analysing the data in the resource to suggest a reason for the beach replenishment, and a further 1 mark for justifying the possible reason, for example:</p> <ul style="list-style-type: none"> • Tide times will vary throughout the day ❶ so students need to ensure that they plan to visit at low tide / visit the two locations at the most appropriate times ❶. • They will need to check where car parks are ❶ because the two locations are quite far apart ❶. • They will need to consider the size of the area being studied ❶ so they can design an appropriate sampling strategy ❶. • They will need to check whether the sediment load / direction of movement is different ❶ so they can be sure the two sites will allow them to answer the geographical question / so they can write a hypothesis before visiting ❶. • The weather conditions may / may not be good ❶ which affects the safety / access to locations / whether people are available to speak to / what clothes they should wear ❶. • They should understand the rock type / recent geomorphological change / level of traffic / ocean currents / complete a risk assessment about the landscape ❶ because soft rock / wet cliffs might be vulnerable to falls / collapses / students might need PPE / be clear about where they shouldn't go / think about whether data can be collected individually or in groups ❶. <p>Accept any other reasonable response.</p> | (2) |

| Question number | Explain two ways students might have used ICT. Answer | Mark |
|-----------------|--|---------------|
| 6(a)(v) | <p style="text-align: center;">A03 (4 marks)</p> <p>Award 1 mark for suggesting an improvement and a further expansion mark up to a maximum of 2 marks each.</p> <ul style="list-style-type: none"> • Students could take photos of beaches / cliffs / sediment movement / waves on a digital device / use Survey123 to enter data about sediment ❶ so that they had a record of their findings to review later / the data collection tools were not so exposed to the weather / are less likely to get lost or damaged ❶. • Students could use a spreadsheet to collate their measurements of the beach / timing of the waves ❶ so they can do statistical analysis on the data / quickly analyse the data later / easily edit the data if there are errors ❶. • Students could create line graphs / graphs / diagrams / annotate photos to process the information / presented their data in ArcGIS / visualised the data in GoogleEarth ❶ so they can decide how sediment is moving ❶. • Students might have used secondary data to compare results / make more sense of their collected data / printed a resource to plot their data on ❶ in reaching a conclusion / validate / evaluate reliability of their own data ❶. <p>Accept any other appropriate response, but note the focus of the question is on managing, collating and processing information, rather than collection per se.</p> | (2 +2) |

| Question number | Assess the value of the data collection methods used in your primary fieldwork. Answer |
|-----------------|---|
| 6(b) | <p style="text-align: center;">A03 (9 marks)</p> <p>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.</p> <p>Indicative content guidance <i>Please remember that the descriptor provides guidance as to the appropriate level. Bullet points covering the indicative content do not translate directly into marks.</i></p> <p>Content depends on students' choice of research question, but might include</p> <ul style="list-style-type: none"> • Fieldwork techniques • Sampling Strategies <p>Links between fieldwork techniques and the resulting geographical enquiry question should be clear</p> <ul style="list-style-type: none"> • Design of sampling: the number of sites, spacing, sample sizes, and sampling method may, or may not be appropriate given the context, the fieldwork hypothesis, and the specific methods of data collection • Data collection techniques: these will depend on specific methods chosen but evaluation might include the equipment used, operator error; and success of recording sheets / tallies for collecting data that helped, or not, to answer the geographical enquiry question. • Appropriate data analysis and whether the data collected could be collated / analysed / generated in a form that made this problematic. • Accuracy refers to the absence of errors in the final data. This could arise from instrumental error in the form of calibration, user error in terms of making the same quantifiable mistake each time (i.e. repeatable but imprecise), the degree of precisions of measurements (number of decimal points), and whether the correct variable was actually being measured (e.g. which part of the corrie wall was being measured). For example, an iPad clinometer app might be more accurate than using an actual clinometer. • Reliability refers to the likelihood that a repeated piece of data collection would yield the same result. This might be because of sampling strategies (systematic / random / stratified) or the timing of the measurements (e.g. are measurements being made in summer vs. winter when the number of tourists might naturally expect to be different). • Inaccessibility of sites / lack of ability to collect data due to time of day, seasons, or unanticipated hazards such as bad weather – which may, or may not, have hindered the ability to collect sufficient / sufficiently high-quality data to answer the hypothesis. • Ethical and socio-political implications could be considered e.g. appropriateness of questionnaire questions. This impacts both the range and quality of data and in turn, has effects on the accuracy of the results and the validity of conclusions • Conclusions could be referred to if data collection yielded unusual / unexpected / anomalous results which affected the reliability / validity of conclusions. <p>All judgements are likely to be partial and tentative given the limited range of primary sources used.</p> <p>Do not accept fieldwork contexts for Regenerating Places and Diverse Places.</p> |

| Level | Mark | Descriptor |
|----------------|------------|--|
| | 0 | No rewardable material. |
| Level 1 | 1–3 | <ul style="list-style-type: none"> Shows evidence that fieldwork investigation skills used may not have been fully appropriate or effective for the investigation of the geographical questions/issue. (AO3) Considers the fieldwork investigation process/data/evidence, with limited relevant connections and/or judgements. (AO3) Argument about the investigation is simplistic and/or generic. (AO3) |
| Level 2 | 4–6 | <ul style="list-style-type: none"> Shows evidence that fieldwork investigation skills used were largely appropriate and effective for the investigation of the geographical questions/issue. (AO3) Critically considers the fieldwork investigation process/data/evidence in order to make some relevant connections and valid judgements. (AO3) Argument about the investigation may have unbalanced consideration of factors, but is mostly coherent. (AO3) |
| Level 3 | 7–9 | <ul style="list-style-type: none"> Shows evidence that fieldwork investigation skills used were appropriate and effective for the investigation of the geographical questions/issue. (AO3) Critically considers the fieldwork investigation process/data/evidence in order to make relevant connections and judgements that are supported by evidence. (AO3) Argument about the investigation includes balanced consideration of factors and is fully developed and coherent. (AO3) |

| Question number | Evaluate the extent to which tectonic and coastal processes create more opportunities than challenges in the Galapagos Islands. Answer |
|-----------------|---|
| 7 | <p style="text-align: center;">AO1 (4 marks)/AO2 (12 marks)</p> <p>Marking instructions</p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Responses that demonstrate only AO1 without any AO2 should be awarded marks as follows:</p> <ul style="list-style-type: none"> Level 1 AO1 performance: 1 mark Level 2 AO1 performance: 2 marks Level 3 AO1 performance: 3 marks Level 4 AO1 performance: 4 marks <p>Indicative content guidance</p> <p>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:</p> <p>AO1</p> <ul style="list-style-type: none"> Volcanoes cause lava flows, pyroclastic flows, ash falls, gas eruptions and secondary hazards. Coastal processes cause erosion and depositional processes that produce distinct coastal landforms (beaches, headlands and bays) Sea level change has produced emergent coastlines (raised beaches) Coastal flooding and storm surge events can have serious economic and social consequences for coastal communities. Sustainable management is designed to cope with future threats, but its implementation can lead to local conflicts. |

AO2

They create more opportunities

- The movement of the Nazca Plate over a hotspot is responsible for the formation of the Galapagos Islands. On the other hand, the older / Eastern islands are increasingly (if not solely) shaped by coastal processes
- Tectonic activity is frequent and significant and creates some unique situations, e.g. the 5 volcanoes that have flowed together. On the other hand, marine processes are responsible for diverse coastal environments, e.g. mangroves on Isla Isabella, which can protect the land from some tectonic processes.
- Tectonic activity (lava flows) is an important reason for the unique ecosystems and endangered species in Galapagos. However, tourism is an increasingly significant and sustained threat to marine life on the island whilst geological processes are of little concern.
- The island is exposed to tsunami waves that travel across the Pacific Ocean, with the power to cause significant damage to wildlife. On the other hand, the threat from tsunamis is managed well and represents little threat to human activity which is well organised.

They create more challenges

- Coastal marine processes play a significant role in shaping the coastline on the older islands, e.g. the bays of Fernandina, and sandy beaches on San Cristobal. On the other hand, the existence of the rocky coastlines is solely the by-product of tectonic activity.
- Tourism is growing rapidly – and income from tourism is needed to pay for the management plan. On the other hand, tourism is creating problems for the ecosystems, particularly in San Cristobal. Equally, hikers are taking advantage of landscapes created by tectonic activity.
- Human activity is mainly attracted to the wildlife (Fernandina) and coastal landscapes (Isabela). However, the existence of these landscapes is the by-product of tectonic activity, particularly the newly raised shoreline on Isabela.
- There is a threat to the islands from climate change – extreme weather and sea-level rise overwhelming the infrastructure. On the other hand, some of the infrastructure for protecting against tsunamis could be useful in protecting local communities. However, the impact of climate change is likely to be greater.

It depends on which island:

- Islands to the East are dominated more by tectonic activity, although climate change is potentially creating a threat to the food chains and local wildlife.
- Islands to the West are dominated more by coastal processes and are particularly threatened by climate change and tourism.
- Tourism is vital to fund the management plan. However, tourists are mainly attracted to the Western islands, whilst the majority of human activity is focused on the Eastern islands.

Judgments and conclusions could be based on whether tectonics dominates coastal processes in the Galapagos. Some candidates will consider the question from the perspective of the three different islands. Most will probably conclude that although tectonics has created the context, coastal processes, climate change and increased tourism are now both necessary but a threat to successfully managing the Galapagos Islands.

| Level | Mark | Descriptor |
|----------------|--------------|---|
| | 0 | No rewardable material. |
| Level 1 | 1–4 | <ul style="list-style-type: none"> • 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, 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) • Limited synthesis of geographical ideas from across the course of study. (AO2) |
| Level 2 | 5–8 | <ul style="list-style-type: none"> • 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 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) • Argument partially synthesises some geographical ideas from across the course of study, but lacks meaningful connections. (AO2) |
| Level 3 | 9–12 | <ul style="list-style-type: none"> • 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 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) • Argument synthesises some geographical ideas from across the course of study, making some meaningful connections. (AO2) |
| Level 4 | 13–16 | <ul style="list-style-type: none"> • 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 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) • Argument comprehensively and meaningfully synthesises geographical ideas from across the course of study throughout the response. (AO2) |

