GCSE
GEOGRAPHY
8035/1

Paper 1 Living with the physical environment

Mark scheme

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

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

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

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

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Point marked questions marking instructions

The mark scheme will state the correct answer or a range of possible answers, although these may not be exhaustive. It may indicate how a second mark is awarded for a second point or developed idea. It may give an indication of unacceptable answers.

One mark questions will not need ticks or crosses or NC (no credit). 2 and 3 mark questions will require ticks to show where credit is being awarded. The number of ticks must equal the mark awarded. You do not need to use crosses to indicate answers that are incorrect.

Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor is linked to the Assessment Objective(s) being addressed. The descriptor for the level shows the average performance for the level.

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

All levels marked questions will have the level awarded at bottom left of response, which might be on an additional page. Creditworthy parts of an answer can (optionally) be highlighted.

Step 1 Determine a level

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

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

Step 2 Determine a mark

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

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

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

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

Assessment of spelling, punctuation, grammar and use of specialist terminology (SPaG)

Accuracy of spelling, punctuation, grammar and the use of specialist terminology will be assessed via the indicated 9 mark questions. In each of these questions, three marks are allocated for SPaG as follows:

- **High performance** – 3 marks
- **Intermediate performance** – 2 marks
- **Threshold performance** – 1 mark

Responses with SPaG marks that gain a mark of 0 for the content/skills of the question can still be awarded SPaG marks if the response is judged to be a genuine attempt to answer the question.

Assessing SPaG when students use a scribe or word processor

Students using a scribe or word processor can access some, or all, of the marks available for SPaG provided there is sufficient evidence that it is their work. The JCQ scribe cover sheet attached to their scripts must show what was dictated or which facilities were disabled on the word processor.
Students using a scribe can access marks for SPaG as follows:

Students who dictate their answers are eligible for marks awarded for grammar. This is a third of the total marks awarded for SPaG.

Students who dictate their answers and indicate punctuation are eligible for marks awarded for punctuation and grammar. This is two thirds of the total marks awarded for SPaG. The cover sheet must indicate that both punctuation and grammar were dictated.

Students who dictate their answers, indicate punctuation and spell out every word are eligible for all SPaG marks. The cover sheet must indicate that spelling, punctuation and grammar were dictated.

General guidance

- Mark schemes should be applied positively. Examiners should look for qualities to reward rather than faults to penalise. They are looking to find credit in each response they mark. Unless the mark scheme specifically states, candidates must never lose marks for incorrect answers.
- The full range of marks should be used. Examiners should always award full marks if deserved, ie if the answer matches the mark scheme.
- 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.
- Do NOT add ticks to level-marked questions – use the highlight tool/brackets to signify what is relevant.
- Sometimes there are specific "triggers" in the mark scheme that enable higher level marks to be awarded. For instance, an example or case study may be required for Level 3 if it is stated within the question.
- Where a source, such as a photograph or map, is provided as a stimulus it should be used if requested in the question, but credit can often be given for inferred as well as direct use of the source.
- Always be consistent – accept the guidelines given in the mark scheme and apply them to every script.

- If necessary make comments to support the level awarded and to help clarify a decision you have made.
- Examiners should revisit standardised script answers as they apply the mark scheme in order to confirm that the level and the mark allocated is appropriate to the response provided.
- Mark all answers written on the examination paper.

Section A

Qu	Pt	Marking guidance	Total marks
01	**1**	**Which one of these natural hazards is a tectonic event?** **B** Earthquake No credit if two or more answers are circled. AO1 – 1 mark	**1**
01	**2**	**Using Figure 1, calculate the mean maximum temperature recorded during heatwaves between 1976 and 2022. Give your answer to one decimal place.** 36.1 No credit if the answer is not given to one decimal place. AO4 – 1 mark	**1**
01	**3**	**Using Figure 1, which one of the following statements about heatwaves in the UK is correct?** **A** Five have occurred since 2010. No credit if two or more answers are circled. AO4 – 1 mark	**1**

01	**4**	**Suggest how extreme weather in the UK can have social and economic impacts.** **Use Figure 2 and your own understanding.**	**6**

Level	Marks	Description
3 (Detailed)	5–6	AO2 – Shows thorough geographical understanding of the social and economic impacts of extreme weather events. AO3 – Demonstrates coherent application of knowledge and understanding in analysing the social and economic impacts of extreme weather in the UK.
2 (Clear)	3–4	AO2 – Shows clear geographical understanding of the social and/or economic impacts of extreme weather event(s). AO3 – Demonstrates reasonable application of knowledge and understanding in analysing the social and/or economic impacts of extreme weather in the UK.
1 (Basic)	1–2	AO2 – Shows limited geographical understanding of the social and/or economic impacts of extreme weather event(s). AO3 – Demonstrates limited application of knowledge and understanding in analysing the social and/or economic impacts of extreme weather in the UK.
	0	No relevant content.

- **Level 3 (detailed) responses** will be developed. Some geographical terms will be applied. All aspects of the question are answered – social and economic impacts, use of Figure. Maximum marks can be awarded for a detailed response based on the Figure alone.
- **Level 2 (clear) responses** are likely to have linked or elaborated statements and some use of geographical terms. Uses Figure and/or own understanding. May focus on social or economic impacts.
- **Level 1 (basic) responses** may comprise simple/partially inaccurate statements with very limited subject vocabulary. Partial sequence or random points made. Answers may depend on selecting/categorising material from the source.

- **Max Level 2** for explanation of social or economic impacts only.
- **Max Level 2** for general explanation of impacts without reference to **Figure 2**.
- There should be some (implied) reference to **Figure 2** to access Level 3.
- No credit for environmental impacts in isolation but allow if linked to social/economic effects.

Indicative content

- The command word is 'suggest' so responses should set out the likely impacts of extreme weather, making use of **Figure 2**.

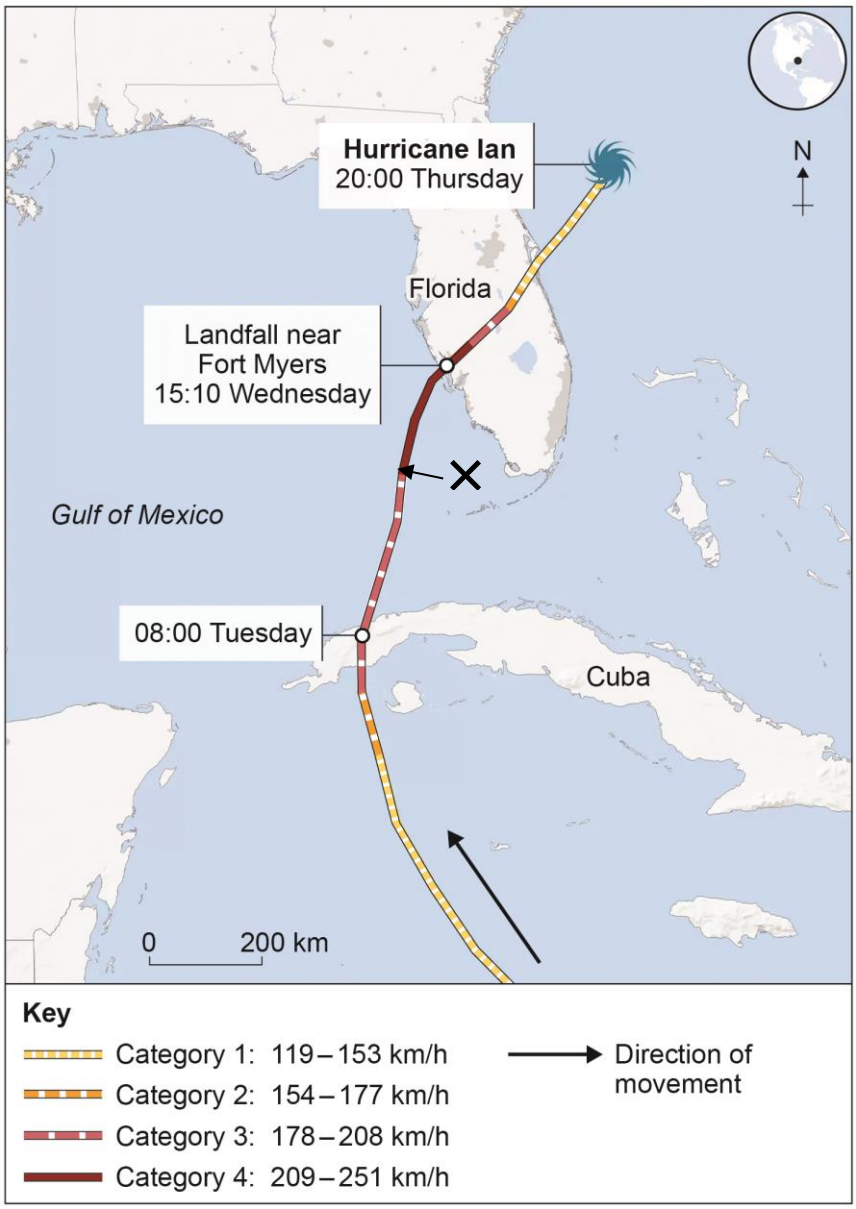
		• Extreme weather hazards may take place over one day or a period of time. In the UK these include storm events, flooding, severe thunderstorms and hailstorms, strong winds and tornadoes, droughts, extreme heat, extremes of cold weather including blizzards. • Understanding of types of impact. Social – effects on people and communities. Economic – impacts on jobs, transport infrastructure, businesses and local and national economies. • Social and economic impacts may overlap. Transport disruption can affect people's daily lives but may have severe effect on transport of supplies and cause delays to employees. • Credit understanding of social and economic impacts of specific weather events such as Cumbria floods (2009), St Jude storm (2013), Somerset Level floods (2014), Storm Dennis 2020, drought/heatwave in 2003, 2018 and 2022, snow and ice in 2010 and March 2018. However, reference to specific example is not needed for access to Level 3. • Impacts depend on the nature of the event. Extreme cold weather may cause major travel disruption which affects supplies of goods to shops and businesses (economic), possible closures of schools, increased chance of accidents and risk to life (social). • Mental Health Challenges-the stress of dealing with extreme weather events, especially repeated flooding, can lead to anxiety and depression. • There may be broader implications of extreme cold including train, ferry and airline cancellations and delays (social and economic), damage to crops and losses of livestock in rural areas (economic), stoppages to certain industries such as construction (economic), loss of electricity supplies if power lines damaged (social and economic). • Heatwaves may lead to pressures on water supplies (hosepipe bans, water shortages), risk to lives of frail and elderly people, danger of wildfires disrupting traffic and destroying farmland, increased food costs, buckling of railway lines and melting of roads. Delays on railways because of over-heated track and longer commuting times are an economic cost. More electricity is necessary to power air conditioning, fridges and pump water. Credit positive social and economic effects including boost to tourism industry, sales of ice cream and cold drinks. • Application of knowledge and understanding to **Figure 2**. Water levels in reservoirs dropped to low levels, threatening water supplies (social). Hosepipe bans meant that people couldn't water gardens, clean cars, fill pools, etc (social). Health alerts warned of the dangers of heatwaves especially to elderly people – risks of heatstroke, dehydration. Food and livelihood security may also be strained if crop yields decrease and prices rise for essential food (economic). • People flocking onto beaches means that tourism thrives in coastal resorts. There may be more social interaction, community events, outdoor activity. Exposure to sunlight boosts vitamin D levels, which can enhance mood and overall health. Increased sales of food, drink and other goods and services, including hotels, entertainments and restaurants. However, this may put pressure on transport and other services. AO2 – 3 marks AO3 – 3 marks	

01	**5**	**Using Figure 3a, describe changes in the UK's greenhouse gas emissions between 1990 and 2020.** 1×2 or 1+1 They decreased (1) by almost 50% (d)(1) / by half (d)(1)/ from 800 (MtCO2e) to 400 (MtCO2e) (d)(1)/ by 400(MtCO2e). Units are not essential They fell slowly until 2005 (1), but more rapidly between 2005 and 2020 (d)(1). Accept idea of fluctuation/unevenness. AO4 – 2 marks	**2**

01	**6**	**Using Figure 3b, compare emissions of carbon dioxide with emissions of methane in 2020.** Carbon dioxide emissions are (much) larger (than methane) (1). Carbon dioxide emissions are approximately 6 times larger (than methane) (1). Carbon dioxide emissions are 66% greater (than methane) (1) Carbon dioxide represents 79% of the total, methane is 13% (1) AO4 – 1 mark	**1**

01	**7**	**Suggest how an increase in greenhouse gases helps to cause climate change.** **Greenhouse gases:** **D** trap heat from the earth in the atmosphere. AO3 – 1 mark	**1**

01	**8**	**Explain how carbon capture may help to reduce the causes of climate change.** It reduces the amount of CO_2 released into the atmosphere (1) Some methods of carbon capture can take CO_2 directly from the air/atmosphere (1) Carbon capture involves trapping CO_2 emissions before they enter the atmosphere (1) This helps lower greenhouse gas levels, (reducing global warming) (d) (1) Carbon dioxide is stored underground (1), which reduces greenhouse gas levels, (helping to slow global warming) (d) (1). Carbon dioxide is removed from waste gases from power stations/chemical works/biomass plants (1) and then stored (in old oil and gas fields or coal mines) underground (d)(1) Allow other forms of carbon capture and storage such as biomass-afforestation, mangroves, peat, wetlands. Maximum 1 mark for link to climate change/reduced amounts of CO_2/greenhouse gases without reference to capture/storage Credit other valid answers. AO1 – 2 marks	**2**

01	**9**	**Label X on Figure 4 where Hurricane Ian became a Category 4 hurricane.** 1 mark for showing the location accurately, SSW of Florida coast in Gulf of Mexico.  X can be marked with arrow to show correct location. It needs to be approximately correct but the letter or arrow doesn't have to touch the line. AO4 – 1 mark	**1**

01	**10**	**Using Figure 4, state one social effect of Hurricane Ian on the local population.** It led to flooding of coastal communities (1) It left thousands of people without power/no power supplies (1) People (may be) displaced/made homeless (1) People (may have been) injured or killed (1) People may lose their jobs Credit other reasonable inferences from the Figure. AO4 – 1 mark	**1**

01	**11**	**Explain how the effects of tropical storms can be reduced.** **Level 2 (clear) responses** are likely to be linked statements with some elaboration. Strategies are identified with further explanation. **Level 1 (basic) responses** will be simple statements with limited understanding or development. May consist of listed or randomly made points. Max marks can be awarded for a developed response on any one strategy. <u>Indicative content</u> Answers may focus on monitoring, prediction, protection and planning strategies. Monitoring strategies may be considered as part of prediction. Scientists use data from radar, satellites and aircraft to monitor storms. Computer models are then used to calculate a predicted path for the storm. Monitoring storm movement may indicate where and when a tropical storm is going to happen, which gives people time to evacuate and protect their homes and businesses. High-income countries, such as the USA, have an effective hurricane monitoring system. All tropical storm activity over the Atlantic and Eastern Pacific are tracked by the National Hurricane Centre, located in Florida. As	**4**

Level	Marks	Description
2 (Clear)	3–4	AO1 – Shows clear knowledge of storm management strategy/ies. AO2 – Shows clear geographical understanding of how storm management strategy/ies are used to reduce the effects of tropical storms.
1 (Basic)	1–2	AO1 – Shows limited knowledge of storm management strategy/ies. AO2 – Shows limited geographical understanding of how storm management strategy/ies are used to reduce the effects of tropical storms.
	0	No relevant content

		a result of this, a hurricane watch is issued when hurricane-strength winds are detected to alert people and give them time to prepare. • Supercomputers can now often give five days' warning and a more accurate location. However, the strength and path of a tropical storm can change quickly, and the cone of uncertainty is large. • Understanding of protection strategies. Buildings can be designed to withstand tropical storms, eg by using reinforced concrete. Buildings can also be put on stilts so they're safe from floodwater. • In many countries schoolchildren are taught about the dangers of tropical storms and given lessons about what to do if a storm hits. Governments produce posters, leaflets and information for the media, and people are encouraged to prepare disaster kits. • In some coastal areas, houses have windproof roofing tiles and stormproof windows. In some lower income countries, storm shelters are common and can ensure the survival of whole villages. • Flood defences can be built along rivers (eg levees) and coasts (eg sea walls). • These all reduce the number of buildings destroyed, so fewer people will be killed, injured, made homeless and made unemployed. • Credit references to examples eg tropical cyclones are tracked by the Bangladesh Meteorological Department. Warnings are issued in several languages by radio, television and via social media. In rural areas, even the most remote communities are reached. AO1 – 2 marks AO2 – 2 marks	

01	**12**	**Suggest how the effects of, and the responses to, a tectonic hazard vary between areas of contrasting wealth.** **Use one or more named examples in your answer.**	**9**

Level	Marks	Description
3 (Detailed)	7–9	AO1 – Demonstrates detailed knowledge of the effects of and responses to a tectonic hazard and illustrates this through use of example(s). AO2 – Shows thorough geographical understanding of how the effects and responses may vary between areas of contrasting levels of wealth and illustrates this through use of example(s). AO3 – Demonstrates application of knowledge and understanding in a coherent and reasoned way in evaluating the difference in effects and responses between areas of contrasting levels of wealth.
2 (Clear)	4–6	AO1 – Demonstrates clear knowledge of the effects of and/or responses to a tectonic hazard and may illustrate this through some use of example(s). AO2 – Shows some geographical understanding of how the effects and/or responses may vary between areas of contrasting levels of wealth and may illustrate this through some use of example(s). AO3 – Demonstrates reasonable application of knowledge and understanding in evaluating the difference in effects and/or responses between areas of contrasting levels of wealth.
1 (Basic)	1–3	AO1 – Demonstrates limited knowledge of the effects of and/or responses to/of a tectonic hazard. AO2 – Shows slight geographical understanding of how the effects and/or responses may vary between areas of contrasting levels of wealth. AO3 – Demonstrates limited application of knowledge and understanding in evaluating the difference in effects and/or responses between areas of contrasting levels of wealth.
	0	No relevant content

- **Level 3 (detailed) responses** will be well developed and have accurate use of geographical terms. Reasoned evaluation of the extent to which the effects of and responses to a tectonic hazard vary between areas of contrasting levels of wealth with detailed use of example(s). Coverage doesn't need to be balanced.

- **Level 2 (clear) responses** will have linked or elaborated statements and some accurate use of geographical terms. Will outline the effects of and/or responses to a tectonic hazard. May start to make an evaluation of the

		extent to which the effects of a tectonic hazard vary between areas of contrasting levels of wealth. Likely to include some use of example(s). • **Level 1 (basic) responses** are likely to consist of simple statements, with limited use of subject vocabulary. Might be limited to generic statements. May be limited to discussing the effects of a tectonic hazard with limited or no evaluation of the extent to which the effects of a tectonic hazard vary between areas of contrasting levels of wealth. May lack any use of example(s) in support. • **Max Level 1** for effects of non-tectonic hazard such as tropical storms, unless the effects or responses could apply to both. • **Max Level 2** if answer does not refer to named example(s). • **Max Level 2** if answer does not cover both effects and responses, <u>Indicative content</u> • The command is 'suggest', so the focus of the question is an assessment of the degree to which the effects of and responses to a tectonic hazard vary between two areas of contrasting levels of wealth. • The question only asks for one type of tectonic hazard which is most likely to be an earthquake or volcanic eruption. Tsunamis caused by tectonic activity are also valid. Credit only effects and not causes of the tectonic hazard. • Answers are likely to refer to the effects of and responses to a tectonic hazard on two different areas of contrasting levels of wealth. This is likely to be, but does not necessarily have to be, an LIC/NEE v HIC. • Tectonic hazards do not discriminate by wealth. However, discussion is likely to focus on how the effects may vary according to how well the country is able to predict, protect against and prepare for a tectonic hazard. This tends to be linked to wealth and is likely to be exemplified as such. There may also be some discussion about how wealthier countries tend to recover more quickly (therefore short v long-term effects). • Effects may be categorised into people and the environment/primary and secondary effects/social and economic effects. • Social and economic effects may include: people being killed or injured, bereavement, homes being destroyed, transport and communication links not working, infrastructure destroyed, businesses damaged or destroyed, unemployment, looting and other crime, local economy disrupted, including manufacturing and tourism, reduced trade, longer-term health effects, insurance claims, destruction of crops, loss of livestock (overlaps with environmental effects) water pipes burst and water supplies contaminated (overlaps with environmental effects). May lead to disease risk. • Environmental effects may include landslides, coastal flooding, disruption of ecosystems, sewage leaks and water pollution. • Immediate or emergency responses are the aid and assistance that are given within the first few hours or days following a disaster. They are vital in reducing the death toll. They include the search and rescue effort, trying to rescue people trapped under rubble, medical care for the sick and injured, providing temporary shelter for those who have lost their homes, providing food and clean bottled water. • Long-term responses are those that take place in the weeks and months after a hazard event, and focus on the rebuilding and reconstruction of areas that have suffered extensive damage. The aim is to help people return to	

		their normal lives as quickly as possible, and to also reduce the risk of damage from natural hazards in the future. These include repairing gas mains and electricity cables, and repairing water pipes. Buildings and transport infrastructure have to be repaired or rebuilt. Long-term responses also include putting measures in place to minimise future risk of damage or loss of life, through monitoring, prediction, protection and planning. • Credit knowledge and understanding of specific examples of tectonic hazards. These might include the Turkey/Syria earthquake 2023, L'Aquila earthquake 2009, Haiti earthquake 2010, Christchurch and Japanese Tohoku earthquakes 2011, Nepal earthquake 2015, Boxing Day tsunami 2004, Japan tsunami 2011, Nyiragongo volcanic eruption, Congo 2002, Eyjafjallajökull eruption, Iceland 2010. Other tectonic examples are valid. • The 6.3 magnitude L'Aquila earthquake in Italy in 2009 killed about 300 people and made over 60 000 homeless. In comparison, the more powerful 7.8 magnitude Gorkha earthquake in Nepal in 2015 is estimated to have killed over 8000 people and made more than 1 million homeless. Historic buildings, school and hospitals were destroyed in both quakes and access to food, water and electricity was reduced. Both areas suffered aftershocks triggering landslides and rockfalls. An avalanche swept through Everest Base camp in the Himalayas killing 19 tourists and Sherpas. In Italy, a mudflow was caused by a burst water pipe near Pagani. Responses to the two quakes varied considerably. A state of emergency was declared in both areas immediately after the quakes and international assistance was provided. Students might discuss differences in responses to the two events including availability of international aid and long-term rehousing of residents. • Discussion about why the effects of and responses to tectonic hazards vary between areas of contrasting wealth is valid. This may focus on levels of preparedness, protection and response. • Credit responses which argue against wealth being the controlling factor. Magnitude might be the most important factor for some events, eg Nepal earthquake magnitude was 31 times greater than Aquila. AO1 – 3 marks AO2 – 3 marks AO3 – 3 marks	
		Spelling, punctuation and grammar (SPaG) **Responses with SPaG marks that gain a mark of 0 for the content/skills of the question can still be awarded SPaG marks if the response is judged to be a genuine attempt to answer the question.** **High performance** • Learners spell and punctuate with consistent accuracy • Learners use rules of grammar with effective control of meaning overall • Learners use a wide range of specialist terms as appropriate. **Intermediate performance** • Learners spell and punctuate with considerable accuracy • Learners use rules of grammar with general control of meaning overall • Learners use a good range of specialist terms as appropriate.	**3** **2**

		Threshold performance • Learners spell and punctuate with reasonable accuracy • Learners use rules of grammar with some control of meaning and any errors do not significantly hinder meaning overall • Learners use a limited range of specialist terms as appropriate. **No marks awarded** • The learner writes nothing • The learner's response does not relate to the question • The learner's achievement in SPaG does not reach the threshold performance level, for example errors in spelling, punctuation and grammar severely hinder meaning.	**1** **0**

Section B

Qu	Pt	Marking guidance	Total marks
02	**1**	**Using Figure 5, name the second largest area of tropical rainforest.** Congo Accept Central Africa AO4 – 1 mark	**1**
02	**2**	**Using Figure 5, what percentage of the total area of tropical rainforest was found in the Amazon in 2020? Give your answer to one decimal place.** 54.3 (%) AO4 – 1 mark	**1**
02	**3**	**Using Figure 6 and your own knowledge, outline two ways that plants in the tropical rainforest are adapted to their environment.** The trees have buttress/long/thick/surface roots (which help to keep the trees stable) (1). Roots grow only for short distances below the ground/shallow (to tap nutrients from the thin topsoil) (1). The trees grow tall (to reach the sunlight) (1). The trees have large/broad leaves (to maximise photosynthesis) Lianas or vines wind around the trunks of trees (to reach the forest canopy) (1). Trees usually have thin and smooth bark (as there is no need to conserve moisture) (1). Leaves usually have pointed drip tips (to allow excess rainwater to run-off/prevent fungal growth) (1). Many rainforest plants have thick, waxy coatings (to reduce water loss/ repel excessive moisture) (1). Epiphytes grow on larger trees rather than in the soil (so they access sunlight and absorb moisture from the air) (1) Credit other valid answers. Note that answers may use the photograph and/or own knowledge. Simply stating the unbracketed adaptation is sufficient. 1 mark for each correct answer. AO3 – 2 marks	**2**

02	**4**	**Give one way rainforest vegetation can support large numbers of animals.** The wide range of plant species supports many different animals, birds and insects (1). The canopy offers many sources of food, (shelter, and hiding places) (1). There are habitats found in the different layers of the forest (1) There is a vast amount of fruit, seeds, leaves, and nectar (1) Predators (like jaguars, snakes, and birds of prey) thrive due to the large number of prey species.(1) Thick/dense vegetation provides (camouflage and) protection from predators.(1) Trees release moisture, helping to maintain humidity and water availability (for amphibians and insects).(1) Do not accept vague points eg 'vegetation provides food'. 'vegetation provides a habitat', 'vegetation provides protection' There should be an (inferred) link to rainforest vegetation eg large leaves providing shelter Credit other valid answers. AO2 – 1 mark	**1**

02	**5**	**Give one way climate affects the soils in tropical rainforests.** (Heavy) rain causes leaching/washing out of nutrients (1). (Heavy) rain leads to infertile soils (1) Heat of the sun causes laterite layer/hard pan to form (1). High temperatures and moisture allow bacteria to quickly decompose leaf litter (1). (Heavy) rain means that rainforest soils tend to be (permanently) moist or saturated (1). Chemical weathering of rock in the equatorial forests is rapid, producing deep soils (1). (Heavy) rain (on exposed soils) causes soil erosion (1). Credit other valid answers. No credit for simply stating that the soil is infertile/eroded, unless linked directly or indirectly to climate. AO1 – 1 mark	**1**

02 | **6** | **'Tropical rainforests are of value to people and the environment.' Discuss this statement.**

Use Figure 7 and your own understanding.

Level	Marks	Description
3 (Detailed)	5–6	AO2 – Shows thorough geographical understanding of the value of tropical rainforests to people and the environment. AO3 – Demonstrates thorough application of knowledge and understanding in assessing the importance of tropical rainforests to people and the environment.
2 (Clear)	3–4	AO2 – Shows reasonable geographical understanding of the value of tropical rainforests to people and/or the environment. AO3 – Demonstrates reasonable application of knowledge and understanding in assessing the importance of tropical rainforests to people and/or the environment.
1 (Basic)	1–2	AO2 – Shows limited geographical understanding of the value of tropical rainforests to people and/or the environment. AO3 – Demonstrates limited application of knowledge and understanding in assessing the importance of tropical rainforests to people and/or the environment.
	0	No relevant content

- **Level 3 (detailed) responses** will be developed with accurate use of geographical terms. Reasoned discussion of the importance of tropical rainforests to both people and the environment, although coverage may not be balanced. Makes effective use of **Figure 7**.
- **Level 2 (clear) responses** will have linked or elaborated statements and some accurate use of geographical terms. Likely to outline the value of tropical rainforests to people and/or the environment. Makes some use of **Figure 7**.
- **Level 1 (basic) responses** are likely to consist of simple statements, with limited use of subject vocabulary. Might be limited to generic statements and basic ideas about the value of rainforests. May depend largely on **Figure 7** with limited development.
- Max marks can be awarded for discussion of one environmental and one people based element

<u>Indicative content</u>

- Students are likely to consider a range of reasons why rainforests are of value to people and the environment.
- They regulate the composition of the atmosphere, taking in carbon dioxide through photosynthesis and releasing oxygen, regulating levels of carbon dioxide in the atmosphere.

6

		• The tree roots increase infiltration, allowing increased amounts of water to percolate to groundwater stores and develop aquifers. • They minimise soil erosion. The roots anchor the soil while the dense canopy protects the soil from heavy rains. • They provide ideal habitats for animals. • They have very high biodiversity levels. Tropical forests cover just 6% of the planet's land surface but contain about 50% of the world's terrestrial plant and animal species. • Tropical rainforests provide many goods and services such as: o Food – rainforests can produce food, such as nuts, which forms part of the diet of local people in the Amazon. Rainforests also produce cash crops. o Raw materials – eg Palm oil is used in cosmetics, confectionary, detergents and many other products. • Application of understanding to **Figure 7**. Rainforests have been used to search for medicines. For example, the rosy periwinkle can help treat childhood leukaemia. • Ecotourism aims to give jobs to local people whilst protecting the environment. Ecotourists travel in small groups and often visit reserves where the scenery and wildlife is protected and managed. • Rainforests are home to many groups of people. Unfortunately, deforestation has often affected their existence. Amerindians are left without homes and many have been killed, either deliberately or by diseases introduced by people coming to the rainforest. • Rainforests sequester around twice as much carbon dioxide as they emit, making them an important carbon sink, although this is under threat. • They influence the hydrological cycle, acting as a water store by intercepting rainfall. They release water into the atmosphere by evapotranspiration. This then falls again as precipitation and so gives the people living in areas such as the Amazon a constant supply of water. • Rainforests can be logged to produce timber such as hardwoods for garden furniture exports. • There may be discussion of how the value of rainforests to people may be in conflict with the protection of the environment. However, value to people usually coincides with protection of the environment, eg without rainforests continually recycling huge quantities of water, feeding the rivers, lakes and irrigation systems, droughts would become more common, potentially leading to widespread famine and disease. • Credit reference to case studies, although these are not necessary to reach Level 3. AO2 – 3 marks AO3 – 3 marks	

02	**7**	**Using Figure 8b, which month has the highest precipitation in Aklavik?** August AO4 – 1 mark	**1**

02	**8**	**Using Figures 8a and 8b, which one of the following statements is correct?** **D** Total precipitation is higher in Aklavik than in Cairo. AO4 – 1 mark	**1**

02	**9**	**Suggest one reason for the difference in temperature between Cairo and Aklavik.** 1×2 Difference or comparison is required. Aklavik receives less direct sunlight than Cairo (1). Cairo has more solar radiation/insolation/intense heating/sunlight (1) Cairo is closer to the Equator (1) so the sun's rays are more concentrated (d)(1). Cairo is near the tropics, (whereas) Aklavik is near Polar/Arctic areas (1) Aklavik is closer to the north pole (1) so sunlight is more dispersed (d)(1). Ice and snow reflect more sunlight (rather than absorbing it in Aklavik (1), which keeps temperatures lower (d) (1). Cold polar winds reduce temperatures in Aklavik (1) compared to warm (subtropical) air masses in Cairo (d)(1). Aklavik has very few/no hours of daylight in winter (1) whereas Cairo has similar amounts all year round (d)(1) Cairo is 30 degrees N of the Equator, (whereas) Aklavik is 68 degrees N of the Equator(1) Do not credit idea that Akjlavik is further from the sun. Do not credit 'more' sunshine or 'more' heat or 'more' daylight at Cairo. Only credit one reason AO2 – 2 marks	**2**

02 **10** **Either (hot deserts)** **9**

To what extent does human activity contribute to desertification in areas on the fringes of hot deserts?

Use Figure 9 and your own understanding.

Level	Marks	Description
3 (Detailed)	7–9	AO1 – Demonstrates detailed knowledge of threats from human activities in environments on the fringe of hot deserts. AO2 – Shows thorough geographical understanding of the interrelationships between places, environments and processes in the context of environments on the fringe of hot deserts. AO3 – Demonstrates application of knowledge and understanding in a coherent and reasoned way in evaluating the extent to which human activity poses a risk to environments on the fringe of hot deserts.
2 (Clear)	4–6	AO1 – Demonstrates clear knowledge of threats from human activities in environments on the fringe of hot deserts. AO2 – Shows reasonable geographical understanding of the interrelationships between places, environments and processes in the context of environments on the fringe of hot deserts. AO3 – Demonstrates reasonable application of knowledge and understanding in evaluating the extent to which human activity poses a risk to environments on the fringe of hot deserts.
1 (Basic)	1–3	AO1 – Demonstrates limited knowledge of threats from human activities in environments on the fringe of hot deserts. AO2 – Shows basic geographical understanding of the interrelationships between places, environments and processes in the context of environments on the fringe of hot deserts. AO3 – Demonstrates limited application of knowledge and understanding in evaluating the extent to which human activity poses a risk to environments on the fringe of hot deserts.
	0	No relevant content.

- **Level 3 (detailed) responses** will be well developed. Reasoned examination of a range of causes of desertification with some evaluation of extent to which human activity is responsible**.** May acknowledge natural

		causes (e.g., climate change, drought) alongside human factors**.** Makes thorough use of Figure 9 as well as own understanding. • **Level 2 (clear) responses** will have linked or elaborated statements and some accurate use of geographical terms. May outline several causes of desertification. May start to make an evaluation of the extent to which human activity is responsible. Uses Figure 9 and/or own understanding. • **Level 1 (basic) responses** are likely to consist of simple statements, with limited use of subject vocabulary. Might be limited to generic statements, or a list of risks to the environment without development. May be limited to a single cause of desertification. May make a limited evaluation. Answer may be largely reliant on Figure 9. Max Level 2 for no (direct or inferred) reference to **Figure 9** <u>Indicative content</u> • The command 'to what extent' means that responses may state the degree to which human activity causes desertification, with some support for the view expressed. Eg the statement may be completely untrue, true to some extent (partly but not completely true), to a great extent, or completely true. • Knowledge of areas affected by the process. 20% of the world's population, in over 60 countries, have to cope with the threat of desertification. For instance, the Sahara has advanced over 250 km southwards in the past 100 years. • Understanding of how desertification occurs – the process of fertile land changing into desert typically as a result of deforestation, drought, or improper/inappropriate agriculture. Causes which link to human activity include: • Population growth – more people needing more food which puts pressure on the land. • Migration – leads to greater population pressure. Drought and desertification in one region will displace people to another fragile environment. • Overcultivation – growing too much without allowing the soil to recover means it becomes exhausted. • Deforestation – trees are cut down for fuel and building. The loss of roots makes the soils more fragile. They are exposed to wind and the rain, leading to gully erosion. • War – many sub-Saharan countries have suffered for years from civil war, where crops and animals have been destroyed, leading to famine. Millions of people have been forced to move into desert fringe areas by armed conflicts. Some become refugees. The resources in and around the cities and camps where these people settle come under severe pressure. • Enhanced greenhouse effect, partially caused by human activity globally, may contribute to increased risks of drought and higher temperatures in areas on fringe of hot deserts. • Mining operations often involve clearing large areas of vegetation, disturbing the soil, and generating waste, which can lead to habitat loss and soil degradation • Other threats include extraction of fossil fuels and high impact tourism in vulnerable areas such as the edge of the Thar desert and in East Africa. • Application of understanding to **Figure 9**.	

		• **Figure 9a** shows a dry parched surface with little or no grazing land. Overgrazing – too many goats, sheep, cattle can destroy the vegetation. Nomadic groups are now restricted in movement and this places more pressure on land resources. The soil may turn to dust and become infertile. • **Figure 9b** shows the effects of gully erosion, where the soils are stripped of vegetation and are washed away in occasional heavy storms. The land is left infertile. This may be caused by deforestation or over-cultivation. • **Figure 9c** illustrates the problem of removing vegetation for use as firewood. As the population in desert areas increases, there is a greater need for fuel wood. When the land is cleared of trees, the roots of the trees no longer hold the soil together so it is more vulnerable to soil erosion. • Understanding of natural factors leading to desertification. Less rainfall, higher temperatures which lead to increased evaporation/drought, or rainfall becoming more irregular, which means that vegetation dies and soils dry out and are removed by soil erosion. Climate is changing; this is part of a natural cycle of climate change as ocean currents and patterns of winds change. Human and physical factors may be linked. • Credit idea that human activity may have positive impacts on/reduce rates of desertification eg through replanting and other management schemes. Human intervention can take place in careful ways that do not contribute to desertification • Credit examples of desertification, eg in Kenya, nomadic Masai farmers have been forced onto marginal land. Traditional migration patterns have been affected and they have been forced to use smaller areas of land for their cattle. Overgrazing has resulted from this, leading to soil erosion by wind and water. • Evaluation of extent to which human activities pose a risk. Eg although climate change, as part of a natural cycle, may contribute to desertification, there is little doubt that human misuse of the land poses a major threat. Desertification is a huge environmental problem affecting many countries on the edge of hot deserts, which to a great extent is driven by human factors. Credit the counter-argument that human activity doesn't contribute to desertification because of good management and irrigation, and may help to reverse/limit the process through strategies such as the Green Wall. AO1 – 3 marks AO2 – 3 marks AO3 – 3 marks	

Or (cold environments)

To what extent does the physical environment create challenges for development in cold environments?

Use Figure 10 and your own understanding.

Level	Marks	Description
3 (Detailed)	7–9	AO1 – Demonstrates detailed knowledge of challenges to development in a cold environment. AO2 – Shows thorough geographical understanding of the challenges of a cold environment. AO3 – Demonstrates thorough application of knowledge and understanding in discussing the challenges to development in a cold environment, using source.
2 (Clear)	4–6	AO1 – Demonstrates clear knowledge of challenges to development in a cold environment. AO2 – Shows reasonable geographical understanding of the challenges of a cold environment. AO3 – Demonstrates reasonable application of knowledge and understanding in discussing the challenges to development in a cold environment, using source.
1 (Basic)	1–3	AO1 – Demonstrates limited knowledge of challenges to development in a cold environment. AO2 – Shows limited geographical understanding of the challenges of a cold environment. AO3 – Demonstrates basic application of knowledge and understanding in discussing the challenges to development in a cold environment, using source.
	0	No relevant content

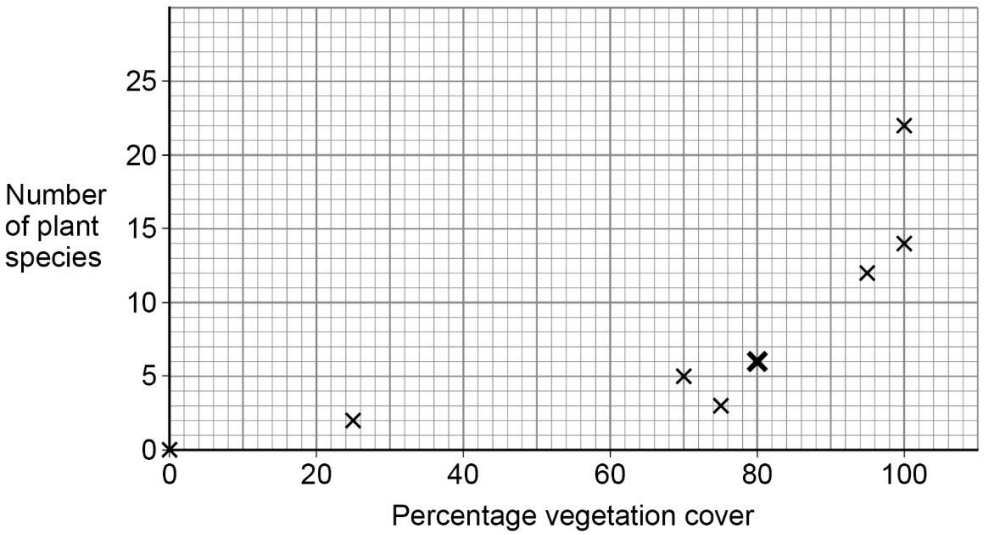
- **Level 3 (detailed) responses** will be well developed with accurate use of geographical terms. Reasoned discussion of how far development is challenged by the physical environment, or whether challenges can be managed with evidence from **Figure 10**.
- **Level 2 (clear**) **responses** will have linked or elaborated statements and some use of geographical terms. May outline some challenges to development in a cold environment. Uses Figure 10 and/or own understanding.
- **Level 1 (basic) responses** are likely to consist of simple statements, with limited use of subject vocabulary. Might be limited to generic statements. May be limited to a single challenge in a cold environment. Answer may be largely reliant on **Figure 10**.

		An answer that lacks (direct or inferred) reference to **Figure 10** is limited to Level 2. <u>Indicative content</u> • The command 'to what extent' means that responses may state the degree to which developed is affected by a range of challenges, with some support for the view expressed. Eg the statement may be completely untrue, true to some extent (partly but not completely true), to a great extent, or completely true. • The question requires discussion of ways in which a cold environment poses challenges for development. • Answers may focus on specific challenges, scale of development and control over the inhospitable conditions. • Challenges include environmental constraints, costs/remoteness, and conflicts with indigenous populations, extreme low temperatures, low precipitation, variable daylight hours, permafrost/active layer, fragile ecosystems, and relief barriers. • Construction disrupts and melts the permafrost, creating unstable ground. Exposure to extreme cold can injure and kill, and healthcare may be many miles away. Restricted employment opportunities are a real problem for people living in remote areas, and there is a lack of services due to low population density. Climate change may lead to widespread and rapid changes which are difficult to adapt to. • Application of knowledge and understanding to **Figure 10**. Photograph **10a** shows a snow-covered mountainous environment. The area appears to be remote and inaccessible, with no sign of communications. • Photograph **10b** shows the use of a pipeline to transport oil. It is elevated to prevent the pipes cracking in the ground. Building roads, railways and pipelines for water and electricity supplies is very difficult on frozen ground that is liable to melting. Despite the challenges of a cold environment, the large-scale drilling for oil may be worthwhile as it produces a good financial return. • Photograph **10c** shows a road that has been affected by ice heave or subsidence due to melting of frozen ground. Melting of permafrost, moving soil layer can make buildings sink and subside, roads crack and even make trees topple and fall. Roads are constructed of gravel, and houses are often built on stilts to reduce the risk of subsidence. • Credit answers that focus on Arctic or Antarctic regions. Allow reference to tundra as well as polar areas. • Support for answers may be based on Northern Canada and/or Alaska, although a case study is not essential. Challenges to development include getting access to resources, finding a workforce to exploit them, and providing protection from the extreme weather. Providing buildings and infrastructure that can cope with the ground and weather conditions is difficult and expensive. The value of some resources means that people find ways to overcome the challenges, eg some parts of the Trans-Alaska oil pipeline are raised on stilts, to prevent it melting the permafrost, which would make the ground unstable. • Discussion may consider relationships between the nature of the challenges and the desire/ability to overcome them in order for development to take place. This might reflect, for example, the value of resources and the technological advances enabling their exploitation.	

		AO1 – 3 marks AO2 – 3 marks AO3 – 3 marks	

Section C

Qu	Pt	Marking guidance	Total marks
03	**1**	**Which term is used to describe the force of waves crashing into the cliffs?** **C** Hydraulic power No credit if two or more statements are shaded. AO1 – 1 mark	**1**
03	**2**	**Using Figure 11, calculate the median soil pH.** 7.5 AO4 – 1 mark	**1**
03	**3**	**Using Figure 11, describe changes in vegetation from the embryo dune to the mature dune.** 2x1 The (percentage of) vegetation (cover) increases across the dune / The embryo dune has 25% cover whereas the mature dune has 100% cover (1) The number of plant species increases across the dune /The embryo dune has 2 species whereas the mature dune has 22 species (1) The embryo dune has very little vegetation whereas the mature dune has much more plant cover (1). The vegetation increases in height across the dune (1) Vegetation changes from grasses to trees (1). The vegetation changes from grasses on the embryo dune to shrubs on the grey dune (1), then changes to woodland on the mature dune (d)(1). Note that 2 changes are required for 2 marks AO4 – 2 marks	**2**

03	**4**	**Plot the following data on Figure 12.** Correct plotting of point.  AO4 – 1 mark	**1**

03	**5**	**Explain how a stack is formed in a coastal landscape.** **Use one or more diagrams.**	**4**

Level	Marks	Description
2 (Clear)	3–4	AO1 – Demonstrates accurate knowledge about coastal erosion processes and stack formation. AO2 – Shows a clear geographical understanding of the interrelationships between coastal environments and processes. Explanations are developed.
1 (Basic)	1–2	AO1 – Demonstrates limited knowledge of coastal erosion processes and stack formation. AO2 – Shows limited geographical understanding of the interrelationships between coastal environments and processes. Explanations are partial.
	0	No relevant content

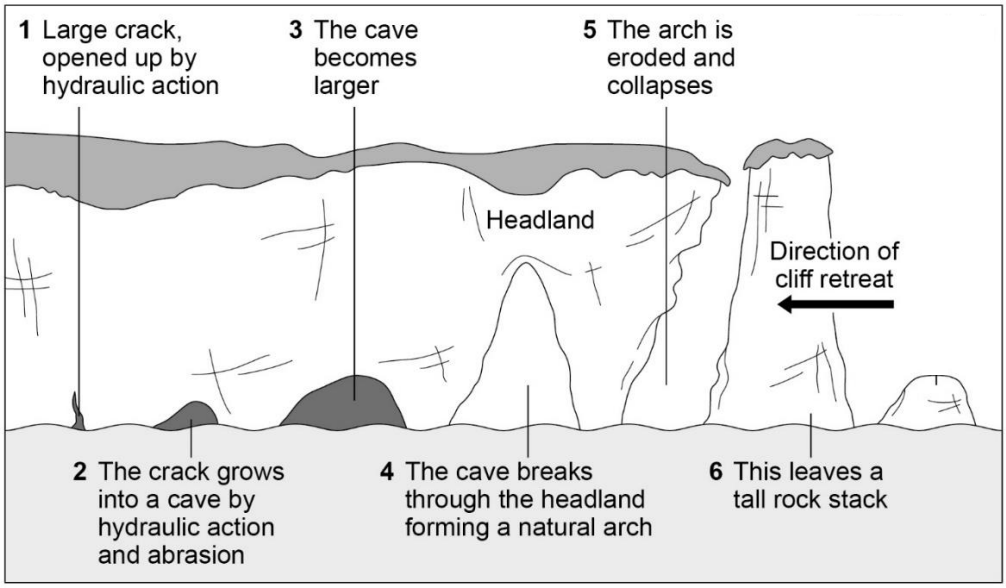
- **Level 2 (clear) responses** are likely to contain linked statements showing understanding of the processes involved and the sequence of formation. Diagram(s) will be labelled and clear. Appropriate geographical terminology.
- **Level 1 (basic) responses** will comprise simple ideas with limited or partial sequence and little reference to the processes involved. Diagrams may be unlabelled or unclear. Geographical terminology will be limited.

- **Max lower L2** if diagram is not used.
- Credit full marks at L2 if annotated diagram clearly shows formation.

<u>Indicative content</u>

- The command is 'explain', so responses should provide a reasoned account of how and why a coastal stack is formed.
- Where headlands extend into the sea, waves attack vertical lines of weakness in the rock/faults.
- Processes such as hydraulic action and abrasion widen these faults into cracks and eventually the waves will penetrate deeply enough to create caves. Over time, the cave will be eroded into an arch, accessible to the sea on both sides.
- Weathering will also play a role, with physical weathering processes such as freeze thaw and salt crystallisation and chemical processes such as carbonation weakening the rock surrounding the cave or arch making it more susceptible to mass movement and collapse.
- Finally, the erosion and weathering continues and the arch collapses leaving behind a stack (a vertical column of rock).
- These stacks can be attacked further, and eventually the stack may collapse to leave a low-lying stump.
- Credit the full sequence of landform development (cave, arch, stack, stump). However, it is not necessary to include stump to be awarded full marks.

No credit for identification of processes unless related to stack formation

		Labelled and annotated diagram(s) can substitute for written text, showing the sequence of changes and processes involved.  The diagram above is worthy of 4 marks. AO1 – 2 marks AO2 – 2 marks	

03 | **6** | **Discuss the effectiveness of using hard engineering strategies to manage the coastline.**

Use Figure 13 and your own understanding.

Level	Marks	Description
3 (Detailed)	5–6	AO2 – Shows thorough geographical understanding of hard engineering strategies used to protect coastlines against erosion. AO3 – Demonstrates thorough application of knowledge and understanding by making reasoned assessment of the effectiveness of coastal management strategies.
2 (Clear)	3–4	AO2 – Shows clear geographical understanding of hard engineering strategies used to protect coastlines against erosion. AO3 – Demonstrates reasonable application of knowledge and understanding by making clear assessment of the effectiveness of coastal management strategy(ies).
1 (Basic)	1–2	AO2 – Shows limited geographical understanding of one or more hard engineering strategy(ies) used to protect coastlines against erosion. AO3 – Demonstrates limited application of knowledge and understanding by making basic assessment of the effectiveness of coastal management strategy(ies).
	0	No relevant content.

- **Level 3 (detailed) responses** will be developed responses clearly assessing the effectiveness of hard engineering coastal management strategies. Appropriate terminology will be used. Appropriate use of **Figure 13**.
- **Level 2 (clear) responses** are likely to show understanding of coastal management strategy(ies) and their effectiveness. Some assessment and some geographical terminology may be evident. Likely to use **Figure 13**.
- **Level 1 (basic) responses** will be simple statements with limited understanding or development. May consist of listed points or random statements about general coastal management strategies. Answer may be largely reliant on **Figure 13**.

- **Max L2** for answers that refer to a single strategy. Full marks available for assessment of two or more strategies.

<u>Indicative content</u>

- Understanding of hard engineering schemes, which involve using artificial structures to control natural processes. These are designed to reduce wave

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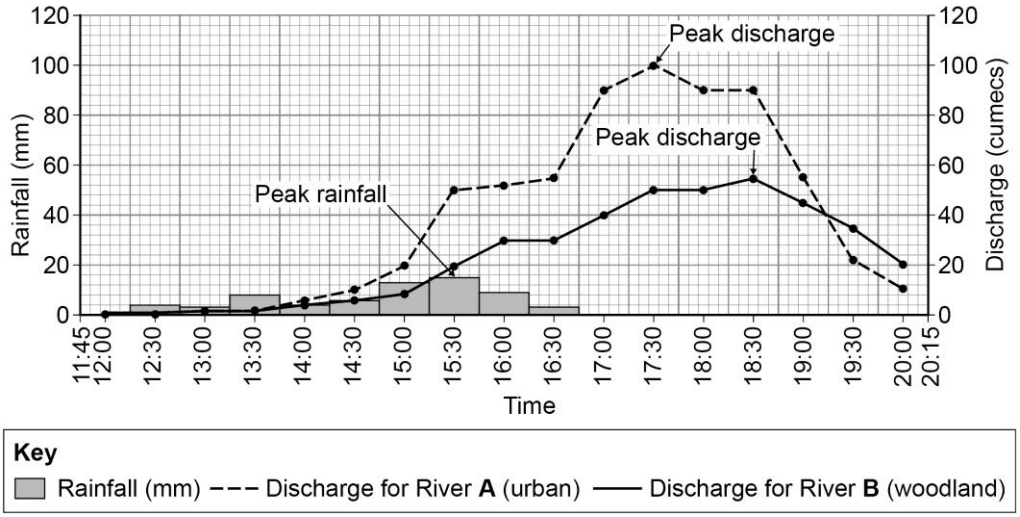
		energy or create a barrier between the land and sea, so storm waves can't reach the cliffs. • Application of understanding to **Figure 13**, showing coastal management in the form of gabions, rip rap or rock armour, a sea wall and groynes. Expect some assessment of the costs and benefits/effectiveness of these approaches. Other types of hard engineering may also be credited. • **Figure 13** shows rock groynes or barriers that are built down the beach at right angles to the coastline. They are designed to stop material being moved along the beach by longshore drift. They work by building up the amount of sand and shingle on the updrift side. They act as a buffer against wave attack, helping to protect the cliffs. The groynes appear to be trapping beach material effectively, providing protection to the coastline. • Groynes create a wider beach, which can be popular with tourists and boost local economy. They reduce the risk of damage, making residents and local business feel more secure. They are not too expensive, and if well maintained, can last up to 40 years. However beaches may be washed away and cliffs eroded beyond the final groyne, as they are starved of beach material. • Sea walls aim to protect the coast using concrete, steel and/or stone. A sea wall protects the base of cliffs, land and buildings against erosion. Also, it can prevent coastal flooding in some areas. It gives people a sense of security. If well maintained, sea walls can last for many years, but they can be undercut by wave scour over time. Sea walls do not impede the movement of sediment downdrift, so they do not disadvantage other areas. • However they are expensive to build. Curved sea walls reflect the energy of the waves back to the sea. This means that the waves remain powerful. Over time the wall may begin to erode and the cost of maintenance is high. • Gabions are wire cages filled with rocks that can be built up to support a cliff or provide a buffer against the sea. Often constructed on site using local pebbles. • They are cheap to produce and flexible in the final design. Can improve drainage of cliffs. Will eventually become vegetated and merge into the landscape. Much cheaper than sea walls, rock armour or groynes. Ideal as a quick-fix solution. For the cost, they are good value for money, as they may last 20–25 years. • However, gabions are unsightly, especially after they have been in the water for a long time and the cages have started to rust. Equipment can be difficult to source. Both the cage and its contents will deteriorate over time, leading to more expense. • Rip rap/rock armour consists of massive blocks of natural rock piled up at the base of a cliff. The rocks are dumped on top of each other leaving gaps between them that allow water through. The rock armour protects the base of the cliffs from erosion. They disperse the energy of the waves. Structure is quick to build and easy to maintain. Much cheaper than a sea wall. If well maintained, rock armour lasts a long time. It is versatile, as it can be placed in front of a sea wall to lengthen its lifespan or used to stabilise slopes on sand dunes. • However , they look different to the local geology, as the rock has been imported from other areas. The rocks are expensive to transport. • Credit other hard engineering strategies, including revetments, offshore barriers and reefs. • Overall assessment of hard engineering strategies. Sea walls, gabions, groynes and rock armour are effective solutions which help reassure the	

		coastal community. However, they are expensive to install and maintain. In addition to this, by installing hard engineering solutions in one place this can have a detrimental effect further along the coast. AO2 – 3 marks AO3 – 3 marks	

Qu	Pt	Marking guidance	Total marks
04	1	**Which term is used to describe the transportation process where pebbles are bounced along a river bed?** **A** Saltation No credit if two or more statements are shaded. AO1 – 1 mark	1
04	2	**Complete the hydrograph for River B on Figure 14 using the following data.**  Time 20:00 for River B should be accurately marked at 20 cumecs and the student should join the points to complete the line as shown above. AO4 – 1 mark	1
04	3	**What is the time difference between peak rainfall and peak discharge for River A?** **B** 2 hours No credit if two or more statements are shaded. AO4 – 1 mark	1

04	**4**	**Using Figure 14, describe two differences in the river discharge between River A and River B.** 2x1 The peak discharge for River A is higher/nearly twice as much (as that for River B) (1) The discharge for River A is higher (1) River B has a higher discharge than River A from 19:30 (1). The peak discharge occurs sooner after peak rainfall for River A (than for River B) / there is a shorter lag time for River A (1). The discharge for River A has a steeper rise and fall / rising and falling limb (than that of River B) (1). River A rises continuously to peak discharge after peak rainfall whereas River B plateaus (at 16:00–16:30) before rising again (1). The discharge for River B takes longer to change after the rainfall event (than that for River A) (1). The discharge for River B has not returned to its normal flow on the hydrograph unlike that of River A (1). No credit for explanation of the two hydrographs. Must make some (implied) comparative reference. Only 1 mark for two separate statements about the same trend. AO4 – 2 marks	**2**

04 **5** **Explain how a waterfall is formed.**
Use one or more labelled diagrams. **4**

Level	Marks	Description
2 (Clear)	3–4	AO1 – Demonstrates accurate knowledge about the formation of waterfall and river erosion processes. AO2 – Shows a clear geographical understanding of the effect(s) of river erosion on waterfall formation.
1 (Basic)	1–2	AO1 – Demonstrates basic knowledge about the formation of waterfall and river erosion processes. AO2 – Shows a limited geographical understanding of the effect(s) of river erosion on waterfall formation.
	0	No relevant content.

- **Level 2 (clear) responses** are likely to contain linked statements showing understanding of river erosion and the formation of waterfalls. Appropriate geographical terminology.
- **Level 1 (basic) responses** will comprise simple ideas with limited or partial sequence and little reference to the processes involved. Limited geographical terminology.

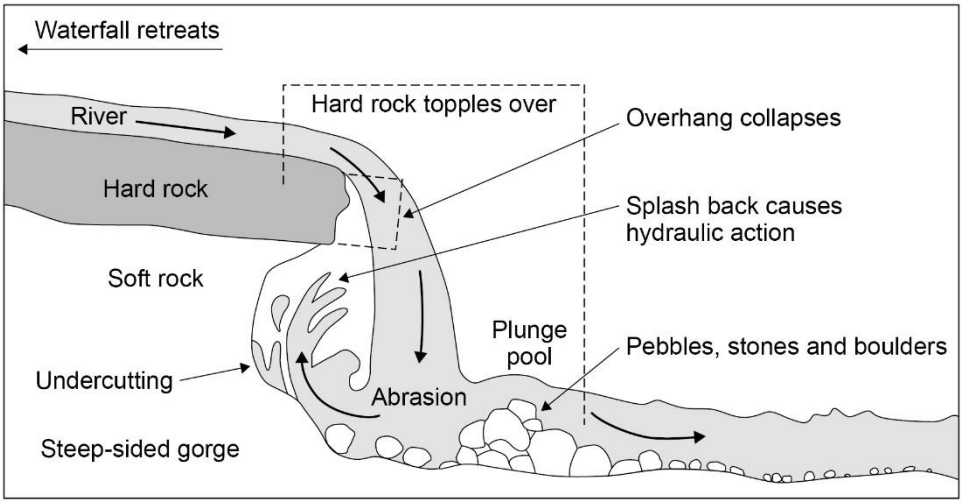
- **Max lower L2** if diagram is not used.
- Credit full marks at L2 if annotated diagram clearly shows formation.

<u>Indicative content</u>

- The command is 'explain', so responses should provide a reasoned account of the formation of a waterfall.
- The river may flow over an area of hard (cap) rock with softer more easily eroded rock underneath. Over time the softer rock is worn away more rapidly by processes of hydraulic action and abrasion, creating a waterfall. The water hits the bottom of the falls with great force. This erodes a deep hole called a plunge pool. The softer underlying rock is eroded and weakened. The softer layer collapses into the plunge pool, undercutting the hard cap rock. The cap rock cracks and then collapses.
- Gradually the waterfall retreats upstream, leaving behind a steep sided gorge. Every time the overhanging cap rock breaks off, the gorge retreats further and grows longer. There is turbulent fast flowing water in the gorge. Note that gorge formation is not needed to achieve max marks.
- Allow other explanations such as knick points along the river caused by changing sea levels. Waterfalls are also found where hanging valleys form in glacial landscapes.

No credit for identification of processes unless related to waterfall formation

Labelled and annotated diagram(s) can substitute for written text, showing the sequence of changes and processes involved. (See next page.)



The diagram above would be awarded 4 marks.

AO1 – 2 marks
AO2 – 2 marks

04 | **6** | **Discuss the costs and benefits of using soft engineering to manage river flooding. Use Figure 15 and your own understanding.** | **6**

Level	Marks	Description
3 (Detailed)	5–6	AO2 – Shows thorough geographical understanding of the costs and benefits of using soft engineering. AO3 – Demonstrates thorough application of knowledge and understanding in discussing the soft engineering strategy/ies shown in **Figure 15**.
2 (Clear)	3–4	AO2 – Shows clear geographical understanding of the costs and/or benefits of using soft engineering. AO3 – Demonstrates reasonable application of knowledge and understanding in discussing the strategy(ies) shown in **Figure 15**.
1 (Basic)	1–2	AO2 – Shows limited geographical understanding of the costs and/or benefits of using soft engineering. AO3 – Demonstrates limited application of knowledge and understanding in discussing the strategy(ies) shown in **Figure 15**.
	0	No relevant content

- **Level 3 (detailed) responses** will be developed responses with reference to both the costs and benefits of soft engineering strategy/ies. Detailed use of **Figure 15** and own understanding. Appropriate terminology will be used.
- **Level 2 (clear) responses** will show some reference to costs and/or benefits of soft engineering strategy(ies). Answers likely to make reference to **Figure 15** and/or own understanding. Some geographical terminology evident.
- **Level 1 (basic) responses** will be simple statements. May consist of listed points or random statements about soft engineering strategy(ies).

- **Max L2** for answer that does not refer to **Figure 15**.

Indicative content

- The command is 'discuss', so responses should provide a reasoned account of the costs and benefits of different types of soft engineering. At the highest level there may be a discussion of the balance of costs and benefits
- Understanding of soft engineering. Soft engineering schemes are set up to work with the natural processes along the river to reduce the effects of flooding. They aim to slow down the movement of water into the river channel and do not involve building artificial structures. Soft engineering aims to work with the environment and is more ecologically sensitive.
- **Figure 15** shows tree planting and flood warnings. Tree planting in a drainage basin increases interception and storage and reduces surface run off. This increases lag time and reduces a river's discharge and so makes it less likely to flood. It creates new habitats for animals and improves water quality by filtering pollutants out of rainwater. Tree planting is relatively cheap in the long-term but it can take years for the trees to mature and start having an effect. Tree planting can also restrict other types of land use.
- Flood warnings help people to take action in advance of flooding.

		Three levels of warning are used: flood watch, flood warning and severe flood warning. The strategy is relatively cheap and can reduce loss of life since people are given time to evacuate areas at risk. Flood warnings can also reduce damage to belongings resulting in fewer insurance claims and emotional distress. However, flood warnings do not actually prevent or reduce the risk of the river flooding and not everyone may be alerted by them or in time. • Credit other soft engineering strategies. For example: ○ Floodplain zoning is a strategy where proximity to river determines land use. Land use close to river may be used for animal grazing. Land furthest from the river used for 'expensive' land use, such as housing and industry. The strategy is relatively cheap and does not interfere with natural flows and river processes. Less damage is caused, leading to fewer insurance claims. However, it is not always possible to change existing land uses and planning decisions may not always be popular. ○ River restoration involves restoring a river that has undergone hard engineering back to its original course. If the land is no longer valuable, river restoration can help reduce the risk of flooding downstream by using the natural processes of the river. This can be an expensive strategy. AO2 – 3 marks AO3 – 3 marks	

Qu	Pt	Marking guidance	Total marks
05	1	**Which term is used to describe the process where a glacier moves forward and pushes material ahead of it?** **B** Bulldozing No credit if two or more answers are circled. AO1 – 1 mark	1
05	2	**Using Figure 17, what is the length of the drumlin from point A to point B?** 820 metres (allow 790–850 metres) AO4 – 1 mark	1
05	3	**Use Figure 16 or Figure 17 to describe the shape of a drumlin.** Potential creditworthy responses could be egg-shaped(1), oval-shaped (1), oval mounds(1), elongated mounds(1), long, narrow mounds(1), hills with a steeper side and more sloped side(1). (Steep) stoss end and (gentle) lee end(1). No credit for simply stating height eg 30m high AO4 – 1 mark	1
05	4	**Outline one possible conflict between tourists and farmers in the area shown in Figure 16.** 1×2 Tourists can damage walls (1) which the farmer would need to repair (d)(1). Walkers trample ground/cause footpath erosion (1) and then damage animal pasture/crops (d)(1). Tourists could drop litter (1) which the farm animals may eat (d) (1) Dog walkers may not pick up dog faeces (1) which may cause disease in farm animals (d) (1) Tourists/walkers could leave gates open (1) this can lead to animals escaping (d)(1) and potentially being injured or lost (d)(1) this would affect profits for the farmer (d)(1). Tourists may visit the area/see the drumlin/landscape (1) and could damage the famer's land (d)(1) Only credit one conflict. Accept other valid responses, as long as they are inferred from Figure 16 AO4 – 2 marks	2

05 | **5** | **Explain how a corrie is formed.**
Use one or more labelled diagrams. | **4**

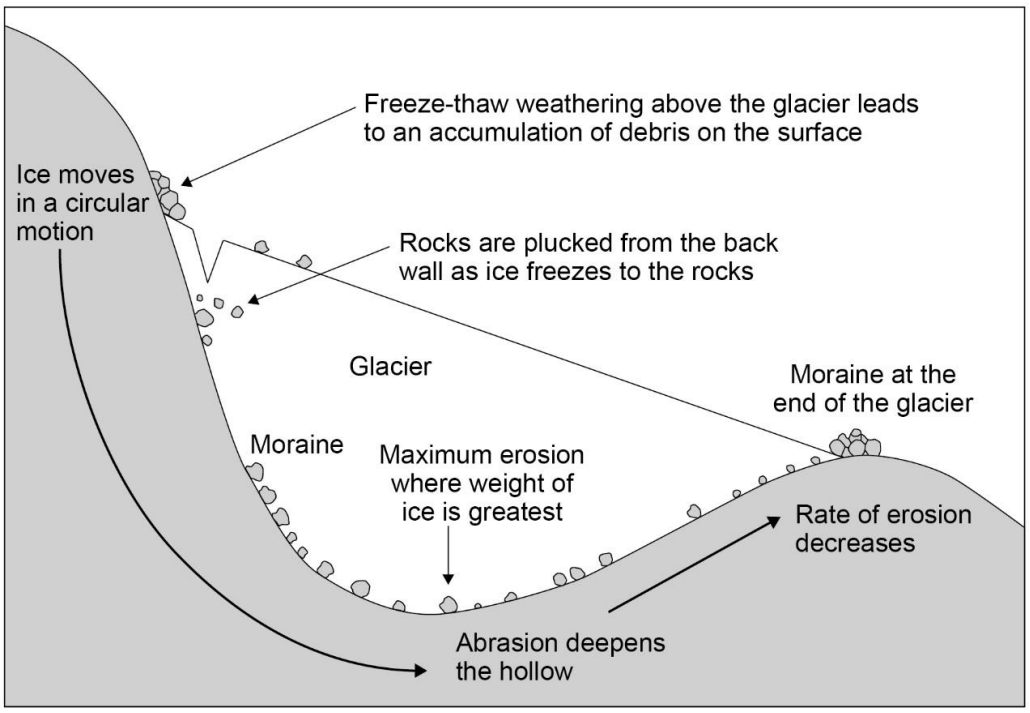
Level	Marks	Description
2 (Clear)	3–4	AO1 – Demonstrates accurate knowledge about the formation of a corrie. AO2 – Shows a clear geographical understanding of the effect(s) of glacial erosion on corrie formation.
1 (Basic)	1–2	AO1 – Demonstrates some knowledge about the formation of a corrie. AO2 – Shows a limited geographical understanding of the effect(s) of glacial erosion on corrie formation. Explanations are partial.
	0	No relevant content

- **Level 2 (clear) responses** are likely to contain linked statements showing understanding of glacial erosional processes and the formation of corries. Appropriate geographical terminology.
- **Level 1 (basic) responses** will comprise simple ideas about glacial processes and corrie formation. Geographical terminology will be limited.
- **Max lower L2** if diagram is not used.
- Credit full marks at L2 if annotated diagram clearly shows formation.

<u>Indicative content</u>

- The command is 'explain', so responses should provide a reasoned account of the formation of a corrie.
- A corrie is formed when snow begins to build up in a small hollow, often facing North or North-East in the UK so less affected by direct sunshine. The snow turns to ice and a small corrie glacier fills the hollow. Nivation (snow-related processes, such as freeze-thaw weathering, meltwater and slumping) enlarges the hollow enabling more snow to collect.
- The corrie glacier begins to move downhill by rotational sliding, while freeze-thaw weathering, along with plucking, loosens and removes material from the back of the hollow, producing a steep back-wall. Moraine gets dragged along the base of the glacier, deepening the hollow by abrasion and forming a rock basin.
- Erosion at the front edge of the corrie is not so powerful, so a sill or rock-lip develops, often made higher by deposition of some of the moraine. When the ice begins to melt, the rock lip acts as a natural dam to the meltwater, and a deep, rounded corrie-loch (or tarn) sometimes form.
- After the ice has melted, an armchair-shaped hollow is left behind, often with a tarn lake.

No credit for identification of processes unless related to corrie formation

		Labelled and annotated diagram(s) can substitute for written text, showing the sequence of changes and processes involved. (See next page).  The diagram above would be awarded 4 marks. AO1 – 2 marks AO2 – 2 marks	

05 | **6** | **Discuss how different strategies are used to manage the impacts of tourism in glaciated areas in the UK.**

Use Figure 18 and your own understanding.

Level	Marks	Description
3 (Detailed)	5–6	AO2 – Shows thorough geographical understanding of different strategies used to manage the impacts of tourism in a glaciated area in the UK. AO3 – Demonstrates thorough application of knowledge and understanding in discussion of different management strategies.
2 (Clear)	3–4	AO2 – Shows clear geographical understanding of one or more strategies used to manage the impacts of tourism in a glaciated area in the UK. AO3 – Demonstrates reasonable application of knowledge and understanding in discussion of one or more management strategies.
1 (Basic)	1–2	AO2 – Shows limited geographical understanding of one or more strategies used to manage the impacts of tourism in a glaciated area in the UK. AO3 – Demonstrates limited application of knowledge and understanding in discussion of one or more management strategies.
	0	No relevant content

- **Level 3 (detailed) responses** will be developed responses with discussion of and reference to different valid strategies used to manage the impacts of tourism in a glaciated area in the UK. Appropriate geographical terminology will be used. Appropriate reference to **Figure 18** and own example(s).
- **Level 2 (clear) responses** are likely to contain some discussion of and reference to different strategy/ies used to manage the impacts of tourism in a glaciated area in the UK. Some geographical terminology will be used. Some reference to **Figure 18** and/or own example(s).
- **Level 1 (basic) responses** will comprise simple ideas related to strategies used to manage the impacts of tourism in glaciated areas. Geographical terminology will be limited. Answer may be largely reliant on **Figure 18**.

- **Maximum Level 2** for answers that refer to a single strategy.
- **Maximum Level 2** if there is no reference to **Figure 18**.

Indicative content

- The command is 'discuss', so responses should provide a reasoned account of different strategies used to manage tourism in glaciated areas. Problems such as congestion, pollution and soil erosion are linked to tourism and are likely to be discussed in relation to a particular glaciated part of the UK. At the highest level responses may weigh up the effectiveness of the different strategies.

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		• **Figure 18** shows people repairing paths in the Lake District and a Park and Sail scheme in the Lake District to encourage tourists to travel by boat rather than car. Students should consider the costs and benefits of such schemes. • For example, fifteen million tourists visit the Lake District each year to walk in the mountains. This has resulted in severe footpath erosion which is being addressed through the Fix the Fells project restoring and maintaining footpaths in the Lake District. Provision and maintenance of footpaths can prevent and minimise soil erosion but it is very costly. • Traffic can be a major problem caused by tourism in glaciated areas. The Park and Sail scheme shown in **Figure 18** is a scenic alternative to driving which can reduce the number of vehicles on the road by moving people around on boats instead. Unfortunately, journeys are limited to the location of the Lakes. • Another scheme operating in the Lake District is the Go Lakes Travel Programme which aims to improve public transport and reduce traffic congestion. This includes a network of pay as you go car and bicycle hire, safer walking and cycling routes and integrated travel tickets. • Students may mention greater general provision of public transport which discourages people from using their own cars and may lead to a reduction in traffic and pollution. • Active zoning is a strategy used in some glaciated areas where tourism is purposely focused on honeypot sites to protect other areas from high tourist numbers. • Legislation around second home ownership. • Credit reference to specific transport and management schemes in **all** glaciated areas of the UK. AO2 – 3 marks AO3 – 3 marks	