GCSE
GEOGRAPHY
8035/1

Paper 1 Living with the Physical Environment

Mark scheme

June 2022

Version: 1.0 Final

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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.

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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. Each mark should be shown by placing a tick where credit is given. The number of ticks must equal the mark awarded. Do not 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. You should read the whole answer before awarding marks on levels response questions.

Step 1 Determine a level

Descriptors for the level indicate the different qualities that might be seen in the student's answer for that level. 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 2 with a small amount of Level 3 material it would be placed in Level 2 but be awarded a mark near the top of the level because of the Level 3 content. For instance, in a 9 mark question with three levels of response, an answer may demonstrate thorough knowledge and understanding (AO1 and AO2) but fail to respond to command words such as assess or evaluate (AO3). The script could still access Level 2 marks. Note that the mark scheme is not progressive in the sense that students don't have to fulfil all the requirements of Level 1 in order to access Level 2.

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 also help. There will generally 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.

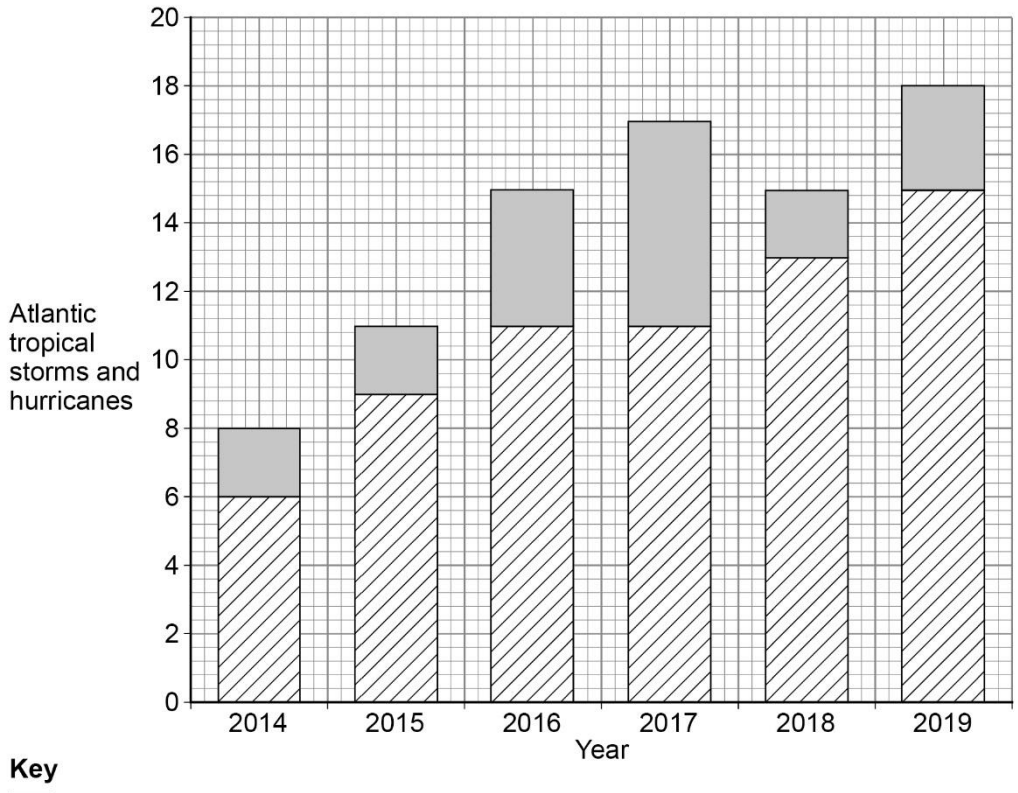
General guidance

- 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 the following events is not an example of a natural hazard?** **D**: Oil spill No credit if two or more answers are shaded. AO1 – 1 mark	1
01	2	**Using Figure 1, which one of the following statements is true?** **C**: Hurricane Dorian passed close to the east coast of the USA No credit if two or more answers are shaded. AO4 – 1 mark	1
01	3	**Using Figure 1, measure the distance travelled by Hurricane Dorian at hurricane force.** Any value between 2600–3200 km (2 marks). 2400–2599 km or 3201–3400 km (1 mark). Add two ticks if 2 marks are awarded. AO4 – 2 marks	2

01	4	**Using Figure 2, identify two features of Hurricane Dorian.** (Largely) circular shape of hurricane (1) Bands of (swirling) cloud/ dense cloud/storm cloud/circling cloud/spiralling cloud(1) The clouds are more extensive to the east of the eye than the west (1) Max 1 for cloud description. Anti-clockwise (rotation of the storm/clouds) (1) A central (circular) eye of the storm (1) where there is no cloud (1) Eye (1) Eye wall/vortex (1) Credit use of scale eg It is (600-1100) km across/W to E.(1) Alow locational features eg it is north of the Bahamas/to the east of the USA (1). Max 1 mark for locational features. Must be evident from the map. No credit for vague locations/reference to the northern hemisphere etc. No credit for clockwise rotation, or heading towards the north west. Do not accept “cloud” or “lots of cloud” Note the requirement for two separate features. AO4 – 2 marks	2

01	5	**Use the data from the following table to complete Figure 3.** | Year	Number of tropical storms and hurricanes scale 1–2	Number of hurricanes scale 3 and above
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2018	13	2 |  	2

		Accurate plotting of total number of 15 hurricanes (1) Correct proportion (13:2) and differentiation (of shading) obvious (2) Accurate plotting of 13 and shading correct (1) Allow 2 marks if the 2 lines are correctly plotted and the bottom part is shaded, but not the top part.(2) The horizontal lines shouldn't touch the grid lines. Allow any width. AO4 – 2 marks	

01	6	**Suggest one reason for the increase in the total number of tropical storms and hurricanes shown in Figure 3.** Rising (sea) temperatures (1) Climate change (1) Longer storm season (1) More places above 27 °C (1) Global warming /greenhouse effect (1) Improved recording of weather events (1) No credit for simply stating that there is an increasing number of hurricanes AO3 – 1 mark	1

01	7	**Outline one way that planning can reduce the impact of tropical storms.** Hurricane Preparedness Week/evacuation plans etc (1) encourage people to plan what they need to do in order to minimise loss of life and injury (d)(1) Preparing disaster supply kits (1) means people have what they need in the event of a tropical storm (d)(1) Evacuation centres/evacuation plan (1) so people know a safe place to go in the event of a hurricane / to minimise loss of life and injury (d) (1) Storing loose objects/storm shutters/hurricane straps (1) to prevent damage and injury from flying objects (d)(1) Remove trees or cut loose branches from trees close to buildings (1) to prevent damage and injury from flying objects in the event of a tropical storm (d)(1) Restrict building in hurricane risk areas (1) to limit the number of people and buildings at immediate risk from storm surges and flooding(d) (1) Coastal flood defences such as levees and flood walls (1) can reduce the impact of storm surges (d) (1) Early warning systems are installed in some countries (such as Bangladesh) (1), helping to reduce the number of deaths (d) (1). Advice to stock up on food and water (1) as people may be housebound for several days following a storm (d) (1). Building of storm proof houses/ adapting building structures (1) enables people to be protected against strong winds (d) (1) Providing a warning (1) (Allow long term protection strategies as part of planning) Only ONE developed strategy to be credited. First mark for strategy, second mark for developed point. AO1 – 2 marks	2

01	8	**'UK weather is becoming more extreme.' Do you agree?** **Use Figure 4 and your own understanding**.	6

Level	Marks	Description
3 (Detailed)	5–6	AO2 Shows thorough geographical understanding of the evidence for extreme weather in the UK. AO3 Demonstrates thorough application of knowledge and understanding in making a supported judgement about whether the weather in the UK is becoming more extreme.
2 (Clear)	3–4	AO2 Shows some geographical understanding of the evidence for extreme weather in the UK. AO3 Demonstrates reasonable application of knowledge and understanding in making a judgement about whether the weather in the UK is becoming more extreme.
1 (Basic)	1–2	AO2 Shows limited geographical understanding of the evidence for extreme weather in the UK. AO3 May include limited application of knowledge and understanding in making a judgement about whether the weather in the UK is becoming more extreme.
	0	No relevant content

- **Level 3 (detailed) responses** will be developed responses with supporting evidence for answer. Appropriate use of Figure 4 (direct or inferred) and specific own understanding.
- **Level 2 (clear) responses** are likely to be linked statements with some elaboration. Some use of Figure 4 (direct or inferred) and/or own understanding.
- **Level 1 (basic) responses** will be simple statements with limited understanding or development. May consist of listed points, using information taken largely from Figure 4

Indicative content

- The command is "do you agree" and so the focus of the question is an evaluation of the degree to which they feel weather events are becoming more extreme in the UK eg fully agree, partially agree, disagree.
- The question also requires the student to "support your answer" with reference to Figure 4 as well as their own understanding. Answers should therefore make some reference to Figure 4.
- Figure 4 shows examples of two extreme weather events – moorland fires and flooding. Whilst these only represent two extreme weather events, the text suggests that their occurrence is becoming more common.

		• The effects on the people and/or environment from these two events are likely to have been significant compared to normal seasonal temperatures and rainfall totals in the UK. • The moorland fires shown in Figure 4 can be linked to higher temperatures and lack of rainfall which have become more common in the UK in the summer months. Drought conditions like this make areas of dry land more vulnerable to fire (though actual ignition is often caused by human activities). These fires would likely have extreme economic, social and environmental impacts. • The flooding shown in Figure 4 is the result of excessive and persistent rainfall which has become more common in the UK in the winter months. Flood events also have extreme economic, social and environmental impacts. • Students may refer to examples of recent 'extreme' weather events in the UK including strong winds (Storms Ciara, Dennis 2020), drought and heatwaves, cold weather (Beast from the East 2018) and record rainfall and flooding (Cumbria 2009, Somerset Levels 2014, Shrewsbury 2020) • Evidence from the Met Office suggests that the UK <u>is</u> experiencing more extreme weather events but that all weather is subject to great variability. However, there is evidence that more winter rain has fallen in heavy events since the 1980s and this has increased the frequency and magnitude of river flooding. Likewise, the UK has seen a temperature increase of 1 ^{o}C since 1980 which has been linked to hotter summers and greater chance of drought (although the latter also relies on lower seasonal precipitation totals). • Students may discuss the need to look at long-term weather trends in order to decide whether the weather in the UK is becoming more extreme. They may rightly acknowledge that reference to only a handful of recent events is not evidence of a trend and that many parts of the UK are not experiencing significantly different weather patterns. • Credit reference to causes of extreme weather trends. Links to global climate change AO2 – 3 marks AO3 – 3 marks	

<table>
<tr>
<td>01</td>
<td>9</td>
<td>
Explain why earthquakes and volcanic eruptions take place along destructive plate margins.
<table>
<tr><th>Level</th><th>Marks</th><th>Description</th></tr>
<tr><td>2 (Clear)</td><td>3–4</td><td>AO1 Demonstrates accurate knowledge of earthquakes and volcanoes and their link to destructive plate margins.

AO2 Shows some geographical understanding of why earthquakes and volcanoes take place along destructive plate margins.</td></tr>
<tr><td>1 (Basic)</td><td>1–2</td><td>AO1 Demonstrates limited knowledge about earthquakes and/or volcanoes and their link to destructive plate margins.

AO2 Shows limited geographical understanding of why earthquakes and/or volcanoes take place along destructive plate margins.</td></tr>
<tr><td></td><td>0</td><td>No relevant content</td></tr>
</table>

Level 2 (clear) responses are likely to have clear reasons why earthquakes and volcanoes take place along destructive plate margins.
Level 1 (basic) responses will be simple statements with limited understanding of why earthquakes and/or volcanoes take place along destructive plate margins.
Top Level 2 requires explanation of both earthquakes and volcanoes. Low level 2 for clear explanation of one of volcanoes or earthquakes
No credit for explanation of volcanoes and/or earthquakes occurring along constructive or conservative margins.

<u>Indicative content</u>

This question requires an explanation of why earthquakes and volcanoes take place along destructive plate margins.
Destructive plate margins occur when two tectonic plates move towards each other and one is subducted under the other.
Allow reference to collision boundaries. If two continental plates collide, the pressure and strain may cause an earthquake.
If an oceanic and continental plate collide, the denser oceanic plate is subducted and sinks below the continental plate and into the Earth’s mantle. This causes part of the mantle to melt and hot magma may rise up through the overlying mantle and lithosphere. This may eventually erupt out of the earth’s surface causing a volcano.
Accept explanations that refer to slab pull and gravitational movement of plates: the denser plate sinks into the mantle under the influence of gravity, which pulls the rest of the plate along behind it (slab pull).

</td>
<td>4</td>
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		• An earthquake may occur because as the plates converge, pressure builds up, the rock may fracture and the pressure is released as an earthquake. AO1 – 2 marks AO2 – 2 marks	

01	10	**To what extent do the effects of 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 a tectonic hazard and illustrates this through use of example(s). AO2 Shows thorough geographical understanding of how the effects 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 between areas of contrasting levels of wealth.
2 (Clear)	4–6	AO1 Demonstrates clear knowledge of the effects of a tectonic hazard and may illustrate this through some use of example(s). AO2 Shows some geographical understanding of how the effects 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 between areas of contrasting levels of wealth.
1 (Basic)	1–3	AO1 Demonstrates limited knowledge of the effects of a tectonic hazard. AO2 Shows slight geographical understanding of how the effects may vary between areas of contrasting levels of wealth. AO3 Demonstrates limited application of knowledge and understanding in evaluating the difference in effects 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 examination of the extent to which the effects of a tectonic hazard vary between areas of contrasting levels of wealth with detailed use of example(s).

Level 2 (clear) responses will have linked or elaborated statements and some accurate use of geographical terms. Will outline the effects of 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 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 could apply to both types of hazard. • Max Level 2 if answer does not refer to named example(s). • Credit responses to tectonic hazard if linked to impacts. It is acceptable for answers to refer to responses as part of the discussion • Any examples with differences in wealth can be credited, even if both are in HICs/LICs <u>Indicative content</u> • The command is 'to what extent', so the focus of the question is an evaluation of the degree to which the effects of 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 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 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. • Credit knowledge and understanding of specific examples of tectonic hazards. These might include 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 Paganio. 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 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. **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	**3** **2** **1** **0**

		• 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.	

Section B

Qu	Pt	Marking guidance	Total marks
02	1	**Using Figure 5, which one of the following statements is true?** **D**: Coniferous forests occur in large areas of North America, Europe and Asia. No credit if two or more answers are shaded. AO4 – 1 mark	1
02	2	**Using Figure 5, name the continent with the largest area of savanna.** Africa Do not accept south/southern Africa AO4 – 1 mark	1
02	3	**Which statement describes the characteristics of temperate deciduous forests?** **B**: The trees drop their leaves because of lower temperatures in winter. No credit if two or more answers are shaded. AO1 – 1 mark	1

02	4	**Suggest how plants are adapted to the climate in tropical rainforests.** **Use Figure 6 and your own understanding.**	6

Level	Marks	Description
3 (Detailed)	5–6	AO2 Shows thorough geographical understanding of ways that plants are adapted to the climate of tropical rainforests. AO3 Demonstrates thorough application of knowledge and understanding in interpreting the characteristics shown in the photograph in relation to the climate of tropical rainforest environments.
2 (Clear)	3–4	AO2 Shows some geographical understanding of ways that plants are adapted to the climate of tropical rainforests. AO3 Demonstrates reasonable application of knowledge and understanding in interpreting the characteristic(s) shown in the photograph in relation to the climate of tropical rainforest environments.
1 (Basic)	1–2	AO2 Shows limited geographical understanding of ways that plants are adapted to the climate of tropical rainforests. AO3 May include limited application of knowledge and understanding in interpreting the characteristic(s) shown in the photograph in relation to the climate of tropical rainforest environments.
	0	No relevant content

- **Level 3 (detailed) responses** will be developed, with supporting evidence for answer. Appropriate use of Figure 6 (direct or inferred) and specific own understanding.
- **Level 2 (clear) responses** are likely to be linked statements with some elaboration. Some use of Figure 6 (direct or inferred) and own understanding.
- **Level 1 (basic) responses** are likely to consist of simple statements, with limited use of subject vocabulary. May consist of listed points, using information derived from Figure 6.
- Responses should refer to the photograph and information in the climate graph in Figure 6 (directly or inferred) to access Level 3.
- Credit is given at all levels for features of vegetation and their adaptation to climate beyond those shown in Figure 6.

		• Explanation of buttress roots only without any inferred link to climate limited to Level 1. • Max Level 1 if answer just refers to the climate of the rainforest (as prompted by the climate graph Figure 6) with no adaptations. <u>Indicative content.</u> • The command word 'suggest' is used, which means to provide an informed account of the ways plants adapt to the tropical rainforest climate illustrated in Figure 6. Interpretation of the characteristics of the vegetation as evidenced in Figure 6, eg the buttress roots of the trees, limited undergrowth, straight trunks, climbing plants or lianas, ferns, trees with different widths and heights, few branches. • The link to climate can include any reference to rainfall, winds, sunlight or temperature. • Interpretation of the climate of tropical rainforest environments as shown in Figure 6. The climate is much the same all year round and there are no seasons. The graph shows uniformly high monthly temperatures (28–29 °C). There is high to very high rainfall in every month, varying from a low of 150 mm in August to a high of 350 mm in March, with a total of over 2000 mm. There are two rainfall maxima (Nov and March), perhaps linked to the position of the overhead sun. The atmosphere is therefore hot and humid. • Consistently high temperatures mean that plants grow all year, and will be competing for sunlight. High rainfall and high humidity encourage rapid growth of tall trees and fast rates of nutrient cycling. • Because of the favourable climate, tropical rainforests have high levels of biodiversity. Around 50–60% of all plant species are indigenous to the rainforests. Two-thirds of all flowering plants can be found in rainforests. • Plants drop their leaves gradually throughout the year, meaning they can go on growing all year round. • Due to the high rainfall, leaves often have drip tips which allow the water to be channelled to the end and fall so the leaf does not break. • Leaf stems are flexible to allow leaves to move with the sun. • The bark on the trees is thin and smooth to allow free flow of water. Because of high temperatures, there is no need for protection against cold. • The waxy upper surface of the leaves protects against the heat. • Some plants, such as lianas, climb up the trees to reach sunlight for photosynthesis, while others live on branches in the canopy for the same reason ie epiphytes. • Buttress roots support the trees as they grow very tall (over 50 m in some cases) as there is great competition for sunlight. • The high humidity and plentiful rain of the rainforest enable some plants to actually grow without soil – called air plants or aerial plants. They get nutrients from plant debris and bird droppings that land on their roots and are not dependent on the poor soil of the forest. • The forest floor receives only 2% of the sunlight. Only plants adapted to low light can grow in this layer apart from river banks, swamps and	

		clearings, where dense undergrowth is found. Decaying plant and animal matter disappear quickly, because the warm, humid conditions promote rapid decay. Many types of fungi help to decay the plant waste. • The understory includes mid-range trees and smaller plants. This area typically receives only about 5% of the sunlight in the area, because of the density of overhead canopy. Even the largest plants in this area don't typically grow over 3 m, and include shrubs, herbs and vines. • The canopy is the highest level of the rainforest, consisting of branches and leaves of the area's largest trees. Many trees reach over 40 metres and have dense foliage, so little to no sunlight reaches lower areas of the rainforest. • Emergent trees can be found above the canopy. They are successful in maximising the greatest amount of sunlight but must endure high temperatures, lower humidity, and strong winds. • Large evergreen trees typically dominate the sunlight of the rainforest canopy. • Smaller orchids, bromeliads, and types of moss and lichen are also found in the canopy level, accessing sunlight and living in harmony with the larger trees. AO2 – 3 marks AO3 – 3 marks	

02	5	**Using Figure 7, describe changes in tropical primary forest loss between 2002 and 2018.** From 2002 to 2015 forest loss fluctuated up and down (1) varying between 2.5 and 3.5 million hectares (d)(1). Between 2002 and 2015 forest loss was fairly constant (1) at around 3 million hectares (d)(1) There was a sudden increase in forest loss in 2016 (1) doubling in a year from 3 million hectares to just over 6 million hectares (d)(1). Between 2016 and 2018 forest loss decreased (1) from 6.1 million hectares to 3.7 million hectares (d)(1). Fluctuated over the period 2002–2018 (1) between 2.5 – 6.1 million hectares (d1). Between 2002 and 2018 there was an increase (1) of about 1 million hectares (d) (1) AO4 – 2 marks	2

02	6	**Give one reason why deforestation has decreased in some countries.** International agreements (to reduce deforestation)/buying certified timber (1) New/stricter laws have been introduced. Consumer pressure (not to use products from deforested areas) (1) Government restrictions on illegal deforestation (1) Greater awareness of environmental problems caused by deforestation (1) Concerns about climate change /loss of species/ destruction of habitats (1) More sustainable farming practices (1)	1

		Debt relief (1) Selective logging (1) Ecotourism, conservation, education needs to be qualified AO2 – 1 mark	

02	7	**Using Figure 8, outline one environmental effect of deforestation.** Where the trees were cut down, the soil was left exposed (1). It appears to have washed away / been eroded (d) (1) The rain has cut into the surface and created gullies(d)(1) The removal of trees has meant that animal habitats have been destroyed (1) There is little sign of animal life in the foreground of the picture (d) (1) Less biodiversity (1), therefore animals lose their homes/habitat (d) (1) There is a great deal of loose soil and sediment where the trees have been cut down (1). This material is being washed away and could clog up the rivers or lead to flooding (d)(1) Less CO2 is absorbed (1) as fewer trees have leaves for photosynthesis (d) (1) Credit only one environmental effect. The initial point must be environmental eg loss of biodiversity, but the developed point could be social eg leading to loss of potential medicines. Do not credit points that cannot be deduced from the photograph. Do not credit idea that animals have become extinct AO4 – 2 marks	2

02	8	**Explain how ecotourism can be a sustainable management strategy in tropical rainforests.** 2x1 or 1x2 Ecotourism aims to educate visitors (1), increasing their understanding and appreciation of nature and local cultures (d) (1). Ecotourism is small-scale (1), employing local people (d)(1) and using local produce (d)(1). Ecotourism provides money for the local area (1) without damaging the environment/trees (d) (1) Profits stay in the local community(d)(1) and the environment is protected (d)(1). Tourism may take the form of replanting trees /other conservation projects (1). This helps to minimise negative environmental impacts (d)(1). Ecotourism projects use local materials for building (1). This limits the consumption of non-renewable resources imported from abroad(d)(1). Ecotourists arrive in small groups (1) so the impact on the environment is limited (d) (1) eg by making sure waste and litter are disposed of properly (d)(1). Ecotourism is tourism that minimises damage to the environment (1) and benefits the local people (d)(1). Ecotourism can help to raise awareness of conservation issues (1) and bring in more money for rainforest conservation (d)(1). AO2 – 2 marks	2

02	9	**Discuss the challenges and opportunities for development in either a hot desert environment or a cold environment.** **Use either Figure 9 or Figure 10 and a case study.**	9

Level	Marks	Description
3 (Detailed)	7–9	AO1 Demonstrates detailed knowledge of challenges and opportunities for development in a named hot desert or cold environment. AO2 Shows thorough geographical understanding of the challenges and opportunities for development in either a hot desert or a cold environment. AO3 Demonstrates thorough application of knowledge and understanding in discussing the challenges and opportunities for development in either a hot desert or a cold environment, using source and case study.
2 (Clear)	4–6	AO1 Demonstrates clear knowledge of challenges and/or opportunities for development in a named hot desert or cold environment. AO2 Shows some geographical understanding of the challenges and/or opportunities for development in either a hot desert or a cold environment. AO3 Demonstrates reasonable application of knowledge and understanding in discussing the challenges and/or opportunities for development in either a hot desert or a cold environment, using source and/or case study.
1 (Basic)	1–3	AO1 Demonstrates limited knowledge of challenges and/or opportunities for development in a named hot desert or cold environment. AO2 Shows slight geographical understanding of the challenges and/or opportunities for development in either a hot desert or a cold environment. AO3 Demonstrates basic application of knowledge and understanding in discussing the challenge(s) and /or opportunity(ies) for development in either a hot desert or a cold environment, using source and/or case study.
	0	No relevant content

Level 3 (detailed) responses will be well developed with accurate use of geographical terms. Reasoned discussion of several opportunities and challenges for development in either a hot desert or cold environment with evidence from Figure 9/10 and some developed case study support.

Level 2 (clear) **responses** will have linked or elaborated statements and some use of geographical terms. May outline some opportunities and/or challenges for development in either a hot desert or cold environment. Will include some case study support and/or refer to evidence from Figure 9/10.

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 opportunity and/or challenge in either a hot desert or cold environment. Answer may be largely reliant on Figure 9/10.

- A purely generic answer without exemplification is limited to Level 2.
- An answer that lacks (direct or inferred) reference to Figure 9 or 10 is limited to Level 2.
- An answer that discusses only opportunities or challenges for development is limited to Level 2.
- If the answer refers to both environments credit the one that is more creditworthy.
- Allow reference to more than one case study if relevant. Credit detail about different desert/cold environment areas to illustrate challenges and opportunities

<u>Indicative content for hot deserts</u>

- The question requires discussion of ways in which a hot desert area provides challenges and opportunities for development.
- Answers may focus on the nature of economic opportunities, the scale of development and control over the inhospitable conditions.
- Challenges include environmental constraints, costs/remoteness, and conflicts with indigenous populations.
- Due to the lack of cloud cover, daily temperatures can range from over 40 °C during the day to below freezing at night.
- Deserts have low annual rainfall (less than 100 mm in places). Rainfall is unpredictable and most rivers are intermittent. Providing enough water for industry or irrigation is difficult.
- Opportunities include resource exploitation relating to agriculture, recreation and tourism. Economic benefits include employment, spending in the local economy, multiplier effect, and improved infrastructure. Many hot desert environments are increasingly important economically.
- Application of knowledge and understanding to Figure 9. Photo 1 shows a barren, inhospitable environment with sparse vegetation. The land is uneven, with hilly or mountainous terrain in the background. The area appears to be remote, with no sign of communications and lacks water supply.
- Photograph 2 shows the use of a desert landscape for mining development. Despite the challenges of a desert environment, the large-scale mining for gold may be worthwhile as it produces a good financial return.
- Support for answers may be based in poorer or richer parts of the world. In HICs, south west US may be used. Economic activity may focus on water supply and how it is managed, provision for commercial farming, mining activity, supplying water, possible provision of a power source to facilitate development, development of tourism on a large scale, building areas for retirement.

		• In LICs, areas such as the Thar Desert may be cited. Economic activities include subsistence farming, including nomadic pastoralism, and hunter-gathering. Commercial farming supported by irrigation may be emphasised. Resources such as limestone and gypsum are found in this desert, valuable for the building industry. Hydroelectric power is supplied. Tourism is a growing industry. • 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. <u>Indicative content for cold environments</u> • The question requires discussion of ways in which a cold environment provides opportunities and challenges for development. • Answers may focus on the nature of economic opportunities, the 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. • Opportunities include resource exploitation, including agriculture, recreation and tourism. Economic benefits include employment, spending in the local economy, multiplier effect, and improved infrastructure. Many cold environments are increasingly important economically • Application of knowledge and understanding to Figure 10. Photo 1 shows an inhospitable environment with sparse vegetation and hollows filled with surface water and ice. In the background is a wide glacier, and a steep mountain front on the right. The area appears to be remote and inaccessible, with no sign of communications • Photograph 2 shows the use of a cold environment in Alaska for oil extraction. Despite the challenges of a cold environment, the large-scale drilling for oil may be worthwhile as it produces a good financial return. • 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. Challenges to development include getting access to resources, finding a workforce to exploit them, and providing protection from the extreme weather. Drilling and mining activities occur, there is considerable hydroelectric power potential, large parts of the coastline offer wind and geothermal energy potential and the region has a large seafood fishing industry. 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	**Using Figure 11, what is the mode of annual rate of erosion along the Holderness coastline?** **B**: 2.0 – 2.9 metres per year. No credit if two or more answers are shaded. AO4 – 1 mark	1
03	2	**Using Figure 11, describe how the rate of erosion changes from north to south.** It increases/generally increases. (1) It tends to increase, but drops at the southernmost site. (1) It changes from 1.5 to over 5 metres per year from N to S. (1) The rate of erosion more than triples between site 1 and site 5. (1) AO4 – 1 mark	1
03	3	**Using Figure 11, what is the coastal landform that has formed at Spurn Head?** **C**: Spit No credit if two or more answers are shaded. AO1 – 1 mark	1
03	4	**Using Figure 11, suggest why there is a headland at Flamborough Head.** Chalk is a harder/resistant type of rock than the rocks to the south, so is eroded more slowly (1) It is made of chalk/hard rock (1) AO4 – 1 mark	1
03	5	**Using Figure 12, give one reason why the rate of erosion of the Holderness coast is high.** The rocks appear to be soft/weak (1) The cliffs are liable to slumping/mass movement (1) The cliffs are made of soft boulder clay (1) Because of (powerful) wave energy/sea hits base of cliff (1) There are no hard engineering defences in place (1) There is no beach at the base. (It consists of) clay	1

		AO3 – 1 mark	

03	6	**Explain how a wave cut platform is formed as a cliff is eroded.** **Use one or more diagrams to support your answer.**	4

Level	Marks	Description
2 (Clear)	3–4	AO1 Demonstrates accurate knowledge about coastal erosion processes and wave cut platform 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 wave cut platform 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 some knowledge or names 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 Level 2 if diagram is not used.

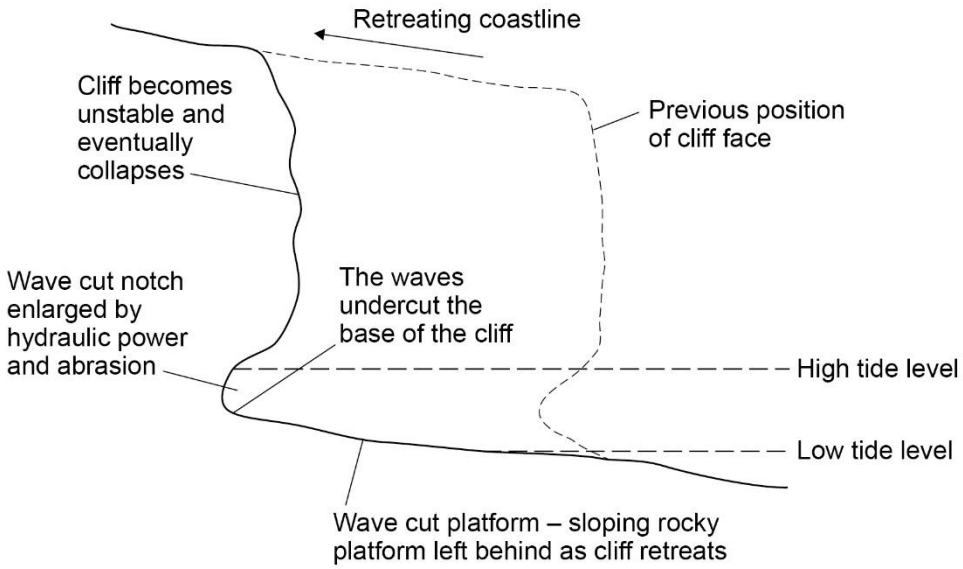
- Credit full marks at L2 if annotated diagram clearly shows formation

<u>Indicative content</u>

The command is 'explain', so responses should provide a reasoned account of how and why a wave cut platform is formed as a cliff retreats.

- Waves cause most erosion at the foot of a cliff.
- This erosion forms a wave-cut notch, which is enlarged as erosion continues.
- The rock above the notch becomes unstable and eventually collapses.
- The collapsed material is washed away and a new wave-cut notch starts to form. Repeated collapsing results in the cliff retreating.
- A wave-cut platform is the surface that's left behind as the cliff retreats. Pebbles grind over the rocky platform, often causing it to become smooth.
- Hydraulic action is the power of the waves as they smash onto a cliff. Trapped air is forced into holes and cracks in the rock, eventually causing the rock to break apart.
- Abrasion or corrasion involves fragments of rock being picked up and hurled by the sea at a cliff.

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



The diagram above, fully labelled, would be awarded 4 marks

AO1 – 2 marks
AO2 – 2 marks

03	7	**Assess the effectiveness of strategies used to protect coastlines against erosion.** **Use Figure 13 and your own understanding.**	6

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

- **Level 3 (detailed) responses** will be developed responses clearly assessing effectiveness / costs and benefits of coastal management strategies. Appropriate terminology will be used. Appropriate use of Figure 13.

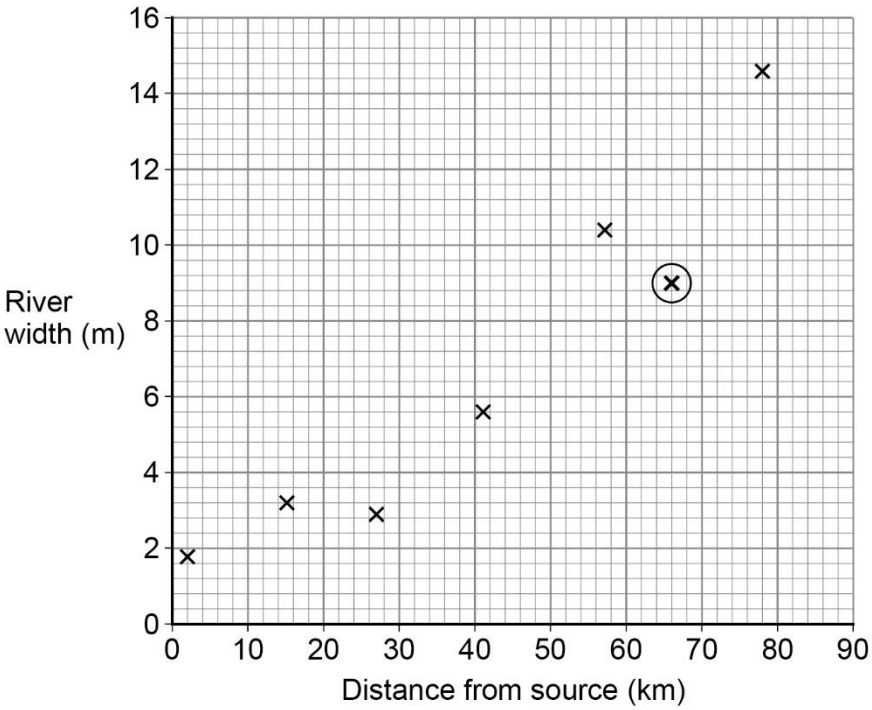
- **Level 2 (clear) responses** are likely to show understanding of coastal management strategy(ies) and their effectiveness / costs and/or benefits. Some assessment and some geographical terminology may be evident. Likely to use Figure 13

- **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 Level 2 for answer that does not refer to Figure 13.
- Max Level 2 for answers that refer to a single strategy. Full marks available for assessment of two or more strategies.

		Indicative content • Understanding of hard engineering schemes, which involve using artificial structures to control natural processes. These are designed to reduce wave energy or create a barrier between the land and sea, so storm waves can't reach the cliffs. • Understanding of soft engineering strategies. Beach nourishment, reprofiling and dune regeneration are listed in the specification. Soft engineering works with nature rather than against it, blends in with the environment and can improve it eg adding sand to beaches, doesn't interfere with processes elsewhere and affect other areas, and is sustainable. • Application of understanding to Figure 13, showing coastal management in the form of rock groynes, rip rap or rock armour and regraded cliffs. Expect some assessment of the costs and benefits/effectiveness of these approaches. Other types of hard and soft engineering may also be credited. • Figure 13 shows two large 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. Both groynes appear to be trapping beach material, providing protection to the cliffs and coastal settlement. However, immediately downdrift of the south groyne, cliffs are being rapidly eroded, as this part of the coast is starved of beach sediment and much more exposed to wave attack. • 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. Not too expensive. If well maintained, can last up to 40 years. • Rip rap / rock armour consists of massive blocks of natural rock piled up at the base of a cliff. These can be seen downdrift of the south groyne and between the two groynes. 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. Credit idea that although rock armour has been placed at the base of the cliffs, some slumping still occurs, so effectiveness might be questioned. • Benefits of rock armour. It disperses the energy of the waves and reduces their erosional power. 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. • Cliff regrading (a form of soft engineering) involves cliff slope angles being reduced to increase stability. These are re-vegetated to reduce surface erosion and mass movement/slumping. Combining cliff regrading with rock armour means that the cliffs here are stabilised. It works on clay or loose rock where little else will. • Credit other hard engineering strategies**.** 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. Benefits. 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. • Sea walls aim to protect the coast using concrete, steel and/or stone. Benefits. Effective in protecting cliffs from erosion and also act as a barrier to prevent flooding. Deflect wave energy back to sea. Give 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. • Other hard engineering strategies include revetments, offshore barriers and reefs. • Soft engineering strategies. Beach nourishment replaces beach or cliff material that has been removed by erosion or longshore drift. • Beach reprofiling is the artificial re-shaping of a beach using existing beach material. For example, after winter storms, bulldozers may move shingle back up the beach. • Dune regeneration is the artificial creation of new sand dunes or the restoration of existing dunes using strategies such as marram grass planting or fencing them off from human impact. • Disadvantages of soft engineering – areas can just be left at the mercy of the sea, more gentle intervention may not be effective, people can lose homes and livelihoods. • Overall assessment of hard engineering strategies. The 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	**Plot the width of the river at Site 6 on to the graph below.** **Use the following data.** **Distance from source (km): 66** **Width of river (m): 9.0**  Correct plot as shown in figure above. Allow dot or other method of showing correct plot AO4 – 1 mark	1
04	2	**Using Figure 14, describe the change in river width downstream from the source.** The river increases in width downstream (1) The width increases from site 1 to 2/ decreases between sites 2 and site 3 (1) The river increases in width between sites 3 and 5 / decreases between sites 5 and 6 (1) The river changes from a width of 1.9 metres near the source to almost 15 metres at 78 km from the source (1) The width is almost 8 times greater at site 7 compared with site 1 (1) No credit for the width fluctuates. AO4 – 1 mark	1

04	3	**Give one reason why the median size of sediment tends to decrease downstream from the source of the river.** The river load is broken down by erosion (1). Erosion (1) Attrition between particles reduces the size of sediment (1). Heavy river sediment is left behind when the river floods, but takes finer particles downstream (1). Allow reference to other specific erosion processes eg abrasion, solution AO3– 1 mark	1

04	4	**Identify the landform shown in Figure 15.** **A**: Interlocking spurs No credit if two or more answers are shaded. AO1 – 1 mark	1

04	5	**Using Figure 15, describe the shape of the valley sides.** The sides are very steep/steep/quite steep/moderate/uniform/constant (1). The valley is V shaped (1). The left side is steeper than the right side of the valley (1). Do not accept gentle sided. AO4 – 1 mark	1

<table>
<tr>
<td>04</td>
<td>6</td>
<td>
Explain how a meander may be formed by both erosion and deposition. Use one or more diagrams to support your answer.
<table>
<tr><th>Level</th><th>Marks</th><th>Description</th></tr>
<tr><td>2
(Clear)</td><td>3–4</td><td>AO1 Demonstrates accurate knowledge about river erosion and deposition processes and meander development.

AO2 Shows a clear geographical understanding of the interrelationships between river environments and processes. Explanations are developed.</td></tr>
<tr><td>1
(Basic)</td><td>1–2</td><td>AO1 Demonstrates limited knowledge about river erosion and deposition processes and meander development.

AO2 Shows limited geographical understanding of the interrelationships between river environments and processes. Explanations are partial.</td></tr>
<tr><td></td><td>0</td><td>No relevant content.</td></tr>
</table>

Level 2 (clear) responses are likely to contain linked statements showing knowledge or names 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 Level 2 if diagram is not used.
Credit full marks at L2 if annotated diagram clearly shows formation

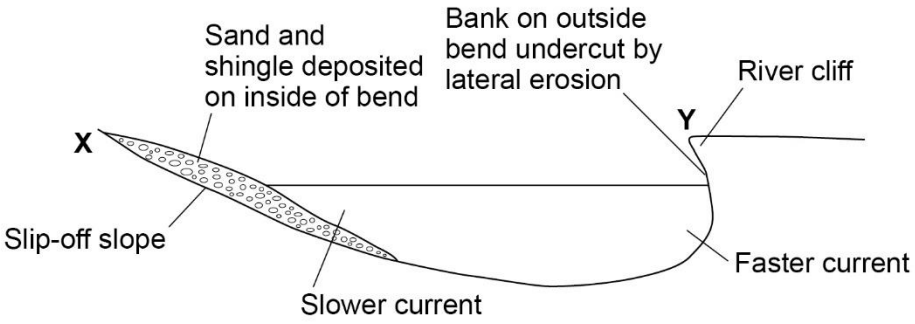
<u>Indicative content</u>

The command is ‘explain’, so responses should provide a reasoned account of how and why meanders develop. Processes may be outlined as well as the sequence of formation.
The development of meanders is due to both deposition and erosion.
A meander is a winding curve or bend in a river. Water flows fastest on the outer bend of the river where the channel is deeper and there is less friction. Lateral erosion results in undercutting of the river bank and the formation of a steep sided river cliff.
On the inside of the bend, where the river flow is slower and water is shallower, material is deposited on a slip off slope, as there is more friction.

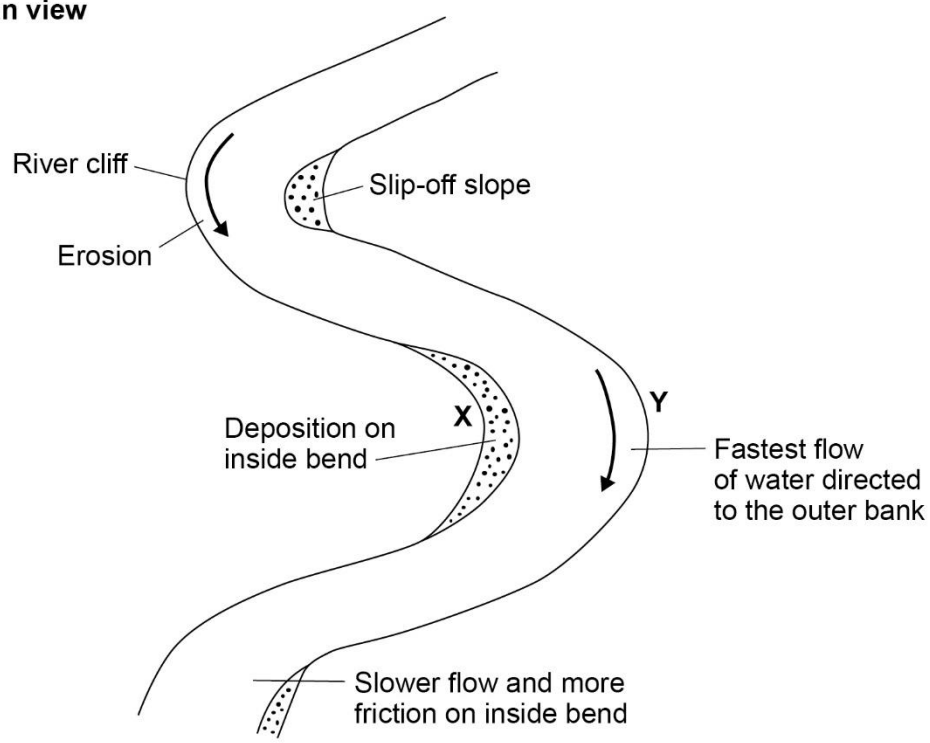
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<td>4</td>
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- Over time, because of erosion and deposition, meanders gradually change shape and move across the floodplain and migrate downstream.
- Accept reference to initial formation (riffles and pools) if change and development over time are explained. In low flow conditions bends in a river are initially formed by the deposit of sediment on the river bed, resulting in the variations in the river's flow. Shallower areas with deposits are known as riffles, while deeper areas are called pools. The flow of the river naturally increases in pools, where there is less friction and more erosion, causing the river to bend.
- Labelled and annotated diagram(s) can substitute for written text, showing the sequence of changes and processes involved (either cross section or plan view)

Cross section



Plan view



Either of the two diagrams, fully labelled, would be awarded 4 marks

AO1 – 2 marks

		AO2 – 2 marks	

04	7	**Assess the benefits of using hard engineering and soft engineering to reduce the risk of river flooding.** **Use Figure 16 and your own understanding.**	6

Level	Marks	Description
3 (Detailed)	5–6	AO2 Shows thorough geographical understanding of hard and soft engineering strategies used to reduce the risk of river flooding. AO3 Demonstrates thorough application of knowledge and understanding in analysing the benefits of hard and soft engineering used to reduce the risk of flooding.
2 (Clear)	3–4	AO2 Shows clear geographical understanding of hard and/or soft engineering strategies used to reduce the risk of river flooding. AO3 Demonstrates reasonable application of knowledge and understanding in analysing the benefits of hard and/or soft engineering used to reduce the risk of flooding.
1 (Basic)	1–2	AO2 Shows limited geographical understanding of hard and/or soft engineering strategy(ies) used to reduce the risk of river flooding. AO3 Demonstrates limited application of knowledge and understanding in analysing the benefits of hard and/or soft engineering used to reduce the risk of flooding.
	0	No relevant content.

- **Level 3 (detailed) responses** will be developed responses, with understanding of how hard and soft engineering strategies reduce the flood risk. Reference to Figure 16 (direct or inferred) and own understanding, with some analysis. Considers advantage(s) of both hard and soft engineering. and may reach a conclusion. Appropriate terminology will be used.

- **Level 2 (clear) responses** are likely to have linked statement(s) showing some understanding of how hard and soft engineering strategies reduce the flood risk. Some use of Figure 16 (direct or inferred) and/or own understanding. Considers advantage(s), although coverage of hard and soft may be imbalanced. May reach simple conclusion. Some geographical terminology evident.

- **Level 1 (basic) responses** will be simple statements with limited understanding or development. May consist of listed points, using information taken largely from Figure 16.

		• Max Level 2 is answer is limited to either hard or soft engineering. • Max Level 2 if there is no (direct or inferred) reference to Figure 16. <u>Indicative content</u> • Answers should emphasise the benefits of soft and hard engineering. There should be reference to at least one hard and one soft engineering strategy. Credit exemplars where relevant. • The command word is 'assess', so expect some analysis of the (relative) advantages of both. • Credit references to costs/disadvantages as part of the assessment of benefits. • There is a need to explain how both hard and soft engineering can contribute to managing the risk of flooding and so a link needs to be made between the strategy and the flood risk. • Responses may mention the possible effects of climate change or on the fact that more people are likely to be affected by flooding in the future due to increased building on floodplains. The economic cost of flood damage and flood prevention schemes (hard engineering) will therefore rise. • Hard engineering involves using man-made structures to prevent or control natural processes from taking place. This form of flood management is usually very expensive – individual projects can cost several million pounds. But this is the preferred option for protecting expensive property or land, such as housing estates, railways and water treatment works. The costs have to be weighed against the benefits. • Soft engineering involves working with nature and natural river processes to manage the risk of floods. Strategies that can be implemented include using floodplains only as temporary water stores, restoring old peat bogs in upland areas and planting more trees. • Application of understanding to Figure 16. Differing views are expressed, with the local resident feeling that hard engineering solutions are needed to protect vulnerable properties on river floodplains, paid for by central government. The use of dams and floodwalls/levees keeps the water in the channel and helps to control its floodwaters more effectively. • The Environment Officer emphasises the benefits of soft engineering, indicating that this is now the more favoured approach. Soft engineering has minimal impact on the environment and is socially sustainable. The costs are significantly less than hard engineering alternatives and they also cost very little to maintain. As they have lower technology requirements they can often be implemented by local people. • The spec includes: ○ hard engineering – dams and reservoirs, straightening, embankments, flood relief channels ○ soft engineering – flood warnings and preparation, flood plain zoning, planting trees and river restoration Credit other strategies if relevant.	

		• Reservoirs store water, especially during periods of prolonged or heavy rain, reducing the risk of flooding. The water in the reservoir can be used as drinking water and to generate hydroelectric power. • River straightening means that water moves out of the area more quickly because it doesn't travel as far – reducing the risk of flooding. • Embankments enable the river to hold more water so it will flood less frequently, protecting buildings on the flood plain. • Planting trees increases interception of water in the catchment area and reduces the amount of precipitation reaching the river and therefore reduces the risk of flooding. Trees absorb CO2, manage and reduce soil erosion, reduce pollution, improve aesthetics, provide habitats for wildlife and thus increase biodiversity in an area. • River restoration involves returning a river to its natural state. This can involve removing man-made levees or removing river straightening. Discharge in the river is reduced, meaning there is less risk of flooding downstream. Little or no maintenance is required which makes this a low-cost solution. Biodiversity is maintained along the river. • Credit overall assessment which compares hard and soft engineering. Hard engineering projects are generally very successful and have a large impact on the river. Soft engineering projects are more sustainable. They are low maintenance and low cost unlike hard engineering projects. They don't disturb the natural processes and ecological systems in a river basin, instead aiming to integrate with them and in some cases improve them. • Credit exemplars of hard and soft engineering schemes. AO2 – 3 marks AO3 – 3 marks	

Qu	Pt	Marking guidance	Total marks
05	1	**Using Figure 17, complete Figure 18, a cross section showing the depth of ice between X and Y.** Correct completion of the cross section showing steep drop in ice depth close to Y  Line must go to 0 at Y. Allow for variation in shape-could be a straight line. AO4 – 1 mark	1
05	2	**Using Figure 17, compare the maximum depth of ice over the British Isles with the maximum depth of ice over Scandinavia.** Over Scandinavia the depth was (over) 2500 metres whereas over the British Isles it was (just over) 1500 metres (1) It was (much) deeper over Scandinavia than the British Isles (1) It was around 1000 metres deeper over Scandinavia (1) 1000 metres difference in depth (1) AO4 – 1 mark	1
05	3	**Using Figure 17, which one of the following statements is true?** **C**: The ice sheet extended westwards from Scandinavia to the British Isles. No credit if two or more answers are shaded. AO4 – 1 mark	1
05	4	**Identify the feature shown at X.** **A**: Moraine No credit if two or more answers are shaded. AO1 – 1 mark	1

05	5	**Suggest one reason why the material deposited by a glacier is mixed in size and shape.** It was transported by ice which picks up all sizes of debris (1). The glacier bulldozed all types of material in its path (1). Ice is solid so it can move large boulders as well as fine debris (1). AO3 – 1 mark	1

05	6	**Explain the formation of a glacial trough (U-shaped valley).** **Use one or more diagrams to support your answer.**	4

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

- **Level 2 responses** will contain linked statements showing knowledge or names of the processes involved and the correct sequence of formation. Appropriate geographical terminology.
- **Level 1 responses** will comprise simple ideas with limited or partial sequence and little reference to the processes involved. Geographical terminology will be limited.
- Max lower Level 2 if diagram is not used**.**
- Credit full marks at L2 if annotated diagram (s) clearly shows formation

Indicative content

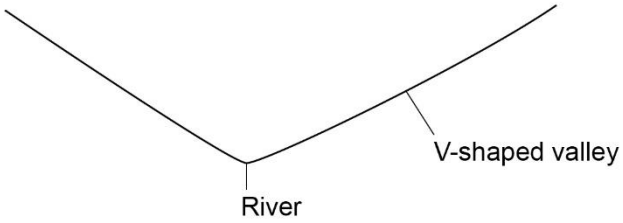
- The command is 'explain', so responses should provide a reasoned account of how and why a glacial trough forms. Processes should be outlined as well as the sequence of formation.
- Ice occupies a former river valley, often V shaped. The glacier is fed by several tributary glaciers that start in corries. These join together and cause the ice to erode powerfully.
- Processes include abrasion-where moraine within the ice to the sides has a sandpapering effect on both sides and base, and plucking – where the ice following melting under pressure, freezes to the rock and tears part of it away when it moves.

- The valley is widened and deepened and the cross profile becomes a steep sided trough with broad base and steep valley sides (U shaped valley). The ice removes the interlocking spurs of the former river valley.

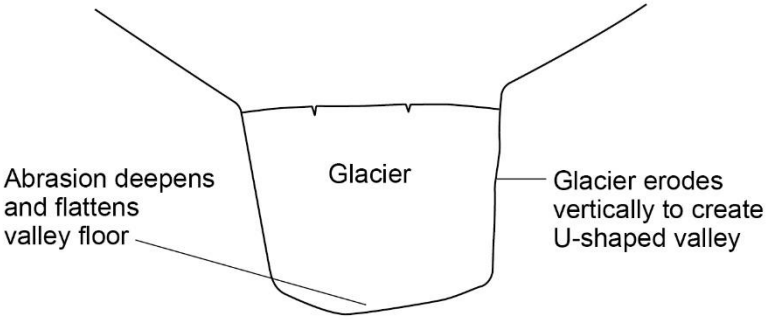
- After the ice melts, the valley floor is filled with glacial debris and river deposits. In places there may be ribbon lakes where water fills hollows.

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

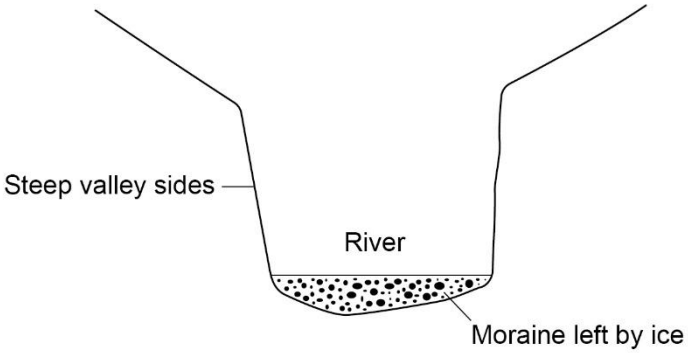
Before the ice age



During the ice age



After the ice age



The diagrams above, fully labelled, would be awarded 4 marks

AO1 – 2 marks
AO2 – 2 marks

<table>
<tr>
<td>05</td>
<td>7</td>
<td>
Assess the economic and environmental impacts of tourism in a glaciated upland area of the UK.
Use Figure 20 and your own understanding.
<table>
<tr><th>Level</th><th>Marks</th><th>Description</th></tr>
<tr><td>3 (Detailed)</td><td>5–6</td><td>AO2 Shows thorough geographical understanding of the economic and environmental impacts of tourism in glaciated areas.

AO3 Demonstrates thorough application of knowledge and understanding in assessing the economic and environmental impacts of tourism in glaciated upland areas.</td></tr>
<tr><td>2 (Clear)</td><td>3–4</td><td>AO2 Shows some geographical understanding of the economic and/or environmental impacts of tourism in glaciated areas.

AO3 Demonstrates reasonable application of knowledge and understanding in assessing the economic and/or environmental impacts of tourism in glaciated upland areas.</td></tr>
<tr><td>1 (Basic)</td><td>1–2</td><td>AO2 Shows limited geographical understanding of the economic and/or environmental impacts of tourism in glaciated areas.

AO3 Demonstrates limited application of knowledge and/or understanding in assessing the economic and environmental impacts of tourism in glaciated upland areas.</td></tr>
<tr><td></td><td>0</td><td>No relevant content.</td></tr>
</table>

Level 3 (detailed) responses will be developed responses, with supporting evidence for answer, making use of Figure 20. Answers will show understanding of both economic and environmental impacts although coverage may not be balanced. Answers may make an assessment of the scale of both economic and environmental impacts or a relative judgement about their importance. Appropriate terminology will be used.
Level 2 (clear) responses are likely to have linked statements showing some understanding of environmental and/or economic impacts of tourism. Answers may make an assessment of economic vs environmental impacts. Answers may make use of Figure 20. Some geographical terminology evident.
Level 1 (basic) responses will be simple or generic statements with limited understanding or development. May consist of listed points or random statements about the benefits of tourism and/or the environmental damage caused. May rely heavily on Figure 20 with little development.

</td>
<td>6</td>
</tr>
</table>

		• Max Level 1 if economic or environmental impacts are not pertinent to a glaciated upland area. • Max Level 2 if there is no assessment of impacts. <u>Indicative content</u> • Responses should consider both environmental and economic impacts of tourism, before assessing whether one is more important than the other, or whether the benefits outweigh the disadvantages. This may be done in the context of a named example such as the Lake District. • Economic impacts of tourism in glaciated areas. o Tourism offers employment to local people o eg in hotels, shops, cafés and the outdoor industry. By diversifying, farmers can generate an alternative source of income, ie B+B, campsites, open farms. o Money spent by tourists boosts the local economy and can be used to improve facilities. Tourism may help to preserve rural services like buses, village shops and post offices. o Increased demand for local food and crafts. o Tourists mainly come to see the scenery and wildlife, so there is pressure to conserve habitats and wildlife. o Spectacular glacial scenery attracts tourists who enjoy outdoor activities and the cultural heritage. Adventure activities include abseiling, gorge scrambling and rock climbing. o Credit disadvantages as well eg the work may be seasonal and employment opportunities limited and low paid. o House prices have risen rapidly because of holiday and second homes, and making it it very difficult for local people (especially those on low wages) to own their own property. • Environmental impacts of tourism. o The main tourist (‘honeypot’) sites and footpaths are often overcrowded. Litter increases during the tourist season and some tourists light bonfires or BBQs, which can damage the ground. o Tourists may park on grass verges, causing damage to vegetation. Potential damage to local flora such as the rare arctic alpine communities. o Footpath erosion is often a problem due to the large numbers of walkers. Vegetation is destroyed and exposed soil is washed away – this damages the landscape and leaves large erosion scars. o Water sports (eg jet skiing and power boating) create noise pollution. The waves created by the boats can erode the shoreline and fuel spills can pollute the water, harming fish, birds and plants. o Pollution (oil, fumes) from vehicles can damage ecosystems. o Walkers can damage farmland by trampling crops or leaving litter. Dogs can disturb sheep and cattle. • Credit environmental benefits as well, eg Some of the money spent by tourists in National Parks can be used for conservation projects. Increasingly, there is a trend towards more sustainable tourism initiatives that help to protect the environment.	

		• Application of understanding to Figure 20. Almost 4 million people visited Snowdonia in 2015 including 600 000 visiting Mt Snowdon, a significant increase on 2013 and 2014 figures. They spent over £120 per head on average, much of which would have helped support local shops, cafes, hotels, camp sites, transport and tourism businesses. The majority were day visitors but almost 1.5 million stayed for longer, so would be paying for overnight accommodation. • The photograph shows the huge number of tourists at the summit of Snowdon. This is likely to contribute to footpath erosion, trampling of vegetation, damage to ecosystems. Other effects might include traffic congestion and pollution, disturbance to farm animals, dropping of litter. • Assessment of economic and environmental impacts. Answers may take the view that the economic impacts are largely beneficial whereas environmental impacts are damaging. Some may take a more balanced perspective, with supporting evidence. Others may suggest that as attempts are made to ensure that tourism becomes more sustainable, environmental damage will be reduced. • Credit reference to examples. AO2 – 3 marks AO3 – 3 marks	