GCSE
GEOGRAPHY
8035/1

Paper 1 Living With The Physical Environment

Mark scheme

June 2020

Version: 1.0 Final mark scheme

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

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 statements about tropical storms is true? Shade one circle only.** D.Tropical storms form above oceans where temperatures are over 27°C No credit if two or more answers are circled. AO1 – 1 mark	1
01	2	**The total number of typhoons reaching Japan was 204.** **What percentage of the total number of typhoons occurred in August?** **Give your answer to the nearest whole percentage.** 34% (2 marks) Working and units not needed. Allow 1 mark for evidence of correct working even if final answer is wrong. Allow maximum 1 mark if figure expressed with 1–2 decimal places (33.8 or 33.82). AO4 – 2 marks	2
01	3	**Give one reason why tropical storms have a seasonal pattern.** They occur (in late summer/autumn) when sea temperatures are highest (over 26/27°C)/ water temperatures of at least 26/27°C are needed down to a depth of at least 50 m/they require high sea temperatures (1). Only occur when atmosphere is unstable (enough for convection and thunderstorms) (1). Reference to higher temperatures on their own is insufficient-must mention sea or water temperatures AO1 – 1 mark	1
01	4	**Describe the structure of Cyclone Idai shown in Figure 2.** Credit 2 different ideas or one developed statement The cyclone has an eye at the centre (1) The centre/circular eye has no cloud (1) There is a mass(swirl) of clouds surrounding the eye (1) The vortex around the eye consists of dense cloud (1)	2

		Clouds have a circular pattern (1) Clouds appear to be arranged in a clockwise pattern (1) Clouds become patchy towards the edge of the cyclone (1) The main parts of the storm are the central eye (1) surrounded by a vortex/eye wall of clouds (d) 1 The centre or eye is cloudless (1) but dense clouds are arranged in a circular pattern around the eye (d) 1 No credit for size of storm using the scale No credit for explanation of structure or for description of movement. AO4 – 2 marks	

01	5	**Suggest why some tropical storms have severe primary and secondary effects.** **Use Figure 3 and your own understanding.**	6

Level	Marks	Description
3 (Detailed)	5–6	AO2 Shows thorough geographical understanding of the primary and secondary effects of tropical storms AO3 Demonstrates coherent application of knowledge and understanding in analysing the severity of primary and secondary effects of tropical storms
2 (Clear)	3–4	AO2 Shows some geographical understanding of the primary and/or secondary effects of tropical storms AO3 Demonstrates reasonable application of knowledge and understanding in analysing the severity of primary and/or secondary effects of tropical storms
1 (Basic)	1–2	AO2 Shows limited geographical understanding of the primary and/or secondary effect(s) of tropical storms AO3 Demonstrates limited application of knowledge and understanding in analysing the severity of primary and/or secondary effect(s) of tropical storms
	0	No relevant content.

- **Level 3 (detailed)** responses will be developed. Some geographical terms will be applied. All aspects of the question are answered, including both primary and secondary, although the two aspects may not be balanced. Uses Figure with elaboration and own understanding. Fully explains the severity of some tropical storms

- **Level 2 (clear)** responses are likely to have linked or elaborated statements and some use of geographical terms. May cover primary or secondary

effects only. Uses Figure with some elaboration and /or own understanding. May explain the severity of some tropical storms

- **Level 1 (basic)** responses may comprise simple/partially inaccurate statements with very limited subject vocabulary. Partial sequence or random points made. May be limited to a single primary **and/or** secondary effect only. May rely on direct or lifted use of Figure or own understanding only. May refer to the severity of some storms

- Max L1 if referring to a natural hazard that is not tropical storms
- Max L2 for explanation of primary or secondary effects only
- Max L2 for explanation of effects without reference to Fig 3

<u>Indicative content</u>

The command word is "suggest", so responses should set out the likely impacts of tropical storms, making use of Figure 3.

- **Primary** effects are the direct result of a tropical storm, such as collapsed buildings. **Secondary** effects are the result of primary effects such as fires from broken gas lines. They also include long-term hazards like water-borne diseases.

- The initial primary effects of a storm involve destructive winds, torrential rain and storm surges.

- **Primary effects** may include:
  people being killed or injured, often caused by flying debris or by drowning.
  homes destroyed.
  transport and communication links not working.
  damage to infrastructure.
  energy supplies cut off.
  trees uprooted by strong winds.
  storm surge raises sea level and floods over the low lying land.

- **Secondary effects** may include:
  people being left homeless.
  a lack of clean water and sanitation.
  water-borne diseases.
  unemployment caused by businesses being damaged.
  if crops are destroyed and/or livestock is killed there can be a shortage of food.
  looting and other crime.
  local economy disrupted, including manufacturing and tourism.
  reduced trade.
  longer term health effects.
  insurance claims.
  destruction of crops.
  disruption to coastal habitats.
  mudslides, landslides.

		• Accept some secondary effects as primary, for example homelessness and displacement of population, as there is some dispute over the precise definition • Analysis of Figure 3. Allow any reasonable inference from the photograph, maps and text. Primary effects include strong winds, torrential rain, roofs and walls of buildings blown away, some buildings destroyed, some buildings underwater, damage to infrastructure, disruption to roads and other communications, large numbers killed or injured. • Secondary effects include damage to local economy, longer term financial impacts, people stranded and made homeless/unemployed, pollution risk, danger of water borne diseases. • Map shows widespread nature of destruction, partial flooding of several large settlements, and submergence of low-lying land near rivers • Factfile indicates loss of human life, homelessness, economic effects and longer term disease risk. Economic data on Mozambique suggests that both primary and secondary effects may be worsened by low incomes and limited investment in monitoring, preparation and protection. • Credit reference to example of tropical storm, although this is not essential to access Level 3, eg Typhoon Haiyan. Primary effects. Strong winds destroyed homes. Over 6,000 people died. Power was interrupted, the airport was badly damaged and roads were blocked by trees. Tacloban was destroyed. Secondary effects Damage to rice and seed stocks. Farmers and fishers lost their income. Huge recovery costs for agriculture and fishing. Looting problems. Increased food prices. Risk of infection and spread of disease. • Assessment of why some tropical storms have severe effects – this may be linked to: strength of storm-wind speeds, size of storm surge, amount of rain extent of area flooded population density in vulnerable areas. wealth of country and money invested in forecasting, warning systems, protection, planning and responses physical geography of coastal zone accessibility and communications quality of infrastructure and building design strength of coastal defences. The extent of both primary and secondary effects may depend on several of these factors. AO2 – 3 marks AO3 – 3 marks	

01	6	**Using Figure 4, which one of the following statements is true?** **Shade one circle only.** B. Most earthquakes happened to the east and south east of Japan. One mark for correct answer: No credit if two or more answers are circled. AO4 – 1 mark	1

01	7	**Using Figure 4, name the type of plate margin between the Pacific and Eurasian plates.** Destructive, convergent No credit for description of movement such as moving towards each other. AO4 – 1 mark	1

01	8	**Suggest one other tectonic hazard likely to occur near to the plate margins shown in Figure 4.** Volcano/volcanic eruption, tsunami No credit for non-tectonic hazard AO3 –1 mark	1

01	9	**Explain how the risks of a tectonic hazard can be reduced.** See table below • **Level 2 (clear)** responses will be clear explanation(s) or linked statements. Some accurate use of geographical terms	4

Level	Marks	Description
2 (Clear)	3–4	AO1 Demonstrates accurate knowledge about the strategy(ies) used to reduce the risks of a tectonic hazard. AO2 Shows a clear understanding of the way(s) that strategy(ies) can help to reduce the risks associated with a tectonic hazard. Explanations are developed.
1 (Basic)	1–2	AO1 Demonstrates limited knowledge about the strategy(ies) used to reduce the risks of a tectonic hazard. AO2 Demonstrates limited understanding of the way(s) that strategy(ies) can help to reduce the risks associated with a tectonic hazard. Explanations are partial.
	0	No relevant content

		• **Level 1 (basic)** responses are likely to be simple random statements. Limited subject vocabulary used. • Max Level 1 for strategies used to reduce the risk of non-tectonic types of hazard. • Answers may focus on one or more of monitoring, prediction, protection and planning. Maximum marks can be achieved for a developed answer about any one type of strategy. <u>Indicative content</u> • The command word is "explain" which requires an account of how and why one or more strategies are helpful in reducing the risks posed by a tectonic hazard. • Answers are likely to be specific to earthquakes or volcanoes, but credit more general responses that are appropriate to both. Allow reference to tsunamis as a type of tectonic hazard. • Strategies to reduce risk are likely to involve one or more of the following, although it is not necessary to use the same terms: • Monitoring – recording physical changes, such as earthquake tremors around a volcano, to help forecast when and where a natural hazard might strike. • Prediction – attempts to forecast when and where a hazard will strike. This can be done to some extent for volcanic eruptions, but less reliably for earthquakes. • Planning – actions taken to enable communities to respond to, and recover from, natural disasters, through emergency evacuation plans and warning systems. • Protection -actions taken before a hazard strikes to reduce its impact, such as educating people or improving building design. • For **earthquakes, monitoring** and **prediction** may involve using seismometers to monitor earth tremors, but specific times and locations are not possible to predict • **Protection** includes constructing buildings so that they are safe to live in and will not collapse. Some examples of building improvements are rubber shock absorbers in the foundations to absorb the Earth tremors, steel frames that can sway during Earth movements, and open areas outside of the buildings where people can assemble during an evacuation. • **Planning**. Hospitals, emergency services and residents may practise for an earthquake. They have drills in all public buildings so that people know what to do in the event of an earthquake. This helps to reduce the impact and increases their chance of survival. Planning may also involve emergency evacuation plans. • **For volcanic eruptions, monitoring and prediction** may involve measuring gas concentrations, using tiltmeters to monitor changes in the volcano's surface), using seismometers to measure small	

		earthquakes and tremors and thermal heat sensors to detect changes in the temperature of the volcano's surface. • **Protection** is difficult but it may be possible to use earth embankments or explosives to divert lava flows away from property. **Planning.** Hazard maps have been produced for many of the world's most dangerous volcanoes, showing the likely areas to be affected. They can be used in planning to restrict certain land uses or to identify which areas need to be evacuated when an eruption is about to happen. AO1 – 2 marks AO2 – 2 marks	

01	10	**State one source of evidence for long-term climate change during the Quaternary period.** Ice cores (which show CO^2 and methane concentrations) (1). Evidence from ocean sediments/rocks/ fossils/plankton (helps to show temperature changes) (1). Pollen analysis.(1) Credit other valid answers No credit for evidence of recent short-term temperature change AO1 – 1 mark	1

01	11	**Using Figure 5, which one of the following statements is true? Shade one circle only.** D Areas north of 60°N will have the greatest increase in temperature. No credit if two or more answers are circled. AO4 – 1 mark	1

<table>
<tr>
<td>01</td>
<td>12</td>
<td>
‘Managing climate change involves both reducing causes (mitigation) and responding to change (adaptation).’

Do you agree?

Explain your answer.

Use Figure 6 and your own understanding.
<table>
<tr><th>Level</th><th>Marks</th><th>Description</th></tr>
<tr><td>3 (Detailed)</td><td>7–9</td><td>AO1 Demonstrates detailed knowledge of the strategies of mitigation and adaptation used in relation to climate change.

AO2 Shows thorough geographical understanding of how different strategies help to reduce the causes of climate change and respond to climate change

AO3 Demonstrates thorough application of knowledge and understanding in evaluating the use of mitigation and adaptation strategies to respond to climate change.</td></tr>
<tr><td>2 (Clear)</td><td>4–6</td><td>AO1 Demonstrates clear knowledge of the strategies of mitigation and/or adaptation used in relation to climate change.

AO2 Shows some geographical understanding of how different strategies help to reduce the causes of climate change and/or respond to climate change

AO3 Demonstrates reasonable application of knowledge and understanding in evaluating the use of mitigation and/or adaptation strategies to respond to climate change.</td></tr>
<tr><td>1 (Basic)</td><td>1–3</td><td>AO1 Demonstrates limited knowledge of the strategies of mitigation and/or adaptation used in relation to climate change.

AO2 Shows basic geographical understanding of how one or more strategies help to reduce the causes of climate change and/or respond to climate change

AO3 Demonstrates limited application of knowledge and understanding in evaluating the use of mitigation and/or adaptation strategy(ies) to respond to climate change.</td></tr>
<tr><td></td><td>0</td><td>No relevant content.</td></tr>
</table>

Level 3 (detailed) responses will be developed. Appropriate use of Figure 6 (direct or inferred) and specific own understanding, with some evaluation. Must cover adaptation and mitigation strategies with justification for both.

</td>
<td>9</td>
</tr>
</table>

- **Level 2 (clear)** responses are likely to be linked statements with some elaboration. Some use of Figure 6 (direct or inferred) and own understanding. Likely to cover both types of strategy.

- **Level 1 (basic)** responses are likely to consist of simple statements, with limited use of subject vocabulary. May only use information derived from Figure 6 or be restricted to one type.

- An answer that lacks consideration of both adaptation and mitigation strategies is limited to Level 2.

Indicative content

- Responses will apply knowledge and understanding of the need to use both adaptation and mitigating strategies in combating climate change, making a judgement about the issues involved.

- The command is 'explain your answer', so responses should support the choice made. Credit responses which highlight the importance of one type of strategy, as well as those which take a more balanced or nuanced approach before reaching a conclusion.

- Knowledge of mitigation strategies. Consists of actions to limit the magnitude or rate of long-term global warming. Mitigation involves reductions in human emissions of greenhouse gases. It may also be achieved by increasing the capacity of carbon sinks, eg, through reforestation.

- Knowledge of adaptation strategies. Action taken to help communities and ecosystems cope with changing climate. The goal is to reduce vulnerability to the harmful effects of climate change (like sea-level rise, more intense extreme weather events or food insecurity). It may also involve making the most of any opportunities (for example, longer growing seasons or increased yields in some regions).

- Understanding of mitigation strategies shown in Figure 6:

  Alternative energy. To help reduce carbon emissions, alternative sources of energy such as hydro-electricity, nuclear power, solar, wind, and tides are increasing in importance. Most are renewable. Nuclear power uses uranium to generate electricity but does not emit CO_2 as a by-product.
  Carbon capture and storage uses technology to capture CO_2 produced from the use of fossil fuels in electricity generation and industrial processes and safely storing it. Carbon dioxide from atmosphere can be converted into liquid and injected into sedimentary rock. It may be possible to capture up to 90 per cent of the CO_2 that would otherwise enter the atmosphere.

		• Understanding of other mitigation strategies. **Planting trees**. Trees act as carbon sinks, removing CO_2 from the atmosphere by the process of photosynthesis. They also release moisture into the atmosphere. This has a cooling effect by producing more cloud, reducing incoming solar radiation. **International agreements**. The UN negotiated a new international climate change agreement for all countries at the 2015 Paris climate conference. It will be implemented from 2020. Aim is to reduce global emissions by at least 40 per cent below 2010 levels by 2030, and by 60 per cent by 2050. Intention to keep global temperature increase below 2°C. Credit reference to other climate conferences, including Madrid 2019. Low level mitigation measures include cutting down on food waste and increasing recycling, introducing energy-saving measures at home, walking or cycling instead of taking the car, buying local food to cut down on food miles. • Understanding of adaptation strategies shown in Figure 6. **Agriculture** – farmers will have to adapt as some crops may not be able to grow in a warmer or drier climate, however, drought resistant plants may be grown where rainfall is lower and other crops (eg oranges and grapes) will be able to be planted. Cultivation might be shifted to new areas and irrigation increased as rainfall patterns change. **Adjusting to rising sea levels** – areas at risk from sea level rise may use sea defences to protect the land from being eroded away. Houses built on stilts may help to protect properties in vulnerable areas. Understanding of other adaptation strategies, such as **Water supply** – water transfer schemes could be used, moving water from an area of water surplus to an area of water shortage. Better management of water resources to ensure evaporation and loss are kept to a minimum. Some countries are installing desalinisation plants to cope with water supply problems. Credit examples of mitigation and adaptation strategies. • Evaluation of the importance of both strategies. Mitigation addresses the root causes, by reducing greenhouse gas emissions, while adaptation seeks to lower the risks posed by the consequences of climatic changes. Both approaches will be necessary, because even if emissions are dramatically decreased in the next 20–30 years, adaptation will still be needed to deal with the global changes that have already started. AO1 – 3 marks AO2 – 3 marks AO3 – 3 marks	

		Spelling, punctuation and grammar (SPaG)	
		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.	**3**
		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.	**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.	**1**
		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.	**0**

Section B

Qu	Pt	Marking guidance	Total marks
02	1	**For a small scale ecosystem you have studied, name one producer and one consumer.** **Producer:** Any green plants, lichens and algae, phytoplankton, seaweeds, sea grass. Max 1 mark for producer. **Consumer**: Any part of the ecosystem that feeds from the producer such as flea, tadpoles, fish, heron etc. The answer does not have to be a primary consumer. Max 1 mark for consumer. Both species should be found in the same ecosystem. Max 1 mark if the two species are not from same ecosystem. AO1 – 2 marks	2
02	2	**What is the role of producers in an ecosystem?** One mark for an appropriate description of the role. Producers are organisms that produce their own food (1) They convert the sun's energy into food (1) They produce food for other animals to eat (1) They produce chemical energy by the process of photosynthesis (1) They convert water, sunlight and CO2 into carbohydrates (1) Plants can also make other nutrients for other organisms to eat (1) They are at the bottom of the food chain and may be eaten by consumers (1) Do not credit examples of producers. AO2 – 1 mark	1
02	3	**Using Figure 7, calculate the temperature range in Place A.** **8.5 (°C)** Working and units not needed. AO4 – 1 mark	1

02	4	**Using Figure 7, state two differences between the climate in Place A and Place B.** Rainfall is (much) lower in Place A, (totalling 27 mm per year in comparison to 213 mm in Place B). (1) The variation in rainfall is (much) higher in Place B (19mm) than Place A (8mm) (1) The highest average temperature in Place A is 23.9°C compared with 6.2°C in Place B (1) The lowest average temperature is (much) lower in Place B (-14.5°C) compared with Place A (at 15.4°C).(1) Place B has a higher yearly temperature range (of 20.7°C compared to 8.5°C in Place A). B has wetter climate (1). B has a cooler climate (1) 2 clear contrasts (differences) are needed for 2 marks AO4 – 2 marks	2

02	5	**Which global ecosystem matches the following description?** **An area with trees which drop their leaves in winter.** **Shade one circle only.** C Deciduous forest No credit if two or more answers are circled. AO1 – 1 mark	1

02	6	**Suggest how different strategies are used to reduce environmental damage in either:** • **an area on the fringe of a hot desert or** • **a cold environment.** **Use Figure 8 <u>or</u> Figure 9 and your own understanding.**	6

Level	Marks	Description
3 (Detailed)	5–6	AO2 Shows thorough geographical understanding of how different strategies are used to reduce environmental damage in the chosen environment. AO3 Demonstrates thorough application of knowledge and understanding in evaluating the role of different management strategies in reducing environmental damage.
2 (Clear)	3–4	AO2 Shows some geographical understanding of how one or more strategies are used to reduce environmental damage in the chosen environment. AO3 Demonstrates reasonable application of knowledge and understanding in evaluating the

		role of one or more management strategies in reducing environmental damage.	
1 (Basic)	1–2	AO2 Shows limited geographical understanding of how one or more strategies are used to reduce environmental damage in the chosen environment. AO3 May include limited application of knowledge and understanding in evaluating the role of one or more management strategies in reducing environmental damage.	
	0	No relevant content	

- Level 3 (detailed) will be developed responses with supporting evidence for answer. Appropriate use of Figure 8/9 (direct or inferred) and specific own understanding.
- Level 2 (clear) responses are likely to be linked statements with some elaboration. Some use of Figure 8/9 (direct or inferred) and 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 8/9.

<u>Indicative content.</u>

- The command is 'suggest', so responses should provide detail about how different management strategies can work to reduce environmental damage in either hot deserts of cold environments.

Hot desert fringe

Understanding of management strategies shown for fringes of **hot deserts** in Figure 8.

- **The Great Green wall** planting strategy. A scheme launched to plant trees across the southern edge of the Sahara desert to reduce desertification. The trees counter soil erosion, slow wind speeds and stop the spread of deserts. By 2030, the aim is to have restored 100 million hectares of currently degraded land and sequester 250 million tons of carbon. It has already seen positive results with 15 million hectares of degraded land restored in Ethiopia and 11.4 million trees planted in Senegal.
- **Building rock walls (bunds).** This is an example of appropriate technology – these low rock walls are constructed to follow the contour of the land and therefore capture the downward flow of water. This also stops sediment from being washed off the slopes as it will be trapped by the bunds and can therefore create a good depth of soil for cultivation. This example of water and soil management

		can help address the problem of intense rainfall washing away loose soil and causing soil erosion. Other management strategies for hot deserts include: • **Planting grass on slopes** to help stabilise the topsoil • **The use of intermediate or appropriate technology** such as solar cookers and more efficient stoves which reduce the need for fuelwood and thus a cause of soil erosion/desertification. Rainwater can be collected on roofs to be used for irrigation. Cold environments Understanding of management strategies for **cold environments** shown in Figure 9. • **Hot water pipes/insulated utilidors (utility tunnels)** raised above the ground so they do not melt or damage the permafrost. • An extract about the role of the **Alaskan Wildlife Conservation Centre** which cares for orphaned and injured animals. Other management strategies for cold environments include: • **Technological developments** such as the Trans-Alaskan pipeline which is insulated to retain the heat of the oil and prevent melting of the permafrost, raised above the ground so wild animals can continue to migrate across the area and has special slides built in to allow movement during an earthquake. • **International agreements.** An example is the Antarctic Treaty which has successfully protected Antarctica since it was signed in 1959. It states that Antarctica should only be used for peaceful purposes, it bans the disposal of nuclear waste, it ensures that tourism takes place sustainably and it promotes international cooperation. • **Conservation groups** such as the WWF work with governments, communities and businesses to protect the biodiversity of cold environments. For example, the WWF Arctic Programme. • **Action by governments**: the US government has sought to protect Alaska since oil was discovered in the 1960s. The Western Arctic reserve protects the north of Alaska from development whilst fisheries and marine habitats are protected by the National Oceanographic and Atmospheric Administration (NOAA). Answers should make it clear how each strategy reduces environmental damage. AO2 – 3 marks	

		AO3 – 3 marks	

02	7	**Using Figure 10, give one feature of the pattern of wildfires in Brazil.** Concentrated largely south of the Amazon river (1). North of Brasilia (1). There is a significant band running from west to east across the centre of Brazil (1). There are relatively few in coastal areas (1). Central Brazil (1). Northern Brazil (1) AO4 – 1 mark	1

02	8	**Outline one reason why wildfires are a threat to global climate.** The Amazon rainforest acts as a huge carbon sink/absorbing and storing carbon dioxide (1). If the trees are destroyed, this carbon sink is lost (d) (1). The forests help to cool global temperatures (1) so burning would lead to rising temperatures (d) (1). The burning of trees releases CO2 into the atmosphere (1) contributing to the greenhouse effect (d)(1). AO2 – 2 marks	2

02	9	**'Some economic activities in tropical rainforests have major environmental impacts.'** **Do you agree?** **Use Figure 11 and a case study to explain your answer.**	9

Level	Marks	Description
3 (Detailed)	7–9	AO1 Demonstrates detailed knowledge of different economic activities and their impacts on tropical rainforests. AO2 Shows thorough geographical understanding of the links between economic activities in tropical rainforests and their environmental impacts. AO3 Demonstrates application of knowledge and understanding in a coherent and reasoned way in judging the impact of different economic activities on the environment of tropical rainforests.
2 (Clear)	4–6	AO1 Demonstrates clear knowledge of different economic activities and their impacts on tropical rainforests. AO2 Shows some geographical understanding of the links between economic activities in tropical rainforests and their environmental impacts. AO3 Demonstrates reasonable application of knowledge and understanding in judging the impact of different economic activities on the environment of tropical rainforests.

		1 (Basic)	1–3	AO1 Demonstrates limited knowledge of one or more economic activities and their environmental impacts on tropical rainforests. AO2 Shows slight geographical understanding of the links between one or more economic activities in tropical rainforests and their impacts. AO3 Demonstrates limited application of knowledge and understanding in judging the impact of one or more economic activities on the environment of tropical rainforests.	
			0	No relevant content	

Level 3 (detailed) responses will be well developed with accurate use of geographical terms. Reasoned examination of the extent of environmental impacts caused by different economic activities in the tropical rainforest with some developed case study support.

Level 2 (clear) responses will have linked or elaborated statements and some accurate use of geographical terms. May outline the environmental impacts of several economic activities in tropical rainforests. May start to make a judgement as to whether these activities have a major environmental impact or not. Likely to include some case study support

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 economic activity in the tropical rainforest and/ or refer to basic environmental impacts. Answer likely to be reliant on **Figure 11**.

Indicative content

Application of understanding to Figure 11. The economic activities shown in this figure have varying environmental impacts.

- **Small-scale shifting cultivation** or slash and burn has traditionally had a relatively small impact on tropical rainforests because when the soil becomes exhausted the people move on and clear another area leaving the original forest area to regenerate.

- In contrast, **palm oil plantations** can lead to the deforestation of huge swathes of rainforest. Large areas of rainforest are cut down to make way for commercial plantations but the land can only sustain crops for a relatively short period of time. After a few years, the farmers have to cut down more rainforest for new plantations. Deforestation for plantations can also contribute to soil erosion since there is still no ground cover crops that help protect the soil. The healthy topsoil gets washed away and can potentially clog up rivers and other bodies of water. Since the soil is no longer as healthy due to erosion and the lack of biodiversity, chemicals in the form of fertilisers, insecticides, pesticides, etc are added to the soil to promote better growth of oil palm trees. The chemicals used can leach into the ground and pollute both land and water.

- **Ecotourism** can bring environmental benefits to an area. It tends to be small-scale with a focus on conservation and minimising negative environmental impacts. Tourism may take the form of replanting and other conservation projects. It can also help educate tourists and locals about the need for the sustainable use of rainforest areas.

- **HEP dams** have caused huge environmental devastation in some areas of tropical rainforest. Large areas of the Amazon have been deforested and flooded to build dams such as the Belo Monte dam. Often the dams have a short lifespan and they may become blocked with soil washed down deforested slopes.

Other economic activities which could be discussed include:

- **Mining**. Minerals such as bauxite, gold and iron ore are mined and sold to make money. The rainforest is clear-felled for mining which leads to soil erosion. In 1999, 10 000 hectares of the Amazon rainforest were used for gold mining. Today the area is over 50 000 hectares.

- **Commercial farming**. As well as plantations, forest is cleared to make space for cattle grazing. The rearing of cattle is believed to account for 80% of the tropical rainforest destruction in Brazil. The soil cannot be used for long and the farmers then move on and destroy more rainforest. In August 2019, record numbers of forest fires in Brazil were blamed on clearance of land for farming. The burning releases massive amounts of greenhouses gases contributing to climate change. A valuable carbon sink is also lost. Other environmental impacts linked to farming are soil erosion and pollution from the excessive use of fertilisers and pesticides.

- **Logging**. Trees are felled for timber and paper. Road building for logging requires more tree clearance.

- **Settlement and population growth** can also lead to clearance of forest.

- **Sustainable development** may allow economic progress whilst preserving the forests. Selective logging, ecotourism, agroforestry, international agreements eg Forestry Stewardship Council.

Credit examples of economic activities and environmental impacts.

- Eg In Indonesia where rainforests are razed to make way for industrial palm oil plantations, deforestation is responsible for 80% of the whole country's CO2 emissions. This makes Indonesia the third largest emitter of greenhouse gases.

- In Malaysia, palm oil plantations have led to the loss of biodiversity. Animals such as orang-utans and tigers have considerably reduced in number.

- Evaluation and judgement. A range of views may be taken. It is likely that students will recognise that small scale, local sustainable economic activities have a relatively small environmental impact

		compared to large-scale commercial projects. Despite economic benefits, clearing rainforest threatens the survival of many plant and animal species and can lead to serious environmental degradation. Widespread deforestation damages the whole biosphere with severe long-term consequences. AO1 – 3 marks AO2 – 3 marks AO3 – 3 marks	

Section C

Qu	Pt	Marking guidance	Total marks
03	1	**Match the following descriptions of coastal landscapes in the UK with the correct letter shown on Figure 12.** An uneven coastline with several large islands offshore – E A headland which marks the coastal limit of the South Downs – C AO4 – 2 marks	2
03	2	**Using Figure 13, state what has happened to the area behind the shingle beach at high tide.** The area is flooded/submerged under water (1). AO4 – 1 mark	1
03	3	**Suggest one advantage of the coastal management strategy shown in Figure 13.** (The salt marsh and mudflat) provides a habitat for wildlife (1). Tourists may visit the salt marsh (and spend money in local businesses).(1) Natural flooding is much less costly than hard engineering (1). Salt marshes are able to store large quantities of water (which act as a buffer to erosion) (1). It is cheap (1) It is natural looking and won't damage the environment (1) AO3 – 1 mark	1
03	4	**Using Figure 14, what is the projected rate of erosion for 2030?** 3.3 (metres per year) Allow 3.25–3.35 metres per year. AO4 – 1 mark	1

03	5	**Explain the benefits of using hard engineering strategies to protect the coastline.**	4

Level	Marks	Description
2 (Clear)	3–4	AO1 Demonstrates accurate knowledge about hard engineering strategies and how they protect the coastline. AO2 Shows a clear geographical understanding of the benefits of hard engineering strategies. Explanations are developed.
1 (Basic)	1–2	AO1 Demonstrates some knowledge about hard engineering strategy(ies) and how they protect the coastline. AO2 Shows a limited geographical understanding of the benefits of hard engineering strategy(ies). Explanations are partial.
	0	No relevant content.

- **Level 2 (clear)** responses are likely to contain linked statements showing understanding of the benefits of hard engineering strategies. Appropriate geographical terminology.
- **Level 1 (basic)** responses will comprise simple ideas with limited or partial understanding of the benefits of hard engineering strategy(ies). Limited geographical terminology.
- Expect two or more strategies to be explained for top of Level 2, but a clear explanation of one strategy gains access to low Level 2.
- Max level 1 for generic explanation of benefits of hard engineering.
- Max 1 mark for a description of strategy(ies) without considering the benefits.
- No credit for costs or disadvantages of hard engineering.
- No credit for benefits of soft engineering.

<u>Indicative content</u>

- The command is “explain”, so responses should provide a reasoned account of the benefits of hard engineering strategies.
- 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.

		• **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. • **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. Benefits. 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. Often used for fishing. • **Groynes** look like wooden "fences" 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 on the updrift side. Benefits. Act as a buffer against wave attack, helping to protect the cliffs. Create a wider beach, which can be popular with tourists and boost local economy. Reduces risk of damage, making residents and local business feel more secure. Not too expensive. If well maintained, can last up to 40 years. Can act as windbreaks. • **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. Often has a promenade on top, which doubles up as cycle route. Steps at the base of a wall act as seating areas for beach users. If well maintained, sea walls can last for many years. Sea walls do not impede the movement of sediment downdrift, so they do not disadvantage other areas. • Credit reference to other hard engineering strategies, including revetments, offshore barriers and reefs, tetrapods. AO1 – 2 marks AO2 – 2 marks	

03	6	**Explain the formation of the physical features of the coastline shown in Figure 15.**	6

Level	Marks	Description
3 (Detailed)	5–6	AO2 Shows thorough geographical understanding of processes and landforms associated with a changing coastline. AO3 Demonstrates thorough application of knowledge and understanding in analysing the landforms shown in Figure 15.
2 (Clear)	3–4	AO2 Shows some geographical understanding of processes and landforms associated with a changing coastline. AO3 Demonstrates reasonable application of knowledge and understanding in analysing the landforms shown in Figure 15.
1 (Basic)	1–2	AO2 Shows limited geographical understanding of processes and landforms associated with a changing coastline. AO3 May include limited application of knowledge and understanding in in analysing one or more landforms shown in Figure 15.
	0	No relevant content

- **Level 3 (detailed)** will be developed responses with supporting detail of the processes involved and the sequence of changes as the coastline evolves. Appropriate terminology will be used.
- **Level 2 (clear)** responses are likely to contain linked statements showing some understanding of the processes involved and some of the changes that occur as the coastline evolves. Some geographical terminology will be used, but processes may not be named.
- **Level 1 (basic)** responses will comprise simple ideas or random statements with limited or partial sequence and little reference to the processes involved. May consider one landform or focus on sequence only. Geographical terminology will be limited.
- The formation of at least two landforms should be explained to access Level 3.
- Allow labelled diagrams as long as they don't duplicate the text.

<u>Indicative content</u>

- Emphasis is on explanation, so processes of erosion should be outlined as well as the sequence of development of landforms as the coastal landscape changes. Some reference to depositional processes is also relevant.

		• Understanding of specific processes relevant to the formation of landforms shown-weathering, erosion, hydraulic action, corrasion/abrasion, attrition, differential erosion, wave refraction, longshore drift. • Landforms shown in the maps include headlands and bays, (bayhead) beaches and wave-cut platforms. Credit other associated landforms seen on photograph: cliffs, caves and stacks. • Analysis of the maps and photograph should emphasise increased unevenness in the shape of the coast from a rounded coastline to jagged headlands and wave cut platforms with bay in between. The photograph illustrates prominent cliffed headlands surrounded by low-lying curved bays. In distance is series of stacks at end of headland, with spit beyond. • Understanding of formation of **headlands and bays** and changes over time. Because of differences in resistance of rocks to erosion, some parts of the coast may retreat faster than others. This will happen where the rocks are at right angles to the coastline (a discordant coast). Over thousands of years the softer less resistant rock will be eroded more quickly than the harder more resistant rock and differences become more pronounced. Eventually there will be headlands that stick out into the sea and bays where the land has been worn back. The headlands are more exposed to wave attack and erosional landforms develop. Due to wave refraction the energy of the waves is then focused on the headlands and spread out in the bays. • **Beaches** develop at the head, or innermost part, of a bay. In this area wave action is usually not very strong and deposition occurs. The beach will not extend to the headlands because erosion from waves increases strongly towards the headlands and deeper water. Longshore drift may cause material to be moved along the bay. • Understanding of formation of **cliffs and wave-cut platforms**. The sea attacks the base of the cliff between the high and low water mark along a headland. A wave-cut notch is formed by erosional processes such as abrasion and hydraulic action. As the notch increases in size, the cliff becomes unstable and collapses, leading to the retreat of the cliff face. The backwash carries away the eroded material, leaving a wave-cut platform. The process repeats. The cliff continues to retreat. • Credit explanation of stack and/or spit formation-shown in the distance on photograph. • Analysis of sources demonstrates that the coastline is constantly changing due to combination of processes. Credit idea that continued wave action /refraction may eventually cause the coastline to become more straightened as headlands are worn back and bays receive more sediment.	

		• Analysis of the formation of 2 landforms with clear application of knowledge and understanding to Figure 15 is sufficient to access maximum marks. AO2 – 3 marks AO3 – 3 marks	

Qu	Pt	Marking guidance	Total marks
04	1	**Match the following descriptions of rivers in the UK with the correct letter shown on Figure 16.** Description of river – Letter A river which flows west from the Pennines into Liverpool Bay – C A river which flows north east through the Fens and into the Wash – D AO4 – 2 marks	2
04	2	**Using Figure 17, describe the relief (height and shape of the land) on either side of the straightened river.** The land is flat (1). There is a floodplain on either side of the river (1). Generally flat but more sloping in background (1). AO4 – 1 mark	1
04	3	**Suggest how the strategy shown in Figure 17 helps to manage the river.** The straightened river reduces flood risk. (1) By straightening the river, the water flows faster and more directly, (so there is less chance of flooding) (1). The straightened river reduces flood risk by moving water out of the area more quickly, (as there is less friction with the bed and banks) (1). The faster-flowing water removes sediment that would otherwise build up (1). The straightened river is shorter so improves navigation (1). AO3 – 1 mark	1
04	4	**Using Figure 18, calculate the range of maximum discharge.** 15 (cubic metres per second) AO4 – 1 mark	1

<table>
<tr>
<td>04</td>
<td>5</td>
<td>
Explain how river levées are formed.
<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 depositional processes and levee formation.

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 some knowledge about river depositional processes and levee formation.

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 some understanding of the processes involved and the sequence of formation. Appropriate geographical terminology.
Level 1 (basic) responses will comprise simple ideas with limited or partial sequence and little reference to the processes involved. Geographical terminology will be limited.
The sequence of formation and some reference to processes involved are both required to reach the top of level 2.

<u>Indicative content</u>

The command is “explain”, so responses should provide a reasoned account of how and why levées form.
The question implies knowledge of the processes of deposition. Emphasis is on explanation, so processes may be outlined as well as the sequence of formation.
Credit relevant labelled/annotated diagrams.
Levées are long narrow ridges or raised embankments alongside the river. Composed of gravel, stones and alluvium. Steeper on channel side than land side.
Levées occur in the lower course of a river when there is an increase in the volume of water flowing downstream and flooding occurs.
Sediment that has been eroded further upstream is transported downstream.
When the river floods, the sediment spreads out across the floodplain. Friction with the land reduces velocity and causes deposition.

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<td>4</td>
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		• When a flood occurs, the river loses energy. The largest material (sand and gravel) is deposited first on the sides of the river banks and smaller material (finer silt and mud) further away. • After many floods, the sediment builds up to increase the height of the river banks, so the levées become higher than the surrounding floodplain. • If a severe flood event occurs, levées may burst and cause serious damage to surrounding land. AO1 – 2 marks AO2 – 2 marks	

04	6	**Explain how physical and human factors may affect flood risk.** **Use Figure 19 and your own understanding.**	6

Level	Marks	Description
3 (Detailed)	5–6	AO2 Shows thorough geographical understanding of physical and human factors affecting the risk of flooding. AO3 Demonstrates thorough application of knowledge and understanding in analysing the physical and human factors affecting the risk of flooding.
2 (Clear)	3–4	AO2 Shows clear geographical understanding of physical and/or human factors affecting the risk of flooding. AO3 Demonstrates reasonable application of knowledge and understanding in analysing the physical and/or human factors affecting the risk of flooding.
1 (Basic)	1–2	AO2 Shows basic geographical understanding of physical and/or human factor(s) affecting the risk of flooding. AO3 Demonstrates limited application of knowledge and understanding in analysing the physical and/or human factor(s) affecting the risk of flooding.
	0	No relevant content.

- Level 3 (detailed) will be developed responses, with understanding of how different physical and human factors play a role. Appropriate use of Figure 19 (direct or inferred) and specific own understanding, with some analysis. Appropriate terminology will be used.
- Level 2 (clear) are likely to have linked statement(s) showing understanding of physical and/or human factor(s) affecting flood risk. Some use of Figure 19 (direct or inferred) and/or own understanding. 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 19.

		Indicative content • Responses will apply knowledge and understanding of human and physical factors affecting the risk of flooding, making an assessment of the role of different factors. • Understanding physical factors/causes. Factors listed in the specification are precipitation, geology, and relief, but credit other factors such as snowmelt, levels of previous saturation, vegetation and soil type. The risk of flooding is determined by the speed in which flood waters are able to reach the river. Credit reference to processes such as infiltration, surface runoff, throughflow and percolation as well peak discharge, baseflow and lag times. • Physical factors affecting the flood risk include – **Geology**. Impermeable rocks (eg granite) and soil (eg clay) will not allow water to pass through, resulting in large amounts of surface runoff and a higher risk of flooding. **Relief.** A drainage basin with steep slopes will result in greater overland flow and a shorter lag time than where the gradient is less steep, allowing more time for infiltration to occur. **Precipitation**. Heavy rain results in rapid saturation of the upper soil layers and the excess water therefore reaches streams quickly as surface runoff (short lag time). Slow light rain can be absorbed by infiltration and the river takes longer to respond to rainfall as water takes longer to pass through the drainage basin via throughflow and groundwater flow. Levels of previous rainfall may also be relevant. **Vegetation.** Vegetated areas help to reduce the risk of flooding by increasing the time it takes for water to reach a river (longer lag time) by encouraging infiltration, intercepting water by their leaves and taking up water in their roots. • Human factors include: **Land use.** Surfaces such as concrete and tarmac are impermeable, therefore rivers in urban drainage basins tend to have higher risk of flooding due to higher amounts of surface runoff and drainage systems taking water to rivers quickly. The increase of house building in towns and villages, especially on river floodplains has meant that rivers respond more quickly to storms. **Deforestation** may result in greater flood risk as interception and infiltration are reduced and runoff increases. **Agricultural practices** – such as ploughing up and down slopes – can increase surface runoff and produce higher flood risk. • Application of knowledge and understanding to **Figure 19**. The large amount of rainfall greatly increases flood risk. Soils are saturated, infiltration capacity is exceeded and excess water flows as surface runoff The confluence of two rivers at Cockermouth means that 2 separate flows converge from 2 drainage basins, increasing water levels and therefore flood risk. The surrounding landscape consists of steep hills, which means that drainage basin flows including surface runoff are rapid, so excess water reaches lowland areas quickly.	

		Homes and businesses built on the flood plains are prone to rising flood waters. The concrete surfaces are impermeable so water cannot percolate and lag times are short. • Credit other examples where relevant, but these are not essential to gain max marks. • Analysis may consider the importance of human and/ or physical factors in determining the flood risk–may emphasise that precipitation is the primary factor, although its impact depends on several aspects such as intensity and duration. However other factors are significant in causing considerable differences in flood risk, even over quite small areas. • Some floods may be more affected by human factors than others – depending on proportion of built-up area, level of tree cover, farming practices, artificial drainage. Many examples of floods where flood levels much higher as a result of human activity, others where physical factors are dominant. • A developed explanation of one physical and one human factor affecting flood risk with clear application of understanding to Figure 19, is sufficient to access maximum marks. AO2 – 3 marks AO3 – 3 marks	

Qu	Pt	Marking guidance	Total marks
05	1	**Match the following descriptions of glaciated uplands in the UK with the correct letter shown on Figure 20.** Description of glaciated upland area – Letter A mountainous area which includes the highest point in Wales – D A large mountainous area in Scotland where the highest point is over 1300m – A AO4 – 2 marks	2
05	2	**Describe the shape of the drumlins shown in Figure 21.** Elongated (1), egg shaped (1), oblong (1) oval (1). Low/rounded hill with one side steeper than the other (1). Allow other valid description AO4 – 1 mark	1
05	3	**Using Figure 21, calculate the mean maximum height of the 6 drumlins.** 31.3 metres Allow 31 metres, 31.33 metres AO4 – 1 mark	1
05	4	**Using evidence from Figure 21, suggest the general direction of movement of ice when the drumlins were formed.** From south east to north west (1). From south south east to north north west (1). Towards the north west/NNW (1). From the south east/SSE (1). AO3 – 1 mark	1

05	5	**Explain how glaciated areas in the UK provide economic opportunities.** See table below for Level, Marks and Description. • **Level 2 (clear)** will have linked statements showing understanding of land use opportunities. Some geographical terminology evident. • **Level 1 (basic)** will be simple statements with limited understanding or development. May consist of listed points or random statements about one or more opportunities. • Expect two or more land use opportunities to be explained for top of Level 2, but a clear explanation of one opportunity gains access to low Level 2. • Allow explanation of economic opportunities in lowland glaciated areas. <u>Indicative content</u> • Economic activities listed in the specification are tourism, farming, forestry and quarrying. Others might include hydro-electric power/wind/renewable energy, water supply, military training. • Opportunities for economic activity are limited. Glaciated upland areas can be extreme environments. For rural landowners, there are few ways to earn a living from the land due to steep slopes, thin soils, low temperatures and heavy relief rainfall. Many farmers have diversified into other economic activities. • **Farming**. In upland areas, soils in these are thin and acidic. Land is mainly used for grazing. Sheep can tolerate cold, wet and windy conditions, and poor vegetation. Some highland areas also farm cattle and deer for venison meat. Soils in valleys are thicker due to deposition. Flat-bottomed glacial troughs are ideal for using machinery and farming can be more productive. Typical crops include cereals and potatoes, and grass for winter feed. • Lowland glaciated areas may be covered by a thick layer of till, which is very fertile. Much of central and eastern Britain has productive farmland growing wheat, barley, potatoes and other crops.	4

Level	Marks	Description
2 (Clear)	3–4	AO1 Demonstrates accurate knowledge about economic opportunities in UK glaciated areas. AO2 Shows a clear geographical understanding of how glaciated areas in the UK provide economic opportunities.
1 (Basic)	1–2	AO1 Demonstrates limited knowledge about economic opportunity(ies) in UK glaciated areas. AO2 Shows a basic geographical understanding of how glaciated areas in the UK provide economic opportunity(ies).
	0	No relevant content

		• **Tourism** is a major source of income in Wales, Scotland and the Lake District. People visit these places to enjoy the mountainous landscape created by glaciation. This environment is popular with tourists because it provides opportunities for walking, cycling, sailing and kayaking. • **Forestry.** Some glaciated areas are covered in woodland and coniferous forest. Conifer trees are well adapted to cope with acidic soils. They are one of the few economic ways of using steep slopes. These forests may be logged to provide materials. Conifers produce 'soft' wood used for timber in the construction industry or for making paper. Forestry provides employment and contributes significantly to the economy. • **Quarrying.** Upland glaciated areas are made of hard, resistant rock. This can be quarried and crushed to provide stone used in the construction industry and for building roads. Eg Limestone makes up much of the Pennine Hills, a valuable resource used in the chemical industry, fertilisers and cement industry. Lowland areas–meltwater stream gravels and sands also used for construction. • Credit named examples where relevant. AO1 – 2 marks AO2 – 2 marks	

05	6	**Explain how glacial processes have created the landforms shown in Figure 22.**	6

Level	Marks	Description
3 (Detailed)	5–6	AO2 Shows thorough geographical understanding of processes and landforms created by glacial erosion. AO3 Demonstrates thorough application of knowledge and understanding in analysing the landforms shown in Figure 22.
2 (Clear)	3–4	AO2 Shows some geographical understanding of processes and landforms associated with glacial erosion. AO3 Demonstrates reasonable application of knowledge and understanding in analysing one or more of the landforms shown in Figure 22.
1 (Basic)	1–2	AO2 Shows limited geographical understanding of processes and landforms associated with glacial erosion. AO3 May include limited application of knowledge and understanding in analysing one or more landforms shown in Figure 22.
	0	No relevant content.

- Level 3 (detailed) will be developed responses with supporting detail of the processes involved and the sequence of formation. Appropriate terminology will be used.
- Level 2 (clear) responses are likely to contain linked statements showing understanding of the processes involved and the sequence of formation. Some geographical terminology will be used.
- Level 1 (basic) responses will comprise simple ideas or random statement with limited or partial sequence and little reference to the processes involved. May consider one landform or focus on sequence only. Geographical terminology will be limited.
- The formation of at least two landforms should be explained to access Level 3
- Credit labelled diagrams as long as they don't duplicate the text.
- No credit for landforms not shown on the photograph and Figure.

<u>Indicative content</u>

- The question implies knowledge of the processes of erosion, as well as the relic landforms associated with glacial erosion in upland areas.
- The command is "explain", so responses should provide a reasoned account of how and why features of glaciation form and develop over time. This could include post-glacial changes through to the present day.

		• Landforms depicted in Figure 22 are corrie (with tarn), arete and pyramidal peak. • Understanding of glacial processes. **Abrasion** – as the glacier moves downhill, rocks that have been frozen into the base and sides of the glacier scrape the rock beneath. The rocks scrape the bedrock like sandpaper, leaving striations behind. • **Plucking** – rocks become frozen into the bottom and sides of the glacier. As the glacier moves downhill it 'plucks' or tears away the rocks frozen into the glacier from the ground. • **Freeze-thaw weathering**. During the day when temperatures are higher, the snow melts and water enters the cracks in the rock. When the temperature drops below 0°C the water in the crack freezes and expands by about 9 per cent. This makes the crack larger. As this process is repeated through continual thawing and freezing the crack gets larger over time. Eventually pieces of rock break off. • Credit appropriate reference to other processes of transportation/movement such as basal slip, rotational slip and internal deformation**.** • **Corrie formation** 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. • Development over time. 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 forms. • An **arête** is a knife-edge ridge often found at the back of a corrie or separating two glaciated valleys. They are often extremely narrow and form when erosion and weathering in two back-to-back corries cause the land in between to become narrower. Continued freeze thaw causes aretes to become more jagged, with very steep sides. • If three or more corries have formed on a mountain, erosion may lead to the formation of a single sharp-pointed **pyramidal peak** or horn. Relatively few are found in the UK because the mountain tops were often covered by ice during the Ice Age. • Analysis of the formation of 2 landforms with clear application of knowledge and understanding to Figure 22 is sufficient to access maximum marks. AO2 – 3 marks AO3 – 3 marks	