OXFORD

INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL
GEOGRAPHY
GG03

Paper 3 Physical Geography 2

Mark scheme

June 2023

Version: 1.0 Final

236XGG03/MS

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.

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

International A-level Geography mark scheme

How to mark

Aims

When you are marking your allocation of scripts your main aims should be to:

- recognise and identify the achievements of students
- place students in the appropriate mark band and in the appropriate part of that mark band (high, low, middle) for **each** Assessment Objective
- record your judgements with brief notes, annotations and comments that are relevant to the mark scheme and make it clear to other examiners how you have arrived at the numerical mark awarded for each Assessment Objective
- ensure comparability of assessment for all students, regardless of question or examiner.

Approach

It is important to be **open-minded** and **positive** when marking scripts.

The specification recognises the variety of experiences and knowledge that students will have. It encourages them to study geography in a way that is relevant to them. The questions have been designed to give them opportunities to discuss what they have found out about geography. It is important to assess the quality of **what the student offers**.

Do not mark scripts based on the answer **you** would have written. The mark schemes have been composed to assess **quality of response** and not to identify expected items of knowledge.

Assessment Objectives

This component requires students to:

AO1	Demonstrate knowledge and understanding of places, environments, concepts, processes, interactions and change, at a variety of scales.
AO2	Apply knowledge and understanding in different contexts to interpret, analyse and evaluate geographical information and issues.
AO3	Use a variety of relevant quantitative, qualitative and fieldwork skills to: • investigate geographical questions and issues • interpret, analyse and evaluate data and evidence • construct arguments and draw conclusions.

The marking grids

Do not think of levels equaling grade boundaries.

Depending on the part of the examination, the levels will have different mark ranges assigned to them. This will reflect the different weighting of Assessment Objectives in particular tasks and across the examination as a whole.

Using the grids

Having familiarised yourself with the descriptors and indicative content, read through the answer and annotate it (as instructed below) to identify the qualities that are being looked for and that it shows. You can now check the levels and award a mark.

Step 1 Determine a level

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

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.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark.

It is often best to start in the middle of the level's mark range and then check and adjust. If there is a lot of indicative content fully identifiable in the work you need to give the highest mark in the level. If only some is identifiable or it is only partially fulfilled, then give the lower mark.

The exemplar materials used during standardisation will also help. There will be an answer in the standardising materials that 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 of 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.

In addition to the levels descriptors, question specific indicative content is provided as a guide for examiners. This is not intended to be exhaustive and you must credit other valid points.

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

Annotating scripts

You should write a summative comment at the end for each Assessment Objective and indicate the marks for each Assessment Objective being tested at the end of the answer in the margin in sequence. It is vital that the way you arrive at a mark should be recorded on the script. This will help you with making accurate judgements and it will help any subsequent markers to identify how you are thinking. Please do not write negative comments about students' work or their alleged aptitudes.

Section A – Water, Carbon and Life on Earth **Total for this section: 40 marks**

Question	Part	Marking guidance	Total marks
01	1	**Which of the following is an example of a positive feedback loop in the carbon cycle?** Key – D: Wild fires increase carbon dioxide emissions enhancing global warming, which increases wild fire incidence.	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
01	2	**Which of the following major global stores of carbon are found on the deep ocean floor?** Key – D: Biosphere, hydrosphere and lithosphere.	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
01	3	**Which of the following would be impacts of intense precipitation on drainage basin stores and transfers?** Key – C: Runoff would increase, increasing river and lake stores.	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
01	4	**Carbon exchange between photosynthesis and respiration in a plant is an example of:** Key – B: mass balance.	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
01	5	**Which of the following is an example of carbon sequestration?** Key – D: Sea creatures capturing and storing carbon in the oceans.	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
02		**Figure 1** shows the predicted percentage change in seasonal precipitation for Europe. It compares predictions for 2071–2100 with actual data for 1961–1990. **Analyse the predicted changes shown in Figure 1.**	**6** **AO3=6**

Level	Marks	Descriptor
2	**4 – 6**	**AO3** – Clear selection and analysis of the evidence that has been provided which makes appropriate use of data to support. Clear connections between different aspects of the data.
1	**1 – 3**	**AO3** – Some basic selection and analysis of the evidence that has been provided which makes limited use of data to support. Basic or limited connections between different aspects of the data.
0	**0**	No creditable content.

Indicative Content

The question requires the candidate to analyse the patterns shown on the four maps and make links between them.

AO3

- Overall the predicted maps show that the winter will be wetter than previously and the summer drier than previously across most of Europe.
- This shows that the seasons will be more extreme with a +20–40% swing to a wetter winter in most of Europe and a –20–40% swing to a drier summer.
- In the summer, there is a clear predicted pattern of a predominately drier climate with the exception of areas in North-Eastern Europe, around the Norwegian Sea which are predicted to become wetter by as much as 20%.
- Southwestern Europe, particularly the SW tip of the Iberian Peninsula, shows an overall pattern of a drier climate in all four seasons. However, the area to the north of the Peninsula (in Northern Spain) shows some predicted wetter climatic conditions in Winter.
- The only part of Europe that does not become drier in any season is the North East.
- The changes seem to be closely related to latitude with more drying the further south, except for the West coast of Scandinavia and Iceland.
- The season with the least change is the autumn where most parts of Europe are between 10% wetter and 10% drier.
- The British Isles shows the most change in summer (drier) and winter (wetter) whereas the Autumn and Spring show little change.
- Students may focus on the details of individual countries as well as look at overall patterns.
- Credit reference to country names, but this is not an expectation for full marks. A focus on one country as an exemplar is possible. Eg Spain where in the Spring and Summer it is 20–40% drier and even in the Winter it is mainly drier, up to 20% except for the North.

Question	Part	Marking guidance	Total marks
03		**Assess the extent to which wildfires cause changes in the carbon cycle.** **AO1** – Knowledge and understanding of the changes in the carbon cycle caused by wildfires. **AO2** – Application of knowledge and understanding to assess the importance of wildfires in contributing to the changes in the carbon cycle. Application of knowledge and understanding to assess the contribution from other factors that change the carbon cycle.	**9** **AO1=4** **AO2=5**

Level	Marks	Descriptor
3	**7 – 9**	**AO1** – Demonstrates detailed knowledge and understanding of the changes to the carbon cycle brought about by wildfires. **AO2** – Applies detailed knowledge and understanding to assess the relative importance of wildfires and other factors in bringing about change in the carbon cycle.
2	**4 – 6**	**AO1** – Demonstrates clear knowledge and understanding of the changes to the carbon cycle brought about by wildfires. **AO2** – Applies clear knowledge and understanding to assess the importance of wildfires and other factors in bringing about change in the carbon cycle.
1	**1 – 3**	**AO1** – Demonstrates basic knowledge and understanding of the changes to the carbon cycle brought about by wildfires. **AO2** – Applies limited knowledge and understanding to assess the importance of wildfires and/or other factors in bringing about change in the carbon cycle.
0	**0**	No creditable content.

Indicative Content

AO1

- Knowledge and understanding of wildfires.
- Understanding of how a wildfire causes changes in the carbon cycle such as through an increase in carbon dioxide, and a reduction of organic matter to carbon. Also how the heat can trigger growth in dormant seeds in some environments.
- Knowledge and understanding of the types of wildfire across the world from grass fires to crown fires, their timing, ferocity and spread.
- Understanding of how carbon changes over time with the initial burn releasing carbon, but the renewal of growth absorbing carbon so creating cycles within the ecosystem.
- Wildfires are created by natural forces such as lightening or spontaneous combustion during a drought such as eucalyptus secreting flammable materials in its leaves.
- The amount of combustible material will affect the ferocity and extent of the wildfire. This will determine the amount of carbon released.
- The carbon dioxide released from wildfires contributes to the atmospheric store increasing global warming.
- Knowledge and understanding of the impact of other factors such as dam building on carbon cycles.

AO2

- Recognising that wildfires can be a natural (lightning) or induced by human activity (slash and burn, arson). The impact on the carbon cycles through time depends on the cause of the fire, but also the climatic background and the management of the fire. Reference might be made to recent wildfires such as those in Australia (2019) or California (2020).
- The changes in the carbon cycle caused by wildfires will depend upon climate change and the frequency of past fires as these will determine the amount of combustible material. Also in some environments such as the Australian outback eucalyptus produce sap that is highly combustible and this is an adaptation to the environment in order to reduce canopy cover for new seedlings. The fires enable seeds to germinate and grow and outcompete other species.
- Some fires are not managed by people, but are free to burn such as in Siberia so these have a different impact on the changes in the carbon cycle. Eg Siberian permafrost can melt and burn releasing carbon stores from partially decomposed peat.
- Wildfires cause rapid and spectacular changes in the carbon cycle which then take time for the ecosystem to recover and return to equilibrium.
- Awareness that due to the nature of wildfires being unplanned and uncontrolled, fires that break out in remote areas are particularly difficult to detect, access and get under control.
- In conclusion changes in land use (eg deforestation and urbanisation) have triggered an increase in climate change which in itself has changed the carbon cycles and made wildfires more likely and tending to cover a larger area.
- Any conclusion is acceptable as long as supported by the evidence presented within the answer.

Question	Part	Marking guidance	Total marks
04		**'Changes in water stores have more severe consequences to life on Earth than changes in carbon stores.'** **With reference to examples you have studied, to what extent do you agree with this statement?** **AO1** – Knowledge and understanding of the role of carbon and water stores in supporting life on earth. Knowledge and understanding of the changes that take place in the carbon and water stores and how these affect life on earth. **AO2** – Application of knowledge and understanding to critically assess the role that carbon and water stores play in supporting life on earth. Application of knowledge and understanding to critically assess the changes that take place through the carbon and water stores and their effect on life on earth.	**20** **AO1=10** **AO2=10**

Level	Marks	Descriptor
4	**16 – 20**	**AO2** – Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question. **AO2** – Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout. **AO2** – Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts. **AO1** – Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout. **AO1** – Full and accurate knowledge and understanding of key concepts and processes throughout. **AO1** – Detailed awareness of scale and temporal change which is well integrated where appropriate.
3	**11 – 15**	**AO2** – Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question. **AO2** – Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding. **AO2** – Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts. **AO1** – Generally clear and relevant knowledge and understanding of place(s) and environments.

		AO1 – Generally clear and accurate knowledge and understanding of key concepts and processes. **AO1** – Generally clear awareness of scale and temporal change which is integrated where appropriate.
2	**6 – 10**	**AO2** – Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question. **AO2** – Some partially relevant analysis and evaluation in the application of knowledge and understanding. **AO2** – Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts. **AO1** – Some relevant knowledge and understanding of place(s) and environments which is partially relevant. **AO1** – Some knowledge and understanding of key concepts, processes and interactions and change. **AO1** – Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies.
1	**1 – 5**	**AO2** – Very limited and/or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question. **AO2** – Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence. **AO2** – Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts. **AO1** – Very limited relevant knowledge and understanding of place(s) and environments. **AO1** – Isolated knowledge and understanding of key concepts and processes. **AO1** – Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies.
0	**0**	No creditable content.

Indicative Content

This question can be answered in a variety of ways. For example the changes could be temporal or spatial. Changes could be at the global or local scale. These different approaches are equally valid and creditworthy.

AO1

- Knowledge and understanding of the different water stores and carbon stores and how they affect life on earth. Eg Lithosphere, cryosphere, etc.
- Knowledge and understanding of the changes in these stores, eg cryosphere is reducing in size as global temperature rises. Humans burning fossil fuel stores (lithosphere) to release carbon dioxide increasing the atmospheric store.
- Knowledge and understanding that changes in the water cycle tend to be more immediate as water is required every day, whereas changes in the carbon cycle occur over longer time frames such as changes in the frequency of hurricanes in the USA.
- Knowledge and understanding that changes in both the water and carbon cycles can be extreme in relatively small areas of the globe through extreme weather events such as hurricanes.
- Knowledge and understanding of the complex interaction between the water and carbon stores, eg carbon dioxide emissions increasing the atmospheric store leading to global warming which causes melting of the ice caps in the cryosphere. Eg global warming and increased atmospheric stores of carbon leading to an increase in the rate of photosynthesis increasing the carbon store in vegetation, however deforestation mitigates against this.
- Knowledge and understanding of the role of other natural factors that affect the water and carbon stores, for example volcanic eruptions, as they emit carbon dioxide and through ash clouds can affect the rate of solar insolation causing changes in temperature and precipitation. Eg Mount Pinatubo in the Philippines.
- Knowledge and understanding of the role of human activity and how this affects the water store through land use change and water abstraction, eg Diminishing Aral Sea in Asia creating regional drought and changes in the ecosystems.
- Knowledge and understanding of the role of human activity and how this affects the carbon cycle through fossil fuel emissions enhancing the greenhouse effect. The increase in extreme weather with a record number of hurricanes in the Atlantic in 2020.

AO2

- Assessment of the relative importance of the changes in water stores compared to carbon stores. Both water and carbon are essential for life, plants through photosynthesis and animals through food provided by plants. Water is critical to plant life as without it leaves cannot grow to absorb the energy of the sun and utilise carbon dioxide. Reduction of atmospheric stores of water in some parts of the earth will cause a loss of vegetation.
- Assessment of the temporal changes compared to the spatial changes. Eg disruption to the water cycle is most dramatic in the Poles where temperature change owing to global warming (carbon changes) is most dramatic as ice calves releasing water into the oceans (water changes).
- Assessment of the relative importance of climate and its link to water stores in different biomes, eg in the tropical rainforest biome climate is critical in the recycling of nutrients whereas in the temperate biome soil is very important in maintaining fertility.
- Assessment of the relative importance of human activity through industrialisation, building dams and deforestation and how these activities have altered the storage of water and carbon.
- Some may show an awareness that other factors outside of water and carbon stores may also have severe consequences to life on Earth, such as disease.

- Assessment of the relative importance of human activity in terms of the size of the impact and how the rate of the impact has increased in recent years. Awareness of how land use change such as deforestation has altered the storage of water and carbon in the tropical rainforest biome. Awareness of how air pollution through exhaust fumes has intensified the greenhouse effect triggering melting of ice caps in the Polar Regions and wildfires in the Tundra.
- A conclusion will look at the complexity of the interaction of these different factors and changes brought about in the water and carbon stores. It will consider the dynamic equilibrium of these cycles and how resilient they are to positive feedback systems. Will they rebound or break? What is the future for life on earth if human activity continues to interfere with the carbon and water cycles on an ever increasing scale as population grows?

Section B – Ecosystems Under Stress **Total for this section: 40 marks**

Question	Part	Marking guidance	Total marks
05	1	**Which of the following statements are <u>both</u> true of tropical rainforests?** Key – C: There are few seasonal changes in temperature **and** rainfall is usually over 1800 mm.	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
05	2	**Which of the following statements are <u>both</u> ecosystem conservation strategies?** Key – C: Protecting orangutans from deforestation **and** guarding white rhinos.	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
05	3	**Which of the following statements are <u>both</u> true of savanna grasslands?** Key – B: A soil with a thin humus layer **and** herbivores that migrate annually.	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
05	4	**Which of the following represents X in Figure 2?** Key – C: Soil moisture surplus	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
05	5	**Which of the following are <u>all</u> stores in mineral nutrient cycling?** Key – D: Soil; leaf litter; biomass	**1** **AO1=1**

Question	Part	Marking guidance	Total marks
06		**Figure 3** shows changes in the bleaching of coral on the Great Barrier Reef of Australia for three different years. **Analyse the data shown in Figure 3.**	**6** **AO3=6**

Level	Marks	Descriptor
2	**4 – 6**	**AO3** – Clear description and assessment of the evidence that has been provided which makes appropriate use of data to support. Clear connections between different aspects of the data.
1	**1 – 3**	**AO3** – Some basic description and assessment of the evidence that has been provided which makes limited use of data to support. Basic or limited connections between different aspects of the data.
0	**0**	No creditable content.

Indicative Content

AO3

- The time difference between the maps is not consistent with one year between 2016 and 2017 and three years between 2017 and 2020.
- In the North there is more severe bleaching close to the coastline in 2016, this diminishes in 2017 and 2020.
- In the North in all three maps the outer reef, about 250 km offshore, remains healthy and the inner reef shows no shading as time progresses.
- In 2016 the severe bleaching increases to the North, in 2017 it is more centralised and in 2020 it moves further south again.
- There appears to be a relationship between distance offshore and the extent of bleaching. Bleaching is worse the closer to the coastline with the exception of the reef to the east of Mackay, furthest from the coast which shows little or no bleaching in each of the three years shown.
- In 2016 there is a significant cluster in the furthest north.
- The areas to the south of Townsville are predominately unaffected by bleaching both in 2016 and 2017. In 2020 however, this area shows a more extensive pattern of severe bleaching.
- In 2016 about 60% of the coral reef is affected by bleaching whereas in 2017 it's nearer to 40% and in 2020 it is again about 40%, but more dispersed.
- In 2017 there is a small cluster of reefs affected by bleaching near Mackay represented by three dots.
- In 2020 the area of the reef about 300 km off the coast has been affected by severe bleaching.
- The density of the bleaching in 2016 and 2017 is highest around Cairns, but in 2020 it is Townsville.

Question	Part	Marking guidance	Total marks
07		**'Tourism is the human activity with the greatest impact on the health and survival of coral reefs.'** **To what extent do you agree with this statement?** **AO1** – Knowledge and understanding of the factors in the health and survival of reefs. Knowledge and understanding of the human activities than can impact reefs, with a focus on tourism. **AO2** – Application of knowledge and understanding to analyse the degree to which tourism is the human activity with the greatest impact on reefs. Application of knowledge and understanding to analyse how other human factors may impact the health and survival of reefs. Case studies might be used to exemplify points, but are not required.	**9** **AO1=4** **AO2=5**

Level	Marks	Descriptor
3	**7 – 9**	**AO1** – Demonstrates detailed knowledge and understanding of the factors in the health and survival of reefs. Demonstrates detailed knowledge and understanding of human activity and its impact, tourism. **AO2** – Applies knowledge and understanding to critically assess the significance of tourism on health and survival of reefs. Connections and relationships between different factors impacting health and survival of corals reefs are thorough and relevant and applied to the context.
2	**4 – 6**	**AO1** – Demonstrates clear knowledge and understanding of the factors in the health and survival of reefs. Demonstrates clear knowledge and understanding of human activity and its impact, tourism. **AO2** – Applies clear knowledge and understanding to assess the significance of tourism on health and survival of reefs. Connections and relationships between human factors are sound and relevant and applied to the context.
1	**1 – 3**	**AO1** – Demonstrates basic knowledge and understanding of the factors in the health and survival of reefs. Demonstrates basic knowledge and understanding of human activity and its impact, tourism. Mainly generic points. **AO2** – Applies limited knowledge and understanding to state the importance of human activity factors in the health and survival of reefs. The tourism will probably be treated in isolation or with connections to other factors vaguely alluded to.
0	**0**	No creditable content.

Indicative Content

The essence of this question is to consider the impact that tourism has on the health and survival of reefs. Candidates should consider the context of whether tourism has the greatest impact and thus answers are likely to analyse the extent of other human activity on reefs and reach a conclusion.

AO1

- Knowledge and understanding of the distribution and main characteristics of coral reef ecosystems; environmental conditions associated with reef development.
- Knowledge and understanding of factors in the health and survival of reefs – human activity and its impact: Major drainage basin schemes, onshore development, desalination, pollution, tourism, fishing.
- Knowledge and understanding of these aspects with reference to a named, located coral reef.
- Knowledge and understanding of natural factors influencing the health and survival of coral reefs: Water temperature, acidity, salinity, algal blooms.
- Knowledge and understanding of future prospects for coral reefs.

AO2

- Application of knowledge and understanding to assess the impact of tourism on the health and survival of reefs, considering the direct impacts that tourism has on coral reef ecosystems, such as the physical impacts of boat anchors, or tourists collecting souvenir coral eg on the Andros Barrier Reef, Bahamas.
- Some may also consider the indirect impacts of tourism on the health and survival of reefs, such as tourist fishing or the associated coastal development of tourist resorts, such as in the mangrove forests and estuaries in Queensland, where approximately five million tourists visit the Great Barrier Reef every year.
- Students may therefore consider that human impacts to reefs may be interconnected.
- Application of knowledge and understanding to assess the extent to which tourism is the greatest human activity to impact the health and survival of coral reefs – this would be via comparisons with other human impacts, such as pollution on the Andros Barrier Reef resulting from increased volumes of silt resulting from increases in logging on North Andros Island. This smothers some areas of the reef, blocking the sunlight needed by corals and threatening their health and survival.
- Any other human impacts to corals are valid as part of assessing the impacts.
- Some may consider that the greatest human impact is the indirect impacts of climate change.
- Awareness that some reef systems are protected by law and therefore could be less affected by direct human activity, although still affected by climate change.
- Awareness of a range of scales of impact, eg some areas of a reef system may be affected more than other areas depending on proximity to a tourist resort for example.
- Awareness of the fragility of coral reef systems and a recognition that the impacts of human activity could be mitigated if addressed through monitoring but recovery should be slow.
- Some may agree that tourism is the human activity with the greatest impact on the health and survival of coral reefs and use evidence to support this position.
- Some may conclude that there are other human impacts having a greater impact than tourism or that the factors work in combination to pose the greatest risk.
- Any conclusion is acceptable, though should relate to preceding content.

Question	Part	Marking guidance	Total marks
08		**'The economic character of a community is the most important factor in how successfully people respond to ecological change.'** **Evaluate this statement with reference to a <u>specified region</u> you have studied.** **AO1** – Knowledge and understanding of how, at the regional scale, people respond to ecological change. Knowledge and understanding of the role of the economic character of a community in affecting the response to ecological changes. **AO2** – Application of knowledge and understanding to assess the type and degree of ecological change. Application of knowledge and understanding to assess the way in which the economic, social and political character affects the response of the community to ecological change. Application of knowledge and understanding to assess the success of these responses.	**20** **AO1=10** **AO2=10**

Level	Marks	Descriptor
4	**16 – 20**	**AO2** – Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question. **AO2** – Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout. **AO2** – Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts. **AO1** – Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout. **AO1** – Full and accurate knowledge and understanding of key concepts and processes throughout. **AO1** – Detailed awareness of scale and temporal change which is well integrated where appropriate.
3	**11 – 15**	**AO2** – Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question. **AO2** – Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding. **AO2** – Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts. **AO1** – Generally clear and relevant knowledge and understanding of place(s) and environments.

		AO1 – Generally clear and accurate knowledge and understanding of key concepts and processes. **AO1** – Generally clear awareness of scale and temporal change which is integrated where appropriate.
2	**6 – 10**	**AO2** – Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question. **AO2** – Some partially relevant analysis and evaluation in the application of knowledge and understanding. **AO2** – Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts. **AO1** – Some relevant knowledge and understanding of place(s) and environments which is partially relevant. **AO1** – Some knowledge and understanding of key concepts, processes and interactions and change. **AO1** – Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies.
1	**1 – 5**	**AO2** – Very limited and/or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question. **AO2** – Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence. **AO2** – Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts. **AO1** – Very limited relevant knowledge and understanding of place(s) and environments. **AO1** – Isolated knowledge and understanding of key concepts and processes. **AO1** – Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies.
0	**0**	No creditable content.

Indicative Content

If a candidate does not use a named case study or uses a study at a different scale marks will be limited to Level 2.

It is likely that candidates will use the case study of Exmoor from the text book. However, the use of the Great Barrier Reef or other coral reefs would be just as valid or even more than one ecosystem, but it must be at the regional scale

AO1

- Knowledge and understanding of the natural and human factors that influence the ecological changes. These changes need to be at the regional scale, eg in the case study of Exmoor, the natural factors include the higher precipitation and colder conditions on Exmoor lead to a moorland landscape with mires or peat wetlands prevalent. However, it is important to realise the human factors that affected this landscape in the past when woodland was cut down for fuel and the moorland is maintained through grazing by sheep, deer and ponies. Candidates may choose to study an area of rainforest such as Rondonia, Brazil or a National Park, or they may look at a part of the Great Barrier Reef. In the case of the Great Barrier Reef, the natural factors such as ocean temperature around 25 °C and high nutrient flows promoted the formation of the reef and more recently global warming has bleached large parts of the reef as temperatures rise to around 30 °C.
- Knowledge and understanding of the ecological changes at the regional scale. In the case of Exmoor, climate change and the increasing use by tourists has led to more heathland fires which damage the ecology. Also footpath erosion can cause gulley erosion on steep slopes. These factors all threaten to upset the ecological balance and endangered species such as adders. In the case of the Great Barrier Reef, the increase in water temperature caused by global warming means there are less nutrients in the water and this stresses the algae leading them to abandon the coral (bleaching).
- Knowledge and understanding of the role of the economic character of the community. In Exmoor, as the UK is a wealthy country, there will be more support from government in the form of grants and the agriculture is more likely to be commercial than subsistent. Also there will be more financial support for monitoring the area and carrying out scientific research. In less wealthy areas such as the mountain gorillas in the mountains of the moon in the DRC, there are insufficient funds to protect them from poachers and so there is a reliance on outside help from international NGOs.
- Knowledge and understanding of the role of other factors, such as social and political characters, of the community response to these changes and how different groups at different scales try to preserve the ecosystems. In the case of Exmoor, the Government acted in the past to create a National Park which gives protection status along with SSSI sites. The Exmoor Mires Project shows how water companies and other stakeholders can work to protect the environment. Locally volunteers may help with measures to prevent footpath erosion.
- In the case of the Great Barrier Reef, there are international groups such as Greenpeace lobbying the United Nations to protect these sites as they have World Heritage Status. The Australian government is also concerned and has instigated many ecotourism policies to limit damage.

AO2

- Critical assessment of the relative importance of the natural and human factors that create these regional ecosystems. In the case of Exmoor, to realise that the original woodland was felled and the moorland that exists now is a plagioclimax and yet to many people it is seen as natural. The interplay of natural and human factors that created this ecosystem need to be understood.
- In the case of the Great Barrier Reef, the reef was created through predominantly natural forces which coincided to create the high biodiversity. Human impacts are relatively recent.

- Critical assessment of the ecological changes that have taken place. Some of these changes have been rapid and others have been slow. In the case of Exmoor, the formation of the moorland took place over many decades, but the recent threats are from population pressure from local people and the behaviour of tourists. This is taking place more rapidly and along with the slow changes brought about by climate change the effects can be large. Eg wildfires are more frequent as climate change causes warmer summers, but also the careless use of disposable barbeques has triggered more wildfires. These have a positive and negative impact on the moorland as they burn off old biomass and release nutrients, but at the same time threaten people's property.
- In the case of the Great Barrier Reef, there are many threats and this ecosystem is more vulnerable and the changes are more difficult to reverse. The increase in water temperature is difficult to control as it is caused by global warming. The irresponsible behaviour of some tourists in removing corals can cause damage. Also local fishermen can threaten the reef with detonations to stun the fish, but also shatter the reef.
- Critical assessment of the relative importance of the role of the economic character of communities compared to the social and political characters which affect the management of the ecological change. There are many different stakeholders in the management of Exmoor and the Great Barrier Reef. The stakeholders may be the UN and environmentalists operating at a global scale to try to reduce emissions to slow global warming or at a regional and local scale through the actions of governments and local residents. Other stakeholders include tourists who visit these areas and perhaps do not show the respect they deserve. In both cases conservation strategies have been used by giving the site world heritage status or creating a National Park. The diligence of the government or group responsible for implementing the protection strategies will determine the protection to the ecosystem.
- Critical assessment of the vulnerability of the ecosystem to change. In the case of Exmoor, change is reversible because the nutrients are stored in the soil and so through planting programmes new vegetation, such as trees, can be planted. In the case of the Great Barrier Reef, change is hard to reverse because once the algae have left the coral it means conditions are not suitable for them to thrive and so they are unlikely to return. Limiting tourist activity and the action of invasive starfish is feasible, but reducing the temperature of ocean water is not.
- A justified conclusion of the interaction of all these different characters with evidence to support or refute the predominant role of the economic character. For example, economics provides the means to manage ecological change, but its success depends on engagement with the social character of the community to ensure implementation. The political character is very important as it provides the economic means to implement change and the vision to achieve it. Future change could be predicted and maybe the use of technology in monitoring this change. Any conclusion is acceptable so long as it links clearly to the question requirements.

Assessment Objective grid

	AO1	AO2	AO3	Total
Section A				
01.1	1			1
01.2	1			1
01.3	1			1
01.4	1			1
01.5	1			1
02			6	6
03	4	5		9
04	10	10		20
Section B				
05.1	1			1
05.2	1			1
05.3	1			1
05.4	1			1
05.5	1			1
06			6	6
07	4	5		9
08	10	10		20
Unit total	38	30	12	80