

OXFORD

INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL GEOGRAPHY

(9635)

Mark scheme

Unit 3: Physical geography 2

Specimen 2018

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 assessment writer.

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.

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: <ul style="list-style-type: none"> • 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 equalling 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 in 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.

The below mark scheme is used to assess both Question 1 and Question 2.

Section A – Water carbon and life on Earth
Total for this section: 40 marks

Question	Part	Marking guidance	Total marks
01	1	<p>Which of these system diagrams shows a correct sequence of events within the water cycle?</p> <p>Key – C</p>	1 AO1=1
01	2	<p>Which of the following groups consists of human activities that are all adding to the concentration of greenhouse gases in the atmosphere?</p> <p>Key – B</p>	1 AO1=1
01	3	<p>Which of the following shows the four major layers of the planet that contain the majority of Earth’s water in solid, liquid or gaseous form?</p> <p>Key – D</p>	1 AO1=1
01	4	<p>Which of the following are all ways of transferring carbon within the carbon cycle?</p> <p>Key – B</p>	1 AO1=1
01	5	<p>A system is in a state of dynamic equilibrium when:</p> <p>Key – D</p>	1 AO1=1

Question	Part	Marking guidance	Total marks									
02		<p>Analyse the total flows between the atmosphere and the Earth and oceans in a year and calculate the net effect on atmospheric carbon.</p> <p>AO3 – There are a variety of ways of approaching this unseen material.</p> <p>Students must select the relevant data from the diagram and distinguish between transfers from atmosphere to Earth and vice versa. Then they must calculate the total variations between the two and reach a conclusion about the net change over a year.</p> <p>Mark scheme</p> <table border="1"> <thead> <tr> <th>Level</th> <th>Marks</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>4–6</td> <td>AO3 – Clear selection and analysis of the evidence that has been provided, and then appropriate calculations are made from that evidence. Clear patterns are established and final calculation of the balance is completed.</td> </tr> <tr> <td>1</td> <td>1–3</td> <td>AO3 – Some basic selection and analysis of the evidence that has been provided, and then appropriate calculations are made from that evidence. Some basic patterns are established and final calculation of the balance may be attempted.</td> </tr> </tbody> </table>	Level	Marks	Description	2	4–6	AO3 – Clear selection and analysis of the evidence that has been provided, and then appropriate calculations are made from that evidence. Clear patterns are established and final calculation of the balance is completed.	1	1–3	AO3 – Some basic selection and analysis of the evidence that has been provided, and then appropriate calculations are made from that evidence. Some basic patterns are established and final calculation of the balance may be attempted.	6 AO3=6
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Question	Part	Marking guidance	Total marks			
02		<table border="1"> <tr> <td></td> <td>0</td> <td>No creditable content.</td> </tr> </table> <p>Notes for answers:</p> <ul style="list-style-type: none"> To the atmosphere: <ul style="list-style-type: none"> 102 units from the oceans 60 units from soil 50 units from biota 1–2 units from deforestation 6 units from fossil fuel use Total = 219–220 units. From the atmosphere <ul style="list-style-type: none"> 105 units to the oceans 110 units to the biota Total = 215 units. Balance to the atmosphere = 4–5 units per annum = 4–5 billion tonnes of carbon. 		0	No creditable content.	
	0	No creditable content.				

Question	Part	Marking guidance	Total marks						
03		<p>Study Figure 2 which shows information about floods in the Indus basin in Pakistan, in July and August 2010.</p> <p>Analyse and explain the causes of the flooding in the Indus basin in 2010.</p> <p>AO1 – Knowledge and understanding of the causes of floods in drainage basins, linked to knowledge and understanding of factors affecting flows in the water cycle.</p> <p>AO2 – Application of knowledge and understanding to the conditions in the Indus drainage basin. There should be an application of this knowledge and understanding to analyse the human and physical factors contributing to flooding, and to the links between those factors.</p> <p>Mark scheme</p> <table border="1"> <thead> <tr> <th>Level</th> <th>Marks</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>7–9</td> <td> <p>AO1 – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change.</p> <p>AO2 – Applies knowledge and understanding to the novel situation, offering detailed analysis and evaluation, drawn appropriately from the context provided. Connections and relationships between different aspects of study are thorough</p> </td> </tr> </tbody> </table>	Level	Marks	Description	3	7–9	<p>AO1 – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change.</p> <p>AO2 – Applies knowledge and understanding to the novel situation, offering detailed analysis and evaluation, drawn appropriately from the context provided. Connections and relationships between different aspects of study are thorough</p>	<p>9</p> <p>AO1=4</p> <p>AO2=5</p>
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Question	Part	Marking guidance		Total marks	
03			and relevant.		
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			0		No creditable content.
<p>Notes for answers:</p> <p>AO1</p> <ul style="list-style-type: none"> • Natural processes operating at hill slope level and in drainage basins. • Inputs and outputs to include precipitation, runoff: stores and flows to include: interception, surface flow, through flow, stem flow, infiltration and channel flow. • The concept of water balance. • Human impact on drainage to include farming, land use change and urbanisation. • Knowledge and understanding of the flood hydrograph. <p>AO2</p> <ul style="list-style-type: none"> • High evaporation over the Indian Ocean led to a particularly heavy monsoon rainfall. • On each of 29th and 30th July over 200 mm of rainfall were recorded at some locations in the basin. • Rainfall averaged 128 mm over the whole basin on the 29th. • Over the two months of July and August rainfall was more than twice the normal for the basin • The river reached record levels of flow. • Flood control systems were washed away or severely damaged. 					

Question	Part	Marking guidance	Total marks
03		<ul style="list-style-type: none"> Many separate tributaries meet below Lahore and, where this happened, the river was obviously unable to drain the water away and the flood built up. Soils would already have been saturated by antecedent rainfall and so were unable to absorb the excess rainfall. 	

Question	Part	Marking guidance	Total marks						
04		<p>In tropical rain forests the year-round supply of heat and moisture lead to the rapid recycling of the carbon stored in the organic material of the forest vegetation.</p> <p>Explain the importance of this statement for the development of soils, agriculture and other human activities in one or more rain forest areas that you have studied.</p> <p>AO1 – Knowledge and understanding of the role of rain forest vegetation in the carbon and water cycles.</p> <p>Knowledge and understanding of the role of rain forest climate in driving the processes in the carbon and water cycles.</p> <p>AO2 – Application of knowledge and understanding to explain the inter-relationships between moisture availability, sunlight, temperature, vegetation and soils in the operation of the carbon and water cycles in the rain forest regions.</p> <p>The response should come to a view with regard to the strength and importance of those interrelationships.</p> <p>Mark scheme</p> <table border="1"> <thead> <tr> <th>Level</th> <th>Marks</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>16–20</td> <td> <p>AO2 – Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question.</p> <p>AO2 – Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout.</p> <p>AO2 – Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts.</p> <p>AO1 – Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout.</p> <p>AO1 – Full and accurate knowledge and understanding of key concepts and processes throughout.</p> <p>AO1 – Detailed awareness of scale and temporal change which is well integrated where</p> </td> </tr> </tbody> </table>	Level	Marks	Description	4	16–20	<p>AO2 – Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question.</p> <p>AO2 – Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout.</p> <p>AO2 – Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts.</p> <p>AO1 – Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout.</p> <p>AO1 – Full and accurate knowledge and understanding of key concepts and processes throughout.</p> <p>AO1 – Detailed awareness of scale and temporal change which is well integrated where</p>	<p>20</p> <p>AO1=10</p> <p>AO2=10</p>
Level	Marks	Description							
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Question	Part	Marking guidance		Total marks
04			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			

Question	Part	Marking guidance	Total marks						
04		<table border="1" data-bbox="368 215 1273 862"> <tr> <td data-bbox="368 215 491 804"></td> <td data-bbox="491 215 614 804"></td> <td data-bbox="614 215 1273 804"> 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. </td> </tr> <tr> <td data-bbox="368 804 491 862">0</td> <td data-bbox="491 804 614 862"></td> <td data-bbox="614 804 1273 862">No creditable content.</td> </tr> </table> <p data-bbox="368 898 638 929">Notes for answers:</p> <p data-bbox="368 954 432 985">AO1</p> <ul data-bbox="368 1010 1276 2078" style="list-style-type: none"> • The temperatures are hot all year round. Statistics for particular location may be given in support. • Rainfall is consistent throughout most of the year. Statistics for particular location may be given in support. • Despite the cloud cover there is always enough solar radiation penetrating through to the vegetation to allow photosynthesis to take place, especially in the canopy and other higher layers. • Organic matter fixed by the leaves is mostly absorbed into the plant structures. The nature of the rain forest cover may be illustrated with reference to a specific case study. • Because there are no seasons plants lose their leaves and other damaged parts, at different times during the year, but temperatures and humidity encourage the rapid decomposition of the waste material. • This waste material can then be recycled very quickly by the rapid growth of more plants. Some is recycled by epiphytes without ever reaching the soil. • There is not time for the humus to be carried down below the uppermost soil horizons before it is reabsorbed by plants. • The heavy rain does wash some decomposed and decomposing plant material off into rivers, so that it is lost to the forest. • Clearance of vegetation for farming leads to removal of most of the organic nutrients from the vegetation/soil system. • Further removal takes place because soil is exposed to leaching due to cessation of interception. 			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		No creditable content.	
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Question	Part	Marking guidance	Total marks
		<p>AO2</p> <ul style="list-style-type: none"> • Analysis and explanation of the transfers and stores within the water cycle and the carbon cycle and their reflection in the development of the ecosystems of the rain forest. • Analysis and explanation of the necessity for the interlinking of the carbon cycle, the water cycle and the nutrient cycle through the mechanism of photosynthesis. • Analysis and explanation of the processes of decomposition as a process within the carbon (and water) cycle. The involvement of soil organisms and other detritivores in this part of the cycle. • Analysis and explanation of the nature and formation of tropical soils and the role of heat, moisture, vegetation and soil fauna in developing the soils and differentiating the horizons in the soil. • Analysis and evaluation of the effects of human interference in the rain forest ecosystem. Reference may be made to subsistence 'slash and burn' agriculture, large-scale commercial clearance for ranching, soya farming, etc. • Analysis and evaluation of the effects of lumbering, road building, mining, dam construction, etc might also be made. • Analysis and evaluation of the effects of conservation policies such as the development of national parks may also be seen, considering how and to what extent such policies can slow down the process of deforestation. 	

Section B – Ecosystems under stress
Total for this section: 40 marks

Question	Part	Marking guidance	Total marks
05	1	<p>In an ecosystem a primary producer is:</p> <p>Key – B</p>	<p>1</p> <p>AO1=1</p>
05	2	<p>A seral progression is:</p> <p>Key – B</p>	<p>1</p> <p>AO1=1</p>
05	3	<p>Which of the following groups are all biomes?</p> <p>Key – C</p>	<p>1</p> <p>AO1=1</p>
05	4	<p>The savannah grassland biome is found in areas with:</p> <p>Key – A</p>	<p>1</p> <p>AO1=1</p>
05	5	<p>The rainforest biome is characterised by:</p> <p>Key – B</p>	<p>1</p> <p>AO1=1</p>

Question	Part	Marking guidance	Total marks												
06		<p>Analyse the data provided in Figure 3a and Figure 3b.</p> <p>AO3- There are a variety of ways of approaching this unseen material.</p> <p>This question requires analysis of the changes in sea surface temperatures recorded at the Great Barrier Reef alongside changes in percentage coral cover and coral mortality data. For maximum marks there should also be use of specific data.</p> <table border="1"> <thead> <tr> <th>Level</th> <th>Marks</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>4-6</td> <td>AO3- Clear analysis of the quantitative evidence provided which makes appropriate use of data to support. Clear connections between different aspects of the data.</td> </tr> <tr> <td>1</td> <td>1-3</td> <td>AO3- Basic analysis of the quantitative evidence provided which makes limited use of data to support. Basic or limited connections between different aspects of the data.</td> </tr> <tr> <td></td> <td>0</td> <td>No creditable content.</td> </tr> </tbody> </table> <p>Indicative Content</p> <ul style="list-style-type: none"> • It is clear from figure 3a that the average sea temperature has fluctuated over time but that in recent years, there has been a general pattern of warming. The year 2000 saw the last cooler than average recorded temperatures albeit by a small amount. • The recorded temperatures ranges from -1.6°F to just under +2°F - a range of 3.6°F in a 110 year time period. • When temperatures more generally started to increase in figure 3a, in the late 1990s, there has been a steady decline in percentage coral cover. • Figure 3b shows the annual mortality of coral in percentage cover has also fluctuated between 1986 and 2011. The greatest mortality was seen in 1999 and 2000 with greater than 5% loss in coverage. The least loss was seen in 2008 with less than 1% cover lost. • Figure 3b shows that bleaching as a cause of mortality has only been evident in six of the recorded years (between 1998 and 2004) and has not been evident post 2004. This supports the data in figure 3a. • Cyclones have caused coral mortality in all years except 1993 and 2008. The worst impact to coral can be seen in 2011 with over 3.5% loss in coverage. • Crown-of-thorns starfish is shows as a cause of death in all recorded years. The highest mortality being in 2003 with 2.5% of coral coverage lost. 	Level	Marks	Description	2	4-6	AO3- Clear analysis of the quantitative evidence provided which makes appropriate use of data to support. Clear connections between different aspects of the data.	1	1-3	AO3- Basic analysis of the quantitative evidence provided which makes limited use of data to support. Basic or limited connections between different aspects of the data.		0	No creditable content.	<p>6</p> <p>AO3=6</p>
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	0	No creditable content.													

Question	Part	Marking guidance	Total marks															
07		<p>Read the extract in Figure 4.</p> <p>Analyse the causes and impact of changing sea conditions on the Great Barrier Reef.</p> <p>AO1 – Knowledge and understanding of the conditions necessary for the growth of coral.</p> <p>Knowledge and understanding of the factors affecting global and local sea temperatures and of the way that changing temperatures affect coral.</p> <p>AO2 – Application of knowledge and understanding to the conditions in the Eden drainage basin. There should be an application of this knowledge and understanding to analyse the human and physical factors contributing to flooding, and to the links between those factors.</p> <p>Mark scheme</p> <table border="1" data-bbox="368 835 1273 1989"> <thead> <tr> <th>Level</th> <th>Marks</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>7–9</td> <td> <p>AO1 – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change.</p> <p>AO2 – Applies knowledge and understanding to the novel situation, offering detailed analysis and evaluation, drawn appropriately from the context provided. Connections and relationships between different aspects of study are thorough and relevant.</p> </td> </tr> <tr> <td>2</td> <td>4–6</td> <td> <p>AO1 – Demonstrates clear knowledge and understanding of concepts, processes, interactions and change.</p> <p>AO2 – Applies knowledge and understanding to the novel situation, offering clear analysis and evaluation, drawn appropriately from the context provided. Connections and relationships between different aspects of study are evident and relevant.</p> </td> </tr> <tr> <td>1</td> <td>1–3</td> <td> <p>AO1 – Demonstrates basic knowledge and understanding of concepts, processes, interactions and change.</p> <p>AO2 – Applies limited knowledge and understanding to the novel situation, offering some basic analysis and evaluation, drawn from the context provided. Connections and relationships between different aspects of study are basic and of limited relevance.</p> </td> </tr> <tr> <td></td> <td>0</td> <td>No creditable content.</td> </tr> </tbody> </table> <p>Notes for answers:</p>	Level	Marks	Description	3	7–9	<p>AO1 – Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change.</p> <p>AO2 – Applies knowledge and understanding to the novel situation, offering detailed analysis and evaluation, drawn appropriately from the context provided. Connections and relationships between different aspects of study are thorough and relevant.</p>	2	4–6	<p>AO1 – Demonstrates clear knowledge and understanding of concepts, processes, interactions and change.</p> <p>AO2 – Applies knowledge and understanding to the novel situation, offering clear analysis and evaluation, drawn appropriately from the context provided. Connections and relationships between different aspects of study are evident and relevant.</p>	1	1–3	<p>AO1 – Demonstrates basic knowledge and understanding of concepts, processes, interactions and change.</p> <p>AO2 – Applies limited knowledge and understanding to the novel situation, offering some basic analysis and evaluation, drawn from the context provided. Connections and relationships between different aspects of study are basic and of limited relevance.</p>		0	No creditable content.	<p>9</p> <p>AO1=4 AO2=5</p>
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	0	No creditable content.																

Question	Part	Marking guidance	Total marks
07		<p>AO1</p> <ul style="list-style-type: none"> • Sunlight: Corals need to grow in shallow water where sunlight can reach them. Corals depend on the zooxanthellae (algae) that grow inside of them for oxygen, and since these algae need sunlight to survive, corals also need sunlight to survive. Corals rarely develop in water deeper than 165 feet (50 metres). • Clear water: Corals need clear water that lets sunlight through; they don't thrive when the water is opaque. Sediment and plankton can cloud water, which decreases the amount of sunlight that reaches the zooxanthellae. • Warm water temperature: Reef-building corals require warm water conditions to survive. Different corals living in different regions can withstand various temperature fluctuations. However, corals generally live in water temperatures of 20–32° C. The range of temperature that can be tolerated by individual species is usually narrower than this. • Clean water: Corals are sensitive to pollution and sediments. Sediment can create cloudy water and be deposited on corals, blocking out the sun and harming the polyps. Wastewater discharged into the ocean near the reef can contain too many nutrients that cause seaweeds to overgrow the reef. • Saltwater: Corals need saltwater to survive and require a certain balance in the ratio of salt to water. <p>AO2</p> <ul style="list-style-type: none"> • The global temperature is rising, at least partly due to human activities such as burning fossil fuels and clearing forests, and this has affected the background temperature of the oceans. • On top of this the reversal of currents caused by the El Niño effect in the Pacific Ocean brings major temperature surges to the coastal regions to the east of Australia. Recent El Niño's have been showing increased temperature fluctuations, possibly linked to the overall global climate changes. • These changes were probably enough to kill species of coral polyp and other species living in the reef. The death of the polyps lead to the bleaching of the reef and the deaths of these and other species would have upset the whole ecology of the reef. It will probably take many years to re-establish the ecosystem even if temperatures return to the previous normal. • However, the circulation patterns in the ocean further to the south were more heavily influenced by the cyclone that would have brought cooler water from the south up to the southern parts of the reef. This would have counteracted the effect of global change and of the El Niño. • Changing currents may also have brought sediments into the reef area and these might have been deposited, adding to the stress on the coral. • This deposition might have been supplemented by the remains of 	

Question	Part	Marking guidance	Total marks
07		dead flora and fauna, which may also have covered parts of the reef, reducing the penetration of sunlight.	

Question	Part	Marking guidance	Total marks						
08		<p>'The idea of a Climatic climax vegetation community is a useful concept in the study of ecology. However, climate change is now so widespread that there are probably few areas of the world where Climatic climax communities still exist in a stable condition'.</p> <p>To what extent do you agree with this statement?</p> <p>AO1 – Knowledge and understanding of the concepts of climatic climax, plagioclimax and sub-climax, seral stages and progression, dynamic equilibrium in ecosystems.</p> <p>Knowledge and understanding of one or more terrestrial ecosystems.</p> <p>AO2 – Application of knowledge and understanding to explain the inter-relationships between climate, soils, relief and vegetation to produce ecosystems through the development of seres and progression towards a climax community.</p> <p>Application of knowledge and understanding to explain the ways in which seral progressions can be interrupted by natural or human factors to produce sub-climax or plagioclimax communities.</p> <p>Evaluation of the extent to which climate change is now destabilising areas of the world to the extent that seral progressions are inevitably interrupted and cannot proceed in the way that theoretical studies have suggested that they should.</p> <p>Analysis of the factors considered above to draw valid conclusions as to the extent of validity of the statement given.</p> <p>Mark scheme</p> <table border="1"> <thead> <tr> <th>Level</th> <th>Marks</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>16–20</td> <td> <p>AO2 – Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question.</p> <p>AO2 – Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout.</p> <p>AO2 – Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts.</p> <p>AO1 – Detailed, highly relevant and appropriate knowledge and understanding of place(s) and</p> </td> </tr> </tbody> </table>	Level	Marks	Description	4	16–20	<p>AO2 – Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question.</p> <p>AO2 – Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout.</p> <p>AO2 – Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts.</p> <p>AO1 – Detailed, highly relevant and appropriate knowledge and understanding of place(s) and</p>	<p>20</p> <p>AO1 = 10</p> <p>AO2 = 10</p>
Level	Marks	Description							
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Question	Part	Marking guidance		Total marks
08			<p>environments used throughout.</p> <p>AO1 – Full and accurate knowledge and understanding of key concepts and processes throughout.</p> <p>AO1 – Detailed awareness of scale and temporal change which is well integrated where appropriate.</p>	
		3	<p>11–15</p> <p>AO2 – Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question.</p> <p>AO2 – Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding.</p> <p>AO2 – Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts.</p> <p>AO1 – Generally clear and relevant knowledge and understanding of place(s) and environments.</p> <p>AO1 – Generally clear and accurate knowledge and understanding of key concepts and processes.</p> <p>AO1 – Generally clear awareness of scale and temporal change which is integrated where appropriate.</p>	
		2	<p>6–10</p> <p>AO2 – Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question.</p> <p>AO2 – Some partially relevant analysis and evaluation in the application of knowledge and understanding.</p> <p>AO2 – Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts.</p> <p>AO1 – Some relevant knowledge and understanding of place(s) and environments which is partially relevant.</p> <p>AO1 – Some knowledge and understanding of key concepts, processes and interactions and change.</p> <p>AO1 – Some awareness of scale and temporal change which is sometimes integrated where</p>	

Question	Part	Marking guidance		Total marks	
08				appropriate. There may be a few inaccuracies.	
		1	1–5	<p>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.</p> <p>AO2 – Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence.</p> <p>AO2 – Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts.</p> <p>AO1 – Very limited relevant knowledge and understanding of place(s) and environments.</p> <p>AO1 – Isolated knowledge and understanding of key concepts and processes.</p> <p>AO1 – Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies.</p>	
			0	No creditable content.	
		<p>Notes for answers:</p> <p>AO1</p> <ul style="list-style-type: none"> • A Climatic climax community is an ecological community in the final stage of succession, in which the species composition. • Remains relatively stable until a disturbance such as fire occurs. • A sub-climax is the development of an ecological community to a stage short of the expected climax because of some factor, such as repeated fires in a forest or impeded drainage that arrests the normal succession. • A Plagioclimax community is one in which human activity intervenes in a consistent way to stop the development towards the climatic climax. Agriculture, gardening or conservation of particular communities are examples. • Climatic change is occurring, and has always occurred, but now the pace of change is probably greater than at any time in the recent past. This change is likely to continue. • Answers should be illustrated with knowledge and understanding of one or more ecosystems. <p>AO2</p> <ul style="list-style-type: none"> • Explanation of the mechanisms of change in ecosystems, 			

Question	Part	Marking guidance	Total marks
08		<p>analysing the way in which the different elements of the ecosystem have normally interacted.</p> <ul style="list-style-type: none">• Analysis and explanation of the concept of equilibrium and dynamic equilibrium.• Analysis and explanation of the processes whereby climate has changed and will probably continue to change, and of the way these changes have affected and are likely to continue to affect particular ecosystems.• Analysis and explanation of the nature of climate change and of the probable future progress of climate change, whether entirely natural or at least partly man-made.• Attempts to draw conclusions based on the presentation and analysis of the evidence. Attempts to achieve a balanced view, supported by the strongest available evidence.	

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