

Fragile environments and climate change-2

Name: _____

Class: _____

Date: _____

Time:

Total Marks Available:

Total Marks Archived:

Level: IGCSE Mathematics A

Subject: Geography

Exam Board: Edexcel IGCSE Geography- it is however suitable for use by mathematics student of other boards

Topic: Fragile environments and climate change-2

Type: Mark Scheme

To be used by all students preparing for Edexcel IGCSE Geography- Students of other Boards may also find this useful



Mark Scheme

Q1.

Question number	Indicative content
	<p style="text-align: center;">AO3 (3 marks)/AO4 (3 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p> <p>AO3</p> <ul style="list-style-type: none">• The most important impacts may be systems changes in the atmosphere e.g. unreliable rainfall and extreme temperatures have a wider global reach• Climate-change is a worrying because of its scale of impacts and the positive feedback / amplification mechanism.• Local effects will also be severe on land especially crop yields affecting people's health and livelihoods. These are linked to atmosphere e.g. monsoon summer changes (reliability, amount)• Ocean degradation is important especially from a marine biodiversity point of view.• Systems are very interlinked and therefore it is actually difficult to predict the scale of impacts especially with unknown temperature increases. <p>AO4</p> <ul style="list-style-type: none">• Figure 7c shows six different climate change impacts.• Figure 7c shows that the climate change impacts are grouped into three categories: ocean, land and atmosphere.• Figure 7c shows a selected range of climate change impacts



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-3	<ul style="list-style-type: none">Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	4-6	<ul style="list-style-type: none">Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)

Q2.



Question number	Indicative content
	<p style="text-align: center;">AO3 (3 marks)/AO4 (3 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p> <p>AO3</p> <ul style="list-style-type: none">• The most important factors locally are likely to be conversion of forest to agriculture, illegal logging and mining. But the impacts of these will vary spatially and will depend on the geo-political arrangements in that country / region.• Longer term climate-change is a worrying factor because of its scale of impacts and the positive feedback / amplification mechanism so, conversion of forest to livestock farming is an example• Development and globalisation are underlying factors that drive air travel, and increasing demand for energy. These are linked to population growth in some parts of the world so play a significant role.• Drivers are often interlinked and there can be a chain of effects that increase the likelihood of climate change. <p>AO4</p> <ul style="list-style-type: none">• Figure 7c shows a range of different drivers which are all linked to human activity and climate change.• Figure 7c shows drivers that can operate at different geographical scales and have very different root causes.• Figure 7c shows that deforestation has an indirect impact, whereas the others are more direct causes and rivers.• Figure 7c indicates that there is only a limited number of drivers, but for some places there may be more which are not on the diagram.



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-3	<ul style="list-style-type: none">Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	4-6	<ul style="list-style-type: none">Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)
		<ul style="list-style-type: none">Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)

Q3.



Question number	Indicative content
	<p style="text-align: center;">A03 (3 marks)/A04 (3 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p>A03</p> <ul style="list-style-type: none">• Soil erosion may increase as a result of climate change, e.g. linked to drying out, wind and droughts.• Soil erosion could be in the form of gully and sheet erosion with more intense precipitation events, which are associated with climate change.• Desertification may increase as productive land becomes degraded by drought, extreme temperatures, unreliable rainfall, further increasing the fragility of the ecosystem.• Rising sea levels may threaten/flood low-lying coastal ecosystems and fragile environments. This is something that could be further exacerbated by more frequent storms/hurricanes due to warmer ocean temperatures.• Increasing risk of fragile environments being affected by flooding as a result of glacial melting, flash floods and baked/impermeable soils. <p>A04</p> <ul style="list-style-type: none">• Figure 7c shows an overall increase in all types of climate disasters, apart from drought.• Figure 7c shows that the most significant rises have been in storms and floods: up to 100 storms and around 50–200 floods per year.• Droughts and extreme temperatures show some variability per year but storms and floods show much higher variability.• Figure 7c indicates that there is only a moderate increase in extreme temperatures over the 1980–2011 period.



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	<ul style="list-style-type: none">Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	4–6	<ul style="list-style-type: none">Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)



Q4.

Question Number	Indicative content
	<p style="text-align: center;">AO3 (3 marks)/AO4 (3 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p> <p>AO3</p> <ul style="list-style-type: none">• There are a range of economic, social and environmental impacts of deforestation. Many of the impacts are interlinked.• Most of the impacts are negative, however, for many countries the economic benefits outweigh the negative which is why deforestation continues even if these benefits are short-lived compared to the long-term impacts.• Physical impacts:



- Loss of biodiversity: Amazon rainforest thought to be home for over 60,000 species of plant, more than 1,000 species of birds and over 300 species of mammals.
- Soil erosion: removal of trees for cattle ranching exposes the soil and makes it more prone to erosion.
- Increased CO₂ in the atmosphere as there are less trees to absorb it, contributing to climate change in the long term.
- Human impacts:
 - Loss of goods provided by the rainforest, for example many rainforest plants are used for medicines.
 - Native tribes forced to move e.g. Kayapo tribe Brazil forced to move due to logging activity.
 - Money made: cattle ranching in areas of Brazil formerly part of the rainforest generated US\$6.7 billion in exports.

A04

- Figure 7c shows a series of physical and human impacts of deforestation.
- Figure 7c indicates how human impacts can include a loss of services provided by the forest, movement of native tribes and money made from deforestation can support economic development.



	<ul style="list-style-type: none">• Figure 7c indicates physical impact of deforestation include loss of biodiversity, soil erosion and increased CO₂ in the atmosphere.• Figure 7c indicates there are some potential positive impacts of deforestation for people (money).
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	0	No rewardable material.
Level 1	1-3	<ul style="list-style-type: none">• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	4-6	<ul style="list-style-type: none">• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)• Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)

Q5.



Question number	Indicative content	Mark
	<p style="text-align: center;">A03 (3 marks)/A04 (3 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p>A03</p> <ul style="list-style-type: none">• Global warming is thought to be contributing to sea level rise, with predictions of how much this going to be over future decades varying significantly. Whichever scenario takes place any amount of sea level rise has the potential to cause damage to the economic development of many countries.• Sea level rise will not only damage many coastal environments, and increase flooding and erosion, it has the potential to damage human lives for those in affected areas.• Those countries such as Bangladesh which are low lying have the greatest potential to have their economies damaged as rising waters would not only damage buildings and infrastructure but disrupt agricultural systems and ability to produce food for consumption and exports. <p>A04</p> <ul style="list-style-type: none">• Figure 7b shows how Asia will be the continent that is most affected by either 0.15m sea level rise potentially affecting 60.2 million people.• Figure 7b shows in terms of total numbers Oceania has the lowest number at risk.• Figure 7b shows how North and South America have a similar level of risk ranging from 5.6-6.2 million people.	(6)



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Level 1	1–3	<ul style="list-style-type: none">• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (A04)
Level 2	4–6	<ul style="list-style-type: none">• Applies understanding to deconstruct information but understanding and connections are flawed. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)• Uses geographical skills to obtain information that supports some aspects of the argument. (A04)

Q6.



Question number	Indicative content
	<p style="text-align: center;">A03 (3 marks)/A04 (3 marks)</p> <p>Marking instructions</p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance</p> <p>The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p> <p>A03</p> <ul style="list-style-type: none">• The most important factors locally are likely to be conversion of forest to agriculture, illegal logging and mining. But the impacts of these will vary spatially and will depend on the geo-political arrangements in that country / region.• Longer term climate-change is a worrying factor because of its scale of impacts and the positive feedback / amplification mechanism (carbon cycle) so, conversion of forest to livestock farming is an example. This is the net loss• Areas with net gain may see increased opportunities for re-wilding and establishment of areas of biodiversity which is a positive impact.• Gain helps to redress the loss of carbon stores associated with deforestation, but impacts can remain at a global scale, unclear. <p>A04</p> <ul style="list-style-type: none">• Figure 7b shows spatial differences in areas of gain, loss and small change (gain or loss).• Figure 7b shows South America has the largest amounts of net loss, especially Brazil; there are also significant areas of loss in parts of SE Asia• Figure 7b shows that deforestation is widespread in the countries of central and southern Africa• Figure 7b indicates that China has the largest net gain (>500,000ha) and there are also net gains in Australia and N America.



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-3	<ul style="list-style-type: none">Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	4-6	<ul style="list-style-type: none">Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)

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Q7.

Question Number	Answer	Mark
(i)	<p>(AO4) 2 marks</p> <p>Award 1 mark for correct figures used, and one mark for correct answer:</p> <p>Highest = 52 Lowest = 12 (1).</p> <p>Range= 40.0 (1). Accept answers from 39.0-41.0</p>	(2)



Question Number	Answer	Mark
(ii)	<p style="text-align: center;">A03 (2 marks)</p> <p>Award 1 mark for the identification of a pattern and 1 mark for further detail through description or use of supporting data from the resource, up to a maximum of 2 marks.</p> <ul style="list-style-type: none">• For many regions there are few differences between 2010 and 2019 (1) except Western Pacific where there are almost double the number of storms (1).• All regions have a higher number of storms in 2019 than in 2010 except Australia (1). The greatest increase has been in the Western Pacific region (1).• In 2010 the regions with the highest number of storms was the Atlantic and Western Pacific (1), but in 2019 it was Western Pacific and Eastern Pacific (1). <p>Accept any other appropriate response.</p>	(2)

Q8.



Question number	Answer	Mark
(i)	AO1 (1 mark) B intensive farming B is the correct answer as the other options are natural causes,	(1)

Question number	Answer	Mark
(ii)	AO1 (1 mark) D significant increase in mining D is the correct answer as the other options are not direct causes,	(1)

Q9.

Question number	Answer	Mark
(i)	AO1 (1 mark) • Desertification means the spread of desert-like conditions into nearby areas/the outward expansion of deserts into their surrounding regions (1). Accept any other appropriate response.	(1)

Question number	Answer	Mark
(ii)	AO3 (2 marks) Award 1 mark for any of the following, up to a maximum of 2 marks. • USA (1) • Australia (1) • South Africa (1)	(2)



Question number	Answer	Mark
(iii)	<p>A02 (2 marks)/A03 (2 marks)</p> <p>Award 1 mark for the identification of a possible reason for the pattern shown on Figure 7a (A03) and a further mark for an explanation of the reason (A02), up to a maximum of 2 marks per idea.</p> <ul style="list-style-type: none">• A lack of rainfall in named area (1) reduces vegetation cover (1).• Some areas have less vegetation than others (1), which increases the chances of soil erosion happening (1).• Some areas experience intense rainfall/flash floods (1), which increases the rate of run-off/reducing soil moisture (1).• Over-farming in named area(s) (1) reduces soil fertility over time (1). <p>Accept any other appropriate response.</p>	(4)

Q10.



Question number	Indicative content
	<p style="text-align: center;">A02 (4 marks), A03 (4 marks), A04 (4 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p> <p>A02</p> <ul style="list-style-type: none">• The threats to fragile ecosystems are many and varied.• Threats can be shorter-term as well as longer term; they may also be local, national or internationally derived.• Fragile environments can be wide ranging but are those that are considered to be under pressure, generally from causes at the hands of people.• Deforestation is the removal of forest cover and is a particular concern in tropical rainforests because these forests are home to much of the world's biodiversity. <p>A03</p> <ul style="list-style-type: none">• Countries, places and regions which have the greatest deforestation do not always have the most fragile environments• The range of threats complex, controversial and politically driven, especially taken as a long-term objective where growth and development might be at risk.• Deforestation is no doubt a significant threat, but many would argue climate change, including temperature increases and sea-level rise will have great impacts on fragile environments that are already under stress• Some places might see land use change and urbanisation as big threats to their fragile environments, especially where there are rapidly growing cities fuelled by rural-urban migration• Pollution and degradation of habitat quality as well as spatial extent are all impacts results from threats.



A04

- Figure 7a shows information for USA only.
- Figure 7a shows some over last century there has been and increase in the percentage of land affected by extreme weather events, although there is considerable variation.
- Figure 7b shows deforestation "hotspots" including Brazil.
- Figure 7b shows that some countries and places are showing anet gain in forest cover
- Figure 7b shows that deforestation varies spatially.





Level	Mark	Descriptor
	0	No acceptable response.
Level 1	1-4	<ul style="list-style-type: none">• Demonstrates isolated elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	5-8	<ul style="list-style-type: none">• Demonstrates elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)• Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	9-12	<ul style="list-style-type: none">• Demonstrates accurate understanding of concepts and the interrelationship of places, environments and processes. (AO2)• Applies understanding to deconstruct information and provides logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)• Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)



Q11.

Question number	Indicative content
	<p style="text-align: center;">AO2 (4 marks), AO3 (4 marks), AO4 (4 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p>



AO2

- Responses to climate change are many and varied.
- Responses can be shorter-term as well as longer term and they can be mitigate (reduce cause) or adaptation (live with impacts)
- Responses can be localised, e.g. managing traffic, more sustainable buildings and heating systems.
- Responses can be based round “polluter pays” principle or more of an incentivised solution, e.g. FITs to encourage green energy technology.

AO3

- Countries, places and regions which have the greatest carbon footprints do not always have the most robust solutions in terms of responses.
- Cutting of CO₂ emissions is complex, controversial and politically difficult, especially taken as a long-term objective where growth and development might be at risk.
- In order for mitigation responses to be effective, many would argue that they need top be global, rather than country or even regionally-based.
- Some places might see adaptation as the best responses as they have the resources and technical capability to withstand shorter and longer-term climate change shocks and impacts.
- The development pathways to secure money for climate change responses going from the richest nations to the poorest to counter the most significant drivers is seen as a good approach.

AO4

- Figure 7a shows “hotspots” in China, India and USA especially as well as much of Europe if taken as a region in itself.
- Figure 7a shows some countries and regions have made very little contribution to carbon emissions, e.g. parts of Sub- Saharan Africa.



Question number	Indicative content	
	<ul style="list-style-type: none">• Figure 7b shows a range of different drivers which are all linked to human activity and climate change.• Figure 7b shows causes that can operate at different geographical scales.• Figure 7b shows that deforestation can be linked to agricultural land conversion e.g. livestock farming.	
Level	Mark	Descriptor
	0	No acceptable response.
Level 1	1–4	<ul style="list-style-type: none">• Demonstrates isolated elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	5–8	<ul style="list-style-type: none">• Demonstrates elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)• Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)



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Level 3	9-12	<ul style="list-style-type: none">• Demonstrates accurate understanding of concepts and the interrelationship of places, environments and processes. (AO2)• Applies understanding to deconstruct information and provides logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)• Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)
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Q12.



Question number	Indicative content
	<p style="text-align: center;">AO2 (4 marks), AO3 (4 marks), AO4 (4 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p> <p>AO2</p> <ul style="list-style-type: none">• Climate change is the increasing temperatures associated with average weather conditions or longer-term average conditions.• There are a range of potential impacts of climate change including: increased temperatures, sea level risk, increased frequency of extreme weather events.• Climate change will affect global atmospheric circulation systems thereby affecting many places.



A03

- Figure 7a shows how arid regions of the world are particularly at risk of desertification, and therefore if climate change continues this process will get worse.
- Figure 7b how there has already been an increase in the number of tropical storms over a decade, if climate change continues and this trajectory continues some regions of the world will be at great risk of a high number of tropical storms each year.
- Rising sea levels due to climate change has the potential to impact a much larger number of people. Ever year the sea rises by around 3mm but this could increase if temperatures continue to rise too, with up to 150 million people being affected by 2050.

A04

- Figure 7a shows the regions at risk of desertification, particularly around the edge of the Sahara desert and the middle east, and the edge of Australia.
- Figure 7a shows that a large number of nations are affected by some level of risk of desertification.



	<ul style="list-style-type: none">• Figure 7a shows a significant level of variability between countries and global regions.• Figure 7b shows how there has been an increase in the number of tropical storms across all regions with the lowest increase seen around Australia.• Figure 7b shows how the Western Pacific region has experienced the greatest increase in the number of tropical storms.• Figure 7b shows how there is significant variability in the risk of tropical storms, although there are many regions at risk.
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Level	Mark	Descriptor
	0	No acceptable response.
Level 1	1–4	<ul style="list-style-type: none">• Demonstrates isolated elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)



Level 2	5-8	<ul style="list-style-type: none">• Demonstrates elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)• Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	9-12	<ul style="list-style-type: none">• Demonstrates accurate understanding of concepts and the interrelationship of places, environments and processes. (AO2)• Applies understanding to deconstruct information and provides logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading
		<p>to judgements that are supported by evidence throughout. (AO3)</p> <ul style="list-style-type: none">• Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)



Q13.

Question number	Indicative content
	<p style="text-align: center;">AO2 (4 marks), AO3 (4 marks), AO4 (4 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p>





	<p>AO2</p> <ul style="list-style-type: none">• Climate change is the increasing temperatures associated with average weather conditions or longer-term average conditions.• Ecosystems and places are affected by water and drought stress linked to climate change.• Low lying places will be threatened by rising sea levels caused by climate change.• Biodiversity will be threatened by animals migrating because they cannot easily / quickly adapt to the changing climate of their current habitat.• Climate change will affect global atmospheric circulation systems thereby affecting many places. <p>AO3</p> <ul style="list-style-type: none">• Figure 7a shows that China, India and USA are the worse emitters, and to some extent they will suffers the effects of climate change although they may be able to adapt especially in the richest parts of those nations.• Perhaps the worst impact will be felt by the people and nations who do not emit, e.g. parts of Africa, small island states (SIDs) etc. Sea level rise for the latter is especially significant especially as they often don't have a voice on the global stage.• 7a shows emissions for a whole country; arguably a more useful measure are emission per capita.• Changes in farming, through adaptation, may mitigate against the risks of climate change. So, the evidence in Figure 7c may not be reliable and conclusions not valid.• Overall the view is likely to be broadly correct, with exceptions.
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	<p>AO4</p> <ul style="list-style-type: none">• Figure 7a shows China, India and USA as the biggest emitters (total CO₂).• Figure 7a shows that a large number of nations, especially in the southern hemisphere have a low total CO₂ output.• Figure 7a shows a good deal of variability between countries and global regions.• Figure 7c shows nine different climate change impacts.• Figure 7c shows that the climate change impacts are grouped into three categories: ocean, land and atmosphere.• Figure 7c shows a selected range of climate change impacts.
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Level	Mark	Descriptor
	0	No acceptable response.
Level 1	1-4	<ul style="list-style-type: none">• Demonstrates isolated elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	5-8	<ul style="list-style-type: none">• Demonstrates elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)• Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	9-12	<ul style="list-style-type: none">• Demonstrates accurate understanding of concepts and the interrelationship of places, environments and processes. (AO2)• Applies understanding to deconstruct information and provides logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)• Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Q14.



Question number	Indicative content
	<p style="text-align: center;">A02 (4 marks)/A03 (4 marks) /A04 (4 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p>A02</p> <ul style="list-style-type: none">• Sea level rise poses a significant threat to the many countries around the world, particularly those with high populations living on coastal or low lying areas.• There are different scenarios for the potential level of sea level rise but even the smallest of these is likely to damage coastlines and cause greater flooding along coast and river courses.• Some of the worlds largest cities are at risk from sea level rise including New York and Tokyo which represent significant global financial centres. Damage in these locations would have a global effect.• There are a range of threats links to global climate change including sea level rise, desertification, changing weather patterns, ecosystem challenges, health challenges and changing patterns of food production.



A03

- Rising global temperatures as an indicator of global climate change will have wider impacts than just sea level rise.
- Atmospheric systems are likely to be altered as temperatures will have changed, and a different level of moisture in the air, which has the potential to cause more frequent and extreme weather events.
- Rising global temperatures are likely to increase risk of desertification for areas of the globe, introducing desertification into some areas, and making it worse in others. Increased desertification has the potential to impact livelihoods across the globe in terms of the availability of land for agriculture.
- Global climate change will lead to a range of threats which will have various social, economic and environmental impacts.
- Changing global temperatures may have an impact on the prevalence of insects, bacteria, and viruses which can affect animal and food crops in other countries.
- Many of the threats from global climate change are interconnected and cannot be seen independently.

A04

- Figure 7b shows the varied levels of population at risk from different levels of sea level rise.
- Figure 7b shows how Asia will be the continent the most affected by either 0.15m sea level rise potentially affecting 60.2 million people.
- Figure 7b presents a range of threats from global climate change in a rank order suggesting that global sea level rise is the greatest, but covers other economic, social and environmental threats.
- Figure 7c shows how there a range of potential threats from climate change.



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-4	<ul style="list-style-type: none">• Demonstrates isolated elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (A04)
Level 2	5-8	<ul style="list-style-type: none">• Demonstrates elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Applies understanding to deconstruct information but understanding and connections are flawed. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)<ul style="list-style-type: none">• Uses geographical skills to obtain information that supports some aspects of the argument. (A04)
Level 3	9-12	<ul style="list-style-type: none">• Demonstrates accurate understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Applies understanding to deconstruct information and provides logical connections between concepts throughout. A balanced well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)• Uses geographical skills to obtain information that supports all aspects of the argument. (A04)

Q15.



Question number	Indicative content
	<p style="text-align: center;">AO2 (4 marks)/AO3 (4 marks)/AO4 (4 marks)</p> <p>Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p>Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p>AO2</p> <ul style="list-style-type: none">• The term climate change can be defined in a range of ways, often to suit different arguments.• Climate change will have an impact on soil, temperature, rainfall and weather events.• Climate change could threaten fragile environments, e.g. tropical rainforests or coral reefs, in terms of structure, function and biodiversity.• Fragile environments may be threatened by rising sea levels caused by climate change; ecosystem biodiversity could be threatened by animals migrating because they cannot adapt to the changing climate of their current habitat.• Responses may be either based around adaptation or mitigation.



AO3

- Attempts to mitigate against climate change threats, e.g. through sustainable management, can vary significantly for different fragile environments (judgements will depend on case studies).
- A specific ecosystem's natural ability to adapt to climate change can vary, which means impacts of climate change will be 'threats' only to ecosystems that cannot adapt.
- A main cause of climate change is greenhouse gas emissions – and the challenge is to reduce these emissions. This can be done by reducing fossil fuel consumption, finding alternative energy sources, reducing deforestation, e.g. in tropical rainforests, and developing carbon capture technologies. However, different groups of people have different opinions about which strategy is the best/most effective.
- The challenge of climate change crosses international boundaries and, therefore, international cooperation is crucial, e.g. Kyoto, 1997. However, arriving at agreement is never a straightforward process.
- The development of alternative energy sources, such as wind farms, nuclear power, HEP and solar panels will reduce fossil fuel consumption, but the development of each type of source has its own advantages and disadvantages.

AO4

- Figure 7a shows rapid increases in temperature and CO₂.
- Figure 7c shows an overall increase in all types of climate disasters during the period 1980–2011.
- Figure 7c shows that the most significant rises have been in storms and floods: up to 100 storms and around 50–200 floods per year.
- Droughts and extreme temperatures show some variability per year but storms and floods show much higher variability.
- Figure 7c indicates that there is only a moderate increase in both droughts and floods over the 1908–2011 period.



Level	Mark	Descriptor
	0	No acceptable response.
Level 1	1–4	<ul style="list-style-type: none">• Demonstrates isolated elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	5–8	<ul style="list-style-type: none">• Demonstrates elements of understanding of concepts and the interrelationship between places, environments and processes. (AO2)• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)• Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	9–12	<ul style="list-style-type: none">• Demonstrates accurate understanding of concepts and the interrelationship of places, environments and processes. (AO2)• Applies understanding to deconstruct information and provides logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)• Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)



Q16.

Question number	Answer	Mark
(i)	<p style="text-align: center;">AO1 (1 mark)</p> <p>Award 1 mark for a suitable definition.</p> <ul style="list-style-type: none">• The long-term changes in the average planetary / surface temperature of the Earth (1). <p>Accept any other appropriate response.</p>	(1)

Question number	Answer	Mark
(ii)	<p style="text-align: center;">AO3 (2 marks)</p> <p>Award 1 mark for any of the following, up to a maximum of 2 marks.</p> <ul style="list-style-type: none">• Highest = China (1)• Lowest = New Zealand (1)	(2)



Question number	Answer	Mark
(iii)	<p style="text-align: center;">AO2 (2 marks) / AO3 (2 marks)</p> <p>Award 1 mark for the identification of a possible reason for the pattern shown on Figure 7a (AO3) and a further mark for an explanation of the pattern (AO2), up to a maximum of 2 marks per idea.</p> <ul style="list-style-type: none">• The two most populated countries have the highest CO₂, e.g. China (1) this is because more people are generating more CO₂ emissions through domestic heating and lighting (1).• Countries with lower levels of development, e.g. within sub-Saharan Africa (1) have poor energy infrastructure grids and therefore use less power (1).• Places such in the Middle East have a high CO₂ footprint as energy is comparatively cheap (oil) (1) so people will be inclined to use more (1). <p>Accept any other appropriate response.</p>	(4)

Q17.



Question number	Answer	Mark
(i)	<p style="text-align: center;">AO1 (1 mark)</p> <ul style="list-style-type: none">• Water vapour• Carbon dioxide / CO₂• Methane / CH₄• Nitrous oxide / NO• Ozone / O₃• Chlorofluorocarbons (CFCs)• Hydrofluorocarbons (incl. HCFCs and HFCs) <p>Reject burning fossil fuels with no gas stated. Reject carbon monoxide as it is not considered a greenhouse gas.</p>	(1)

Question number	Answer	Mark
(ii)	<p style="text-align: center;">AO1 (1 mark)</p> <p>B warming of the Earth's atmosphere resulting from human activities</p> <p>B is the correct answer as the other options do not have the correct meanings of the term.</p>	(1)

Question number	Answer	Mark
(iii)	<p style="text-align: center;">AO1 (1 mark)</p> <p>A cyclical movement of the Earth's orbit around the sun</p> <p>A is the correct answer as the other options do not have the correct meanings of the term.</p>	(1)



Q18.

Question Number	Answer	Mark
(i)	<p style="text-align: center;">AO3 (2 marks)</p> <p>Award 1 mark for any of the following, up to a maximum of 2 marks.</p> <ul style="list-style-type: none">• Iran (1).• Senegal (1).	(2)

Question Number	Answer	Mark
(ii)	<p style="text-align: center;">AO2 (2 marks) / AO3 (2 marks)</p> <p>Award 1 mark for the identification of a possible reason for the pattern shown on Figure 7a (AO3) and a further mark for an explanation of the pattern (AO2), up to a maximum of 2 marks per idea.</p> <ul style="list-style-type: none">• Countries most at risk of desertification experience arid condition including high temperatures (1) this leads to high evaporation of water (1).• Places such as the Middle East have climates with high temperature and low rainfall (1) which mean they have the conditions that are more susceptible to desertification (1).• Some countries such as those on the edge of the Sahara Desert (1) may have been overgrazing the land increasing the risk of desertification (1).	



	<ul style="list-style-type: none">• More developed countries have the resources to respond to desertification (1) with strategies to try and reduce the risk of soil erosion in areas that are considered at risk (1). <p>Accept any other appropriate response.</p>	(4)
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Q19.



EXAM PAPERS PRACTICE



Question number	Answer	Mark
	<p style="text-align: center;">AO1 (2 marks) / AO2 (2 marks)</p> <p>Award 1 mark (AO1) for identification of causes and a further mark (AO2) for an explanation of the reason, up to a maximum of 2 marks per idea.</p> <ul style="list-style-type: none">• Overgrazing through exceeding the land natural carrying capacity (1) is caused when there is pressure on the land to produce more food from livestock (1).• Deforestation of large areas of tress and woodland especially in places like Asia (1) is often caused by conversion of the forest into a farmed landscape (1).• Over exploitation of plants for domestic use (1) causes soils to be degraded or lost which puts more pressure on the vulnerable land (1).• Increasing population pressures on vulnerable land (1) cause land to become degraded as the soils are slowly exhausted over time. (1).• Changing rainfall patterns (1) leading to reduce water availability (1). <p>Accept any other appropriate response.</p>	(4)



Q20.

Question number	Answer	Mark
	<p style="text-align: center;">A03 (1 mark)</p> <ul style="list-style-type: none">• 1990's• 2000's• 2010's	(1)

Question number	Answer	Mark
(ii)	<p style="text-align: center;">A04 (2 marks)</p> <p>Award 1 mark for the comparison using data on Figure 7a (and a further mark for additional development, up to a maximum of 2 marks per idea.</p>	

	<ul style="list-style-type: none">• Much lower in A compared with B (1) and A seems to have less variation than B (1).• Time B had a lot of variation 17% to around 12% (1) whereas Time A is 10 to around 7% (1).• Time A does not show an obviously increasing upward trend (1) whereas Time B looks like there is a positive upward trend. (1). <p>Accept any other appropriate response.</p>	(2)
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Question number	Answer	Mark
(iii)	<p style="text-align: center;">AO2 (2 marks)</p> <p>Award 1 mark (AO2) for identification of reason and a further mark (AO2) for a development of the reason, up to a maximum of 2 marks per idea:</p> <ul style="list-style-type: none">• Increasing urbanisation (less permeable surfaces) (1) leading to greater flooding and flood risk (1).• Changes in climate – atmosphere with more energy (1) creates more intense rainfall events (1).• Changes in farming have led to more soil compaction (1) leading to greater run-off and flood risk (1). <p>Accept any other appropriate response.</p>	(2)

Question number	Answer	Mark
(iv)	<p style="text-align: center;">(AO2) 1 mark / (AO3) 1 mark</p> <p>Award 1 mark (AO2) for identification of reason and a further mark (AO2) for a development of the reason, up to a maximum of 2 marks per idea:</p> <ul style="list-style-type: none">• Historical dimension, i.e. land use changes over time (1) which makes comparisons over time complex and / or unreliable (1)• Different people and equipment measurements which have changed (1) so that they are not done in the same way, meaning comparisons should not always be trusted (1)• Different definitions and interpretations of extreme events over time (1) so that what was recorded or classified may have changed (1).	(2)