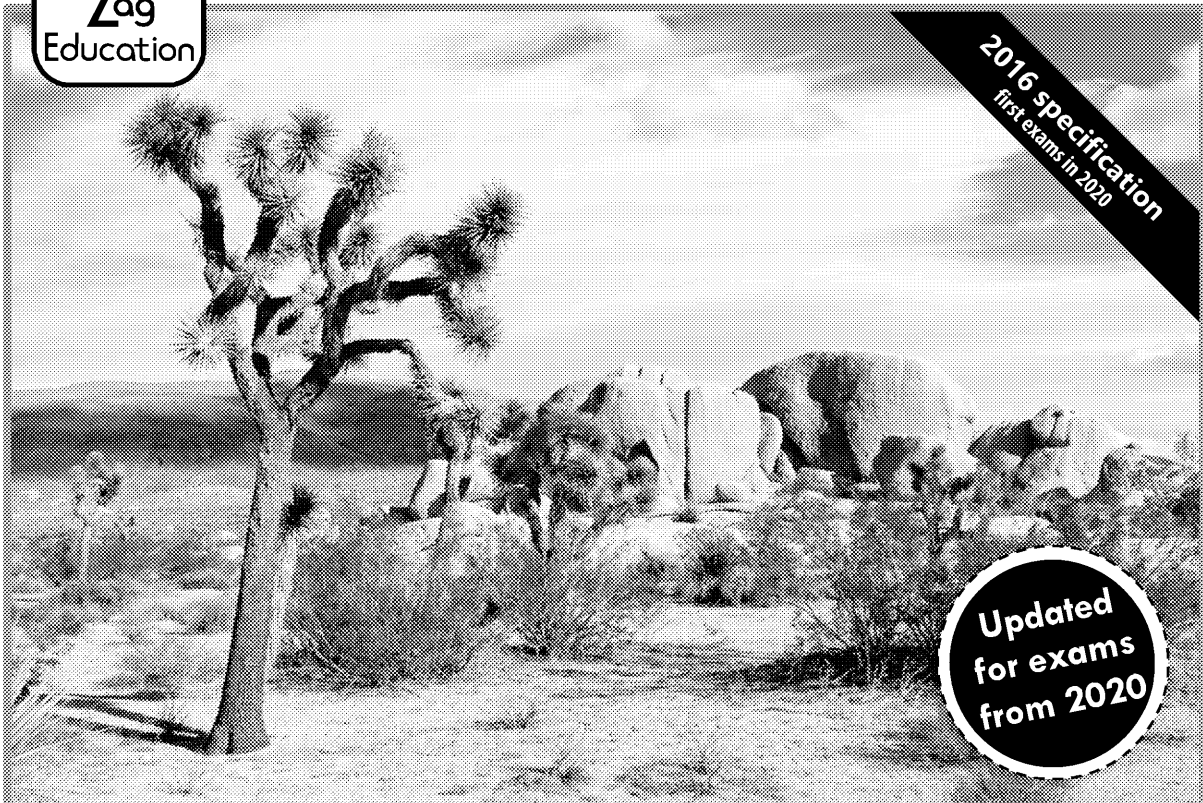




Geography

A Level | AQA | 7037



2016 specification
first exams in 2020

Updated
for exams
from 2020

A Level AQA Practice Exams

Component 1: Physical Geography

Update v2.0, January 2020

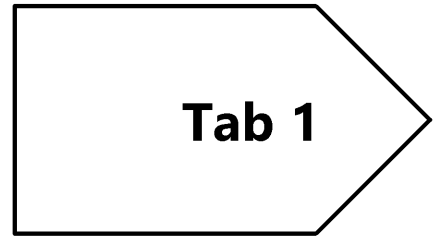
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Teacher's Introduction

This resource provides four practice exam papers, with full mark schemes, for the **A Level AQA (7037) Component 1: Physical Geography** examination. Each paper is divided into three sections; A, B, and C, to mirror the style of the AQA exam. Students should answer **all** questions in Section A, and **one** question each from Sections B and C.

Remember!

Always check the exam board website for new information, including changes to the specification and sample assessment material.

Should you wish to reduce photocopying during earlier revision sessions, it is possible to remove the content which relates to topics that your students are not studying and present them with only the questions they should be expected to answer.

For full mock exams the full paper should be offered so that students can become familiar with the structure of their final exam.

The resource will enable students to gain greater experience of answering questions in preparation for the **Component 1** exam. The resource contains a full mark scheme for each question which will enable teachers to set and mark the work with confidence or for students to carry out self-assessment and revision.

On the following page there is an additional answer sheet for students to use where extra space is required. This should be necessary for any long answer questions. It is suggested that each student is provided with 3–4 copies of this sheet to use alongside each exam paper.

April 2018

Update v2.0, January 2020

Update for 2020 exams:

- Four 1-mark multiple-choice questions removed from section C of each paper and replaced with one 4-mark question (AO1)

Free Updates!

Register your email address to receive any future free updates* made to this resource or other Geography resources your school has purchased, and details of any promotions for your subject.

* resulting from minor specification changes, suggestions from teachers and peer reviews, or occasional errors reported by customers

Go to [zzed.uk/freeupdates](https://www.zzed.uk/freeupdates)

ZigZag Practice Exams

Supporting A Level AQA

INSPECTION COPY

Geography

Practice Paper B

Name

Time allowed:

2 hour 30 minutes

The **maximum mark** for this paper is 120.

The number of marks for each question are shown alongside the question.

Instructions:

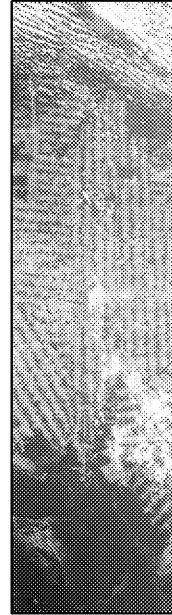
- Fill in your name in the space provided above.
- Answer **all** questions from Section A.
- Answer **one** question from Section B. Answer **either** question 2 **or** question 3 **or** question 4.
- Answer **one** question from Section C. Answer **either** question 5 **or** question 6.
- Use a black pen and answer all the questions in the appropriate spaces.

Advice:

- Read questions carefully, and check your answers at the end if there is time left.
- You have 2 hours and 30 minutes to complete this exam. You can choose how to divide your time, but it is recommended that you spend approximately **45 minutes on Section A, 45 minutes on Section B, and 30 minutes on Section C.**

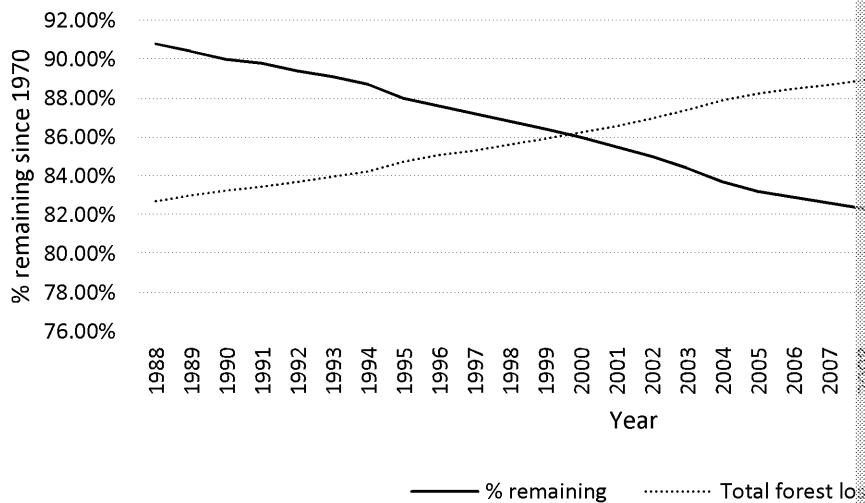
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Deforestation in Brazil



The map shows the River Amazon and its tributaries.
 The aerial photograph shows the classic herringbone pattern of deforestation.
 The graph shows statistics on the rate of deforestation since 1988, compared to 1970.
 Figure 1

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INSPECTION COPY



1.3. Take a look at Figure 2 on the below.

Using the figure and your prior understanding, assess how the Earth's climate is affected by calving from Antarctica.

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Pine Island Glacier has shed another block of ice into Antarctic waters. This is the largest iceberg that broke off in 2014 and 2015, but the event is further evidence of a long-term retreat of the glacier.

Pine Island is one of the main glaciers responsible for moving ice from the Antarctic Ice Sheet to the ocean. It already delivers plenty of ice to Pine Island Bay. ...But scientists watch this glacier closely because the evidence has been mounting that it is retreating. Such a retreat would lessen the shelf's buttressing effect on the rest of the ice sheet, out to the ocean, where it ultimately melts and contributes to sea level rise.

The Operational Land Imager (OLI) on Landsat 8 captured this image of Pine Island Glacier on Jan. 26, 2017, after the recent break. About a kilometer or two of ice (the white line off) from the shelf's front.

According to Ian Howat, a glaciologist at Ohio State University, the event occurred in July 2015, when a 30-kilometer-long (20-mile) crack developed below the glacier and calved an iceberg spanning 583 square kilometers (225 square miles).

Figure 2

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Figure 3

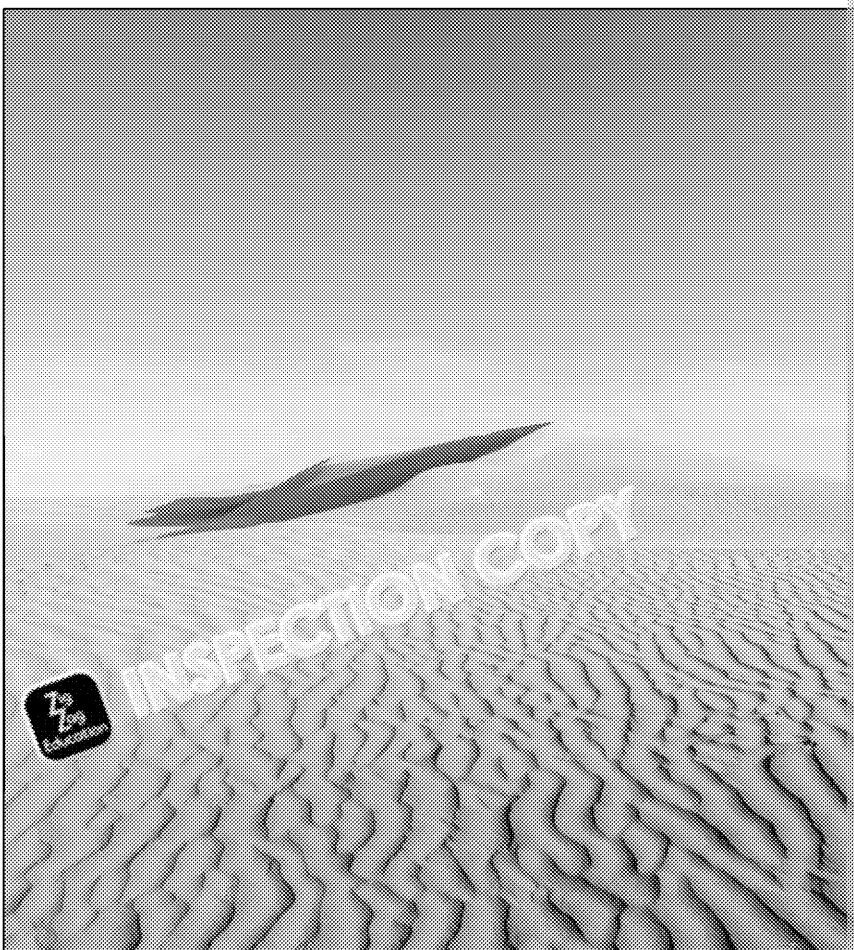


Figure 4

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2.3. Take a look at Figure 5 below.

Using the figure and your prior understanding, assess how the location

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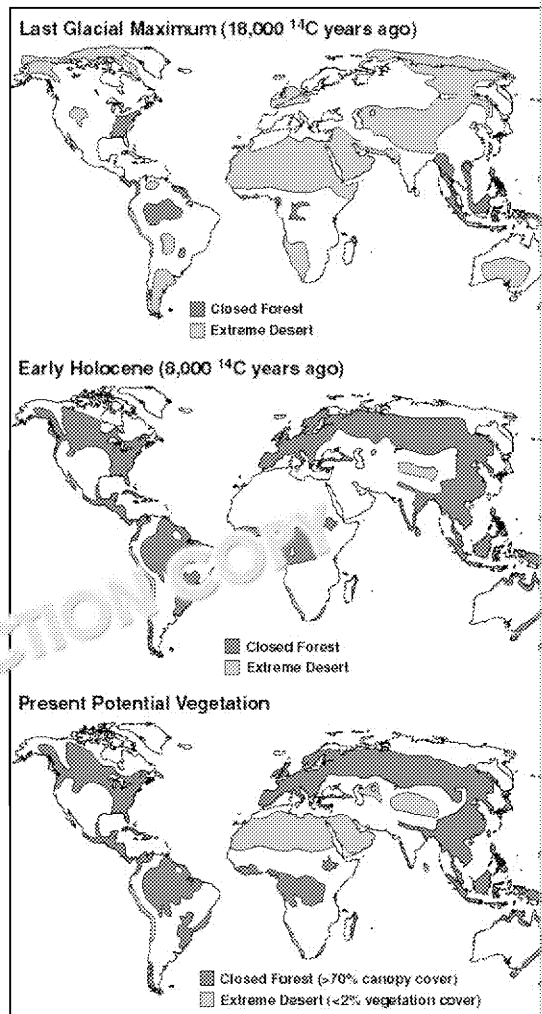


Figure 5: Note that not all deserts depicted on the map are hot deserts

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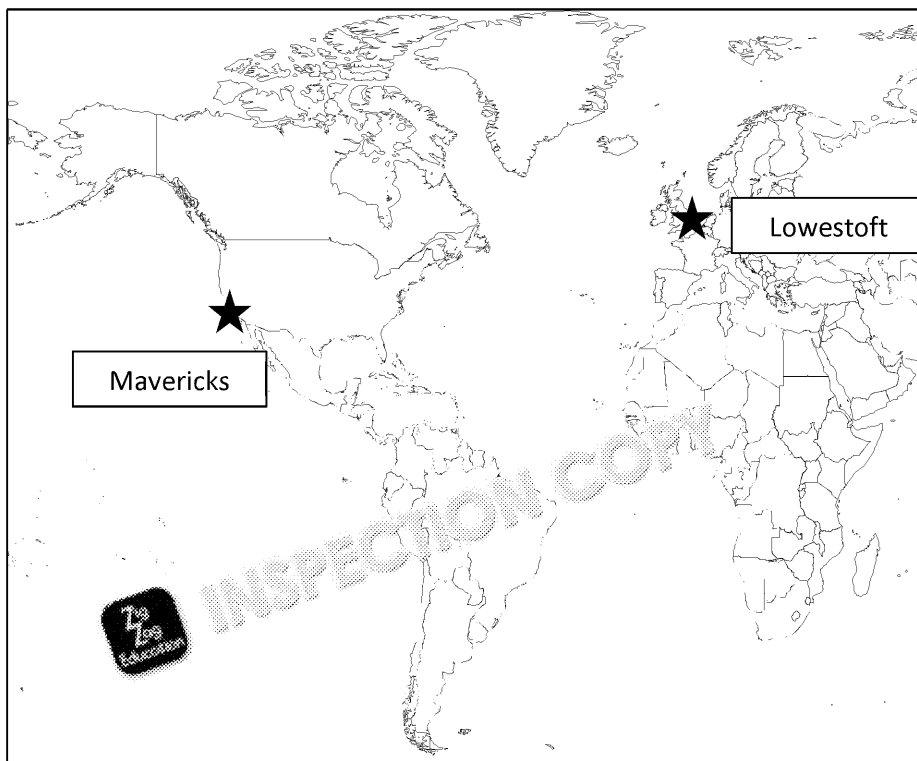


Figure 6: Location map



Figure 7: Mavericks and Lowestoft

	Mavericks	Lowestoft
Wave Height (m)	1.21	
Wave Energy (KJ)	232.22	
Height of sea level (m)	1.48	
Low tide height (m)	0.42	

Figure 8: Averaged data for one week in July 2017

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3.3. Take a look at Figure 9 below.

Using the figure and your prior understanding, assess the stage of success

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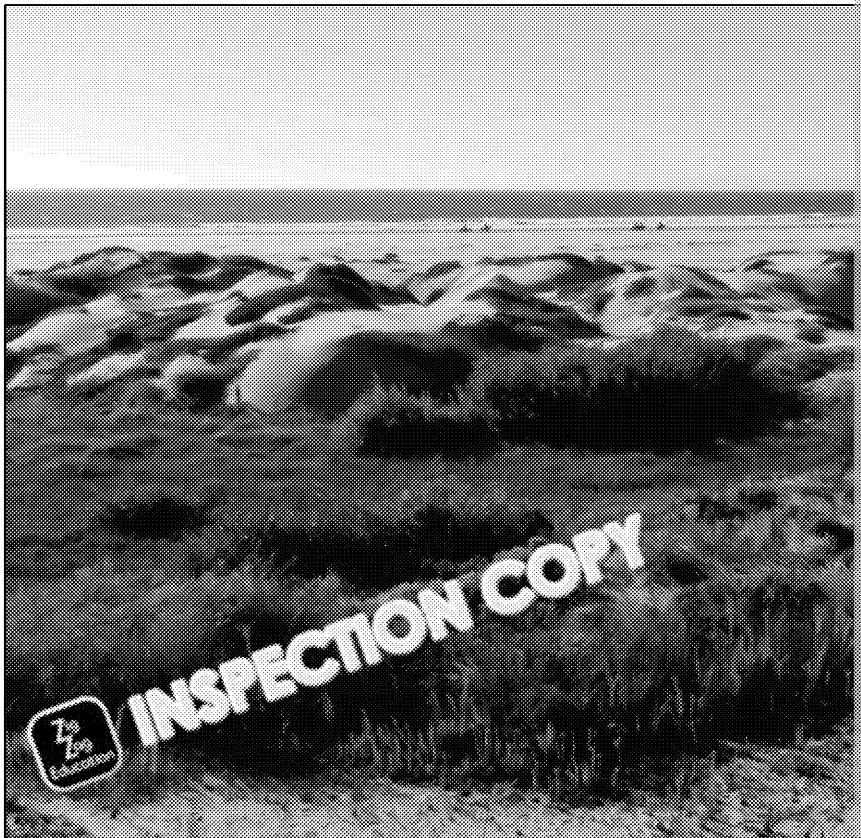


Figure 9

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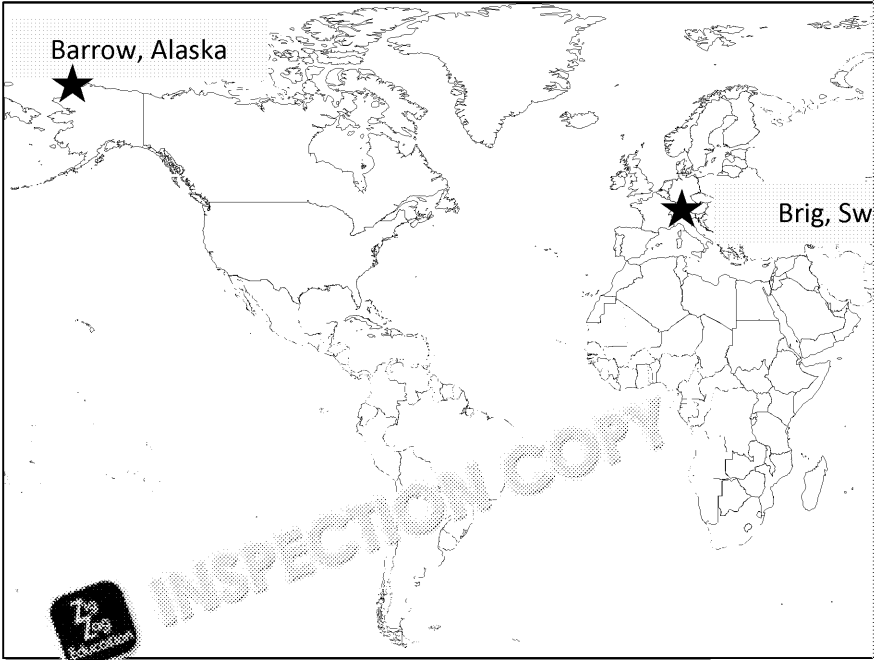


Figure 10

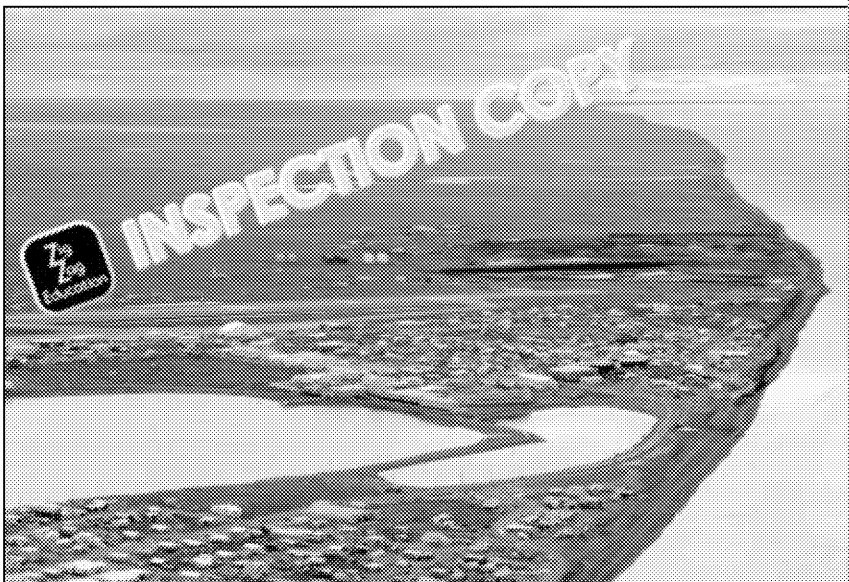
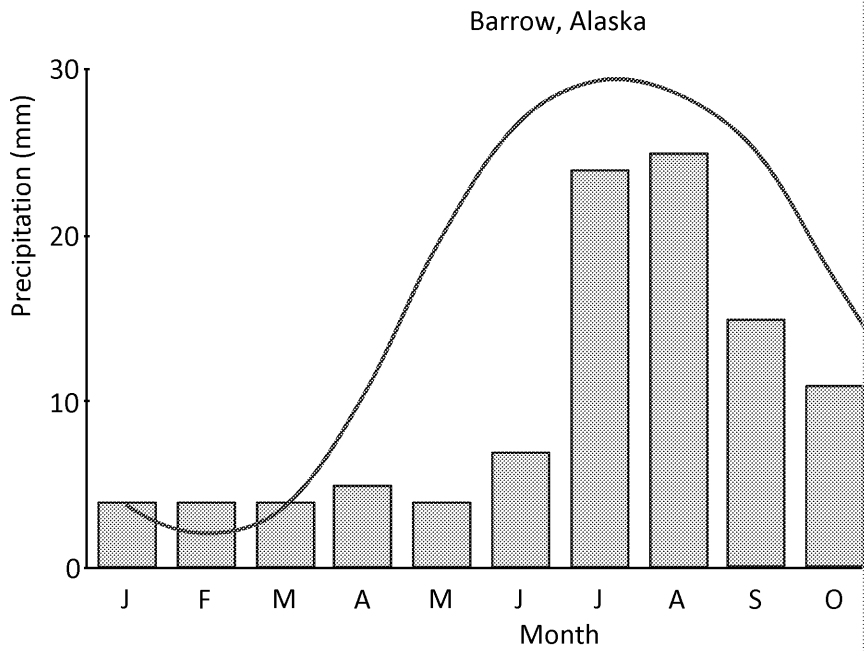


Figure 11

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Brig, Switzerland

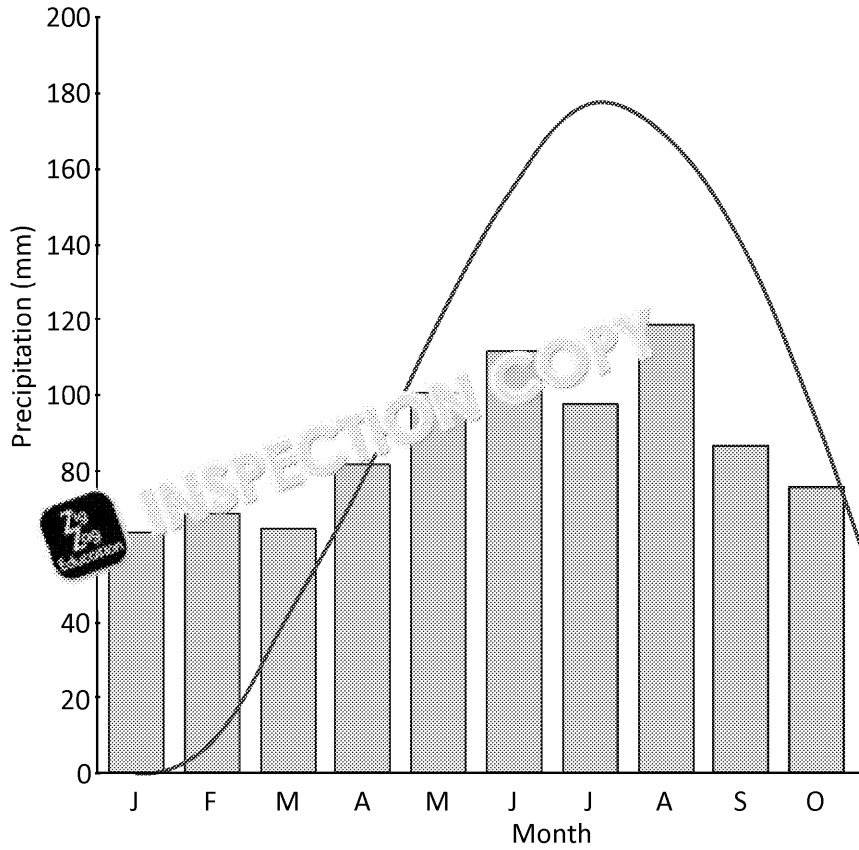


Fig 2.2

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Year	Number of earthquakes in magnitude range			
	8.0 to 9.9	7.0 to 7.9	6.0 to 6.9	5.0 to 5.9
2000	1	14	146	1,344
2001	1	15	121	1,224
2002	0	13	127	1,201
2003	1	14	140	1,203
2004	2	14	141	1,515
2005	1	10	140	1,693
2006	2	9	142	1,712
2007	4	14	178	2,074
2008	0	12	118	1,768
2009	1	16	144	1,896
2010	1	23	150	2,209
2011	1	19	185	2,276
2012	1	12	106	1,364

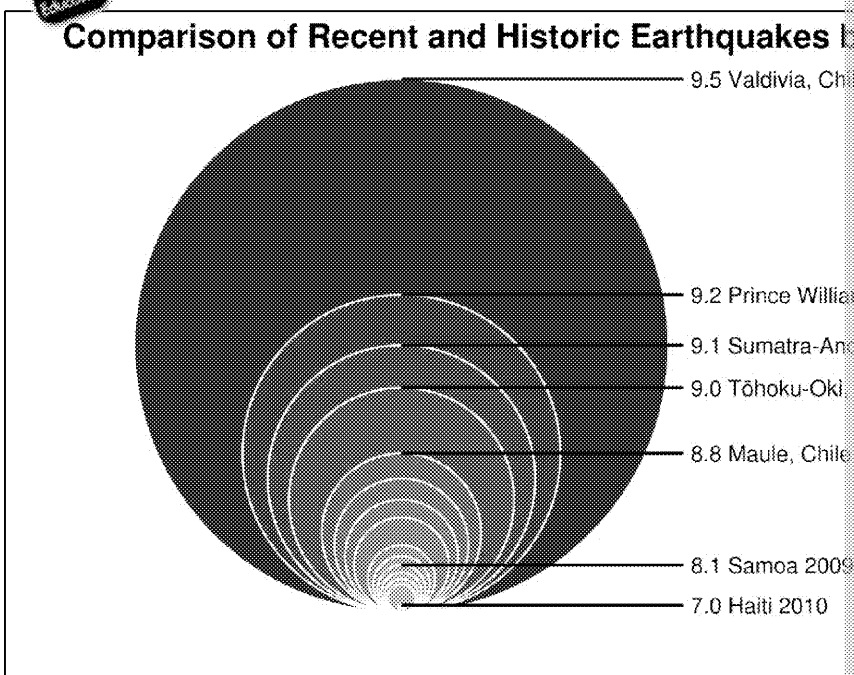


Figure 16

5.3. Take a look at figures 17, 18 and 19 on the following two pages.

Using the figures and your prior understanding, assess the benefits of having a...

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(If you need more space, please continue your answer on a separate page)

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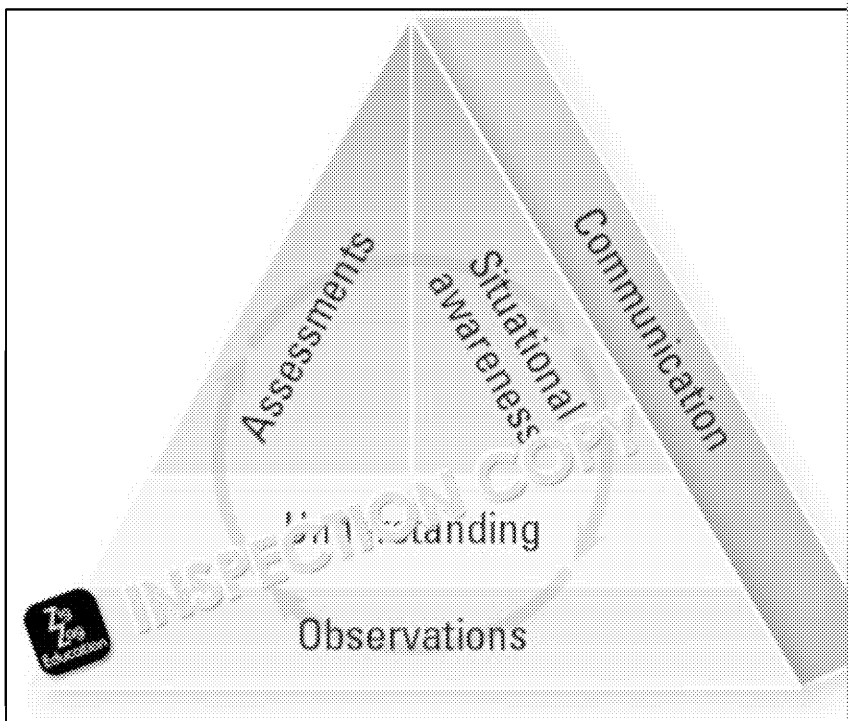


Figure 17

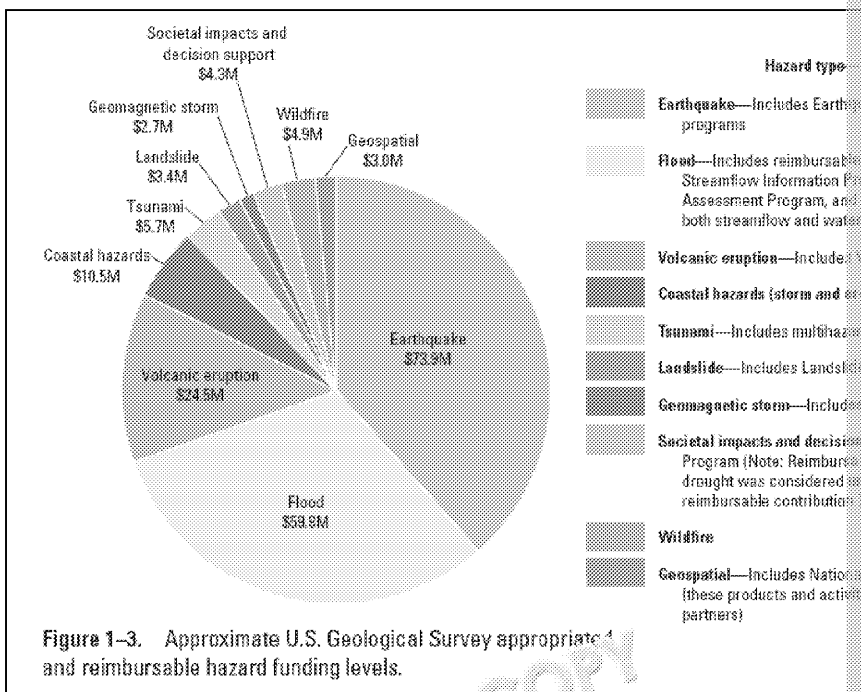


Figure 18

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Figure 23: Distribution of lowland heaths. 16% remains from the extent

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Figure 24: Heathland management

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6.4. Assess how far physical factors determine the ecosystem which can dev

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Preview of Questions Ends Here

This is a limited inspection copy. Sample of questions ends here to avoid students previewing questions before they are set. See contents page for details of the rest of the resource.

Answers: Paper D

1.1. Allow up to four points, with an additional mark for each expanded point.

AO1 x 4

- Flows can work in both directions
- Sequestration by plants and other photosynthesising organisms
- Respiration by organisms and decomposers
- Diffusion in and out of oceans and downwards through the different layers of water
- Combustion of fossil fuels and biomass
- Cement manufacture
- Flows through the rock cycle
- Flows through food webs
- Erosion of carbonate rock back into the atmosphere
- From volcanic eruptions

1.2. Students must analyse the data to provide inferences on how and why there are differences between the two variables.

AO3 x 6

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student demonstrates simple analysis of the figure, with limited inferences and links.
Level 2	(4–6 marks)	The student shows a good and thorough understanding of the inferences and links, and analysis is detailed.

Possible answers:

- There is some overlap between the two lists, such as Australia, Malaysia, South Africa, United States, Canada and Iran.
- There is a very wide range within the data – over 4,000 m³/year water withdrawal and 34 tons of CO₂ per year per capita.
- For water use, there is a mixture of developed and developing countries. The student may draw inferences from their knowledge of some of the countries on the list – for example, countries with high agricultural output (irrigation), as well as countries with high domestic use and affluent lifestyles.
- For CO₂ generation, the majority of countries are developed, where affluent lifestyles and increased transport are used. There is a large cluster of countries in the Middle East at the top of the table, as CO₂ generation is typical of oil-producing countries. While China has a large population, its manufacturing economy causes its high per-capita emissions.

1.3. 2 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the changes to carbon stores and fluxes.

4 marks can be awarded for AO2 if the student uses their facts and comprehension to assess how feedback cycles could affect stores.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student offers basic comprehension and knowledge of the carbon cycle. The answer provided is of limited relevance and there are significant inaccuracies. Application of knowledge is limited and the analysis or evaluation is supported by use of limited evidence.
Level 2	(4–6 marks)	The student offers clear comprehension and understanding of the carbon cycle and the changes that result. Relevance and accuracy of information provided is generally good. The student applies this knowledge appropriately and offers some relevant connections. There is clear attempt at analysis or evaluation that is supported by evidence.

Possible answers:

- The article discusses seepage of methane from the sea floor, but that the oceans offset the released methane by storing CO₂. The findings don't tally with current hypothesis, and, therefore, need to be confirmed by further testing. Also, further study needs to be done, to confirm whether the high rates of ocean absorption are not limited to the Arctic Ocean.
- Feedback cycles can push a system back towards (negative) or further away (positive) from equilibrium.
- An example is melting of permafrost, which releases methane as organic matter is decomposed by bacteria. As methane is a potent greenhouse gas, it is theorised that significant warming could occur – resulting in further melting at an increasing rate. This is a positive feedback cycle.
- The ocean can absorb CO₂, thereby removing the gas from the atmosphere and reducing temperature – a negative feedback. However, there are issues caused by the ocean absorbing large quantities of CO₂, such as acidification, and the ocean cannot absorb ever-increasing concentrations of gas indefinitely.
- Allow reference to other ways in which feedback cycles can occur within the carbon cycle – such as the increased growth of trees due to carbon fertilisation.

- 1.4. 10 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the problems caused to natural systems such as the carbon and water cycles, as well as the causes of these issues. 10 marks can be awarded for AO2 if the student uses their facts and comprehension to assess the extent to which humans have modified natural systems, and linkages between modifications and cycles, with judgement.

Level	Mark	Descriptor
Level 1	(1–5 marks)	AO1: <ul style="list-style-type: none"> • The answer uses little geographic theory, and information may be inaccurate or superficial. • No use of geographical terms. • Little evidence of comprehension. • No or restricted use of example material, where appropriate.
		AO2: <ul style="list-style-type: none"> • Investigation, connections and developments are absent. • Argument is unclear; points may be brief, biased or inaccurate, with no evidence of structure. Answer is likely to be poorly written and not always relevant to the question.
Level 2	(6–10 marks)	AO1: <ul style="list-style-type: none"> • Use of more complex theories may be inaccurate, but overall use of geographic information is correct. • Geographical terms used infrequently. • Comprehension is apparent but may be patchy. • Case study material is present, where appropriate, but may be brief, biased or superficial.
		AO2: <ul style="list-style-type: none"> • Investigation, connections and developments are present, but unclear. • Argument is apparent but may be poorly structured. Most of the answer is relevant to the question.
Level 3	(11–15 marks)	AO1: <ul style="list-style-type: none"> • Reliable references to geographical theories; the answer is likely to be detailed and appropriate. • Geographical terms used often. • The answer demonstrates a good level of critical comprehension. • Case study material is appropriate, specific and well linked to the argument, where applicable.
		AO2: <ul style="list-style-type: none"> • Investigation, connections and developments are developed. • Argument is explicit, with a good balance of evidence, clear structure and a solid conclusion. Answer is highly relevant to the question.

Level	Mark	Descriptor
Level 4	(16–20 marks)	<p>AO1:</p> <ul style="list-style-type: none"> Geographical theories and processes are appropriately referred to, demonstrating comprehensive and specific knowledge. Frequent use of geographical terms. Critical comprehension is self-evident from the confident and appropriate use of geographical theory and information. Use of case study material is suitable, broad and thorough, where applicable. Specific facts and figures are fully integrated and support the overall argument. <p>AO2:</p> <ul style="list-style-type: none"> Investigation, connections and developments are fully developed. Argument is well written, supported by the evidence and clear in structure, and uses a balance of viewpoints in order to reach a justified conclusion. Conclusions are creative, sophisticated and highly relevant.

Possible answers:

There are few parts of the UK and many other countries that have not been modified through human activity. In the UK, we have significantly altered the environment – chopping down most of the forests that once covered the land – and we have altered many of our waterways, for navigation and flood-relief purposes.

Allow a discussion using case study material, such as the deforestation of a tropical rainforest – for reasons such as subsistence farming, cash cropping, ranching, logging and settlement, and its effects, such as the release of sequestered carbon back into the atmosphere from biomass, and the effects upon the water cycle, both on large-scale and small-scale deforestation events.

Also allow discussion of the effects of human modification of a catchment – such as deforestation and field drainage or ploughing – which affect run-off rates as well as releasing soil carbon. Allow discussion based on channel modification, such as the flood-relief schemes.

Allow similar discussions for the following components:

- Significant increase in global CO₂ level since the Industrial Revolution.
- The effects of climate change and shifts in weather systems; also allow discussion on how these effects may become more severe in the future.
- Changes which have occurred in the oceans (or are likely to occur), such as acidification; future changes, such as a potentially rapid release of stored carbon.
- Land-use change / expansion of agriculture / deforestation.
- Combustion of fossil fuels.
- Cement manufacture.
- Any other suitable modification.

2.1. Allow up to four points, with an additional mark for each expanded point.

AO1 x 4

- In deserts, the days are very hot (40+°C), and the nights are cold – sometimes with frost.
- The surface of the rocks (especially dark rocks) will be at a temperature far in excess of the air temperature.
- Rocks cool quickly in the evening.
- The outer layers of rock expand in the daytime, and shrink again at night. Repeated cycles cause the surface to crack.

2.2. Students must analyse the data to assess how the scheme has helped to halt desertification in the region, and also to balance the positives against potential limitations at the site.

AO3 x 6

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student demonstrates simple analysis of the figure, with limited inferences and links.
Level 2	(4–6 marks)	The student shows a good and thorough understanding of the inferences and links, and analysis is detailed.

Possible answers:

- The desertification was caused by a number of different factors, both human (overuse of the land) and ‘natural’, such as drought. While the residents cannot control the drought factor, they can determine the human aspects.
- The native trees in the area were removed – the student may suggest reasons such as the use of fuelwood. When vegetation is removed, the soil is susceptible to erosion because of deflation by the wind, and increased run-off (reduced interception).
- The scheme involved planting gum arabic trees and fencing off regions – the student may suggest that this is to stop animals from entering the fenced-off areas and grazing on the new saplings.
- Managed grazing is permitted, allowing limited, seasonal grazing. Students may use Figure 4 to discuss the benefits of restored ecosystems – in terms of economic value, but also in the unpaid sense of many ecosystem goods and services.
- Not all of the issues have yet been solved, partly through the use of a monoculture, which does not support such a healthy and rich ecosystem as the natural vegetation.
- However, students may argue that the ecosystem is still in a fairly early stage, and that when trees mature and a denser canopy is established, then the lingering issues such as soil erosion may be reduced.

2.3. 2 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the features of hot deserts.

4 marks can be awarded for AO2 if the student uses their facts and comprehension to assess how features in hot deserts are distinctive.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student offers basic comprehension and knowledge of hot deserts and their features. The answer provided is of limited relevance and there are significant inaccuracies. Application of knowledge is limited and the analysis or evaluation is supported by use of limited evidence.
Level 2	(4–6 marks)	The student offers clear comprehension and understanding of hot deserts and their features. Relevance and accuracy of information provided is generally good. The student applies this knowledge appropriately and offers some relevant connections. There is clear attempt at analysis or evaluation that is supported by evidence.

Possible answers:

- Hot deserts are rocky and sandy, and often have a relatively flat topography. The case of Monument Valley is slightly different, due to the formation of the mesas and buttes seen in Figure 5, with their characteristic scree slopes at their bases caused by weathering and rockfalls. The student may discuss the formation of a variety of desert features, and the role of wind, watering and weathering processes in their formation.
- Hot deserts are shaped by wind, but also by water – often causing significant erosion during flood events as a consequence of the topography and permeability of the soil surface, coupled with the nature of the heavy precipitation events.
- There is limited vegetation in the area, determined by the availability of water – a common feature of dryland environments.
- The students may discuss the location of Arizona and its relation to the other hot deserts (latitude).
- The student may discuss the formation of dunes, with possible evidence of dunes in the figure.

- 2.4. 10 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the development of hot desert landscapes.
 10 marks can be awarded for AO2 if the student uses their facts and comprehension to assess the influence of time in the development of hot desert and their features.

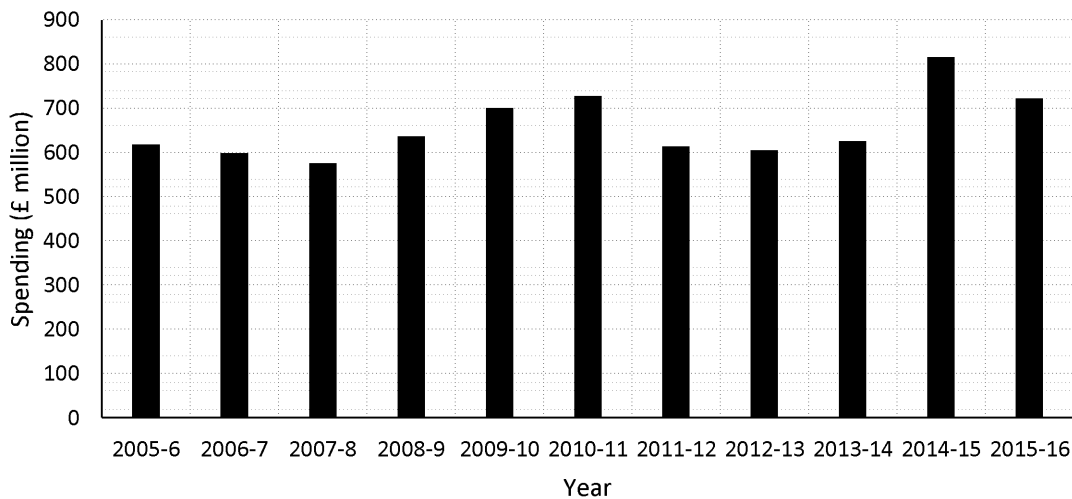
Level	Mark	Descriptor
Level 1	(1–5 marks)	AO1: <ul style="list-style-type: none"> The answer uses little geographic theory, and information may be inaccurate or superficial. No use of geographical terms. Little evidence of comprehension. No or restricted use of example material, where appropriate.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are absent. Argument is unclear; points may be brief, biased or inaccurate, with no evidence of structure. Answer is likely to be poorly written and not always relevant to the question.
Level 2	(6–10 marks)	AO1: <ul style="list-style-type: none"> Use of more complex theories may be inaccurate, but overall use of geographic information is correct. Geographical terms used infrequently. Comprehension is apparent but may be patchy. Case study material is present, where appropriate, but may be brief, biased or superficial.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are present, but unclear. Argument is apparent but may be poorly structured. Most of the answer is relevant to the question.
Level 3	(11–15 marks)	AO1: <ul style="list-style-type: none"> Reliable references to geographical theories; the answer is likely to be detailed and appropriate. Geographical terms used often. The answer demonstrates a good level of critical comprehension. Case study material is appropriate, specific and well linked to the argument, where applicable.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are developed. Argument is explicit, with a good balance of evidence, clear structure and a solid conclusion. Answer is highly relevant to the question.
Level 4	(16–20 marks)	AO1: <ul style="list-style-type: none"> Geographical theories and processes are appropriately referred to, demonstrating comprehensive and specific knowledge. Frequent use of geographical terms. Critical comprehension is self-evident from the confident and appropriate use of geographical theory and information. Use of case study material is suitable, broad and thorough, where applicable. Specific facts and figures are fully integrated and support the overall argument.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are fully developed. Argument is well written, supported by the evidence and clear in structure, and uses a balance of viewpoints in order to reach a justified conclusion. Conclusions are creative, sophisticated and highly relevant.

Possible answers:

- Hot desert landscapes are not developed overnight.
- Weathering and erosion processes can be very slow in deserts due to the lack of moisture; however, flooding events can cause erosion on a more significant scale.
- Hot deserts are also influenced by past climates – such as wetter or cooler periods in Earth’s history, e.g. the development of periglacial features during ice ages, and the growth of forests in warm, wet interglacial periods – including in the Sahara.
- The student may reference exemplar material, such as the development of studied locations, e.g. the large deflation hollows, and the formation of stone features in deserts throughout the world. The periodic role of water is also an important aspect; large features such as the Grand Canyon have taken millennia to reach their current depth, with features reliant on water from outside the region to form (exogenous water).
- Discussion of weathering forms, such as exfoliation, heating and cooling cycles (thermal fracture), and various forms of chemical weathering.
- The development of features such as desert pavements (accumulation of stones on the surface due to deflation) can help slow transport by creating a barrier for the wind, stopping further removal of material.
- There are other factors which slow the development of deserts such as the hardness of rocks and structure (jointing of rocks), and the climatic determinants such as the amount of precipitation (and the time between events), and the temperature differences over a day – the higher the precipitation, the faster the erosion; and the greater the diurnal temperature range, the faster the erosion.
- While deserts appear timeless, they can be dynamic places – characterised by the rapid movement of dunes.
- Students may also discuss desertification and its rapid onset as a result of human activity such as the use of fuelwood and overgrazing, with discussion of the effects of future climate change, tailored to a region of study, and discussion of feedback cycles.

- 3.1. Allow up to four individual points, or award an additional mark for each expanded point.
AO1 x 4
- Do nothing means that no intervention is made to stop the sea from eroding the land
 - Managed retreat is slightly different – houses and infrastructure may be moved away from the present coast and existing defences are no longer maintained. However, some natural protective features and land uses, such as salt marshes, may be encouraged to help protect the land, such as saltmarshes.
- 3.2. Students must complete the graph and analyse the data to identify and explain trends in the expenditure of flood defences.

Spending on flooding and coastal defences (in real terms
(2016/17 prices))



AO3 x 6

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student demonstrates simple analysis of the figure, with limited inferences and links.
Level 2	(4–6 marks)	The student shows a good and thorough understanding of the inferences and links, and analysis is detailed.

Possible answers:

- There appears to be a normal spending rate of £600 million – seven years represented on the graph are around this figure.
- This may suggest that a budget is in place, which doesn't change much between years – unless catastrophic flooding requires extra protection.
- The year 2014–15 was particularly high at £815 million, which is more than £200 million above the usual figure. This can be explained by the winter storms which battered the coast, which caused extensive damage to coasts and their defences and inland river flooding – much of the extra cost was spent on repairs.

- 3.3. 2 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, rising and falling sea levels.
4 marks can be awarded for AO2 if the student uses their facts and comprehension to assess the effects of the changes in sea/land levels.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student offers basic comprehension and knowledge of (relative) sea/land level change. The answer provided is of limited relevance and there are significant inaccuracies. Application of knowledge is limited and the analysis or evaluation is supported by use of limited evidence.
Level 2	(4–6 marks)	The student offers clear comprehension and understanding of (relative) sea/land level change and the complications that result. Relevance and accuracy of information provided is generally good. The student applies this knowledge appropriately and offers some relevant connections. There is clear attempt at analysis or evaluation that is supported by evidence.

Possible answers:

- The graph for Stockholm, Sweden shows that over the period 1920–2010, sea level fell by approximately 0.4m.
- For Newlyn, UK, sea levels rose by approximately 0.15m over the same period.
- However, sea level should rise or fall equally, meaning the level change is relative to the land.
- Sweden’s drop in sea level is likely to be attributed to isostatic (postglacial) rebound (still rising after being depressed during the last glacial cycle).
- Newlyn is located in Cornwall, meaning that the land is falling for the same reason due to the associated pivoting action.
- This is coupled with the rising sea level because of a combination of melting land ice and thermal expansion of ocean water – both as a result of rising sea level.
- In Newlyn, coastal flooding risk may become a greater issue, with greater susceptibility to storm surges, and inundation of valuable land and settlement over time.
- The opposite may be true for Stockholm, where there could also be the formation of coastal features nearby, such as raised beaches and relict cliffs.

3.4. 10 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the ways that coasts can be protected, as well as the issues of maintenance and examples of failure.

10 marks can be awarded for AO2 if the student uses their facts and comprehension to assess reasons why coastal protection can fail, with judgement.

Level	Mark	Descriptor
Level 1	(1–5 marks)	AO1: <ul style="list-style-type: none"> • The answer uses little geographic theory, and information may be inaccurate or superficial. • No use of geographical terms. • Little evidence of comprehension. • No or restricted use of example material, where appropriate.
		AO2: <ul style="list-style-type: none"> • Investigation, connections and developments are absent. • Argument is unclear; points may be brief, biased or inaccurate, with no evidence of structure. Answer is likely to be poorly written and not always relevant to the question.
Level 2	(6–10 marks)	AO1: <ul style="list-style-type: none"> • Use of more complex theories may be inaccurate, but overall use of geographic information is correct. • Geographical terms used infrequently. • Comprehension is apparent but may be patchy. • Case study material is present, where appropriate, but may be brief, biased or superficial.
		AO2: <ul style="list-style-type: none"> • Investigation, connections and developments are present, but unclear. • Argument is apparent but may be poorly structured. Most of the answer is relevant to the question.
Level 3	(11–15 marks)	AO1: <ul style="list-style-type: none"> • Reliable references to geographical theories; the answer is likely to be detailed and appropriate. • Geographical terms used often. • The answer demonstrates a good level of critical comprehension. • Case study material is appropriate, specific and well linked to the argument, where applicable.
		AO2: <ul style="list-style-type: none"> • Investigation, connections and developments are developed. • Argument is explicit, with a good balance of evidence, clear structure and a solid conclusion. Answer is highly relevant to the question.

Level	Mark	Descriptor
Level 4	(16–20 marks)	<p>AO1:</p> <ul style="list-style-type: none"> • Geographical theories and processes are appropriately referred to, demonstrating comprehensive and specific knowledge. • Frequent use of geographical terms. • Critical comprehension is self-evident from the confident and appropriate use of geographical theory and information. • Use of case study material is suitable, broad and thorough, where applicable. • Specific facts and figures are fully integrated and support the overall argument. <p>AO2:</p> <ul style="list-style-type: none"> • Investigation, connections and developments are fully developed. • Argument is well written, supported by the evidence and clear in structure, and uses a balance of viewpoints in order to reach a justified conclusion. Conclusions are creative, sophisticated and highly relevant.

Possible answers:

- Students are likely to discuss case study or exemplar material pertaining to the use of engineering or management as a way of protecting the coast.
- Students should discuss the successes or failures of scheme(s) that they have studied, and discuss the costs and maintenance required to keep older coastal defences in working order.
- Students are likely to compare old and new forms of engineering, comparing and contrasting the consequences and benefits, with a discussion of the benefits of sustainable approaches. For example, students may suggest that some items of high importance should continue to be protected (the maintenance costs are justified by the town, city or infrastructure that is protected).
- Students may cite examples of where coastal protection has failed – such as the extensive storm damage experienced in the winter of 2013–14.
- Students may also suggest that the sea is an unstoppable force – even if an area is highly defended by sea walls, the sea will still erode around the site.
- The students may conclude that in a changing world – where sea levels are rising, and powerful storms may become more frequent – then defences may become even more important, but also even more of a challenge. Important coastal cities continue to grow in size, especially in the developing world. While a coastal location for a city is likely to have a trade advantage, there are also challenges that such locations bring!

4.1. Allow up to four points, with an additional mark for each expanded point.

AO1 x 4

- Melting of permafrost due to increase in temperature.
- Causes include: human activity such as house building and road building, as well as climate change resulting in the creation and expansion of thaw lakes.
- Forest fires also melt permafrost.

4.2. Students must analyse the data to compare the extent of ice cover between the two maps.

AO3 x 6

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student demonstrates simple analysis of the figure, with limited inferences and links.
Level 2	(4–6 marks)	The student shows a good and thorough understanding of the inferences and links, and analysis is detailed.

Possible answers:

- At the last glacial maximum, ice had descended from the poles (snowball earth) – which can be seen across North America, Greenland and much of Northern Europe, extending down towards 40°N.
- The ice extends across areas which are now covered by ocean – the sea level would have been considerably lower because of the extra water on the land surface.
- There are also large pockets of ice at lower latitudes, which include many of the mountain ranges of the world.
- Today, only a fraction of the ice remains in the northern hemisphere, above 60°N. The majority is found in Greenland, with some in Northern Canada, Svalbard, Severny Island, etc. At the end of the ice age, the ice retreated northwards once again and sea levels rose.
- The only other Alpine-type ice is found on high mountains – such as the coastal and Alaska ranges in North America, the European Alps and the Himalayas.

4.3. 2 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the issues of sustainability in cold environments.

4 marks can be awarded for AO2 if the student uses their facts and comprehension to assess why traditional land uses in cold environments may have been more sustainable than modern uses.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student offers basic comprehension and knowledge of periglacial landscapes. The answer provided is of limited relevance and there are significant inaccuracies. Application of knowledge is limited and the analysis or evaluation is supported by use of limited evidence.
Level 2	(4–6 marks)	The student offers clear comprehension and understanding of periglacial landscapes and the processes and features which exist within them. Relevance and accuracy of information provided is generally good. The student applies this knowledge appropriately and offers some relevant connections. There is clear attempt at analysis or evaluation that is supported by evidence.

Possible answers:

- Allow discussion of any type of land use – such as resource extraction or tourism.
- Traditionally, land uses supported a small local population, rather than large-scale exploitation as seen today, sometimes by multinational corporations.
- A nomadic lifestyle is discussed in Figure 11 – meaning that the land isn't constantly in use and the subsistence lifestyle meant that only enough resources were taken for the residents, and presumably some to trade for goods that they couldn't produce themselves.
- The use of fuelwood would have limited carbon dioxide emissions and their impact on climate change. Modern land uses may be reliant on the use of fossil fuels.
- Local knowledge can also go a long way to ensuring sustainability, following the seasons, and adapting as necessary.
- The low carrying capacity reduces the ability for the habitats to recover, meaning that damage such as oil spills, or even tyre tracks, can persist for many years.
- Modern transport methods can cause the spread of invasive species, which displace or cause disease to native species – an example could be accidental releases of seeds, pests and animals from tourism.

- 4.4. 10 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the processes which occur in cold environments.
 10 marks can be awarded for AO2 if the student uses their facts and comprehension to assess timescales, and linkages between these to provide a discussion on the interactions between different processes to build up a distinctive landscape, with judgement.

Level	Mark	Descriptor
Level 1	(1–5 marks)	AO1: <ul style="list-style-type: none"> The answer uses little geographic theory, and information may be inaccurate or superficial. No use of geographical terms. Little evidence of comprehension. No or restricted use of example material, where appropriate.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are absent. Argument is unclear; points may be brief, biased or inaccurate, with no evidence of structure. Answer is likely to be poorly written and not always relevant to the question.
Level 2	(6–10 marks)	AO1: <ul style="list-style-type: none"> Use of more complex theories may be inaccurate, but overall use of geographic information is correct. Geographical terms used infrequently. Comprehension is apparent but may be patchy. Case study material is present, where appropriate, but may be brief, biased or superficial.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are present, but unclear. Argument is apparent but may be poorly structured. Most of the answer is relevant to the question.
Level 3	(11–15 marks)	AO1: <ul style="list-style-type: none"> Reliable references to geographical theories; the answer is likely to be detailed and appropriate. Geographical terms used often. The answer demonstrates a good level of critical comprehension. Case study material is appropriate, specific and well linked to the argument, where applicable.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are developed. Argument is explicit, with a good balance of evidence, clear structure and a solid conclusion. Answer is highly relevant to the question.
Level 4	(16–20 marks)	AO1: <ul style="list-style-type: none"> Geographical theories and processes are appropriately referred to, demonstrating comprehensive and specific knowledge. Frequent use of geographical terms. Critical comprehension is self-evident from the confident and appropriate use of geographical theory and information. Use of case study material is suitable, broad and thorough, where applicable. Specific facts and figures are fully integrated and support the overall argument.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are fully developed. Argument is well written, supported by the evidence and clear in structure, and uses a balance of viewpoints in order to reach a justified conclusion. Conclusions are creative, sophisticated and highly relevant.

Possible answers:

- The student should discuss the processes of erosion, deposition and mass movement that occur within cold environments.
- The students should realise that the characteristic landscapes that we see today were not simply created by a single ice age – features were deepened and enlarged by successive glacial periods spanning millions of years – therefore, time is a vital component of cold environments.
- Students may discuss rates of glacier movement and, therefore, draw links to erosion rates and the speed between warm-based Alpine glaciers and cold (polar) based glaciers and ice sheets.
- The students may discuss periglacial environments and the development of permafrost, but may discuss the role of the active layer and the summer thaw.
- The students may discuss timescales of mass-movement events – such as slow creep and sudden rockfalls.
- The student may also argue that there are other determinants – such as varying climate between latitude and altitude, as well as pre-existing landforms and geology.
- The student may also discuss how climate change could affect glaciers – meltwater will increase speed, but the decreased thickness of ice will lower the weight of the glacier.

- 5.1. Allow up to four points, with an additional mark for each expanded point. These suggested points are not exhaustive.
AO1 x 4
- Occurs as the ground shakes (1).
 - Strength of (partially) saturated soil decreases (1) where water fills the gaps between the soil particles (1).
 - Water pressure in the spaces in the soil increases during the earthquake (1), allowing the soil particles to move (1) and behave as a liquid (1).
 - This means that water can emerge at the surface, causing flooding (1) and causing buildings to collapse (1).
- 5.2. 6 marks for AO3 can be awarded where the student uses and assesses information provided in the figures to assess how the image could be used to develop the theory of plate tectonics.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student provides a partial examination of the figure, with limited inference or success.
Level 2	(4–6 marks)	The student provides a successful and detailed examination of the figure, inferences are detailed and used with success.

Possible answers:

- The hand-drawn map in Figure 12 does not have a key. Students may infer that the darkest shading could represent either the concentration of the number of earthquakes in a region, or the intensity.
 - The theory of plate tectonics was relatively new at the time that the map was produced – for example, mid-ocean ridges had not yet been discovered.
 - By comparing Figure 12 to a modern map of plate boundaries, the similarity is striking – the Pacific Ring of Fire can be clearly outlined, suggesting that plate boundaries and earthquake activity are clearly linked.
 - The darkest shaded regions of Figure 12 appear to follow destructive plate margins – where the subduction of oceanic plates cause powerful earthquakes as built up pressure is released.
 - The lighter shaded areas tend to follow the constructive plate margins – earthquakes are often gentler in such regions, and the mid-Atlantic ridge can clearly be seen.
 - Figure 12 also highlights several hotspots.
 - There are, however, gaps in Figure 12, where a modern map shows plate boundaries – areas include parts of Russia and the boundary of the Antarctic plate. Students may suggest that in the 1930s, coverage of the world by seismographs may not have been developed. The purpose of the map is not known either – perhaps these regions were less important to the map maker.
 - The map clearly outlines plate margins, and could be used as evidence for plate tectonic theory.
- 5.3. 4 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the causes and prevention of wildfires.
5 marks can be awarded for AO2 if the student uses their facts and comprehension to assess the role of public engagement in the prevention of wildfires.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student offers few facts about, and shows little comprehension of, the causes and prevention of wildfires. The answer provided may neither respond to the question asked, nor be factually accurate. Analysis and supported statements are often missing.
Level 2	(4–6 marks)	The student offers good facts about, and shows good comprehension of, the causes and prevention of wildfires. The student responds to the question asked, and is generally factually accurate. Analysis and supported statements are well articulated; some exemplar material is provided, where appropriate.
Level 3	(7–9 marks)	The student offers excellent facts about, and shows excellent comprehension of, the causes and prevention of wildfires. The student responds to the question asked, and is factually accurate. Analysis and supported statements are well articulated, with precision; exemplar material, where applicable, is showcased.

Possible answers:

- Figure 14 shows that 88% of fires are caused by humans. While some of these fires are deliberately set, many are accidental, such as out of control campfires and rubbish-burning or dropped cigarette ends. These accidental fires can often be prevented if care is increased, and public awareness is an important part of this.

- Figure 15 shows a billboard, clearly addressing the public. The campaign is cleverly designed, and is well-known by many Americans. For example, the campaign has a cute mascot (Smokey Bear) pointing at the reader (and emphasis on the word 'YOU'), and a message in block capitals. The campaign also references a website – the student might suggest content that may be available online, e.g. tips on how not to inadvertently start fires, and activity sheets for children.
- However, there are other methods of preventing fires, such as controlled burning and forest management. Landowners can also limit or prohibit campfires on their land when the threat of fires is highest.
- Therefore, public perception plays a part within a multifaceted approach to help reduce the number of wildfires.

5.4. 4 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, seismic processes. 5 marks can be awarded for AO2 if the student uses their facts and comprehension to assess the link between seismic processes and subsequent hazards, with reference to exemplar material and importance as appropriate.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student offers few facts about, and shows little comprehension of, seismic hazards and their effects. The answer provided may neither respond to the question asked, nor be factually accurate. Analysis and supported statements are often missing.
Level 2	(4–6 marks)	The student offers good facts about, and shows good comprehension of, seismic hazards and their effects. The student responds to the question asked, and is generally factually accurate. Analysis and supported statements are well articulated; some exemplar material is provided, where appropriate.
Level 3	(7–9 marks)	The student offers excellent facts about, and shows excellent comprehension of, seismic hazards and their effects. The student responds to the question asked, and is factually accurate. Analysis and supported statements are well articulated, with precision; exemplar material, where applicable, is showcased.

Possible answers:

- Discussion of different waves (P, S and L), and their effects on the ground surface.
- Discussion of the effects to buildings and surface structures, and effects on the land surface, such as rock falls or landslides.
- Allow reference to aftershocks (which may be very powerful) adding to the destruction caused by the first quake – for example, causing the collapse of weakened structures.
- Inference on how these occurrences can cause loss of life, including references to exemplar material, such as collapse of buildings and falling debris, resulting in deaths from crushing, mudslides burying and causing collapse of buildings, liquefaction causing buildings to tip over.
- Also allow discussions of scale – for example, relating to the magnitude of an earthquake and the level of damage caused.
- The student may also discuss tsunami – while the wave may only travel a short distance inland, there may be a large population within the coastal zone. In addition, tsunami, such as the 2004 Indian Ocean tsunami, can easily propagate through open water, affecting many countries.

5.5. 10 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, a variety of hazards and their effects. 10 marks can be awarded for AO2 if the student uses their facts and comprehension to assess understanding of the effects of hazards, and provides examples of how different hazards affect different countries in a variety of ways, with judgement.

Level	Mark	Descriptor
Level 1	(1–5 marks)	<p>AO1:</p> <ul style="list-style-type: none"> • The answer uses little geographic theory, and information may be inaccurate or superficial. • No use of geographical terms. • Little evidence of comprehension. • No or restricted use of example material, where appropriate. <p>AO2:</p> <ul style="list-style-type: none"> • Investigation, connections and developments are absent. • Argument is unclear; points may be brief, biased or inaccurate, with no evidence of structure. Answer is likely to be poorly written and not always relevant to the question.

Level	Mark	Descriptor
Level 2	(6–10 marks)	AO1: <ul style="list-style-type: none"> Use of more complex theories may be inaccurate, but overall use of geographic information is correct. Geographical terms used infrequently. Comprehension is apparent but may be patchy. Case study material is present, where appropriate, but may be brief, biased or superficial.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are present, but unclear. Argument is apparent but may be poorly structured. Most of the answer is relevant to the question.
Level 3	(11–15 marks)	AO1: <ul style="list-style-type: none"> Reliable references to geographical theories; the answer is likely to be detailed and appropriate. Geographical terms used often. The answer demonstrates a good level of critical comprehension. Case study material is appropriate, specific and well linked to the argument, where applicable.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are developed. Argument is explicit, with a good balance of evidence, clear structure and a solid conclusion. Answer is highly relevant to the question.
Level 4	(16–20 marks)	AO1: <ul style="list-style-type: none"> Geographical theories and processes are appropriately referred to, demonstrating comprehensive and specific knowledge. Frequent use of geographical terms. Critical comprehension is self-evident from the confident and appropriate use of geographical theory and information. Use of case study material is suitable, broad and thorough, where applicable. Specific facts and figures are fully integrated and support the overall argument.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are fully developed. Argument is well written, supported by the evidence and clear in structure, and uses a balance of viewpoints in order to reach a justified conclusion. Conclusions are creative, sophisticated and highly relevant.

Possible answers:

- The student is encouraged to use examples, spanning a range of hazards, with linkages between the causes and effects.
- Some hazards may simply be of low magnitude (such as a low-magnitude earthquake, or a small volcanic eruption, or a low-level tropical cyclone).
- Some hazards are more catastrophic than others – for example, there is likely to be advance warning of an approaching wildfire, giving residents time to evacuate.
- The hazard event may occur in a remote location away from high population, reducing its effect. In the case of volcanic and tectonic hazards, location can be critical – such as the type of plate margin, depth of the focus. Other hazards may pose risks on wide-reaching scales, such as the 2004 Indian Ocean tsunami, or the 2010 eruption of Eyjafjallajökull, or the eruption of Mount Tambora in 1815.
- However, there are many factors that help determine the impact of a hazard event, such as:
 - Level of development – some countries are more vulnerable than others, and can warn residents quickly, and respond immediately and effectively.
 - Government policy, religious beliefs and attachment to an area – affecting tolerance to a hazard – i.e. it's a way of life, rather than treating an event as a disaster.
 - Level of planning and preparation, adaptation and mitigation, process of risk management, etc.

6.1. Allow up to four points, with an additional mark for each expanded point. These suggested points are not exhaustive.

AO1 x 4

- Migration northwards of some species (to higher latitude) (1) due to warming (1).
- Invasion of species from the south / continental Europe / ability of introduced species to survive in the new climate (1) and increased competition from the new species (1).
- Increase in elevation for some species (e.g. alpine plants) (1) because temperature decreases with altitude (1).

6.2. 6 marks for AO3 can be awarded where the student uses and assesses information provided in the figures to highlight the differences between primary and secondary succession.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student provides a partial examination of the figure, with limited inference or success.
Level 2	(4–6 marks)	The student provides a successful and detailed examination of the figure; inferences are detailed and used with success.

Possible answers:

- Both figures show processes of succession – where species follow on from (replace) the prior stage as the conditions become more favourable.
- Figure 16 shows primary succession – starting from a sterile environment. The process might be very slow, as the soil needs time to build up, allowing for the later stages.
- Figure 17 shows secondary succession – the primary succession has already run its course, and the climatic climax vegetation is in place. The fire shown in stages 2 and 3 destroyed the forest, leaving empty earth. But the ground is quickly recolonised. There is already soil, and the addition of ash may have increased its fertility. There may be seeds which have survived the fire, and seeds are likely to blow in from nearby areas which were not burned.

6.3. 4 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the savanna biome.

5 marks can be awarded for AO2 if the student uses their facts and comprehension to assess how climate and other factors result in a highly adapted ecosystem.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student offers few facts about, and shows little comprehension of, adaptation in the savanna biome. The answer provided may neither respond to the question asked, nor be factually accurate. Analysis and supported statements are often missing.
Level 2	(4–6 marks)	The student offers good facts about, and shows good comprehension of, adaptation in the savanna biome. The student responds to the question asked, and is generally factually accurate. Analysis and supported statements are well articulated; some exemplar material is provided, where appropriate.
Level 3	(7–9 marks)	The student offers excellent facts about, and shows excellent comprehension of, adaptation in the savanna biome. The student responds to the question asked, and is factually accurate. Analysis and supported statements are well articulated, with precision; exemplar material, where applicable, is showcased.

Possible answers:

- Wet-dry climate.
- Located between the rainforest and hot desert biomes shown on Figure 18, affected by the movement of the ITCZ (inter-tropical convergence zone) and subtropical high pressure.
- The photo in Figure 20 (tree savanna) was likely taken during the winter dry season as there are no leaves on the baobab trees (shed leaves to conserve water; during a period of high potential evapotranspiration, the potential evapotranspiration is higher than the evaporation on a yearly basis). The baobabs have very thick trunks to store water. The acacia trees have flat tops to protect them from windthrow from the trade winds). The area is mostly grassland because the climate is too dry to support extensive tree cover, and the trees which do grow are highly adapted.
- There is a vegetation gradient – as the distance from the rainforest biome increases, the number of trees decreases.
- Figure 20 shows a simplified food web. Some of the animals will be able to migrate, the giraffe is capable of reaching high trees, and some animals live underground to escape the high temperature. The animals all have different niches or territories and are highly adapted, allowing their coexistence in an ecosystem with relatively low NPP. Many of the animals are large – which is perhaps surprising.

- 6.4. 4 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, the carrying capacity of different ecosystems.
5 marks can be awarded for AO2 if the student uses their facts and comprehension to assess why some ecosystems are more fragile than others.

Level	Mark	Descriptor
Level 1	(1–3 marks)	The student offers few facts about, and shows little comprehension of, ecosystems and the concept of fragility. The answer provided may neither respond to the question asked, nor be factually accurate. Analysis and supported statements are often missing.
Level 2	(4–6 marks)	The student offers good facts about, and shows good comprehension of, ecosystems and the concept of fragility. The student responds to the question asked, and is generally factually accurate. Analysis and supported statements are well articulated; some exemplar material is provided, where appropriate.
Level 3	(7–9 marks)	The student offers excellent facts about, and shows excellent comprehension of, ecosystems and the concept of fragility. The student responds to the question asked, and is factually accurate. Analysis and supported statements are well articulated, with precision; exemplar material, where applicable, is showcased.

Possible answers:

- Students should discuss the notion of carrying capacity, resilience, recovery and threats in the context of several named examples.
 - Pressures may be direct (such as human development within the ecosystem) or indirect (such as acid rain and climate change).
 - Ecosystems with very low NPP have very slow recovery rates – their carrying capacity is low – an example would be a tundra environment. Even in the savanna ecosystem, damage can last for decades.
 - Size of the ecosystem is another aspect – small-scale ecosystems may be easier to damage and less resilient than larger sites, with fewer overall species.
 - Different ecosystems are under differing levels of threat – through human presence, the spread of invasive species.
 - Some ecosystems are very susceptible to climate change, the effects of which may be most acute in the Arctic, where the melting of permafrost may cause feedback cycles to occur, in terms of methane release, and reduction in sea ice.
 - Some ecosystems are very susceptible to erosion, such as sand dunes; coral reefs are very susceptible to changes in water temperature and human development.
 - Rainforest, however, can recover, which is why slash-and-burn agriculture is said to be sustainable.
- 6.5. 10 marks can be awarded for AO1 if the student presents facts about, and shows comprehension of, ecosystem determinants.
10 marks can be awarded for AO2 if the student uses their facts and comprehension to assess how ecosystems are adapted to their environments, and the limitations/fragility caused by climate and other factors.

Level	Mark	Descriptor
Level 1	(1–5 marks)	AO1: <ul style="list-style-type: none"> • The answer uses little geographic theory, and information may be inaccurate or superficial. • No use of geographical terms. • Little evidence of comprehension. • No or restricted use of example material, where appropriate.
		AO2: <ul style="list-style-type: none"> • Investigation, connections and developments are absent. • Argument is unclear; points may be brief, biased or inaccurate, with no evidence of structure. Answer is likely to be poorly written and not always relevant to the question.
Level 2	(6–10 marks)	AO1: <ul style="list-style-type: none"> • Use of more complex theories may be inaccurate, but overall use of geographic information is correct. • Geographical terms used infrequently. • Comprehension is apparent but may be patchy. • Case study material is present, where appropriate, but may be brief, biased or superficial.
		AO2: <ul style="list-style-type: none"> • Investigation, connections and developments are present, but unclear. • Argument is apparent but may be poorly structured. Most of the answer is relevant to the question.

Level	Mark	Descriptor
Level 3	(11–15 marks)	AO1: <ul style="list-style-type: none"> Reliable references to geographical theories; the answer is likely to be detailed and appropriate. Geographical terms used often. The answer demonstrates a good level of critical comprehension. Case study material is appropriate, specific and well linked to the argument, where applicable.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are developed. Argument is explicit, with a good balance of evidence, clear structure and a solid conclusion. Answer is highly relevant to the question.
Level 4	(16–20 marks)	AO1: <ul style="list-style-type: none"> Geographical theories and processes are appropriately referred to, demonstrating comprehensive and specific knowledge. Frequent use of geographical terms. Critical comprehension is self-evident from the confident and appropriate use of geographical theory and information. Use of case study material is suitable, broad and thorough, where applicable. Specific facts and figures are fully integrated and support the overall argument.
		AO2: <ul style="list-style-type: none"> Investigation, connections and developments are fully developed. Argument is well written, supported by the evidence and clear in structure, and uses a balance of viewpoints in order to reach a justified conclusion. Conclusions are creative, sophisticated and highly relevant.

Possible answers:

- Students should discuss a range of ecosystems and discuss the stresses that those ecosystems face, carrying capacities and resilience, and a range of limiting factors.
- Any biomes and local ecosystems can be discussed.
- Discussion will involve the climate of the ecosystem – especially climates which are hostile, such as the cold, dry and windy tundra, and the hot, dry savanna ecosystems. Even within ecosystems there are pressures, such as altitude, slope and relief, the formation of treelines, short growing seasons.
- Predator/prey relationships and complicated food webs.
- Plants and animals have needed to adapt to their ecosystems, a slow process.
- In the past there have been great changes to the planet, such as the successive ice ages, causing the migration of species. Some species are relict species – such as Alpine plants in the UK, which are confined to uplands.
- Extreme weather events – hurricanes (windthrow, sedimentation), floods (soil erosion), droughts (vegetation die-off, dehydration in animals and death), and lightning strikes (fires) all affect ecosystems, including coral reefs.
- Discussion of mass extinction events, and the natural background extinction rate.
- Some ecosystems are adapted to fire regimes – such as cones which remain closed until heat from fires allows them to open.
- Comparison between past events and ecosystem functioning, along with the relatively recent human activity.
- Discussion of the human effects on the biome, and resilience capability due to existing stressors.

Preview of Answers Ends Here

This is a limited inspection copy. Sample of answers ends here to stop students looking up answers to their assessments. See contents page for details of the rest of the resource.