Pearson Edexcel

GCSE (9-1) Geography A

Ecosystems

Exam questions

Booklet 1

Name:

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Questions

Q1.

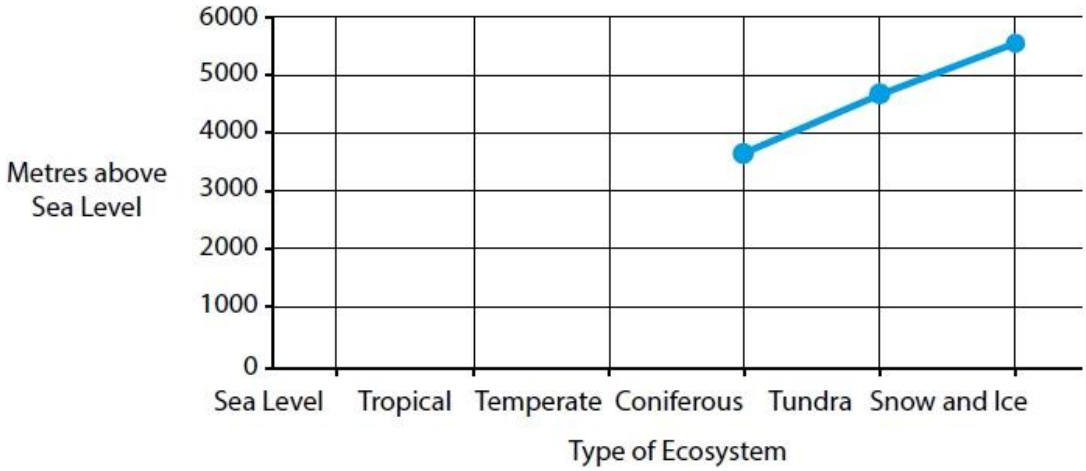
Biodiversity is influenced by the interrelationship and interaction of biotic and abiotic factors.

Study the figure below.

(i) Complete the line graph in the figure below using data from the table.

(3)

Height above sea level (m)	Vegetation type (ecosystem)
0–900	Tropical Rainforest
900–1800	Temperate Forest



Changes in large ecosystems up a mountain in South America

(ii) With reference to the line graph in Figure A, explain how changes in altitude affect the distribution of ecosystems.

(4)

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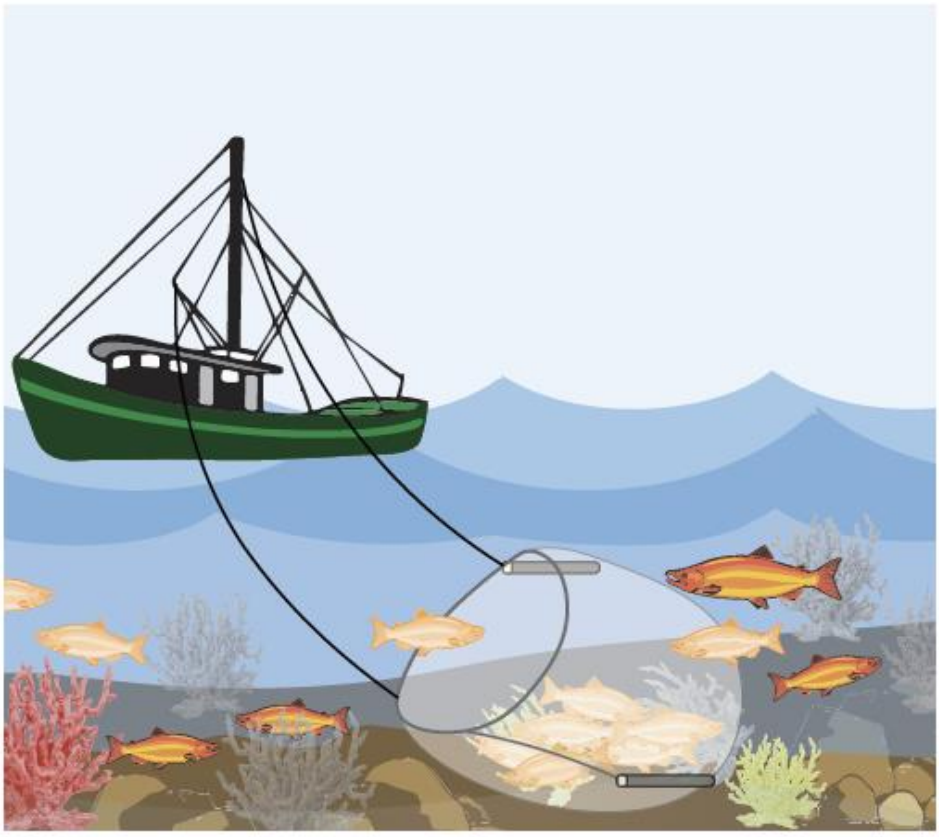
Q2.

With reference to the figure below, explain **one** way human activity can damage marine ecosystems in the UK.

(2)



An example of how human activity can affect marine ecosystems

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Q3.

Explain **two** ways climate can influence the distribution of large-scale ecosystems.

(4)

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Q4.

Biodiversity is influenced by the interrelationship and interaction of biotic and abiotic factors.

Moorland is one of the UKs main terrestrial ecosystems.

(i) State **two** other UK terrestrial ecosystems.

(2)

_____

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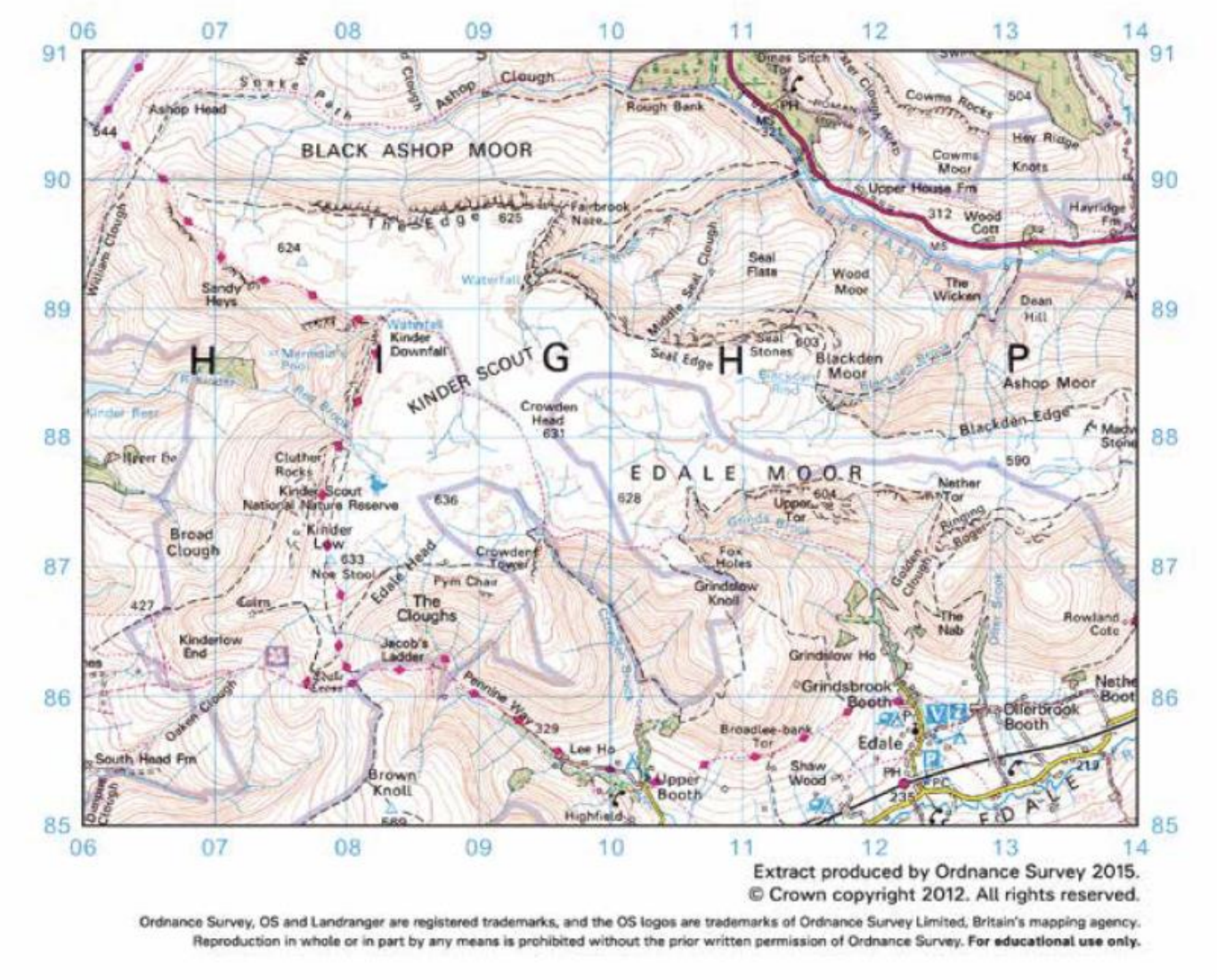
_____

(ii) Study the figure below which shows an area of moorland in the UK.

Identify the feature at 075887.

(1)

_____



OS 1:50,000 map of Edale Moor, the Peak District, England

(iii) Give the direction from the farm in 1189 to the nature reserve in 0887.

(1)

_____

Q5.

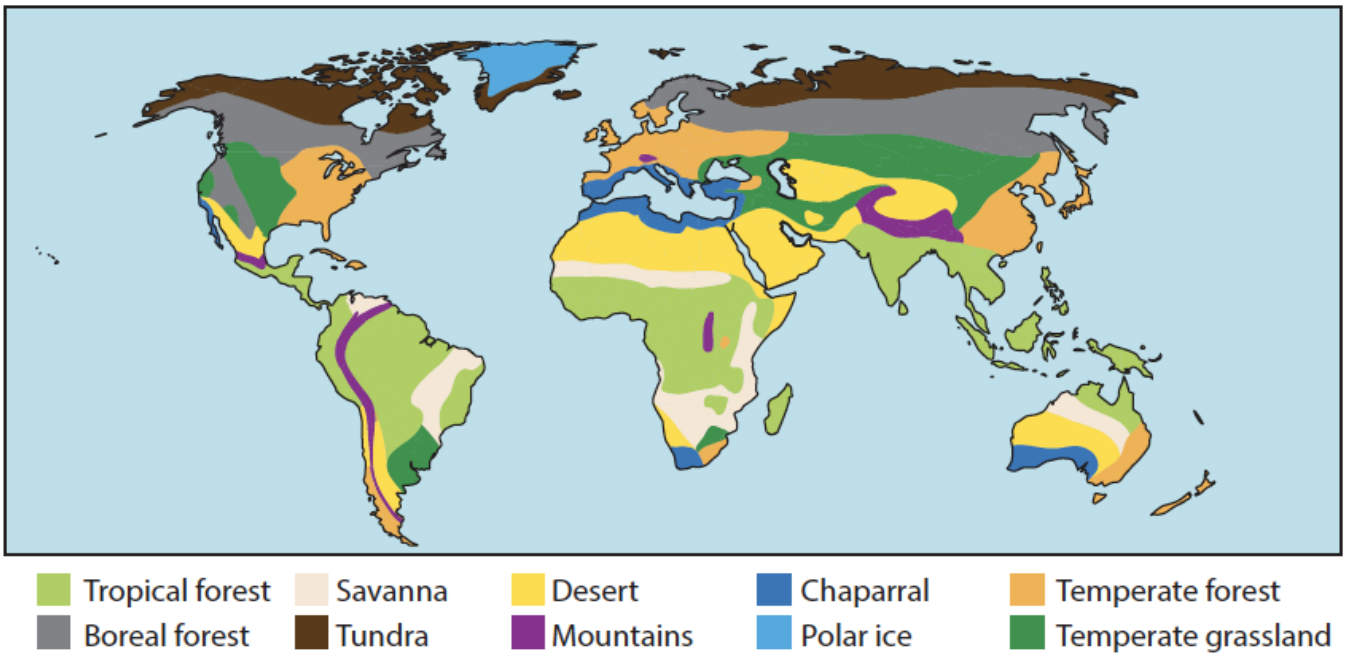
Large-scale ecosystems (global biomes) are found in different parts of the world.

(i) Study the figure below.

Identify the continent with the smallest area of desert.

(1)

- ☒ **A** Asia
- ☒ **B** Europe
- ☒ **C** North America
- ☒ **D** Africa



Map showing the global biomes

(ii) Explain **one** way climate influences the distribution of deserts

(3)

_____

_____

_____

_____

Q6.

Large-scale ecosystems, such as tundra, are found in different parts of the world.

(i) State **two** characteristics of a tundra ecosystem.

(2)

_____

_____

(ii) Identify **two** countries where a tundra ecosystem is located.

(2)

- ☒ **A** Australia
- ☒ **B** Canada
- ☒ **C** Libya
- ☒ **D** Spain
- ☒ **E** Norway

Q7.

(i) Complete the bar chart using data from the table below.

(2)

Year	Spawning Stock Biomass (SSB)
1982	115
1990	50

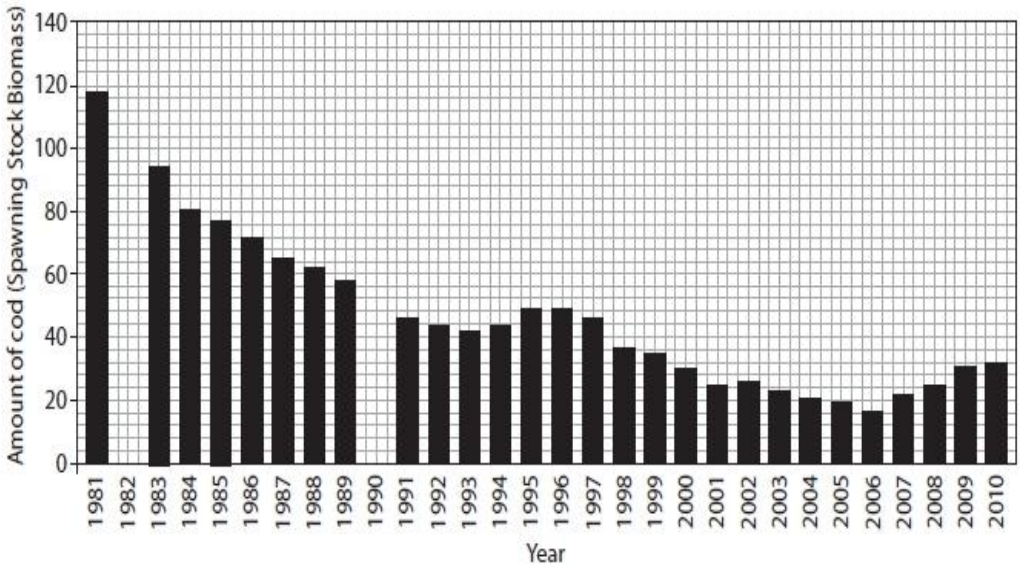


Figure A

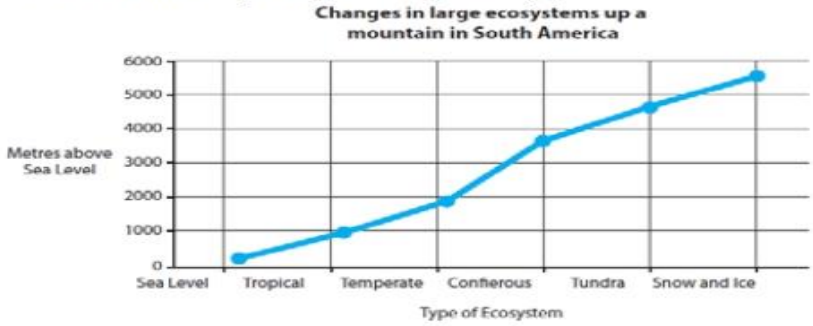
Amount of North Sea cod, 1981–2010

(ii) With reference to the bar chart in Figure A, explain why human activities can affect the amount of North Sea cod.

(4)

Mark Schemes

Q1.

Question number	Answer	Mark
(i)	Award 1 mark for each correct plot (2 x 1) Award 1 mark for joining dots together (1) 	(3)

Question number	Answer	Mark
(ii)	Award 1 mark for interpretation of the line graph and a further mark for a link to the distribution of ecosystems, up to a maximum of 2 marks each. Tundra can exist only above 4000 m (1) because other trees cannot grow in the thin soil at the top of a mountain (1). The line graph shows the steepest increase is between 1900 and 3800 m (1), which means that coniferous forests can exist in a greater range of altitude/temperature than the other ecosystems shown on Figure A (1). Tropical can exist only under 900 m above sea level (1) because it cannot survive in the colder temperatures associated with higher altitude (1). **Accept any other appropriate response**	(4)

Q2.

Question number	Answer	Mark
	Award 1 mark for a human activity shown on Figure 7b, and a further 1 mark for expansion, through explanation, up to a maximum of 2 marks. There are people fishing in Figure 7b (1) which could lead to fish populations falling / idea of overfishing (1). Figure 7b shows a boat trawling the bottom of the sea (1) which can destroy damage / destroy marine organisms / habitats (1). Large fishing boats can lead to the water being polluted (1) which can kill marine organisms (1). Overfishing of one particular species in the sea (1) which upset food chains and/or food webs (1). **Accept any other appropriate response.**	(2)

Q3.

Question number	Answer	Mark
	Award 1 mark for identifying the climate (temperature and/or precipitation) in a particular large-scale ecosystem (1) and a further 1 mark for a link to distribution, up to a maximum of 2 marks. Tropical rainforests are found where it is hot and wet (1) which means that they are located largely along the Equator / between the Tropics (1). Hot deserts are found where it is hot and dry (1) which means that they are usually located close to the Tropics (1). Temperate forests are found largely in the mid-latitudes (1) due to the mild temperatures which is found here (1). Temperate grasslands are found largely between 40-60°N of the equator (1) due to the mild temperatures and relatively low rainfall which is found here (1). Tundra regions are found largely along the Arctic Circle (1) due to the temperatures being below freezing most of the year (1). Boreal forests are found between 50-60°N (1) where winter temperatures are very cold (1). **Accept any other appropriate response.**	(4)

Q4.

Question number	Answer	Mark
(i)	Award 1 mark for the following, up to a maximum of 2 marks: Heathlands (1) Woodland (1) Wetlands (1)	(2)

Question number	Answer	Mark
(ii)	Mermaid's Pool/lake/tarn	(1)

Question number	Answer	Mark
(iii)	South west/SW	(1)

Q5.

Question number	Answer	Mark
(i)	B - Europe Europe does not have any desert shown on the map and therefore has the smallest area. The other continents all have desert areas shown on the map.	(1)

Question number	Answer	Mark
(ii)	Award 1 mark for a climatic factor, and a further 2 marks for expansion, up to a maximum of 3 marks. The climate in some areas is dry (1) as they are located so far from the sea/ oceans (1) which means that there is very little rainfall (1). The locations of deserts are associated with high pressure (1) which is linked with sinking air (1) which means that there is very little rainfall (1). Deserts are found where there is the sinking arm of the Hadley Cell (1) which means that there is high pressure (1) and the climate is dry (1). **Accept any other appropriate response.**	(3)

Q6.

Question number	Answer	Mark
(i)	Award 1 mark for the following, up to a maximum of 2 marks. The temperatures stay below 0°C most of the year (1) Bare landscape/treeless (1) Very little precipitation (1) The ground/sub-soil remains frozen (1) A few centimetres of top soil may thaw in the summer (1) Winds can be very strong (1) Summers may have many hours of continuous daylight (1) Winters are long, dark periods (1) Lichen/mosses (1) Arctic foxes/hares (1) **Accept any other appropriate response**	**(2)**

Question number	Answer	Mark
(ii)	B E	**(2)**

Q7.

Question number	Answer	Mark
(i)	Award 1 mark for each correct plot (2 x 1)	**(2)**

Question number	Answer	Mark
(ii)	Award 1 mark for interpretation of the bar chart and a further mark for a link to human activities, up to a maximum of 2 marks each. Between 1981 and 2005, there has been an overall decline because over fishing has taken place (1) the demand for cod went up (1) Since 2005, the amount of North Sea cod has started to rise again which might be because quotas/restrictions are in place (1) to prevent overfishing (1) A rise in pollution levels caused by industrial leakages can damage marine habitats (1) which will have a negative impact on the quantity of North Sea cod (1) **Accept any other appropriate response**	**(4)**

Pearson Edexcel

GCSE (9-1) Geography A

Ecosystems (Deciduous woodlands)

Exam questions

Booklet 2

Name:

Questions

Q1.

In this question, four additional marks will be awarded for your spelling, punctuation and grammar and for your use of specialist terminology.

* Evaluate the different approaches used to manage the threats facing deciduous woodlands in a named region.

(8)

Paragraph 1: Some may argue that…
Paragraph 2: Other may argue that…
Conclusion: Overall, what do you think?

Q2.

In this question, up to four additional marks will be awarded for your spelling, punctuation, grammar and use of specialist terminology.

Evaluate the impact of physical and human factors on the biodiversity of deciduous woodland ecosystems.

(8)

Paragraph 1: Some may argue that…
Paragraph 2: Other may argue that…
Conclusion: Overall, what do you think?

Q3.

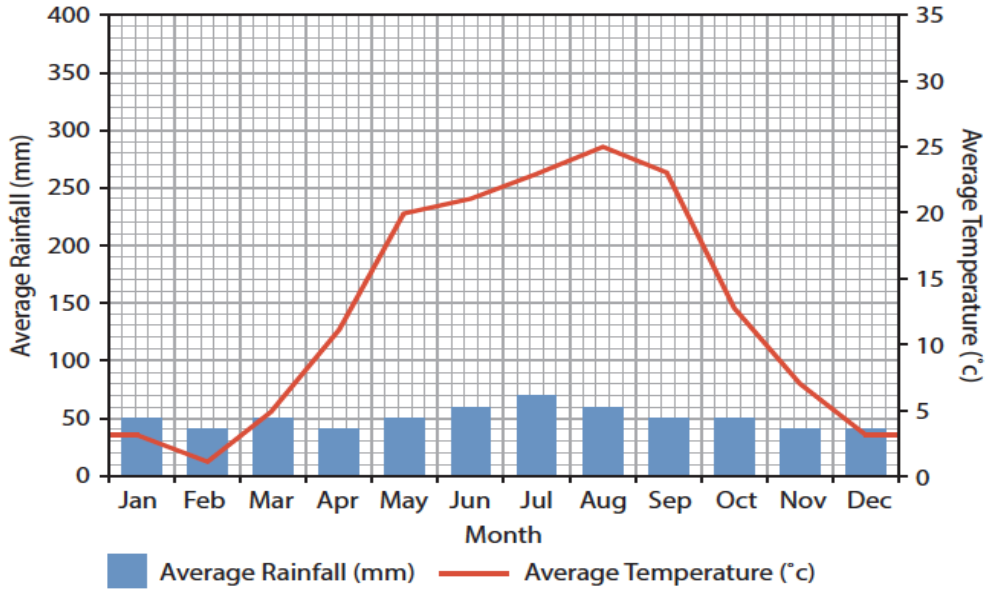
(i) Explain **one** cause of deforestation in deciduous woodlands.

(2)

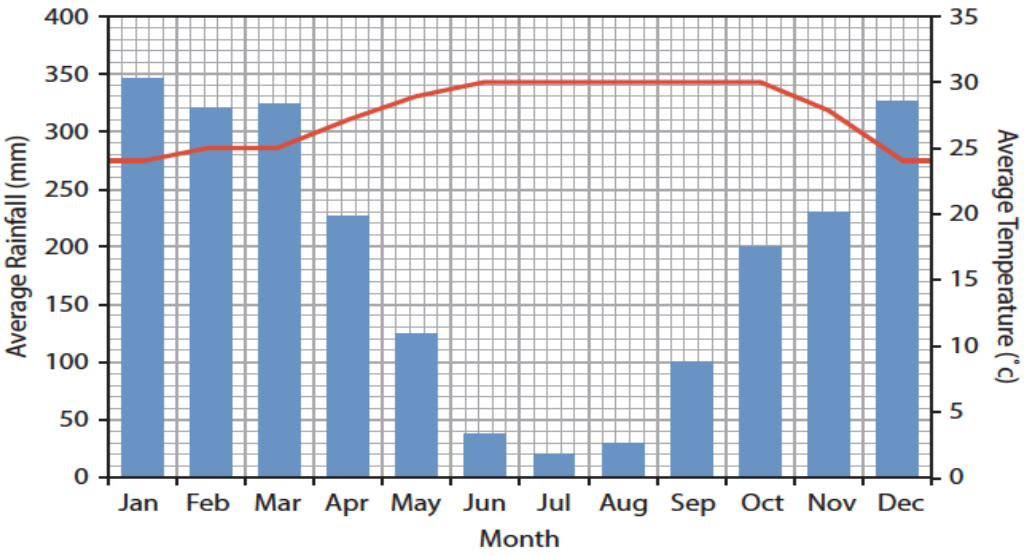
(ii) Explain **two** ways in which plants have adapted to living in deciduous woodlands.

(4)

(iii) Study the two figures below.



Climate graph for an area of deciduous woodland



Climate graph for an area of tropical rainforest

Explain why there are differences in these climate graphs.

(4)

Q4.

Deciduous woodland is one of the UK's main ecosystems.
Name **one** tree species found in deciduous woodlands in the UK.

(1)

Q5.

Biodiversity is influenced by the interrelationship and interaction of biotic and abiotic factors.

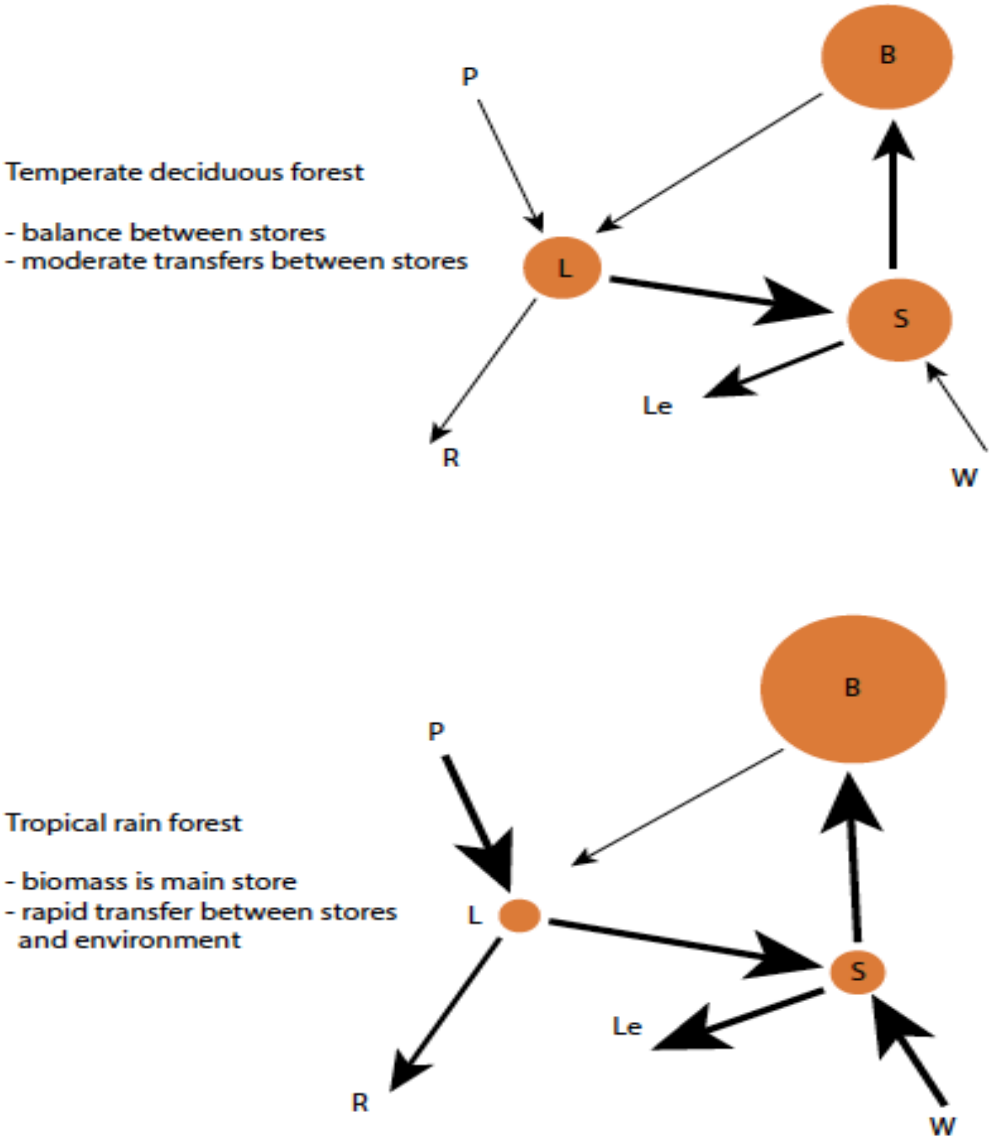
(i) State **two** goods or services provided by tropical rainforests.

(2)

(ii) Explain **two** ways in which plants have adapted to living in a tropical rainforest.

(4)

(iii) Study the figure below.



Nutrient cycle models

Explain why there are differences in these nutrient cycles.

(4)

In this question, 4 of the marks awarded will be for your spelling, punctuation and grammar and for your use of specialist terminology.

* (iv) Assess the following statement.

Climate change presents a greater threat to tropical rainforests than it does to deciduous woodlands.

(8)

Paragraph 1: Some may argue that…
Paragraph 2: Other may argue that…
Conclusion: Overall, what do you think?

Mark Schemes

Q1.

Question number	Indicative content
	AO2 (4 marks)/AO3 (4 marks) **AO2** • Deciduous woodlands are facing a range of natural and man-made threats resulting from climate change, urbanisation, population growth, timber extraction and agricultural change. • Uncontrolled and unchecked exploitation of deciduous woodlands can cause irreversible damage such as loss of biodiversity, soil erosion, flooding and climate change. • The sustainable use and management of deciduous woodlands is essential but requires careful planning. • For a management strategy to be judged 'sustainable', it will meet the needs of the local/national population without compromising the needs of future generations. • Land uses and strategies that are being used to manage deciduous woodlands can vary within a named region. • Sustainable activities in deciduous woodlands include 'pollarding' – a strategy used to encourage new trees to grow and species of birds to increase in number. • In some parts of the world, education has been used to ensure those involved in exploitation and management of deciduous woodlands understand the consequences of their actions. • In more developed parts of the word, monitoring via satellite technology and photography can be used to check that any activities taking place are legal and follow guidelines for sustainability.
	AO3 Evaluation will depend on specific case study but may include: • A country's level of development may influence the approach of management – crucially the extent to which it can be judged 'sustainable'. For example, in countries that are attempting to improve their level of development, they might not see any other option but to exploit its deciduous woodlands; the challenge is being able to do this in a sustainable manner. • Different approaches of managing deciduous woodland have different impacts on people and the environment; they are also different in the extent to which they can be judged 'sustainable'. • The scale of the area will have an impact on the type and success of a management approach; for example, in a small-scale deciduous woodland, management may involve some grassy areas left uncut to encourage wildlife like butterflies or recreational areas for biking and horse riding being marked out. This reduces damage to other areas of the forest.

Q2.

Question number	Answer
	AO2 (4 marks)/ A03 (4 marks) **AO2** • Deciduous woodlands have only moderate biodiversity compared with tropical rainforests. • They are often dominated by 3 or 4 tree species (e.g. oak, beech, ash). • Other plant species in the sub-canopy and herb layer have adapted to the growing season of trees (e.g. bluebells). • A range of human and physical factors can affect the biodiversity of deciduous woodlands. • These can both reduce and increase biodiversity. • Historically, human factors have included: – Wood for fuel – Clearance for agriculture – Materials for building and use for fuel Modern day human factors include: – Recreation (e.g. walking, horse-riding, cycling) – Urbanisation/ house building – Removal of timber – Conservation – Climate change (which can lead to invasion by viruses and animal/ plant species) • Physical factors include: – Climate (cold winter months when trees/ plants become dormant and only limited food available for animals) – Past/future climate change due to natural causes – Weather (e.g. wind) – Relief (e.g. higher relief, steep slopes) • These physical factors will all affect the range and type of trees, other vegetation and animals.

	AO3 • Naturally, climate is a very significant factor. • This plays a key role in controlling the distribution of deciduous woodlands. • The low temperature conditions slow down the production of food in winter. • This affects both the amount and range of animal and plant species which can be supported. • The plants and animals which occur here naturally are adapted to the climate. • Human factors have played a key role in the past. • They are also having a significant affect in the present. • In many cases this has resulted in the destruction of deciduous woodland and a reduction in biodiversity. • However, in some examples conservation efforts have helped to restore/ maintain biodiversity.

Q3.

Question number	Answer	Mark
(i)	Award 1 mark for a cause of deforestation and a further 1 mark for explanation of this, up to a maximum of 2 marks. Trees are cut down for fuel/firewood (1) as demand rises due to population growth (1) The wood is used as timber for buildings (1) as rates of urbanisation increase (1) Land is cleared for recreation (1) as the leisure and tourism industry grows (1) Land is cleared for farming (1) as practices change in response to changing demands (1) **Accept any other appropriate response**	(2)

Question number	Answer	Mark
(ii)	Award 1 mark for the identification of the adaption and a further 1 mark for an explanation of the adaptation, up to a maximum of 4 marks. Leaves are broad/green (1) which allows them to capture sunlight/photosynthesis in summer (1) As temperatures drop, the tree cuts off the supply of water to the leaves (1) which allows them to survive during the winter months (1) In winter, trees shed their leaves (1) because it is too cold for the trees to protect their leaves from freezing (1) In winter, trees seal up the places where the leaves attach to the branch (1) which helps to conserve water that would be lost through transpiration (1) Before the leaves die, some of the food material they contain is drawn back into the twigs and branches where it is stored (1) which will be used to grow new leaves again in the following spring (1) Trees have thick bark (1) to protect them from cold winters (1) Reference to plants blooming at particular times of the year (1) prior to trees coming into leaf (1) **Accept any other appropriate response**	(4)

Question number	Answer	Mark
(iii)	Award 1 mark for a basic reason for a difference and further mark for the extension of this point up to maximum of 4 marks. **Seasonal variations** Deciduous woodlands are exposed to both warm and cold air masses during a year (1) which results in greater seasonal variations/four distinct seasons (1) **Temperature** Higher in TRFs because they are located nearer to the equator (1) where there is more direct sunlight hitting the land and sea (1) however deciduous woodlands have lower temperatures because they are found in higher latitudes further away from the Equator (1) where the sunlight is more dispersed (1) **Rainfall** Higher in TRFs because there are higher temperatures (1) which increases evaporation rates (1) and warmer air can hold more water vapour than the milder area in areas of deciduous woodland (1) **Accept any other appropriate response**	(4)

Q4.

Question number	Answer	Mark
	Award 1 mark for the following, up to a maximum of 1 mark. Alder (1) Ash (1) Beech (1) Elm (1) Hazel (1) Hornbeam (1) Oak (1) **Accept any other appropriate response.**	(1)

Q5.

Question number	Answer	Mark
(i)	Award 1 mark for the following, up to a maximum of 2 marks: Foodstuffs or specific examples (1) Medicines or chemical/genetic material for medicines (1) Timber/wood (1) Recreation or other cultural value (1) **Accept any other appropriate response.**	(2)

Question number	Answer	Mark
(ii)	Award 1 mark for identification of the adaptation and a further one mark for an explanation of the adaptation, up to a maximum of 4 marks. Drip tips (1) to remove excess water in conditions of over 2000mm of precipitation (1). Buttress roots (1) to stabilise the trees as they increase in height (1). Waxy leaves (1) to stop water infiltrating into leaf and rotting it (1). Tall straight tree trunks (1) to grow straight up towards the light to out compete other species (1). Epiphytes sink roots into a host plant (1) so they do not need to sink roots to the ground (1). **Accept any other appropriate response**	**(4)**

Question number	Answer	Mark
(iii)	Award 1 mark for identification of the difference and a further one mark for an explanation of this point, up to a maximum of 4 marks. **Biomass store** – bigger in TRF (1) as more nutrients are held in the vegetation because of the high biodiversity in the system (1) so there are more available nutrients (1), as there is more photosynthesis, meaning a greater amount of productivity (1). **Soil store** – smaller in TRF (1) – as the nutrient uptake is higher in TRF and there is greater amount of leaching due to more rainfall in TRF (1). **Litter store** – smaller in the TRF (1) as the rate of decomposition is much greater because of the high humidity (1). Arrows are generally larger in TRF as the rate of nutrient recycling is much faster between stores (1) due to climatic and biodiversity, meaning that transfer is more preferable in TRF (1). Accept comments based on different-sized stores/arrows in the temperate deciduous forest.	**(4)**

Question number	Indicative content
(iv)	**AO2 (4 marks)/AO3 (4 marks)** **AO2** • Climate change will have an impact on soil, temperature, rainfall, and weather events, which could threaten tropical rainforests' and deciduous woodlands' structure, function and biodiversity. • Tropical rainforest structure will be threatened by rising sea levels caused by climate change. • Tropical rainforest biodiversity could be threatened by animals migrating because they cannot adapt to the changing climate of their current habitat. • Deciduous woodland structure could be threatened by nutrient and moisture depletion in soils, leading to reduced tree growth. • Deciduous woodland biodiversity could be threatened, as increased numbers of pests are introduced into ecosystems through migration. **AO3** • Threats to tropical rainforests and deciduous woodlands are naturally similar, since climate change may bring an increase in temperature and a decrease in moisture, which will have common effects on vastly different ecosystems. • Attempts to mitigate against climate change threats, for example through sustainable management, can vary significantly for tropical rainforests and deciduous woodlands (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. • Climate change will not have the same impact everywhere (e.g. some areas may get colder/wetter rather than hotter), so the degree of threat is dependent on the impacts in the given area.

Pearson Edexcel

GCSE (9-1) Geography A

Ecosystems (Tropical rainforests)

Exam questions

Booklet 3

Name:

Questions

Q1.

In this question, up to four additional marks will be awarded for your spelling, punctuation, grammar and use of specialist terminology.

Assess the role of biotic and abiotic characteristics in the functioning of tropical rainforests.

(8)

Paragraph 1: Some may argue that…
Paragraph 2: Other may argue that…
Conclusion: Overall, what do you think?

Q2.

Tropical rainforests provide goods and services for people, but are also under threat.
Study the figure below.

The amount of land lost to deforestation in 1995 was 29 059 km^2.

In 2015 the amount of land lost to deforestation had fallen by 80%.

Figure 7d

Information about deforestation in Brazil

(i) Calculate the amount of land lost to deforestation in 2015.

Answer to one decimal place.

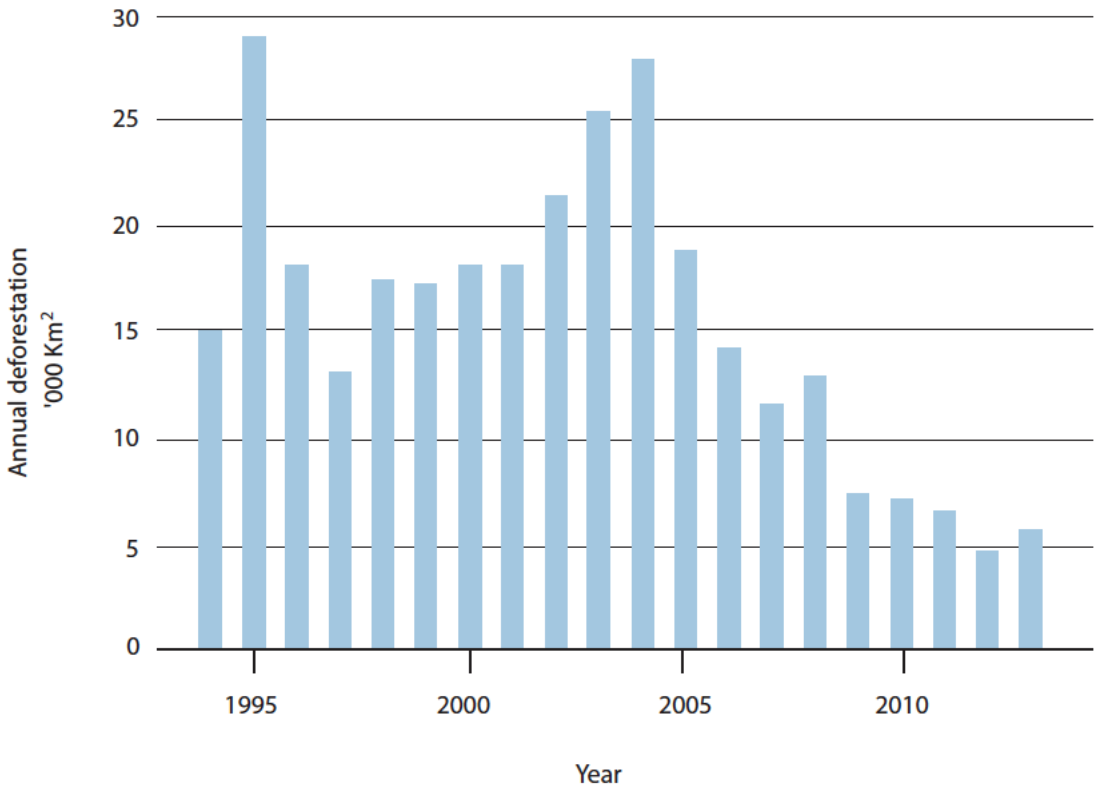
You must show your working in the space below.

(2)

(ii) Explain **two** causes of deforestation in tropical rainforests.

(4)

(iii) Study the figure below.



Annual rate of deforestation in Brazil, 1994–2013

Suggest **one** reason why the annual rate of deforestation has changed since 2004.

(4)

Q3.

Tropical rainforests provide goods and services for people, but are also under threat.

Study the figure below.

Calculate the range and median annual deforestation (km^2) shown on the figure.

(2)

Year	Annual deforestation (km^2)
2005	19 014
2006	14 285
2007	11 651
2008	12 911
2009	7 464
2010	7 000
2011	6 418
2012	4 571
2013	5 891

(Source from: http://rainforests.mongabay.com/amazon/deforestation_calculations.html)

Q4.

Biodiversity is influenced by the interrelationship and interaction of biotic and abiotic factors.

Define the term 'abiotic'.

(1)

Q5.

In this question, four additional marks will be awarded for your spelling, punctuation and grammar and for your use of specialist terminology.

* Evaluate the different approaches used to manage the threats facing deciduous woodlands in a named region.

(8)

Paragraph 1: Some may argue that…
Paragraph 2: Other may argue that…
Conclusion: Overall, what do you think?

Q6.

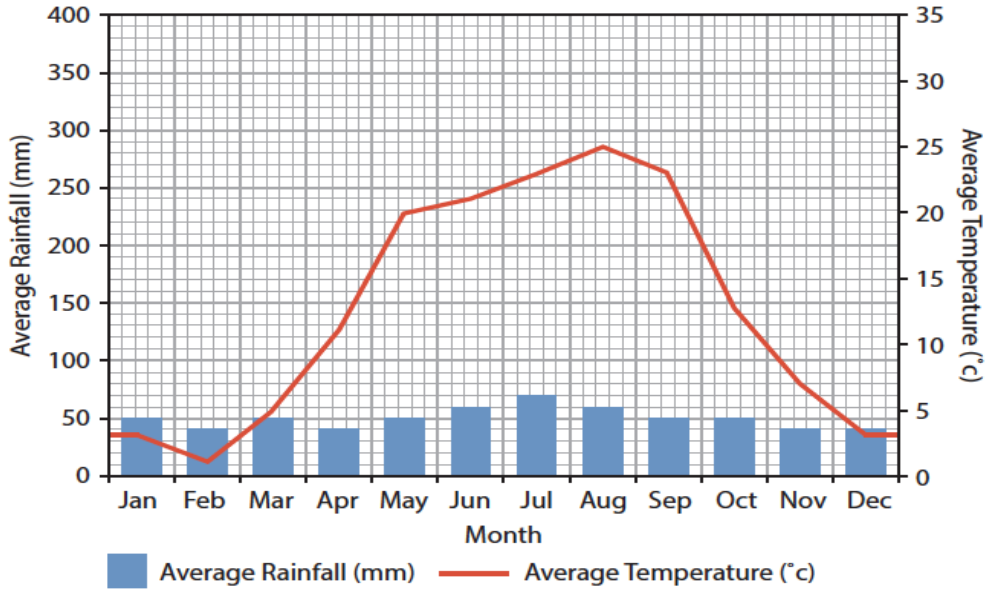
(i) Explain **one** cause of deforestation in deciduous woodlands.

(2)

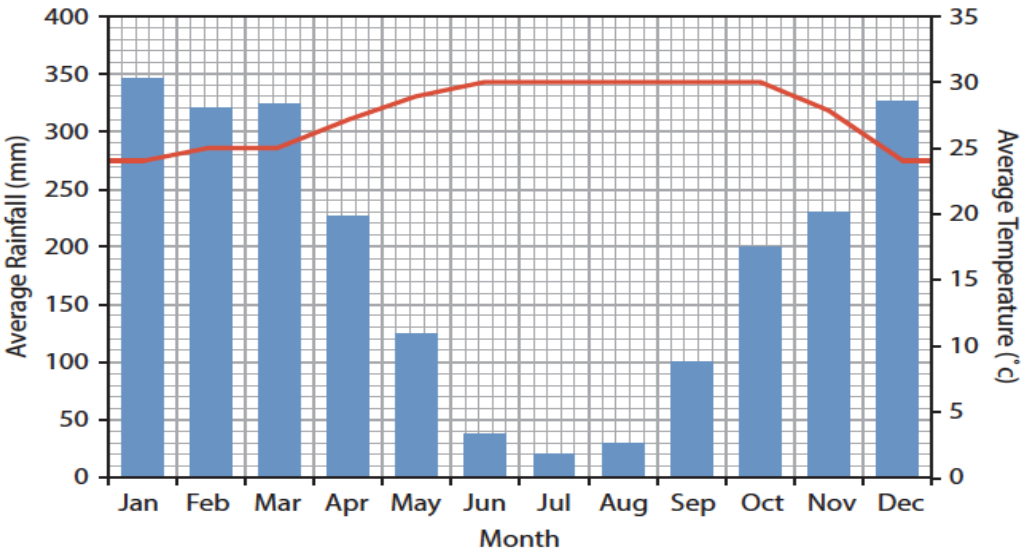
(ii) Explain **two** ways in which plants have adapted to living in deciduous woodlands.

(4)

(iii) Study the two figures below.



Climate graph for an area of deciduous woodland



Climate graph for an area of tropical rainforest

Explain why there are differences in these climate graphs.

(4)

Q7.

The tropical rainforest nutrient cycle is very rapid.

Explain **one** reason why the litter store is usually very small in tropical rainforests.

(3)

Q8.

Explain **two** ways that tropical rainforests can be managed sustainably.

(4)

Q9.

Study Figure 7c below.

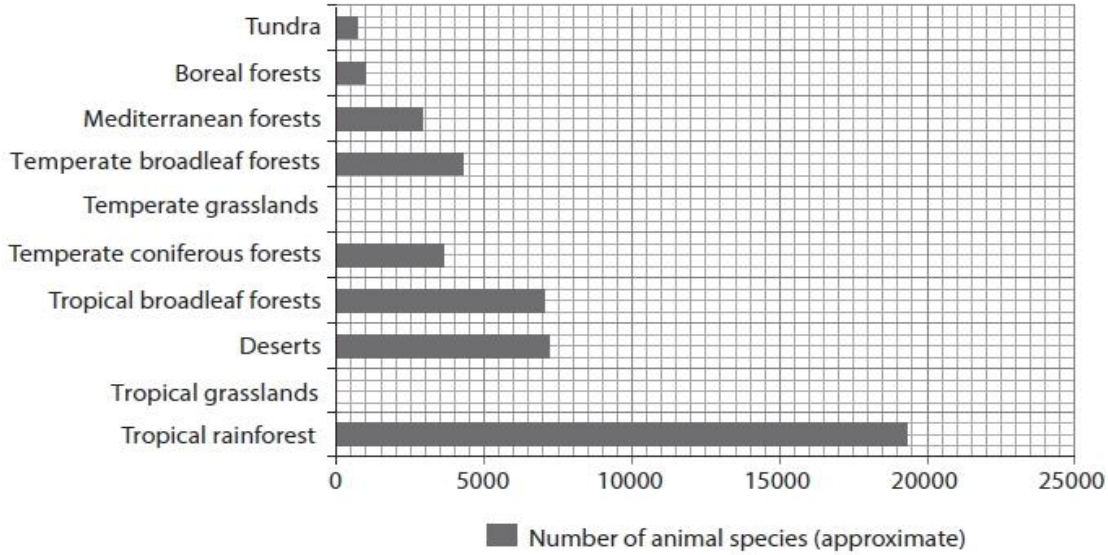


Figure 7c

Number of animal species in selected large-scale ecosystems

(i) Plot the data from the table below on Figure 7c.

(2)

Large-scale ecosystem	Number of animal species
Tropical grasslands	7 500
Temperate grasslands	4 000

(ii) Explain **one** reason why Tropical rainforests have a very high biodiversity.

(2)

Q10.

Study the figure below.

The effects of human activity in a tropical rainforest

Suggest **one** economic cause for the changes to the tropical rainforest shown on the figure.

(3)

Q11.

Biodiversity is influenced by the interrelationship and interaction of biotic and abiotic factors.

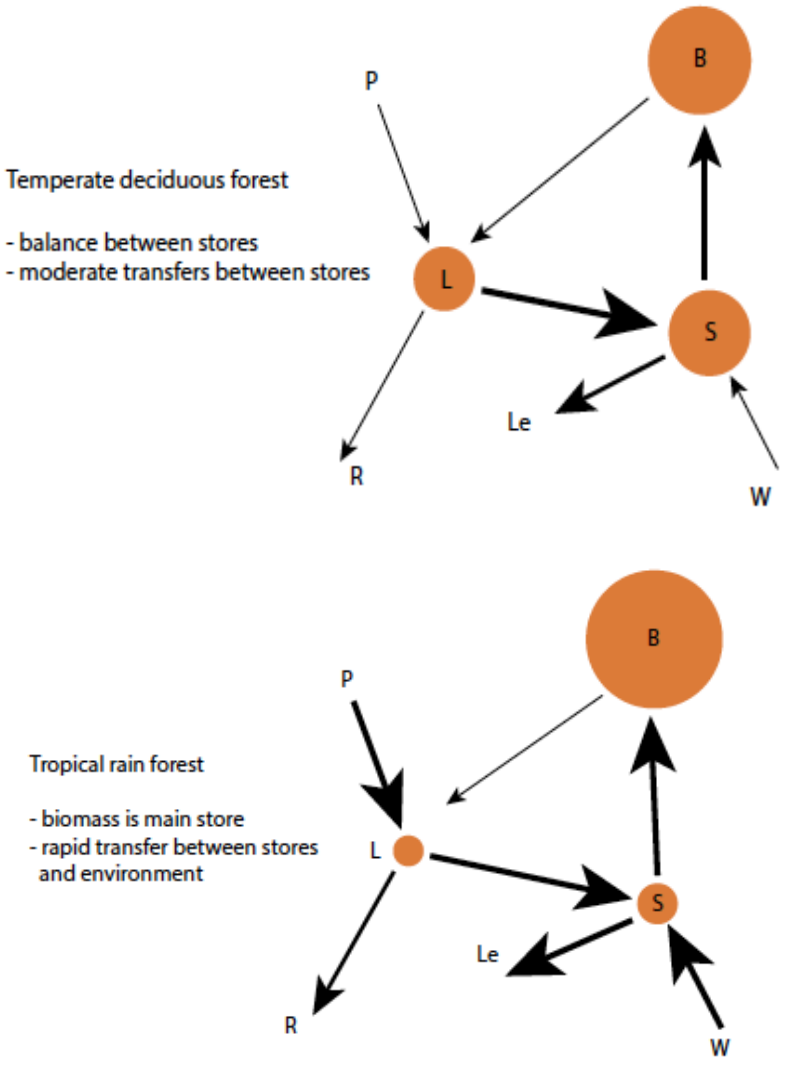
(i) State **two** goods or services provided by tropical rainforests.

(2)

(ii) Explain **two** ways in which plants have adapted to living in a tropical rainforest.

(4)

(iii) Study the figure below.



Nutrient cycle models

Explain why there are differences in these nutrient cycles.

(4)

In this question, 4 of the marks awarded will be for your spelling, punctuation and grammar and for your use of specialist terminology.

* (iv) Assess the following statement.

Climate change presents a greater threat to tropical rainforests than it does to deciduous woodlands.

(8)

Paragraph 1: Some may argue that…
Paragraph 2: Other may argue that…
Conclusion: Overall, what do you think?

Mark Schemes

Q1.

Question number	Answer
	AO2 (4 marks)/ A03 (4 marks) **AO2** • The nutrient cycle involves the movement of nutrients (e.g. phosphates, nitrates) between the physical environment and living organisms. • Nutrient cycling in the tropical rainforest is very rapid. • Many of the soils are old and impoverished and are low in nutrients. • The hot, damp conditions on the forest floor allow for the rapid decomposition of dead plant material. • This provides plentiful nutrients that are easily absorbed by plant roots. • However, these nutrients are in high demand from the rainforests many growing plants. • The nutrients do not remain in the soil for long. They stay close to the surface in the soil. • The thick layer of leaf litter and decomposing organic matter is rapidly broken down by decomposers (bacteria, fungi, termites) which take up the nutrients and release them as wastes when the organisms die. • The plants are able to take up the released nutrients in their roots. • The dense vegetation cover helps to protect the nutrients from leaching. • Human activity is impacting on nutrient cycling (e.g. through deforestation). **AO3** • Naturally, the key is the rapid decomposition of dead organic matter. • This is clearly linked to climate. • The hot, wet climate causes rapid decomposition of the leaf litter. • It also provides heat and water to support the rapid growth of vegetation. • Other factors also affect the rate of nutrient cycling. • Human impact has a considerable effect through deforestation - the removal of ground cover lead to the leaching of nutrients (washed out of the soil be heavy rainfall) and to their removal from the cycle when crops are harvested. • The impact of human activity is accentuated by the fact that the soils are relatively nutrient poor and rely on rapid cycling for their fertility. • Evaluation may depend on the location of examples used.

Q2.

Question number	Answer	Mark
(i)	Working to show: 80% reduction means that the 2015 figure is 20% of the 1995 figure (1) Or 20% of the original total (1) Correct answer is 5811.8 km^2(1) Max of 1 mark if no working (or incorrect working) shown but correct answer or correct method and incorrect answer.	(2)

Question number	Answer	Mark
(ii)	Award 1 mark for a basic cause, and a further 1 mark for expansion, up to a maximum of 2 marks for each cause. Trees are cleared to grow crops/ cattle ranching (1) as population increases/ to export to other countries (1). Trees are cleared for mining/ oil production (1) as the country seeks to become more developed (1). Trees are cut down for fuel/ firewood (1) as demand rises due to population growth (1). Trees are cleared for timber (1) as rates of urbanisation increase (1). **Accept any other appropriate response.**	(4)

Question number	Answer	Mark
(iii)	Award 1 mark for interpretation of the bar chart (falling rate of deforestation) and 1 mark for a valid reason – and 2 extension marks for the development of this, up to a maximum of 4 marks. The rate of deforestation has fallen since 2004 (1) because of increased protection of the forests by the government (1). This means that clear felling has been banned in some areas (1) and loggers will face significant fines or imprisonment if they do not follow this (1). The rate of deforestation has fallen since 2004 (1) because of the increased importance of ecotourism (1). This means that jobs can be created without damaging the forest (1) which brings money into the local economy and means that fewer trees need to be cut down (1). **Accept any other appropriate response.**	(4)

Q3.

Question number	Answer	Mark
	Range = 14 443 Median = 7464	**(2)**

Q4.

Question number	Answer	Mark
	Abiotic refers to the non-living component of an ecosystem Reject living components. **Accept any other appropriate response**	**(1)**

Q5.

Question number	Indicative content
	AO2 (4 marks)/AO3 (4 marks) **AO2** • Deciduous woodlands are facing a range of natural and man-made threats resulting from climate change, urbanisation, population growth, timber extraction and agricultural change. • Uncontrolled and unchecked exploitation of deciduous woodlands can cause irreversible damage such as loss of biodiversity, soil erosion, flooding and climate change. • The sustainable use and management of deciduous woodlands is essential but requires careful planning. • For a management strategy to be judged 'sustainable', it will meet the needs of the local/national population without compromising the needs of future generations. • Land uses and strategies that are being used to manage deciduous woodlands can vary within a named region. • Sustainable activities in deciduous woodlands include 'pollarding' – a strategy used to encourage new trees to grow and species of birds to increase in number. • In some parts of the world, education has been used to ensure those involved in exploitation and management of deciduous woodlands understand the consequences of their actions. • In more developed parts of the word, monitoring via satellite technology and photography can be used to check that any activities taking place are legal and follow guidelines for sustainability.
	AO3 Evaluation will depend on specific case study but may include: • A country's level of development may influence the approach of management – crucially the extent to which it can be judged 'sustainable'. For example, in countries that are attempting to improve their level of development, they might not see any other option but to exploit its deciduous woodlands; the challenge is being able to do this in a sustainable manner. • Different approaches of managing deciduous woodland have different impacts on people and the environment; they are also different in the extent to which they can be judged 'sustainable'. • The scale of the area will have an impact on the type and success of a management approach; for example, in a small-scale deciduous woodland, management may involve some grassy areas left uncut to encourage wildlife like butterflies or recreational areas for biking and horse riding being marked out. This reduces damage to other areas of the forest.

Q6.

Question number	Answer	Mark
(i)	Award 1 mark for a cause of deforestation and a further 1 mark for explanation of this, up to a maximum of 2 marks. Trees are cut down for fuel/firewood (1) as demand rises due to population growth (1) The wood is used as timber for buildings (1) as rates of urbanisation increase (1) Land is cleared for recreation (1) as the leisure and tourism industry grows (1) Land is cleared for farming (1) as practices change in response to changing demands (1) **Accept any other appropriate response**	**(2)**

Question number	Answer	Mark
(ii)	Award 1 mark for the identification of the adaption and a further 1 mark for an explanation of the adaptation, up to a maximum of 4 marks. Leaves are broad/green (1) which allows them to capture sunlight/photosynthesis in summer (1) As temperatures drop, the tree cuts off the supply of water to the leaves (1) which allows them to survive during the winter months (1) In winter, trees shed their leaves (1) because it is too cold for the trees to protect their leaves from freezing (1) In winter, trees seal up the places where the leaves attach to the branch (1) which helps to conserve water that would be lost through transpiration (1) Before the leaves die, some of the food material they contain is drawn back into the twigs and branches where it is stored (1) which will be used to grow new leaves again in the following spring (1) Trees have thick bark (1) to protect them from cold winters (1) Reference to plants blooming at particular times of the year (1) prior to trees coming into leaf (1) **Accept any other appropriate response**	**(4)**

Question number	Answer	Mark
(iii)	Award 1 mark for a basic reason for a difference and further mark for the extension of this point up to maximum of 4 marks. **Seasonal variations** Deciduous woodlands are exposed to both warm and cold air masses during a year (1) which results in greater seasonal variations/four distinct seasons (1) **Temperature** Higher in TRFs because they are located nearer to the equator (1) where there is more direct sunlight hitting the land and sea (1) however deciduous woodlands have lower temperatures because they are found in higher latitudes further away from the Equator (1) where the sunlight is more dispersed (1) **Rainfall** Higher in TRFs because there are higher temperatures (1) which increases evaporation rates (1) and warmer air can hold more water vapour than the milder area in areas of deciduous woodland (1) **Accept any other appropriate response**	**(4)**

Q7.

Question number	Answer	Mark
	Award 1 mark for a point about a basic reason and a further 2 marks for expansion, up to a maximum of 3 marks. The litter store is very small because of the rapid decomposition of fallen plant material (1) which is caused by the hot/damp conditions (1) which are perfect conditions for decomposers (1). Hot and wet / humid conditions (1) leads to rapid decomposition (1) which means that nutrients are absorbed rapidly by plants (1). In areas where there are few trees (1) the high levels of rainfall during the year (1) can lead to the litter store being washed away (1) **Accept any other appropriate response.**	(3)

Q8.

Question number	Answer	Mark
	Award 1 mark for each identified method, and a further 1 mark for explanation, up to a maximum of 2 marks for each way. Sustainable farming/agriculture is used to grow food (1) which means that less new land needs to be cleared (1). Environmental education is provided (1) which helps children learn about the importance of protecting the rainforest (1). Ecotourism schemes are being set up (1) which bring in money while protecting the rainforest (1). Rainforest restoration schemes have been set up (1) which involve re-planting areas of forest (1). **Accept any other appropriate response.**	(4)

Q9.

Question number	Answer	Mark
(i)	Award 1 mark for each correct plot (2×1)	(2)

Question number	Answer	Mark
(ii)	Award 1 mark for a point about a basic reason and a further 1 mark for expansion, up to a maximum of 2 marks. The tropical rainforest biome is the oldest biome on Earth (1) and has had more time to develop a greater species diversity (1). The tropical rainforests are very old (1) so species have had time to adapt to the conditions (1). The tropical rainforest biome covers a very large area (1) which meant greater separation between species (1). Lack of seasonal variation in climate (1) means that the environment has been much less stressful for species (1). The high rainfall/ temperature (1) produces good conditions for growth (1). There are a variety of layers in the rainforest (1) which provides many different habitats (1). **Accept any other appropriate response.**	(2)

Q10.

Question number	Answer	Mark
	Award 1 mark for an economic cause, a further 1 mark for a link to deforestation and a further 1 mark for development, (up to a maximum of 3 marks. Mineral extraction (1) is one cause of the deforestation of the rainforest (1) leaving ground exposed to soil erosion (1). Commercial farming (1) is one cause of the deforestation of the rainforest (1) as it results in the clear felling of large areas for large cattle ranches and/ or plantations (1). Energy development (1) is one cause of the deforestation of the rainforest (1) leading to more rapid surface runoff (1). Road building (1) is one causes of the deforestation of the rainforest (1) as it allows roads to be built to access the resources of the rainforests (1). **Do not accept 'social' causes (e.g. population pressure/urbanisation), unless clearly linked to economic reasons as well.** **Must identify an economic cause for credit.** **Accept any other appropriate response.**	(3)

Q11.

Question number	Answer	Mark
(i)	Award 1 mark for the following, up to a maximum of 2 marks: Foodstuffs or specific examples (1) Medicines or chemical/genetic material for medicines (1) Timber/wood (1) Recreation or other cultural value (1) **Accept any other appropriate response.**	**(2)**

Question number	Answer	Mark
(ii)	Award 1 mark for identification of the adaptation and a further one mark for an explanation of the adaptation, up to a maximum of 4 marks. Drip tips (1) to remove excess water in conditions of over 2000mm of precipitation (1). Buttress roots (1) to stabilise the trees as they increase in height (1). Waxy leaves (1) to stop water infiltrating into leaf and rotting it (1). Tall straight tree trunks (1) to grow straight up towards the light to out compete other species (1). Epiphytes sink roots into a host plant (1) so they do not need to sink roots to the ground (1). **Accept any other appropriate response**	**(4)**

Question number	Answer	Mark
(iii)	Award 1 mark for identification of the difference and a further one mark for an explanation of this point, up to a maximum of 4 marks. **Biomass store** – bigger in TRF (1) as more nutrients are held in the vegetation because of the high biodiversity in the system (1) so there are more available nutrients (1), as there is more photosynthesis, meaning a greater amount of productivity (1). **Soil store** – smaller in TRF (1) – as the nutrient uptake is higher in TRF and there is greater amount of leaching due to more rainfall in TRF (1). **Litter store** – smaller in the TRF (1) as the rate of decomposition is much greater because of the high humidity (1). Arrows are generally larger in TRF as the rate of nutrient recycling is much faster between stores (1) due to climatic and biodiversity, meaning that transfer is more preferable in TRF (1). Accept comments based on different-sized stores/arrows in the temperate deciduous forest.	**(4)**

Question number	Indicative content
(iv)	**AO2 (4 marks)/AO3 (4 marks)** **AO2** • Climate change will have an impact on soil, temperature, rainfall, and weather events, which could threaten tropical rainforests' and deciduous woodlands' structure, function and biodiversity. • Tropical rainforest structure will be threatened by rising sea levels caused by climate change. • Tropical rainforest biodiversity could be threatened by animals migrating because they cannot adapt to the changing climate of their current habitat. • Deciduous woodland structure could be threatened by nutrient and moisture depletion in soils, leading to reduced tree growth. • Deciduous woodland biodiversity could be threatened, as increased numbers of pests are introduced into ecosystems through migration. **AO3** • Threats to tropical rainforests and deciduous woodlands are naturally similar, since climate change may bring an increase in temperature and a decrease in moisture, which will have common effects on vastly different ecosystems. • Attempts to mitigate against climate change threats, for example through sustainable management, can vary significantly for tropical rainforests and deciduous woodlands (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. • Climate change will not have the same impact everywhere (e.g. some areas may get colder/wetter rather than hotter), so the degree of threat is dependent on the impacts in the given area.