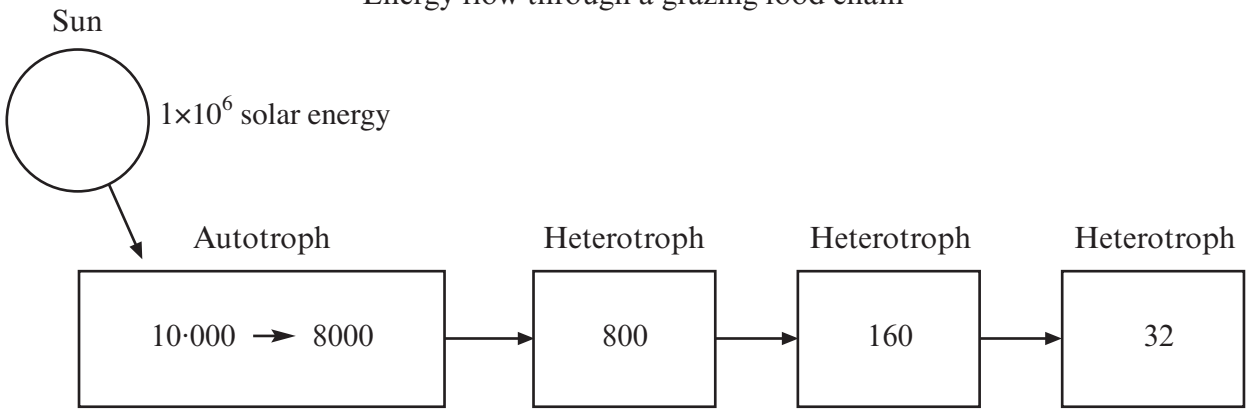
Examiner only

7. Answer **one** of the following questions.
Any diagrams included in your answer must be fully annotated.

Either, *(a)* Using the diagram below explain what is meant by the flow of energy through an ecosystem. Describe how energy is lost at each stage and comment on the efficiency of the transfer. Suggest reasons for any differences in efficiency which you may observe. [10]

Energy flow through a grazing food chain



Figures represent $kJm^{-2}yr^{-1}$

Examiner only

8. *(a)* Explain what is meant by the following terms:

(i) Succession [2]

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(ii) A climax community. [1]

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(b) Heather plants are small shrubs and are the dominant species in the climax community of some moorlands. The structure and shape of the heather plant changes as it ages. This results in changes in the species composition of the community. A large area of moorland was burnt leaving bare ground. The table shows four stages of succession in this area.

Time after burning/ years	Appearance of heather plant	Mean percentage cover of heather	Other plant species present
4		10	Many
12		90	Few
19		75	Several
24		30	Many

Explain why the number of other plant species decreases between 4 and 12 years after burning. [2]

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(c) The rate at which a heather plant produced new biomass was measured in g per kg of heather per year. As the plant aged the ratio of leaves to woody parts decreased. Use the information in the table to explain why. [3]

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(Total 8 marks)

Examiner only

9. Answer **one** of the following questions.
Any diagrams included in your answer must be fully annotated.

Either, *(a)* Define the terms conservation and extinction. Discuss the importance of the conservation of genetic sources. Describe steps conservationists have taken to prevent the extinction of endangered species. [10]

Examiner only

2. The Grand Banks is an area of sea off the coast of Newfoundland in Canada. It was once one of the most productive fishing grounds in the world for Atlantic cod.

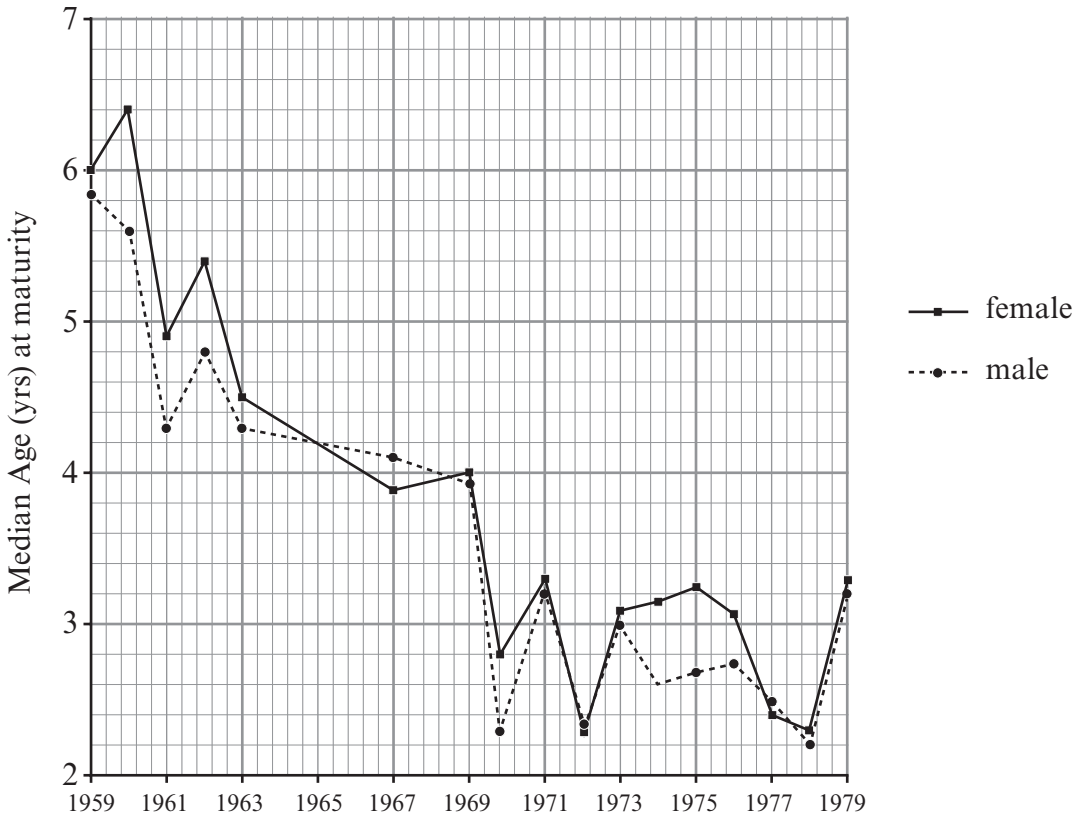
The cod was fished heavily for about 50 years.

About 60% of the total cod population of reproductive age was harvested annually.

Cod fishing in the Grand Banks was closed in 1992 but by then the population was less than 1% of what it had been.

Cod grow evenly throughout their life.

The cod that remained when fishing was finally closed were much smaller and grew more slowly than the cod that lived in the Grand Banks several decades previously.



Graph to show the median age of cod at sexual maturity in the same location during the time of heaviest fishing.

Examiner only

(a) (i) Use the information provided opposite and your own knowledge of natural selection to describe and explain how the phenotype of the cod has changed since 1960. [5]

(ii) The cod fisheries have been closed for nearly 20 years but there has been little change in the phenotype and no population recovery. Suggest why there has been little change in the phenotype and no population recovery. [3]

Turn over.

Examiner only

(b) Other than restricting the mesh size of nets, give **two** other methods which are used to prevent overfishing. [2]

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(c) (i) One solution to overfishing is aquaculture or fish farming.
Give **two** problems associated with producing fish in this way. [2]

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(ii) Wild trout are diploid **(2n)**. Some trout used in fish farming are triploid **(3n)**.
Suggest why triploid trout are infertile. [4]

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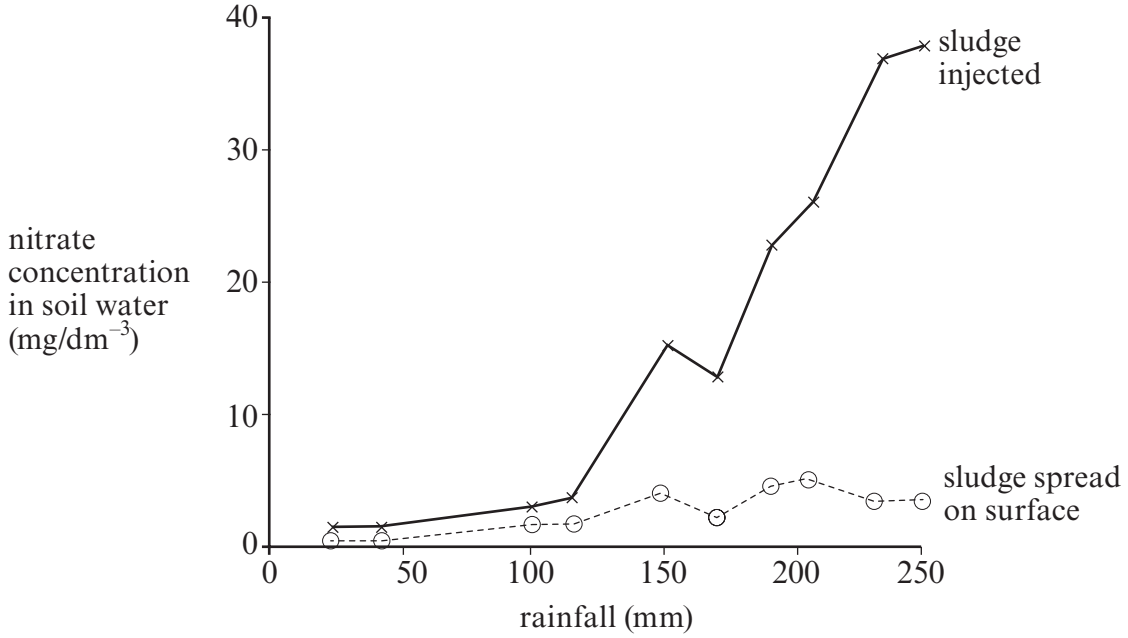
Examiner only

5. The treatment of sewage produces sludge as a product. This sludge contains high concentrations of nitrogen compounds such as nitrates and ammonia.

Experiments have been carried out into the leaching of nitrate from grassland to which sludge has been applied. The sludge was applied to two areas of grassland. On one area it was spread onto the surface whilst in the other it was injected at various points across the area.

The rate of leaching was measured by taking samples from the water flowing through the soil and measuring the concentration of nitrate in them after different volumes of rainfall had fallen.

The graph below shows the results obtained.



(a) (i) State **two** precautions that should be taken to ensure that the results are reliable. [2]

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(ii) Using the information in the graph describe fully the relationship between the leaching of nitrate and rainfall. [2]

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Examiner only

(iii) Using the data from the graph opposite, what advice would you give to a farmer as to the best time to apply sludge to the farmer's field for maximum benefit? [1]

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(b) The presence of high nitrate levels in rivers can lead to eutrophication. Briefly describe why eutrophication can result in the death of fish and many invertebrates in a river. [3]

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(c) Describe and explain what type of crops a farmer could grow to increase the nitrate level in the soil without using fertilisers, such as sludge. [3]

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Examiner only

6. *(a)* Explain what is meant by the term *gross primary productivity*. [1]

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(b) It has been found that an increase in temperature has a greater effect on the rate of respiration in a plant than on the rate of photosynthesis.
Using this information, explain what effect an increase in temperature has on the net primary productivity. [2]

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(c) (i) Give **two** ways by which energy is lost as it passes from one trophic level to the next. [2]

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(ii) Consumption efficiency is defined as the percentage of net production at one trophic level that is consumed by the next.
Suggest why the consumption efficiency of herbivores is much lower than that of carnivores. [2]

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(d) Tropical marine or tropical lake ecosystems generally have one or two more trophic levels than terrestrial ecosystems. Suggest **one** reason why this is the case. [1]

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Examiner only

6. *(a)* (i) Describe what is meant by the photosynthetic efficiency of a plant. [1]

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(ii) Distinguish between Gross Primary Production (GPP) and Net Primary Production (NPP). [1]

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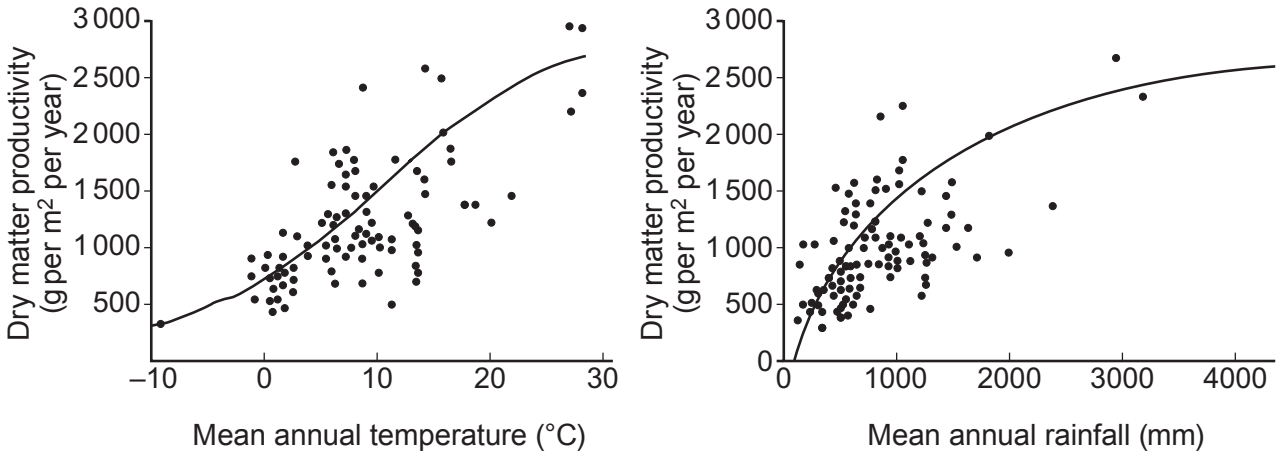
(b) The rate of Primary Production is called Primary Productivity. The graphs below show the effect of two environmental factors on Primary Productivity.



(i) Describe the relationship between productivity and the **two** abiotic factors shown. [1]

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(ii) Use this information to suggest why tropical rain forest is one of the most productive ecosystems in the world. [1]

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Examiner only

(c) Estimates of Net Primary Productivity for different types of ecosystem are given in the table below.

Type of Ecosystem	Average NPP (kJ/m^2/yr)
Tropical rain forest	35 280
Temperate forest	24 360
Northern coniferous forest	15 120
Woodland and shrubs	10 920
Lakes and streams	9 240
Agricultural crops	8 820
Desert	840

The average value for the solar energy striking the Earth's atmosphere is estimated at 4.41×10^7 kJ/m^2/yr.

The ecological efficiency of tropical rain forest is $(35\,280 \div 4.41 \times 10^7) \times 100 = 0.08$

(i) Calculate the ecological efficiency of agricultural crops. [2]

Answer .....

(ii) Calculate the loss in Net Production for one year, if an area of tropical rain forest the size of Wales (21 785 km^2) was cleared and used to grow sugar cane (an agricultural crop). [2]

Answer .....

Turn over.

Examiner only

(iii) Explain why keeping cattle on the cleared land would be less efficient than growing crops. [2]

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(iv) Suggest a negative impact on the Earth's atmosphere of keeping large numbers of cattle. [2]

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(v) Suggest why growing sugar cane for producing biofuels could be considered carbon neutral. [1]

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13

Examiner only

Answer **all** *questions.*

1. *(a)* Bananas are grown on large plantations in tropical regions such as South America, using monoculture production methods.

(i) Define the terms:

I. biodiversity; [1]

.....

.....

II. monoculture. [1]

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.....

(ii) Describe and explain the effects of banana production on biodiversity in South America. [2]

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(b) Multinational banana companies own plantations, sea transport, ripening facilities and distribution networks in countries where the bananas are consumed. The data below was published by one such company.

	Banana Carbon Footprint (Farm-to-Retail Distribution Centre) /kg	
	USA	Europe
Per box (18kg)	18	24

(i) Define the term *'carbon footprint'*. [1]

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(ii) Explain the difference in the values for USA and the values for Europe. [2]

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Examiner only

(c) In an attempt to reduce their carbon footprint for their USA operation, the company switched to transporting the bananas part of the way by rail, instead of taking them the whole way by truck.

(i) Explain why this would reduce the carbon footprint. [2]

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(ii) How would this change benefit the environment? [1]

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1075 010003

Turn over.

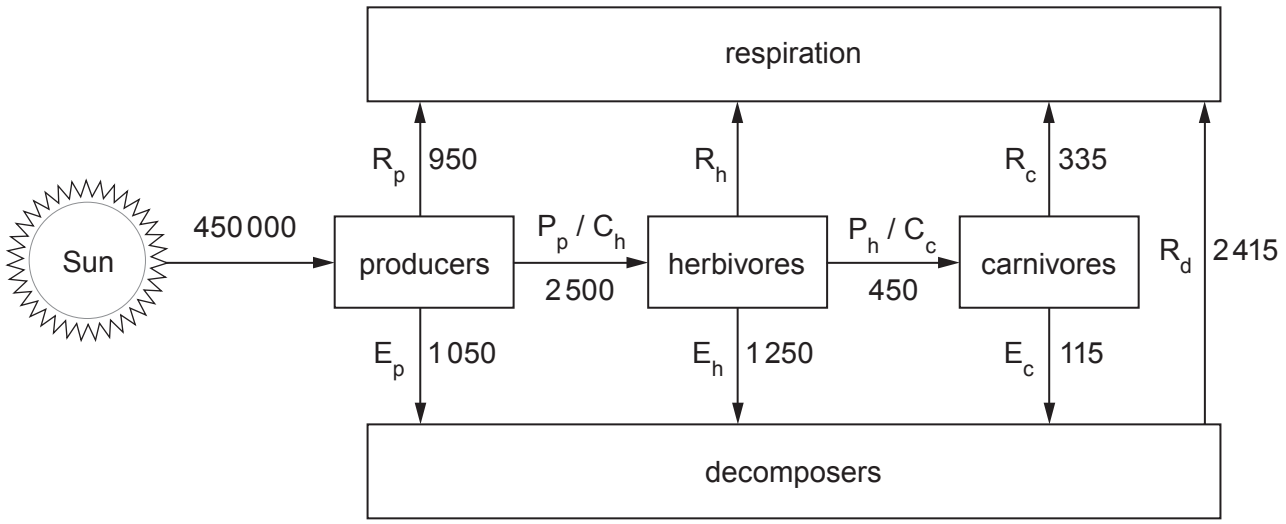
Examiner only

5. The diagram below shows energy transfer through a model ecosystem, where,

C = consumption, P = production, R = respiration, E = death, faeces or urine;

subscripts indicate the feeding group $_p$ = producers, $_h$ = herbivores, $_c$ = carnivores, $_d$ = decomposers,

e.g. C_h = consumption in herbivores.



(a) (i) Define the term *trophic level*. [1]

.....

(ii) Using appropriate letters from the diagram write an equation to represent energy transfer through the herbivores. [1]

(b) The numbers in the diagram represent energy transfer over a given area of ecosystem in a given time.

(i) Suggest suitable units for the values. [1]

.....

Examiner only

(ii) Calculate the following:

I. the photosynthetic efficiency of the producers. [2]

photosynthetic efficiency = ...

II. R_h [2]

R_h = ...

(c) The model assumes that **all** of the biomass produced by one group is transferred to the next group in the food chain. This might not be true in natural ecosystems.

(i) Suggest why this assumption is **not** likely to be true in a woodland ecosystem. [2]

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(ii) State the assumption the model makes about the dead organic material that the decomposers receive. [1]

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(iii) Conditions in peat bogs are acidic. Describe and explain how this will affect the rate of decomposition. [2]

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(iv) Explain whether the assumption the model makes about the dead organic material that the decomposers receive is likely to be true in peat bogs. [1]

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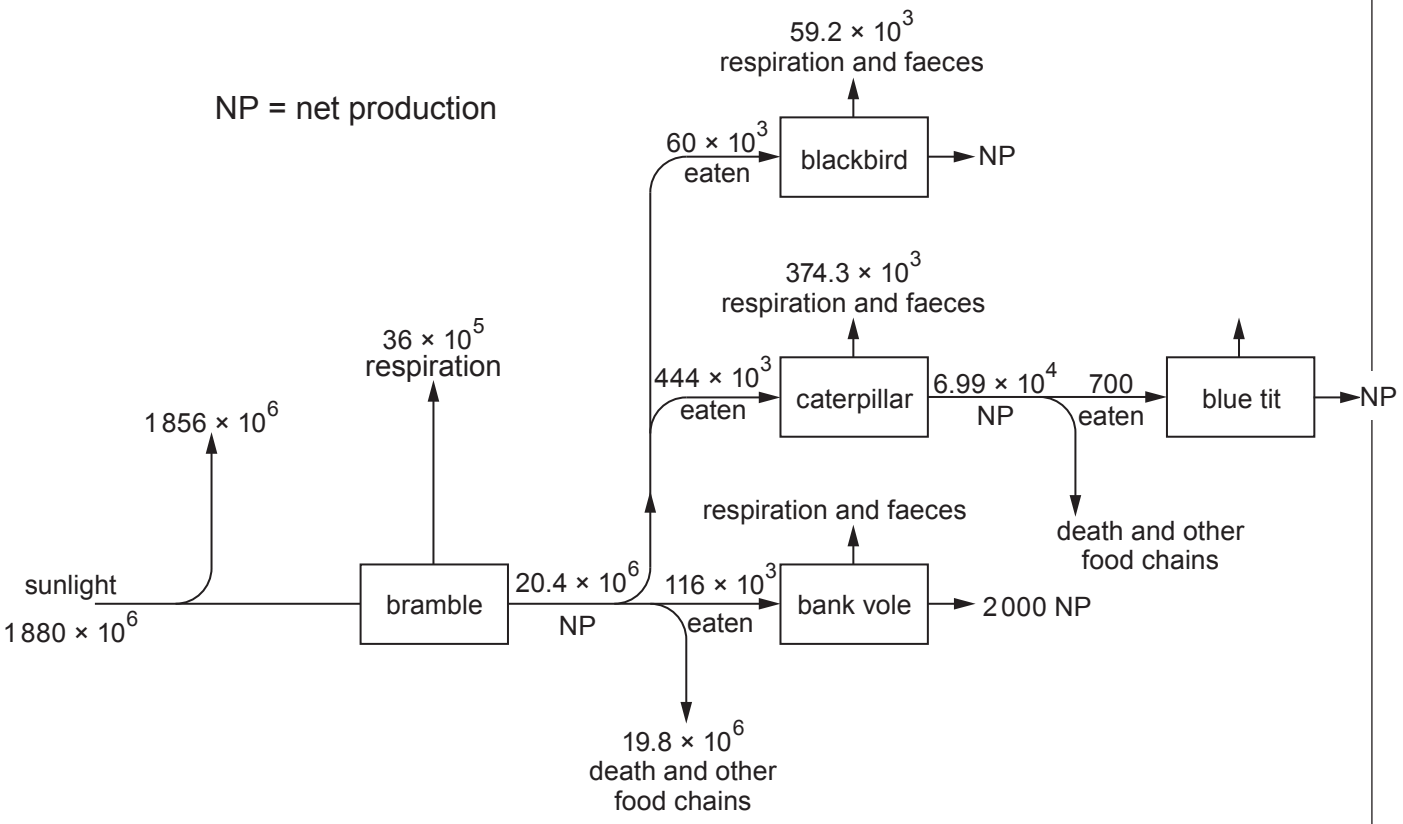
Examiner only

2. The diagram below shows the energy flow in a **small portion** of a woodland ecosystem. Figures are given in $kJ\,m^{-2}\,yr^{-1}$.



(a) Which of the organisms are:

(i) autotrophic; [1]

.....

(ii) secondary consumers? [1]

.....

Examiner only

(b) Calculate the following values:

(i) the gross primary production of brambles; [2]

gross primary production of brambles = ... $kJ\,m^{-2}\,yr^{-1}$

(ii) the net production of blackbirds; [2]

net production of blackbirds = ... $kJ\,m^{-2}\,yr^{-1}$

(iii) how much energy is lost via respiration and faeces by bank voles. [2]

energy lost = ... $kJ\,m^{-2}\,yr^{-1}$

8

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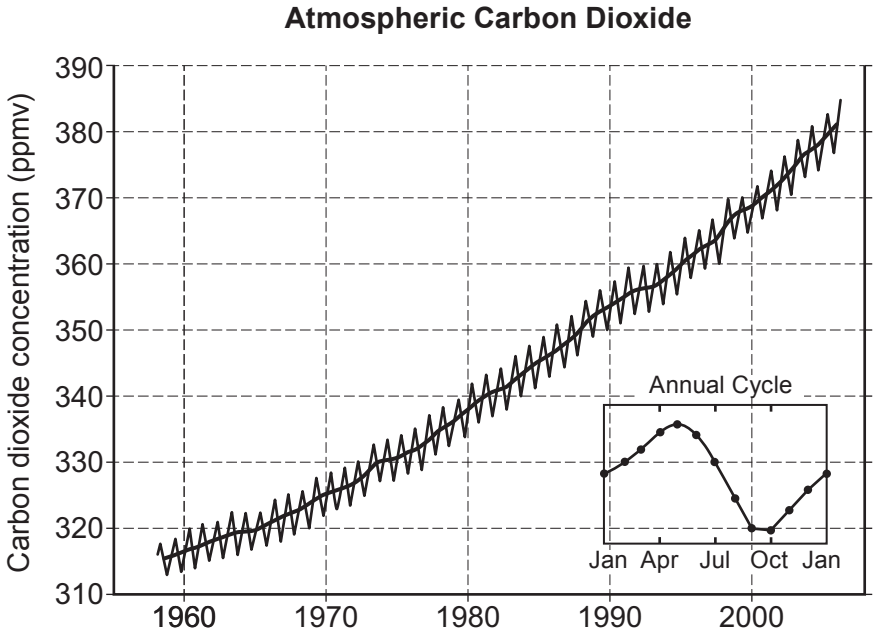
Turn over.

Examiner only

3. There is currently great concern about the concentration of carbon dioxide in the atmosphere. The graph below shows the results of measurements taken at one location in the USA.



(a) (i) Describe the trend over the years 1960 to 2000 shown in the graph. [1]

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(ii) The location is heavily forested. Explain how this might account for the annual cycle shown in the insert. [2]

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Most scientists agree that forest management can affect the atmospheric carbon dioxide level but there is disagreement about the best methods to manage forests in order to counteract the effects of climate change.

(b) Briefly explain the link between atmospheric carbon dioxide concentration and climate change. [2]

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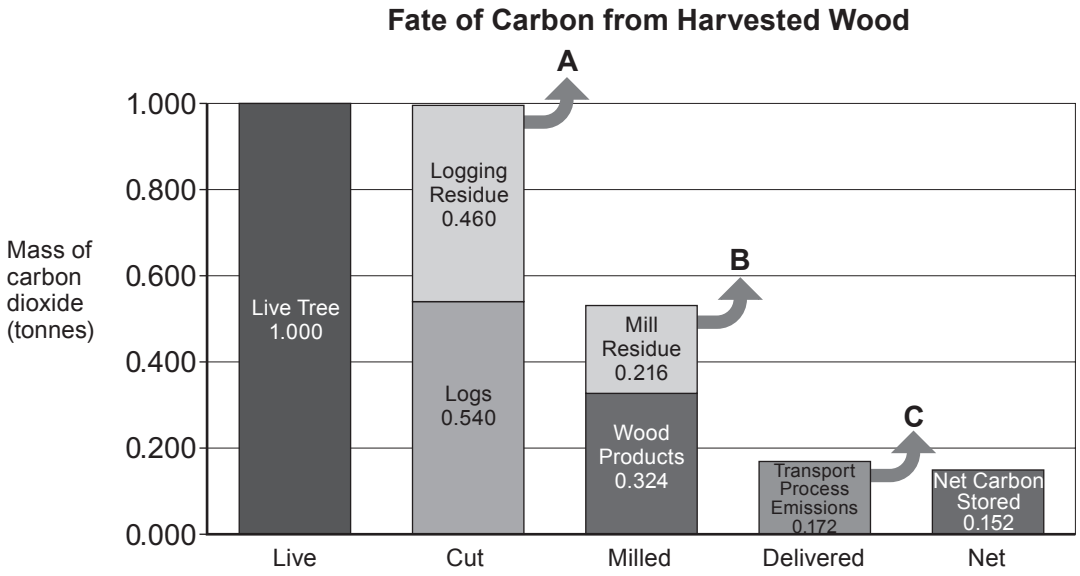
Examiner only

One group suggests that the best way to store the carbon fixed by forests is to harvest the trees and store it in wood products. The diagram below shows the fate of carbon atoms at each stage.



Data from Smith et al. 2006 and Gower et al. 2006.

Logging residue consists of stumps as well as thin branches and twigs at the tops of the trees. Mill residue consists of bark, shavings and strips of wood too thin to use.

(c) Calculate the percentage of carbon from a live tree which is stored in milled wood products. [2]

percentage of carbon = ... %

(d) Arrows **A**, **B** and **C** represent carbon returned to the atmosphere.

(i) Explain how the carbon would be returned to the atmosphere in **A** and **B**. [1]

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(ii) Explain why the net carbon stored is less than that stored in the milled wood products. [1]

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1075 0100007

Turn over.

Examiner only

8.

Any diagrams included in your answer must be fully annotated.

(b) (i) Explain what is meant by primary and secondary succession and describe how succession affects communities. [7]

(ii) Explain how human activity can impact upon ecological succession. [3]

Question			Mark Scheme
7	(a)	A = Energy (in form of organic mols) passing from one trophic level to another. (not: through food chain/between consumers) B = Photosynthesis/light energy to chemical energy. C + D = Energy loss, not all wavelengths of light absorbed/some reflected/transmitted; Latent heat of evaporation; Loss as heat/ by radiation/convection. (Any 2 marks from 3 for C + D energy loss from plant) E = Loss of energy from plant by respiration. F = Ref NPP <u>and</u> GPP. G = Calc of efficiency = 1% or 0.8% H = some parts of plant not eaten / enter decomposition pathway. I = Respiratory loss by consumers/heterotrophs. J + K = Examples of what energy produced by respiration used for. 2 Examples from movement/anabolic / catabolic reactions/ maintaining temp/active transport. l = Consumers lose energy by egestion/ref. cellulose not digested. M = Consumers lose energy by excretion. O = Secondary and tertiary consumers more efficient than primary consumer/ Calc primary to secondary or secondary to tertiary (comparison 10% to 20%). P = reason for difference in efficiency – more egested waste in primary consumers	**10 MARKS**

Question			Marking details	Marks Available
8.	(a)	(i)	• Change in structure in a <u>community</u> over time; • Change in {composition of species / species present} (in a community) over time; • Either due to change in environmental / (named) abiotic factors;	2
		(ii)	A stable community which {undergoes no further change / reached equilibrium} / no further succession;	1
	(b)		• (Increased) interspecific competition / other plant species compete with heather / heather outcompetes other plant species; • For light / nutrients / minerals / named nutrient / water (linked to competition); Reject resources unqualified.	2
	(c)		• More energy used in respiration; • Higher respiration relative to {photosynthesis / GPP} / NPP decreases; • {Fewer leaves / less surface area} for photosynthesis; • Less energy / glucose to {produce new biomass / for growth / synthesis of protein or named compound}; • (Heather increases in size / ages / more competition from other species) soil fertility decreases / less minerals or nutrients available / greater competition for named resources; • Growth rate decreases / fewer leaves produced; • (As heather increases in size) less light penetrates the centre of the plant; • Loss of central leaves, (therefore woody parts increase); (Any 3 points)	3
			Question total	**8**

Question		Marking details		Marks Available
9	(a)	A	Extinction is the loss of species;	1
		B	Conservation is the <u>planned</u> preservation of wildlife / the {enhancement / maintenance} of biodiversity;	1
		C	To ensure the survival of the species;	1
		D	Conservation of existing <u>gene pools</u>;	1
		E	To conserve potentially useful {genes / genetic sources} (for future generations);	1
		F	Qualification / Example of E – resistance to disease or other;	1
		G	Use of plants / animals as a gene bank to cross with highly cultivated varieties;	1
		H	Conservation of <u>plants</u> with medicinal properties;	1
		I	(Planned) preservation of habitat, with example – wetlands, coral reef, sand dune;	1
		J	Seed / sperm banks;	1
		K	Re-introduction programmes, e.g. Red Kite;	1
		L	Protection / breeding of endangered species in specialised zoos / captive breeding programmes / rare breeds;	1
		M	Trade restrictions on endangered species / reference to CITES / ivory / whaling;	1
		N	Relevant reference to NGOs {e.g. WWFN / government agency / CCW / SSSI / National Parks / nature reserves} / ecotourism / education;	1
		O	Correct reference to relevant <u>legislation</u> e.g. to prevent over-grazing / over-fishing / hunting / poaching in context / collecting birds eggs / picking wild flowers / collecting plants;	1
			Question total	**10**

Question			Marking details	Marks Available
2.	(a)	(i)	A. <u>Variation</u> in age at which sexual maturity is reached; B. Caused by mutation; C. Reach sexual maturity earlier/ Small fish {have a selective advantage/ pass through net}/ ora; D. Breed/ reproduce; *reject mate* E. Pass on alleles to offspring; *reject genes* F. Allele frequency for earlier maturity / hence small size at maturity increases; G. Figs quoted from graph (in context);	Max 5
		(ii)	Very few large cod survived/ ORA; *reject none* reduced gene pool; {No/ little} mutation (to increase size) / insufficient time for genetic drift (to increase size) / No gene flow from another gene pool; Small fish produce less gametes/ difficulty in breeding/ few fish remain to reproduce/ reproductive isolation; Not enough food/ increased competition for food/ increased predation/ disease; Change in {temperature/ pH}/ pollution;	Max 3
	(b)		Restricted fishing times/ hours; Quotas/ licenses; Exclusion zones/ OWTTE; Limiting numbers of fishing vessels/ international agreements limiting catches; Limiting season; Restriction of <u>area</u> of nets; Closing spawning and/ or nursery areas; *REJECT any reference to mesh size*	2

Question			Marking details	Marks Available
	(c)	(i)	Eutrophication/ pollution; {Disease/ parasites} more likely (to spread) in {cultivated fish/ overcrowded conditions}/ disease may spread to wild fish; {Antibiotics/ pesticides} qualified e.g. can harm other marine organisms/ bioaccumulation of pesticides/ enters food chain/ high cost; Problems associated with flow of alleles into wild population; Higher level of dioxins/ PCBs in farmed fish;	2
		(ii)	Three of each type of chromosome / {odd/uneven} number of chromosomes/ unpaired chromosomes; No pairing of homologous chromosomes/ no bivalent formed; Prophase 1 meiosis; Meiosis does not take place; No gametes produced; **Question 2 total**	Max 4 **[16]**

Question			Marking details	Marks Available
5.	(a)	(i)	repeat experiments; Same area of grassland used for each test/ Same grass covering/ sludge injected to same depth/ Same {volume / mass/ concentration} of sludge/ same sludge applied/ Same soil {type/ gradient/ aspect/ exposure}/ same soil nitrate concentration/ same time of year; NOT temperature/ pH	2
		(ii)	increase in rainfall increases {leaching/ nitrate concentration in soil water}; greater effect on injected sludge with increased rainfall/ ORA; only a small effect at low rainfall;	2 max
		(iii)	apply (to surface) when {dry / little rainfall/ rainfall is less than [any figure less than 120]};	1
	(b)		Algal growth/ algal bloom/ overgrowth of plant; Less light, so {algae/ plants} die; {Bacteria/ saprobionts/ saprotrophs/ fungi} decompose {plants/ organic material} (and increase in number); (Reject decomposers) Using up oxygen in respiration;	3 max
	(c)		Leguminous plants/ any named leguminous plant; Rhizobium/ nitrogen fixing bacteria (in root nodules); *Reject nitrate fixing Azotobacter* Convert nitrogen (gas) into ammonium/ ammonia/ amino acids; Plants {left to decay/ ploughed in}; **Question 5 Total**	3 **[11]**

Question			Marking details	Marks Available
6.	(a)		Rate of Conversion of light energy into chemical energy (by producers /by photosynthesis); *Accept rate at which {products/ organic materials} are formed/ produced*	1
	(b)		(net primary production) decreases; More {carbohydrate/ glucose} is {broken down/ used by} respiration (than is produced by photosynthesis);	2
	(c)	(i)	(heat lost in) respiration; Excretion; egestion/not all parts of the material are digestible; not all parts eaten;	Max 2
		(ii)	Herbivores: {difficult to digest/ less efficient at digesting} cellulose/ have more {indigestible/ fibrous} material (in diet)/ ; *Reject cannot digest cellulose* Carnivores:{easily digest/ more efficient at digesting } {protein/ fat}; More {<u>egested</u> material/ faeces} (lost) by herbivores/ less {<u>egested</u> material/ faeces} lost by carnivores;	Max 2
	(d)		Productivity of producers higher/ primary productivity higher; Secondary productivity higher/ more energy stored in consumers; {Less energy {used/wasted} /respiratory rate is lower} + qualification eg.in cold blooded animals/ buoyancy; Higher {temperature/ light} higher rate of photosynthesis;	Max 1
			Question 6 Total	**[8]**

			Marking details	Marks Available
6	*(a)*	(i)	(Photosynthetic efficiency is a measure of) how well a plant is able to {capture/convert} light energy (and convert to biomass / chemical energy / product) / the percentage of light captured by the plant; NOT rate	1
		(ii)	Gross is the total {energy / CO_2} {transferred / fixed by plant}, net is total energy minus the energy lost in plant respiration / NPP=GPP-{Respiration / R};	1
	(b)	(i)	The higher the temperature the higher the {NPP / dry matter productivity} **and** The higher the rainfall the higher the {NPP / dry matter productivity};	1
		(ii)	Rainforest have high temperature and rainfall;	1
	(c)	(i)	(8820÷44100000)x100; = 0.02(%); Correct answer = 2 marks	2
		(ii)	(35280 – 8820) = 26460 = 2.6×10^4 [tropical – agricultural crops] $(2.6 \times 10^4) \times (2.1785 \times 10^4) = 5.8 \times 10^8$ [multiply by area of Wales (km^2)] $(5.8 \times 10^8) \times 10^6 = 5.8 \times 10^{14}$ [convert to m^2] Correct answer = 2 marks 57643110 / $5.8 \times 10^?$ = 1 mark	2
		(iii)	• Energy is lost in transfer to {next trophic level / description of e.g. plants to cow}; • to respiration of herbivores / movement / keeping warm / excretory products / not all plant {eaten / digested};	2
		(iv)	• (Cattle produce) {Methane / carbon dioxide} / deforestation occurs so less carbon dioxide absorbed in photosynthesis / the burning of the cut trees produces carbon dioxide; • reference to greenhouse {effect / gas}; NOT global warming	2
		(v)	Burning the biofuel increases carbon dioxide in the air **and** photosynthesis removes carbon dioxide (during growth);	1
			Question 6 total	**[13]**

GCE BIOLOGY - BY5

SUMMER 2016 MARK SCHEME

Question			Marking details	Marks Available
1	(a)	(i)	I (Biodiversity is) the {variety/ number of} <u>species</u> on {earth/in an ecosystem/ in an area}; NOT variation	1
			II (monoculture is) {growing/planting/producing} one {species/ plant/crop} (in large area);	1
		(ii)	reduces (bio)diversity; {destroys/takes up/reduces} habitat/deforestation or description of; Accept reference to interspecific competition/effect on food web	2
	(b)	(i)	the {mass/amount/volume/level} of carbon (dioxide) attributable to the actions of an {individual / product/ service} over a period of {time/ one year/lifetime}/ total CO_2 released in the production of bananas from field to shelf;	1
		(ii)	Greater distance to transport the bananas; ORA vehicles {burn/use} more fuel; ORA	2
	(c)	(i)	Any two from: • One train carries more bananas than a truck; • trains take a more direct route; • less fuel burnt; • trains could use renewable electricity;	2
		(ii)	Less Greenhouse {effect/gases} / less CO_2 / global warming / climate change; NOT ref to ozone/ prevent global warming	1
			Question 1 total	**[10]**

Question			Marking details	Marks Available
5				
	(a)	(i)	Position in a food chain; Accept feeding level	1
		(ii)	$C_h=R_h + E_h +P_h$ / $P_h= C_h- R_h - E_h$ / $P_h= C_h- (R_h + E_h)$; Accept P_p for C_h Accept C_c for P_h	1
	(b)	(i)	$kJ\,m^{-2}\,week^{-1}$/ $kJhectare^{-1}year^{-1}$ [any energy unit / area unit/time unit] (allow / or per or $^{-1}$)	1
		(ii)	I $\frac{(950+2500+1050)}{450000} \times 100 = 1.0$**%** 2 for correct answer 1 if correct workings wrong answer or no units	2
			II 2500-1250-450 = 800 2 for correct answer, 1 if correct workings wrong answer	2
	(c)	(i)	(Biomass of producers includes) {wood/ cellulose/ligno-cellulose}/biomass includes {bones/teeth/fur}; Which is inedible/ not {eaten/digested} by herbivores;	2
		(ii)	**All** (of the dead organic material) is {broken down/ digested/ used in respiration/ owtte}.	1
		(iii)	Rate of decomposition will be less/owtte; (Acidic conditions) {prevent/slow} growth of bacteria and fungi/ {inactivate/ denature/away from optimum pH} enzymes; Accept: rate of decomposition will increase because the enzymes have low optimum pH = 2 marks	2
		(iv)	**No,** because not all of the dead organic matter is {decomposed/ broken down} / owtte;	1
			Question 5 Total	**[13]**

Question			Marking details	Marks Available
2	*(a)*	(i)	Brambles;	1
		(ii)	Blue tits;	1
	(b)	(i)	$20.4 \times 10^{6} + 36 \times 10^{5}$; 24×10^{6}/ 24 000 000;	2
		(ii)	$60 \times 10^{3} - 59.2 \times 10^{3}$; 800/ 8×10^{2};	2
		(iii)	116×10^{3} -2000; $=1.14 \times 10^{5}$/ 114×10^{3}/ 114 000/ 11.4×10^{4};	2
			Question 2 Total	**8**

Question			Marking details	Marks Available
3	*(a)*	(i)	CO_2 concentration increasing (with time);	1
		(ii)	Decreases Apr/ May trees photosynthesise; Increases Oct {trees lose leaves/ less growth}; NOT reference to cutting down trees/ trees dying	2
	(b)		CO_2 layer does not allow heat out/ correct reference to wavelengths of light; NOT absorbs more heat Leads {to increasing temperature/ global warming}; Not planet	2
	(c)		0.324/1 x 100; 32.4%; 2 for correct answer, 1 for correct workings wrong answer	2
	(d)	(i)	Decay/ combustion/ action of decomposers;	1
		(ii)	CO_2 is produced by burning (fossil) fuels in lorries/ trains etc/ carbon footprint qualified;	1
			Question 3 total	**9**

Question			Marking details	Marks Available
8	*(b)*			
		A	Succession is the change in structure and species composition of a community overtime;	
		B	The different stages in a succession when particular communities dominate are known as seres;	
		C	reaches a climax of succession known as the climax community;	
		D	{species diversity/ biodiversity} increases;	
		E	as does the stability of the community;	
		F	Primary succession refers to the introduction of plants/ animals into areas that have not previously been colonised;	
		G	Suitable example in general terms - bare rock to grassland to scrub to woodland /sand dune succession	
		H	secondary succession refers to the (reintroduction of organisms into) a bare habitat previously occupied by plant and animals	
		I	Suitable example e.g. following (forest) fire / logging	
		J	Specific reference to named plants in seres e.g. grasses/ shrubs/ trees. for either 1^{o} or 2^{o}	
		K	Human activities: {grazing /mowing} arrests succession at grassland (sere) NOT [deforestation/ habitat destruction} unqualified	
		L	Burning gorse/ heathland management arrests succession (at scrub (sere))	
		M	{Forest management / logging/ slash and burn/ coppicing} starts new secondary succession	
		N	Intensive agriculture/ monoculture prevents succession	
		O	Plagioclimax/ deflected succession/ AVP	
			Question 8 Total	**10**