FOR OFFICIAL USE

Total for Sections A and B

X055/301

NATIONAL QUALIFICATIONS 2010

WEDNESDAY, 9 JUNE
1.00 PM – 3.30 PM

MANAGING ENVIRONMENTAL RESOURCES
HIGHER

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

Scottish candidate number

Number of seat

1. (a) All questions should be attempted.
   (b) It should be noted that in **Section B** questions 8 and 9 each contain a choice.
2. The questions may be answered in any order but all answers are to be written in the spaces provided in this answer book, and must be written clearly and legibly in ink.
3. Additional space for answers will be found at the end of the book. If further space is required, supplementary sheets may be obtained from the Invigilator and should be inserted inside the **front** cover of this book.
4. The numbers of questions must be clearly inserted with any answers written in the additional space.
5. Rough work, if any should be necessary, should be written in this book and then scored through when the fair copy has been written.
6. Before leaving the examination room you must give this book to the Invigilator. If you do not, you may lose all the marks for this paper.

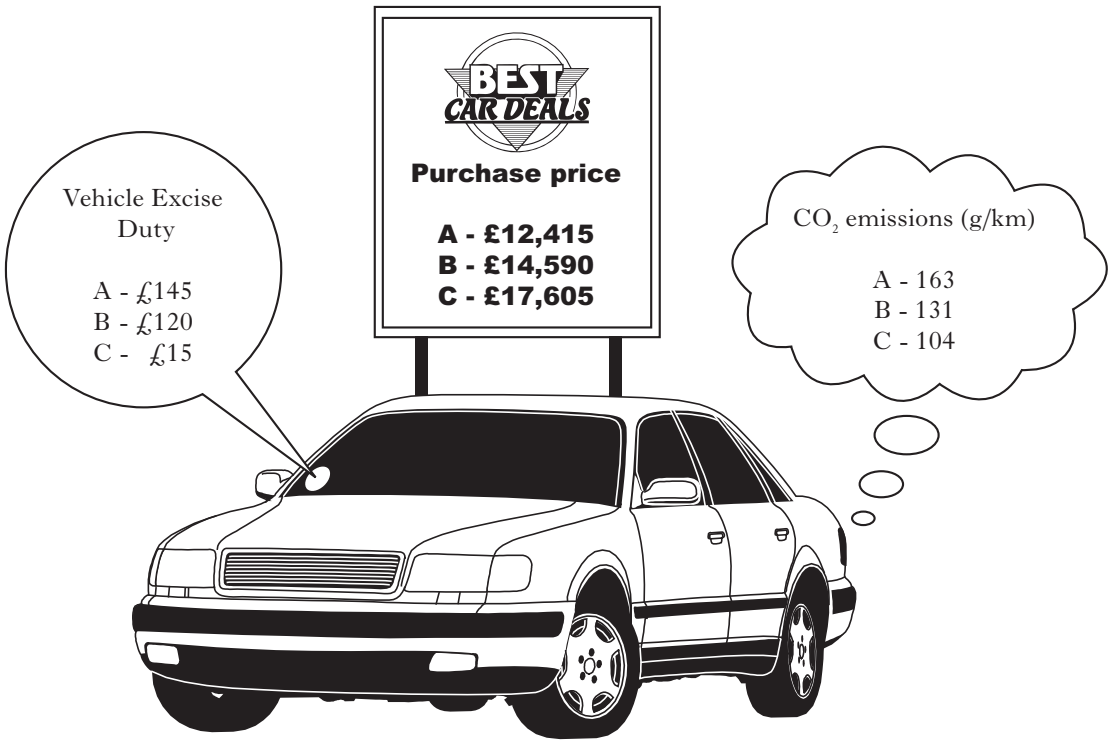
Marks

SECTION A

Answer ALL questions in this section.

1. (*a*) The diagram below shows the purchase price, Vehicle Excise Duty (Road Tax) and carbon dioxide (CO_2) emissions of three different types of car:

A petrol;
B diesel;
C hybrid.



(i) Select the car type which would cause the least damage to the environment and justify your selection.

Car type _____

Justification _____

_____ **1**

(ii) Name the type of assessment process which would be carried out to determine the full environmental impact of a new car type.

_____ **1**

(iii) The UK Government uses Vehicle Excise Duty to promote sustainability. Name **one** other piece of legislation that promotes sustainability.

_____ **1**

Marks

1. (continued)

(*b*) There are initiatives to reduce car use at national, local and personal level.

(i) Name **one** initiative at local level.

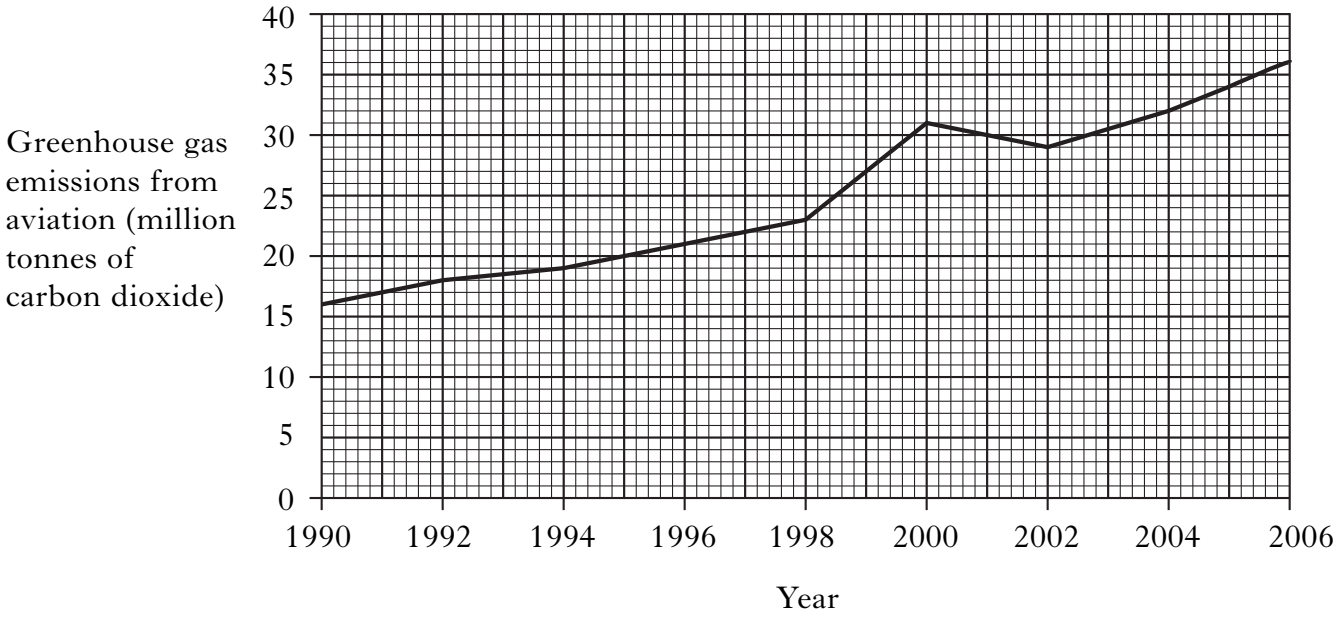
_____ **1**

(ii) Give **two** initiatives at personal level.

1 _____

2 _____ **1**

(*c*) The graph below shows the change in emissions of greenhouse gases from aviation between 1990 and 2006.



(i) Calculate the increase in greenhouse gas emissions from aviation between 1990 and 2006?

Space for calculation

_____ million tonnes of carbon dioxide **1**

Marks

1. (*c*) (continued)

(ii) Describe and explain the trend shown in the graph.

_____

_____

_____

_____ **2**

(iii) Carbon offsetting is a method of helping to reduce the greenhouse gas levels in the atmosphere. One way in which this is achieved is by planting trees.

Predict the effect on greenhouse gas levels if more people were to use carbon offsetting when travelling by air.

Circle your choice and give a reason for your answer.

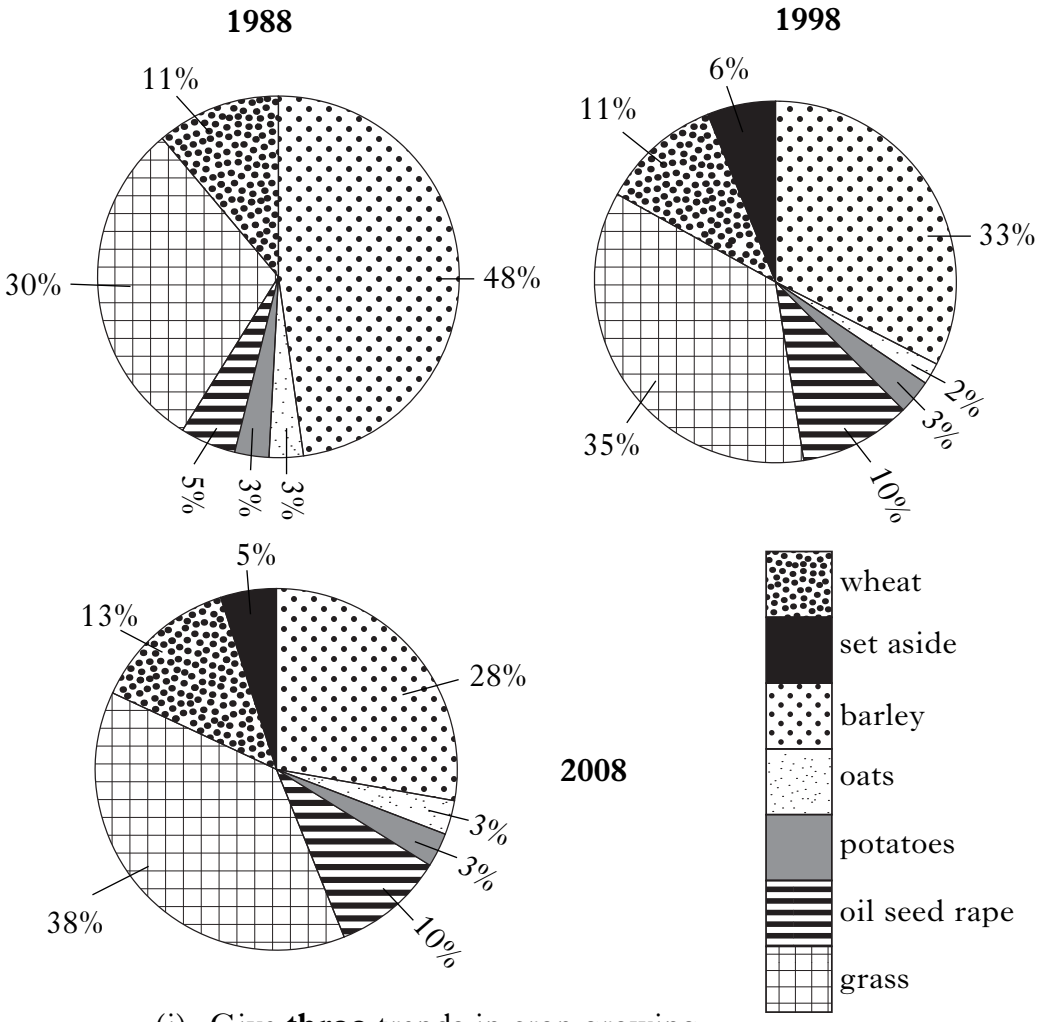
Greenhouse gas levels would increase / decrease / stay the same.

Reason _____

_____ **1**

[Turn over for Question 2 on *Page six*

2. (*a*) The pie charts below show the changes in use of agricultural land (%) in an area of eastern Scotland over two decades. *Marks*



(i) Give **three** trends in crop growing.

1 _____

2 _____

3 _____ **1**

(ii) Oilseed rape can be converted to a biofuel.

1 Give **one** reason why the agricultural land used for growing this crop doubled between 1988 and 1998.

_____ **1**

2 Name any other crop which can be converted to biofuel.

_____ **1**

(iii) Explain **one** environmental benefit of set aside as an agricultural land use.

_____

_____ **1**

Marks

2. (continued)

(*b*) Read the information below and answer the questions that follow.

Intensive cereal farming — the facts

- The cycle for growing cereals involves cultivating, sowing, monitoring growth, harvesting and re-cultivating for the next crop
- The length of the growing season is dependent on the soil temperature and day length
- Cereals require the addition of artificial fertiliser for growth
- The use of fungicides helps to control the growth of moulds and other fungi
- Soil moisture content must be low enough at harvesting to support the weight of farm machinery
- Underground drainage pipes are installed in fields to drain away excess winter rainfall.

(i) Name **two** natural resources on which intensive cereal growing depends.

_____ and _____ **1**

(ii) Name the natural resource from which artificial fertilisers are made.

_____ **1**

(iii) At which stage in the cycle for growing cereals should fungicide be added? Give a reason for your choice.

Stage in cycle _____

Reason _____

_____ **1**

(iv) Describe and explain **one** effect that a very wet summer will have on a cereal crop's growing cycle.

_____

_____

_____ **1**

[Turn over

Marks

2. (continued)

(*c*) Some rivers flowing through agricultural land are designated as Nutrient Sensitive Areas (NSAs).

Underline **one** statement below that best describes the impact of intensive agricultural practices on a river ecosystem.

Increase in agricultural leachate causes an increase in biodiversity.

Increase in agricultural leachate causes a decrease in biodiversity.

Decrease in agricultural leachate causes an increase in biodiversity.

Decrease in agricultural leachate causes a decrease in biodiversity. **1**

(*d*) Legislation based on the "polluter pays principle" applies to agricultural practices.

Describe **two** management practices a farmer should take to avoid incurring fines under this legislation.

_____

_____

_____ **1**

(*e*) Explain why organic methods of farming are considered to be sustainable.

_____

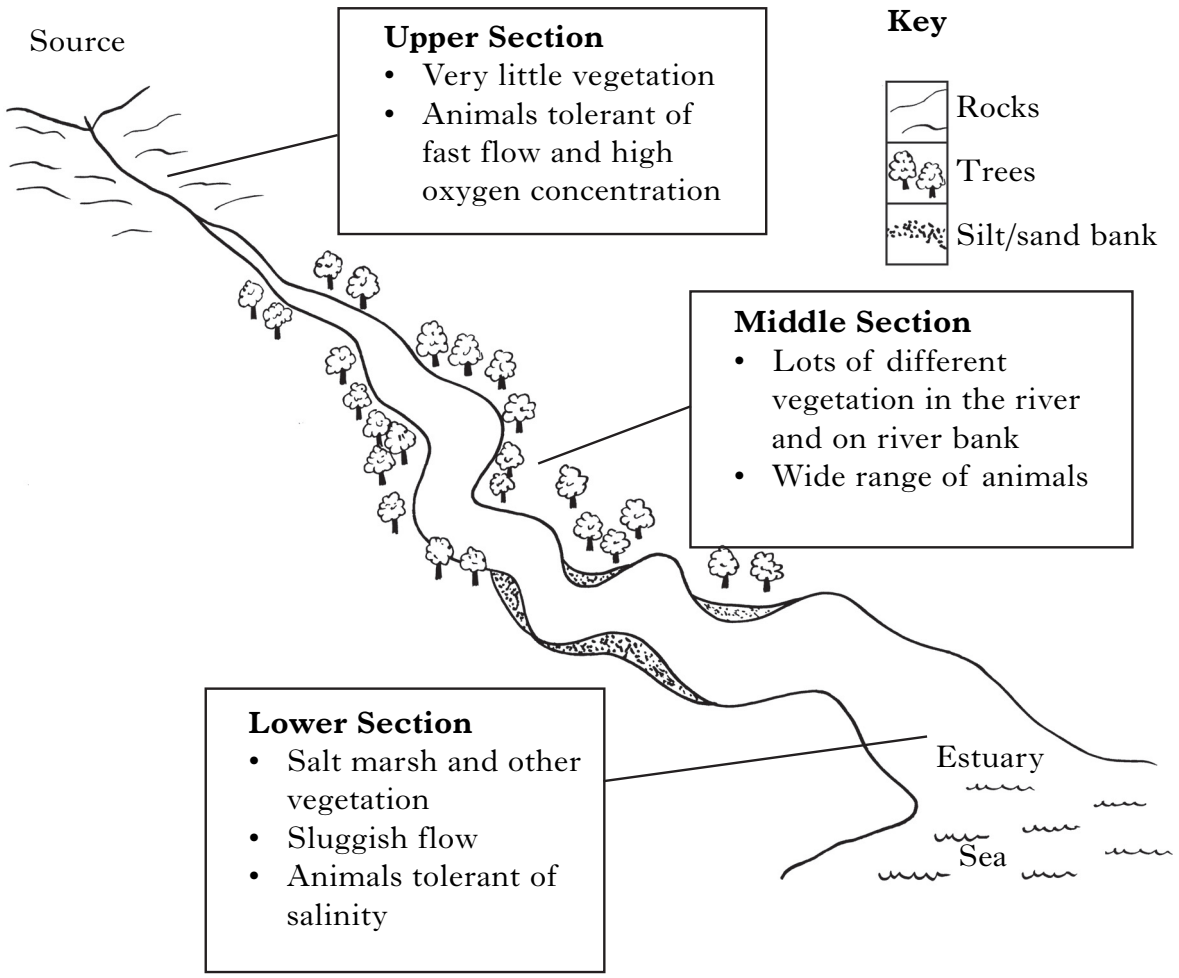
_____

_____

_____ **2**

Marks

3. (*a*) The diagram below shows a river from source to sea.



(i) Give **one** adaptation required by organisms found:

1 in the upper section of the river;

_____

2 in the lower section of the river.

_____ **1**

(ii) Explain how the flow rate in the middle section of the river could account for the increase in the number and variety of plant species.

_____

_____ **1**

[Turn over

Marks

3. (continued)

(*b*) A river may flood after very heavy rain. This can have damaging effects on the river community.

(i) Is flooding a density-dependent or a density-independent factor? Underline your choice and give a reason for your answer.

density-dependent density-independent

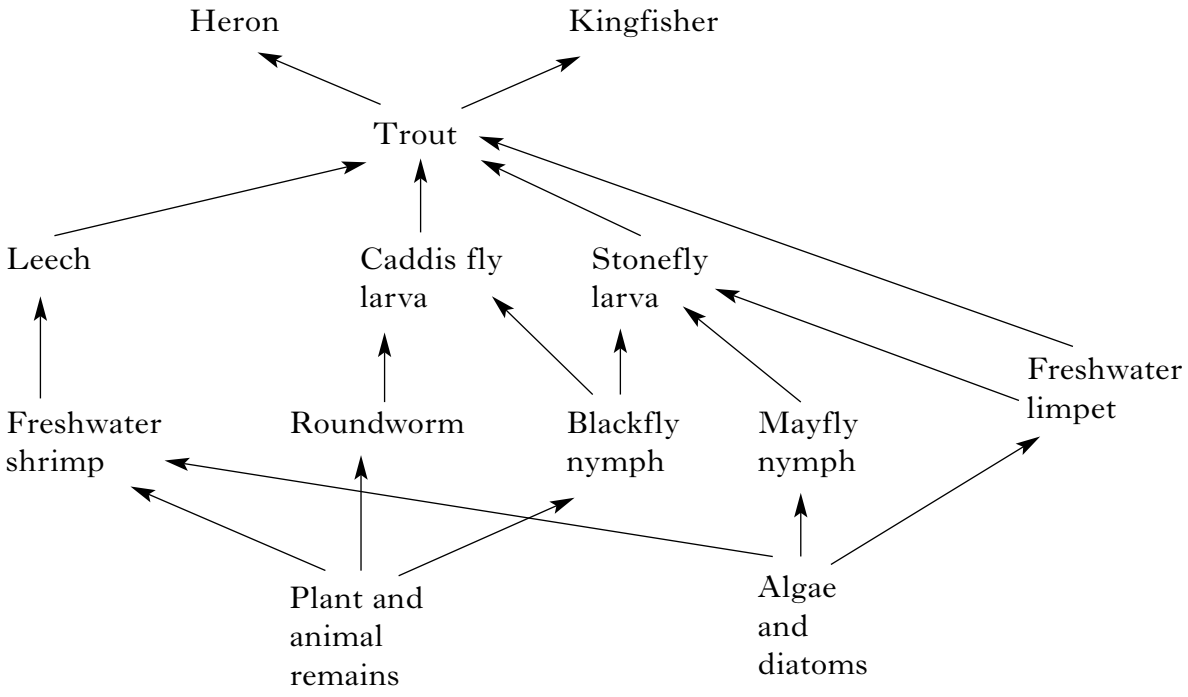
Reason _____

_____ **1**

(ii) Circle the biological term that describes how the number of organisms in a population are normally maintained at a steady level in an ecosystem by the action of density-dependent factors.

carrying capacity population dynamics homeostasis **1**

(*c*) The diagram below shows part of a food web from a section of a river.



Marks

3. (*c*) (continued)

Using information from the food web opposite, answer the following questions.

(i) Name **one** detritivore.

_____ **1**

(ii) Name all the organisms found at the third trophic level.

_____

_____ **1**

(iii) Compare the niche of the caddis fly larva with that of the stonefly larva.

1 _____

2 _____

3 _____ **2**

(iv) Draw a pyramid of biomass using five organisms selected from the food web.

1

(v) Give **two** ways in which energy can be lost from a food web.

_____ and _____ **1**

Marks

3. (continued)

(*d*) Freshwater invertebrates can be used as indicator species. What is an indicator species?

_____ **1**

(*e*) In spring 2009, European Beavers were re-introduced into two water catchment areas of Scotland. Beavers:

- live in broad-leaved, riparian (river bank) woodland
- are herbivorous with teeth adapted for gnawing
- gnaw down trees to make dams on rivers
- are attractive to ecotourists.

(i) Suggest **two** impacts on the ecosystem arising from the re-introduction of beavers.

1 _____

2 _____ **1**

(ii) Give **one** way in which the riparian woodland could be managed:

1 to ensure the long-term survival of the beaver;

_____

2 to meet the needs of ecotourists.

_____ **1**

Marks

3. (continued)

(*f*) The key below can be used to identify certain freshwater invertebrates.

Key to some freshwater invertebrates

1 Animal without jointed legs 2
Animal with jointed legs 3

2 Body with more than 15 segments .....Roundworm
Body with less than 15 segments .....Biting midge larva

3 Six legs present.....4
More than six legs present 5

4 No tails at end of abdomen.....Dragonfly nymph
One or more tails at end of abdomen.....6

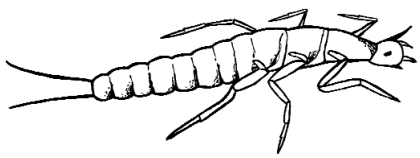
5 Four pairs of jointed legs .....Water spider
More than four pairs of jointed legs.....Freshwater shrimp

6 One tail at end of abdomen.....Water scorpion
Two tails at end of abdomen.....7

7 Tails more than half as long as the body .....Stonefly nymph
Tails less than half as long as the body .....Beetle larva

From the key:-

(i) Identify the invertebrate shown below.



Name _____ **1**

(ii) Give **one** similarity and **one** difference between the water scorpion and the stonefly nymph.

Similarity _____

Difference _____

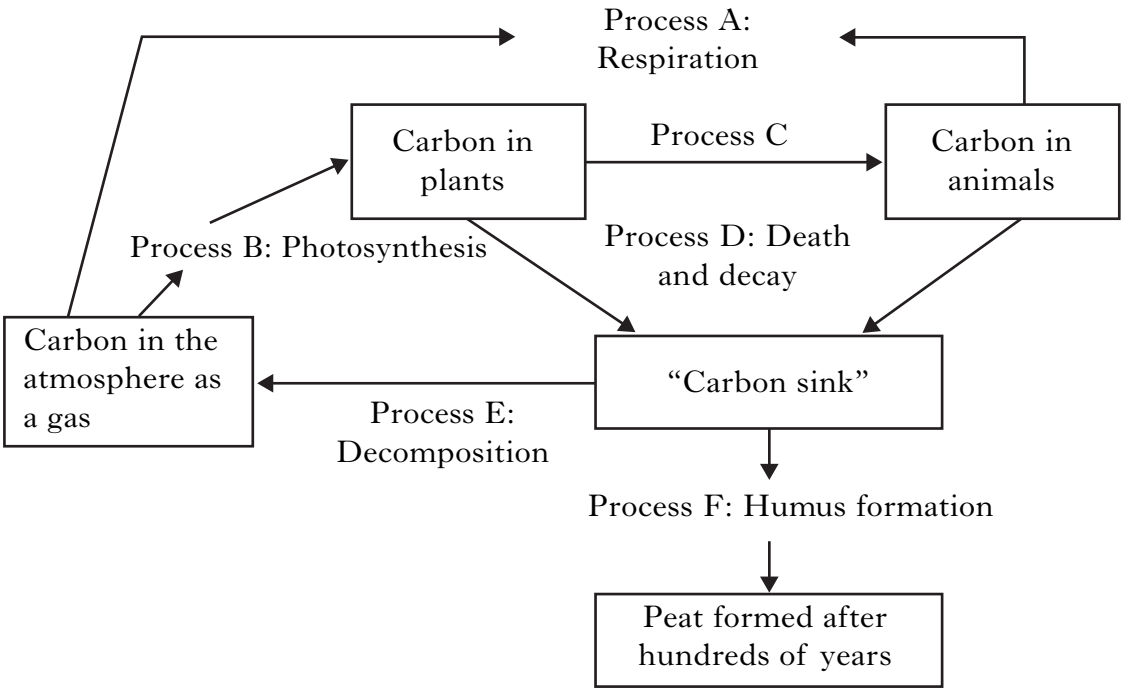
_____ **2**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks

4. (*a*) Peatland ecosystems are nationally and internationally important for their biodiversity as well as being substantial reservoirs of carbon known as "carbon sinks". The diagram below shows the cycling of the nutrient carbon in a peat bog ecosystem.



(i) Complete the table below with:

1 a description of photosynthesis;

2 **two** letters and **two** processes from the diagram.

Letter	*Process*	*Description*
B	Photosynthesis	
		Breakdown of organic material to release carbon dioxide into the atmosphere
		Formation of soil organic material

2

(ii) Name Process C.

_____

1

Marks

4. (continued)

(*b*) A soil sample taken from a peat bog was compared with samples of a gley and a brown earth soil. The results are shown in the table below.

	Soil sample		
	X	*Y*	*Z*
Water content (%)	30	22	40
pH	5·5	6·5	3·8
Humus content (%)	25	10	56

(i) Which soil sample is from a peat bog?

_____ **1**

(ii) Describe how the pH of **one** soil sample is determined.

_____

_____

_____

_____ **2**

(iii) When a soil sample was analysed for humus content, the following results were obtained.

Mass of soil sample 450 g

Mass of soil sample after drying 375 g

Mass of soil sample after roasting 80 g

Calculate the percentage of humus in the soil sample.

Space for calculation

_____ % **1**

Marks

4. (continued)

(*c*) Peat bogs have been exploited by humans for many years, being:

- cut for fuel
- excavated and used in horticulture and gardening
- used as sites for the building of windfarms.

(i) Describe and explain the global consequences of increasing the release of carbon from "carbon sinks" such as peat bogs.

_____

_____

_____

_____

_____ **2**

(ii) Explain why the use of peat for horticulture and gardening is unsustainable.

_____

_____ **1**

(iii) Describe **two** impacts of building a windfarm on a peatland ecosystem.

1 _____

2 _____ **1**

(*d*) A "Ramsar" designation is used internationally to protect wetland areas such as peat bogs.

Give **one** way in which environmental protection can be given to peat bogs at national level.

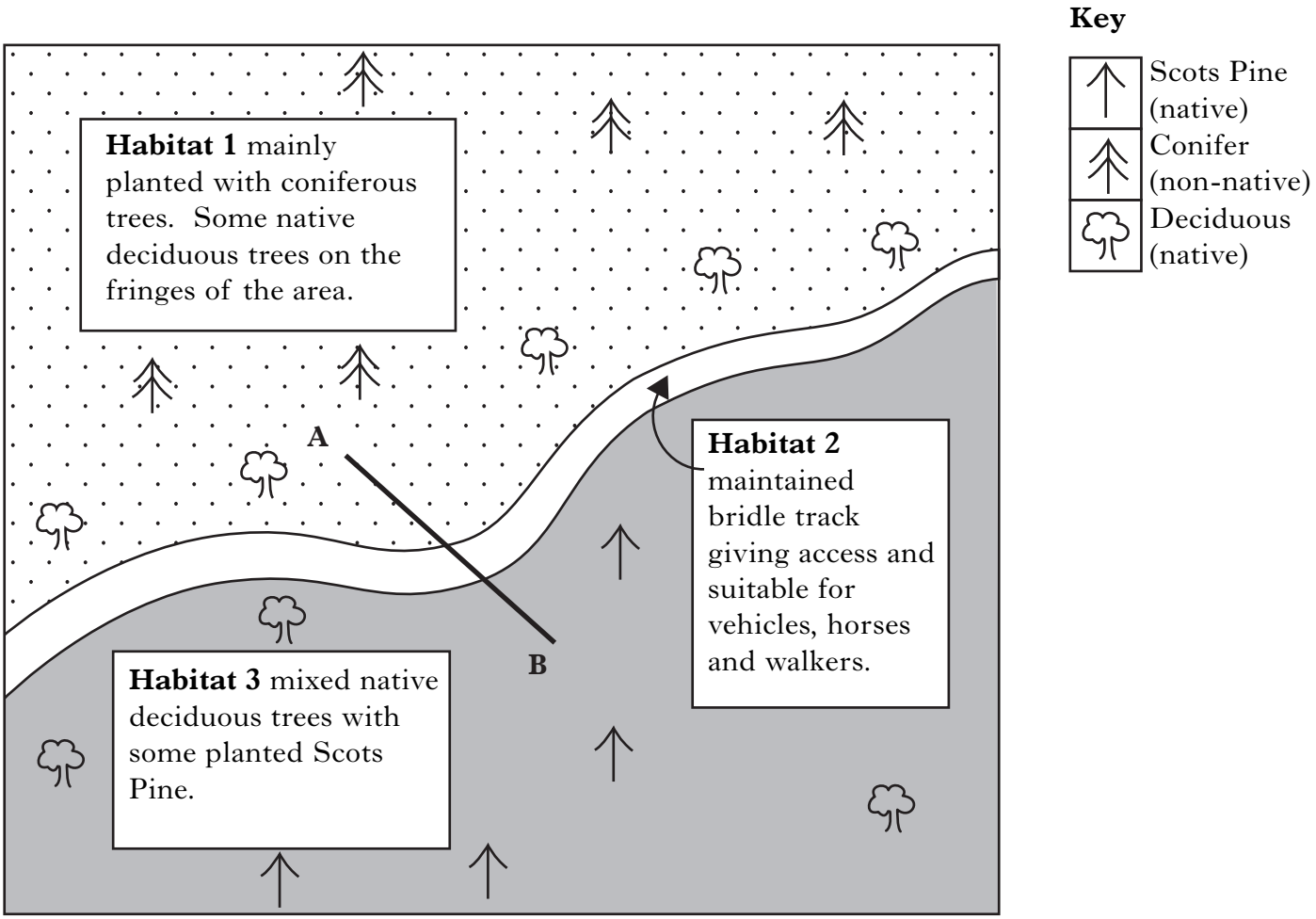
_____ **1**

[Turn over for Question 5 on *Page eighteen*

5. (*a*) An investigation was carried out to compare the ground vegetation of three different habitats along a transect A-B, in a managed woodland ecosystem.

The vegetation was sampled using quadrats and the percentage cover of certain species was measured. Leaf litter cover was also assessed as part of the study.

A sketch plan showing the three habitats and location of the transect, along with a table of results, are shown below.



Species	*Average percentage cover (%)*		
	Habitat 1	*Habitat 2*	*Habitat 3*
Heather	10	4	0
Blaeberry	12	6	0
Grass	30	30	10
Moss	25	15	30
Bracken	0	15	10
Other species	3	8	25
Leaf litter cover	20	10	25

5. (*a*) (continued)

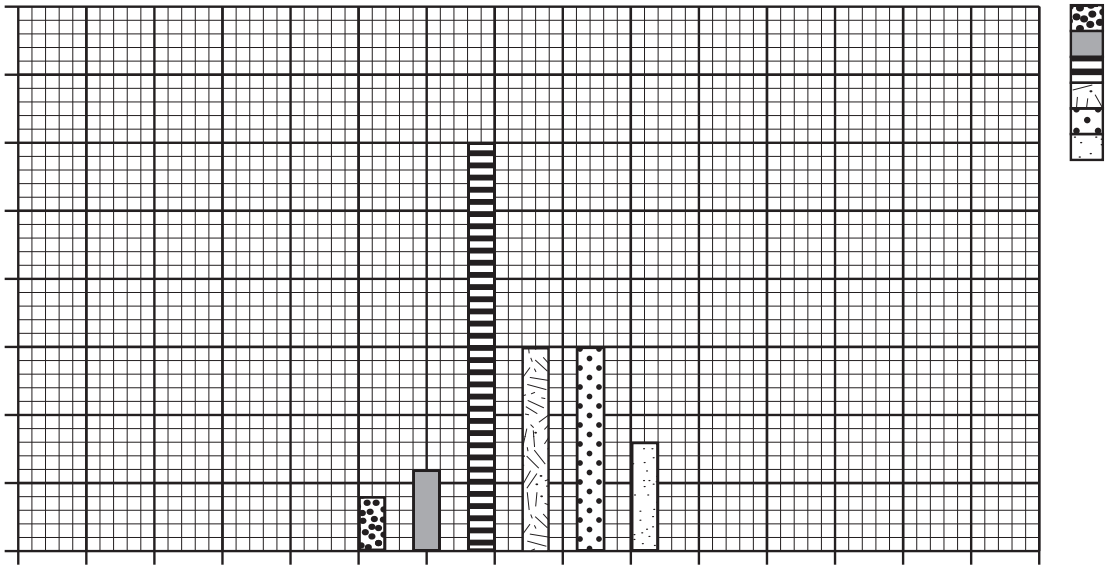
Marks

(i) Complete the bar chart to show the vegetation cover for each habitat by:

- adding the label and scale to the y axis; **1**
- completing the key and the labels to the x axis; **1**
- adding the data for habitats 1 and 3. **1**

(Additional graph paper, if required, can be found on *Page thirty-two*)

Key



Habitat 2

(ii) Give **one** way in which the results of the vegetation study were made more reliable.

_____ **1**

(iii) The results for habitat 2 are unexpected. Suggest **one** reason why this is the case.

_____ **1**

(iv) Which habitat has the greatest biodiversity?

Explain your choice.

Habitat _____

Explanation _____

_____ **1**

(v) Good forestry management practices have been applied in this area of woodland. Give **three** pieces of evidence to support this.

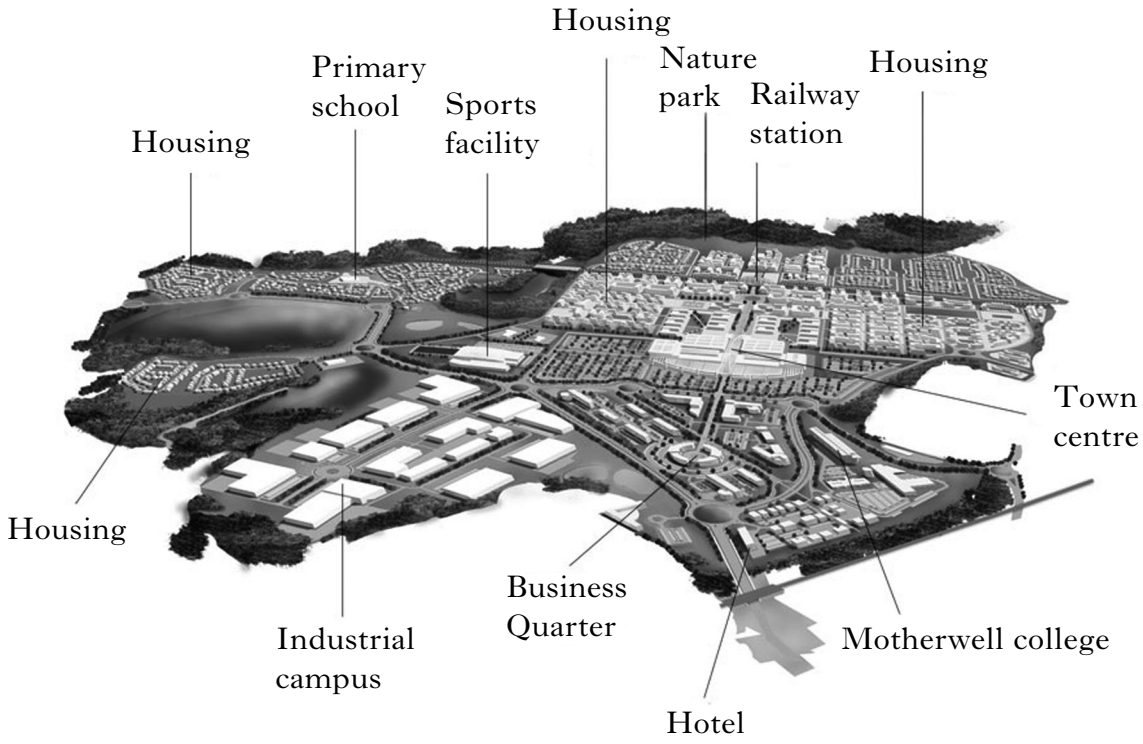
1 _____

2 _____

3 _____ **2**

6. (*a*) The picture below shows Ravenscraig steelworks from the air in the early 1990s.

The diagram shows the development planned for the present day site.



6. (*a*) (continued) *Marks*

Read the passage below and answer the questions that follow the passage.

Ravenscraig was a huge steelworks plant on the outskirts of Motherwell. Today it is one of the largest (450 hectares) brownfield sites in Europe and is being developed as a community project to meet the needs of the 21st century. The proposed development integrates housing, business, education and recreational and leisure facilities with the supportive infrastructure.

The picture and diagram opposite show the area from a historical perspective and the proposed development which is being created in the area over a 20-year period.

Ravenscraig steelworks was built in 1957 on a greenfield site in the River Clyde catchment area. The eastern fringes of the site retained many of the natural features of the landscape and wildlife populations of deer, foxes, badgers and hares. After demolition of the steelworks in 1992, the brownfield site was left to develop naturally over a period of years creating new habitats and communities.

One of the major environmental issues associated with the development of this brownfield site has been dealing with the problems of hazardous waste originating from the steelworks and leachate.

As part of the planning process for the development of the area, a baseline ecological study was carried out in 1999. From this study a Natural Heritage Strategy has been devised to address the short- and long-term effects of the development on wildlife.

(i) Describe the land use changes that have occurred in the area since 1950.

_____

_____

_____ **2**

(ii) Give **two** historical influences, other than industrial, that may have brought about land use change in this area.

1 _____

2 _____ **1**

(iii) Compare the terms "greenfield" and "brownfield" as applied to the Ravenscraig site.

_____

_____

_____ **1**

Marks

6. (*a*) (continued)

(iv) Name **three** types of land use associated with the new development.

1 _____

2 _____

3 _____ **1**

(v) Name **one** other land use which will contribute to the infrastructure of the development.

_____ **1**

(vi) Suggest **two** recreational activities that could form part of the town centre development.

1 _____

2 _____ **1**

(vii) Explain why a baseline ecological study was carried out before the area was developed.

_____

_____ **1**

(viii) Suggest **one** way in which the industrial archaeology of the area can be preserved for future generations.

_____ **1**

(*b*) Complete the table below to compare a town centre shopping complex with an out of town one in relation to the advantages in transport and general facilities provided at **each** complex.

	Town centre shopping complex	*Out of town shopping complex*
Transport advantage		
Facilities advantage		

2

[Turn over for Question 7 on *Page twenty-four*

Marks

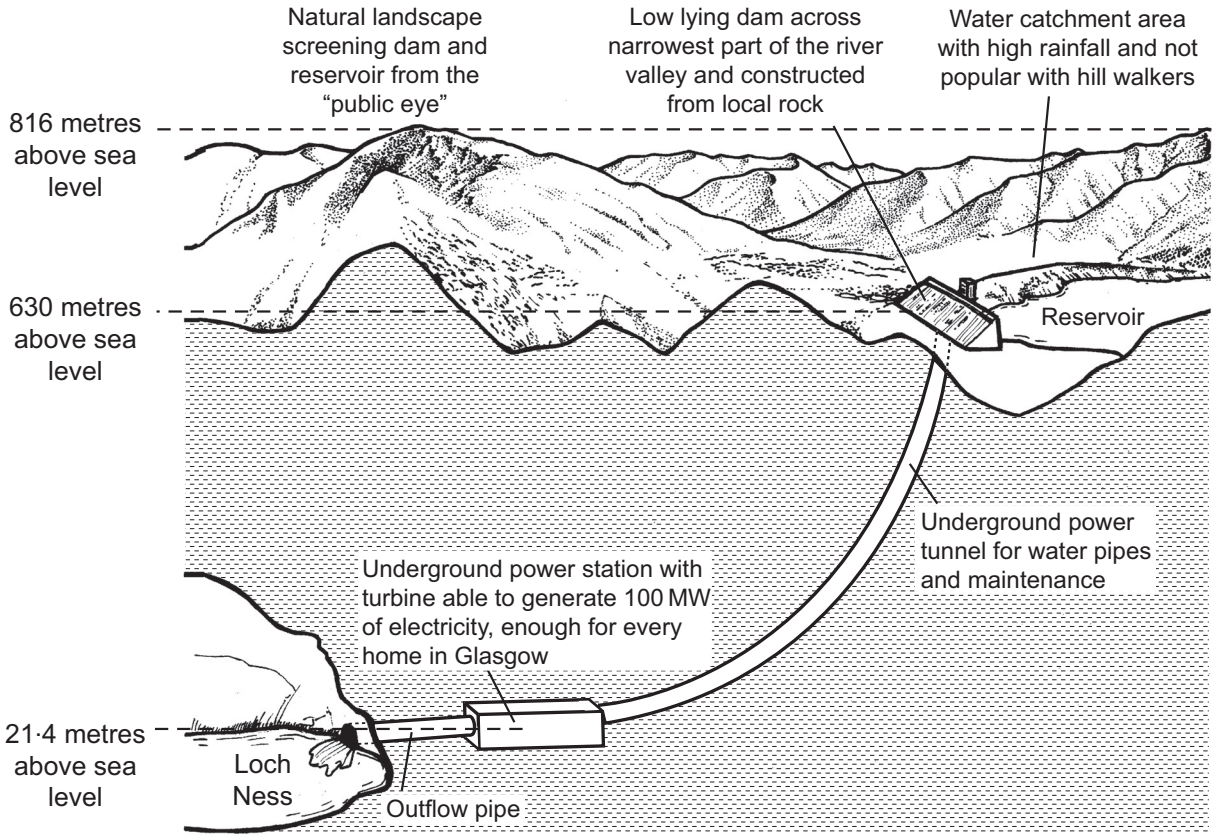
7. (*a*) Read the following information and answer the questions that follow.

Glendoe Hydro Scheme

Hydro generation of electricity is currently the world's leading source of renewable energy. The most recent, and possibly the last, large-scale scheme in Scotland is the Glendoe Hydro Scheme, near Loch Ness.

The natural features in the water catchment area of the River Tarff allowed a dam to be built and water collected in a reservoir high above Loch Ness. The power station, built underground, has the highest "head of water" in the UK. This is the drop from the reservoir to the turbine in the power station.

The diagram below shows some of the main features of the Glendoe scheme.



(i) Calculate the height of the "head of water" at Glendoe.

Space for calculation

_____ metres **1**

Marks

7. (*a*) (continued)

(ii) Suggest **two** natural features that favoured the creation of a reservoir at Glendoe.

1 _____

2 _____ **2**

(iii) Explain why the power station is located underground.

_____ **1**

(*b*) Environmental protection is a potential source of conflict in the development of a project such as a hydro scheme. In the case of Glendoe, conflict was minimised by careful planning, consultation, and cooperation between the developers, landowners, the local authority, statutory and voluntary conservation agencies and the local community.

(i) Name the type of assessment by which the environmental effects of a project like Glendoe would have been investigated.

_____ **1**

(ii) Name **one** statutory organisation and **one** voluntary organisation that would have been consulted in the planning process.

Statutory _____

Voluntary _____ **2**

(iii) Suggest **one** possible source of conflict that may have arisen between the developers and local residents during construction, and suggest how it might have been resolved.

Conflict _____

_____

Resolution _____

_____

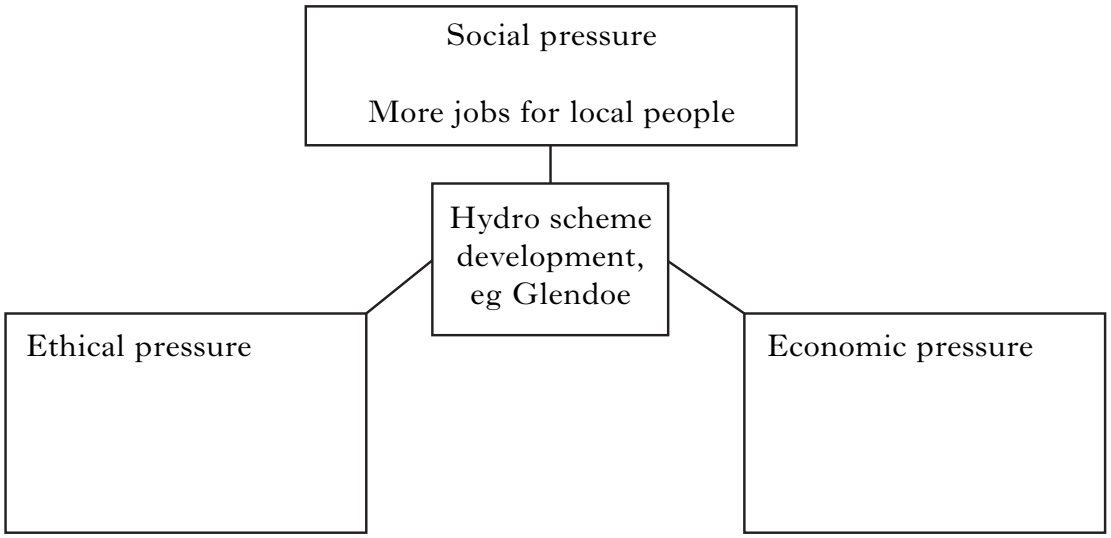
_____ **1**

[Turn over

Marks

7. (continued)

(*c*) Complete the diagram below to indicate **one** ethical and **one** economic pressure which might affect the creation of a large Hydro scheme such as Glendoe.



2

(*d*) Loch Ness is an important tourist attraction in Scotland.

(i) Suggest **two** leisure/recreational uses of Loch Ness.

_____ and _____ **1**

(ii) Describe **one** source of conflict resulting from leisure/recreational use of Loch Ness by tourists.

_____

_____ **1**

[Turn over for Section B on *Page twenty-eight*

SECTION B

BOTH questions in this section should be attempted.

Note that each question contains a choice.

Questions 8 and 9 should be attempted on the blank pages which follow.

Supplementary sheets, if required, may be obtained from the Invigilator.

Labelled diagrams may be used where appropriate.

Marks

8. Answer **EITHER** A **OR** B.

A. Discuss initiatives supporting sustainable development under the following headings:

(*a*) the role of **one** statutory organisation; **5**

(*b*) Local Biodiversity Action Plans (LBAPs); **5**

(*c*) recycling schemes. **5**

(15)

OR

B. Discuss sustainability in relation to energy issues under the following headings:

(*a*) sources and uses of energy in ELDCs compared to EMDCs; **5**

(*b*) waste incineration; **5**

(*c*) domestic practices. **5**

(15)

9. Answer **EITHER** A **OR** B.

A. *The Land Reform (Scotland) Act 2003 established a statutory right of responsible access to land and inland waters.*

Describe the impacts on the environment arising from the Scottish Access Code and the responsibilities incurred by both users and stewards. **(15)**

OR

B. Describe the reforms associated with the Common Agricultural Policy (CAP) and the implications on the scale and diversity of agricultural land use in Scotland. **(15)**

[*END OF QUESTION PAPER*]

DO NOT WRITE IN THIS MARGIN

Marks

SPACE FOR ANSWERS

DO NOT WRITE IN THIS MARGIN

Marks

SPACE FOR ANSWERS

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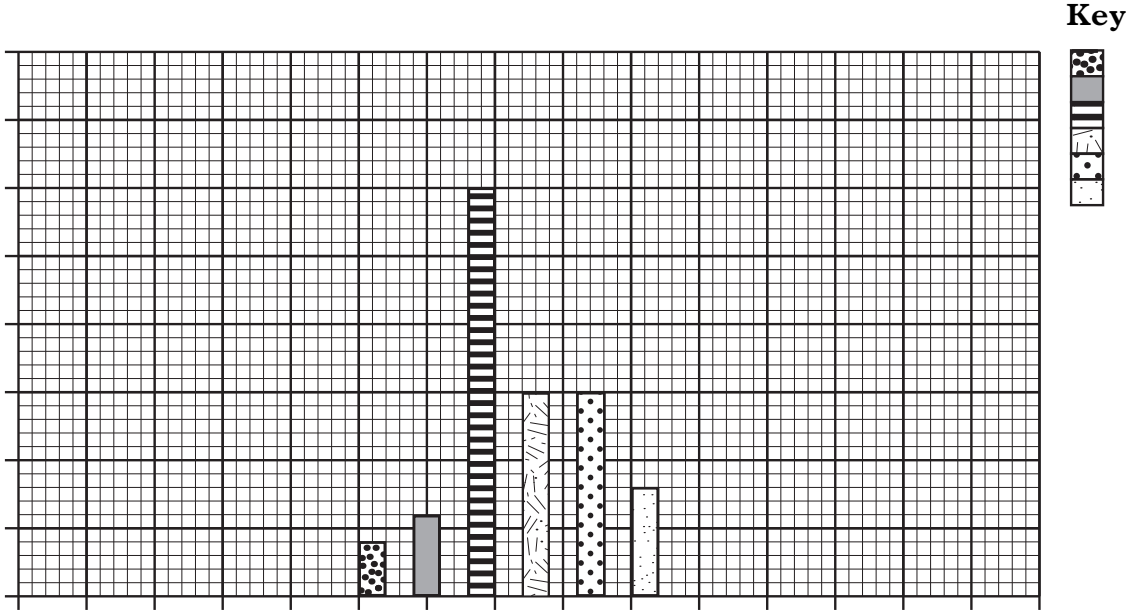
SPACE FOR ANSWERS

ADDITIONAL BAR GRAPH FOR QUESTION **5**(*a*)(i)



Habitat 2