

FOR OFFICIAL USE

--	--	--	--	--	--

X055/301

Total for
Sections A and B

--

NATIONAL
QUALIFICATIONS
2007

WEDNESDAY, 6 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

--

- All questions should be attempted.
 - It should be noted that in **Section B** questions 8 and 9 each contain a choice.
- 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.
- 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.
- The numbers of questions must be clearly inserted with any answers written in the additional space.
- Rough work, if any should be necessary, should be written in this book and then scored through when the fair copy has been written.
- 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.



SECTION A

Answer ALL questions in this section.

1. (a) An independent survey to compare disposable and cloth nappies, found that there was no difference in the impact each made on the environment.

The table below gives information about the two types of nappy.

	<i>Type of nappy</i>	
	<i>Disposable</i>	<i>Cloth</i>
Information relating to composition	One item with three layers: <ul style="list-style-type: none"> • Plastic lining inner layer from local source; • Absorbent middle layer of cellulose tissue from local softwoods or sawmill residues; • Plastic outer layer from local source. 	Three separate items: <ul style="list-style-type: none"> • Inner lining sheet of cellulose from local softwoods or sawmill residues; • Absorbent cloth made from cotton fibre harvested in and transported from India; • Plastic over pants from local source.
Destination after use	Complete item into dustbin then transported to landfill site.	Lining only into dustbin then transported to landfill site. Cloth and pants washed in detergent and reused.

Using information from the table, answer the following questions.

- (i) Name a renewable resource present in the composition of both types of nappy.

1

- (ii) Give **one** reason why the composition of a disposable nappy illustrates the use of a natural resource which is sustainable.

1

Marks

1. (a) (continued)

- (iii) Suggest **two** ways in which cloth nappies have a negative environmental impact.

1 _____

2 _____

1

- (iv) In your opinion, which type of nappy should be recommended for use? Give a reason for your answer.

Type of nappy _____

Reason _____

1

- (b) Name the natural resource from which plastic is made.

1

- (c) The energy input, materials and transport required to make, use and dispose of cloth nappies has been assessed.

Name this type of assessment process.

1

- (d) Soiled disposable nappies are sent to landfill.

Give **two** disadvantages of using landfill sites for the disposal of waste.

1 _____

2 _____

1

- (e) Disposable nappies create 400 000 tonnes of waste per annum.

This represents 0.1% of the total waste sent to landfill per annum.

Calculate the total mass of waste sent to landfill per annum.

Space for calculation

Answer _____ tonnes

1

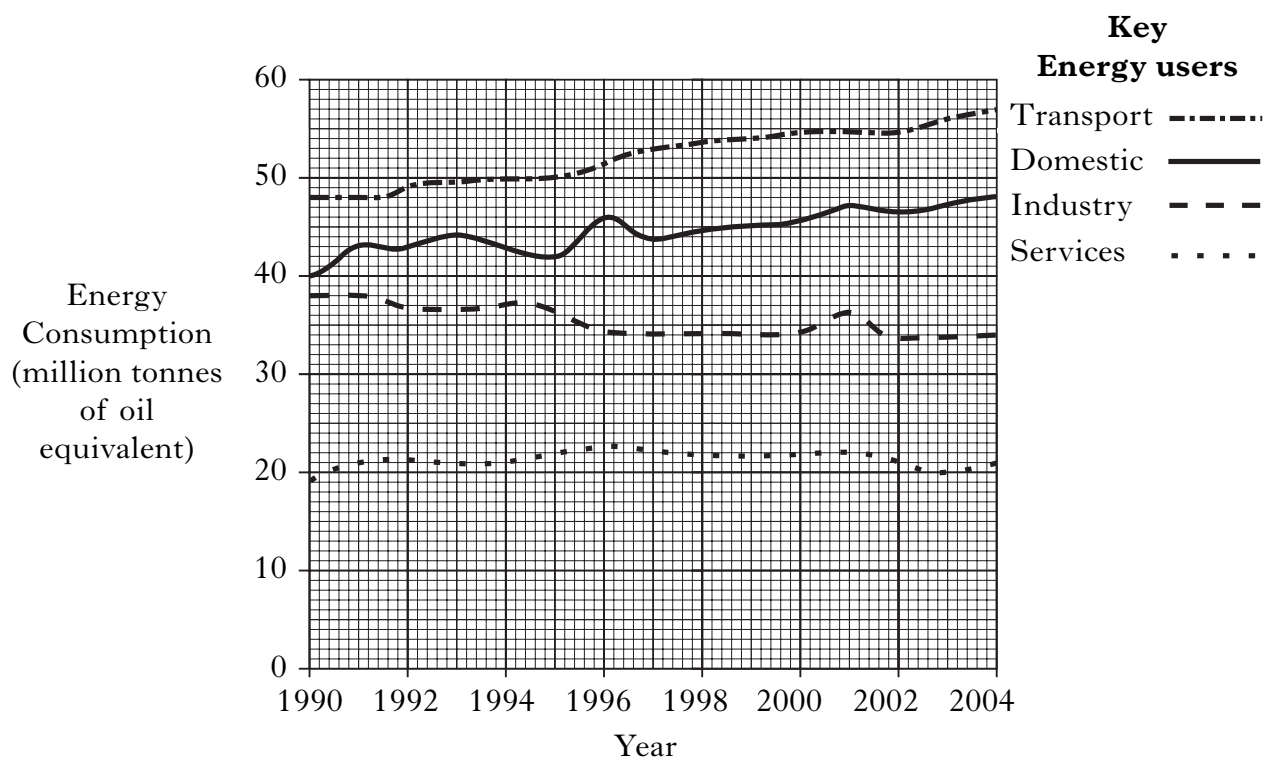
- (f) In 2003, more than 60% of the waste sent to landfill was biodegradable. By 2010, an EU directive states that this be reduced to 10%.

Suggest **one** alternative method for disposing of biodegradable waste.

1

Marks

2. (a) The line graph below shows energy consumption by energy users in the UK between 1990 and 2004.



- (i) Calculate the increase in the total energy consumption between 1990 and 2004.

Space for calculation

_____ million tonnes of oil equivalent **1**

- (ii) Calculate the percentage increase in domestic energy consumption between 1990 and 2004.

Space for calculation

_____ % **1**

Marks

2. (a) (continued)

- (iii) Suggest **two** ways by which domestic energy consumption can be reduced.

1 _____

2 _____

1

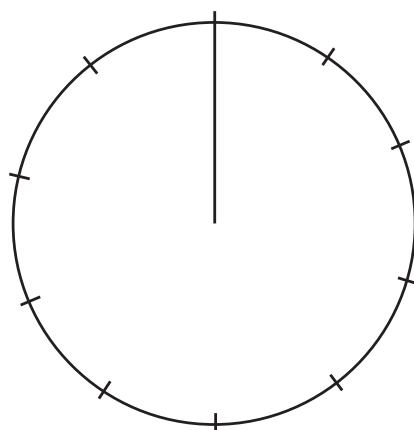
- (iv) Compare **and** explain the trend in energy consumption for transport with that of industry.

2

- (b) The table below shows the percentage consumption by energy users in the UK in 2004.

<i>Energy user</i>	<i>Percentage consumption</i>
Transport	35
Domestic	30
Industry	22
Others	13

- (i) Complete the pie chart and key to show this information.
(Additional pie chart, if required, can be found on *Page thirty-one.*)

**Key**

1

*Marks***2. (b) (continued)**

- (ii) Give **two** ways in which the energy use in an economically less developed country (ELDC) differs from an economically more developed country (EMDC) such as the UK.

1 _____

2 _____

1

- (c) The nuclear industry in Scotland contributes approximately one third of the total electricity generated. A target of 18% electricity generation from renewable sources has been set for 2010 rising to 40% by 2020.

- (i) Name **two** non-renewable sources of energy that are used for electricity generation.

_____ and _____

1

- (ii) Name the government initiative which sets targets for electricity generation from renewable sources.

1

- (iii) Give **two** disadvantages of increasing the use of nuclear sources for electricity generation.

1 _____

2 _____

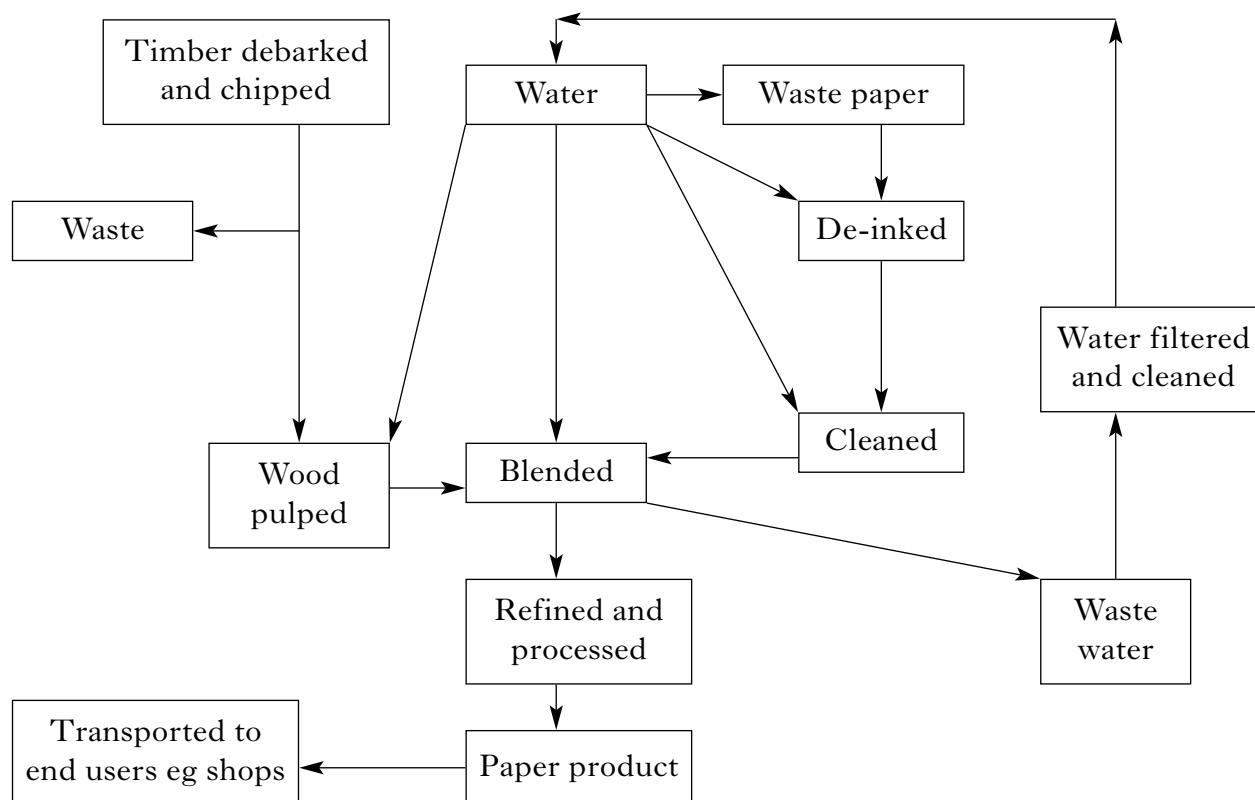
1

- (iv) Give **one** reason for increasing the percentage of electricity generated from nuclear sources.

1

Marks

3. (a) The flow chart below shows one method of making paper.



- (i) Is paper a renewable or non-renewable resource? Circle your answer.

Renewable**Non-renewable**

Give a reason for your answer.

1

- (ii) Describe how water use in this process illustrates the “reduce and re-use” principle.

1

- (iii) Name **one** other waste product from this process and suggest how it could be used.

Waste product _____

Use _____

1

*Marks***3. (continued)**

- (b) Legislation based on the “polluter pays principle” applies to the paper making process.

- (i) Describe what is meant by the “polluter pays principle”.

1

- (ii) Give **two** ways in which a paper making company can exercise “duty of care”.

1

2

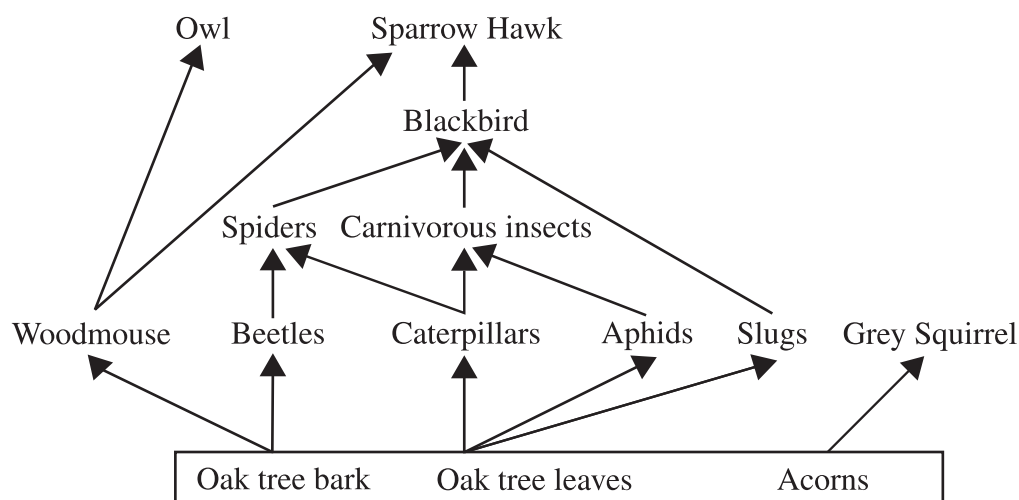
2

- (c) Name **one** voluntary environmental quality standard which companies can adopt in relation to environmental management.

1

Marks

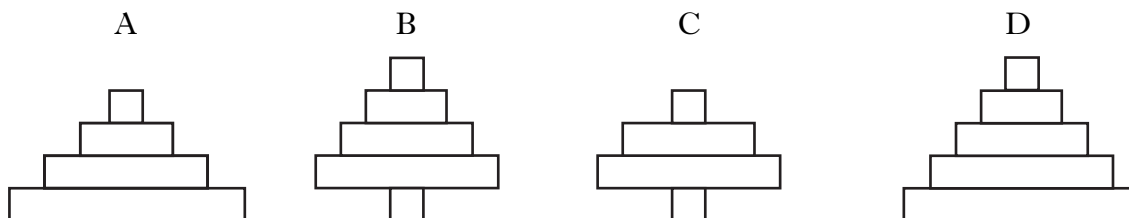
4. (a) The diagram below shows part of a food web from an oak woodland.



- (i) Name **all** of the organisms from the second trophic level.

1

- (ii) Circle **one** letter to identify the correct pyramid of biomass for this food web.

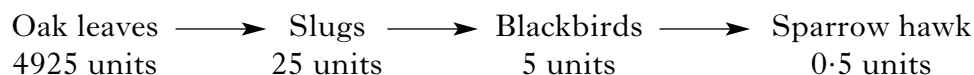


1

- (iii) Explain why the population of grey squirrels in this food web is increasing.

1

- (b) The diagram below shows the decrease in units of energy along a food chain.



- (i) Calculate the percentage energy **loss** between slugs and blackbirds.
Space for working

Answer _____ %

1

Marks

4. (b) (continued)

- (ii) Give
- two**
- ways in which energy can be lost from this food chain.

_____ and _____

1

- (c) The table below shows the mean biomass derived from plants in three different types of forest.

Type of Forest	Mean Biomass (kg m ⁻² per annum)			
	Living Plant Material	New Growth Material	Dead Plant Material	Humus in Soil
Coniferous	26.6	0.7	0.5	4.5
Deciduous	40.5	0.9	0.7	1.4
Tropical	52.8	3.3	2.5	0.2

- (i) Suggest a reason why coniferous forest has the least mean biomass of living plant material.

1

- (ii) The ratio of new growth material to living plant material in a coniferous forest is 1 : 38.

- (A) Calculate the ratio of new growth material to living plant material in a deciduous forest.

Space for calculation

New growth _____ : _____ Living plant

1

- (B) Suggest a reason for the difference.

1

- (iii) In which type of forest is dead plant material recycled most effectively?

1

- (iv) Name the process carried out by plants which produces carbohydrate for growth.

1

*Marks***4. (continued)**

- (d) Dead plant material in a forest is mainly leaf litter.

Name a technique by which the abundance of organisms in leaf litter could be assessed.

1

- (e) Describe the process of nitrification in the nitrogen cycle.

2

- (f) Forest represents a climax community.

Name the process by which a climax community is established.

1**[Turn over**

Marks

5. (a) A survey was carried out of animals at different depths in the mud of a river estuary. Ten cores, each 100 cm^2 in area and 8 cm deep, were taken at random sampling points across the site. The cores were sectioned into 2 cm depths. Each section was sieved and the animals living within each depth range were recorded. The results are shown in the table below.

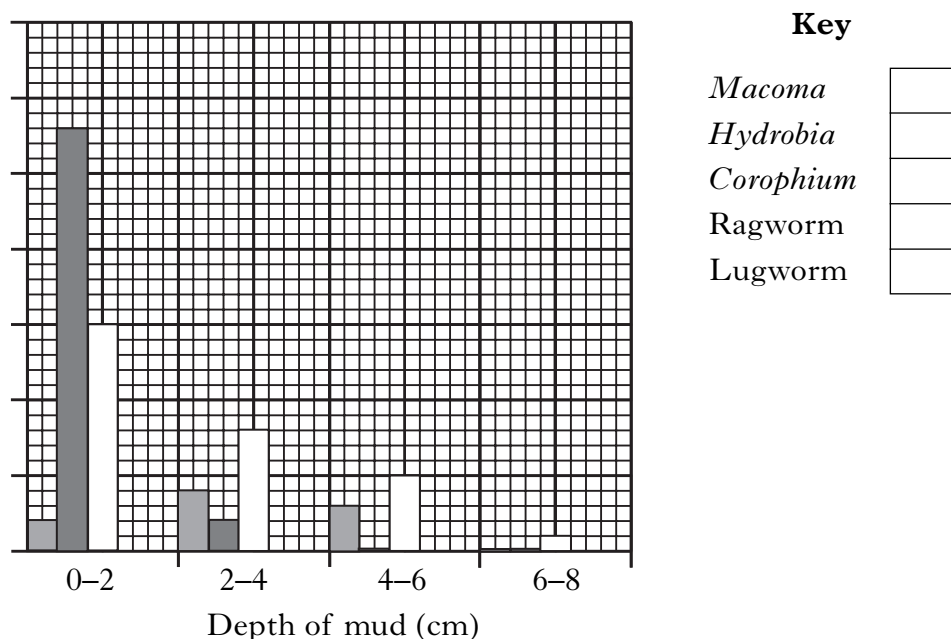
Depth of Mud (cm) <i>Animals</i>	Average Number of Animals found			
	0–2	2–4	4–6	6–8
<i>Macoma</i>	2	4	3	0
<i>Hydrobia</i>	28	2	0	0
<i>Corophium</i>	15	8	5	1
Ragworm	5	10	9	7
Lugworm	0	0	1	5

- (i) Complete the bar chart by:

- adding the scale and label on the y axis;
- adding data for the ragworm and lugworm;
- completing the key.

1
1
1

(Additional graph paper, if required, can be found on
Page thirty-one.)



Marks

5. (a) (continued)

- (ii) Compare the frequency and distribution of *Corophium* with that of lugworm.

2

- (iii) Suggest **two** ways in which the method used increases the reliability of the results.

1 _____

2 _____

1

- (b) Name **two** abiotic factors that could affect the distribution of species in a river estuary.

_____ and _____

1

[Turn over]

5. (continued)

- (c) Read the information below about organisms in the estuarine ecosystem and answer the questions that follow.

Macoma burrow in the sand and use a specialised siphon to filter their food;

Hydrobia browse on plant plankton on the surface of the mud;

Corophium consume decaying organic material;

Ragworm live in burrows in sand or mud emerging occasionally to seize their prey with powerful jaws;

Lugworm construct protective burrows where they extract organic material and plankton from the sand;

Estuarine seabirds with different beak lengths feed selectively on all the above animals.

- (i) From the information above, select **one** organism for each of the following niches.

Herbivore _____

Carnivore _____

Detritivore _____

Omnivore _____

2

*Marks***5. (c) (continued)**

- (ii) Select **one** estuarine organism and give **one** structural and **one** behavioural adaptation that fits it to its niche.

Organism _____

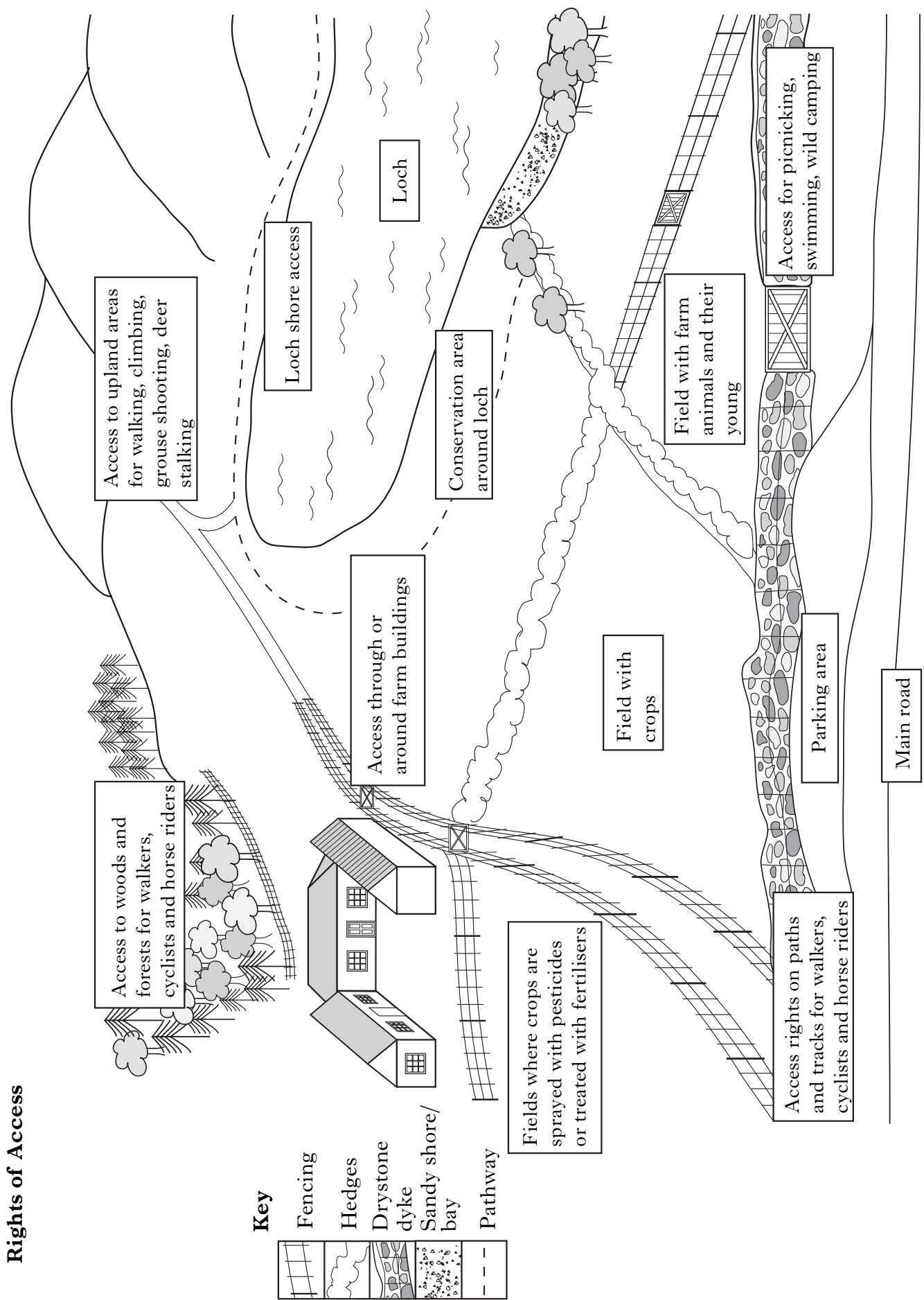
Structural adaptation _____

Behavioural adaptation _____

2

- (iii) Explain how estuarine birds avoid inter-specific competition.

1**[Turn over**



Marks

6. (a) The diagram on the opposite page shows some of the rights of access arising from the Scottish Outdoor Access Code which came into operation in February 2005. Landowners and the general public have moral responsibilities in relation to the care of the countryside.

- (i) Suggest **one** moral responsibility that a landowner has to the general public when they access his/her land.

1

- (ii) Give **two** moral responsibilities that the general public have when visiting the countryside.

1 _____

2 _____

2

- (iii) Suggest why access may be restricted at certain times of the year in:

farmland used for rearing animals _____

_____;

conservation areas _____

_____.

2

- (iv) Compare and explain the potential of **two** types of field boundary, shown in the diagram, as wildlife habitats.

2

- (b) Suggest **one** way in which a landowner could benefit from developing or maintaining a conservation area.

1

- (c) Describe **one** impact on paths and tracks resulting from overuse by walkers and cyclists.

1

[Turn over

Marks

6. (continued)

(d) Suggest **two** ways in which pathways can be managed to meet the needs of countryside users.

1 _____

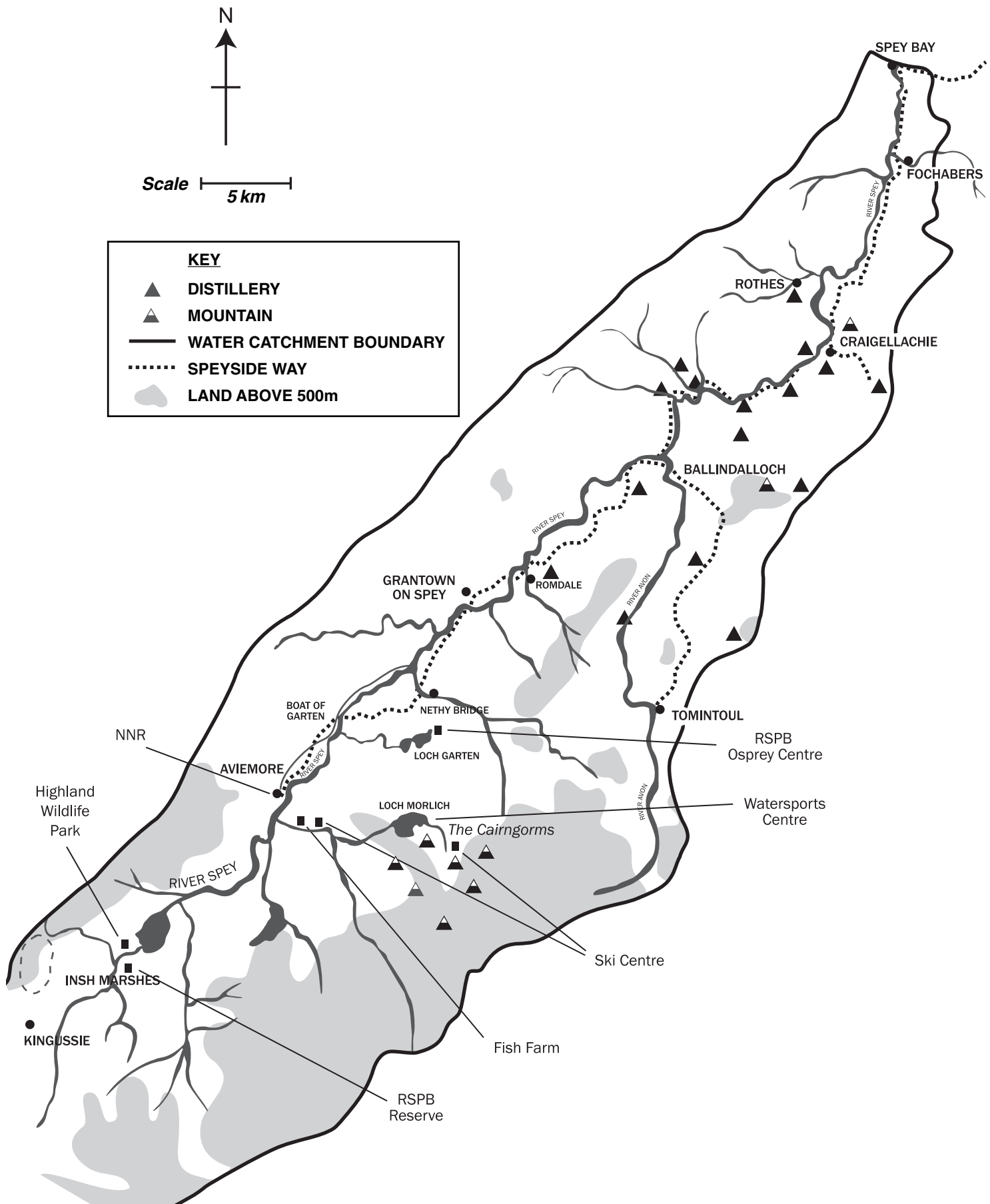
2 _____

1

[Turn over for Question 7 on *Page twenty*

7. The map below shows part of the water catchment area of the River Spey and some of the features of the area on which the following questions are based.

RIVER SPEY - Water Catchment Area



Marks

7. (continued)

- (a) A River Basin Management Plan has been produced for the area.

The objectives of this plan cover:

- flooding and water quality;
- economic development;
- recreation and access;
- habitats and species;
- forestry and woodland.

- (i) Suggest **one** effect the landscape features of the area will have on water flow rates in the Spey after heavy rain.

Effect _____

Give a reason for your answer.

1

- (ii) Flooding in the area is a problem. At present, the Insh Marshes soak up excess water. This prevents some flooding downstream. Explain why flooding could become a bigger problem in the future.

1

- (iii) Name the organisation that monitors river quality and flooding in Scotland.

1

- (b) The distilleries in the area provide permanent employment for local people. Give **one** social and **one** economic benefit of this to the area.

Social _____

Economic _____

1

- (c) The high quality river water is used by distilleries in the whisky making process. Warm water may sometimes be discharged as an effluent into the river. A rise in water temperature reduces the oxygen content of water.

- (i) Predict **two** changes in the community of the river as a result of warm water effluent.

1 _____

2 _____

2

Marks

7. (c) (continued)

- (ii) What name is given to an organism which is used to monitor changes in an abiotic factor such as oxygen in an ecosystem?

1

- (d) Using the map, give **three** examples of recreational activities for ecotourists.

1 _____

2 _____

3 _____

1

- (e) Give **two** impacts a large number of tourists could have on this area.

1 _____

2 _____

1

- (f) Canoeists have access rights to use the Spey but anglers must have a permit to fish.

Describe **one** example of conflict which may arise from this situation and suggest how it can be resolved.

Conflict _____

Resolution _____

2

7. (continued)

- (g) The table below gives information on four species found in the catchment area.

<i>Species</i>	<i>Population Size</i>	<i>Habitat</i>	<i>Other Information</i>
Capercaillie	In serious decline	Natural pine woodland	Voluntary ban on shooting; ground nesting; preyed on by pine marten which is protected; may fly into deer fences.
Osprey	Increasing	Woods around lochs and rivers which have a plentiful supply of fish	Once extinct in the UK but has re-colonised; carrying capacity limited.
Fresh water pearl mussel	In serious decline	Fast flowing water with gravel beds	Symbiotic relationship with young salmon and trout. The mussel filters its food from the water. The fish gains cleaner water. Breeds in mussel beds in gravel.
Salmon	In decline	Fast flowing water with gravel beds	Average catch is 7,777 per annum. This contributes £7 m to the local economy along the River Spey. Breeds in gravel beds.

- (i) Explain the importance of monitoring the numbers of a species.

1

- (ii) Name **one** initiative at local level which would protect a species in decline.

1

[Turn over

*Marks***7. (g) (continued)**

- (iii) Give **one** reason for the serious decline in Capercaillie numbers and suggest **one** improvement to the habitat that would help reverse this decline.

Reason _____

Improvement _____

1

- (iv) Explain why the osprey population will eventually stabilise.

1

- (v) Name the type of symbiotic relationship between the fresh water pearl mussel and young salmon and trout.

1

- (vi) Salmon conservation is given high priority in the water catchment management plan. Suggest a reason for this.

1

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 the impact of urbanisation in Scotland under the following headings:

- | | |
|--|-------------|
| (a) changing land use; | 5 |
| (b) effects on natural resources; | 5 |
| (c) conflicts arising from new developments. | 5 |
| | (15) |

OR

B. Discuss the role of Scottish Natural Heritage (SNH) under the following headings:

- | | |
|--|-------------|
| (a) as a statutory organisation; | 5 |
| (b) as an advisory organisation for land managers; | 5 |
| (c) as a public resource. | 5 |
| | (15) |

9. Answer EITHER A OR B.

A. Describe improving rural practices and management of farming to reduce detrimental impacts on the environment. **(15)**

OR

B. Describe the natural carbon cycle and the impacts on the environment of human activities associated with it. **(15)**

[END OF QUESTION PAPER]

Marks

SPACE FOR ANSWERS

--	--

Marks

SPACE FOR ANSWERS

--	--

Marks

SPACE FOR ANSWERS

--	--

Marks

SPACE FOR ANSWERS

--	--

Marks

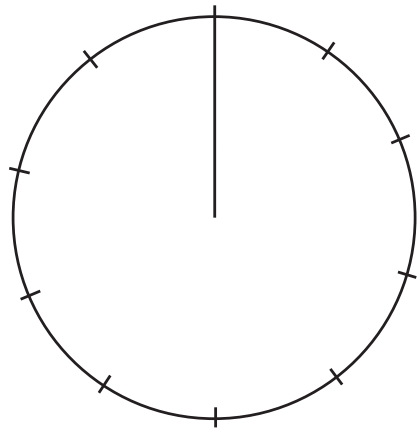
SPACE FOR ANSWERS

--	--

Marks

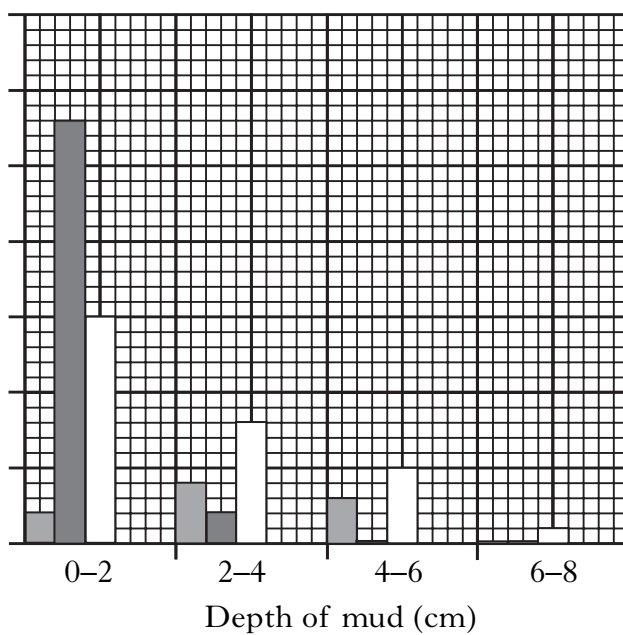
SPACE FOR ANSWERS

ADDITIONAL PIE CHART FOR QUESTION 2(b)(i)



Key

ADDITIONAL GRAPH PAPER FOR QUESTION 5(a)(i)



Key

<i>Macoma</i>	
<i>Hydrobia</i>	
<i>Corophium</i>	
Ragworm	
Lugworm	

[BLANK PAGE]