

FOR OFFICIAL USE

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Total for
Sections A and B

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X055/12/01

NATIONAL
QUALIFICATIONS
2013

FRIDAY, 7 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

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Town

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Forename(s)

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Surname

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Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

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- 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. The diagram and table below compare two different light bulbs used in the home.

	<i>Incandescent light bulb</i>	<i>Fluorescent light bulb</i>
		
Power rating	40 W	10 W
Light brightness	*****	*****
Time to reach full brightness	*****	***
Energy efficiency	***	*****
Lifetime	***	*****
Waste disposal	Place in household waste	Specialised recycling required due to mercury content

Star rating

Low = *

High = *****

1. (continued)*Marks*

(a) Answer the following questions using information from the table.

(i) Give **two** reasons to justify banning incandescent light bulbs from 2012.

1 _____

2 _____

1

(ii) State **two** disadvantages of fluorescent light bulbs.

1 _____

2 _____

1

(b) Tungsten and mercury are metals used in the manufacture of light bulbs.

Are metals a renewable or non-renewable resource?

Circle your choice and give a reason for your answer.

Renewable

Non-renewable

1

(c) In 2012 the cost of a single fluorescent light bulb was £2.50. A box of eight incandescent bulbs could be bought for £4.

Calculate as a simple whole number ratio the comparative cost of a **single** bulb based on this information.

Space for calculation

Answer: Fluorescent _____ : _____ Incandescent

1

(d) Give **three** factors which would be considered in the life cycle assessment of a light bulb.

1 _____

2 _____

3 _____

2

1. (continued)*Marks*

- (e) Give **three** ways, other than using fluorescent light bulbs, in which the use of electrical energy can be reduced in the home.

1 _____

2 _____

3 _____

1

- (f) Suggest **one** practice which has helped reduce energy demand in industry.

1

- (g) Uses of energy and energy sources differ in economically less developed countries (ELDC) such as Malawi compared to economically more developed countries (EMDC) such as the UK.

Complete the table below with:

- (i) **two** ways in which energy is used in ELDCs and **two** ways in which energy is used in EMDCs.
- (ii) **one** example of a renewable energy source in ELDCs and **one** example of a renewable energy source in EMDCs.

	<i>ELDC</i>	<i>EMDC</i>
Energy use	1	1
	2	2
Renewable energy source		

2

Marks

2. (a) Environmental improvements are often brought about by initiatives at local, national and international levels.

- (i) Complete the table below with:

one role of the Scottish Government for environmental improvement;

one initiative of local authorities;

one initiative at international level.

	<i>Level at which environmental initiative originates</i>		
	<i>Local</i>	<i>National</i>	<i>International</i>
Agency/ organisation	Local Authority	Scottish Government through agencies such as SNH and SEPA	WWF
Role of agency/ organisation	Implement policies and initiatives at local level on behalf of national government		Research & monitoring of endangered species
Example of an initiative		NSA	

2

- (ii) What do the abbreviations WWF and NSA stand for?

WWF _____

1

NSA _____

1

2. (continued)**Marks**

- (b) The Royal Society for the Protection of Birds (RSPB) is an organisation which provides environmental protection at local, national and international levels.

Describe and explain the role RSPB plays in education about the environment.

2

- (c) The Marine (Scotland) Act is a new piece of legislation. It introduces ways by which the marine and coastal environment in Scottish waters can be managed and protected comparable to the designation of land areas as National Parks.

Suggest **one** impact this Act could have on coastal areas and **one** impact on the marine environment.

1

1

2

1

- (d) The Moray Firth is a designated marine Special Area of Conservation (SAC) because of its resident population of bottlenose dolphins (*Tursiops truncatus*). The 'Dolphin Space Programme' encourages people to watch dolphins from the shore or to use cruise boats which have agreed to follow a code of conduct. This is a form of ecotourism.

What is meant by ecotourism?

1

2. (continued)*Marks*

(e) Landfill tax was introduced to reduce the waste going to landfill.

(i) Give **two** benefits to the environment of reducing waste going to landfill.

1 _____

2 _____

1

(ii) Suggest **two** benefits to humans of this initiative.

1 _____

2 _____

1

(f) Describe **one** example of a strategy for the management of waste in a named European country other than the UK.

Named country _____

Strategy for waste management _____

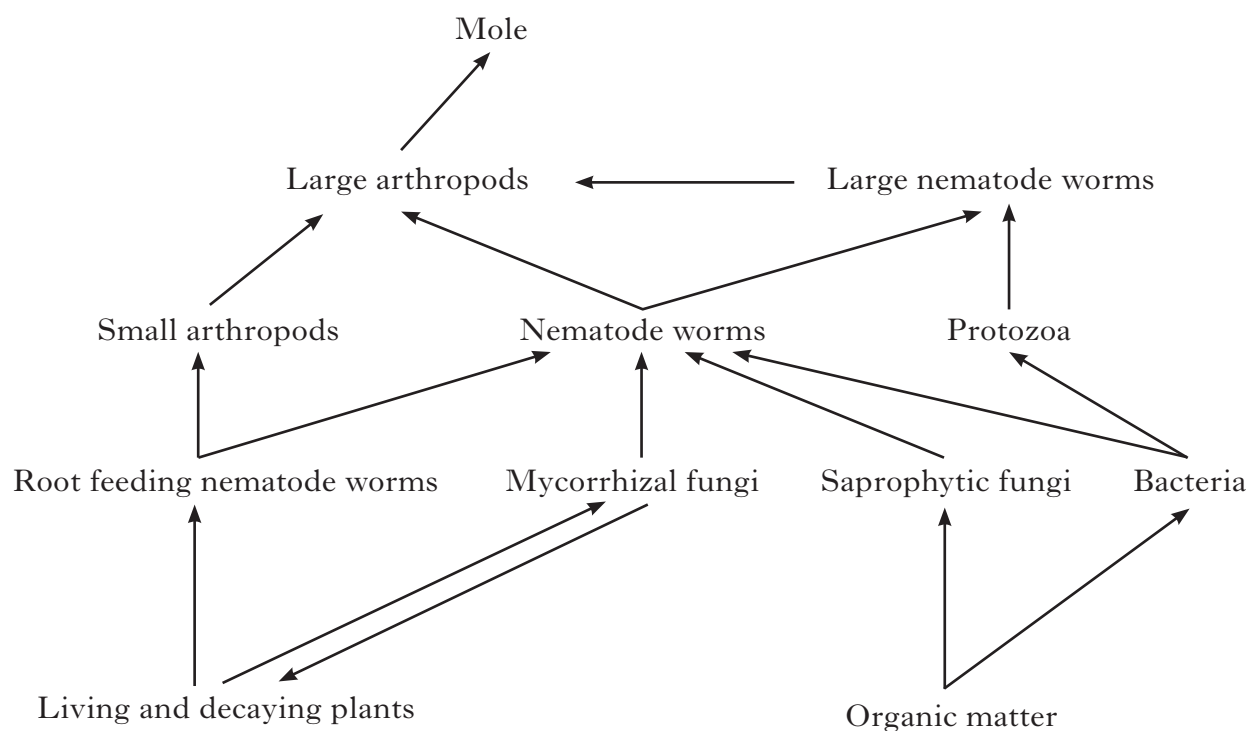
1

(g) Give a definition of the term 'sustainable development'.

1**[Turn over**

Marks

3. (a) The diagram below shows part of a soil food web.



Answer the following questions using information from the diagram.

- (i) Name **one** heterotroph at the fourth trophic level.

_____ 1

- (ii) Name **one** detritivore.

_____ 1

- (iii) Describe the niche of the Protozoa.

_____ 1

- (iv) Draw a pyramid of energy starting with living plants.

1

3. (continued)*Marks*

- (b) Give **two** ways in which energy is lost from a food web.

_____ and _____

1

- (c) Some mycorrhizal fungi provide essential nitrates to orchids, and the orchids supply the fungi with carbon compounds.

Give the term used to describe this specialised feeding relationship.

1

- (d) Complete the equation of photosynthesis below.

_____ + _____ + Light energy \longrightarrow _____ + _____

1

- (e) Bacteria living in the roots of legumes play an important role in the nitrogen cycle.

Describe their role.

2

- (f) In an investigation to measure the humus content of a soil sample, the following results were obtained.

Mass of fresh soil = 548.2 g

Mass of dry soil = 498.9 g

Mass of soil after roasting = 421.2 g

Calculate the percentage (%) of humus in the **fresh soil** sample.

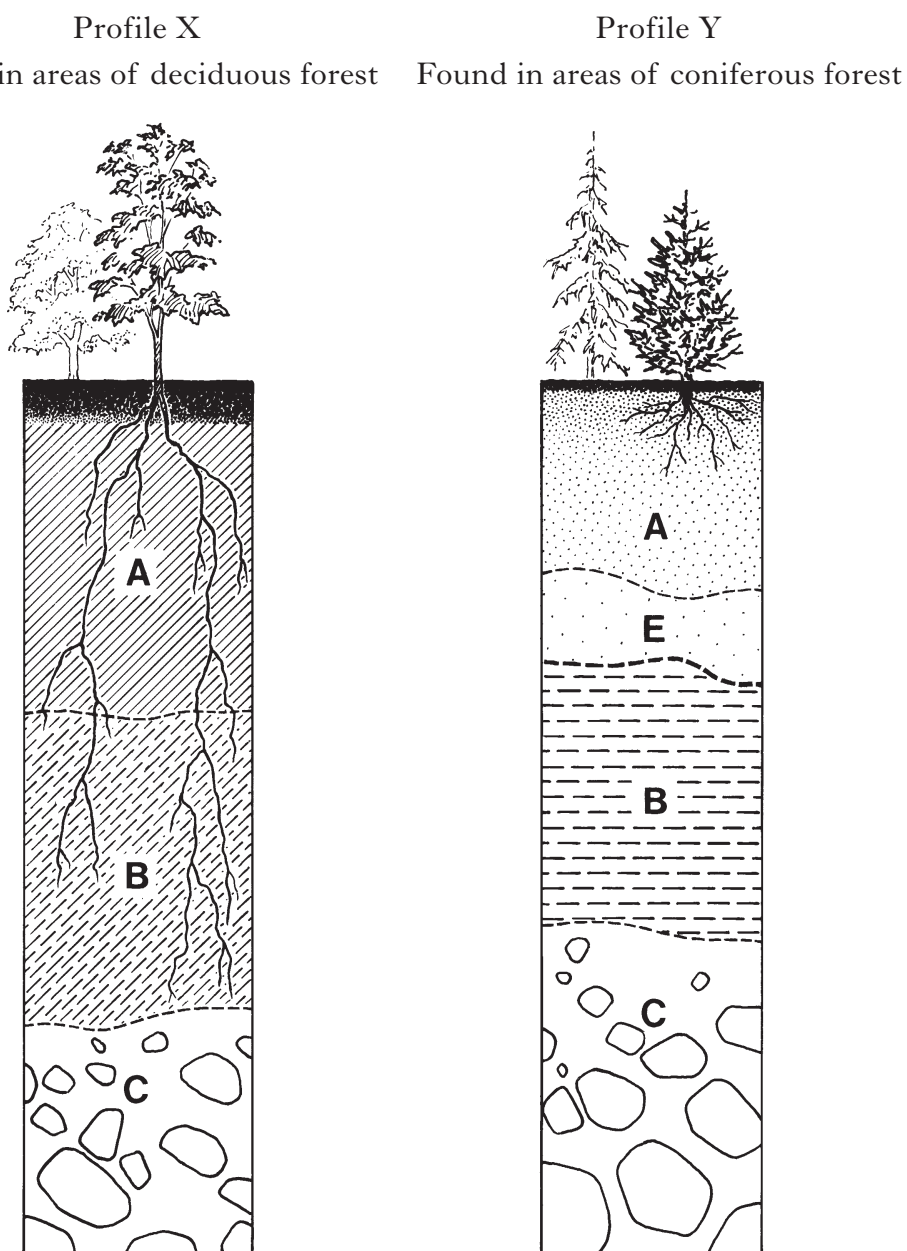
Space for calculation

Answer _____ % **1**

3. (continued)

Marks

- (g) Identify the **two** soil profiles shown below and give a reason for your choice.



Profile X _____ Reason _____ **1**

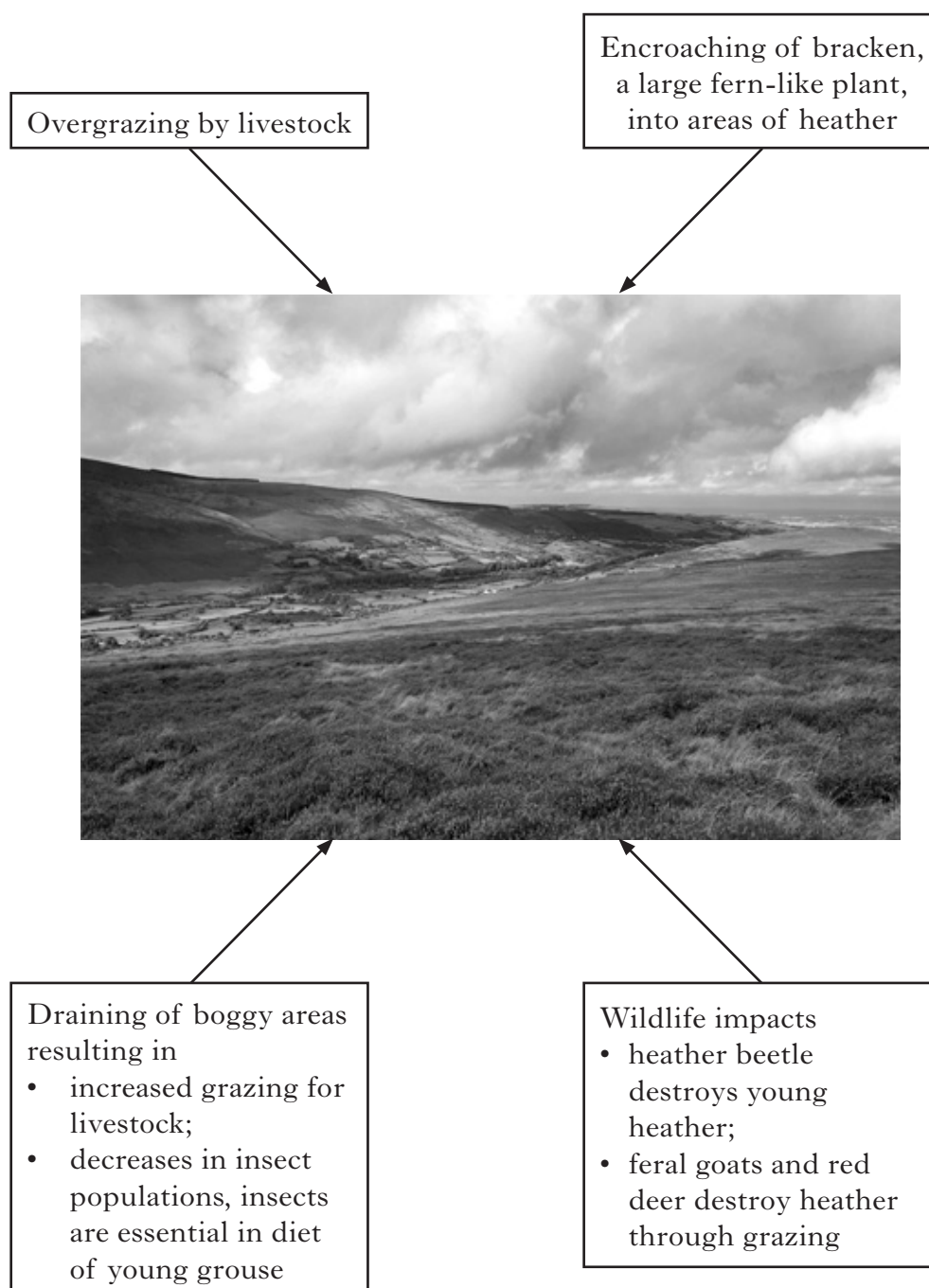
Profile Y _____ Reason _____ **1**

[Turn over for Question 4 on *Page twelve*

Marks

4. (a) Heather moorland can be managed to support a red grouse population. This is vital to maintain the economic viability of sporting estates. The total area of heather moorland in Scotland is decreasing.

The diagram below shows some of the factors which have contributed to this.



4. (a) (continued)*Marks*

- (i) European farming subsidies were previously based on the number of livestock kept on the moorland. Describe the impact this has had on the moorland environment.

1

- (ii) Explain how encroaching bracken reduces the area of heather.

1

- (iii) UK government grants were awarded to improve drainage of moorland for agricultural improvement.

Describe and explain how this policy affected the red grouse population.

2**[Turn over**

4. (continued)*Marks*

- (b) Langholm Moor in Southern Scotland is a Special Protection Area (SPA), because of the presence of hen harriers. Hen harriers prey on red grouse, voles and meadow pipits. Adult red grouse eat heather shoots, use the heather plants as cover and nest on the ground.

A study has been carried out to resolve the conflict between the management of moorland for hen harriers and for red grouse.

The conclusions included:

- increase and restore the heather habitat and manage livestock;
- control vermin populations of fox, stoat and carrion crow which feed on red grouse;
- give out medicated grit to control the parasitic worm infecting grouse;
- diversionary feeding of harriers;
- import grouse from other moors.

- (i) From the information above select:

- 1 a predator;

- 2 a habitat.

1

- (ii) Suggest why there is a conflict between red grouse management and hen harrier conservation.

2

- (iii) Why is it especially important to control the number of vermin in the spring when the chicks hatch?

1

4. (b) (continued)*Marks*

- (iv) The population of hen harriers is monitored.

Why is this good scientific practice?

1

- (c) Japanese knotweed is an alien species introduced into the UK as an ornamental plant. It is not eaten by native species but spreads very quickly and is very hard to eradicate.

Suggest and explain the effect Japanese knotweed is having on populations of native plant and animal species.

1**[Turn over**

Marks

5. (a) The maps below show the distribution of blanket peat and coniferous woodland in Scotland. The total land area of Scotland is 7.71 million hectares. Several statutory and voluntary conservation agencies/organisations own, lease, or manage by agreement, large areas of this land for conservation. The area of land held by five of these organisations is shown in the table below.

(Map data from the Macaulay Institute.)

**Distribution of
Blanket Peat**
(shaded areas)



**Distribution of
Coniferous Woodland**
(shaded areas)



<i>Agency/conservation organisation</i>	<i>Hectares</i>
Royal Society for the Protection of Birds (RSPB)	70 316
Scottish Natural Heritage (SNH)	35 800
Forestry Commission Scotland (FCS)	668 000
Scottish Wildlife Trust (SWT)	20 000
John Muir Trust (JMT)	75 000

5. (a) (continued)*Marks*

Answer the following questions using information from the maps and table.

- (i) Comment on the distribution of blanket peat compared to that of coniferous woodland.

1

- (ii) Calculate the percentage of Scotland's **total** land area collectively owned, leased or managed for conservation by these five organisations.

Space for calculation

Answer _____ % **1**

- (b) Scottish Natural Heritage (SNH) is a statutory agency.

- (i) What is meant by a statutory agency?

1

- (ii) Describe **one** role of SNH in conservation.

1

[Turn over

5. (continued)

Marks

(c) Forestry Commission Scotland (FCS) manages 15% of its land for conservation or enhancement of biodiversity. Large areas of FCS land are densely planted with Sitka spruce, a non-native species. Capercaillie are frequently found in these areas seeking food and shelter but prefer the more open nature of the native Scots pine woodland. Improving forestry practices have resulted in:

- moving away from clear felling towards creating smaller wooded areas with open areas;
- replacing Sitka spruce with a wider mix of tree species;
- improving public access for recreational activities.

(i) Explain why moving away from clear felling will be more beneficial for the capercaillie.

1

(ii) Give **one** reason why clear felling is used by Scottish forestry industries.

1

(iii) Suggest why it would not be realistic for FCS to replant entirely with native species.

1

(iv) Name **two** recreational activities in forest and woodland areas.

 and

1

(v) Name the code of conduct under which FCS land can be used by the public and outline **one** commitment of users and stewards under this code.

Code name _____

Users' commitment _____

Stewards' commitment _____

2

5. (continued)*Marks*

- (d) FCS has a duty to carry out an Environmental Impact Assessment (EIA) before undertaking forestry projects. What is the purpose of an EIA?

1

- (e) Large parts of northern Scotland covered with blanket bog are now designated as Special Areas of Conservation (SAC). In the past, large areas were drained for forestry and agriculture or depleted by peat extraction. More recently, grants are available from the Scottish Rural Development Programme (SRDP) for conserving blanket bog.

- (i) Describe the changes in land use associated with blanket bogs.

1

- (ii) Give **two** reasons why the SRDP supports the conservation of blanket bog.

1 _____

2 _____

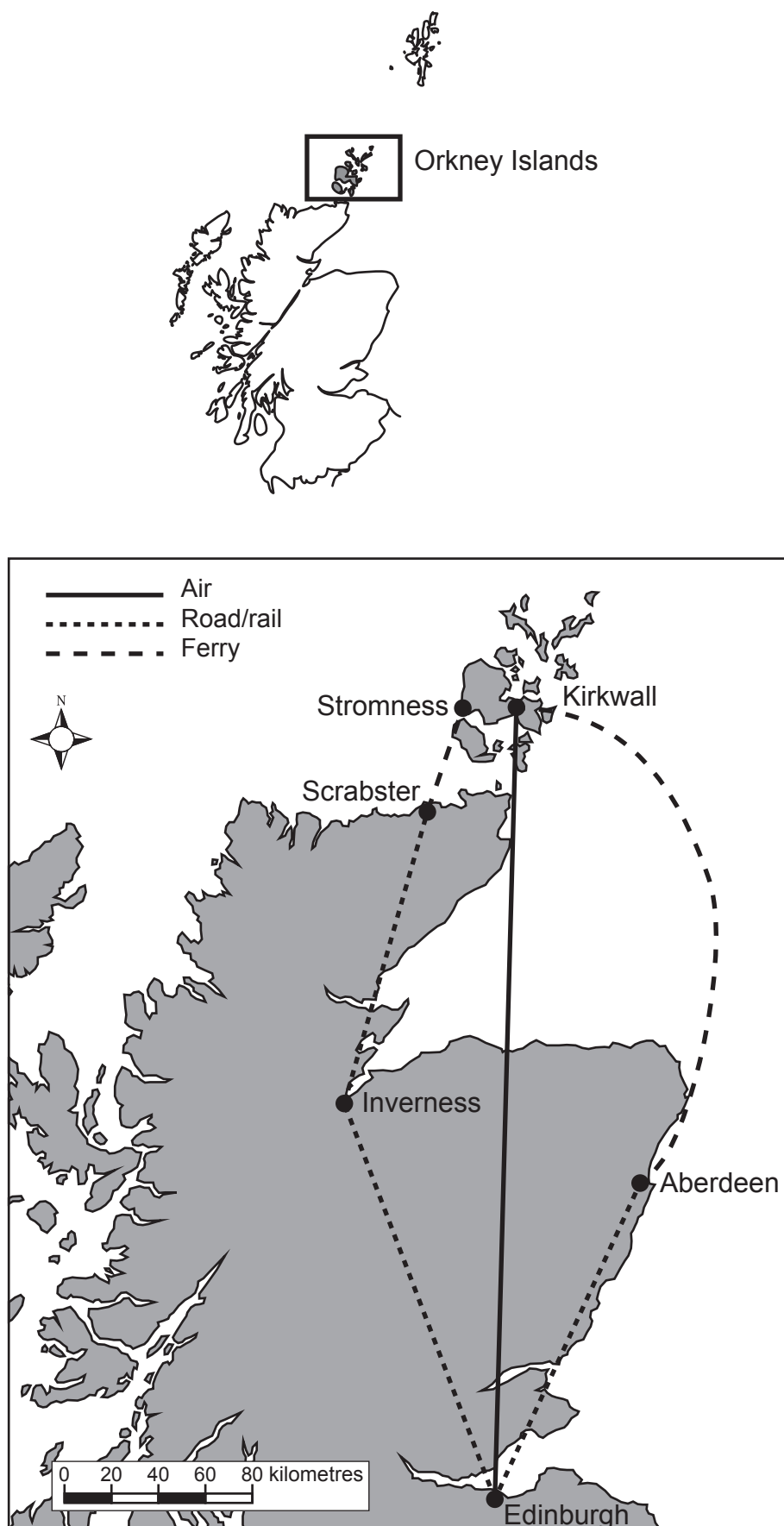
1

- (f) Name **two** historical influences which have affected Scotland's landscape.

1**[Turn over]**

Marks

6. (a) The maps below show the location of the Orkney Islands and the transport links with Edinburgh.



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

The table below compares the CO₂ emissions for different modes of transport and type of fuel used journeying from Edinburgh to the Orkney Islands. The wide variations are due to many factors including type of fuel used, engine power, service speed, fuel consumption per hour and of course route distance.

Mode of transport/fuel	CO₂ emissions (kg) for each mode of transport on each route				
	<i>Edinburgh to Aberdeen</i>	<i>Edinburgh to Kirkwall</i>	<i>Edinburgh to Scrabster</i>	<i>Aberdeen to Kirkwall</i>	<i>Scrabster to Stromness</i>
Car with petrol engine	21		43		
Rail using diesel	17		44		
Bus using diesel	9		18		
Ferry using diesel and transporting car				578	118
Air using aircraft fuel		74			

- (i) Calculate the difference in emissions when travelling by car and ferry on the Edinburgh to Kirkwall route compared to the Edinburgh to Stromness route.

Space for calculation

Answer _____ kg **1**

6. (a) (continued)

Marks

- (ii) Explain why the Edinburgh to Stromness route is the most popular with tourists to the Orkney Islands.

1

- (iii) Suggest why air travel to and from the Orkney Islands is more popular with the islands' inhabitants.

1

- (b) Explain **two** consequences of increasing emissions from transport on the environment.

Consequences _____ and _____

1

Explanation _____

1

- (c) The Orkney Islands are now the busiest cruise liner port of call in Scotland and third in Britain. The table below shows the number of passengers and number of cruise liners docking in the Orkney Islands each year.

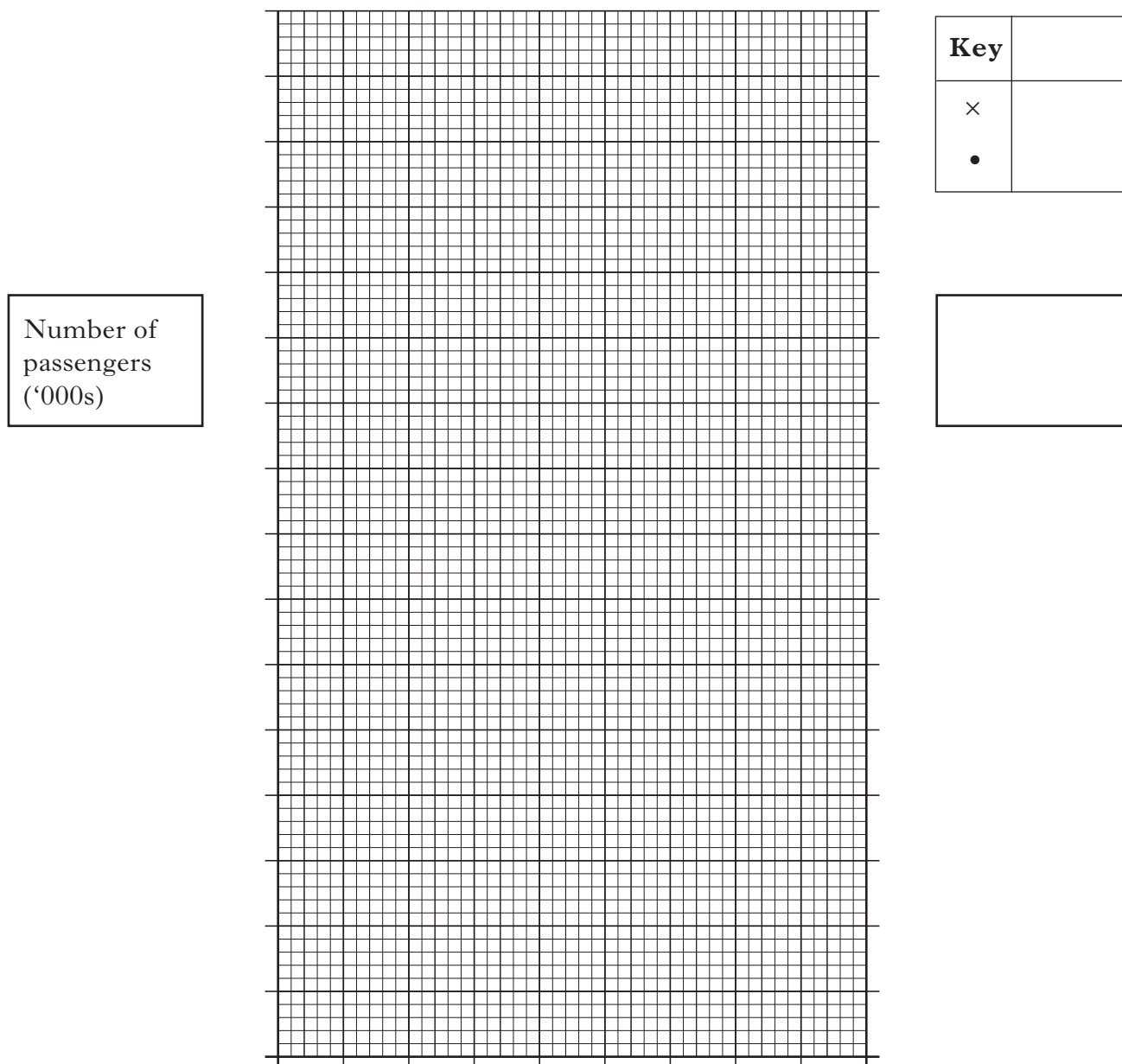
<i>Year</i>	<i>No. of passengers ('000)</i>	<i>No. of liners</i>
2002	16.5	53
2003	21.5	62
2004	23.0	63
2005	30.5	75
2006	20.5	47
2007	29.5	67
2008	30.0	73
2009	27.0	72
2010	26.0	70
2011	36.0	62

6. (c) (continued)

- (i) Complete the graph below to show the number of cruise liners and passengers visiting Orkney each year by:

- adding the label and scale to the x axis; **1**
- adding the scale, inserting the data for the numbers of passengers and completing the key; **1**
- adding the label and scale for the number of liners and inserting the data. **1**

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



- (ii) Describe the overall trend for the number of passengers between 2002 and 2011.

1

6. (continued)

Marks

- (d) Kirkwall harbour is too short for large cruise liners to dock. Passengers must be ferried ashore by smaller boats which creates problems for disabled people.

Work is underway to extend the pier from 225 m to 380 m.

From 2013 the world's biggest cruise ships will have direct access to the harbour.

- (i) Explain why the extension of the pier is being undertaken.

1

- (ii) The statements below suggest the impact this development will have on how many cruise liners and passengers will visit Kirkwall once the pier has been extended.

Underline **one** statement and give a reason for your choice.

The number of liners will increase and the number of passengers will decrease.

The number of liners will decrease and the number of passengers will decrease.

The number of liners will stay the same and the number of passengers will increase.

It is not possible to predict the effect on numbers of liners and passengers.

Reason _____

1

6. (d) (continued)

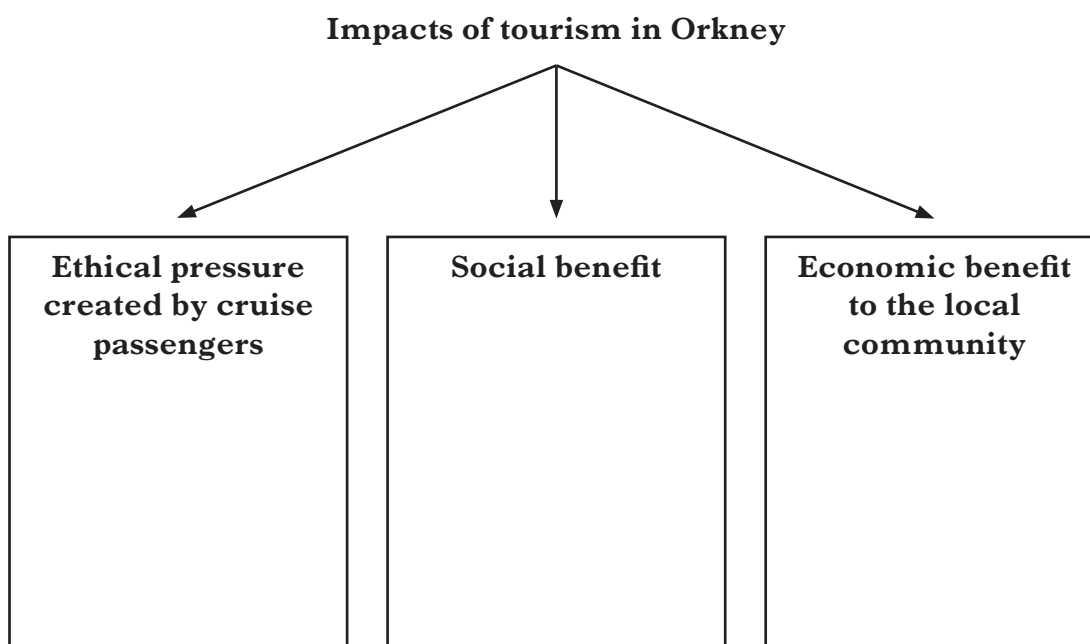
Marks

- (iii) At present, large numbers of cruise passengers arrive for short stays, spending money on local goods and visits to sites of interest. The Kirkwall community is expanding the range of services and activities including provision for excursions to archaeological and historical sites.

Complete the diagram below by giving:

- **one** ethical pressure created by cruise passengers
- **one** social benefit
- **one** economic benefit to the local community.

2



[Turn over

Marks

7. (a) Scotland was once renowned for its fishing industry which has diminished greatly due to the impact of European fishing policies. The areas of action in one EU management policy for the fishing industry are shown in the table below.

Areas of action for the fishing industry
To ensure sustainable fishing in Europe
To monitor the size of the European fishing fleet and prevent it from expanding further
To provide tools to enforce rules and punish offenders
To provide funding and technical support for initiatives that can make the fishing industry more sustainable
To negotiate in international fisheries organisations and with non-EU countries around the world
To help producers, processors and distributors get a fair price for their produce
To ensure customers can trust the seafood they eat
To support the development of a dynamic EU aquaculture sector
To fund scientific research and data collection

- (i) Name the policy associated with these areas of action.

_____ 1

- (ii) Sustainable fishing depends on the EU setting a limit known as a TAC. What does TAC stand for?

_____ 1

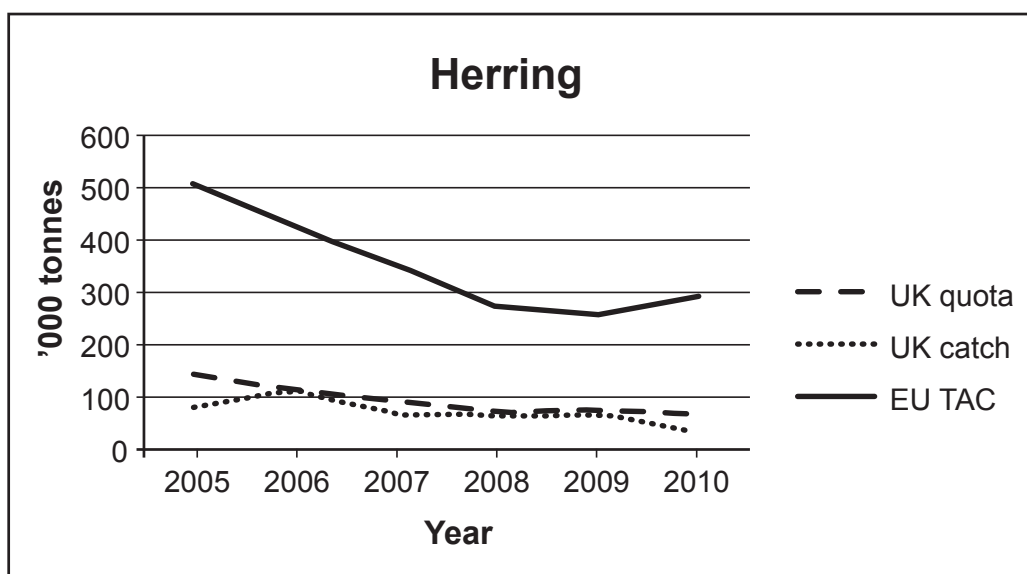
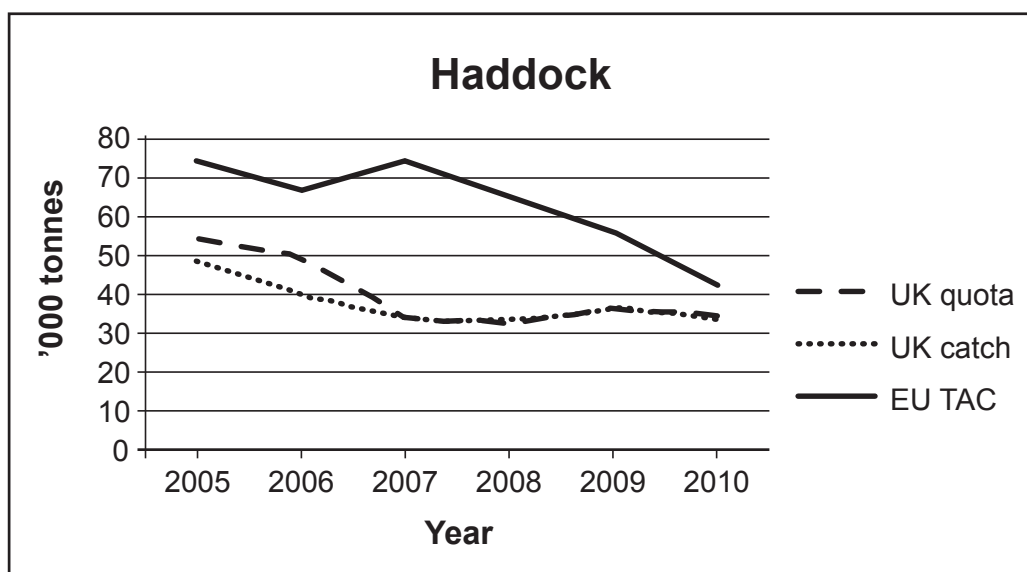
- (b) Give **one** way by which rural areas of Scotland have been able to contribute to the development of a 'dynamic aquaculture sector'.

_____ 1

7. (continued)

Marks

- (c) TACs are shared between EU members. The graphs below show the UK quota and catch figures (in tonnes) for two species between 2005 and 2010.



- (i) Describe and explain the trend in haddock and herring UK catches between 2005 and 2010.

2

- (ii) Haddock is a favourite with Scottish consumers.

Predict **two** impacts for the consumer if present trends continue.

1

2

1

7. (continued)

Marks

- (d) Whales, dolphins and turtles are often found captured or entangled in fishing ropes and nets. Name **two** groups which could come into conflict, the reason for the conflict and suggest a resolution.

Groups in conflict _____ and _____

Conflict _____

1

Resolution _____

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. Describe succession in a named ecosystem, including examples where possible, under the following headings:

- | | |
|---|-------------|
| (a) the sequence of changes involved in succession; | 5 |
| (b) the characteristics of the climax community; | 5 |
| (c) inter and intra specific competition for named resources. | 5 |
| | (15) |

OR

B. Describe an investigation into a named terrestrial ecosystem under the following headings:

- | | |
|---|-------------|
| (a) sampling techniques to assess the abundance and distribution of plants and animals; | 5 |
| (b) techniques to investigate 3 named abiotic factors; | 6 |
| (c) how data is collected and analysed to ensure validity and reliability. | 4 |
| | (15) |

9. Answer EITHER A OR B.

A. Describe initiatives and changes in agricultural practices which have contributed to the sustainable use of resources.

(15)

OR

B. Describe the negative impacts on landscape, wildlife and biodiversity in Scotland of using non-renewable sources of energy and describe how these environmental impacts may be reduced.

(15)

[END OF QUESTION PAPER]

SPACE FOR ANSWERS

Marks

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SPACE FOR ANSWERS

Marks

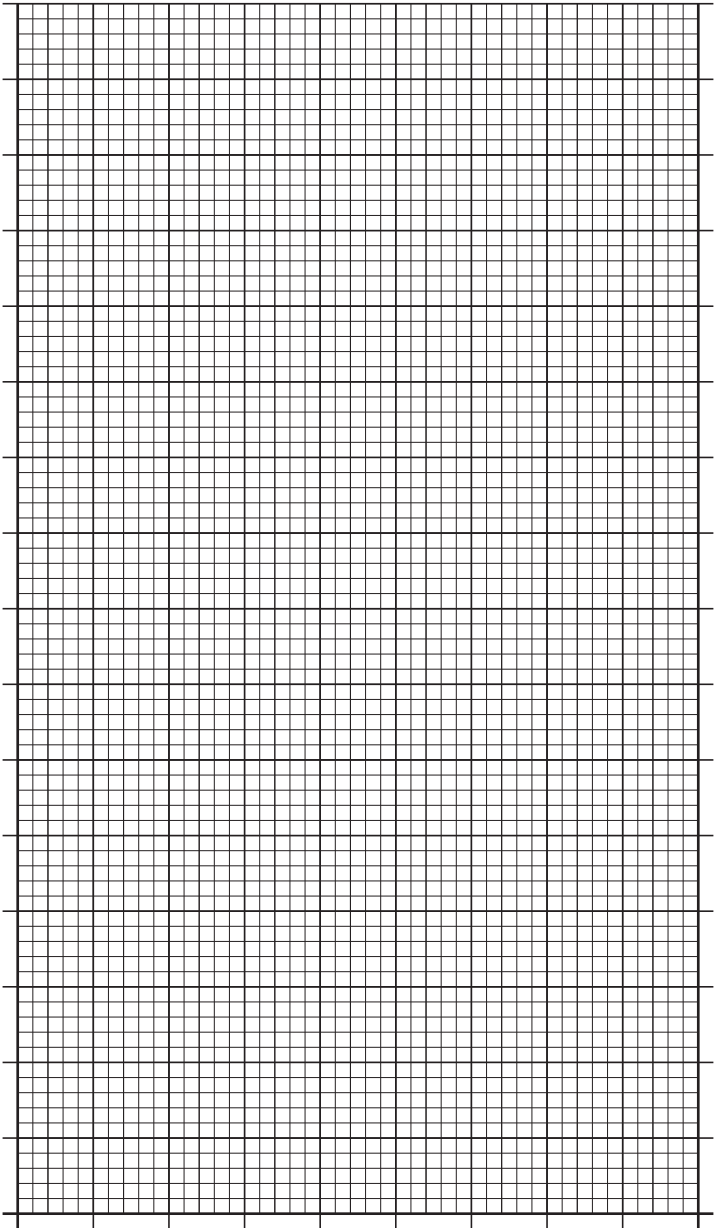
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SPACE FOR ANSWERS

Marks

ADDITIONAL GRAPH PAPER FOR QUESTION 6(c) (i)

Number of
passengers
(‘000s)



Key

×

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ACKNOWLEDGEMENTS

Question 5(a)—Map data was adapted from The Macaulay Institute. Reproduced by kind permission of The Macaulay Institute.