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N5

National Qualifications 2017

Mark

X726/75/01 Environmental Science

WEDNESDAY, 31 MAY
9:00 AM – 11:00 AM

X7267501

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day | Month | Year

Scottish candidate number

Total marks — 80

Attempt ALL questions.

Questions 10 and 11 each contain a choice.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers and rough work is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting. Any rough work must be written in this booklet. You should score through your rough work when you have written your final copy.

Use **blue** or **black** ink.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

SQA ©

X7267501

Total marks — 80

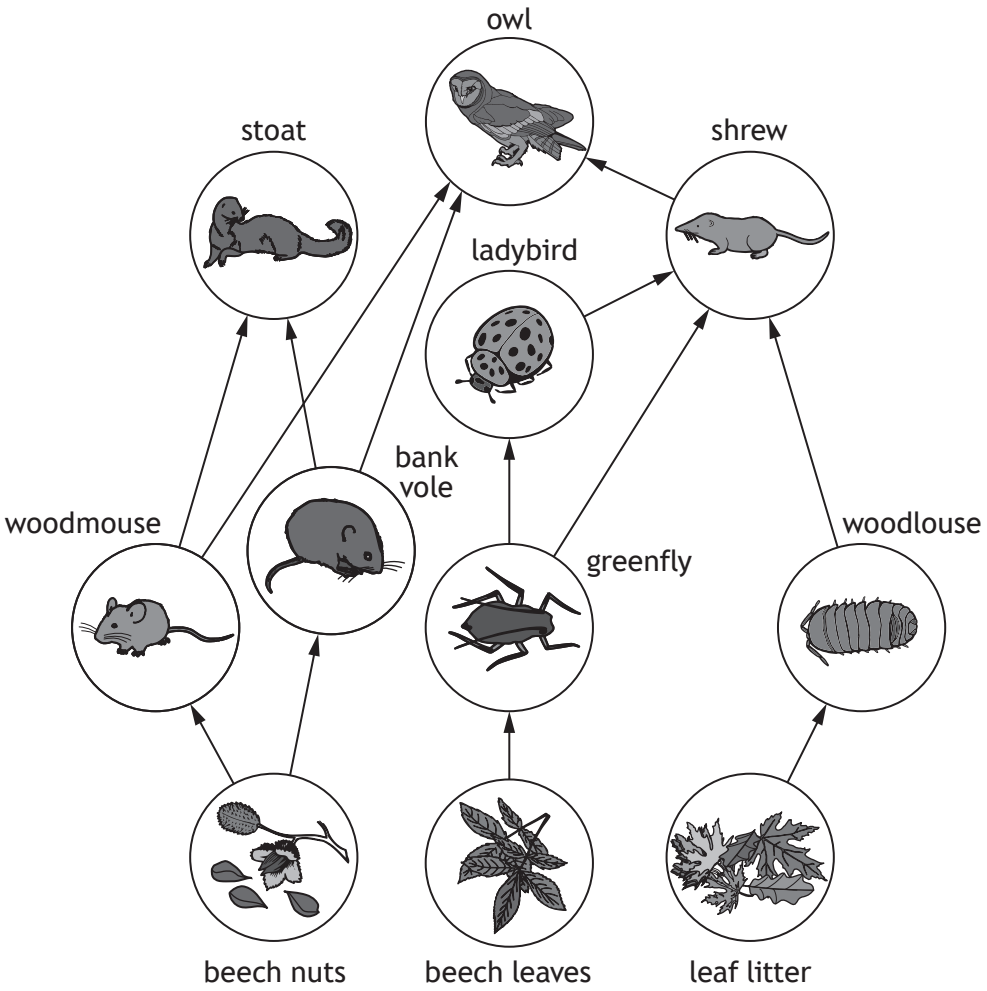
Attempt ALL questions

1. The biosphere is one of the Earth systems.

(a) (i) Other than the biosphere, name one of the four Earth systems. **1**

(ii) State one human activity which may negatively impact on biodiversity. **1**

(b) The food web below shows the feeding relationships in a Scottish woodland.



(i) Name one tertiary consumer from the food web. **1**

1. (b) (continued)

(ii) Explain, using a named example from the food web, the role detritivores would play in a Scottish woodland. **2**

Named example _____

Role in the food web _____

_____

_____

_____

(c) (i) Beech leaves undergo the process of photosynthesis.

Complete the word equation for photosynthesis below. **1**

_____ + water ⟶ _____ + glucose

(ii) Name the source of energy for the food web. **1**

_____

(d) (i) Energy is lost at each stage in a food chain. Only 10% of an organism's energy is passed on to the consumer.

The woodlouse contains 1500 units of energy.

Calculate the number of units of energy which are lost when the shrew consumes the woodlouse. **1**

Space for calculation

_____ units of energy

(ii) State one way in which energy is lost from the food chain. **1**

_____

[Turn over

2. Potatoes are one of Scotland's economically important resources. Potato blight is one of the worst diseases affecting potatoes. It is caused by a fungus which spreads through the air when weather conditions are warm and humid. It can wipe out crops overnight.

(a) Other than potatoes, suggest one economically important agricultural resource produced in Scotland. **1**

_____

(b) Temperature and humidity are examples of abiotic factors which affect potato growth.

(i) State one other abiotic factor that affects the growth of potato crops. **1**

_____

(ii) Describe how this abiotic factor is measured to obtain reliable results. **2**

_____

_____

_____

(c) There are 2700 farms in Scotland which grow potatoes. The total area used to grow potatoes in 2014 was 28 500 hectares.

Calculate the average area used to grow potatoes on each Scottish farm in 2014. **1**

Space for working

_____ hectares

2. (continued)

(d) Potato blight is most likely to occur when the minimum temperature is 10 °C or more and the humidity is 90% for at least 11 hours.

A farmer monitored the temperature and the time humidity was equal to or more than 90% in the potato crop.

The table below shows the results for one week in June.

Date	*12th June*	*13th June*	*14th June*	*15th June*	*16th June*	*17th June*	*18th June*
Minimum temperature (°C)	3·7	10·5	7·8	8·6	6·6	10·9	7·4
Number of hours humidity is equal to or more than 90%	5·0	11·0	11·0	10·0	12·0	10·0	7·0

(i) Give the date on which potato blight was most likely to occur. **1**

(ii) Suggest a strategy the farmer could use to reduce the likelihood of an outbreak of potato blight in the crop. **1**

(e) Scottish potato consumption is decreasing because consumers are opting for alternative products such as rice, which cannot be grown in Scotland.

Explain the environmental impact that may arise if the consumption of rice increases. **2**

[Turn over

3. Crude oil is a valuable global resource which is extracted from the Earth, refined and used for industrial, domestic and agricultural purposes.

(a) Place the statements below into the correct order to reflect the stages in the formation of oil. **2**

A Organic material slowly turns into crude oil

B Being less dense, oil moves upwards into the overlying sandstone

C Organic material is changed by pressure and heat

D Organic material falls to the ocean floor

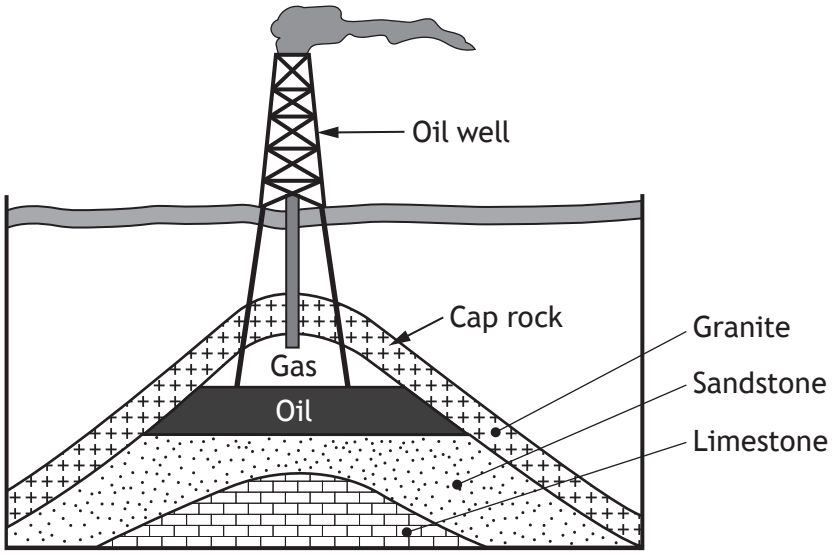
E Organic material gets buried beneath sand and mud on the ocean floor.

Give only the letters

D _____ _____ _____ _____ _____

3. (continued)

(b) The diagram below shows an oil well.



(i) Name the igneous rock shown in the diagram. **1**

(ii) Describe the property of sandstone that allows it to hold oil.
You may wish to include a diagram as part of your answer. **2**

[Turn over

3. (continued)

(c) The table below shows the oil and gas reserves for the well between 1994–2002.

Year	*Oil and Gas Reserves* (million tonnes)
1994	5·7
1995	5·2
1996	5·1
1997	5·0
1998	4·5
1999	4·4
2000	3·5
2001	3·3
2002	3·1

(i) Describe the trend in the oil and gas reserves between 1994 and 2002. **1**

_____

(ii) Calculate the percentage change in the oil and gas reserves between 1994 and 2002. **1**

Space for calculation

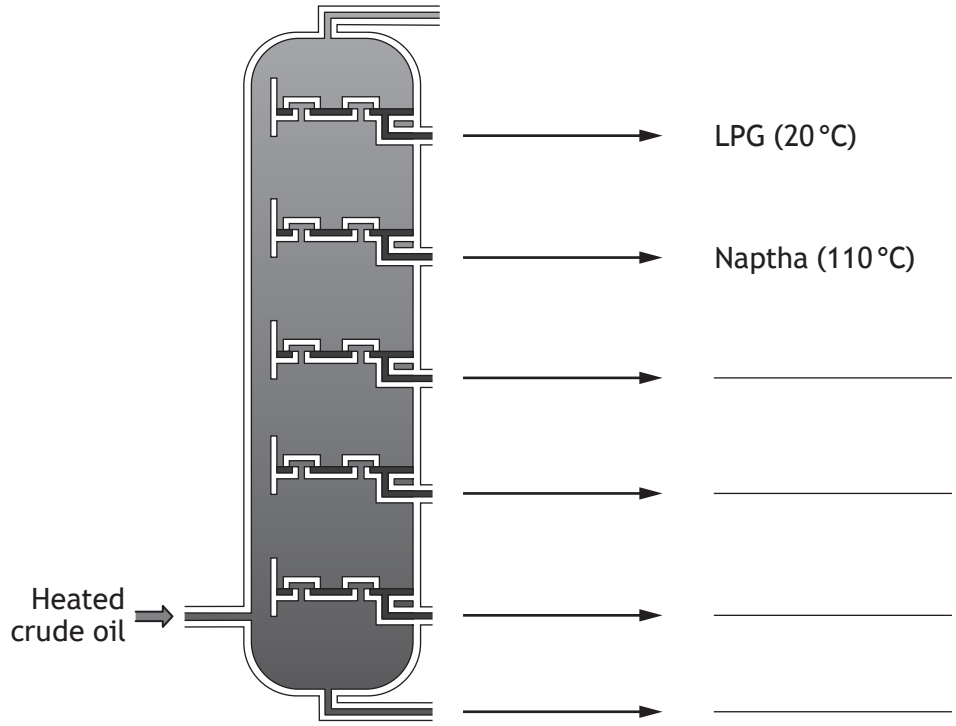
_____%

3. (continued)

(d) Crude oil is refined using the process of fractional distillation.

Complete the diagram below using the information given in the box to show the order in which the different fractions are separated. **2**

Kerosene (250 °C); Petrol (160 °C); Diesel (320 °C); Bitumen (400 °C)



(e) Current oil usage is not sustainable.

Describe one domestic and one industrial approach to reducing oil use. **2**

Domestic _____

_____

_____

Industrial _____

_____

_____

[Turn over

4. (a) The release of carbon dioxide into the atmosphere as a result of human activities has a significant effect on the planet.

State the term used to describe this effect. **1**

_____

(b) The table below shows the carbon emissions from selected countries, by burning fossil fuels, as a percentage of the global total.

Country	*Carbon emissions as a percentage of the global total*
United States	21
China	19
Russia	6
Japan	5
India	4
Germany	3
Canada	2
United Kingdom	2
Other countries	

Calculate the carbon emissions for the Other countries as a percentage of the global total. **1**

Space for working

_____%

(c) The global total is 7596 million tonnes.

Calculate the emissions produced by Japan. **1**

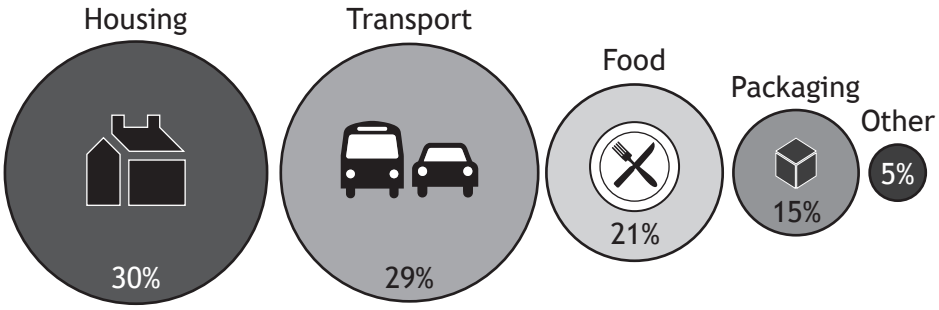
Space for working

_____ million tonnes

5. The Scottish Government is committed to a sustainable approach for reducing greenhouse gas emissions in order to meet their 2013–2027 targets.

(a) Suggest one way in which the Scottish Government can ensure that its targets for reducing greenhouse gas emissions are met. **1**

(b) The diagram below shows the percentage of carbon emissions by category, produced by Scotland's population.



Suggest one action that individuals could take to reduce carbon emissions for each of the housing and packaging categories. **2**

Housing _____

Packaging _____

(c) Calculate, as a simple whole number ratio, the percentage of carbon emissions from housing compared with those from packaging. **1**

Space for working

_____ : _____

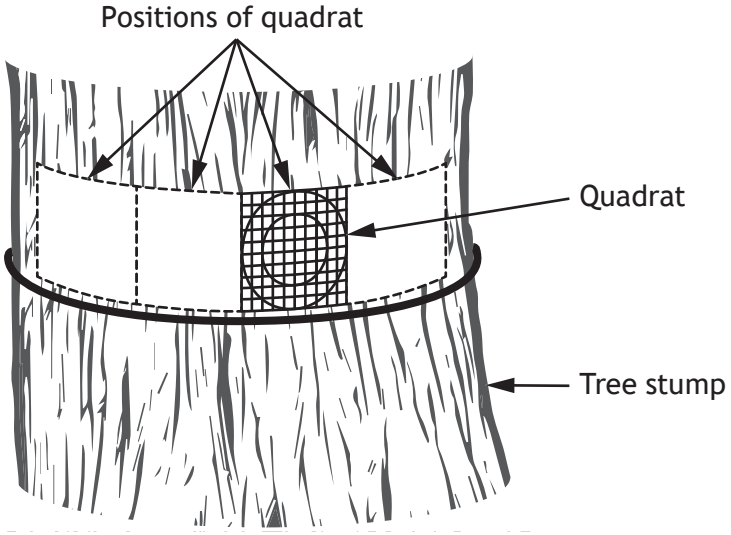
(d) Other than carbon dioxide, name one greenhouse gas. **1**

DO NOT WRITE IN THIS MARGIN

6. *Pleurococcus vulgaris* (*P. vulgaris*) is one of many species of algae found growing on tree stumps.

The distribution of *P. vulgaris* was investigated on an isolated tree stump.

A quadrat was placed at different positions around the stump and each position was determined by compass point. The quadrat was used to estimate the percentage cover of *P. vulgaris*.



The results at each compass point are shown in the table below.

Compass Point	*Percentage cover of P. vulgaris* (%)
W	56
NW	91
N	100
NE	100
E	87
SE	32
S	10
SW	24

6. (continued)

(a) *P. vulgaris* is a producer.

State the meaning of the term producer. **1**

_____

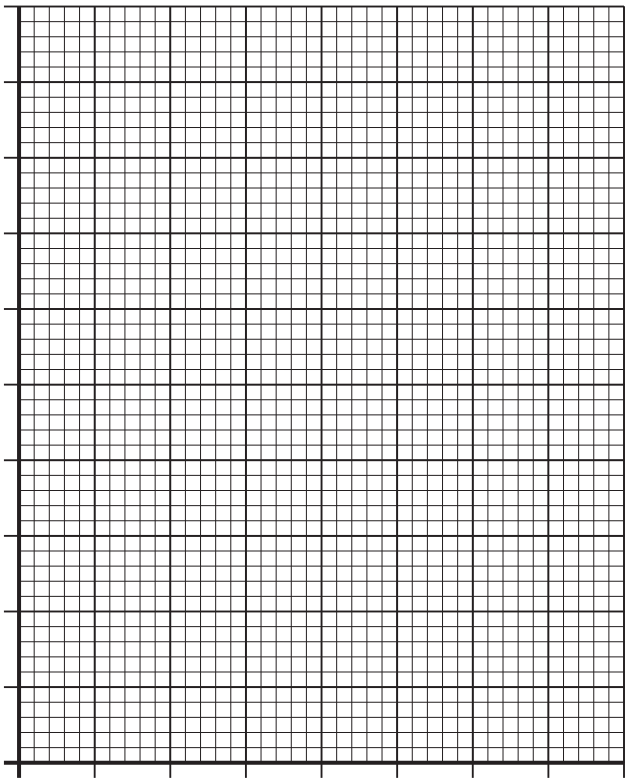
_____

(b) Using the information in the table, complete the bar graph below to show the percentage cover of *P. vulgaris* at each compass point by:

(i) adding the scale and label to the vertical (y) axis;

(ii) adding labels to the horizontal (x) axis;

(iii) completing the bar graph. **3**



(Additional graph paper, if required, can be found on *Page 27*.)

[Turn over

6. (continued)

(c) (i) Using the data, draw a conclusion about the distribution of *P. vulgaris* on tree stumps. **1**

_____

_____

(ii) State a biotic factor that may affect the distribution of *P. vulgaris* on tree stumps. **1**

_____

(d) Decide if each of the following statements is True or False, and tick (✓) the appropriate box.

If the statement is False, write the correct word in the Correction box to replace the word(s) underlined in the statement. **3**

Statement	True	False	Correction
Biodiversity is the variety of habitats in an area.			
The population is all of the living organisms in the ecosystem.			
Niche is the role an organism plays in an ecosystem.			

[Turn over for next question

DO NOT WRITE ON THIS PAGE

7. Some farmers produce food using organic farming methods.

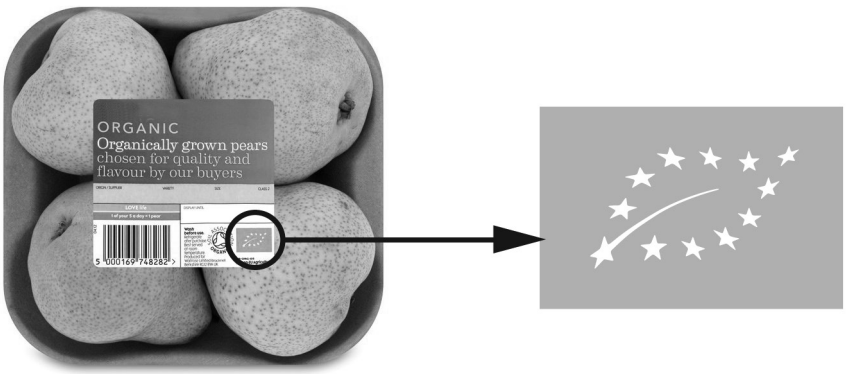
(a) Explain what is meant by the term "organic farming". **1**

(b) Describe **and** explain one advantage to the farmer of producing foods using organic farming methods. **2**

(c) Some people believe that organic farming methods help protect the environment.

Name one piece of legislation used to protect the environment. **1**

(d) Organic food production in the European Union (EU) is strictly regulated. Pre-packaged organic foods that have been produced in the EU must display the EU organic production logo as shown below.



(i) Suggest one advantage to the **consumer** of having a European Union approved logo for organically produced food. **1**

7. (d) (continued)

(ii) Tick (✓) the box to indicate whether or not you would choose organically produced food products and justify your choice. **1**

Would choose organically produced food ☐

Would not choose organically produced food ☐

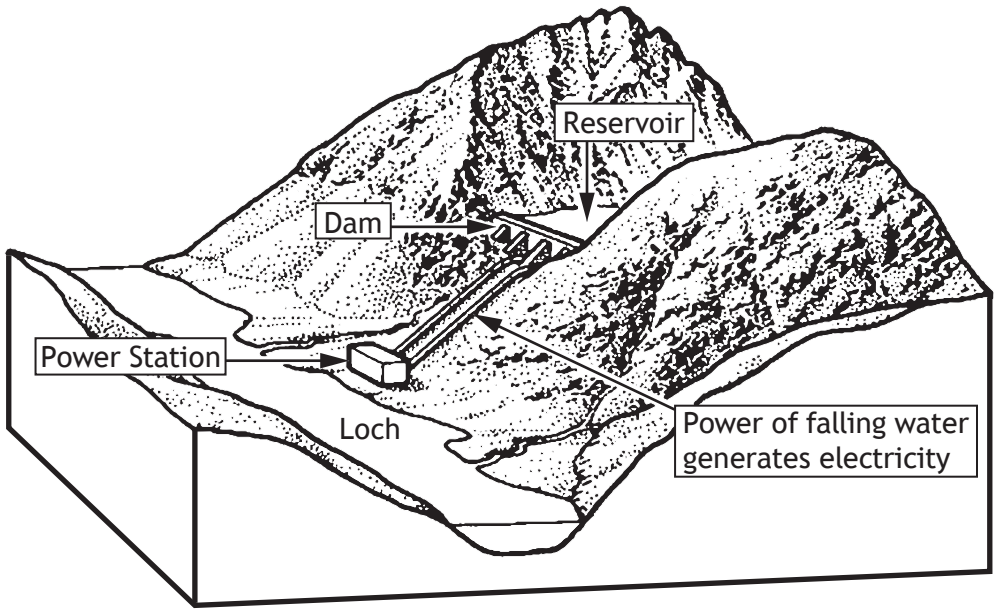
Justification _____

_____

_____

[Turn over

8. The diagram below shows the location of a hydroelectric power scheme.



(a) (i) Explain why this is a suitable site for a hydroelectric power scheme. **3**

(ii) Suggest one disadvantage of building a hydroelectric power scheme in this location. **1**

(b) State the energy change involved as water passes through the turbines in the power station. **1**

8. (continued)

(c) (i) The power generated in this way is a form of renewable energy.
State what is meant by the term renewable energy. **1**

_____

(ii) Give one other example of a source of renewable energy. **1**

_____

[Turn over

9. Plastic debris on beaches and in the oceans has increased over the last few decades because of the increased use of plastics in everyday consumer items.

The OSPAR Commission is a European organisation which aims to reduce marine litter in the North East Atlantic.

(a) Name one national organisation relating to waste management in Scotland. **1**

_____

(b) Suggest one way in which marine litter could be reduced. **1**

_____

(c) The Northern fulmar is a seabird that feeds in the North Sea. They frequently mistake plastic floating on the surface for prey and eat it alongside food items. The ingested plastic can damage birds' digestive systems and lead to death.

A survey of the stomach contents of 796 beached, dead Northern fulmars around the North Sea showed that 62% of the birds had at least 0·1 g of plastic in their stomach.

Calculate, to the nearest whole number, the number of Northern fulmars with at least 0·1 g of plastic in their stomach. **1**

Space for calculation

_____ Northern fulmars

9. (continued)

(d) Unlike most seabirds, Northern fulmars cannot expel the plastic from their stomachs. The content of plastic in their stomachs can be used as a measure of the abundance of marine litter.

The map below shows the regional differences in the percentage of Northern fulmars with at least 0·1 g of plastic in their stomachs.

(i) Describe the trend shown by the data. **1**

(ii) Suggest an explanation for the trend shown by the data. **1**

[Turn over

9. (continued)

(e) Scientists use a variety of plant and animal species as indicators to monitor environmental conditions.

Name one indicator species and describe the environmental condition it indicates. **2**

Species _____

Environmental condition _____

_____

Write your answers to questions 10 and 11 on the following pages. Diagrams may be used where appropriate.

10. (a) Fishing is a traditional Scottish industry, however in recent years fish stocks have reduced.

Describe and explain approaches to conserve fish stocks. **7**

OR

(b) The introduction of non-native species to the UK has caused widespread concern.

Using a named example, describe the impacts of a non-native species. **7**

11. (a) Water is a valuable resource for the human population.

Describe the water cycle and explain sustainable approaches to water conservation. **7**

OR

(b) The atmosphere contains approximately 80% nitrogen.

Describe the nitrogen cycle and explain its contribution to food production. **7**

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

SPACE FOR ANSWERS

MARKS | DO NOT WRITE IN THIS MARGIN

SPACE FOR ANSWERS

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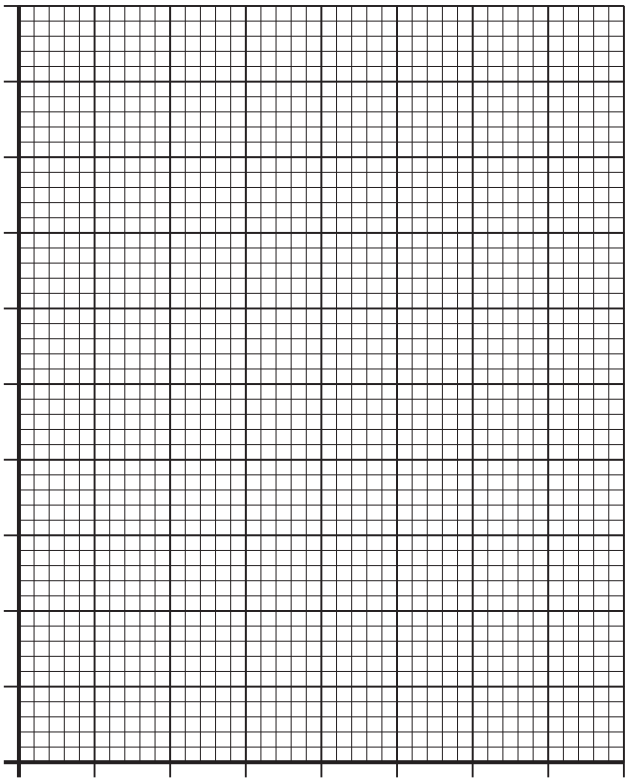
SPACE FOR ANSWERS

[END OF QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS AND ROUGH WORK

Additional graph paper for Question 6 (b)



ADDITIONAL SPACE FOR ANSWERS AND ROUGH WORK

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