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N5

National
Qualifications
2021 ASSESSMENT RESOURCE

Mark

X826/75/01 Environmental Science

X8267501

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

SECTION 1 — 66 marks
Attempt ALL questions.

SECTION 2 has been removed.

SECTION 3 — 14 marks
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.

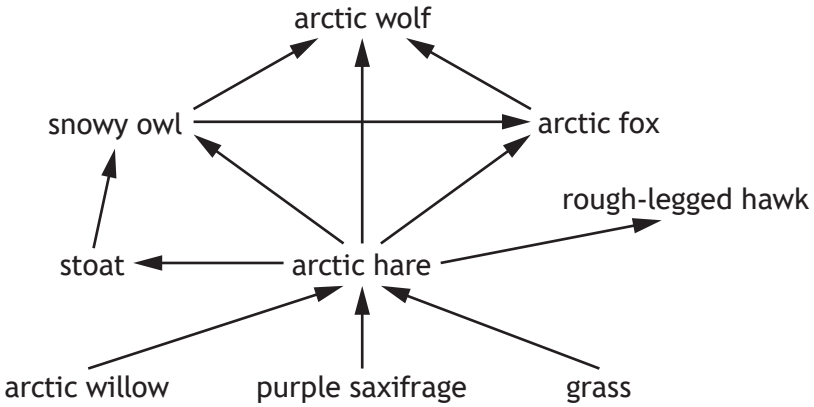
SQA ©

X8267501

SECTION 1 — 66 marks

Attempt ALL questions

1. (a) The food web shows some of the organisms in the tundra ecosystem.



(i) State the source of energy for the food web. **1**

(ii) Identify one herbivore from the food web. **1**

(iii) Explain why there are arrows pointing both towards and away from the arctic fox. **2**

(iv) Suggest how the snowy owl and rough-legged hawk avoid competition for the arctic hare. **1**

1. (continued)

(b) The image shows a stoat.

A team of scientists used the capture-mark-recapture method to estimate the stoat population.

During the first trapping session they captured 12 stoats and marked them. The marked stoats were then released.

During the second trapping session 15 stoats were captured, 5 of which were already marked.

(i) Suggest a way in which the stoats could be marked by the scientists. **1**

(ii) Calculate the estimated stoat population using the formula

$$N = \frac{MC}{R}$$

where N is the estimated stoat population

M is the number captured in 1st trapping session

C is the number captured in 2nd trapping session

R is the number of marked stoats in the 2nd sample. **1**

Space for calculation

1. (continued)

(c) The coat colour of the stoat changes from brown in the summer to white in the winter.

(i) Suggest an advantage to the stoat of this colour change. **1**

(ii) State the term used to describe a feature, such as colour change, which allows the stoat to live successfully in its habitat. **1**

(iii) Increasing temperature in the stoats' habitat is causing a reduction in snowfall.

Suggest an impact on the stoat caused by a reduction in snowfall.

Explain your answer. **2**

2. It is estimated that one in every six children does not have access to clean water. According to the United Nations Children's Fund (UNICEF) about 1·5 million children worldwide die every year from waterborne diseases such as dysentery, cholera and salmonellosis. Most of these children live in developing countries that do not have access to a clean water supply.

If everyone who did not have access to a clean water supply boiled their drinking water such deaths could be avoided. It is usually a lack of fuel for boiling the water that forces people to drink water that is unsafe.

(a) Using information from the passage, name a disease that can be spread through water supplies. **1**

_____

(b) Suggest **two** reasons why families might lack fuel for boiling water. **2**

1 _____

_____

2 _____

_____

[Turn over

2. (continued)

(c) The Jompy Boiler, an innovation by a Scottish plumber, could reduce the number of people drinking contaminated water. It takes the form of a tightly coiled metal tube that sits over a fire.

Cold, contaminated water goes in one end of the tube and as it moves through the coil it is heated to boiling point. This kills water-borne diseases. Boiled, clean water comes out of the other end of the tube. While it is being used, a cooking pan may be placed on top of the coil.

(i) The Jompy Boiler can produce clean water at a rate of 1 litre per minute.

Each person requires 3 litres of clean water for drinking and cooking per day.

Calculate how long it will take to produce enough clean water for a family of 5 for 1 week. **2**

Space for calculation

2. (c) (continued)

(ii) Suggest how the Jompy Boiler can help contribute to sustainable development. **1**

_____

_____

(d) The quality of water in Scotland is monitored.

Name the national organisation responsible for monitoring water quality in Scotland. **1**

_____

_____

(e) Give one way in which you could reduce water use in the home. **1**

_____

_____

[Turn over

3. There are 8 million pet dogs and 8 million pet cats in the UK.

(a) Like people, pets also have a carbon footprint.

State what is meant by the term *carbon footprint*. **1**

(b) A pet's annual 'ecological footprint' can also be measured. This is the area of land needed to support a pet. The units of an ecological footprint are global hectares (gha).

A cat has an annual ecological footprint of 0·15 gha, which is about the same as is needed for a small car. Smaller pets such as a goldfish (0·00034 gha), a hamster (0·014 gha) and a budgie (0·007 gha) have much less impact on the environment.

(i) Complete the table to show the annual ecological footprints of the pets mentioned by

- adding appropriate headings
- arranging the pets in order from smallest to largest annual ecological footprint
- completing the annual ecological footprint for each pet. **3**

3. (b) (continued)

(ii) A border collie needs 280 kg of dog food per year.
One kilogram of dog food requires 0·003 gha to produce.
Calculate the ecological footprint of the border collie. **1**

Space for calculation

_____ gha

[Turn over

4. The Kelpies are horse-head sculptures made from stainless steel. Each Kelpie is 30 metres high and weighs 300 tonnes.

Stainless steel is a mixture of iron and other elements.

(a) Name one use of iron other than for sculptures. **1**

(b) (i) The iron used to make the stainless steel sculptures was extracted from iron ore.

Describe the formation of iron ore. **2**

(ii) Name the industrial equipment used to process the iron from the iron ore. **1**

4. (continued)

(c) The percentage of iron in stainless steel can vary. It can range from 90–95% of the total mass.

Calculate the **maximum** mass of iron contained in **both** the Kelpies. **1**

Space for calculation

_____tonnes

(d) Scale models of the Kelpies were made. These are transported around the country and displayed to encourage people to visit the full size sculptures.

The models are made on a 1:10 scale.

(i) Calculate the height of the scale model Kelpies. **1**

Space for calculation

_____ m

(ii) Describe one environmental impact of transporting the scale model Kelpies. **1**

_____

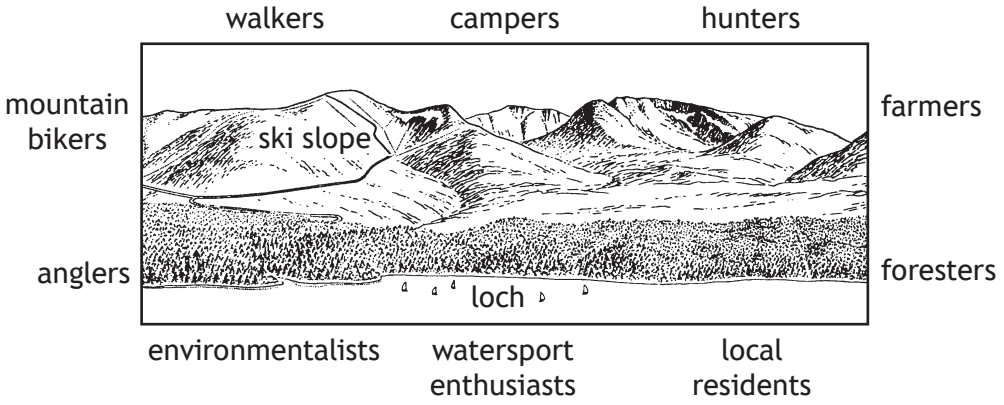
_____

[Turn over

5. The Cairngorm National Park in Scotland contains several Sites of Special Scientific Interest (SSSIs).

(a) State one reason why an area may be designated as an SSSI. **1**

(b) The Cairngorm National Park has a range of terrestrial and aquatic environments. Many people visit, live and work in the Cairngorms. Some of these stakeholders are identified in the diagram.

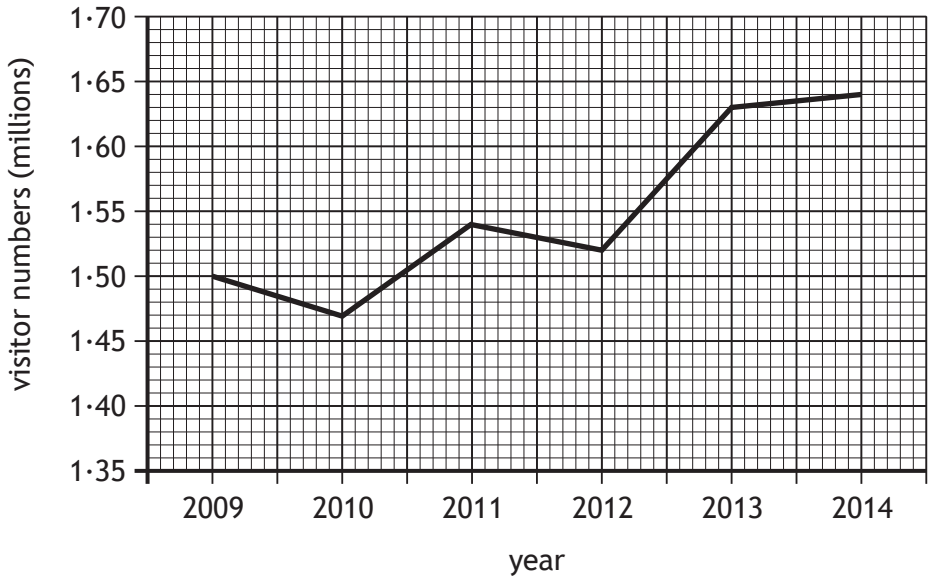


(i) Using the diagram, identify two stakeholders who may come into conflict and suggest **two** reasons why conflict may occur between them. **2**

(ii) Describe how these conflicts could be reduced. **2**

5. (continued)

(c) The graph shows the number of visitors to the Cairngorm National Park over a 5 year period.



Calculate the percentage increase in visitor numbers from 2009 to 2014. **2**

Space for calculation

_____%

[Turn over

5. (continued)

(d) The table provides information about some of the species found in the Cairngorms.

Species		Habitat	Food source
	pine marten	native and plantation forest	nuts, berries, eggs, small rodents
	red deer	moorland, native forest	grasses, heather, shrubs, trees
	red grouse	heather moorland	heather shoots, small invertebrates
	golden eagle	moorland, mountain	small mammals, birds

(i) From the table, identify an omnivore. **1**

_____

(ii) Red deer are hunted in the Cairngorms.

Suggest a reason for and a reason against hunting as a sustainable activity. **2**

_____

_____

_____

_____

5. (d) (continued)

(iii) After many years of decline, golden eagles and pine martens are increasing in numbers.

Suggest how human activities may have contributed to this increase in numbers. **1**

(iv) The Cairngorms include large areas of forest.

Explain the differences between native and plantation forestry. **2**

(v) Name the national organisation with responsibility for conservation and education about environments such as the Cairngorms. **1**

[Turn over

6. The Scottish Government has set a target for 100% of Scotland's electricity to be produced by renewable sources.

The construction of wind farms is one way that the Scottish Government is planning to meet this target.

(a) Describe the energy change in a wind turbine. **1**

_____

_____

(b) Suggest one benefit to the environment of wind farms. **1**

_____

_____

(c) Wind farms can be located on land or offshore. The largest offshore wind farm is being constructed off the coast of Scotland. It will eventually provide one million households with electricity.

(i) There are 2·5 million households in Scotland.

Calculate the percentage of Scottish households that the offshore wind farm will provide with electricity. **1**

Space for calculation

_____ %

(ii) Suggest two advantages of locating the wind farm offshore. **2**

_____

_____

_____

_____

6. (continued)

(d) Some people disagree with siting the wind farm off the coast of Scotland.

From the list below underline one group of people who might disagree with siting the wind farm off the coast of Scotland and suggest a reason why they might disagree. **1**

Fishermen Coastal hotel owners Sailing clubs

Reason _____

_____

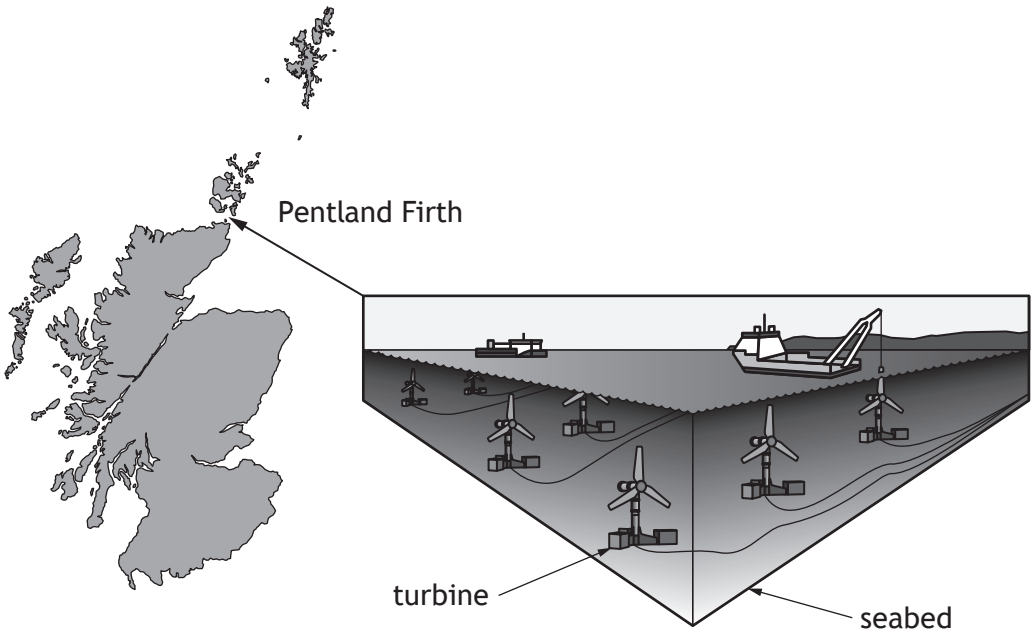
(e) Name a non-renewable source of energy used for generating electricity. **1**

_____

_____

[Turn over

7. The Pentland Firth tidal power plant will be the biggest tidal turbine power plant in Europe.



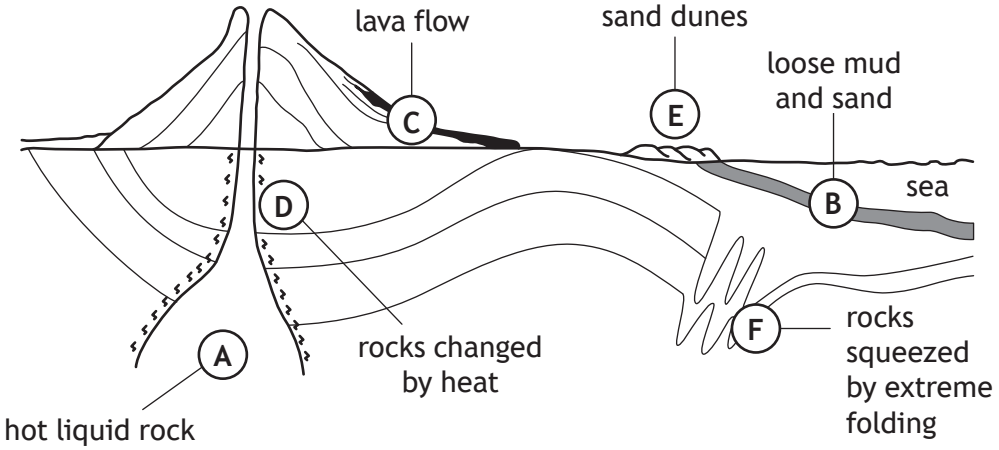
(a) State three factors that need to be taken into consideration when deciding where to site a tidal power plant. **3**

(b) Suggest one environmental and one economic impact on the local area, arising from the use of a tidal power plant. **2**

Environmental

Economic

8. (a) The diagram shows a section of the Earth's crust.



(i) Complete the table by naming the rock type that will form at each location.

Choose from igneous, sedimentary and metamorphic. **3**

Letter on diagram	Type of rock
A	
B	
C	
D	
E	
F	

(ii) The sand at position B will eventually turn into a porous rock.

Give two reasons why the rock formed in this area will contain water. **2**

Reason 1 _____

_____

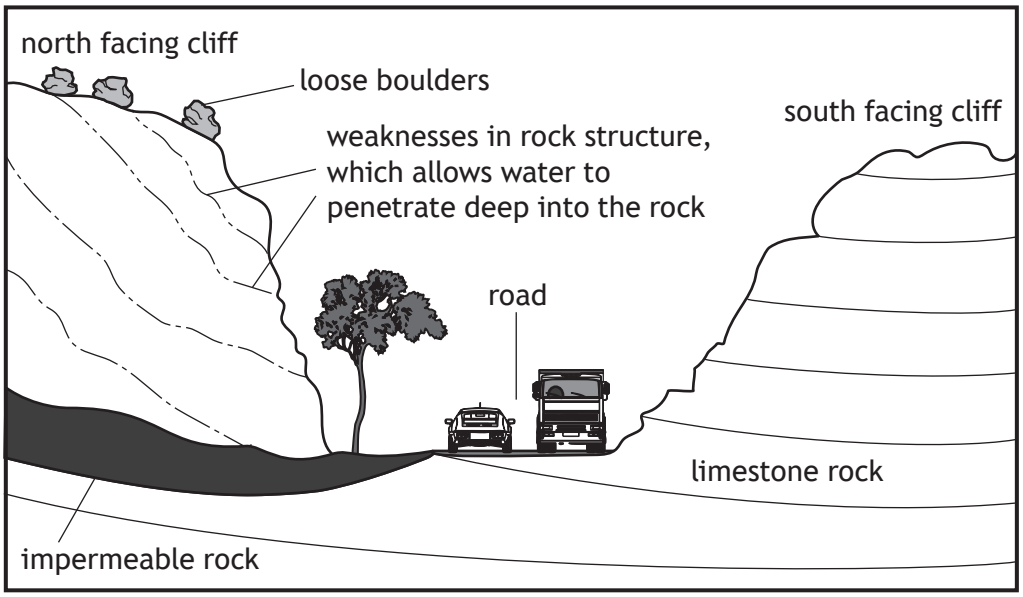
Reason 2 _____

_____

[Turn over

8. (continued)

(b) A glen in the Scottish Highlands has a very wet climate. Temperatures often drop below freezing point, especially during the night.



(i) Name two weathering processes that will affect the cliff faces on the sides of the glen. **2**

Process 1 _____

Process 2 _____

(ii) The Scottish Government sends geologists to inspect the north facing cliff face before the start of every winter.

Suggest two reasons why this is necessary. **2**

_____

_____

_____

_____

_____

SECTION 3 — 14 marks

Questions 10 and 11 each contain a choice

Write your answers to questions 10 and 11 on the following pages.

You may use diagrams where appropriate.

10. A The image shows some of the activities on a farm.

Choose activities associated with the image and

- describe ways that the activities can cause damage to the environment
- discuss the potential solutions for reducing the damage. **7**

OR

B Scotland's fish stocks are of valuable economic importance.

Discuss ways in which fish stocks can be conserved. **7**

11. A The atmosphere contains approximately 80% nitrogen.

Describe the nitrogen cycle and its role in sustaining life on Earth. **7**

OR

B Carbon is an element found in all living things.

Describe the carbon cycle and its role in sustaining life on Earth. **7**

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

SPACE FOR ANSWERS

SPACE FOR ANSWERS

MARKS | DO NOT WRITE IN THIS MARGIN

SPACE FOR ANSWERS

[END OF QUESTION PAPER]

MARKS | DO NOT WRITE IN THIS MARGIN

ADDITIONAL SPACE FOR ANSWERS AND ROUGH WORK

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ADDITIONAL SPACE FOR ANSWERS AND ROUGH WORK

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