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National
Qualifications
SPECIMEN ONLY

Mark

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S826/76/01

Environmental Science Paper 1

Date — Not applicable

Duration — 45 minutes



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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Number of seat

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Date of birth

Day

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Month

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Year

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Scottish candidate number

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Total marks — 20

Attempt ALL questions.

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.

Do not remove any exam materials. You must leave this booklet on your desk; if you do not, you could lose all the marks for this paper.



Total marks — 20
Attempt ALL questions

The Forest of Glen Tanar in Aberdeenshire is the third largest expanse of native Scots pine (*Pinus sylvestris*) in the UK. It was designated a National Nature Reserve (NNR) in 1979 and a Site of Special Scientific Interest (SSSI) in 1984.

The site is of national and European importance for the Scots pine forest, and is also important for its open moorland habitats, including heathland and blanket bog, and for its woodland and moorland birds, insects, and fungi.

The forest lies almost entirely within the Cairngorms National Park. Most nature conservation management of the SSSI is carried out through a NNR Management Agreement with Glen Tanar Estate.

A sports organisation is seeking permission to hold a car rallying stage within the Forest of Glen Tanar. They want to use the Glen Tanar area for one week in June. They will make use of existing forest tracks, with the proposed route passing mostly through areas of semi-managed Scots pine woodland and moorland.

The World Rally Championship (WRC) promotes motorsports. Its Sustainability Roadbook lays out a strategic framework for improving sustainability within the sport, focusing on climate change, natural environment, people and communities, and public policy and societal relevance.

The Cairngorms National Park receives over two million visitors annually. The value of tourism in the park was estimated to be £491 million in 2024. The car rally draws international attention each year and is expected to attract an additional 4000 visitors into the area during the rally stage. This will contribute significantly to the local economy.

An assessment of potential impacts of the rally stage on the area must be undertaken before permission is granted to the sports organisation.



1. (a) **Source B** shows the key aims of the Cairngorms National Park. These are referred to when considering proposed developments within the park.
Suggest why the Cairngorms National Park may have difficulty fulfilling all these aims. 2
- (b) **Source C** shows the percentage of employment by industry sector within the Cairngorms National Park, the Highlands and Islands, and Scotland.
- (i) Identify the sector with the greatest percentage employment within the Cairngorms National Park. 1
- (ii) Suggest one advantage and one disadvantage of so many people being employed in this one industry sector. 2
- Advantage:
- Disadvantage:
- (iii) The most recent population survey estimated the population living within the Cairngorms National Park boundary to be 24 882.
Using information from **Source C**, calculate how many people are employed in the agriculture, forestry, and fishing sector within the Cairngorms National Park. 1
- Space for working*

[Turn over



1. (continued)

- (c) In addition to forestry, the land around Glen Tanar is currently used for hill sheep farming, hunting, fishing, walking, mountain biking, horse riding, wildlife photography, and estate safaris.

Suggest one reason why such land users might object to the proposed rally stage in the Forest of Glen Tanar.

1



2. (a) Ecologists surveying the proposed rally area used an index of diversity to compare common woodland bird species present in three areas that may be affected by the rally.

The surveyed areas are marked on **Source A** as Site 1, Site 2, and Site 3.

The index is calculated using the formula below.

$$I = \frac{\text{sum of absolute (positive) differences from mean}}{\text{number of species}}$$

The higher the index value, the lower the species diversity at the site.

The ecologists collected the following data.

Bird species	Number of birds recorded at each site		
	Site 1	Site 2	Site 3
Blackbird (<i>Turdus merula</i>)	20	10	2
Chaffinch (<i>Fringilla coelebs</i>)	25	8	7
Rook (<i>Corvus frugilegus</i>)	14	17	6
Siskin (<i>Spinus spinus</i>)	15	10	24
Song thrush (<i>Turdus philomelos</i>)	6	15	11

They used the following table to calculate the index for each site.

Bird species	Site 1		Site 2		Site 3	
	Number of individuals	Difference from mean	Number of individuals	Difference from mean	Number of individuals	Difference from mean
Blackbird	20	4	10	2	2	
Chaffinch	25	9	8	4	7	
Rook	14	2	17	5	6	
Siskin	15	1	10	2	24	
Song thrush	6	10	15	3	11	

Mean	16	–	12	–		–
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Sum of differences from mean	–	4 + 9 + 2 + 1 + 10 = 26	–	16	–	
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Index	26 ÷ 5 = 5.2	3.2	
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MARKS	DO NOT WRITE IN THIS MARGIN
2	
1	

2. (a) (continued)

(i) Calculate the index for Site 3.

(ii) State which of the three sites has the greatest species diversity.
Justify your response.



2. (continued)

- (b) Glen Tanar SSSI is known to be very rich in invertebrates. Some species are only found in Scots pine woodland.

The table shows some species of beetles named in the SSSI citation, and their preferred habitat.

Beetle species	Preferred habitat
<i>Chrysanthia nigricornis</i>	Well-rotted fallen pine branches
<i>Dictyoptera aurora</i>	Larvae develop in rotting pine trunks
<i>Dendrophagus crenatus</i>	Below bark on recently fallen pine branches
<i>Rhagium inquisitor</i>	Below bark on recently fallen pine branches
<i>Rhagium bifasciatum</i>	Well-rotted pine branches
<i>Quedius anthopus</i>	Rotten pine stumps
<i>Pytho depressus</i>	Recently fallen pine trunks
<i>Pityogenes quadridens</i>	Rotting pine bark

Select which **one** of the following sampling methods would be most appropriate for assessing the populations of the named beetles.

Justify your answer.

2

- transect and quadrat
- capture-mark-recapture
- paired statement key

[Turn over



* S 8 2 6 7 6 0 1 0 7 *

2. (continued)

- (c) The top speed of a rally car is around 140 mph, although the average speed can be significantly lower.

Suggest an environmental impact of high-speed rallying within the forest.

1

- (d) The motorsports organisation would deploy a 'self-repair team' to manage the impact of the rally cars on the forest tracks. Following the event, this team would ensure that the tracks are returned to their previous state.

Suggest a reason why this would not fully address the environmental impacts of the rally.

1

- (e) **Source E** shows how the WRC plans to achieve its sustainability strategy, and some of the 17 UN Sustainable Development Goals the strategy will address.

In a response to a planned ban of all new petrol and diesel cars by 2035, the WRC has been researching innovative approaches to fuel the rally cars. This includes using 100% fossil-free fuels.

State one source of fossil-free fuel that could be used to power a rally car.

1



3. A decision must be made about whether to grant permission to run the car rally through the Forest of Glen Tanar.

Using evidence from the sources and your knowledge of environmental science, decide whether permission should be granted.

Justify your answer.

5

☐

Grant permission

☐

Do not grant permission

[END OF SPECIMEN QUESTION PAPER]



* S 8 2 6 7 6 0 1 0 9 *

ADDITIONAL SPACE FOR ANSWERS AND ROUGH WORK

DO NOT
WRITE IN
THIS
MARGIN



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ADDITIONAL SPACE FOR ANSWERS AND ROUGH WORK

DO NOT
WRITE IN
THIS
MARGIN



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S826/76/11

Environmental Science Paper 1 — Supplementary source booklet

Date — Not applicable

Duration — 45 minutes

Supplementary sources of information

Source A is a map extract showing the Forest of Glen Tanar in Aberdeenshire.

Source B is a table showing the aims of the Cairngorms National Park.

Source C is a graph showing percentage employment by industry sector of people living within the Cairngorms National Park, the Highlands and Islands, and Scotland.

Source D is a table of information about the proposed rally stage in the Forest of Glen Tanar.

Source E is a table showing World Rally Championship (WRC) objectives and associated UN Sustainable Development Goals

Acknowledgement of Copyright

Source A Map extract of Glen Tanar is taken from http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=724. Produced by: Geographic Information Group, SNH, 2011. Reproduced by kind permission of Scottish Natural Heritage Sitelink. © Crown Copyright and database rights (2017) – OS OpenData.

Source B Aims of the Cairngorms National Park are taken from <http://cairngorms.co.uk/authority>. Reproduced by kind permission of the Cairngorms National Park Authority.

Source C Chart is adapted from Page 6 of Cairngorms National Park Profile, 2014. Reproduced by kind permission Highlands and Islands Enterprise.

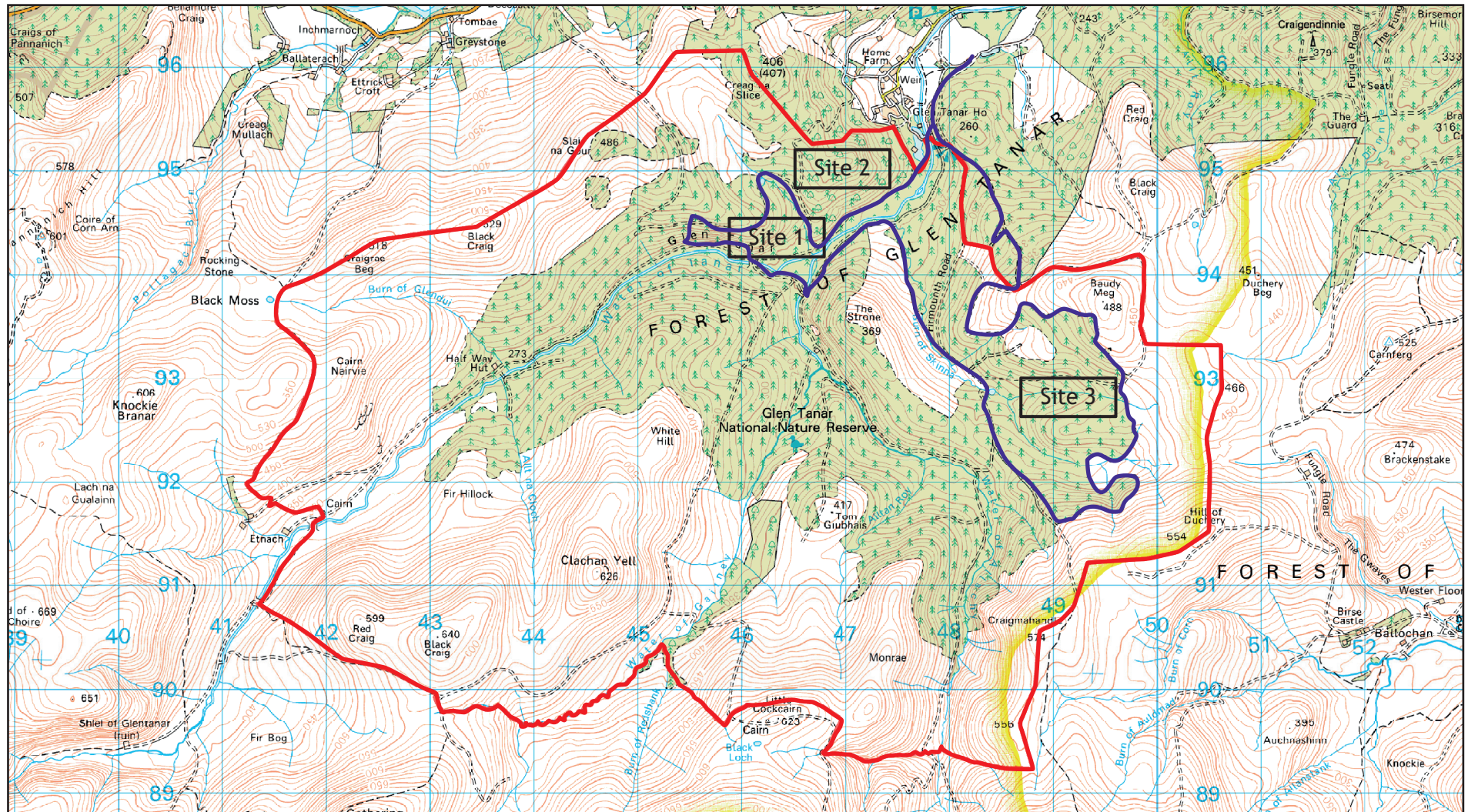
Source E World Rally Championship (WRC) Sustainability Roadbook (2024)
WRC Objectives are adapted from “World Rally Championship (WRC) Sustainability Roadbook (2024)”

Sustainable Development Goals icons are reproduced by kind permission of United Nations. (The content of this publication has not been approved by the United Nations and does not reflect the views of the United Nations or its officials or Member States.) <https://www.un.org/sustainabledevelopment/>

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Source A Map extract showing the Forest of Glen Tanar in Aberdeenshire



Key

- | | | | |
|---|------------------------|---|-----------------------------------|
|  | Coniferous woodland |  | Path / other road, drive or track |
|  | SSSI boundary |  | River |
|  | National Park boundary |  | Proposed rally route |
|  | Forest track |  | Site 1 Survey sites |

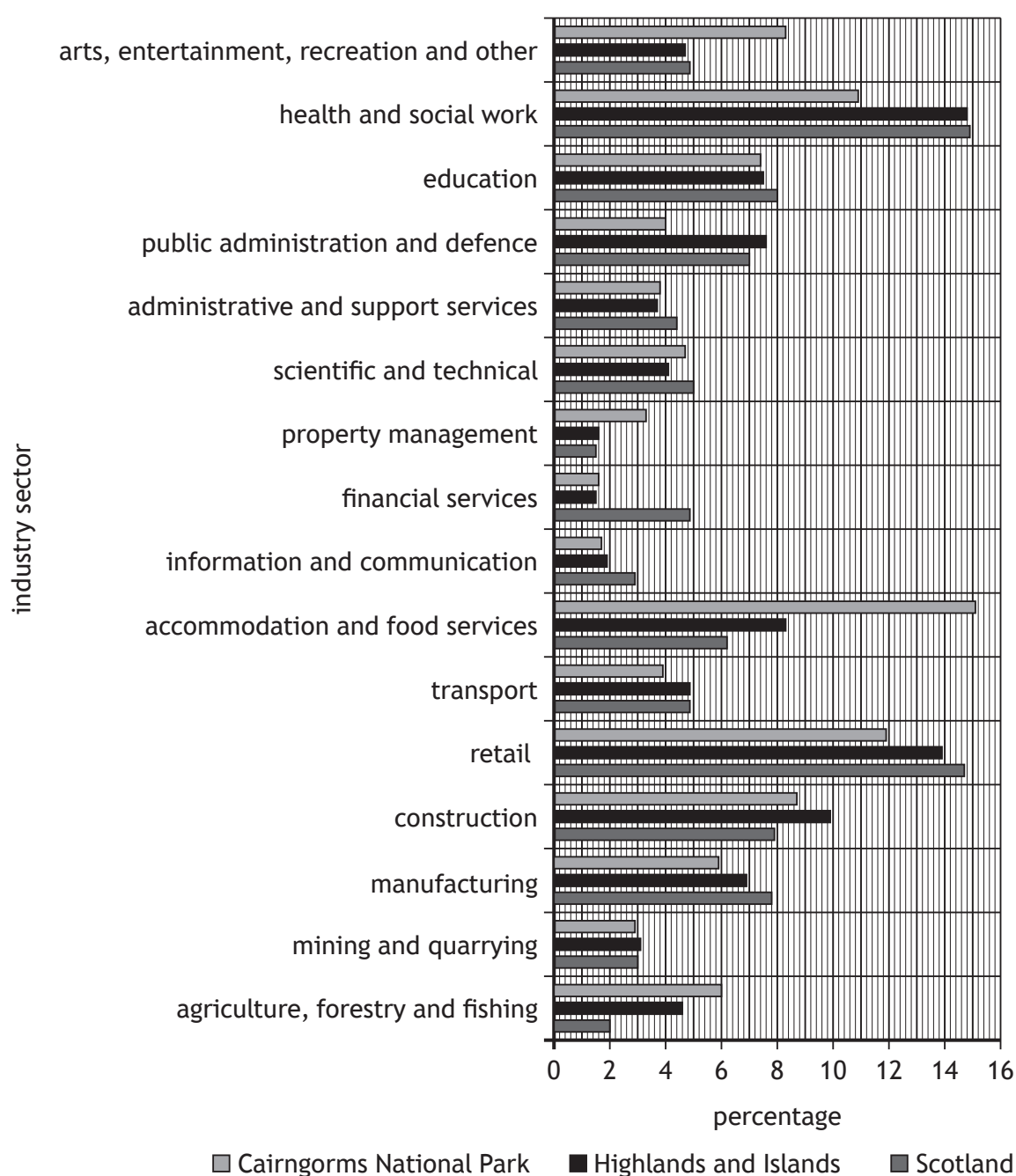
0 1
km



Source B Aims of the Cairngorms National Park

1. To conserve and enhance the natural and cultural heritage of the area.
2. To promote sustainable use of the natural resources of the area.
3. To promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public.
4. To promote sustainable, economic, and social development of the area's communities.

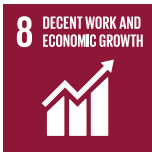
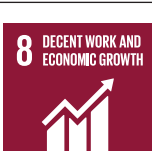
Source C Percentage employment by industry sector of people living within the Cairngorms National Park, the Highlands and Islands, and Scotland



Source D Information about the proposed rally stage in the Forest of Glen Tanar

- Access to the Forest of Glen Tanar is required for one week in June, with the rally stage taking place over one weekend.
- The rally is expected to attract international attention.
- The rally is predicted to bring in an additional 4000 visitors to the Glen Tanar area and Cairngorms National Park.
- The additional visitors will spend money in the area and contribute significantly to the local economy.
- The rally stage will make use of existing forest tracks, with the route passing through areas of semi-managed Scots pine woodland and moorland.
- Road signs will direct visitors to official car parks and spectator access points along the rally stage route. These access points will be located on minor country roads.
- Toilet facilities will be located at official spectator access points.
- Spectators will be encouraged to take their litter home, with a limited number of litter bins provided beside official toilet facilities.

Source E World Rally Championship (WRC) objectives and associated UN Sustainable Development Goals

WRC objectives	Associated UN Sustainable Development goals				
Climate — define science-based, near-term and net zero targets and develop a carbon reduction plan accordingly					
Biodiversity — understand and address the impacts of rallying on biodiversity and lead nature-positive action by 2030 and beyond					
Innovation — evolve sustainability innovation platforms					
Responsible management — achieve the international standard for sustainable event management, 3-star environmental accreditation, and meet sustainability criteria in procurement					
Social impact targets — promote diversity and inclusivity, and foster a positive social impact in the communities where our events take place					



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**Environmental Science
Paper 1**

Marking Instructions

These marking instructions have been provided to show how Qualifications Scotland would mark this specimen question paper.

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General marking principles for Environmental Science Higher

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

- (a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.
- (b) If a candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you should seek guidance from your team leader.
- (c) Where a candidate makes an error at an early stage in a multi-stage calculation, award marks for correct follow-on working in subsequent stages. Do not award marks if the error significantly reduces the complexity of the remaining stages. Apply the same principle in questions that require several stages of non-mathematical reasoning.
- (d) Award full marks for a correct final answer (including units if required) on its own with no working shown.
- (e) Candidates may access larger mark allocations fully, whether they respond in continuous prose, linked statements, or a series of discrete developed points.
- (f) In the detailed marking instructions, if a word is **underlined** then it is essential; if a word is **(bracketed)** then it is not essential.
- (g) In the detailed marking instructions, words separated by / are alternatives.
- (h) Do not award marks if a candidate gives two answers, where one is correct and the other is incorrect.
- (i) Where the candidate is instructed to choose one question to answer but instead answers both questions, mark both responses and award the better mark.
- (j) Award marks for a valid response, even if the response is not presented in the format expected. For example, award the mark if the response is correct but is not presented in the table as requested, or if it is circled rather than underlined as requested.
- (k) Candidates may use abbreviations (for example, BOD or GPP) or chemical formulae (for example, CO₂ or H₂O) as acceptable alternatives to naming, unless required by the question, but these must be correct. For instance, chemical formulae with an incorrect subscript or superscript component (for example CO²), or full-size number (for example CO2) should not be awarded the mark.
- (l) Award marks, up to the maximum mark allocation for the question, for content that is outwith the course specification but used appropriately at the correct level for Higher.
- (m) If candidates are required to give a numerical answer, and units are not given in the stem of the question or the answer space, they must supply the units to gain the mark.
- (n) If incorrect **spelling** is used:
 - and the term is recognisable, then award the mark;
 - and the term can easily be confused with another scientific term, then do not award the mark, for example bioaccumulation and biomagnification, or qualitative and quantitative;
 - and the term is a mixture of other terms, then do not award the mark.

(o) When presenting data:

- for marking purposes no distinction is made between bar charts (used to show discontinuous features, have descriptions on the x -axis and have separate columns) and histograms (used to show continuous features, have ranges of numbers on the x -axis and have contiguous columns)
- other than in the case of bar charts/histograms, if the question asks for a particular type of graph or chart and the wrong type is given, then do not award the plotting mark. Marks may still be awarded for other required components, as specified in the detailed marking instructions.
- do not award the relevant mark if the graph too small to check the accuracy of plotting; or if 0 is plotted when no data for this is given (ie candidates should only plot the data given)

(p) Award marks only for a valid response to the question asked. For example, in response to questions that ask candidates to:

- **identify, name, give, or state**, they need only name or present in brief form;
- **define**, they should give a statement of the definition;
- **calculate**, they must determine a number from given facts, figures, or information;
- **compare**, they must demonstrate knowledge and understanding of the similarities and/or differences between things;
- **describe**, they must provide a statement or structure of characteristics and/or features;
- **evaluate**, they must make a judgement based on criteria;
- **explain**, they must relate cause and effect and/or make relationships between things clear;
- **justify**, they must give reasons to support their suggestions or conclusions;
- **discuss**, they must write about a topic in detail, taking into account different issues or ideas;
- **outline**, they must provide a brief sketch of content - more than naming but not a detailed description;
- **predict**, they must suggest what may happen based on available information;
- **suggest**, they must apply their knowledge and understanding of Environmental Science to a new situation. A number of responses are acceptable: marks will be awarded for any suggestions that are supported by knowledge and understanding of Environmental Science.

Note that this list is not exhaustive.

Marking instructions for each question

Question			Expected response	Max mark	Additional guidance
1.	(a)		It would be difficult to conserve the natural and cultural heritage, (1 mark) while also encouraging people to make use of it. (1 mark) OR Development will result in damage/degradation of habitats or wildlife, (1 mark) so not meet the conservation aim. (1 mark) Or other valid response.	2	Response should refer to the impact of one aim on another aim.
	(b)	(i)	Accommodation and food services	1	
		(ii)	Advantages: Brings money into the area/jobs are flexible and would suit a wide range of circumstances. Disadvantages: Many jobs will be low paid/may be seasonal/may require people to have multiple jobs/limited progression opportunities/reliant on tourism. Or other valid response.	2	1 mark for advantage. 1 mark for disadvantage.
		(iii)	1493	1	$24\,882 \times 6\% = 1492.92$ Must be rounded to a whole person. Accept: 1492
	(c)		Access would be restricted/noise pollution could disturb wildlife/landscape could be damaged by vehicles or trampling/risk of injury/other valid response.	1	

Question			Expected response	Max mark	Additional guidance
2.	(a)	(i)	6	2	1 mark for correctly calculating the mean for Site 3. 1 mark for correctly calculating the index for Site 3. $\text{mean} = \frac{(2+7+6+24+11)}{5} = 10$ $\text{index} = \frac{(8+3+4+14+1)}{5} = 6$ Allow for follow through where the calculated mean is incorrect (0 marks) but the index is correctly calculated using the incorrect mean (1 mark).
		(ii)	Site 2 - has the lowest index (3.2), which indicates the greatest species diversity (across the three sites).	1	
	(b)		Capture-mark-recapture (1 mark) Because it's a method used to estimate population size. OR Because transect and quadrat are used to assess what is present within the quadrat on one occasion only. OR Because a paired statement key is used to identify species, not to sample them. (1 mark) Or other valid response.	2	1 mark for capture-mark-recapture. 1 mark for valid justification.
	(c)		Noise pollution/air pollution/wildlife disturbed or killed/habitat destruction/soil erosion/dust pollution/vegetation flattened by spectators or cars/other valid response.	1	
	(d)		It would only manage the physical damage to the track, not pollution or damage to vegetation or habitats.	1	
	(e)		Hydrogen/biofuels/EV powered by electrolysis or renewable energy/other valid response.	1	Must be fossil-free fuel.

Question			Expected response	Max mark	Additional guidance
3.			Yes: - potential to generate income for the local economy/boost to local businesses, which meets aim 4 of the Cairngorms National Park - people coming to the rally may stay longer in the area and spend more on other activities, which will support employment (eg in accommodation and food services, arts, entertainment and recreation) - is an exciting prospect for locals to have an internationally significant event on their doorstep, and they could get involved, which meets aim 3 - is only for one week of the year, so environmental impact would be limited and habitats would recover - rally will make use of existing tracks, so there should not be any new habitat destruction - activities that could impact on wildlife already take place in the area, so one more might not make much difference - WRC objectives aim to meet most/11 of the 17 UN SDGs, which aim to improve the sustainability of the event Or other valid response.	5	1 mark for each valid yes/no justification. Candidates may cite statements from the information provided, but these must then be discussed further. No marks awarded for simply stating information provided. Discussion may offer counter-arguments for either option but should conclude with which one of the options should be adopted. Do not accept points that are relevant for both options. Max of 2 marks for how the rally organisers could address named SDGs, eg use/development of fossil-free fuels will help meet SDGs: 7 - affordable and clean energy 9 - industry, innovation and infrastructure 12 - responsible production and consumption 13 - climate action 14 - life below water 15 - life on land

Question			Expected response	Max mark	Additional guidance
3.			No: • people interested in wildlife may be put off visiting due to the noise and disruption, resulting in loss of money to the area/some businesses • it is a SSSI and the rally could damage the habitat of endangered beetle species • traffic congestion on narrow rural roads, resulting in increased journey times for locals • animal/bird disturbance could affect breeding or development of young • rallying would result in significant noise and air pollution • clean water sources are likely to be affected by erosion of tracks, increasing sedimentation • litter bins and toilet facilities will be limited to official spectator points, so spectators away from these points may pollute the woodland • not all the UN SDGs will be addressed/6 of the 17 SDGs will not be addressed, so WRC should do more work to meet these Or other valid response.		

[END OF SPECIMEN MARKING INSTRUCTIONS]

Published: August 2026

Change since last published:

Some questions have been removed from the previous specimen question paper, some have been edited or updated, and some have been replaced.