



Course report 2024

National 5 Environmental Science

This report provides information on candidates' performance. Teachers, lecturers and assessors may find it useful when preparing candidates for future assessment. The report is intended to be constructive and informative, and to promote better understanding. You should read the report with the published assessment documents and marking instructions.

We compiled the statistics in this report before we completed the 2024 appeals process.

Grade boundary and statistical information

Statistical information: update on courses

Number of resulted entries in 2023: 413

Number of resulted entries in 2024: 464

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	26	Percentage	5.6	Cumulative percentage	5.6	Minimum mark required	87
B	Number of candidates	88	Percentage	19.0	Cumulative percentage	24.6	Minimum mark required	73
C	Number of candidates	152	Percentage	32.8	Cumulative percentage	57.3	Minimum mark required	59
D	Number of candidates	121	Percentage	26.1	Cumulative percentage	83.4	Minimum mark required	45
No award	Number of candidates	77	Percentage	16.6	Cumulative percentage	100	Minimum mark required	N/A

We have not applied rounding to these statistics.

You can read the general commentary on grade boundaries in the appendix.

In this report:

- ◆ 'most' means greater than 70%
- ◆ 'many' means 50% to 69%
- ◆ 'some' means 25% to 49%
- ◆ 'a few' means less than 25%

You can find statistical reports on the [statistics and information](#) page of our website.

Section 1: comments on the assessment

Question paper

The majority of the question paper performed as expected. Feedback from teachers and lecturers, including the marking team, indicated that centres received it positively and that it was fair and accessible for candidates. Most candidates understood what was required and completed the question paper in the allocated time.

Some candidates appeared to have been presented at an inappropriate level, as they struggled to access many of the questions. Feedback from markers indicated that lower levels of numeracy skills in some candidates presented a barrier to accessing marks for a number of questions. These included questions 3(b)(iii)(A), 4(b), 9(g)(i) and 9(g)(ii), which all involved calculations.

More candidates attempted to answer the extended-response questions in section 3 of the paper than in previous years. However, in the structured extended-response questions, a few candidates did not answer both parts of the option they chose. A few candidates gave incomplete responses to the questions in section 3. Questions 10B and 11A were the most popular options for candidates when selecting which option in each question to undertake.

Three questions appeared to be more demanding than anticipated — question 4(d)(ii), 7(b)(iii), and 9(g)(ii). Therefore, the C-grade boundary was lowered to take account of these questions.

Assignment

The assignment component returned for session 2023–24. The mean mark was lower than in 2019, and slightly lower than some of the preceding years.

Overall, most candidates had a clear understanding of what was required, particularly in terms of layout and organisation of their reports. Most candidates presented their report using headings and structured their report in a logical manner.

In a number of centres, candidates had studied identical topics, which is not acceptable. Teachers and lecturers must provide a range of topics and minimise the number of candidates in a class investigating the same topic.

In a few centres, candidates studied topics that were unsuitable for National 5 level and therefore the candidates struggled to access some of the marks, especially those for the underlying environmental science.

Section 2: comments on candidate performance

Areas that candidates performed well in

Question paper

- Question 1(a)(i) Most candidates were able to name a producer from the food web.
- Question 1(a)(ii) Many candidates were able to use information from the food web to describe how competition between the goose and the eider duck is reduced.
- Question 1(a)(iv) Many candidates were able to state one way, other than heat, in which energy may be lost from the food web.
- Question 1(b)(i) Most candidates were able to identify the coldest part of the Arctic fox's body.
- Question 1(c)(ii) Most candidates were able to state the term used to describe the features that make an Arctic fox well suited to living in its environment.
- Question 1(d)(i) Most candidates were able to use information from the graph to name the mammal with the longest fur.
- Question 1(d)(ii) Many candidates were able to use information from the graph to state the relative insulation value of the mammal with an average fur length of 40 mm.
- Question 1(d)(iii) Many candidates were able to describe the overall trend shown in the graph. A common issue, where candidates were not awarded the mark, was including data values for individual mammals instead of identifying the overall trend.
- Question 2(b) Many candidates were able to describe how carnivores obtain nitrogen for protein production.
- Question 2(c) Most candidates were able to name the type of organism responsible for breaking down dead plants and animals during the nitrogen cycle.
- Question 3(b)(i) Many candidates were able to name the type of energy converted into electrical energy by the generator. A few candidates used the term 'motion energy', which is not appropriate at National 5 level. Candidates should use the proper term, 'kinetic energy'.
- Question 3(b)(iii)(B) Most candidates were able to state an appropriate conclusion, based on the students' results.
- Question 4(b) Many candidates were able to calculate the mass of iron oxide that could be processed from the iron ore carried by the train.

Question 5(a)	Many candidates could state the term 'wastewater'.
Question 5(b)(i)	Many candidates could calculate the percentage of household water that the greywater recovery system will recycle.
Question 5(b)(ii)	Most candidates could state one method of conserving water in the home, and many could state two methods.
Question 6(a)(i)	Other than outcompeting native species, many candidates could describe one impact of an invasive non-native species (INNS).
Question 7(a)	Many candidates were able to give another reason why there is an increase in global waste.
Question 7(c)	Many candidates were able to give one way in which local councils can encourage recycling, but only some were able to give two ways.
Question 8(b)(i)	Most candidates were able to identify a reason why net fishing may be less environmentally sustainable than hook and line fishing, and some candidates were then able to explain the impact on sustainability.
Question 9(d)	Most candidates were able to suggest another use that could be made of the wood from the fallen trees.
Question 9(e)(ii)	Most candidates were able to match each public benefit to the different opinions given in Source 4.
Question 9(f)(ii)	Many candidates could suggest a potential source of error that may occur during testing.
Question 9(f)(iii)	Many candidates were able to identify all the species that are suitable for planting in the community woodland, using the information provided.
Question 9(g)(i)	Most candidates were able to calculate the total cost of the order for Christmas trees.
Question 9(h)	Most candidates were able to identify that native mixed woodland will have the greatest animal biodiversity and many could explain why this was the case.

Candidates opting to answer questions 10B and 11B in the extended-response questions performed better than those answering questions 10A and 11A.

Assignment

1 An aim that describes clearly the purpose of the investigation

Most candidates were able to state an aim that described the purpose of the investigation clearly.

3(b) Sufficient raw data from the candidate's experimental work/fieldwork

Most candidates included sufficient raw data from their experiment or fieldwork.

3(e) Data/information relevant to the aim from an internet/literature source

Many candidates included data from an internet or literature source that was relevant to the aim of their investigation.

3(f) A reference for the source of the internet/literature data/information

Most candidates included a reference for their source of internet or literature data that contained sufficient information to allow the retrieval of the data.

4(a) An appropriate format from the options of bar graph, line graph, pie chart or other display method appropriate to environmental science

Most candidates chose an appropriate format for their graph. A few candidates attempted to draw bar charts when a scatter graph or line graph was the appropriate option.

4(b) The axes of the graph have suitable scales

Most candidates produced a graph that had suitable scales on the axes.

4(c) The axes of the graph have suitable labels and units

Many candidates produced a graph that had suitable labels and units on the axes.

8(a) An informative title

Most candidates produced a report that had an informative title. There were fewer instances of the title being 'National 5 Assignment' than had been observed in the past.

8(b) A clear and concise report

Most candidates produced a clear and concise report that flowed in a logical manner. Candidates had clearly followed the 'Instructions for candidates'. The use of subheadings throughout the reports aided clarity.

Areas that candidates found demanding

Question paper

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|--------------------|---|
| Question 1(a)(iii) | Many candidates were unable to use information from the food web to describe the niche of the caribou. |
| Question 1(b)(ii) | Many candidates were unable to calculate the difference between the Arctic fox's internal temperature and the surrounding air. Common issues included candidates not being aware that subtracting a negative number produces a positive and the omission of the unit for temperature. |
| Question 1(c)(i) | Few candidates were able to describe the effect of the fur on the internal temperature of the Arctic fox. Many candidates talked about |

the fur providing insulation, but not the effect it had on the internal temperature.

- Question 1(d)(iv) Although most candidates were able to suggest a possible impact of having wet fur on the temperature of the polar bear, few could provide an appropriate justification for their suggestion.
- Question 2(a) Many candidates found question 2(a) challenging, and did not fully demonstrate their knowledge of the nitrogen cycle. A few candidates changed the complete sentence for incorrect statements when they were only required to replace the underlined word in incorrect statements.
- Question 3(a)(i) Although most candidates could suggest a reason why site A was chosen rather than site B, few could explain the reason for the choice.
- Question 3(a)(ii) Although most candidates could give either an advantage or a disadvantage of siting wind farms near areas of high population density, few could give both.
- Question 3(b)(iii)(A) Many candidates were unable to calculate the power generated by the fan. A common mistake was the omission of the unit from the answer.
- Question 3(b)(iv) Although most candidates suggested that the students should repeat the experiment, few could describe how that would allow the students to establish whether the results were reliable.
- Question 4(a) Few candidates could state what is meant by the term 'ore'.
- Question 4(c)(i) Many candidates were able to identify substance X or substance Y, but few could identify both.
- Question 4(c)(ii) Few candidates were able to name the type of iron produced by a blast furnace.
- Question 4(c)(iii) Few candidates were able to suggest an environmental challenge of dealing with the solid waste product. This was one of a number of questions where candidates confused social, environmental, and economic impacts. Candidates should make sure they understand the differences between the three and also that they read the questions carefully.
- Question 4(d)(i) Few candidates could define the term 'carbon footprint'.
- Question 4(d)(ii) Few candidates could explain why electrolysis may be considered a sustainable alternative to the blast furnace. Candidates struggled to access the marks because they did not include that electricity can be made from renewable or non-renewable sources.

- Question 6(a)(i) Few candidates could name the national organisation responsible for providing advice on managing INNS. Common incorrect responses were SEPA and SNH.
- Question 6(b)(i) Many candidates were unable to suggest an appropriate reason why giant hogweed was introduced to the UK.
- Question 6(b)(ii) Few candidates were able to use the information given in the question to explain why giant hogweed is able to successfully outcompete native species.
- Question 6(c) Although many candidates were able to label both axes correctly and some were able to include suitable scales on both axes, few candidates could either plot the points accurately and/or draw an appropriate line of best fit. Common mistakes included 'joining the dots' to produce a line graph rather than a scatter graph, or attempting to draw a bar chart or histogram.
- Question 6(d)(i) Many candidates were unable to suggest how grazing pressure could be reduced.
- Question 6(d)(ii) Many candidates were unable to suggest the impact of high grazing pressure on biodiversity.
- Question 7(b)(i) Few candidates were able to state what is meant by the term 'recycling'. Candidates often confused reuse with recycling.
- Question 7(b)(ii) Many candidates were unable to suggest why it is more sustainable to reuse, rather than recycle, plastic items.
- Question 7(b)(iii) Although many candidates suggested a benefit of installing the containers around the city, few could explain how that would benefit the city economically. As with question 4(c)(iii), candidates often confused the terms 'social', 'economic', and 'environmental'.
- Question 8(a) Although many candidates could suggest one reason why the Western and Central Pacific Ocean area has the largest catch, few could suggest two reasons.
- Question 8(b)(ii) Many candidates were unable to suggest a reason why there may be a problem with using hook and line fishing in areas rated as 'fishery requires improvement'.
- Question 8(b)(iii) Many candidates were unable to identify a sustainable fishing method or explain how it would allow fish populations to recover. A common incorrect response was to state 'no fishing areas' or 'ban fishing in these areas', but this is not a fishing method.

- Question 9(a) Many candidates were unable to state an environmental impact of climate change other than extreme weather events. Again, a few candidates confused social or economic impacts with environmental impacts. A few candidates simply suggested another type of extreme weather event.
- Question 9(b) Many candidates were unable to name an anemometer as the piece of equipment used to measure wind speed.
- Question 9(c) Few candidates could predict the direction in which the majority of the damaged trees fell. Candidates often stated 'northeast' and did not appreciate that 'northeasterly winds' meant that northeast was the direction from which the winds were blowing, and therefore the trees would fall towards the southwest.
- Question 9(e)(i) Few candidates could state the meaning of the term 'sustainability'. Candidates often omitted one of the three factors (social, economic, environmental) or gave the meaning of the term 'sustainable development' instead.
- Question 9(f)(i) Although most candidates could name an appropriate piece of equipment for their chosen soil condition, few were able to describe how that piece of equipment is used. This suggested that many candidates were unfamiliar with or inexperienced in actually using the equipment.
- Question 9(g)(ii) Few candidates were able to calculate the percentage difference correctly. Candidates often selected incorrect points from the graph and therefore could not access the marks.
- Question 9(i) Although many candidates were awarded at least 1 mark for justifying their choice and some were awarded at least 2 marks, few were awarded either 3 or 4 marks. Justifications often lacked the necessary depth required at National 5 level, or simply quoted directly from the sources without expansion or explanation.

A few candidates misinterpreted the instructions of the essay questions and answered parts A and B for question 10. They then did not attempt question 11. In addition to this, a few candidates only answered part (a) of the structured essay, resulting in a maximum of 4 marks being awarded.

Assignment

The choice of experimental work or fieldwork often influenced candidate performance. Some of the fieldwork that candidates chose was overly complicated and made it difficult for them to analyse the data properly and to describe the underlying environmental science. For example, some candidates investigated photosynthesis through the immobilisation of algae, which is a difficult concept for National 5 candidates to understand.

1 An account of environmental science relevant to the aim of the investigation

Many candidates demonstrated at least a limited understanding of the underlying science for their chosen topic. Some candidates were able to demonstrate a reasonable understanding, but few were able to demonstrate a good understanding. Where the topics chosen for investigation were at too low a level, candidates struggled to demonstrate understanding at National 5 level. Similarly, where the topics chosen were at too high a level, the responses often conveyed that they did not understand the underlying science.

3(c) Data presented in a correctly produced table

Many candidates were unable to present data in a table. Common issues included column headings that simply said 'mean' and were not covered by an overarching heading, and missing or incorrect units.

3(d) Mean and/or derived values calculated correctly

Many candidates were unable to calculate either mean or derived values correctly.

4(d) Accurately plotted data points and a line (line graph), clear bar tops (bar graph) or angles (pie chart). Where appropriate, a line of best fit

Many candidates were unable to plot either points or bars accurately. This was often as a result of poorly chosen scales, where they had made it difficult for themselves to plot accurately.

5 A valid comparison of the experimental/fieldwork data with data/information from the internet/literature source

Many candidates were unable to analyse their results by making a valid comparison between their experimental or field work data and the data from their internet or literature source. This was often a result of a poor choice of secondary source.

6 A valid conclusion that relates to the aim and is supported by all the data/information in the report

Few candidates were able to state a valid conclusion that was supported by all of the data in their report. Often, candidates did not address all aspects of their aim and/or did not reflect the data from both their experimental or fieldwork data and the data from their internet or literature source. Some candidates concluded using only their experimental or fieldwork data and a few concluded using only their secondary-source data. Where the data from the sources conflict, candidates should ensure that their conclusion reflects this.

7 An evaluation of the experimental/fieldwork procedure

Some candidates were able to identify a factor that could be expected to have a significant effect on the reliability, accuracy or precision of the experimental work or fieldwork. However, few candidates were able to explain what could have been done to minimise the effect of the identified factor, or what was done to minimise the effect of the identified factor, or the evidence supporting the identification of the factor.

Some candidates opted to evaluate their performance, enjoyment, and learning of the topic. Some candidates stated that they would repeat measurements to improve reliability. However, as candidates are instructed that they must repeat measurements, this is not a valid evaluative statement.

Section 3: preparing candidates for future assessment

Centres are reminded that National 5 Environmental Science is a practical course that requires candidates to develop the knowledge and skills associated with practical work and fieldwork.

Candidates **must** be given the opportunity to undertake a wide range of practical work and fieldwork to develop the knowledge and skills detailed in the National 5 Environmental Science course specification on the [National 5 page](#) of SQA's website.

Question paper

Teachers and lecturers are encouraged to incorporate the command words used in exam questions into teaching at an early stage, especially the difference between 'describe' and 'explain'.

Teachers and lecturers should continue to familiarise and expose candidates to the format of the question paper to ensure that candidates understand the requirements of the paper — for example, ensuring that candidates fully understand that they must select one essay from the first set of essay questions and one essay from the second set.

Definitions and terminology

It is important that candidates learn definitions and have the ability to express them accurately, using scientifically appropriate terminology. Acceptable definitions are in the National 5 Environmental Science course specification on the [National 5 page](#) of SQA's website.

Centres must ensure that candidates are provided with a copy of the mandatory content tables available in the National 5 Environmental Science Course Specification and encouraged to keep a glossary of terms. These will enable candidates to familiarise themselves with phrasing and terminology used at National 5 level.

Practical Work

Candidates must be given the opportunity to take an active part in a wide range of practical work and fieldwork. This will help candidates with questions that ask about practical or fieldwork contexts. In particular, this should include the planning and evaluation of the practical setup and procedure. While demonstration of experiments, videos, and computer simulations may be useful additional tools, they cannot replace active practical or fieldwork and do not develop the knowledge and skills associated with them.

Candidates should experience the use of a variety of apparatus and techniques and be aware of the purpose and methodology of each. A list of apparatus and techniques is detailed in the National 5 Environmental Science Course Specification.

Extended responses

Candidates should consider how to structure their responses where there is an allocation of multiple marks. This will help them respond effectively. Teachers and lecturers should support candidates with practise in exam techniques throughout the course for this purpose. Centres should encourage candidates to practise past paper questions. The past papers and marking instructions on the [SQA website](#) are a useful resource to show candidates the expected level and depth of response required to access marks.

Assignment

Candidates must be given the opportunity to take an active part in a wide range of practical work and fieldwork. This will allow candidates to enhance the skills required for the assignment, including experimental design, analysing, evaluating, and concluding.

Centres must ensure that candidates are given a choice of topics to study in the assignment, and that these are appropriate to National 5 level. Centres must minimise the number of candidates in a class investigating the same topic. The maximum number of candidates that can work together to conduct an experiment or fieldwork is four.

Centres should use the assignments and commentaries available on the [Understanding Standards website](#) as a teaching and learning aid, to facilitate understanding and expectations of the assignment component.

Appendix: general commentary on grade boundaries

SQA's main aim when setting grade boundaries is to be fair to candidates across all subjects and levels and maintain comparable standards across the years, even as arrangements evolve and change.

For most National Courses, SQA aims to set examinations and other external assessments and create marking instructions that allow:

- ◆ a competent candidate to score a minimum of 50% of the available marks (the notional grade C boundary)
- ◆ a well-prepared, very competent candidate to score at least 70% of the available marks (the notional grade A boundary)

It is very challenging to get the standard on target every year, in every subject, at every level. Therefore, SQA holds a grade boundary meeting for each course to bring together all the information available (statistical and qualitative) and to make final decisions on grade boundaries based on this information. Members of SQA's Executive Management Team normally chair these meetings.

Principal assessors utilise their subject expertise to evaluate the performance of the assessment and propose suitable grade boundaries based on the full range of evidence. SQA can adjust the grade boundaries as a result of the discussion at these meetings. This allows the pass rate to be unaffected in circumstances where there is evidence that the question paper or other assessment has been more, or less, difficult than usual.

- ◆ The grade boundaries can be adjusted downwards if there is evidence that the question paper or other assessment has been more difficult than usual.
- ◆ The grade boundaries can be adjusted upwards if there is evidence that the question paper or other assessment has been less difficult than usual.
- ◆ Where levels of difficulty are comparable to previous years, similar grade boundaries are maintained.

Every year, we evaluate the performance of our assessments in a fair way, while ensuring standards are maintained so that our qualifications remain credible. To do this, we measure evidence of candidates' knowledge and skills against the national standard.

During the pandemic, we modified National Qualifications course assessments, for example we removed elements of coursework. We kept these modifications in place until the 2022–23 session. The education community agreed that retaining the modifications for longer than this could have a detrimental impact on learning and progression to the next stage of education, employment or training. After discussions with candidates, teachers, lecturers, parents, carers and others, we returned to full course assessment for the 2023–24 session.

SQA's approach to awarding was announced in [March 2024](#) and explained that any impact on candidates completing coursework for the first time, as part of their SQA assessments, would be considered in our grading decisions and incorporated into our well-established

grading processes. This provides fairness and safeguards for candidates and helps to provide assurances across the wider education community as we return to established awarding.

Our approach to awarding is broadly aligned to other nations of the UK that have returned to normal grading arrangements.

For full details of the approach, please refer to the [National Qualifications 2024 Awarding — Methodology Report](#).