Course report 2023

National 5 Engineering 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 in conjunction with the published assessment documents and marking instructions.

The statistics in the report were compiled before any appeals were completed.

Grade boundary and statistical information

Statistical information: update on courses

Number of resulted entries in 2022:   1,743

Number of resulted entries in 2023:   1,876

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	968	Percentage	51.6	Cumulative percentage	51.6	Minimum mark required	77
B	Number of candidates	330	Percentage	17.6	Cumulative percentage	69.2	Minimum mark required	64
C	Number of candidates	283	Percentage	15.1	Cumulative percentage	84.3	Minimum mark required	51
D	Number of candidates	156	Percentage	8.3	Cumulative percentage	92.6	Minimum mark required	38
No award	Number of candidates	139	Percentage	7.4	Cumulative percentage	100	Minimum mark required	N/A

Please note that rounding has not been applied 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 more statistical reports on the [statistics and information](#) page of SQA's website.

Section 1: comments on the assessment

Question paper

The question paper sampled the content as outlined in the course specification.

Marker feedback confirmed that the question paper functioned as intended and every mark was accessible.

Assignment

The requirement to complete the assignment was removed for session 2022–23.

Section 2: comments on candidate performance

Areas that candidates performed well in

Question paper

Question 1(a)

Most candidates correctly stated 'sound' as an output.

Question 2

Most candidates calculated the velocity ratio correctly. Some candidates incorrectly included a unit in their final answer, but they did not miss out on marks as a result.

Question 5(a)

Most candidates calculated the value of the voltage V_1 correctly.

Question 6(a)

Most candidates calculated the correct value for electrical energy.

Question 6(b)

Most candidates described the reason for lubricating the gear system.

Question 7(a)

Most candidates drew and completed the wiring of a lamp.

Question 8(b)

Most candidates calculated the force correctly.

Question 9(c)

Most candidates identified the program line that contained a time delay.

Question 11(d)

Most candidates correctly identified a suitable metal and justified their choice.

Question 12(c)

Most candidates stated the thermistor number from the graph values.

Areas that candidates found demanding

Question paper

Question 4(a)
Some candidates simply stated 'force' and did not include any description of position, magnitude, or direction.

Question 4(b)
Many candidates did not round the final value for strain correctly and incorrectly answered 0.00028 (recurring) or 0.000288, rather than 0.00029.

Question 7(d)
Many candidates did not identify a resistor as the component used to protect a transistor from large input currents. 'Diode' and 'relay' were common incorrect responses.

Question 9(a)
Candidates' descriptions of the operation of the pneumatic circuit were mixed. A few candidates responded with a simplistic bulleted list, without the terminology required at National 5. Some responses did not explain the role and effect of a uni-directional restrictor when piped between a 5/2 valve and cylinder. Many candidates made incorrect statements relating to time delay or main air speed control.

Question 10(a)
Many candidates did not describe a specific task, or an electronic engineer-related aspect, appropriate for the designing stage.

Question 11(a)(ii)
Many candidates' responses related to a structural engineering task rather than a civil engineering task.

Question 12(a)
Many candidates did not describe a reason for including a system boundary.

Question 12(b)
Many candidates did not describe the closed-loop control of the output.

Question 12(g)
Most candidates did not complete a Boolean equation for the truth table.

Question 13(d)

Some candidates did not identify an emerging technology as defined in the question stem: 'An emerging technology is one that is new and still to be tried commercially within a product or system.' Many candidates answered with developing technologies such as drones, AI, 3D printers, and electric vehicles.

Question 14(c)

Some candidates did not describe the effect on the red and green LED when the transistor first activates the relay.

Question 14(f)

Most candidates did not explain the suitability of a compound gear in terms of using small gear sizes to achieve the large speed reduction and did not relate this to the context of it fitting inside the laminator.

Section 3: preparing candidates for future assessment

Teachers and lecturers could reinforce good practice on how candidates should present their responses to calculation-based questions:

♦ take formulae from the data booklet

♦ substitute values from the question (transpose)

♦ calculate the final value

♦ round the final answer to an appropriate significant figure without a recurring decimal

♦ include the correct unit, when appropriate

There were a few instances of candidates responding to 'describe' questions with a bulleted list. Teachers and lecturers should ensure that candidates respond to the questions as they have been asked, for example 'Describe…' would need a descriptive answer, not a list of points.

Teachers and lecturers should ensure candidates have a clear understanding of the differences between the roles of civil engineer and structural engineer. Candidates should understand and use the terminology linked to developing solutions, such as 'testing', 'measuring', or 'evaluating', rather than terms like 'making sure'.

Candidates could practise questions about developing a Boolean equation from a truth table.

Candidates should be able to analyse a sub-system diagram and describe the control of an output. Candidates should have a good understanding of the role of sensors and control sub-systems.

Candidates must be familiar with emerging technologies and know the difference between an emerging technology and a developing technology. If a question asks for an example of an emerging technology, we cannot award marks if a candidate gives an example of a developing technology. This year we accepted 'self-driving vehicle' as a response, but we will not accept this in future.

Session 2023–24

This course will return to full assessment requirements from session 2023–24 onwards. This means that candidates must complete the question paper and the annually issued assignment.

The assignment will be published on SQA's secure website in January 2024. It will assess candidates on their problem-solving skills:

♦ analysis

♦ designing a solution

♦ building a solution

♦ testing

♦ evaluation

More information and supporting documentation on the full course assessment is available on the National 5 Engineering Science subject page. This includes the course specification, past papers, and specimen assessments (question paper and assignment), and previous years' course reports.

Teachers and lecturers should continue to make use of the Understanding Standards website. This resource provides candidate evidence from past question papers and assignments with supporting commentary, presentations, and webinar recordings.

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.

Grade boundaries from question papers in the same subject at the same level tend to be marginally different year on year. This is because the specific questions, and the mix of questions, are different and this has an impact on candidate performance.

This year, a package of support measures was developed to support learners and centres. This included modifications to course assessment, retained from the 2021–22 session. This support was designed to address the ongoing disruption to learning and teaching that young people have experienced as a result of the COVID-19 pandemic while recognising a lessening of the impact of disruption to learning and teaching as a result of the pandemic. The revision support that was available for the 2021–22 session was not offered to learners in 2022–23.

In addition, SQA adopted a sensitive approach to grading for National 5, Higher and Advanced Higher courses, to help ensure fairness for candidates while maintaining standards. This is in recognition of the fact that those preparing for and sitting exams continue to do so in different circumstances from those who sat exams in 2019 and 2022.

The key difference this year is that decisions about where the grade boundaries have been set have also been influenced, where necessary and where appropriate, by the unique circumstances in 2023 and the ongoing impact the disruption from the pandemic has had on learners. On a course-by-course basis, SQA has determined grade boundaries in a way that is fair to candidates, taking into account how the assessment (exams and coursework) has functioned and the impact of assessment modifications and the removal of revision support.

The grade boundaries used in 2023 relate to the specific experience of this year's cohort and should not be used by centres if these assessments are used in the future for exam preparation.

For full details of the approach please refer to the National Qualifications 2023 Awarding — Methodology Report.