Common questions about National 3, National 4, National 5, Higher and Advanced Higher Computing Science
## Contents

1. General questions  
2. Units  
3. SQA reference language  
4. National 3 and National 4  
5. National 5 and Higher course assessment: question paper  
6. National 5 and Higher coursework  
   a) assignment format  
   b) conditions of assessment  
7. National 5 and Higher course content  
   a) Software design and development  
   b) Computer systems  
   c) Database design and development  
   d) Web design and development  
8. Support materials
1 General questions

What software does SQA recommend?
SQA does not recommend any software; however, we do give a list of requirements in order to complete the tasks in the course.

What are the most popular languages used for Computing Science?
Without conducting a survey, our experience is that the three most popular languages in schools and colleges are Python, VB and Java with Python now being the most prevalent.

Will the arrangements for a compensatory National 4 award remain?
The Scottish Government has stated in its policy statement on the changes to National Courses (Annex B) that the current mechanism of fallback to National 4 ‘will remain available for an interim period only’, and that this pathway ‘should only be used in a very limited number of exceptional circumstances, where the view of the teacher and head teacher, in discussion with parents and learners, is that it is in the interests of specific individual learners’.

If you have any questions about Recognising Positive Achievement, please don’t hesitate to get in touch with your centre’s Liaison Manager.

Further information is also available on our Recognising Positive Achievement web page at www.sqa.org.uk/rpa

How should we decide whether to enter candidates for National 4 or National 5?
The Scottish Government has provided guidance on candidate progression and entries in its policy statement on the changes to assessment in National Courses.

Will it be possible to continue teaching the National 5 course to bi-level National 4/5 classes now that the units have been removed?
Yes, with careful planning it should be possible to continue bi-level teaching of National 4 and National 5 Computing Science. However, decisions about curriculum models for learners in the senior phase remain a matter for local authorities and schools, and should be based on the needs of their candidates.

Are there plans to change the National 4 course?
At present, SQA has only been asked to take forward the nationally-agreed revisions to National 5, Higher and Advanced Higher.
2 Units

Do the unit thresholds that were introduced in 2016–17 still apply?
Yes, these thresholds have now been added to the unit specifications.

The units that were previously part of the course are now available as freestanding units. These units no longer contribute to the course.

There is a link to the freestanding units page from the ‘see also’ section on the subject landing page at www.sqa.org.uk/nqsubjects.

When using SQA’s unit assessment support packs, must we use the tasks exactly as they are, or can we change them in any way?
With any of our unit assessment support packs, you are free to adapt them as you see fit (or, alternatively, use an assessment of your own creation), as long as they help the candidate meet the assessment standards.

However, if you make substantial changes to a SQA unit assessment, or create your own, we recommend submitting the assessment for prior verification to ensure that it is suitable. Details of this process can be found here.

Will the units for National 5, Higher and Advanced Higher be updated to reflect the revised course specifications when the transition to a non-unitised course model is complete?
No. These units will no longer be part of the National 5, Higher and Advanced Higher Computing Science courses. They will be available as freestanding units and will remain in their current format.
3 SQA reference language

What is SQA reference language?
SQA does not specify a programming language to be used for its qualifications, but we do need to assess candidates’ ability to read, understand and explain code in assessments.

In order to do this, we asked colleagues in the Higher Education sector to develop a standardised way of presenting code in question papers. This language is used at National 5, Higher and Advanced Higher question papers and is known as SQA reference language.

Do I have to teach candidates to write programs using SQA reference language?
No, candidates do not need to be taught to write programs using SQA reference language. Teachers and lecturers should ensure that candidates are able to identify how course constructs will be presented in SQA reference language, compared to the language they have been working with. It is recommended that this is covered as part of preparation for the question paper once the course content has been taught.

Is SQA reference language pseudocode?
No. Originally, this reference language was referred to as ‘pseudocode’ and as ‘Haggis’. Given that the language is a formally-defined, executable language (and pseudocode is not), the term ‘reference language’ is appropriate. A formally-defined language is required because it is a candidate’s ability to read and understand code in a programming languages that is being assessed in some questions.

More information on reference language can be found in the ‘Course support’ section on the subject page for each level.

Can candidates use SQA reference language as a design technique?
It is important to note that as a formally-defined language and not pseudocode, SQA reference language is not suitable for use in the design stage of software development. However, the marking instructions focus on the general concepts and constructs required in the design of a solution. If a candidate were to provide their answer using a programming language (including SQA reference language), or a mix of pseudocode and code, marking would focus on the concepts and constructs set out in the marking instructions.
4 National 3 and National 4

If a National 4 candidate passes both National 4 units but not the Added Value Unit, will they automatically get the National 3 course award? If not, what would a centre have to do to facilitate this?

Although a hierarchy exists, there is no ‘automatic’ certification from National 4 to National 3; however, there is a straightforward process for these circumstances.

The centre would need to enter the candidate for the National 3 course, but they would not have to enter or assess them for the National 3 units, as unit passes at National 4 would be credited towards the course at National 3. The candidate’s certificate would therefore show a pass for the National 3 course and a pass for both National 4 Units.

For further information, please visit the Recognising Positive Achievement page: www.sqa.org.uk/rpa

The Added Value Unit states that candidates should learn a graphical design notation. Would it be acceptable for National 4 candidates to design the code using pseudocode?

Making assessment judgements section states ‘candidate selects and uses appropriate graphical or contemporary design notation’. As pseudocode is a contemporary design notation, candidates could use this rather than a graphical design notation.

Is the National 4 Added Value Unit going to change from year to year?

There are currently four Added Value Unit assessments to choose from. Centres can also adapt these or create their own assessments for the Added Value Unit, within limits that are clearly described in the ‘Assessment overview’ section of the Added Value Unit assessment. All assessments, whether produced by SQA or a centre, should be marked against the judging evidence tables in the SQA Added Value Unit assessment support packs.

We will continue to provide a free prior verification service to schools and colleges who devise their own assessments, or who significantly change SQA’s assessments to suit their particular needs. Find out more about prior verification here.

Can National 5 coursework be used to assess a National 4 qualification?
No, the revised National 5 assignment introduced in 2017–18 does not match the assessment standards for the National 4 Added Value Unit.
5 National 5 and Higher question paper

Will candidates be expected to write syntactically correct HTML, CSS, Javascript and SQL in the exam?
We will mainly assess the writing of SQL, CSS and HTML within the assignment. The question paper is more focused on the reading and explaining of code. However, where candidates are asked to write code, marks will be awarded as long as the intention of the coding is clear. This is in line with the current marking principles.

There is no requirement to write Javascript in the National 5 course. At Higher, candidates might be asked to implement a few mouse over events (over, out and click).

Where candidates are asked to write code at National 5 and Higher, questions will provide them with some scaffolding, for example they may be asked to re-write code that is given in a more efficient way. The only instances where no scaffolding will be provided is where candidates are asked to write one of the standard algorithms.

Will only the standards algorithms specified in the course specifications be used?
While questions will focus on the standard algorithms stated in the course specification for each level, questions may use other code appropriate to the level.

If candidates are asked to write code they will be provided with scaffolding. No scaffolding will be provided if candidates are asked to write one of the standard algorithms.

Will coding questions in the question paper still give the option to answer in pseudocode or a language of choice?
No, candidates will be asked to write code using a programming language of choice. While the revised courses aim to distinguish pseudocode as a design technique, if a candidate were to write their response in pseudocode, or a hybrid of pseudocode and code, marks would be awarded to the constructs as per the marking instructions.

It is worth emphasising that although we will present code using SQA reference language there is no requirement or expectation that candidates will write code in this language. However, if candidates did write in SQA reference language, they will be awarded marks as appropriate.

Are the solutions in published marking instructions the only answers that are acceptable?
No, the published marking instructions are not exhaustive. They are designed to give markers the flexibility to use their professional judgement to give credit to other acceptable answers which are not explicitly covered in the marking instructions. This is why we appoint experienced computing science teachers to mark the exams.
6 National 5 and Higher coursework

All questions in this section apply to both the National 5 and Higher assignments. The format of the assignment and conditions of assessment are the same at both levels.

a) Assignment format

What is the balance between difficulty and size/number of tasks in the assignment?

The assignment at both levels will consist of three tasks; one for each of software design and development, database design and development, and web design and development. The assignments are intended to differentiate between candidates and will be designed with a proportion of grade A-type marks. This is exemplified in the specimen assignment tasks.

When will the live National 5 and Higher assignments be issued?

The live assignment task for National 5 and Higher will be made available via the secure website in January each year.

We will issue communications with the exact dates each year.

Will SQA still accept electronic submissions, for example OneNote?

No, currently all candidate evidence for the assignment (whether handwritten or word processed), must be submitted to SQA in hard copy. This includes hard copies of program listings, screenshots or similar, as appropriate.

Can we still use Access for the coursework?

Yes, you can still use Access for databases using the SQL view to write SQL statements. No database server is required for the National 5 or Higher assignments.

Will the implementation tasks for database design and development need to be done in SQL?

Yes. For National 5, some parts of the implementation task for database design and development must be done in SQL and for Higher all implementation tasks must be done in SQL. Please note that candidates will not be awarded marks if they used the inbuilt features of database application software to carry out the required query and then generate SQL.

b) Conditions of assessment

Can the 8 hours permitted for assessment be split into smaller sessions?

Yes. The assignments can be completed over a number of sessions that amount to 8 hours in total. How this is structured is a centre decision.
If the assessment is split into sessions, can teaching take place in between assessment activity?
Yes, however the assignments must not be interrupted with periods of targeted learning and teaching with the specific purpose of preparing candidates for assessment tasks or to develop a solution that candidates can access during the assignment.

The assignments should only be undertaken by candidates at an appropriate point in the course, after all content has been delivered.

Can I give practice tasks to candidates?
Yes, we would anticipate that specimen tasks and tasks from previous years would be used as practice tasks either in preparation for assessment or as part of teaching. Centres can of course also devise their own tasks for these purposes. However, practice tasks must not be created and used, with the specific purpose of developing a solution to that year’s assignment that candidates can access during the assessment.

What support can I give candidates?
The assignments are designed in a way that allows candidates to work through the tasks independently. Full guidance on support, including what is defined as ‘reasonable assistance’ can be found in the ‘Instructions for teachers and lecturers’ section of the coursework assessment task.

Can teachers and lecturers provide support to candidates while they are being assessed (deducting marks where support is given)?
No. The assignments are designed to be completed by candidates without any support from their teacher or lecturer. They will be externally marked, therefore deducting marks for providing support is no longer applicable.

Can I adapt the task into a template for candidates?
No, this is not permitted as it may provide candidates with levels of support that other candidates don’t have.

Can I help candidates to gather evidence?
Yes, there is a role for teachers and lecturers in supporting candidates to ensure that all their evidence is submitted to SQA for marking. This includes preparing candidates for how they can generate evidence from the software they are using and encouraging candidates to use the checklist provided to ensure that evidence for all completed tasks is printed and submitted.

You should also ensure candidates are aware that their evidence should be clear and legible.
Can the format of the files provided by SQA for candidates to complete the assignments be changed?
No, files should not be adapted in any way. Candidates are being assessed on their ability to implement a solution to the given task using the specific file type provided, subsequently none of the files supplied should be converted into a different format.

Do centres need to organise invigilators for the 8-hour coursework to ensure the conditions of assessment are applied?
This is not a requirement, however it is for the centre to decide how to organise supervision of the assignment in line with the conditions of assessment.

The course specification states that ‘at the end of each session, and upon completion of the assignment, teacher and lecturers must ensure that candidate evidence is stored securely’. What does this mean?
Centres can store candidate evidence in the way that they find most appropriate but must ensure that candidates cannot access their work from outside the classroom (for example when at home).

If candidates use flash drives for the assessments, how do we backup?
It is for centres to choose the most appropriate backup approach. An example of this could be to use a folder on the network which staff make secure at the end of each classroom session.

Can candidates use their own reference material/notes during the assessment, i.e. an open-book assessment?
Yes, the assignments are open book. This means candidates can access resources such as programming manuals, class notes, textbook and programs they have written throughout the course. These may be online resources.

Can assessment arrangement be put in place for candidates sitting the assignment?
Yes, assessment arrangements can be put in place for candidates sitting the assignment provided that the assessment arrangement does not comprise the assessment in any way and reflects the candidate’s routine way of working.

If you are in any doubt about whether a candidate is eligible for a particular assessment arrangement, or whether the assessment arrangement compromises the assessment, you must discuss this with your centre’s SQA co-ordinator before contacting us for advice. You should then contact us as soon as possible, and before the candidate undertakes the assessment. You should submit full details of the candidate’s difficulty in accessing the assessment, the proposed assessment arrangement, and the specific assessment being undertaken, to the Assessment Arrangements Team by e-mailing aarequests@sqa.org.uk.
Can I ask SQA for clarification of requirements of the task?
SQA staff are not able to provide clarification on aspects of the task to teachers and lecturers. This is to ensure that all candidates are given the same assessment task and the same instructions.

The quality assurance processes for developing and marking a single, annually issued and externally marked assignment are similar to that of a question paper.

Markers will be trained to mark using candidate responses where a variety of approaches have been taken. This is to ensure that they are marking to the principles set out in the marking instructions and not one particular expected response. This way, candidates will be awarded marks for their work as appropriate and not necessarily penalised if they have misinterpreted the task or approached it in an unusual way.

If a part of the task was deemed not to have functioned as intended, either being of greater or lesser demand, we would take this into account when setting grade boundaries.

Does program evidence have to be printed from environment?
No, program code can be copied and pasted into any other package such as Notepad or Microsoft Word.

Screenshots can also be pasted into other documents, however, candidates should ensure their evidence will be clear and legible to a marker.

7 National 5 and Higher course content
The following questions and answers relate to the four topic areas of the National 5 and Higher Computing Science course and discuss the technical content of the course.

Will National 5 course content be assessed at Higher?
No, National 5 course content will not be assessed at Higher, marks at Higher will focus solely on the course content outlined in the Higher Course Specification. However, there is an expectation that candidates who are doing the Higher course are familiar with National 5 course content (particularly code), as there are areas where an understanding of National 5 content/concepts is required and assumed, for Higher assessments.

a) Software design and development

How can a user interface be shown with Python?
It is acceptable, with a text based language, to show a user interface as a series of expected inputs and outputs in text.
Should the user interface design be annotated?
We would expect candidates to annotate the user interface design but there may be times when the design is so self-explanatory that there is little benefit.

Should candidates show button names and listbox names?
Language-specific additions are not required but candidates could include them if they feel that it helps to clarify the design.

Why has exemplification of pseudocode to solve problems been removed?
The requirement for all candidates to be able to use pseudocode has been removed from the course and replaced with a requirement for candidates to design using a recognised design technique. This is to allow candidates to use alternative design techniques to show solutions to problems.

Candidates should be familiar with pseudocode and structure diagrams (and flowcharts at National 5) in order to read and understand a design presented in each, but will only be asked to exemplify and implement a design using one technique of their choice.

Why are flowcharts not included at Higher?
Flowcharts at Higher level would need to be supplemented by a separate data flow diagram. For this reason it was decided that at Higher, candidates would only be required to read two design techniques; structure diagrams and pseudocode. Candidates, however can still exemplify their refinements using flowcharts in Higher assessments.

The pseudocode exemplified in appendix 1 of the National 5 Course Specification uses a modular approach. Will this format be used in the National 5 assignment or question paper?
Yes, although there is no requirement for the candidates to design using a modular approach or to implement modular code at National 5. As the Higher is a modular approach we felt that it was better to keep the approach for pseudocode at National 5 in a similar style.

Do candidates need to know what the different shapes mean in the design techniques?
Yes, the exam questions and assignment tasks will use the symbols we've identified in the appendices and candidates are required to be able to read and understand design techniques. If candidates are asked to produce a design, the marking will focus on the solving of the problem rather than the correct use of the symbols.

Are candidates expected to memorise every function in their programming language in case it comes up in the question paper?
We would expect candidates to know and have used the predefined functions that are listed in the course specifications in their preferred programming language.
True Basic has a quite complex way of creating a record structure or array of records required at Higher. Should we consider changing to teach another language?

The programming language used is a centre/teacher and lecturer decision. The only stipulation is that the language must allow for the requirements of the course, as set out in the course specification, to be met.

At Higher, can I cover records, arrays and procedures in Python using tuples, lists and functions?

Python 3.7 allows the creation of record structures. If you are using earlier versions of Python, you can use a variety of approaches to simulate an array of records including a list of tuples, dictionary objects or simple class objects. It is important that candidates understand the terminology of records and arrays as this will be the terminology used in assessment.

Centres can use Python functions to teach both functions and procedures. You should make it clear that although both are modules of code, a function uses the syntax ‘return’ to return a calculated value to the main program. Additionally, a function is called from within an assignment statement. For example:

Procedure call: findMax(scores)
Function call: maxScore = findMax(score)

There are Python teaching resources on Glow.

Do candidates need to implement passing parameters by value and by reference? These are not explicitly mentioned at Higher but implied by the use of data flow in the design part of SDD. Only formal and actual parameters are mentioned.

No. As many languages don’t use value and reference these have been removed from the course.

Will candidates be expected to name specific errors, for example an ‘end of file’ error?

We are looking for candidates to describe errors not specifically name errors. Questions will only ask for specific terminology that is stated within the course specification for that level.

Are candidates expected to identify the requirement for either parallel arrays or an array of records from a design?

Yes. In the Higher specimen assignment task, the array of records is identified as beachData(name, rating). If the design required parallel arrays, this would be shown as beachName() beachRating().
How does the design in the Higher specimen assignment task show that a function is required?
The design shows a single value, calculated by the module, being passed back out.

b) Computer systems

Networks and security have been removed. Isn’t this basic theory that any computing scientist must know?
Security has not been removed completely. We have removed certain aspects of security from the courses that relate to digital literacy. This keeps the courses more focused on the computing science aspects. While these aspects are no longer a mandatory requirement of the courses, teachers and lecturers may choose to cover them during learning and teaching time, as long as candidates are aware that they will not be assessed on this content.

Security has been revised to provide a progression through the levels. A separate Cyber Security National Progression Award (NPA) is available for centres to deliver.

Are the three examples of environmental impact of intelligent systems at Higher just examples that can be used? Can teachers and lecturers teach other examples of intelligent systems?
The three examples used would be the only ones that we would mention. A candidate would not be penalised for providing an appropriate alternative example as a response to a question in the question paper. The level of depth required is clarified in appendix 7 of the course specification.

Can we assume two’s complement questions in Higher will always ask for 16 bits rather than 8 bits?
The size of two’s complement number to be used in calculations has not been specified. This means that the number could be of any length in an exam question. However, a candidate would not be asked to work with a value greater than 16 bits in length.

c) Database design and development

Why has implementation of SQL been introduced?
SQL was previously included in a unit assessment support pack as one means of scripting an information system. We have now brought this into the mandatory content and provided additional detail, giving the database section of the course a strong computing science focus. The specimen assignment tasks and specimen question papers exemplify SQL requirements.
MS Access SQL Jet engine is quite different from mySQL, SQLi. Which version will exam questions be written in?
We have published course specification appendices at National 5 (appendix 12) and Higher (appendix 11) that show the way that we will structure SQL statements. We would, of course, accept variations of these in candidate's responses.

How correct does the SQL have to be, can it be written in English?
Markers would take into account different variations of SQL and candidates would not be penalised for incorrect syntax but we would expect candidates to attempt to write in SQL.

Why does the entity-relationship diagrams part of the course now include attributes?
We have provided additional clarity and detail relating to database design. Attributes are important to the overall understanding of the design. Further exemplification of entity-relationship diagrams with attributes can be found in appendix 5 of the National 5 Course Specification.

Is the ‘size’ only required for text fields?
Yes.

Could completing an ER diagram mean that candidates could be asked to name the relationship between entities?
Yes, candidates could be asked to name relationship between the entities. This is to assess that candidates are able to provide an appropriate description of the cardinality between entities. If naming the relationship is required, this would be made clear in the question.

In the data dictionary example at National 5, there is a ‘Required’ column. ‘Required’ is not in the course specification so is it necessary to include it? Should ‘Required’ not be under validation?
The ‘required’ column is to show the presence check which is in the course specification. It could be under validation but we have chosen to give it a separate column as a field may have other validation as well as a presence check. Candidates would not be penalised for not having a ‘required’ column and showing the presence check under the validation column. Once again this shows the way that we will represent data dictionaries in question papers and assignments. In question papers and assignments candidates will be given the data dictionary table with the column headings and asked to complete the rest.

Why are equi-joins covered at National 5, but not progressed at Higher?
All the coding at Higher (SDD programming language, HTML, CSS and SQL) must assume some previous knowledge. In the same way we would expect a Higher candidate to program a loop, despite them not being specifically mentioned at Higher, we would expect Higher candidates to understand an equi-join’s purpose and use.
Equi-joins may appear in Higher questions and assignment tasks but as they are National 5 content they would not be allocated marks. The SQL code would contain operations that were part of the Higher course.

d) Web design and development

Do candidates need to add text sizes and styles to their designs?
No, although we may annotate designs with text sizes and styles for the purpose of exam questions or assignment tasks.

Would generic text box/image boxes be appropriate for wire frames?
Yes.

Under exemplification of compatibility testing, are candidates expected to test their site on different devices or just understand the possibilities?
The requirement is only to describe and exemplify, not to implement.

Can JQuery be used for JavaScript?
Some centres may currently use JQuery, a module library for JavaScript which makes coding easier by supplying procedures which are simply called when implementing things like rollover images. There are also alternative variations of JavaScript modules available.

While this is not a requirement of the course, it is acceptable to use JQuery (and alternatives). Marking instructions for assignments and question papers are designed to allow candidates to be credited for using alternative approaches.

What does a candidate need to produce at National 5 and Higher as a low-fidelity prototype for a web page?
The requirement to describe, exemplify and implement prototyping (low-fidelity) from wireframe design at National 5 and Higher is exactly the same (see National 5 Course Specification appendix 11).

At Higher candidates would create prototypes that related to the requirements of the implementation section — horizontal navigational bars, relative horizontal and vertical positioning of the media and form inputs.

What is the scope of assessment of Javascript at Higher? The course specification only specifies functions related to three mouse events.
Appendix 17 of the Higher Course Specification gives more detail. Javascript can be used to:

- hide page elements
reveal page elements
change the position of an element
change the size of an element
change the colour of an element
change the look of text

Actions can be executed by:

- referring to the element containing the JavaScript event
- referring to a different element, identified by an ID
- calling a JavaScript function containing the actions

**Do candidates need to have a response to their form submission at Higher?**
Forms are never submitted to a server at Higher so there is no requirement to use:

- Form attribute names
- Action
- Method

The course specification appendices suggest that as part of the general understanding of what a web page form does you may wish to name the elements of the form. Adding an action to the submit button is not required at Higher, but could improve candidates’ experience particularly if they go on to experience server side processing of forms in Advanced Higher.
8 Support materials

Have support materials been provided by SQA for revisions to National 5 and Higher?
SQA does not produce off-the-shelf teaching materials. However, we worked with Education Scotland to identify and adapt suitable learning and teaching materials, homework and topic assessments. These are available on Glow. The course specification appendices for National 5 and Higher contain links to these resources.

Further resources are available under ‘Understanding standards’ tab on the National 5 and Higher subject pages.

National 5
♦ Introduction to teaching SQL (presentation)
♦ Teaching design techniques to design efficient solutions to problem (presentation)
♦ Teaching web design and implementation (presentation with audio and files)

Higher
♦ Database design and development — SQL
♦ Web design and development — Implementation

What is the purpose of the appendices in the course specification?
The appendices have been produced to provide teachers and lecturers with clarification and exemplification on the depth which some topics should be restricted to. They also show how we will present code and diagrams in question papers and assignments, and what candidates could be assessed on. Candidates are not required to respond using the same notations exemplified in the appendices — marks are assigned to concepts and constructs rather than one specific model answer.

For Higher, web page and database (Access) files that were used to create the appendices are available under ‘Course support’ on the Higher Computing Science subject page.

Are any other resources or support materials available?
Project Quantum
Project Quantum is a crowd sourced bank of multiple-choice questions which has been developed by Computing At School, The Centre for Evaluation and Monitoring, Cambridge Assessment and the Diagnosticquestions.com website for the English national curriculum for Computing Science.

In partnership with Education Scotland, we have developed 80 multiple-choice questions relating to the National 5 Computing Science course (2 x 10 question sets for each of the four course areas).
This can be accessed at https://diagnosticquestions.com/Quantum (registration required) Go into the quizzes tab and in the ‘search by author box’ type ‘SQAComputingScience’.

**Bitesize**

Bitesize is a BBC product. However, we understand that BBC Bitesize has been updated for both National 5 and Higher.

National Qualification questions and answers can be found on the frequently asked questions section of SQA’s website.

Questions and answers on the changes to National Courses can be found at www.sqa.org.uk/ngchanges