



# Common questions about National 3 to Advanced Higher Biology and Higher Human Biology

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# National 3 and National 4 unit assessments

## General questions

### Is there guidance about how to assess units?

You can find guidance about unit assessment in the presentation on the [Understanding Standards website](#). You can also access this presentation from the 'Understanding Standards' section of the [Biology subject pages](#).

## Transfer of evidence

### Are unit passes still transferrable between levels?

Unit passes are transferrable between National 4 and National 3 Biology as the units are in a hierarchy. Candidates can achieve a National 3 award with a combination of units at National 4 and National 3. The candidate's certificate would show the unit or units achieved at National 4 and/or National 3 and the course award at National 3.

Unit passes are not transferrable between National 4 and SCQF level 5 as the units are not in a hierarchy. If a candidate has achieved outcome 1 for a freestanding Biology unit at SCQF level 5, you can use this as evidence for outcome 1 at National 4 level and judge the evidence against the National 4 criteria. However, if the outcome 1 practical is on a topic that is relevant to SCQF level 5, then it is not acceptable evidence for National 4. For outcome 2, the content of the units at National 4 and SCQF level 5 is different, and you would have to assess candidates at National 4.

## Outcome 1

### Do candidates have to produce an outcome 1 report to pass a unit?

To pass the units Biology: Life on Earth, Biology: Multicellular Organisms, and Cell Biology, candidates must pass outcome 1 and outcome 2. The National 4 added value unit has one outcome.

### Can I give candidates a template to complete their outcome 1 report?

You can give candidates a template to complete their outcome 1 report at National 3 only. You must not give National 4 candidates a template to complete their outcome 1 report. You should give candidates the 'Instructions for candidates' section, which is an appendix of the

UAS pack. It contains a series of prompts to guide candidates to produce the required assessment evidence.

### **Is outcome 1 evidence transferable between units?**

Yes. Evidence of outcome 1 in a unit is transferable between the other units at the same level.

### **Does an outcome 1 report count as evidence for the added value unit?**

No. The assessment standards for outcome 1 in the National 4 units and outcome 1 in the added value unit are different.

Outcome 1 in the National 4 units requires candidates to produce a scientific report about an experiment or practical investigation. The added value unit is an assignment that candidates complete over a period of time. They must complete the communication stage of the assignment under supervised conditions.

The unit specifications outline what candidates have to do to pass each unit.

## **Outcome 2**

### **Can you clarify how I assess outcome 2?**

Candidates are no longer required to pass assessment standards 2.1 and 2.2 independently.

If you use a unit-by-unit approach, candidates must achieve 50% or more of the total marks available in a single unit assessment to pass outcome 2 for that unit. If you use a portfolio approach, candidates must achieve 50% of the total marks available for assessment standard 2.1 in each unit and 50% of the total marks available for assessment standard 2.2 across the units.

### **Is outcome 2 evidence transferable between units?**

No. Evidence for outcome 2 is not transferable between the units as the key areas are different.

## **Can I assess candidates using a combination of unit-by-unit approach and portfolio approach?**

You cannot use a combination of assessment approaches for an individual candidate. You should select the approach that best suits the needs of each candidate. This can mean that you use different approaches to assess candidates in the same class.

If you assess a candidate for one unit using the unit-by-unit approach, you must continue using the unit-by-unit approach with that candidate for all subsequent unit assessments. Likewise, if you use the portfolio approach with a candidate for one unit, you must continue using the portfolio approach with that candidate for all subsequent unit assessments.

# SCQF level 5 to SCQF level 7 unit assessments

## Outcome 1

### **Is outcome 1 evidence transferable between units?**

You can use evidence for outcome 1 in one unit as evidence for outcome 1 in the other units at the same level, with one exception. You cannot use evidence for outcome 1 in the SCQF level 7 Biology: Cells and Proteins or the Biology: Organisms and Evolution units as evidence for outcome 1 in the SCQF level 7 Investigative Biology unit. However, you can use evidence for outcome 1 in the SCQF level 7 Investigative Biology unit as evidence for outcome 1 in the SCQF level 7 Biology: Cells and Proteins and the Biology: Organisms and Evolution units. There is no requirement to match assessment standards.

## Outcome 2

### **Is outcome 2 evidence transferable between units?**

No. Evidence for outcome 2 is not transferable between the units as the key areas are different.

### **Can I assess candidates using a portfolio approach?**

You cannot use a portfolio approach for the freestanding units at SCQF levels 5, 6, or 7.

Candidates do not need to pass assessment standards 2.1 and 2.2 separately to achieve outcome 2 in a freestanding Biology unit at SCQF levels 5, 6, or 7. Candidates must pass at least 50% of the total marks available in the holistic assessment.

# National 5 and Higher assignments

## Topics

### Could you give some examples of topics or key areas for the assignment?

#### List of possible investigations

You can find a list of possible investigations and independent variables in the 'Coursework' section on the Biology and Human Biology subject pages:

- ◆ [National 5 Biology](#)
- ◆ [Higher Biology](#)
- ◆ [Higher Human Biology](#)

These lists are neither exhaustive nor prescriptive. They are based on assignments submitted by previous candidates.

Each year's course report provides information about candidate performance, which can help teachers and lecturers prepare candidates for future assessment.

Experiments must be at an appropriate level and the assignment must link to the key areas of biology or human biology in the course specification.

#### Higher Human Biology

Memory-based assignments tend to achieve fewer marks than laboratory-based assignments. This is because non-practical assignments do not align well with the requirements of the Higher Human Biology Assignment Assessment Task. Centres that use non-practical assignments should consider changing to laboratory-based assignments.

## Aim

### Can I provide candidates with an aim?

You **must not** provide candidates with an aim, but you **must** provide advice about the suitability of your candidates' aims in terms of:

- ◆ health and safety
- ◆ availability of resources
- ◆ availability of internet/literature data or information

Aims should refer to the independent and dependent variables, specifying what is being changed and what is being measured.

The 'Research stage' section in the 'Instructions for teachers and lecturers' section of the relevant coursework assessment task contains information about formulating aims. You can find the coursework assessment tasks in the 'Coursework' section of the [National 5 Biology](#), [Higher Biology](#), and [Higher Human Biology](#) subject pages.

## **Can everyone in my class do the same experiment but investigate different independent variables?**

The whole class, or more than one class, can investigate the same general topic as long as candidates investigate a variety of independent variables or carry out a variety of experiments.

Individual candidates, or small groups of candidates (maximum of four in each group), must carry out different experiments or investigate different independent variables, or both. For example:

- ◆ At National 5, all candidates can carry out an investigation into enzyme activity, but they cannot all investigate the same independent variable, such as temperature. Some candidates could investigate the pH or the type of tissue used instead.
- ◆ At Higher, all candidates can use the same experiment, such as hydrogen peroxide being broken down by catalase, but work with a different independent variable, such as substrate concentration or inhibitor concentration, or use the same reaction but measure it with a different experiment.

Centres must not use whole-class experiments.

## **How many candidates can use the same independent variable?**

To meet the conditions of assessment, candidates should:

- ◆ work individually or in small groups (of up to four)
- ◆ decide on the range and interval of values for the independent variable (they should not share data across groups but within groups if time does not allow a replicate)
- ◆ investigate different aspects of the topic, for example pH, temperature, type of enzyme

and/or

- ◆ use different methods to measure the dependent variable, for example height of foam, time taken for disc to float to surface, diameter of clear zone, volume of gas released

## Underlying biology

**For Higher, what counts as relevant biology for the underlying biology section? If the aim is about substrate concentration and enzyme activity, would statements about inhibitors be relevant? If not, is there enough Higher biology to pick up 4 marks for expanded statements?**

Candidates should only include underlying biology that is relevant to the aim. The underlying biology should demonstrate understanding at the appropriate level. Candidates should use their own words and not reorganise sentences from texts.

Competitive inhibition would be relevant for substrate concentration. It should be possible for candidates to get 4 marks without referring to inhibition.

If the aim is about substrate concentration then inhibition would not be relevant unless the candidate was discussing the effect of substrate concentration on inhibition.

Candidates could also have expanded statements about control of metabolic pathways, induced fit, affinity, and the direction of reactions.

## Data collection and handling

**What should candidates include in the brief summary of the approach used to collect their experimental data?**

Candidates should avoid too much detail. They should not include volumes, concentrations or temperatures in the summary, unless they refer to the independent variable. They must describe how they measured the dependent variable.

**How much input can I give candidates about the procedure?**

You can give candidates instructions for the experimental procedure. These instructions must **only** be a basic list.

Your instructions **must not** include the range, number or interval of values or measurements, or any reference to repeats. If there is a safety issue, you can give candidates a maximum value for the range.

It is your responsibility to ensure that an appropriate risk assessment has been carried out and to provide candidates with guidance on the safe and correct use of chemicals and equipment.

The 'Experimental/fieldwork research' section in the 'Instructions for teachers and lecturers' section of the relevant coursework assessment task contains information about experimental



procedure. You can find the coursework assessment tasks in the 'Coursework' section of the [National 5 Biology](#), [Higher Biology](#), and [Higher Human Biology](#) subject pages.

### **I am aware that the average cannot be more accurate than the data collected. Can candidates have raw data to 1 or 2 decimal places with the average rounded to a whole number?**

Although candidates are showing improvement in averaging their results, many are missing out on marks because they do not round figures appropriately.

Any rounding of results must be appropriate and consistent across all average values, and should not change the overall trend found in the raw data. In some cases, it may be appropriate for candidates to round data to a whole number so that they can plot it on a graph.

## **Internet/literature research**

### **What sources of data or information should candidates use?**

Candidates should carefully select data or information from an internet or literature source that is relevant to the aim of their investigation.

The selected source must link to both aspects of the aim of the investigation. You should encourage candidates to include statements indicating how their selected data source links to their aim.

If candidates indicate a specific substance or enzyme in the aim, they must refer to it in subsequent sections, including the internet or literature source.

### **How many data points do candidates need?**

The number and range of values must be appropriate to the aim.

A minimum of three values may be appropriate in some investigations, but the number will depend on the aim of the investigation.

Candidates must decide on the range of values for themselves.

### **Any hints or tips on how candidates can research data to support their findings?**

Candidates could do an internet search for the aim and click on images to find graphs and/or tables.

## **Do the aim of the assignment and the details in the second source have to match, for example same enzyme, same inhibitor? Or, is an explanation of the differences in the analysis enough?**

If the aim identifies the enzyme and/or inhibitor then the second source should be about the same enzyme and/or inhibitor. For an aim, for example to investigate the effect of (unspecified) inhibitor concentration on (unspecified) enzyme activity, then the second source could be about a different enzyme or inhibitor.

If the aim is generic (for example, 'The effect of inhibitors on enzyme activity'), candidates can use different inhibitors and enzymes.

## **Can candidates use past paper questions as a source of data?**

Past paper questions are often out of context and do not provide enough background information. We do not recommend that candidates use them as a source of data for the assignment.

The basis of some past paper questions is the reliability of data, for example flawed experimental procedure or incorrect processing, and it would not be appropriate for candidates to use such questions as a comparative source. However, if candidates choose to use past paper questions, it is up to them to search through a number of past papers to find data that is comparable with their own, and decide on its suitability.

Candidates must carry out their own research. You must not direct them to specific websites or other resources.

## **Can I provide candidates with a resource pack?**

Candidates must only use websites, journals and/or books to find comparative data or information.

You must not provide a list of potential sources of comparative data or lists of extracts to support a candidate's underlying biology. You must not give candidates whole articles or extracts from websites, journals or textbooks. You must not direct candidates to specific websites, journals or textbooks.

Internet and/or literature research must be the work of individual candidates. Candidates must not work in groups to carry out research.

Candidates can carry out research to find comparative data or information and information on underlying biology outwith your direct supervision, for example at home.

The 'Internet/literature research' section in the 'Instructions for teachers and lecturers' section of the relevant coursework assessment task contains information about research. You can find the coursework assessment tasks in the 'Coursework' section of the [National 5 Biology](#), [Higher Biology](#), and [Higher Human Biology](#) subject pages.

## **Can candidates use data or information from a revision website?**

Yes, however, candidates must carry out their own research online. You must not direct them to specific websites.

A candidate's data or information can be data that:

- ◆ matches the sample range used
- ◆ is not an exact match for the sample range used
- ◆ is generic and illustrates a trend or pattern expected in the experimental or fieldwork data

For example, if a candidate finds a revision website with a graph showing the effect of temperature on enzyme activity, this generic graph may show the same trend as their experimental data, but they need to decide if it is appropriate to use.

## **In the report stage, can candidates take in their raw data and include blank columns for the processed data?**

During the report stage, candidates can use their raw experimental or fieldwork data, which can be in table form. They **must not** include additional blank or pre-populated columns for average and derived values. It would be inappropriate for them to take a half-drawn table into the report stage.

Candidates can take in their raw data with headings for raw data but not headings and blank columns for the processed data.

The 'Report stage' section in the 'Instructions for teachers and lecturers' section of the relevant coursework assessment task lists the materials that candidates can use in the report stage. You can find the coursework assessment tasks in the 'Coursework' section of the [National 5 Biology](#), [Higher Biology](#), and [Higher Human Biology](#) subject pages.

## **Citation and reference**

### **Some references for sources of internet data contain very long URLs. Can candidates use programs, such as TinyURL, to make URLs shorter and ensure no mistakes in transcription?**

Candidates can copy and paste the full URL into a Word document, print it out, and stick it into their report during the report stage.

# Graphical presentation

## Can I support candidates with their graphs?

The graph the candidate produces in the report stage must be their own work. You must not check graphs or offer any support with drawing graphs during the report stage.

You must not provide any form of feedback to a candidate on their report and you must not read the reports before they are submitted to SQA.

Once they have completed the report stage, candidates must not have an opportunity to redraft their report.

The 'Report stage' section in the 'Instructions for teachers and lecturers' section of the relevant coursework assessment task explains the role of the teacher or lecturer during the report stage. You can find the coursework assessment tasks in the 'Coursework' section of the [National 5 Biology](#), [Higher Biology](#), and [Higher Human Biology](#) subject pages.

You can provide opportunities to help your candidates practise and improve their graph skills throughout the course. You should encourage candidates to practise drawing graphs using a variety of experimental data. Candidates should not use the experimental data from their experimental work for the report stage of their assignment.

Candidates should:

- ◆ use a ruler
- ◆ not use abbreviations (as they often use incorrect or inappropriate abbreviations to label graph axes)
- ◆ take care if using a common zero — candidates often use a common zero inappropriately in a bar graph
- ◆ produce a linear scale

## Analysis

### **Do candidates have to compare their own data with quoted numerical values from the second source, or can they compare general trends in the two sources?**

#### **National 5**

Candidates must compare their experimental or fieldwork data with the data or information from their internet or literature source.

For the comparison to be valid, candidates must include any similarities and differences between their experimental or fieldwork data and the data or information from their internet or literature source.

## Higher

Candidates can compare general trends in the two sources.

If the range of values of the independent variable in the two sources is different, candidates should state the range of values the sources have in common and compare the data from this common range of values.

## Conclusion

**For Higher, is it essential that the internet data has all of the temperatures being investigated in the experiment? If the internet data does not have all of the temperatures being investigated, can candidates gain the mark for the conclusion?**

Candidates must support their conclusion with the findings from two sources (their experimental data and data from the internet or literature). If the temperature ranges in the two sources are different, candidates can write a conclusion covering the range of values of the independent variable that was common to both sources.

The 'Internet/literature research' section in the 'Instructions for teachers and lecturers' section of the relevant coursework assessment task contains information about data from literature or the internet. The 'Analysis' section in the 'Instructions for candidates' section of the relevant coursework assessment task explains how candidates can compare data sources. You can find the coursework assessment tasks in the 'Coursework' section of the [Higher Biology](#) and [Higher Human Biology](#) subject pages.

**The conclusion has to refer to all data. Is it a summary of overall trends linked to the aim? What if the data conflicts?**

Candidates should analyse the data, selecting values from the independent variable, and highlight where the data conflicts. Candidates can state that they were unable to draw a conclusion.

## Evaluation

**Are there any specific words that candidates must use?**

Candidates do not need to use the words 'validity', 'reliability,' or 'accuracy' in their evaluation. If they do use them, they must use them correctly.

# Presentation

## Can candidates type their assignments?

Provided they meet the assessment conditions, candidates can produce typed reports and use appropriate software packages to produce graphs.

We mark computer-generated graphs in the same way as hand-drawn graphs.

Graphs should be of a size that allows markers to readily check the scaling and labelling of the axes and the accuracy of the plotted data points. Markers may be unable to check the accuracy of plotting if candidates use excessively large data points, omit minor gridlines, or do not use graph paper.

The 'Report stage' section in the 'Instructions for teachers and lecturers' section of the relevant coursework assessment task explains the resources candidates can use to produce their reports. You can find the coursework assessment tasks in the 'Coursework' section of the [National 5 Biology](#), [Higher Biology](#), and [Higher Human Biology](#) subject pages.

# Advanced Higher project

## Aim

### What level of detail is required in the aim?

The Advanced Higher Biology coursework assessment task provides guidance on the aim. You can find the coursework assessment task in the 'Coursework' section of the [Advanced Higher Biology](#) subject page.

You can find examples of aims and projects on the [Advanced Higher Biology Understanding Standards page](#).

### Do candidates have to provide a null hypothesis to gain the aim/hypotheses mark?

No. A null hypothesis is not required but candidates must explicitly state a testable hypothesis in their introduction.

## Underlying biology

### The marking instructions state that candidates do not have to justify their investigation in terms of an immediate benefit to humans or to the environment. What are other common areas or examples of justification?

Candidates can, for example, justify their work in terms of inherent biological interest, but they must be clear about why their individual study is important.

## Support and guidance

### How much should I be involved in my candidates' projects?

At the start of the research stage, you must agree the choice of topic with each candidate to ensure it is appropriate.

You must not provide candidates with an aim.

You are responsible for risk assessments and providing guidance about the safe and correct use of equipment.

You must not provide candidates with experimental data or a blank or pre-populated table for experimental results.

You can read a draft of your candidates' projects before you submit them to SQA for marking. You can provide guidance as long as it is not overly directive. For example, you might suggest to a candidate that adding wording about a particular aspect would improve their project, but you must not provide them with any wording.

The 'Instructions for teachers and lecturers' section of the Advanced Higher Biology coursework assessment task explains the role of the teacher or lecturer during the research and report stages. You should read this before your candidates start work on the project. You can find the coursework assessment task in the 'Coursework' section of the [Advanced Higher Biology](#) subject page.

### **Can I use SQA Understanding Standards material with my candidates to help them fully understand the assessment requirements of the project?**

Yes. However, you must take care only to use material from topics that will not later form the basis of candidate projects, as that would count as providing model answers. You must ensure that candidates do not plagiarise the Understanding Standards material.

## **Topics**

### **Can SQA provide project ideas?**

Candidates can refer to sources, such as the [SAPS](#) and [SSERC](#) websites, for project ideas. Candidates must, however, develop these ideas and protocols when planning their investigations.

## **Protocols**

### **How much guidance can I give candidates with protocols for practicals?**

There are various sources where candidates can get basic protocols, such as standard enzyme assays, which they can use when developing their projects.

The Advanced Higher Biology coursework assessment task provides guidance. You can find the coursework assessment task in the 'Coursework' section of the [Advanced Higher Biology](#) subject page.



## **Experimental research**

### **Do lab-based projects do better than field-based projects?**

We have no data that shows marks achieved broken down by topic area, but all appropriate types of projects can achieve high marks. When discussing topics with your candidates, you must ensure that the proposed topics allow candidates to access all the marks available.

### **Are candidates disadvantaged if they carry out their projects at a field centre?**

Candidates are not disadvantaged if they carry out their projects at a field centre. As long as they are working to the instructions in the coursework assessment task, there is no reason they should not complete the practical element of their project at a field centre.

To achieve high marks, candidates must plan thoroughly to address the key issues of reliability and validity. This includes considering issues such as the size and variability of samples. Candidates must have the time and opportunity to repeat experiments and gather more data where data analysis shows this is required. They must also have the opportunity to perform a second independent replicate. This can be difficult if they are carrying out their projects at a field centre, but there are also advantages to using a field centre.

The most common reasons for candidates not achieving high marks are not related to where they carry out their projects, but how they carry out their projects. Some candidates do not follow the instructions in the coursework assessment task, for example on referencing sources. Some candidates include introductions and/or discussions that suggest they have a poor understanding of the underlying biology. Many candidates miss out on marks because of incomplete descriptions of methods and poorly presented data.

### **What quality of devices and/or techniques are suitable for measuring abiotic factors that are confounding variables?**

The coursework assessment task does not specify the types of equipment that are suitable for projects. If equipment does not allow the candidate to accurately measure the dependent variable, it will likely cause issues in terms of the validity of conclusions. You should advise candidates that a project is unsuitable if the appropriate equipment is not available.

SSERC may be able to offer some help with appropriate equipment at a reasonable cost. You may also be able to borrow equipment.

## **Are projects involving human subjects still acceptable given the number of confounding variables and subsequent difficulty drawing valid conclusions? If so, what is an appropriate rough sample size?**

Section 3d in the project marking instructions (about the control of confounding variables) states that if it has not been practical for candidates to control confounding variables, it must be clear that they have taken steps to monitor them and/or minimise their impact.

The 'Instructions for candidates' in the coursework assessment task also directs candidates to consider this. Candidates must decide, and should be able to justify, the sample size they consider appropriate, and this will vary depending on the project.

You must ensure that candidates address all health and safety and ethical concerns. You can refer to the British Psychological Society for guidance.

## **Independent replication**

### **How much detail do candidates need to include about how they achieved independent replication?**

In the 'Procedures' section of the report, candidates only need to include enough detail to make it clear that they met the criteria for independent replication, for example fresh solutions, carried out a different time, using fresh samples. Candidates should demonstrate understanding of the role and impact of replicates in the 'Evaluation' section of the report.

### **Is there a standard format for the pilot study?**

The mark in section 3g of the detailed marking instructions is for a justification of how the pilot informed the final procedures.

The coursework assessment task does not specify how candidates should present the information about the pilot study. Candidates can present data from a pilot study in a variety of ways. They can include it in an appendix if they choose to. Candidates should discuss pilot studies further in the 'Evaluation' section of the report, but there is no standard approach to this.

### **Do candidates need to include results from pilot studies?**

Many candidates include the results of their pilot experiment as it can help them justify how the pilot study informed the final procedure.

## **Do pilot studies need to include repeat measurements?**

Candidates do not have to include repeat measurements to gain the mark for justifying how the pilot study informed their final procedure. However, they may find it helpful to include repeat measurements to be sure that they have obtained a correct result from their pilot.

Refer to section 3g in the 'Detailed marking instructions' section of the coursework assessment task for full details.

## **Is simple duplication acceptable?**

Simple duplication is the minimum requirement for candidates to gain the mark for appropriate sample size. However, simple duplication may not be sufficient for candidates to gain the mark for drawing valid conclusions. Refer to sections 3e and 5b in the 'Detailed marking instructions' section of the coursework assessment task for full details.

Candidates should apply their knowledge and understanding of the connection between degree of variation and sample size when deciding on an appropriate sample size for their investigation.

## **What types of statistical analysis of results are appropriate?**

Candidates do not have to use specific statistical tests to analyse results.

If candidates include statistical analysis, they can use statistical test(s) of their choice, but they must be appropriate for the data they are analysing and it must be clear that they understand the purpose of the statistical test. Candidates can complete the required analysis of results without using specific statistical tests.

## **Do candidates need to include error bars on any graphs they draw? Are error bars sufficient, or do candidates need to show calculated values in a table?**

Candidates do not need to include error bars, but they may help with analysing the data. If candidates add error bars to data points, it must be clear what these error bars represent.

The values candidates use to plot the error bars should be clear to the marker. These values could be in the table of data used to plot the graph.

**When calculating the overall average, do candidates average the two average values from the main and replicate or would they take all individual repeat results (across the main and replicate study) and average them?**

The two approaches should give the same, or very similar, values, and either approach is acceptable. It may, however, help their analysis of results if candidates also compare the average values obtained from individual replicates.

**I understand that what constitutes an appropriate sample size will depend on the investigation, but is there a standard way to calculate acceptable replicate numbers? Will a marker be looking for evidence of how candidates calculated sample size?**

Candidates should be aware, from the 'Skills, knowledge and understanding for the course assessment' section in the course specification, of the link between sample size and variation in results. A justification of why they considered their sample size to be appropriate is one of the points candidates should discuss in their evaluation of procedures.

**Should candidates state what type of referencing style they have chosen?**

Candidates must use either the Harvard referencing system or the Vancouver referencing system. The candidate must cite at least three references correctly in the main body of the report, not including diagrams, and list the same references correctly at the end of the report.

You will find general questions and answers about National Qualifications on our website at [www.sqa.org.uk/faq](http://www.sqa.org.uk/faq).