



National Qualifications

Qualification Verification Summary Report 2022–23

Skills for Work: Laboratory Science

Verification group number: 487

Skills for Work Courses

Skills for Work: Laboratory Science National 5

HN9X 75 Careers Using Laboratory Science
HT8X 75 Careers Using Laboratory Science — Scotland
HN9W 75 Working in a Laboratory
HN9Y 75 Practical Skills
HP00 75 Practical Investigation

General comments

In academic session 2022–23, a decision was made that Skills for Work: Laboratory Science verification would return to visiting verification.

Nearly all centres visited in session 2022–23 had a good understanding of the requirements of the course and units. Many centres had contacted other experienced centres prior to undertaking the course for the purposes of sharing resources and good practice.

The course is a National 5 course and the recommended entry for candidates is that they should have attained, or be studying, a science subject and Mathematics at National 4 or 5.

Course arrangements, unit specifications, instruments of assessment and exemplification materials

Assessors and internal verifiers in most centres were familiar with the course as well as the individual unit specifications.

The SQA assessment materials were used by all centres with appropriate changes to enhance the candidate experience. The SQA assessment support packs (ASPs) for the units were also used, again with appropriate changes and additions to support learning and individual centre assessment strategies.

Centres ensured that any materials devised or amended did not deviate from the required assessment of outcomes for all units. Where centres had omitted materials to avoid repetition for candidates, this was deemed appropriate by external verifiers where the changes were documented and agreed internally.

Evidence requirements

The evidence submitted during verification showed a clear understanding of the requirements by all centres.

The course is a skills-for-work course and as such centres should ensure that employability skills and self-analysis should be the focus at appropriate points in the course. Most centres in session 2022–23 were able to offer workplace visits or to organise external speakers from related industries to visit the centre. The SQA support materials give examples of responses for candidate reviews of employability skills. Progression in these skills should be evident for each candidate in their folio.

Centres must ensure that all candidate evidence is available when recording a pass for an outcome or complete unit. This required evidence is outlined in the relevant unit assessment support pack available through centre SQA co-ordinators.

In session 2022–23, all centres were given general guidance as well as subject-specific guidance for internally assessed qualifications. The alternative approaches to assessment were developed to provide further flexibility to centres during this session. However, all centres verified chose to complete the full course.

Administration of assessments

Assessment evidence submitted by centres for verification was generally well presented, organised and easily accessible for external verification of each candidate.

Most centres assessed the units of the course to the appropriate standard and were able to justify candidate assessment judgements for each outcome or unit as appropriate.

For candidates who did not meet the required standard, centres gave an appropriate number of opportunities for re-assessment. The number of re-assessment opportunities was documented and agreed by assessors and internal verifiers. Evidence for re-assessment for any candidate was made available for external verification.

Many centres were in the process of completing the Practical Investigation unit at the point of external verification but could show that plans were in place to complete the teaching and assessment of this unit. This unit should be the final unit undertaken by candidates as it allows the scientific and employability skills gained in the other units to be used in a practical scientific situation.

Learning and teaching

In most centres learning and teaching was of a high standard. With many centres using similar strategies as used in the discrete sciences at National 5.

Overall assessment

The overall assessment of the course was of a high standard and followed SQA assessment support packs. Some centres had devised their own internal assessment tests at appropriate parts of the course.

Verification

Appropriate internal verification was evident and documented by all centres. Most centres also had internal verification plans or policies and documented evidence to show discussion of internal verification issues arising during the course. Where candidates did not meet the standard required for an outcome within a unit, centres made it very clear to both candidates and external verifiers why the standard had not been met and appropriate remediation was offered before candidates could attempt the outcome again.

Areas of good practice reported in 2022–23

Centre judgements were found to be reliable in terms of individual outcomes for each candidate, whether the outcomes had been achieved or not achieved. When a candidate required further assessment opportunities, centres presented all assessment evidence to external verifiers clearly indicating which outcome evidence was achieved.

Candidate assessment folders were organised in a manner such that external verifiers could easily verify candidate evidence.

Careers using Laboratory Science

Many centres combined outcomes 1 and 2 in this unit to avoid duplication for candidates. Where outcomes in this unit had been achieved by candidates as part of their presentation, centres clearly indicated where this had occurred.

In all centres, candidates completed a CV, which incorporated some of the skills undertaken in the course. Completed CVs were detailed and aimed towards employment in the laboratory science sector. Candidate evaluation of their skills were detailed, and assessors provided extensive feedback.

A visit to a scientific industrial site is not mandatory for the course. However, many centres use this activity to enhance the candidate experience and allow them to see science skills in action in the workplace and to talk to working scientists about their career paths. Under normal circumstances, centres organise visits from STEM ambassadors to the centre for the same purpose. Some centres also have extensive links with local FE colleges and/or universities and many of the practical assessments in the course were conducted at the FE college or university. Due to COVID-19 restrictions this was not possible for most centres in this academic session. However, some centres were able to organise online discussions with industrial sites which used laboratory science.

Centres ensured that the three self-evaluations required in this unit were suitably spread out throughout the course. The self-evaluations were discussed with candidates and progress in each skill area was evident.

Many centres had employability principal teachers and careers officers with whom they liaised to enhance the overall course, setting up mock interviews and application forms for employment and visits from external science-based employers.

Centres ensured that a variety of choice of scientific industry and presentation method was available for candidates while still covering the required outcomes. This meant very little duplication between candidates which was evident from the various videos, posters and PowerPoint presentations, and many other innovative presentation methods.

Working in a Laboratory and Practical Skills

As the course covers a wide range of scientific laboratory work, it may be unlikely that the staff member timetabled has experience from all areas. It is deemed good practice to involve specific members of staff for advice and even to assess and/or teach areas that the timetabled staff may find difficult. An example of this would be physics staff demonstrating the safe handling of radioactive sources. The same arrangements can be used for the chemistry and biology aspects of the course.

In some centres the internal verification of some practical outcomes was carried out by a verifier who specialised in that area.

Many centres used staff members with level 3 Microbiology training to verify outcome 1 in the Practical Skills unit.

In the Practical Skills unit, candidates carried out a wide variety of experiments for outcome 4 including titration and chromatography. Many centres included more than the minimum requirement.

In the Practical Skills unit, candidates must correctly describe and explain the safety precautions when working with radiation.

Calculation evidence was seen throughout the course, rather than just in the Working in a Laboratory unit, and particularly in processing of results in the practical investigation. It was evident that centres were aware of the standards required for calculations, as the calculations were of the standard required in National 5 discrete science examinations.

In some centres a further unit to develop the numeracy skills required for the course had been introduced and worked through.

Some centres used existing problem sheets from the discrete sciences to enhance this area before allowing the candidates to perform the calculation as part of practical work for evidence purposes.

Some centres added value to the Working in a Laboratory unit with involvement from their science technicians. They demonstrated and supervised candidates in PAT testing on electrical equipment in the centre. They allowed candidates to conduct their own PAT tests on appropriate equipment. The technicians were also involved in the demonstration and supervision of the proper method for preparing agar plates.

Practical Investigation

There were many examples observed of good planning for the practical investigation, including clear, well laid out plans showing evaluation of hypothesis and methods.

Candidates carried out different practical experiments and the SQA marking instructions in the ASP were used. Written comments were used to justify decisions allowing agreement between external verifier and assessor.

In some centres, candidates carried out a practice investigation together to ensure understanding of how to plan, carry out and write-up their own investigation independently.

Centre staff planned the investigation rigorously to enable each candidate to perform an individual investigation but to plan and evaluate it as part of a team.

Centres avoided duplication of work, for example, if a candidate performed titrations as part of their investigation and if they had shown all their volumes (initial/final/used) with units, then this was seen as sufficient evidence for outcome 4 in the Practical Skills unit. This was well documented by centre assessors and verifiers and was clearly evident during external verification.

The evidence showed that the individual requirements for the investigation were well met by most centres, ie headings, units, labels, scales and plotting.

Where possible centres also gave candidates a choice of investigation topic for the final unit. Candidates were encouraged to choose a topic which they had not covered in their scientific experience to date.

Internal verification

Some centres prepared a detailed internal verification policy specifically for Laboratory Science containing dates of assessment periods and clear details of how the verification will be carried out.

Observational internal verification of practical work was documented and clearly visible for external verification.

Internal verification was dated and completed in a timely manner to allow remediation for candidates.

Specific areas for improvement reported in 2022–23

Internal verification

Centres should ensure that internal verification is taking place within a suitable time frame after assessment. This ensures that candidates are given feedback as quickly as possible and are given the best opportunity to pass an outcome on the next attempt after appropriate remediation. The timing of internal verification for individual outcomes is a centre decision but should take place as soon as possible after assessment for this course as the course is fully internally assessed.

A range of assessment methods should be included in the sample, and the number of candidates sampled should be proportionate to the total number of candidate entries for that qualification in a centre, including any candidates at alternative or satellite sites. However, a higher level of sampling would be expected, if a centre is undertaking this qualification for the first time, to reduce any quality assurance risks.

Where visual verification of candidate practical work has taken place, centres should make this clear for external verifiers. This can be best established by inclusion in the centre's verification policy for this course. The verification policy should be short and concise but agreed by assessors and internal verifiers.

When centres produce their own class records for external verification, they should ensure that these records match closely with the exemplar records produced in the SQA materials.

Pass/fail decisions on the record sheet must match the evidence available. Some centres had passed outcomes for candidates for which there was no or incomplete evidence that the candidate had performed the minimum requirement.

One centre re-arranged the course and delivered it using Biology, Chemistry, Electricity and Radiation groupings. This is acceptable as long as the correct assessments for each outcome are covered and presented for external verification.

Careers using Laboratory Science

The Careers using Laboratory Science unit should be assessed throughout the course to ensure that the first self-evaluation is covered by candidates close to the start of the course with the second around the middle of the course and the last towards the end. This will ensure that progress is made by candidates on the skills

mentioned in their self-evaluations for the course, including practical skills which are undertaken in other units.

In this unit candidates should be encouraged to research their own choice of industries. In some centres repetition was evident. The industries chosen for outcome 1 must match the industries in outcome 2. The industries selected must come from the sectors detailed in the unit specification.

Candidates should provide more details in their candidate reviews, for example how they will work on their goals. The goals should be reviewed in candidate reviews 2 and 3 instead of setting new goals each time. Candidate reviews should be spread throughout the year and candidate review 3 requires feedback from another person.

Candidates should link their CV to one of the laboratory careers they have researched and should utilise their evaluations more when writing their CV. The CV must be specifically written to apply for a laboratory science related job opportunity.

The CV must link to a science career and not just be a general CV.

Working in a Laboratory

Centres should ensure that candidates present at least one piece of evidence for the completion of each calculation type in the Working in a Laboratory unit. Where this evidence is contained in another unit, this should be made clear for external verification. Centres should encourage candidates to use an appropriate number of significant figures for the final answers calculations and ensure the use of units in final answers where appropriate. 'An appropriate number of significant figures' for final answers is the guidance associated with external examination in that science subject at National 5 level. If significant figures and units are not considered by candidates in calculation work, then the evidence presented will be deemed inappropriate. When carrying out the calculations for the Working in a Laboratory unit the candidates must show the recorded measurements as well as the working for the calculations.

Centres should ensure that candidates' assessments are carried out for all three types of hazards listed in the unit specification. In outcome 2, candidates must ensure that the type of container is mentioned for storage. For all chemicals, state and concentration must be recorded by the candidates in the risk assessments.

For outcome 1 — flammable risk assessment — use of a Bunsen burner is insufficient as a flammable hazard.

Practical skills

Candidates must create their own tables with headings and units. Candidates must not be provided with a partially completed table and they must ensure that appropriate units are included in all headings.

For radiation safety, candidates must justify why health and safety are important when working with radioactivity. For outcome 2, candidates are asked to explain safety precautions. Each safety precaution needs an explanation; the precaution should not just be stated without an explanation.

For example:

- Precaution — Use forceps to lift radioactive sources.
- Explanation — Forceps ensure no direct contact between biological tissue and source. They also ensure a greater distance between source and biological tissue. Greater distance — less dose.

Practical Investigation

Centres should be aware that a change was made to this unit in session 2018–19 to reflect National 5 investigations in discrete sciences. Centres should refer to the ASPs.

Candidates should be given a choice of investigation. If all candidates in one centre complete the same topic for the practical investigation, then centres would be expected to justify reasons for this decision.

If candidates struggle with handwritten reports, they should be encouraged to type the report.

Use of technology such as Excel for drawing graphs is acceptable and should be marked according to the marking scheme for the investigation.

The investigations for each candidate must be marked by the assessor and a sample verified. The external verifier will ensure that marking has been completed to standard. The investigation is marked out of 20 and the centre must ensure that they are using the most up to date ASP for this unit and applying the marking criteria to the investigation write up.

Candidates must not be given a template for the write up of the investigation. Tables with headings or graphs with labels must not be given to candidates.

Unit assessment support packs

Centres must ensure that they use the most up to date ASP for each unit and give opportunities for all candidates to achieve each outcome in each unit.