



**National Qualifications 2021
Qualification Verification Summary Report
Skills For Work: Laboratory
Science**

Verification group number: 487

The purpose of this report is to provide feedback to centres on verification in National Qualifications in this subject.

Skills for Work Courses

C781 75	Skills for Work: Laboratory Science (National 5)
HN9X 75	Laboratory Science: Careers Using Laboratory Science
HN9W 75	Laboratory Science: Working in a Laboratory
J2W3 75	Laboratory Science: Practical Skills
J2W4 75	Laboratory Science: Practical Investigation

General comments

The course has been delivered by centres since session 2010–11.

Approval visits prior to the delivery of the course are no longer a requirement.

The course is a National 5 qualification and the entrance requirements for candidates are that they should have attained or be studying a science subject and Mathematics at National 4 or 5.

All centres visited in session 2018–19 had a very good understanding of the requirements of the course/units and had contacted other centres prior to undertaking the course for the purposes of sharing resources and good practice.

In academic session 2019 to 2020 there was no verification activity due to COVID-19 restrictions from January 2020 to August 2020.

In response to the disruption to learning caused by COVID-19, modifications were made to the assessment requirements in session 2020–21. This information is available on the Skills for Work Laboratory Science section of the SQA website.

In academic session 2020–21 a decision was made that Skills for Work verification would take place and a limited number of centres were chosen for remote verification.

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

Assessors and internal verifiers in most centres were very 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. SQA support materials for the units were also used with appropriate changes and additions to support learning and individual centre assessment strategies. Any materials organised by centres ensured that the materials did not deviate from the required assessment of learning outcomes for all units, but where centres could justify omissions from the assessments that avoided repetition for candidates this was deemed appropriate by external verifiers — providing changes were documented and agreed internally by centres.

Evidence requirements

The evidence submitted by centres during remote external verification showed a clear understanding of the requirements by all centres. Due to COVID-19 restrictions and the remote (non-visiting) nature of verification in this session, some centres had omissions for some outcomes in units undertaken by candidates. External verifiers were instructed to give some leeway to take account of candidate absence from centres due to COVID-19 restrictions that restricted attendance and access to practical work.

The course is a Skills for Work course and, as such, centres should ensure that employability skills and self-analysis should be a focus at appropriate points in the course.

SQA materials exemplify responses in the candidate reviews of these skills and progression in these skills. These reviews should be evident for each candidate in their folio.

When centres record a pass for an outcome or complete unit they must ensure that **all** evidence is available as outlined in the relevant unit assessment support pack (UASP). UASPs are available to staff through their centre SQA co-ordinator.

Administration of assessments

Assessment evidence submitted by post this session was generally well presented and easily accessible for external verification of each candidate. Most centres assessed the units of the course to an appropriate standard and were able to justify both positive and negative candidate assessment for each outcome or unit as appropriate. In the event of candidates who did not meet the standard required, centres gave an appropriate number of opportunities for re-assessment. The agreed number of re-assessment opportunities was documented and agreed within centres and evidence for re-assessment for any candidate was made available for external verification.

Appropriate internal verification was evident in all centres. Most centres also had internal verification plans and documented evidence to show discussion of internal verification issues arising during the course with documented decisions regarding these issues. Internal verification had taken place in a formal, documented manner in most centres. 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. The number of attempts a candidate can take to pass any outcome is at the discretion of the centre, however more than two attempts would have to be justified by centres for any candidate as a special circumstance.

Many centres were in the process of completing the investigation unit at the point of external verification but could show that good plans were in place to complete the teaching and assessment of the 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.

Areas of good practice

Centres' judgements have been found to be reliable in terms of individual outcomes for each candidate whether the outcomes have been achieved or not achieved. When any outcome has required a resit, centres have made it clear for external verification which assessment showed achievement of the outcome and presented both unachieved and achieved assessments as evidence.

Some centres had candidates from a variety of backgrounds on the course from National 4 to Advanced Higher. In such cases centres ensured that all candidates met the minimum requirements for the course outcomes.

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

Unit 1: Careers using Laboratory Science

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

All centres completed a CV for each candidate that incorporated some of the skills undertaken in the course. Completed CVs were detailed and mainly towards employment in the laboratory science sector. Candidates' evaluations of their skills were detailed, and the assessor provided extensive feedback.

A visit to a scientific industrial site is not mandatory for the course, however many centres are using 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/universities and many of the practicals/assessments in the course were conducted at these FE colleges/universities. Due to COVID-19 restrictions this was not possible for most centres in this academic session.

Centres ensured that the three self-evaluations required in this unit were suitably spread out throughout the course with the first at the beginning, one in the middle and the last towards the end. 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, application forms for employment and visits from external science-based employers.

When choosing their scientific industries for this section centres ensured that candidates' choices were varied with very little duplication between candidates.

Candidates also showed a variety of choice in method of presentation from video, poster and PowerPoint, and many other innovative presentation methods. Centres ensured that, for the method chosen, candidates still presented the required information from the outcomes.

Unit 2 Working in a Laboratory and Unit 3 Practical Skills

It is deemed good practice to involve specific members of staff for advice, or to assess and teach areas that the timetabled staff do not specialise in. An example of this is centres where radioactive sources are available for experimental use and the timetabled staff have no Physics experience in the safety measures required when handling radioactive sources. In some centres the Physics staff or technicians have offered sound advice or even taken the class for this section. The same arrangements have been used for Chemistry and Biology aspects of the course for which timetabled assessors may require assistance. In some centres the internal verification of some practical outcomes was carried out by a verifier who specialised in that area.

Although the course is not externally assessed through examination and there is no requirement for centres to assess the course through unit tests or final examination, many centres added rigour to the course by making their own short unit assessments for units 2 and 3. Other centres also used their prelim time to timetable practical assessments for candidates.

Many centres used teaching staff or technicians trained to level 3 in microbiology to verify unit 3, outcome 1 where various subcultures need to be grown by candidates.

In unit 3, candidates carried out a wide variety of experiments for outcome 4, including titration and chromatography, and many centres included more than the minimum requirement.

Calculation evidence was seen throughout the course, rather than just in unit 2. The calculations were of a standard required for examination in National 5 discrete sciences. 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 the practical work for evidence purposes.

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

The science technicians added value to the Working in a Laboratory unit by showing candidates how they carried out PAT tests on electrical equipment in the centre. They also allowed candidates to conduct their own PAT tests on suitable equipment. The technicians also instructed candidates on the proper method for preparing their own agar plates.

Unit 4 Practical Investigation

In most centres the plan was well laid out and candidates showed evaluation of their hypothesis and method.

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

In some centres candidates had 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 that was planned and evaluated as part of a team.

Good decisions for individual candidates to avoid duplication of work was clear and highlighted during external verification by assessors and verifiers. For example, if a candidate had to perform titrations as part of the unit 4 investigation and if they had shown all their volumes (initial/final/used) with units, then this was seen as sufficient coverage for outcome 4 in the Practical Skills unit.

Decisions on candidate submissions for the investigation in the final unit were at the correct level for National 5. All decisions on requirements for tables and graphs were considered, 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 that 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.

New approaches used during COVID-19 restrictions

Many centres used new approaches to assessment in this session to alleviate attendance and practical work problems due to COVID-19 restrictions. These included the use of Google Forms to carry out remote self-evaluations and other digital technologies to allow assessment of areas of the course. Microsoft Teams was also used well to discuss any issues with individual candidates. Some centres produced remote learning notes to allow candidates to achieve some outcomes.

Specific areas for improvement

Internal verification

Centres should ensure that internal verification is taking place within a suitable time 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 not take place more than approximately two weeks after assessment for this course as the course is fully internally assessed.

Internal verification must include the verifier's signature and date of verification.

The sample size for internal verification is dependent on the cohort. For a full practical class of 20 candidates, approximately 12 candidates should be internally verified. For any cohort of fewer than 10 candidates, all candidates should be internally verified. The number of candidates to be verified should be agreed and documented.

Where visual verification of candidate practical work has taken place then centres should make this clear for external verifiers. Ideally, this should be included 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 met the minimum requirements.

Unit 1 Careers using Laboratory Science

This 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 evaluation towards the end. This will ensure that progress is made by candidates on the skills mentioned in their self-evaluations involved in this course, including practical skills that are developed in other units.

Candidates should be encouraged to research their own choice of industries. In some centres candidates had obviously collaborated too much and repetition was clear. 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 assessment support pack.

Candidates should provide more details in their candidate reviews, for example how they will work on their goals. Also, the goals should be reviewed in candidate reviews 2 and 3 instead of setting new goals each time.

Candidates should link their CVs to one of the laboratory careers they have researched and should make more use of their evaluations when writing their CVs.

Unit 2 Working in a Laboratory

Centres should ensure that candidates present at least one piece of evidence for completing each calculation type. 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. 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. For formula work, the candidates must rearrange a formula not just substitute values into the formula.

Centres should ensure that candidates' assessments are carried out for all three types of hazard listed in the documentation. In outcome 2, candidates must ensure that containers are mentioned for storage and not just the material. For all chemicals, state and concentration must be recorded by the candidates in the risk assessments.

Unit 3 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 is important when working with radioactivity. In learning 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 results in a lower dose.

Unit 4 Practical Investigation

Centres should be aware that a major change was made to this unit in session 2018–19 to reflect National 5 investigations in the discrete sciences and should ensure they are fully familiar with the unit assessment support packs.

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 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.

Unit assessment support packs

Centres must ensure that they consult the UASP for each unit and give opportunities for all candidates to achieve each outcome in each unit. The UASP for each unit is detailed and external verifiers will be looking for evidence of full completion for each outcome before the candidate can be deemed to have passed that outcome.