



**National Qualifications 2019**  
**Qualification Verification Summary Report**  
**Skills for Work:**  
**Laboratory Science**

Verification group: 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 Careers Using Laboratory Science

HN9W 75 Working in a Laboratory

HN9Y 75 Practical Skills

HP00 75 Practical Investigation

## **General comments**

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

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.

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

The course is a National 5 course 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.

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

Assessors and internal verifiers in all 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 again 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. However, where centres could justify omissions from the assessments which avoided repetition for candidates, this was deemed appropriate by external verifiers if the changes were documented and agreed internally by centres.

## **Evidence requirements**

The evidence submitted by centres during external verification showed a clear understanding of the requirements by all centres. There were no omissions for any outcomes in all units.

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

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

### **Administration of assessments**

Assessment evidence was well presented and easily accessible for external verification of each candidate.

All 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.

When candidates 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 particular candidate was made available for external verification.

Appropriate internal verification was evident in all centres. All 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 all 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 three attempts for any candidate would have to be justified by the centre 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**

The following areas of good practice were reported:

Centres' judgements were found to be reliable in terms of individual outcomes for each candidate, whether the outcomes were achieved or not achieved. When any outcome required a re-sit, centres 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.

### **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 overtaken by candidates as part of their presentation, centres clearly indicated where this had occurred.

All centres completed a CV for each candidate which incorporated some of the skills undertaken in the course.

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. Other centres had organised visits from STEM ambassadors to the centre for the same purpose. Some centres had extensive links with local FE colleges/universities and many of the practicals/assessments in the course were conducted at the FE colleges/university.

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 and 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 their method of presentation such as video, poster, PowerPoint and many other innovative presentation methods. Centres ensured that candidates still presented the required information from the outcomes, whatever method was chosen.

## **Unit 2 — Working in a Laboratory and Unit 3 — Practical Skills**

As the course covers work from all areas of science it is deemed good practice to involve specific members of staff for advice and even to assess/teach areas which the timetabled staff may find difficult. An example of this is centres in which radioactive sources are available for experimental use and the timetabled staff have no Physics experience in the safety measures required when handling the 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. Some centres made use of outcome 1 and assignment assessment standards used in discrete sciences at National 5 to set a standard for aspects of the investigation unit undertaken by candidates.

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

Calculations evidence was seen throughout the course, rather than just in Unit 2 — Working in a Laboratory, and especially in processing of results in the practical investigation. 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 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 Lab 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 appropriate equipment. The technicians also instructed candidates on the proper method for preparing their own agar plates.

## **Unit 4 — Practical Investigation**

The plan was well laid out and candidates showed evaluation of their hypothesis and method.

In some centres, candidates had carried out a practice investigation 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.

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 Unit 4 — Practical 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 taken into account, that is: 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.

### **Specific areas for improvement**

The following areas for development were reported:

#### **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 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. 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.

### **Unit 1 — Careers using Laboratory Science**

The careers 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 the self-evaluations involved in this course — including practical skills which are undertaken 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 evident.

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.

### **Unit 2 — 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 particular 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 Lab 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. A greater distance means less dose.

#### **Unit 4 — Practical Investigation**

Candidates must provide reasons why variables were kept the same and why particular equipment was used.

The candidates must state the roles and responsibilities for each group member, including themselves.

For recording results, candidates must ensure that they record their results in the appropriate format with appropriate SI units.

#### **Future developments to course**

Centres must keep up to date with developments and changes to the course requirements.

In session 2018–19, development work was conducted for this course. The work was designed to make record keeping more meaningful and less demanding for centres. The main changes will be in Unit 1 — Careers in Laboratory Science and Unit 4 — Practical Investigation. Unit 1 will be less demanding on the paperwork required by candidates and centres, and unit 4 has been redesigned to reflect the assignments in the discrete sciences.

More information on these changes will become available in due course.