



## National Unit Specification: general information

**UNIT** Science: Practical Skills (SCQF level 4)

**CODE** F3TC 10

### SUMMARY

This Unit is suitable for candidates who wish to gain some practical experience in measuring quantities, basic laboratory skills and calculating and presenting results. Candidates will be involved in a number of practical exercises which will help them develop practical skills in a scientific context. These exercises could take place in the laboratory or in the field.

### OUTCOMES

- 1 Measure and record quantities in a scientific context.
- 2 Carry out practical scientific procedures.
- 3 Present and calculate scientific experimental results.

### RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

- ◆ Standard Grade Science, Biology, Chemistry, or Physics at Foundation level
- ◆ Access 3 Units in Biology, Chemistry or Physics

### CREDIT VALUE

0.5 credits at Intermediate 1 (3 SCQF credit points at SCQF level 4\*).

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

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#### Administrative Information

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## **National Unit Specification: general information (cont)**

**UNIT**      Science: Practical Skills (SCQF level 4)

### **CORE SKILLS**

There are opportunities to develop the Core Skills of *Numeracy* and *Problem solving* at SCQF level 4 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

## **National Unit Specification: statement of standards**

### **UNIT      Science: Practical Skills (SCQF level 4)**

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

#### **OUTCOME 1**

Measure and record quantities in a scientific context.

##### **Performance Criteria**

- (a) Set up the measuring instrument in accordance with a given specification.
- (b) Take measurements from the instrument to a specified accuracy.
- (c) Record the measurements correctly with respect to the value and the unit of measurement.

#### **OUTCOME 2**

Carry out practical scientific procedures.

##### **Performance Criteria**

- (a) Complete the practical procedures in accordance with given instructions.
- (b) Follow safety regulations throughout the practical procedures.

#### **OUTCOME 3**

Present and calculate scientific experimental results.

##### **Performance Criteria**

- (a) Present results of an experiment in an appropriate format and to a specified level of accuracy.
- (b) Draw and interpret graphs correctly using the experimental results.
- (c) Carry out calculations from measurements correctly using experimental results.
- (d) Use correct notation throughout.

## National Unit Specification: statement of standards (cont)

**UNIT**      Science: Practical Skills (SCQF level 4)

### EVIDENCE REQUIREMENTS FOR THIS UNIT

Performance evidence is required to demonstrate candidates have achieved Outcomes 1 and 2. This can be provided in the format of observation checklists to ensure that the Performance Criteria are covered. Written and/or oral evidence is required to demonstrate candidates have achieved all the Performance Criteria for Outcome 3.

For Outcome 1, the candidate is required to carry out tasks demonstrating that **four** different measuring instruments can be set up, readings taken to a specified accuracy and recorded accurately.

For Outcome 2, the candidate is required to perform **four** practical procedures safely and in according to given instructions.

For Outcome 3, the candidate must show that graphs can be drawn and results interpreted from the graphs in a least **one** practical exercise. The candidate must also show that results can be calculated using at least **two** of the following basic arithmetic operations — percentages, fractions, simple ratios or simple formulae. The correct notation for all of whole numbers, decimals, percentages, fractions and simple ratios must be used.

The Assessment Support Pack for this Unit provides sample assessment material. Centres wishing to develop their own assessments should refer to the Assessment Support Pack to ensure a comparable standard.

## National Unit Specification: support notes

### UNIT Science: Practical Skills (SCQF level 4)

This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 20 hours.

#### GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

This Unit is a mandatory Unit in the National Certificate in Applied Sciences at SCQF level 5 but it can also be taken as a free-standing Unit. The Unit can be offered in the context of biology, chemistry, physics or general science and can be integrated with the teaching of any of the Intermediate 1 or 2 Units in the sciences which involve practical work in the laboratory.

#### Outcome 1

The following range of measuring instruments would be appropriate: burette, pipette, measuring cylinder, melting point apparatus, thermometer, syringe, balance, Bourdon gauge, ammeter, voltmeter, ohmmeter, multi-meter, count rate meter, barometer, Newton balance, light meter, meter rule, pH meter, oxygen meter, humidity meter, compass, clinometer, calliper.

Measurement tasks should be related to a range of variables: for example, mass, length, volume, time, temperature, light intensity, resistance, voltage, pH, area, velocity, gradient, humidity.

#### Outcome 2

A wide range of practical procedures may be appropriate: for example, sampling, filtration, chromatography, crystallisation, titration, electrolysis, wiring electric circuits, use of a microscope, use of field instruments and techniques, use of control procedures.

#### Outcome 3

The candidate should gain experience of a range of presentation formats; for example, table, chart, graph and histogram. It is important that the candidate can also interpret graphical information, can carry out calculations which involve more than one step and can carry out basic numeracy operations which may include the use of simple formulae such as  $F = ma$ .

If this Unit is being taken as part of the Group Award, the learning and teaching approaches and the assessment could be integrated with any of the science Units which involve practical work.

#### GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Laboratory practical work will play a significant part in this Unit. The Unit can be integrated with the teaching of Intermediate 1 or 2 Science Units to enable the practical skills to be developed. Where appropriate, Outcomes may be treated as separate tasks. Practical work should be approved by the teacher/lecturer and must be carried out according to safety regulations at all times.

The practical skills may be developed in small group activities however each candidate must perform the measurements and the practical procedures individually to enable the Performance Criteria to be achieved. Candidates should have several opportunities to practise their skills.

## National Unit Specification: support notes

**UNIT**      Science: Practical Skills (SCQF level 4)

### OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

This unit provides the candidate with the opportunity to develop the Core Skills of *Numeracy* and *Problem Solving* at SCQF level 4. Candidates will develop *Problem Solving* skills in Outcome 2 while carrying out scientific procedures. The Core Skill of *Numeracy* will be developed throughout the Unit but mainly in Outcome 3 where graphs will be drawn and results interpreted. Calculations will also be completed in this Outcome.

### GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

#### Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by information and communications technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

It is recommended that the lecture/teacher assess the candidate at the stage when consistent competence in a given task is shown. Where a candidate is unsuccessful in achieving an Outcome, provision should be made for remediation and reassessment.

Checklists may be used to record the achievement of the Outcomes 1 and 2 and the Performance Criteria.

In the Evidence requirements of Outcome 3 the candidate is asked to carry out two arithmetic operations and to use notation of numbers, percentages, etc. It should be possible to select a suitable practical exercise to enable calculations to be carried out, eg a formula mass determination, percentage yield etc. The candidate must be able to work confidently with basic numerical notation and the range must include whole numbers, decimals, percentages, fractions and ratios. Similarly when the candidate is required to draw and interpret a graph, a suitable practical exercise such as that of the melting point determination could be used.

### CANDIDATES WITH DISABILITIES AND/OR ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* ([www.sqa.org.uk](http://www.sqa.org.uk)).