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Pearson Edexcel Level 3 NVQ Diploma in Laboratory and Associated Technical Activities

Specification

NVQ/competence-based qualifications

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Issue 3

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This specification is Issue 3. Key changes are listed in the summary table on the next page. We will inform centres of any changes to this issue. The latest issue can be found on the Pearson website: qualifications.pearson.com

This qualification was previously known as:

Pearson Edexcel Level 3 NVQ Diploma in Laboratory and Associated Technical Activities (QCF)

The QN remains the same.

References to third party material made in this specification are made in good faith. Pearson does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

All information in this specification is correct at time of going to publication.

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Summary of Pearson Edexcel Level 3 NVQ Diploma in Laboratory and Associated Technical Activities specification Issue 3 changes

Summary of changes made between previous issue and this current issue	Page/section number
All references to QCF have been removed throughout the specification	
Definition of TQT added	Page 1
Definition of sizes of qualifications aligned to TQT	Page 2
TQT value added	Page 6
Guided learning definition updated	Page 12
QCF references removed from unit titles and unit levels in all units	Page 13-207

Earlier issue(s) show(s) previous changes.
If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

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Introducing Pearson Edexcel NVQ/Competence-based qualifications

What are NVQ/Competence-based qualifications?

National Vocational Qualifications (NVQs)/Competence-based qualifications are work-based qualifications that give learners the opportunity to develop and demonstrate their competence in the area of work or job role to which the qualification relates.

NVQs/Competence-based qualifications are based on recognised occupational standards for the appropriate sector. Occupational standards define what employees, or potential employees, must be able to do and know, and how well they should undertake work tasks and work roles. These standards are written in broad terms to enable employers and providers to apply them to a wide range of related occupational areas.

NVQs/Competence-based qualifications are outcomes-based with no fixed learning programme, therefore allowing flexible delivery to meet the individual learner's needs. At Level 2 and above, these qualifications are recognised as approved training and development courses for employees that have been in the workplace for some time or as a way of inducting, training and developing new entrants into the workplace. Qualifications at Level 1 can be used in Traineeships, which enables progression to entry level employment or to Apprenticeship programmes.

Learners will work towards their qualification in the workplace or in settings that replicate the working environment as specified in the assessment requirements. Colleges, training centres and/or employers can offer these qualifications as long as they have access to appropriate physical and human resources and have the necessary quality assurance systems in place.

Sizes of NVQ/Competence-based qualifications

For all regulated qualifications, Pearson specify a total number of hours that it is estimated learners will require to complete and show achievement for the qualification – this is the Total Qualification Time (TQT). The TQT value indicates the size of a qualification.
Within the TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we estimate a centre delivering the qualification might provide. Guided learning means activities, such as lessons, tutorials, online instruction, supervised study and giving feedback on performance, that directly involve tutors and assessors in teaching, supervising and invigilating learners. Guided learning includes the time required for learners to complete external assessment under examination or supervised conditions.
In addition to guided learning, other required learning directed by tutors or assessors will include private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.
As well as TQT and GLH, qualifications can also have a credit value – equal to one tenth of TQT, rounded to the nearest whole number.
TQT and credit values are assigned after consultation with users of the qualifications.
NVQ/Competence-based qualifications are available in the following sizes:

- Award – a qualification with a TQT value of 120 or less (equivalent to a range of 1–12 credits)
- Certificate – a qualification with a TQT value in the range of 121–369 (equivalent to a range of 13–36 credits)
- Diploma – a qualification with a TQT value of 370 or more (equivalent to 37 credits and above).

Qualification title covered by this specification

This specification gives you the information you need to offer the Pearson Edexcel Level 3 Diploma in Laboratory and Associated Technical Activities:

Qualification title	Qualification Number (QN)	Accreditation start date
Pearson Edexcel Level 3 NVQ Diploma in Laboratory and Associated Technical Activities	600/1731/4	01/06/11

You should use the Qualification Number (QN), when you wish to seek public funding for your learners. Each unit within a qualification will also have a unique reference number, which is listed in this specification.

The qualification title and unit reference numbers will appear on the learners' final certification document. Learners need to be made aware of this when they are recruited by the centre and registered with Pearson.

Key features of the Level 3 NVQ Diploma in Laboratory and Associated Technical Activities

This qualification:

- is nationally recognised
- is based on the Level 3 Laboratory and Associated Technical Activities (NOS). The NOS, assessment requirements/strategy and qualification structure(s) are owned by SEMTA.

The Pearson Edexcel Level 3 NVQ in Laboratory and Associated Technical Activities have been approved as components for the Level 3 Laboratory Technicians Apprenticeship framework.

What is the purpose of this qualification?

The Pearson Edexcel Level 3 NVQ Diploma in Laboratory and Associated Technical Activities provides recognition of the skills and knowledge of individuals who work in a laboratory. It covers health and safety; effective working relationships; dealing with laboratory specimens/samples and communicating information. It contains two Pathways: Industrial Science and Education Science.

Who is this qualification for?

This qualification is for all learners aged 18 and above who are capable of reaching the required standards.

Pearson's policy is that the qualification should:

- be free from any barriers that restrict access and progression
- ensure equality of opportunity for all wishing to access the qualification(s).

What are the potential job roles for those working towards this qualification?

- Analytical scientist
- Biochemist
- Biomedical scientist
- Biologist
- Biotechnologist
- Clinical scientist
- Microbiologist
- Physicist
- Research scientist

- Education laboratory technician
- Laboratory technician
- Medical laboratory assistant
- Scientific laboratory technician

What progression opportunities are available to learners who achieve this qualification?

Progression from this qualification can be to other relevant level 3 and/or level 4 qualifications, for example:

- Pearson Edexcel Level 3 NVQ Diploma in Laboratory Science
- Pearson Edexcel Level 4 NVQ Diploma in Laboratory and Associated Technical Activities.
- Pearson Edexcel Level 4 HNC in Applied Biology
- Pearson Edexcel Level 4 HNC in Applied Chemistry.

What is the qualification structure for the Pearson Edexcel Level 3 Diploma in Laboratory and Associated Technical Activities?

The Total Qualification Time (TQT) for this qualification is 480 hours.

The Guided Learning Hours (GLH) for this qualification is 300.

Within the Pearson Edexcel Level 3 Diploma in Laboratory and Associated Technical Activities learners may achieve one of the following pathways: Education Science or Industrial Science.

For the Education Science pathway learners must achieve a minimum of 48 credits by completing two common mandatory units, one pathway mandatory specific unit and five pathway specific optional units. Three of these optional units should be taken from Group A and the remaining units may be taken from Group A or Group B, within the Education Science pathway.

For the Industrial Science pathway learners must achieve a minimum of 60 credits by completing two common mandatory units, three pathway mandatory specific units and three pathway specific optional units. Two of these optional units should be taken from Group A; the remaining unit may be taken from Group A or Group B within the Industrial Science pathway.

Unit	Title	Credit	Level
Common Mandatory units			
Unit 1:	Maintain health and safety in a scientific or technical workplace	5	3
Unit 2:	Maintain effective and efficient working relationships for scientific or technical activities	5	3

Unit	Title	Credit	Level
Education Science Pathway Must complete the following unit plus five more optional units (three must come from Group A).			
Unit 19:	Evaluate and provide scientific or technical assistance for learning activities	6	3
Group A - Optional units			
Unit 11:	Diagnose faults, repair and maintain scientific or technical equipment for workplace activities	8	3
Unit 16:	Provide training for scientific or technical activities in the workplace	8	3
Unit 20:	Demonstrate scientific or technical methods, techniques and skills to others in the workplace	8	3
Unit 21:	Improve the quality and reliability of scientific or technical activities in the workplace	10	3
Unit 22:	Test and evaluate new scientific or technical methods and equipment for learning activities	12	3
Unit 23:	Provide technical support for computer application software and equipment for learning activities	10	3
Group B - Optional units			
Unit 13:	Maintain and control stocks of all resources, equipment and consumables for scientific or technical activities	4	3
Unit 14:	Make presentations for scientific or technical activities in the workplace	6	3
Unit 15:	Assess their own scientific or technical knowledge and skills for workplace activities	4	3
Unit 17:	Provide scientific or technical leadership for a workplace team	16	3

Unit	Title	Credit	Level
Industrial Science Pathway			
Must complete the following units plus three more optional units (two must come from Group A).			
Unit 3:	Carry out scientific or technical testing operations	12	3
Unit 4:	Access and communicate scientific or technical information to authorised personnel	6	3
Unit 5:	Provide technical advice and guidance for scientific or technical activities	12	3
Group A - Optional units			
Unit 6:	Plan scientific or technical sampling and testing activities	8	3
Unit 7:	Carry out complex scientific or technical testing operations	12	3
Unit 8:	Carrying out complex scientific or technical sampling operations	8	3
Unit 9:	Carry out scientific or technical investigations	9	3
Unit 10:	Carry out small scale processing	8	3
Unit 11:	Diagnose faults, repair and maintain scientific or technical equipment for workplace activities	8	3
Unit 12:	Measuring, weighing and preparing compounds and solutions for laboratory use	16	3
Group B - Optional units			
Unit 13:	Maintain and control stocks of all resources, equipment and consumables for scientific or technical activities	4	3
Unit 14:	Make presentations for scientific or technical activities in the workplace	6	3
Unit 15:	Assess their own scientific or technical knowledge and skills for workplace activities	4	3
Unit 16:	Provide training for scientific or technical activities in the workplace	8	3
Unit 17:	Provide scientific or technical leadership for a workplace team	16	3
Unit 18:	Following aseptic procedures in the laboratory environment	9	2

How is the qualification graded and assessed?

The overall grade for the qualification is a 'pass'. The learner must achieve all the required units within the specified qualification structure.

To pass a unit the learner must:

- achieve **all** the specified learning outcomes
- satisfy **all** the assessment criteria by providing sufficient and valid evidence for each criterion
- show that the evidence is their own.

The qualifications are designed to be assessed:

- in the workplace or
- in conditions resembling the workplace, as specified in the assessment requirements/strategy for the sector, or
- as part of a training programme.

Assessment requirements/strategy

The assessment strategy for this qualification has been included in *Annex D*. It has been developed by SEMTA in partnership with employers, training providers, awarding organisations and the regulatory authorities. The assessment strategy includes details on:

- criteria for defining realistic working environments
- roles and occupational competence of assessors, expert witnesses, internal verifiers and standards verifiers
- quality control of assessment
- evidence requirements.

Evidence of competence may come from:

- **current practice** where evidence is generated from a current job role
- a **programme of development** where evidence comes from assessment opportunities built into a learning/training programme whether at or away from the workplace
- the **Recognition of Prior Learning (RPL)** where a learner can demonstrate that they can meet the assessment criteria within a unit through knowledge, understanding or skills they already possess without undertaking a course of learning. They must submit sufficient, reliable and valid evidence for internal and standards verification purposes. RPL is acceptable for accrediting a unit, several units or a whole qualification
- a **combination** of these.

It is important that the evidence is:

Valid	relevant to the standards for which competence is claimed
Authentic	produced by the learner
Current	sufficiently recent to create confidence that the same skill, understanding or knowledge persist at the time of the claim
Reliable	indicates that the learner can consistently perform at this level
Sufficient	fully meets the requirements of the standards.

Types of evidence (to be read in conjunction with the assessment strategy in Annexe C)

To successfully achieve a unit the learner must gather evidence which shows that they have met the required standard in the assessment criteria. Evidence can take a variety of different forms including the examples below. Centres should refer to the assessment strategy for information about which of the following are permissible.

- direct observation of the learner's performance by their assessor (O)
- outcomes from oral or written questioning (Q&A)
- products of the learner's work (P)
- personal statements and/or reflective accounts (RA)
- outcomes from simulation, where permitted by the assessment strategy (S)
- professional discussion (PD)
- assignment, project/case studies (A)
- authentic statements/witness testimony (WT)
- expert witness testimony (EPW)
- evidence of Recognition of Prior Learning (RPL).

The abbreviations may be used for cross-referencing purposes.

Learners can use one piece of evidence to prove their knowledge, skills and understanding across different assessment criteria and/or across different units. It is, therefore, not necessary for learners to have each assessment criterion assessed separately. Learners should be encouraged to reference the assessment criteria to which the evidence relates.

Evidence must be made available to the assessor, internal verifier and Edexcel standards verifier. A range of recording documents is available on the Pearson website: qualifications.pearson.com. Alternatively, centres may develop their own.

Centre recognition and approval

Centre recognition

Centres that have not previously offered Pearson qualifications need to apply for and be granted centre recognition as part of the process for approval to offer individual qualifications. New centres must complete both a centre recognition approval application and a qualification approval application.

Existing centres will be given 'automatic approval' for a new qualification if they are already approved for a qualification that is being replaced by the new qualification and the conditions for automatic approval are met. Centres already holding Pearson approval are able to gain qualification approval for a different level or different sector via Edexcel online.

Approvals agreement

All centres are required to enter into an approvals agreement which is a formal commitment by the head or principal of a centre to meet all the requirements of the specification and any linked codes or regulations. Pearson will act to protect the integrity of the awarding of qualifications, if centres do not comply with the agreement. This could result in the suspension of certification or withdrawal of approval.

Quality assurance

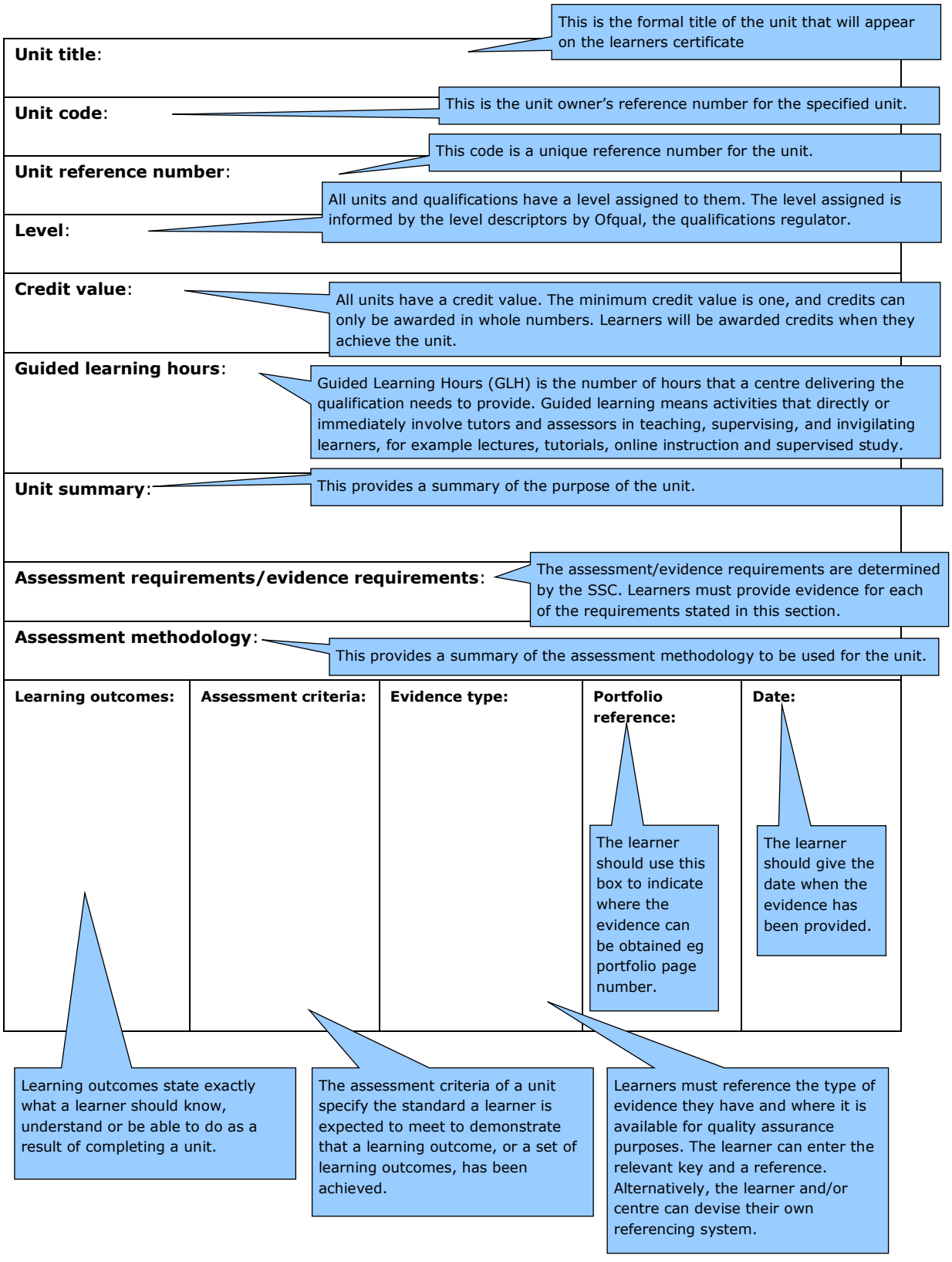
Detailed information on Pearson's quality assurance processes is given in *Annexe A*.

What resources are required?

Each qualification is designed to support learners working in the Laboratory and Associated Technical Activities sector. Physical resources need to support the delivery of the qualifications and the assessment of the learning outcomes and must be of industry standard. Centres must meet any specific resource requirements outlined in *Annexe C: Assessment requirements/strategy*. Staff assessing the learner must meet the requirements within the overarching assessment strategy for the sector.

Unit format

Each unit in this specification contains the following sections.



Units

Unit 1: Maintain health and safety in a scientific or technical workplace

Unit reference number: H/601/9718

Level: 3

Credit value: 5

Guided learning hours: 35

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to maintain health and safety in a workplace where scientific or technical activities are performed. The learner is required to observe all legal, statutory and organisational requirements, and they must be able to identify any hazards and potential risks to health and safety. They must also know what actions to take in case of an emergency and, as well as ensuring their own safety, they must show responsibility towards their colleagues and others. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within specified parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical activities undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete scientific or technical tasks and procedures, including, where relevant, responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete workplace tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

They will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Maintain health and safety in a scientific or technical workplace	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Identify health and safety workplace procedures for all of the following: – workplace hazards – manual handling – unsafe practices – VDU & RSI policies – spillages – other (please specify) 1.3 Comply with established procedures for both of the following: – workplace emergency (e.g. injury, spillage) – workplace evacuation (e.g. fire, gas leak) 1.4 Accurately assess health and safety in relation to their work and the workplace 1.5 Use safe practices and the appropriate personal protective clothing and equipment for the work			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Use safe handling practices for three of the following, in accordance with approved procedures: – flammables (liquid or solid) – corrosive material – equipment or tools – toxic/harmful material – biological material – radioactive material – water reactive material – explosive material – extreme temperature – compressed gas – pyrophoric material – oxidiser – unstable reactive – sensitising/irritant substance – manual handling/lifting loads 1.7 Identify and rectify any breaches to health and safety procedures and report them to the appropriate person as soon as possible			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.8 Make recommendations on, or if appropriate, take action on both of the following: – areas where the work practices do not fully comply with health and safety requirements – improvements to handling and/or storage of materials, substances or equipment 1.9 Maintain the security of the workplace, in accordance with organisational requirements			
2 Maintain health and safety in a scientific or technical workplace (continued)	2.1 Maintain and keep tidy their work area to a standard of health and safety which is consistent with local policies and legal requirements 2.2 Use equipment and materials in accordance with manufacturers' instructions and local safety regulations 2.3 Dispose of waste materials and substances safely and correctly 2.4 Take the appropriate precautions to protect their self and others during work activities 2.5 Follow the correct procedure when an emergency arises or is suspected 2.6 Identify and recommend health and safety improvements to their work area and/or environment 2.7 Communicate the required information about the work done, to authorised people, in accordance with departmental and organisational procedures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.8 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to maintain health and safety in a scientific or technical workplace	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the workplace procedures, as set down in local operating manuals and schemes of work 3.4 Describe the importance of following manufacturers' instructions 3.5 Describe the techniques and processes they must use correctly in the workplace 3.6 Describe the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.7 Describe the specific safety precautions to be taken when working with scientific or technical equipment and computer-based systems (to include such things as safety guidance relating to the use of visual display unit (VDU) equipment and work station environment (such as lighting, seating, positioning of equipment), and repetitive strain injury (RSI)) 3.8 Describe the identity of health and safety representatives (such as the Laboratory Safety Officer, Staff Health & Safety Representatives and First-Aiders) 3.9 Describe the location and correct use of emergency equipment (such as fire extinguishers, including the situations in which different types of fire extinguishers are used) 3.10 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.11 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.12 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.13 Explain why risks in the workplace should be assessed, and the correct action to be taken			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.14 Describe the local procedures for emergency evacuation (including escape routes and assembly points)			
4 Know how to maintain health and safety in a scientific or technical workplace (continued)	4.1 Describe the location of fire alarm call points and how to operate them 4.2 Describe the location of spillage kits and the procedures to follow in the event of spillages of chemicals and/or biological fluids and materials 4.3 Explain how to identify and recommend health and safety improvements to their work area and/or environment 4.4 Describe the control of substances hazardous to health (COSHH) regulations, and their application in the workplace 4.5 Describe the range of signs and symbols used for the warning of workplace hazards and prohibited practices 4.6 Describe the types of hazards which may be present in the workplace and how these can be minimised 4.7 Describe the correct storage and disposal procedures for hazardous materials 4.8 Describe the hazards associated with chemicals, radioactive substances and/or biological materials			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.9 Explain what constitutes dangerous occurrences and hazardous malfunctions in the workplace and why these must be reported 4.10 Explain how to lift and carry loads safely, and use the manual and mechanical aids available in the workplace 4.11 Describe the importance of safe storage of tools, equipment and materials 4.12 Describe the reasons for cleaning work surfaces and equipment 4.13 Explain why it is important to differentiate and segregate categories of waste 4.14 Describe the correct procedures for the storage, transport and disposal of waste			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 2: Maintain effective and efficient working relationships for scientific or technical activities

Unit reference number: D/601/9569

Level: 3

Credit value: 5

Guided learning hours: 25

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to maintain effective and efficient working relationships in a workplace where scientific or technical activities are performed, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within specified parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical activities undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete scientific or technical tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete workplace tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Maintain effective and efficient working relationships for scientific or technical activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection clothing and equipment (PPE) when doing scientific or technical activities 1.3 Establish and maintain effective working relationships in the workplace 1.4 Sustain positive working relationships by all of the following: – working in teams – supporting others – being cooperative and flexible – providing clear and accurate information 1.5 Maintain working relationships with two of the following: – colleagues in their own working group – supervisors/managers – more senior professionals/scientists – colleagues outside their normal working group – persons external to their organisation			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Meet workplace standards for timekeeping, appearance and behaviour 1.7 Deal with disagreements in an amicable and constructive way, so that good relationships are maintained			
2 Maintain effective and efficient working relationships for scientific or technical activities (continued)	2.1 Maintain communication with others, to ensure that they are kept informed about any work plans or activities which may affect them 2.2 Be aware of the limits of their skills, and seek assistance from others in a polite and courteous way without causing undue disruption to normal work activities 2.3 Review their personal performance and development, with the appropriate people, at regular intervals 2.4 Review personal development objectives and targets, to include one of the following: – dual or multi-skilling – training on new equipment/technology – understanding of company working practices, procedures, plans and policies – increased responsibility – other specific requirements			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.5 Communicate the required information about the work done, to authorised people, in accordance with departmental and organisational procedures 2.6 Record details of work done, and communicate the details to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific company documentation – computer-based record – electronic mail			
3 Know how to maintain effective and efficient working relationships for scientific or technical activities	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.6 Describe the interactions which take place between their scientific or technical speciality and others where the same speciality is used 3.7 Explain how their scientific or technical work activities may affect others within the department and the workplace 3.8 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.9 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			
4 Know how to maintain effective and efficient working relationships for scientific or technical activities (continued)	4.1 Describe the lines of accountability within the department 4.2 Describe the reasons why good working relationships are important 4.3 Explain how to create and maintain good working relationships 4.4 Describe the methods of working effectively with others 4.5 Describe the problems that can affect relationships in the workplace 4.6 Describe the procedures for dealing with disagreements within the workplace			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.7 Describe the departmental performance review process, and their role in this process 4.8 Describe the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 3: Carry out scientific or technical testing operations

Unit reference number: K/601/9719

Level: 3

Credit value: 12

Guided learning hours: 57

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to carry out scientific or technical testing activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Carry out scientific or technical testing operations	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Identify conditions for scientific or technical tests to be done 1.4 Identify conditions for scientific or technical test that include two of the following: – test environment – test criteria – safety factors – time recording system – cleanliness – external influence that can cause variations 1.5 Establish the requirements for the scientific or technical tests to be done			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Establish requirements for one of the following types of test: – plastics/polymers – metal/metallurgy – material/physical properties – petroleum/petrochemical – chemicals/pharmaceuticals – mechanical properties – product/process quality – omissions/leaks/contamination – other (please specify) 1.7 Select the appropriate testing methods from procedures for the testing requirements 1.8 Prepare the resources needed for the testing operations			
2 Carry out scientific or technical testing operations (continued)	2.1 Prepare all of the following resources for testing operations: – consumables – test materials – utilities/facilities – equipment – instruments			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.2 Prepare the test samples in accordance with the procedures and check their integrity 2.3 Carry out the required tests in accordance with the procedures 2.4 Carry out two of the following pre-test checks on equipment and test instruments: – calibration – serviceability – cleanliness – setup conditions 2.5 Carry out integrity checks that include three of the following: – free from subsequent defects – damage and decomposition – homogeneity 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.7 Record and communicate details of work done, to the appropriate people, using: verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to carry out scientific or technical testing operations	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Explain why it is important to follow safe operating procedures when using equipment and/or materials 3.10 Describe the principles and procedures for testing 3.11 Describe the purposes of testing, and the specific use to which the test results are to be put 3.12 Describe the relevant testing methods that can be used to achieve the purpose of testing 3.13 Explain why calibration is important and how to check calibration			
4 Know how to carry out scientific or technical testing operations (continued)	4.1 Explain how to check the sample identity and it's integrity 4.2 Describe the range of methods used to prepare samples 4.3 Explain how to identify defective equipment and the appropriate action to take 4.4 Describe the methods that can be used for controlling test variables			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.5 Describe the concepts of repeatability and reproducibility 4.6 Describe the range of equipment available for testing, and how to choose the most appropriate equipment 4.7 Describe the potential impact of the test on health, safety and the environment 4.8 Describe the methods that can be used for dealing with the handling, storage and disposal of materials 4.9 Describe the cleaning materials and the methods for their use 4.10 Describe the methods of safe storage that can be used 4.11 Describe the document control and reporting procedures that should be used 4.12 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 4: Access and communicate scientific or technical information to authorised personnel

Unit reference number: D/601/9720

Level: 3

Credit value: 6

Guided learning hours: 39

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to access and communicate scientific or technical information to authorised personnel, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

Their underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

They will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Access and communicate scientific or technical information to authorised personnel	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Ensure the data integrity of the laboratory information system 1.4 Follow procedures correctly to ensure the security and confidentiality of laboratory information 1.5 Access existing and record new information on the laboratory information system 1.6 Search and access data from the information system for three of the following: – test/sample information – process information – output quality information – cost/budget information – work delivery information – other (please specify)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Access and communicate scientific or technical information to authorised personnel (continued)	2.1 Produce and distribute laboratory information system reports in accordance with procedures 2.2 Communicate scientific or technical information to three of the following customers: – other department – technical expert – team members – external organisation – other (please specify) 2.3 Communicate four of the following types of information: – instructions – test results – progress/analysis report – work requirements – services available – other (please specify)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Ensure the integrity of the laboratory information system by all of the following: – using the correct startup/shutdown procedures – following good practice for logging on/off – information is passed to authorised people only – following anti-virus protocols 2.5 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.6 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to access and communicate scientific or technical information to authorised personnel	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational policies that exist for the use and application of licensed computer software 3.7 Describe the organisational policies that exist for the use of anti-virus and anti-spy software protection 3.8 Describe the organisational policies that exist on data protection and the data protection act 3.9 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.10 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.11 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.12 Describe the basic set-up and operation of the laboratory records system and the peripheral devices that are used (such as mouse, keyboard, VDU, printer and barcode reader)			
4 Know how to access and communicate scientific or technical information to authorised personnel (continued)	4.1 Describe the correct startup and shutdown procedures to be used for the computer system 4.2 Explain how to access the computer information database and the use of software manuals and related documents to aid efficient operation of the relevant scientific or technical records 4.3 Explain how to deal with system problems (such as error messages received, peripherals which do not respond as expected, obvious faults with the equipment or connecting leads) 4.4 Explain how to access and communicate data effectively, and how to identify key information when recording and forwarding messages accurately 4.5 Describe where to obtain the information that they need to carry out their job, the form in which the information is expressed and why it should be up to date 4.6 Describe the different forms of communication available to them, and how they are used 4.7 Explain why it is important to communicate clearly and to give all of the information necessary to the audience			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.8 Describe the organisational and/or workplace procedures for acknowledging and responding to incoming and outgoing information 4.9 Describe the organisational and/or workplace procedures for recording scientific or technical information 4.10 Describe the document control and reporting procedures that should be used 4.11 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 5: Provide technical advice and guidance for scientific or technical activities

Unit reference number: H/601/9721

Level: 3

Credit value: 12

Guided learning hours: 57

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to provide technical advice and guidance for scientific or technical activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Provide technical advice and guidance for scientific or technical activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines 1.4 Ensure that they have accurate and up-to-date information on the scientific or technical activities for which advice and guidance is being sought 1.5 Determine the extent of the advice and guidance required 1.6 Provide valid and up-to-date information, advice and guidance, as necessary			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Provide technical advice and guidance for scientific or technical activities (continued)	2.1 Provide technical advice and guidance for two of the following groups of people: – colleagues – contractors – customers (e.g. distributors, end users, clients) – others in related technical activity areas 2.2 Provide technical support for two of the following scientific or technical activities: – providing technical support – planning sampling and testing – complex testing – complex sampling – carrying out investigations – small scale processing – demonstration and instruction – team leading/coaching			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.3 Provide technical advice and guidance on four of the following: – equipment operating detail (function) – equipment performance parameters – physical characteristics (dimensions, weight) – environment considerations/operating conditions – scientific or technical methods – processing requirements – work instructions or procedures – output volume required – resource requirements – equipment/component interfacing – specific or specialist equipment required – resource usage – timing/delivery details – cost/budget estimation/details – quality requirements/control – maintenance/cleaning/calibration frequency – aseptic procedures – training required – customer interface requirements – safety/regulations/guideline requirements			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Analyse any problems in full and provide effective advice that will maintain the quality and progress of the work 2.5 Deal appropriately with all of the following: – reported problems found during the scientific or technical activity – recorded deviations from agreed plans and schedules – customer requests/complaints 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Know how to provide technical advice and guidance for scientific or technical activities	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Describe the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Describe the regulations and guidelines that are relevant to the work area 3.10 Explain how to obtain information on regulations and guidelines			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.11 Explain how to obtain and interpret drawings, charts, specifications and other documents that can be used when giving technical advice and guidance			
4 Know how to provide technical advice and guidance for scientific or technical activities (continued)	4.1 Describe the activities for which the technical guidance is being given 4.2 Explain how to identify opportunities for giving technical advice, guidance and support 4.3 Explain how to plan and prepare for providing technical guidance 4.4 Describe the methods and techniques involved in problem solving 4.5 Explain how to deal with customer complaints and requests 4.6 Explain how to review and adjust approaches to the provision of technical guidance, in the light of experience gained (such as offering written summaries of guidance) 4.7 Describe the techniques for offering and providing technical guidance (such as verbally, one to one, one to many, in written form, using diagrams, drawings or other technical information) 4.8 Explain how to use a variety of communication methods, in appropriate combination (such as verbal, verbal/written combinations)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.9 Describe the document control and reporting procedures that should be used 4.10 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 6: Plan scientific or technical sampling and testing activities

Unit reference number: K/601/9722

Level: 3

Credit value: 8

Guided learning hours: 41

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to plan scientific or technical sampling and testing activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Plan scientific or technical sampling and testing activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Carry out all of the following when determining and producing the plans: – use the correct issue of workplace information – check that all essential information and data needed to produce the plans is available – collect relevant information on the scientific or technical requirements, operations, methods and resources – determine the availability of resources required – ensure that the activities to be carried out fall within budget constraints – ensure that health and safety regulations and safe working practices are taken into account – ensure that the influence of working conditions is recognised and included in the plans – present the plans in the appropriate formats			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.4 Collect the information needed to prepare the plan 1.5 Identify health and safety issues and safe working practices and procedures that must be followed 1.6 Identify the operations to be carried out and determine their sequence 1.7 Establish which methods are required and what resources are to be used			
2 Plan scientific or technical sampling and testing activities (continued)	2.1 Identify any special requirements and incorporate them in the plan 2.2 Produce plans for both of the following scientific or technical activities: – testing – sampling 2.3 Deal effectively with problems within their control and report those that cannot be solved			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Provide technical advice and guidance on four of the following: – space required – cost/budget – timescales – utilities required – description of the activities to be carried out – the sequence in which the activities will take place – the documentation to be used (such as drawings, specifications, quality assurance, surveys) – people required who have the necessary skills and knowledge – the raw materials required (such as type of material, form of material, amount of material) – consumable materials required (such as chemicals, reagents) – environmental/legislative requirements that must be met – special/specific safety equipment required (such as fume extraction, fire equipment)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.5 Carry out all of the following on completion of the planning activities: – validation and evaluation of the planning systems and procedures used – suggested improvements to their process of planning – recommendations for improvements or changes to the scientific or technical activities that were planned 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Know how to plan scientific or technical sampling and testing activities	3.1	Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities			
		3.2	Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities			
		3.3	Describe the scientific or technical techniques and processes they must use correctly in the workplace			
		3.4	Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities			
		3.5	Explain the importance of correct identification, and any unique workplace coding system			
		3.6	Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions)			
		3.7	Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation			
		3.8	Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			
		3.9	Explain how to access information on health and safety regulations and guidelines relating to the sampling and testing activities to be used and plans being produced			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.10 Describe the implications of not taking account of legislation, regulations, standards and guidelines when producing the laboratory plans 3.11 Explain how to access and use the appropriate information and documentation systems 3.12 Describe the materials, formats, codes and conventions that are used in preparing the plans 3.13 Describe the main planning methods and techniques in use, and what problems could occur in them			
4 Know how to plan scientific or technical sampling and testing activities (continued)	4.1 Describe the factors to be taken into account when preparing the plans, especially those covering working conditions and safety 4.2 Describe the main types of resources involved with different types of sampling and testing activity, and the typical timescales for providing them 4.3 Describe the normal timescales for carrying out specific sampling and testing activities, and how and why they vary 4.4 Describe the development of the sampling and testing plans (to include both master documents and working instructions, along with their purpose, content and status) 4.5 Explain how to prepare the plans (to include the structure, style, clarity and compliance with relevant standards)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.6 Describe the process used in the organisation to validate the plans produced 4.7 Describe the control procedure for ensuring that the plans are maintained up to date 4.8 Describe the procedures for changing the plans and why control procedures are needed 4.9 Explain the importance of maintaining records; what needs to be recorded and where records are kept 4.10 Describe the problems that can occur during the implementation of the plan and how these problems can be rectified 4.11 Describe the document control and reporting procedures that should be used 4.12 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 7: Carry out complex scientific or technical testing operations

Unit reference number: M/601/9723

Level: 3

Credit value: 12

Guided learning hours: 57

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to carry out complex scientific or technical testing activities, in accordance with approved procedures and practices. They will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, while well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Carry out complex scientific or technical testing operations	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Carry out testing operations that have two of the following complex components: – multi stage testing operations – multitasking testing – multi-parameter or control factors – environmentally sensitive outcomes – spontaneity/suddenness of test event – very cold/hot test temperatures involved – noisy/vibrating/turbulent elements involved – involves substances hazardous to health – high level of skill/experience needed – complex sample components 1.4 Identify conditions for the complex scientific or technical tests to be done			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.5 Identify conditions for the test that include two of the following: – test environment – test criteria – safety factors – time recording system – cleanliness – external influence/factors 1.6 Establish the requirements for the tests to be done 1.7 Identify hazards and assess risks against testing requirements 1.8 Select the appropriate testing methods from procedures for the testing requirements			
2 Carry out complex scientific or technical testing operations (continued)	2.1 Prepare the resources needed for the testing operations 2.2 Prepare all of the following resources for the testing operations: – consumables – test materials – utilities/facilities – equipment – test instruments			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.3 Prepare the test samples in accordance with the procedures and check their integrity 2.4 Carry out the required tests in accordance with the procedures 2.5 Carry out two of the following pre-test checks on equipment and test instruments: – calibration – serviceability – cleanliness – setup conditions 2.6 Check three of the following test sample integrity factors: – free from defects – damage and decomposition – arrangement of like parts – common elements or characteristics 2.7 Communicate the required information about the work done, in accordance with departmental and organisational procedures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.8 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to carry out complex scientific or technical testing operations	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Explain why it is important to follow safe operating procedures when using equipment and/or materials 3.10 Describe the principles and procedures for the scientific or technical testing 3.11 Describe the purposes of testing, and the specific use to which the test results are to be put 3.12 Describe the hazards/difficulties associated with complex testing 3.13 Describe the relevant testing methods that can be used to achieve the purpose of testing			
4 Know how to carry out complex scientific or technical testing operations (continued)	4.1 Explain why calibration is important and how to check calibration 4.2 Explain how to check the sample identity and it's integrity 4.3 Describe the range of methods used to prepare samples 4.4 Explain how to identify defective equipment and the appropriate action to take			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.5 Describe the methods that can be used for controlling test variables 4.6 Describe the concepts of repeatability and reproducibility 4.7 Describe the range of equipment available for testing, and how to choose the most appropriate equipment 4.8 Describe the potential impact of the test on health, safety and the environment 4.9 Describe the methods that can be used for dealing with the handling, storage and disposal of materials 4.10 Describe the cleaning materials and the methods for their use			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.11 Describe the methods of safe storage that can be used 4.12 Describe the document control and reporting procedures that should be used 4.13 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 8: Carrying out complex scientific or technical sampling operations

Unit reference number: T/601/9724

Level: 3

Credit value: 8

Guided learning hours: 41

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to carry out complex scientific or technical sampling activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Carrying out complex scientific or technical sampling operations	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Identify conditions for the scientific or technical sampling to be done 1.4 Establish the requirements for the sampling to be done 1.5 Carry out sampling operations that have two of the following complex components: – multi stage sampling operations – multitasking sampling – multi-parameter or control factors – environmentally sensitive outcomes – spontaneity/suddenness of sample event – very cold/hot sample temperatures involved – noisy/vibrating/turbulent elements involved – involves substances hazardous to health – high level of skill/experience needed – complex sample components			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Identify hazards and assess risks against sampling requirements 1.7 Identify conditions for sample that include two of the following: – sample environment – sample criteria – safety factors – time recording system – cleanliness – external influence that can cause variations			
2 Carrying out complex scientific or technical sampling operations (continued)	2.1 Select the appropriate sampling methods from procedures for the sampling requirements 2.2 Prepare the resources needed for the sampling operations 2.3 Prepare all of the following resources for sampling operations: – consumables – sample equipment/instruments – utilities/facilities 2.4 Carry out the required sampling in accordance with the procedures 2.5 Label, package and store collected samples in accordance with the procedures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to carry out complex scientific or technical sampling operations	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Explain why it is important to follow safe operating procedures when using equipment and/or materials 3.10 Describe the principles and procedures for sampling 3.11 Describe the purposes of sampling, and the specific use to which the sample results are to be put 3.12 Describe the hazards/difficulties associated with complex sampling			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Know how to carry out complex scientific or technical sampling operations (continued)	4.1 Describe the relevant sampling methods that can be used to achieve the purpose of sampling 4.2 Describe the range of methods used to collect samples 4.3 Explain how to identify defective sampling equipment and the appropriate action to take 4.4 Describe the methods that can be used for controlling sample variables 4.5 Describe the range of equipment available for sampling, and how to choose the most appropriate equipment 4.6 Describe the potential impact of the sample on health, safety and the environment 4.7 Describe the range of methods used for labelling, packaging, handling, storage of samples 4.8 Describe the sample records database and tracking system 4.9 Describe the types of handling and sorting system used, and the procedures and practices used for transferring samples within the workplace			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.10 Describe the document control and reporting procedures that should be used 4.11 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 9: Carry out scientific or technical investigations

Unit reference number: A/601/9725

Level: 3

Credit value: 9

Guided learning hours: 52

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to carry out scientific or technical investigation activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the leaner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Carry out scientific or technical investigations	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Carry out investigations into one of the following: – a non-compliance problem – the properties of a new material – applications of a new material – identifying a substance – resolution technical problem – cost reduction programme – quality assurance review – hazard/accident 1.4 Obtain and collate appropriate scientific or technical information which assists the investigation			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.5 Evaluation information from two of the following sources: – new external standards/regulations – manufacturer's instructions – equipment technical reviews – material technical reviews – COSHH data sheets – environmental reports – in-company archives – operating procedures – test reports – accident reports – health and safety documentation 1.6 Use two of the following resources to complete the investigations: – other staff – equipment – materials – allotted time 1.7 Analyse the information correctly and evaluate it against the objective of the investigation			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Carry out scientific or technical investigations (continued)	2.1 Prioritise the tasks within the investigation and follow the appropriate procedures 2.2 Use the specified resources required to complete the investigations 2.3 Follow set procedures to deal with contingencies arising during investigations 2.4 Conduct investigations in accordance with the established plans 2.5 Deal with contingencies for one of the following: – equipment failure – delays – changes in variables – safety/environmental change 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to carry out scientific or technical investigations	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Describe the principles and procedures for investigations 3.10 Describe the techniques that are relevant to the scientific or technical investigation 3.11 Explain how to source and access relevant standards 3.12 Describe the acceptable operating conditions for conducting investigations			
4 Know how to carry out scientific or technical investigations (continued)	4.1 Describe the implications of deviations from set procedures 4.2 Describe the essential features of an investigation plan and why this must be followed 4.3 Describe the range of equipment used for investigations 4.4 Describe the procedures for recording and reporting the investigations done 4.5 Explain how to identify and deal with contingencies 4.6 Describe the limits and constraints for investigations that are done			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.7 Describe the procedures used to deal with deviations from investigation plans 4.8 Explain what the procedures are for using contingency plans when deviations from investigation plans occur 4.9 Describe the document control and reporting procedures that should be used 4.10 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 10: Carry out small scale processing

Unit reference number: J/601/9579

Level: 3

Credit value: 8

Guided learning hours: 45

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to carry out small scale processing activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Carry out small scale processing	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Set the conditions for small scale processing and take the appropriate action to maintain them 1.4 Maintain two of the following controlled conditions during processing: – health and safety – environment – allotted time – recording systems – cleanliness & hygiene 1.5 Confirm the calibration status of equipment and prepare it correctly for the processing operation 1.6 Produce small scale quantities required against specification			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Carry out small scale processing (continued)	2.1 Produce small scale processing qualifies for one of the following: – testing the viability of a proposed large-scale manufacturing method – meeting a customer's requirements for a specialist product not required in any great quantity – producing small quantities of products to be used in sampling – testing or other investigations such as reference standards or design evaluation 2.2 Maintain the specified controlled conditions for processing and record required information 2.3 Take specified action in the event of abnormal occurrences and report them to the relevant people 2.4 Record all of the following processing information: – sample identification – calculations and data – results of small scale processing – conditions of in-process test			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.5 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.6 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to carry out small scale processing	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Describe the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.5 Describe the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Describe the principles and procedures for small scale processing 3.10 Describe the essential features of a process plan and how to follow it 3.11 Explain how to source and access relevant standards 3.12 Describe the operating conditions that are necessary to conduct the small scale processing, and how to maintain them			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Know how to carry out small scale processing (continued)	4.1 Explain why it is important to follow set procedures 4.2 Describe the range of equipment used for small scale processing 4.3 Explain why it is important to follow the correct data recording and reporting procedures 4.4 Describe the methods that can be used for dealing with the handling, storage and disposal of materials 4.5 Describe the cleaning materials and methods that should be used 4.6 Describe the range of resources needed for small scale processing 4.7 Describe the reporting procedure in the event of deviations from processing plans 4.8 Describe the document control and reporting procedures that should be used 4.9 Describe the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 11 Diagnose faults, repair and maintain scientific or technical equipment for workplace activities

Unit reference number: F/601/9726

Level: 3

Credit value: 8

Guided learning hours: 43

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to diagnose faults, repair and maintain scientific or technical equipment for workplace activities, in accordance with approved procedures and practices. The learners will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Diagnose faults, repair and maintain scientific or technical equipment for workplace activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.3 Carry out all of the following operations – adhere to procedures or systems in place for risk assessment, COSHH, use of personal protective equipment, electricity at work and other relevant safety regulations – ensure the safe isolation of scientific or technical equipment (such as electrical and fluids supply) – follow manufacturers' instructions, drawings and procedures for repair or maintenance – check that the tools and equipment used are in a safe and usable condition – ensure that the scientific or technical equipment is kept free from foreign objects, dirt or other contamination – carry out auditory and visual checks on the operation of the equipment – identify fault and isolate components where appropriate to determine the corrective action – confirm that the equipment is ready for use – return all repair and maintenance tools, equipment and waste to the correct locations on completion of the activities – ensure that accurate, complete and legible records are kept of the repair and maintenance activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.4 Confirm that the scientific or technical equipment is in a safe and usable condition, according to established procedures 1.5 Identify accurately any equipment faults or problems and report those outside their control to the relevant people 1.6 Identify and interpret the required information from the manufacturers' instructions and diagrams, in accordance with established operating procedure 1.7 Employ the appropriate test equipment and measurement to locate the source of the fault			
2 Diagnose faults, repair and maintain scientific or technical equipment for workplace activities (continued)	2.1 Perform repair or maintenance in accordance with manufacturers' instructions, diagrams and relevant health and safety procedures 2.2 Carry out maintenance and cleaning on two of the following scientific or technical categories: – biological equipment and/or instruments – chemical equipment and/or instruments – electronic equipment and/or instruments – weighing and measuring equipment and/or instruments – information technology equipment – engineering machines, equipment and/or instruments – other technical equipment or instruments			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.3 Organise the repair of defective equipment when other specialists are required 2.4 Dispose of defective equipment that is beyond repair, in accordance with workplace procedures 2.5 Test and confirm that the equipment is operating correctly, within calibration specifications, in accordance with workplace procedures 2.6 Maintain records of repairs, maintenance and checks completed in accordance with workplace procedures 2.7 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.8 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Know how to diagnose faults, repair and maintain scientific or technical equipment for workplace activities	3.1	Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities			
		3.2	Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities			
		3.3	Describe the scientific or technical techniques and processes they must use correctly in the workplace			
		3.4	Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities			
		3.5	Explain the importance of correct identification, and any unique workplace coding system			
		3.6	Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions)			
		3.7	Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation			
		3.8	Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			
		3.9	Describe the manufacturers' specifications and recommendations for the maintenance and calibration of the scientific or technical equipment			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.10 Describe where to obtain, and how to interpret drawings, circuit diagrams, specifications, manufacturers' manuals and other technical documents needed for the fault-finding or maintenance activities 3.11 Describe the methods used for visually checking, and cleaning, of scientific or technical equipment 3.12 Describe the different types, condition and quantities of consumables required for the range of scientific or technical equipment maintained			
4 Know how to diagnose faults, repair and maintain scientific or technical equipment for workplace activities (continued)	4.1 Describe the methods for maintaining personal health and safety during the maintenance of equipment 4.2 Describe the methods for maintaining personal hygiene 4.3 Explain how to check that the scientific or technical equipment is working correctly and in accordance with the manufacturer's specifications 4.4 Explain how to evaluate the different types of equipment fault, and how these must be dealt with 4.5 Explain how to use appropriate tools and equipment to locate the source of a fault or carry out maintenance activities 4.6 Describe the procedures to be followed to investigate faults or maintenance activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.7 Describe the department or person to whom equipment faults should be reported 4.8 Describe the methods used for keeping records of the maintenance, cleaning and calibration of scientific or technical equipment, and why this is important 4.9 Describe the procedure for the disposal of any waste produced and any equipment beyond repair 4.10 Describe the document control and reporting procedures that should be used 4.11 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 12: Measuring, weighing and preparing compounds and solutions for laboratory use

Unit reference number: H/601/8195

Level: 3

Credit value: 16

Guided learning hours: 66

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to measure, weigh and prepare compounds and solutions for laboratory investigations. Prior to undertaking the laboratory activity, and in accordance with approved procedures and practices, the learner will be required to carry out all the necessary preparations, within the scope of their responsibility. This may include preparing the work area and ensuring that it is in a safe condition to carry out the intended activities, and ensuring that any materials, equipment or other resources required are available and are in a safe and usable condition. The learner will be required to work to the relevant standard operating procedures, legislation and organisational policy, and to follow Good Laboratory Practice (GLP) and/or Good Clinical Practice (GCP)/Good Manufacturing Practice (GMP). The learner will also be required to present records and details of their laboratory work to the appropriate people.

On completion of the laboratory activity, the learner will be required to return their immediate work area to an acceptable condition before undertaking further work. This may involve putting processed paperwork in the correct location, returning and/or storing any materials and equipment in the correct area, identifying any waste and arranging for its disposal, and reporting any defects or damage to the materials and equipment used.

The learner's responsibilities will require them to comply with organisational policy and procedures for the measuring, weighing and preparations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve or that are outside their permitted authority, to the relevant people. The learner will work with a minimum of supervision, either on their own or as part of a team, whilst taking responsibility for their own actions and for the quality and accuracy of the work that they carry out.

The learner's underpinning knowledge will provide a good understanding of their work, and will provide an informed approach to measuring, weighing and preparing compounds and solutions in a laboratory environment. The learner will understand the importance of doing this work efficiently and effectively, and will know what to consider when preparing and tidying up the work area before and after the measuring, weighing and preparation activities. The learner will also know how to deal with problems, and how to achieve their work objectives and targets, in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

The learner will understand the safety precautions required when carrying out laboratory activities. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Measure, weigh and prepare compounds and solutions for laboratory use	1.1 Ensure that their work is carried out in accordance with standard operating procedures 1.2 Wear the appropriate personal protection equipment (PPE) when handling materials 1.3 Use three of the following types of protective clothing and equipment: – laboratory coat – face mask – gloves – safety glasses – other (please specify) 1.4 Use laboratory scales for accurately weighing out materials, using metric/imperial measures 1.5 Carry out weighing activities using balances (scales), using two of the following accuracies: – grams – milligrams – micrograms			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Measure out aliquots of solutions, using four of the following: – automated pipettes – graduated/bulb pipettes – syringes – graduated cylinders/beakers/tubes – burettes – volumetric flasks – other (please specify) 1.7 Accurately measure pH and conductivity of solutions in the laboratory, using correctly calibrated meters 1.8 Measure out aliquots of liquids into tubes and microtrays for laboratory use and analysis			
2 Measure, weigh and prepare compounds and solutions for laboratory use (continued)	2.1 Measure liquids and solids for laboratory use and analysis 2.2 Measure pH and/or conductivity, using two of the following: – handheld pH meter – bench top pH meter – combined pH/conductivity meter – conductivity meter – other (please specify)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.3 Calibrate or check the calibration for two of the following: – pH meter – balance – conductivity meter – pipettes – other(please specify) 2.4 Calculate the concentrations of solutions, the amounts and volumes required, using four of the following: – moles per litre – grams per litre – parts per million – mass percent – other (please specify) 2.5 Make up known volumes of solutions to a specified concentration, using both of the following: – by measuring and dissolving the correct amount of solute in the correct volume of diluent/solvent – by dilution from a concentrated stock solution			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.6 Weigh and prepare three of the following types of compound or solution: – powders/granulations that do not readily lose or gain weight (moisture or solvent) – solids that readily lose or gain weight (moisture or solvent) – liquid samples (by difference) – liquid samples (direct) 2.7 Communicate the required information about the work done, to authorised people, in accordance with departmental and organisational procedures. 2.8 Record details of work done, and communicate the details to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report (e.g. laboratory notebook) – specific company documentation – computer-based record – electronic mail			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Know how to measure, weigh and prepare compounds and solutions for laboratory use	3.1 Describe the health and safety requirements of the area in which they are carrying out the laboratory activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting laboratory activities 3.3 Describe the principles of Good Laboratory Practice (GLP) and/or Good Clinical Practice (GCP)/Good Manufacturing Practice (GMP) applied in the workplace 3.4 Describe the importance of wearing protective clothing, gloves and eye protection when handling specimens/samples 3.5 Describe the importance of correct identification, and any unique organisational or laboratory numbers 3.6 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.7 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.8 Explain how to calculate mass/mole calculations in metric and/or imperial measures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.9 Explain how to select the appropriate balance and scale for less than 100mg, 100mg to 5g, and 5g and above 3.10 Explain how to check that a pipette is clean, dry, free of chips and ready for use			
4 Know how to measure, weigh and prepare compounds and solutions for laboratory use (continued)	4.1 Explain how to check the calibration on a pipette 4.2 Explain how to calibrate and check the calibration on a pH meter 4.3 Explain how to calibrate and check the calibration on a balance 4.4 Explain how to calibrate and check the calibration on a conductivity meter 4.5 Explain how to measure and weigh solids and liquids for laboratory use 4.6 Explain how to convert between different units of concentration (such as moles/litre, grams/litre, percent mass per volume and parts per million) 4.7 Explain how to calculate dilution factors and dilution volumes to make solutions from concentrated stock solutions 4.8 Describe the pH scale as a logarithmic scale for the measurement of the acidity of aqueous solutions, and the importance of pH to biological systems and processes			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.9 Explain how to choose the appropriate measuring equipment for the scale, accuracy and precision required for the task 4.10 Explain how to clean and maintain the pipettes, balances, pH meter probes and conductivity meter probes			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 13: Maintain and control stocks of all resources, equipment and consumables for scientific or technical activities

Unit reference number: J/601/9727

Level: 3

Credit value: 4

Guided learning hours: 23

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to maintain and control stocks of all resources, equipment and consumables for workplace scientific or technical activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Maintain and control stocks of all resources, equipment and consumables for scientific or technical activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Check stock levels for three of the following: – chemicals – glassware – consumables – equipment – other (please specify) 1.4 Count stocks and confirm that they are within the maximum/minimum levels required for the scientific or technical activities 1.5 Check the packaging information on individual stock items, and confirm that critical details are within acceptable limits			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Check four of the following for stock items: – batch numbers – expiry dates – quantities – delivery dates – hazard labels – safety data sheets – volumes – weights – good received condition 1.7 Identify, record and communicate requirements to replenish stocks at specified re-order levels 1.8 Check new stocks received against delivery notes; label and store items in the correct environment and location 1.9 Correctly handle and transport stock items, using the appropriate methods and techniques			
2 Maintain and control stocks of all resources, equipment and consumables for scientific or technical activities (continued)	2.1 Handle and transport all of the following types of material: – chemical – equipment – heavy/bulky items			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.2 Transport stock using all the following methods:: – manual handling – moving aids (e.g. trolley) – with assistance from others 2.3 Check stock items held in four of the following storage environments: – ambient temperature locations – refrigerators/freezers – zero or low light locations – hazardous chemical locations – equipment locations – consumable item locations – secure locations 2.4 Dispose, in the appropriate manner and locations, of stock or items that are damaged or outside acceptable limits for scientific or technical use 2.5 Access and update records for stock levels in the information system 2.6 Access and update scientific or technical information system data for all of the following: – booking items out from stock – booking items into stock – stock check levels			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.7 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.8 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to maintain and control stocks of all resources, equipment and consumables for scientific or technical activities	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct handling techniques and aids when moving chemicals, materials, equipment and consumables			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.6 Explain the importance of correct identification, and any unique workplace coding system 3.7 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.8 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.9 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.10 Explain why it is important to maintain accurate records for stocks of chemicals, materials, equipment and consumables			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Know how to maintain and control stocks of all resources, equipment and consumables for scientific or technical activities (continued)	4.1 Describe the types and range of chemical, materials, equipment and consumables used, and how they have to be checked 4.2 Explain how to check the packaging information on stock (such as batch numbers and expiry dates) 4.3 Explain how and why it is important to identify materials or chemicals that should not be stored together 4.4 Describe the range of storage environments used to store chemicals, materials, equipment and consumables for use 4.5 Explain how to label new stock items correctly, and how to record the information in the information systems 4.6 Explain where and how stock items should be stored so they remain suitable for use 4.7 Explain how to monitor and control stock levels for all resources 4.8 Explain how to dispose of waste or damaged stock items, in accordance with workplace procedures 4.9 Explain how to resolve issues with receiving damaged or incomplete replacement stock			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.10 Describe the document control and reporting procedures that should be used 4.11 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 14: Make presentations for scientific or technical activities in the workplace

Unit reference number: L/601/9728

Level: 3

Credit value: 6

Guided learning hours: 36

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to make presentations for scientific or technical activities in the workplace, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, while well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Make presentations for scientific or technical activities in the workplace	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Complete all of the following for planning and delivering the presentation: – plan the presentation in a logical and structured way for the brief – prepare the content to meet the needs of the target audience – rehearse the presentation and amend as appropriate for the content and delivery timescale – prepare supporting materials (such as, handouts, copies of slides) – prepare answers to anticipated questions – use the equipment correctly to deliver the planned presentation – answer audience questions – issue the appropriate handouts to the audience following the presentation 1.4 Work safely at all times, complying with health and safety and other relevant regulations and guidelines			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.5 Establish the scope and purpose of the development/research presentation to be delivered 1.6 Determine quality, cost and delivery issues, and the resources needed to deliver the presentation 1.7 Present the data in an appropriate format and structure for the audience 1.8 Obtain appropriate equipment, facilities and resources, and verify its fitness for purpose			
2 Make presentations for scientific or technical activities in the workplace (continued)	2.1 Ensure the venue and equipment are suitable and in good order for the presentation 2.2 Deliver the prepared presentation in the correct media for the audience 2.3 Deliver presentations to both of the following audiences: – small groups – large groups			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Make presentations for two of the following scientific or technical activities: – providing scientific or technical support – demonstration of equipment or a system – review of skills or techniques – curriculum/training activity or investigation – demonstration of a new/existing process – team leading/coaching – other (please specify) 2.5 Ensure that the audience has the appropriate post-presentation media to support the presentation 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Know how to make presentations for scientific or technical activities in the workplace	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Describe the different types of audience and their scientific or technical information needs 3.10 Explain how to gather relevant and accurate information for the presentation			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Know how to make presentations for scientific or technical activities in the workplace (continued)	4.1 Describe the purpose of the presentation and the key messages to be delivered 4.2 Explain how to ensure the content of the presentation is balanced and accurate 4.3 Describe the time available to make presentations 4.4 Describe the advantages and disadvantages of different methods of presentation delivery 4.5 Describe the materials that are appropriate to support presentations (such as handouts, samples, scientific or technical equipment) 4.6 Explain how to use the presentation equipment correctly 4.7 Describe the scientific or technical questions they might expect to receive as a result of the presentation 4.8 Explain how to judge the effectiveness of the presentation			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.9 Describe the factors that can affect or influence the impact of a presentation (such as room configuration, audio-visual systems, dress code) 4.10 Describe the venue health and safety considerations to be taken into account at any presentation 4.11 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 15: Assess their own scientific or technical knowledge and skills for workplace activities

Unit reference number: R/601/9729

Level: 3

Credit value: 4

Guided learning hours: 23

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to assess their own scientific or technical knowledge and skills for workplace activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, while well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Assess their own scientific or technical knowledge and skills for workplace activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Identify and agree the scientific or technical requirements of their role in the workplace 1.4 Discuss and agree personal work objectives and how they will measure progress 1.5 Discuss and agree workplace performance with one of the following people: – supervisor – manager – team leader – head of department – health and safety officer – teacher or trainer			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Agree scientific or technical work objectives that are all the following: – specific – measureable – achievable – realistic – time-bound 1.7 Identify any scientific or technical knowledge, understanding and skills gaps for their workplace role			
2 Assess their own scientific or technical knowledge and skills for workplace activities (continued)	2.1 Discuss and agree a development plan to address any identified knowledge, understanding and skills gaps 2.2 Undertake agreed development actions and evaluate how they have contributed to their improved performance 2.3 Obtain regular feedback on their scientific or technical performance to meet workplace requirements and milestones 2.4 Work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines 2.5 Communicate the required information about the work done, in accordance with departmental and organisational procedures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.6 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to assess their own scientific or technical knowledge and skills for workplace activities	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			
4 Know how to assess their own scientific or technical knowledge and skills for workplace activities (continued)	4.1 Explain how to identify and assess the scientific or technical requirements of a work role 4.2 Describe the different ways in which they are set their agreed personal work objectives 4.3 Explain how to assess and identify gaps in their current scientific or technical knowledge, understanding and skills 4.4 Explain how to measure their progress against scientific or technical work objectives 4.5 Describe the type of development activities that can be undertaken to address identified scientific or technical gaps in knowledge, understanding and skills			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.6 Explain how to identify development needs to address any gaps between the requirements of their work role and their current scientific or technical knowledge, understanding and skills 4.7 Explain how to identify whether/how development activities have contributed to their performance 4.8 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 16 Provide training for scientific or technical activities in the workplace

Unit reference number: J/601/9730

Level: 3

Credit value: 8

Guided learning hours: 52

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to provide training for scientific or technical activities in the workplace, in accordance with approved procedures. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Provide training for scientific or technical activities in the workplace	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Discuss the training and instruction activities needed with the relevant person or persons 1.4 Discuss training activities with: – trainee Plus one of the following: – supervisor – manager – team leader – head of department – technical expert – training provider – training coordinator – head teacher 1.5 Analyse the training needs of the individuals to be trained 1.6 Assess and manage risks associated with the training and instruction to be delivered 1.7 Select and prepare training and instruction resources to deliver these activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Provide training for scientific or technical activities in the workplace (continued)	2.1 Carry out training for two of the following people: – trainee technician – technician – newly qualified person – teacher – trainer 2.2 Select and prepare four of the following training requirements: – induction – risk assessment – curriculum/course modification – equipment – appraisal or CPD review – resources/worksheets – problem solving task – scientific or technical technique – off site activity – organisation policy change – department directives 2.3 Evaluate and review trainee progress during the training process			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Monitor and refine training activities to improve the trainee's attainment of required scientific or technical skills 2.5 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.6 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Know how to provide training for scientific or technical activities in the workplace	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.9 Explain how to assess the scientific or technical skills of new trainees 3.10 Explain how to conduct a training needs analysis 3.11 Describe the checks to be made to ensure trainees can learn safely and apply job skills in the workplace 3.12 Explain how to identify and deliver a training plan for trainees 3.13 Explain how to give trainees on-the-job instruction and supervise their work			
4 Know how to provide training for scientific or technical activities in the workplace (continued)	4.1 Explain how to assess the trainee's progress in acquiring and applying job skills and skills in working with others 4.2 Explain how to gather trainee feedback on their progress and achievements 4.3 Describe the methods used for giving the trainee feedback on their progress and achievements 4.4 Describe the procedures for keeping training records 4.5 Describe the procedures for reporting trainees' progress and updating performance and development records 4.6 Explain how to work with colleagues and make use of unplanned opportunities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.7 Explain how to ensure resources are available for training and timescales are realistic 4.8 Explain how to ensure they show fairness, integrity and consistency in their decision making 4.9 Explain what is meant by SMART (specific, measurable, achievable, realistic and time-bound) learning objectives 4.10 Explain how to evaluate effectiveness of training completed and feedback to the relevant people 4.11 Describe the organisational requirements for maintaining the security and confidentiality of any training records kept 4.12 Describe the document control and reporting procedures that should be used 4.13 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 17: Provide scientific or technical leadership for a workplace team

Unit reference number: L/601/9731

Level: 3

Credit value: 16

Guided learning hours: 83

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to provide scientific or technical leadership for a workplace team, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical activities undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete scientific or technical tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete workplace tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Provide scientific or technical leadership for a workplace team	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Discuss and agree their teams' workplace performance requirements with one of the following people: – supervisor – manager – team leader – head of department – health and safety officer – teacher or trainer 1.4 Set out and positively communicate the purpose and scientific or technical objectives of the team to all members			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.5 Agree scientific or technical work objectives with their team with targets that are all the following: – specific – measureable – achievable – realistic – time-bound 1.6 Involve member in planning how the team will achieve its scientific or technical objectives 1.7 Ensure that each member of the team has personal work objectives and understands how achieving these will contribute to achievement of the team's objectives 1.8 Encourage and support team members to achieve their personal work objectives and those of the team			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.9 Help their team's performance with the following: – progress against objectives for workplace activities Plus four from the following: – technical support for a procedure – problem diagnosis and solution – technical advice and guidance – introduction of new equipment – introduction of new process – a defective product or piece of equipment – evaluating the possible use of a new raw material within an existing process			
2 Provide scientific or technical leadership for a workplace team (continued)	2.1 Provide recognition when individual and team objectives have been achieved 2.2 Help individuals and the team find solutions to problems and issues with objectives and the work environment 2.3 Provide scientific or technical information from all of the following sources: – changes in legislation – new methods and techniques – findings from internal activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Use two of the following sources of support to help their team: – scientific or technical documents – workplace guidelines or procedures – external specialist/associate – new curriculum – student/learner assessments – new or changes in a scheme of work 2.5 Encourage and recognise creativity and innovation within the team 2.6 Monitor progress and achievement across the team against agreed objectives for workplace activities 2.7 Work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines 2.8 Communicate the required information about the work done, in accordance with departmental and organisational procedures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.9 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			
3 Know how to provide scientific or technical leadership for a workplace team	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			
4 Know how to provide scientific or technical leadership for a workplace team (continued)	4.1 Explain how to identify and assess the scientific or technical requirements of a work role 4.2 Describe the planning required for the team to achieve its workplace scientific or technical objectives 4.3 Explain how to set and monitor the personal work objectives for the team 4.4 Describe the team's scientific or technical purpose and their corresponding workplace objectives 4.5 Explain how the quality, cost and delivery targets for the team are measured 4.6 Describe the types of support and advice that team members are likely to need and how to respond to these 4.7 Describe the standards of performance for the scientific or technical work of their team and how the organisation measures them 4.8 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 18: Following aseptic procedures in the laboratory environment

Unit reference number: T/601/2031

Level: 2

Credit value: 9

Guided learning hours: 51

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to identify and follow aseptic or clean room protocols in the laboratory, in accordance with approved procedures and practices. Prior to undertaking the laboratory activity, the learner will be required to carry out all the necessary preparations within the scope of their responsibility. The learner will be required to work to the relevant standard operating procedures, legislation and organisational policy, and to follow Good Laboratory Practice (GLP) and/or Good Clinical Practice (GCP)/Good Manufacturing Practice (GMP).

The learner's responsibilities will require them to comply with any policies of their organisation in respect of preparing for work and working in aseptic or clean rooms and clean work areas. The learner will be required to report any problems with clean room procedures that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. The learner will be expected to work to verbal/written instructions and standard operating procedures, with a high level of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. On completion of laboratory activities, the learner will be expected to discard personal protective equipment in the correct location, and in accordance with established policies and procedures.

The learner's underpinning knowledge will be sufficient to provide a sound basis for their work, and will enable them to adopt an informed approach to preparing for and working in aseptic or clean rooms. The learner will have an understanding of the attribute and behaviours required for clean room working, in adequate depth to provide a sound background for carrying out the laboratory activities to the required specification.

The learner will understand the safety precautions required when carrying out laboratory activities. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Follow aseptic procedures in the laboratory environment	1.1 Ensure that their work is carried out in accordance with standard operating procedures 1.2 Dress in the appropriate personal protection equipment (PPE) required for the clean room or clean work area environment, in accordance with the correct procedure 1.3 Use three of the following types of personal protective equipment for clean room working: – body suit – face mask – gloves – respirator – air supply – other (please specify)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.4 Prior to entering clean room, carry out all of the following: – use the correct issue of job instructions and specifications – follow risk assessment procedures and COSHH regulations – ensure that they are appropriately dressed and uncontaminated before entering the area – carry out their activities in line with organisational procedures – store accurate records of their activities, in accordance with appropriate procedures 1.5 Carry out visual quality checks on their personal protection equipment prior to entering the working environment			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Satisfy all the following company clean room/clean work area requirements: – use appropriate clothing/personal protective equipment (PPE) (such as suits, gowns, coats, hoods, hats, caps, helmets, other headwear, boots, overshoes, other forms of footwear, safety goggles, visors, gloves) – comply with hazard protection (such as breathing apparatus, gloves, apron/smock, other forms of PPE or clothing required) – deal appropriately with damaged or dirty clothing/PPE (such as reporting damage, replacement, safe removal and cleaning or disposal, subjected to acid/hazardous substance spills, damaged/dirty labelling) – store specified clothing/PPE correctly when not in use – ensure the proper cleaning/laundering/maintenance of clothing/PPE – dispose of single-use clothing and equipment in the correct location – report any hazards or breaches of protocol 1.7 Follow the correct procedures for entering and exiting the clean room or clean work area			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Follow aseptic procedures in the laboratory environment (continued)	2.1 Use personal protective equipment in one of the following clean room environments: – health/disease screening – biochemical processing – biotechnology processing – drug development – agro-biotech research – other (please specify) 2.2 Follow aseptic techniques in the laboratory 2.3 Identify and follow protocol methods and procedures that satisfy all of the following: – the safety of people – containment/integrity of the specimen/product – containment/integrity of the clean room/work area – appropriate industry standards and protocols 2.4 Remove personal protection equipment on completion of clean room or clean work area activities, and dispose/store in line with the correct procedure 2.5 Communicate the required information about the work done, to authorised people, in accordance with departmental and organisational procedures			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.6 Record details of the work activity, and communicate the details to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific company documentation – computer-based record – electronic mail			
3 Know how to follow aseptic procedures in the laboratory environment	3.1 Describe the health and safety requirements of the area in which they are carrying out the laboratory activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting laboratory activities 3.3 Describe the principles of Good Laboratory Practice (GLP) and/or Good Clinical Practice (GCP)/Good Manufacturing Practice (GMP) applied in the workplace 3.4 Describe the importance of wearing protective clothing, gloves and eye protection when handling materials (such as biochemical substances, biological pathogens and/or antigens), and the equipment used to contain and process them			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.5 Describe the manufactured materials and batch process tracking and records system 3.6 Describe the types of handling and sorting system, and the procedures used for materials undergoing processing in the laboratory facilities 3.7 Describe the importance of correct identification, and any unique organisational or laboratory numbers 3.8 Describe the organisational requirements for maintaining the security of the workplace 3.9 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.10 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.11 Describe the specific safety precautions to be taken when working in a clean room or clean work area environment 3.12 Describe the correct fitting and use of clothing and personal protective equipment that must be worn in a clean room or clean work area (such as for body, hands, eyes, ears, feet, mouth and face)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
4 Know how to follow aseptic procedures in the laboratory environment (continued)	4.1 Describe the hazards associated with working in a clean room or clean work area, with laboratory equipment (such as heat, radiation, chemicals, static electricity, high voltages, trapping points on equipment) 4.2 Explain how to put on clean room clothing and footwear correctly 4.3 Describe the procedures for entering and exiting the clean room or clean work area, and the authority needed to do so 4.4 Describe the classification of the relevant clean room or clean work area, and how this impacts upon them 4.5 Describe the industry standards/classifications for clean rooms and clean work areas 4.6 Describe the company requirements for clothing and personal protective equipment, and the reasons why such clothing and equipment must be used 4.7 Describe the procedures and methods for maintaining issued clothing and personal protective equipment			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.8 Explain how to apply procedures for dealing with damaged or dirty clothing and personal protective equipment 4.9 Explain how to store clothing and personal protective equipment correctly 4.10 Describe the laundering/cleaning/maintenance procedures relating to the issued clothing and personal protective equipment 4.11 Describe the aseptic techniques that are applied and used in the laboratory 4.12 Explain how to dispose correctly of single-use personal protective equipment 4.13 Describe the policy and procedures relating to personal items (such as body lotions, makeup, jewellery, contact lenses, footwear, own clothing)			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 19: Evaluate and provide scientific or technical assistance for learning activities

Unit reference number: R/601/9732

Level: 3

Credit value: 6

Guided learning hours: 43

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to evaluate and provide scientific or technical assistance for learning activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within specified parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical activities undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete scientific or technical tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete workplace tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Evaluate and provide scientific or technical assistance for learning activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Discuss the response to requests for scientific or technical assistance with one of the following people: – supervisor – manager – team leader – head of department – health and safety officer – teacher or trainer 1.4 Receive requests for scientific or technical assistance and respond to them correctly 1.5 Maintain scientific or technical information that is accurate and sufficient 1.6 Maintain technical information from one of the following sources: – changes in legislation – new methods and techniques – finding from internal activities 1.7 Evaluate accurately their scientific or technical capacity to meet the required assistance			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Evaluate and provide scientific or technical assistance for learning activities (continued)	2.1 Use appropriate sources of support to provide scientific or technical assistance 2.2 Provide technical assistance for two of the following situations: – technical support for a procedure – problem diagnosis and solution – technical advice and guidance – introduction of new equipment – introduction of new process – investigating a defective product or piece of equipment – evaluating the possible use of a new raw material within an existing process 2.3 Provide the appropriate assistance as requested to the appropriate people			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Use two of the following sources of support to provide assistance: – scientific or technical documents – student/learner assessments – workplace guidelines or procedures – new curriculum – new or changes in a scheme of work – external specialist/associate 2.5 Work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Know how to evaluate and provide scientific or technical assistance for learning activities	3.1	Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities			
		3.2	Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities			
		3.3	Describe the scientific or technical techniques and processes they must use correctly in the workplace			
		3.4	Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities			
		3.5	Explain the importance of correct identification, and any unique workplace coding system			
		3.6	Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions)			
		3.7	Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation			
		3.8	Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			
		3.9	Describe the processes involved in establishing and meeting customer requests			
		3.10	Describe the procedures for making requests			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.11 Describe the format used for standard operating procedures 3.12 Describe the range of facilities and services which can be provided			
4 Know how to evaluate and provide scientific or technical assistance for learning activities (continued)	4.1 Explain how to evaluate the materials and equipment that are appropriate to the provision of technical services 4.2 Explain how to access information sources 4.3 Describe the range of support that can be used to provide technical assistance 4.4 Describe the documentation that should be used and why it is important to complete it accurately 4.5 Describe the methods that are used for obtaining, storing and retrieving information 4.6 Explain how to evaluate the resources needed to deliver support 4.7 Describe the methods that should be used for recording outcomes			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.8 Describe the evaluation criteria that should be used that is relevant to customer requirements 4.9 Describe the actions that should be taken in circumstances where a request cannot be met 4.10 Describe the document control and reporting procedures that should be used 4.11 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 20 Demonstrate scientific or technical methods, techniques and skills to others in the workplace

Unit reference number: Y/601/9733

Level: 3

Credit value: 8

Guided learning hours: 56

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to demonstrate scientific or technical methods, techniques and skills to other in the workplace, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Demonstrate scientific or technical methods, techniques and skills to others in the workplace	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Agree the learning/training objectives of the demonstration with the relevant people 1.4 Agree the requirements for the demonstration with one of the following people: – supervisor – manager – team leader – head of department – health and safety officer – teacher or trainer 1.5 Gather relevant and accurate information for the demonstration			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.6 Establish both of the following for the demonstration: – scientific or technical methods and skills Plus six of the following: – health and safety precautions – place for the demonstration – start and finish time for the demonstration – the number of learners/students – equipment required – services required (e.g. gas, electricity) – materials required – workplace procedures to be used – consumables required 1.7 Prepare the content of the demonstration to meet the learning needs of learner/students			
2 Demonstrate scientific or technical methods, techniques and skills to others in the workplace (continued)	2.1 Confirm that the location for the demonstration allows for optimum visibility and conforms to health and safety requirements and regulations and guidelines 2.2 Prepare answers to anticipated questions 2.3 Demonstrate scientific or technical methods, techniques and skills in a manner appropriate to learner/student's needs			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.4 Demonstrate methods and skills in one of the following locations: – timetabled lessons – other supervised events – outside activities 2.5 Work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Know how to demonstrate scientific or technical methods, techniques and skills to others in the workplace	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.9 Describe what are the approved scientific or technical working practices and why it is important to follow them at all times 3.10 Describe what workplace procedures apply and why it is important to follow them at all times 3.11 Describe what are the basic techniques and skills required to help prepare for scientific or technical demonstrations 3.12 Explain how to select the materials and equipment for the demonstration activity 3.13 Explain how to prepare resources for demonstration activity			
4 Know how to demonstrate scientific or technical methods, techniques and skills to others in the workplace (continued)	4.1 Explain how to demonstrate the scientific or technical methods, techniques and skills to others in the workplace 4.2 Explain how to promote best working practice amongst learners/students 4.3 Explain how to monitor learner/student's learning activities 4.4 Explain how to encourage learners/students to ask questions 4.5 Describe what learning activities can be prepared by learners/students, and how to help them to prepare for the demonstration activities			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.6 Describe what hazards are associated with the demonstration activities 4.7 Describe the range of scientific or technical methods and skills that can be demonstrated 4.8 Explain how to deal with spillages and what action to take 4.9 Describe what are the procedures for the safe storage and handling of materials and equipment 4.10 Explain how to identify problems that might occur in the demonstration 4.11 Describe what are appropriate actions to take in the event of problems 4.12 Explain when and how to use remedial, supportive and/or prohibitive actions 4.13 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 21 Improve the quality and reliability of scientific or technical activities in the workplace

Unit reference number: D/601/9734

Level: 3

Credit value: 10

Guided learning hours: 82

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to improve the quality and reliability of scientific or technical activities in the workplace, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within specified parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical activities undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete scientific or technical tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete workplace tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Improve the quality and reliability of scientific or technical activities in the workplace	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Monitor activities at intervals in order to identify potential improvements in working practices or the work area 1.4 Obtain views, when appropriate, of relevant people on potential improvements to the working practices or the work area 1.5 Agree plans for improvements and timescales with relevant people in sufficient detail to allow effective planning 1.6 Discuss quality improvements with one of the following people: – supervisor – manager – team leader – head of department – health and safety officer – teacher or trainer			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.7 Consider all of the following for potential quality improvements: – adherence to COSHH and other relevant safety regulations – changes required to quality control specifications and related documents – estimated costs v benefits, implementation timescales and other inputs required – the approval needed to implement the identified quality improvement activities – all the personnel and workplace processes that will be effected by quality improvement activities 1.8 Identify potential quality improvements related to two of the following scientific or technical activities: – biological equipment and/or instruments – chemical equipment and/or instruments – electronic equipment and/or instruments – weighing and measuring equipment and/or instruments – information technology equipment – engineering machines, equipment and/or instruments – other technical equipment or instruments			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Improve the quality and reliability of scientific or technical activities in the workplace (continued)	2.1 Identify any considerations which may affect the implementation of potential improvements 2.2 Make recommendations for improvements to working practices or the work area which are consistent with the objectives of their team and their organisation 2.3 Monitor the implementation of improvements to identify any problems and take appropriate action 2.4 Evaluate the effectiveness of the improvement 2.5 Work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Know how to improve the quality and reliability of scientific or technical activities in the workplace	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Describe the organisational procedures for determining when and how quality assurance activities should be undertaken			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.10 Describe the processes and specifications for the activity being quality assured 3.11 Explain how to obtain the quality criteria that could be used for the different types of scientific or technical processes 3.12 Describe the current quality assurance methods that are in use 3.13 Describe the people who should be involved in the quality assurance process 3.14 Describe the impact that quality assurance methods have on the organisation			
4 Know how to improve the quality and reliability of scientific or technical activities in the workplace (continued)	4.1 Describe the people who require information on quality assurance, and the procedures for informing them 4.2 Explain how to make recommendations for improvement 4.3 Explain how to ensure that the recommendations are consistent with objectives of their team and/or their workplace 4.4 Explain how to communicate suggestions for change and improvements 4.5 Describe what methods can be used to implement the improvements 4.6 Explain how to plan and agree appropriate timescales for improvements			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.7 Explain how to identify problems and the actions that are appropriate to take in the event of them 4.8 Explain how to evaluate and monitor improvements 4.9 Explain how to ensure that quality improvement recommendations are followed up 4.10 Describe the importance of making sure that all information used is accurate 4.11 Describe the format and procedure for maintaining quality assurance records 4.12 Describe the document control and reporting procedures that should be used 4.13 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 22: Test and evaluate new scientific or technical methods and equipment for learning activities

Unit reference number: H/601/9735

Level: 3

Credit value: 12

Guided learning hours: 83

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to test and evaluate new scientific or technical methods and equipment for learning activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within specified parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical activities undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete scientific or technical tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete workplace tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Test and evaluate new scientific or technical methods and equipment for learning activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Establish the testing requirements of the new method and equipment with relevant people 1.4 Prepare the resources required and identify the hazards and risks associated with the testing of the equipment 1.5 Work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines 1.6 Run and test the new methods and equipment and record the results 1.7 Evaluate the results of the test with one of the following people: – supervisor – manager – team leader – head of department – health and safety officer – teacher or trainer			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	1.8 Evaluate the results of the test for one of the following learning activities: – timetabled lessons – other supervised events – outside activities			
2 Test and evaluate new scientific or technical methods and equipment for learning activities (continued)	2.1 Run and test methods for two of the following scientific or technical activities: – biological equipment and/or instruments – chemical equipment and/or instruments – electronic equipment and/or instruments – weighing and measuring equipment and/or instruments – information technology equipment – engineering machines, equipment and/or instruments – other technical equipment or instruments			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.2 Develop all of the following procedures for the learning activities with relevant people: – equipment use – services (e.g. gas, electricity) – time required – cost of purchase – materials/consumable use – scientific or technical skills – hazards and risks – learning outcomes – curriculum/course documents			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.3 Assess and give advice on two of the following hazards and risks: – harmful/toxic material – sensitising/irritant material – high voltage item – highly flammable material – oxidising material – extreme temperature item – radioactive material – corrosive material – biohazard material – electrostatic discharge item – manual handling – equipment safety 2.4 Evaluate the test results from the new methods and equipment for learning activities in partnership with the relevant people			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.5 Test results records should include two of the following: – hazard/safety issues – operating methods/procedures – performance reports – pass/fail sheets – test records – quality/output results 2.6 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.7 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Know how to test and evaluate new scientific or technical methods and equipment for learning activities	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.7 Describe the lines of communication and responsibilities in their department, and their links with the rest of the organisation 3.8 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve 3.9 Describe the organisational policy and procedures on safe working practices			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.10 Explain why it is important to follow safe operating procedures when using new equipment and materials 3.11 Describe what are the principles and procedures for testing new equipment 3.12 Describe what are the purposes of testing, and the specific use to which the test results are to be put 3.13 Describe what are the relevant testing methods that can be used to achieve the purpose of testing			
4 Know how to test and evaluate new scientific or technical methods and equipment for learning activities (continued)	4.1 Explain how to identify defective equipment and the appropriate action to take 4.2 Explain how the equipment should be operated during testing and the precautions to take 4.3 Explain why calibration is important and how to check calibration 4.4 Describe what is the potential impact of the test on health, safety and the learning environment 4.5 Describe what methods can be used for dealing with the handling, storage and disposal of materials 4.6 Describe what cleaning materials and methods of use should be used 4.7 Describe the methods that should be used for safe storage of the equipment 4.8 Explain how to record and evaluate the results of the testing			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.9 Explain how to modify the scientific or technical method, and when this may be required 4.10 Describe what documentation should be used for new learning activities 4.11 Describe the document control and reporting procedures that should be used 4.12 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Unit 23: Provide technical support for computer application software and equipment for learning activities

Unit reference number: K/601/9736

Level: 3

Credit value: 10

Guided learning hours: 64

Unit summary

This unit covers the skills and knowledge needed to prove the competences required to provide technical assistance for computer application software (does not include CAD) and equipment for scientific or technical activities, in accordance with approved procedures and practices. The learner will be expected to identify and use relevant understanding, methods and skills to complete tasks and address problems that, whilst well defined, have a measure of complexity. They will be expected to initiate and complete tasks and procedures as well as exercise autonomy and judgement within limited parameters. They will also be aware of different perspectives or approaches used within the workplace.

On completion of workplace activities, the learner will be required to show they have addressed problems that, whilst well defined, may be complex and non-routine. They will be expected to show they have identified, selected and used appropriate scientific or technical skills, methods and procedures. They will use appropriate investigation to inform actions and review how effective these methods have been.

The learner's responsibilities will require them to comply with organisational policy and procedures for the scientific or technical operations undertaken, and to report any problems with the activities, materials or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to initiate and complete tasks and procedures, including, where relevant, taking responsibility for supervising or guiding others. They will be expected to exercise autonomy and judgement within limited parameters, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. They will be expected to work to instructions, with a minimum of supervision, either on their own or as part of a team.

The learner's underpinning knowledge will enable them to use factual, procedural and theoretical understanding to complete scientific or technical tasks and address problems that, whilst well defined, may be complex and non-routine. They will be able to interpret and evaluate relevant workplace information and ideas. They will have an understanding of the scientific or technical process used, and its application, and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities to the required specification.

The learner will understand the safety precautions required when carrying out scientific or technical activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Assessment requirements

Assessment requirements are set down in Annexe C: Assessment strategy.

Assessment methodology

This unit is assessed in the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
1 Provide technical support for computer application software and equipment for learning activities	1.1 Ensure that their work is carried out in accordance with workplace procedures 1.2 Use safe practices and the appropriate personal protection equipment (PPE) when performing scientific or technical activities 1.3 Agree the technical support requirement with the relevant people 1.4 Clarify the technical support required with one of the following people: – supervisor – manager – team leader – head of department – health and safety officer – teacher or trainer 1.5 Gather relevant and accurate information for the technical support provided 1.6 Demonstrate computer application software and equipment methods and skills in a manner appropriate to educational environment needs			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
2 Provide technical support for computer application software and equipment for learning activities	2.1 Provide computer equipment support for three of the following: – desk tops – lap tops – digital whiteboards – interactive panels – computer projectors – copy boards – intranet system – printers/plotters – other (please specify) 2.2 Provide technical support for four of the following software applications: – operating system – windows software – data management system – firewall/antivirus system – costing/budgeting system – web browsing – device drivers – installation of software – other (please specify)			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	2.3 Work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines 2.4 Communicate the required information about the work done, in accordance with departmental and organisational procedures 2.5 Record and communicate details of work done, to the appropriate people, using: – verbal report Plus one method from the following: – written or typed report – specific workplace documentation – computer-based record – electronic mail			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
3 Know how to provide technical support for computer application software and equipment for learning activities	3.1 Describe the health and safety requirements of the area in which they are carrying out the scientific or technical activities 3.2 Describe the implications of not taking account of legislation, regulations, standards and guidelines when conducting scientific or technical activities 3.3 Describe the scientific or technical techniques and processes they must use correctly in the workplace 3.4 Explain the importance of wearing protective clothing, gloves and eye protection for scientific or technical activities 3.5 Explain the importance of correct identification, and any unique workplace coding system 3.6 Describe the organisational policies that exist for the use and application of licensed computer software 3.7 Describe the organisational policies that exist for the use of anti-virus and anti-spy software protection 3.8 Describe the organisational policies that exist on data protection and the data protection act			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	3.9 Describe the organisational requirements for maintaining the security of the workplace (e.g. access or aseptic conditions) 3.10 Describe the lines of communication and responsibilities in their department, and the links with the rest of the organisation 3.11 Describe the limits of their own authority and to whom they should report if they have problems that they cannot resolve			
4 Know how to provide technical support for computer application software and equipment for learning activities (continued)	4.1 Describe what are the approved codes of practice/ working practices and why it is important to follow them at all times 4.2 Describe what standard operating procedures apply and why it is important to follow them at all times 4.3 Describe the specific safety and security precautions to be taken when working with computer equipment 4.4 Describe the correct start-up and shutdown procedures to be used for the computer systems 4.5 Explain how to identify and select the correct software package from the on-screen menu			

Learning outcomes	Assessment criteria	Evidence type	Portfolio reference	Date
	4.6 Explain how to deal with system problems (such as error messages received, peripherals which do not respond as expected, obvious faults with the equipment or connecting leads) 4.7 Explain how to use the software to perform required operations for organisations requirements 4.8 Describe the organisational standards and conventions that are used for the computer and the software 4.9 Explain why it is important to create backup copies of software and to file them in a separate and safe location away from electromagnetic sources 4.10 Describe the document control and reporting procedures that should be used 4.11 Explain the reasons why effective communication is important, and the methods used for communicating effectively			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)

Further information

To get in touch with us visit our 'Contact us' pages:

- Edexcel, BTEC and Pearson Work Based Learning contact details: qualifications.pearson.com/en/support/contact-us.html
- books, software and online resources for UK schools and colleges: www.pearsonschoolsandfecolleges.co.uk

Key publications

- *Adjustments for candidates with disabilities and learning difficulties, Access and Arrangements and Reasonable Adjustments, General and Vocational qualifications* (Joint Council for Qualifications (JCQ))
- *Supplementary guidance for reasonable adjustments and special consideration in vocational internally assessed units* (Pearson)
- *General and Vocational qualifications, Suspected Malpractice in Examination and Assessments: Policies and Procedures* (JCQ)
- *Equality Policy* (Pearson)
- *Recognition of Prior Learning Policy and Process* (Pearson)
- *UK Information Manual* (Pearson)
- *Pearson Edexcel NVQs, SVQs and competence-based qualifications – Delivery Requirements and Quality Assurance Guidance* (Pearson)

All of these publications are available on our website: qualifications.pearson.com

FFurther information and publications on the delivery and quality assurance of NVQ/Competence-based qualifications are available at our website on the Delivering BTEC pages. Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please go to the resources page of our website.

Useful publications

Related information and publications include:

- *Centre Handbook for Pearson NVQs and Competence-based Qualifications* published annually
- functional skills publications – specifications, tutor support materials and question papers
- *Regulatory Arrangements for the Qualification Framework* (published by Ofqual, August 2008)
- the current Pearson publications catalogue and update catalogue.

Pearson publications concerning the Quality Assurance System and the internal and standards verification of vocationally related programmes can be found on the Pearson website.

NB: Some of our publications are priced. There is also a charge for postage and packing. Please check the cost when you order.

How to obtain National Occupational Standards

To obtain the National Occupational Standards for Laboratory and Associated Technical Activities please go to:

SEMTA
www.semta.org.uk

Professional development and training

Pearson supports UK and international customers with training related to NVQ and BTEC qualifications. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing student-centred learning and teaching approaches
- building functional skills into your programme
- building effective and efficient quality assurance systems.

The national programme of training we offer is on our website. You can request centre-based training through the website or you can contact one of our advisers in the Training from Pearson UK team via Customer Services to discuss your training needs.

The training we provide:

- is active
- is designed to be supportive and thought provoking
- builds on best practice
- may be suitable for those seeking evidence for their continuing professional development.

Annexe A: Quality assurance

Key principles of quality assurance

- A centre delivering Pearson qualifications must be an Pearson recognised centre and must have approval for qualifications that it is offering.
- The centre agrees, as part of gaining recognition, to abide by specific terms and conditions relating to the effective delivery and quality assurance of assessment. The centre must abide by these conditions throughout the period of delivery.
- Pearson makes available to approved centres a range of materials and opportunities to exemplify the processes required for effective assessment and provide examples of effective standards. Approved centres must use the guidance on assessment to ensure that staff who are delivering Pearson qualifications are applying consistent standards.
- An approved centre must follow agreed protocols for: standardisation of assessors; planning, monitoring and recording of assessment processes; internal verification and recording of internal verification processes and dealing with special circumstances, appeals and malpractice.

Quality assurance processes

The approach to quality assured assessment is made through a partnership between a recognised centre and Pearson. Pearson is committed to ensuring that it follows best practice and employs appropriate technology to support quality assurance processes where practicable. The specific arrangements for working with centres will vary. Pearson seeks to ensure that the quality-assurance processes it uses do not inflict undue bureaucratic processes on centres, and works to support them in providing robust quality-assurance processes.

The learning outcomes and assessment criteria in each unit within this specification set out the standard to be achieved by each learner in order to gain each qualification. Pearson operates a quality-assurance process, designed to ensure that these standards are maintained by all assessors and verifiers.

For the purposes of quality assurance, all individual qualifications and units are considered as a whole. Centres offering these qualifications must be committed to ensuring the quality of the units and qualifications they offer, through effective standardisation of assessors and internal verification of assessor decisions. Centre quality assurance and assessment processes are monitored by Pearson.

The Pearson quality-assurance processes will involve:

- gaining centre recognition and qualification approval if a centre is not currently approved to offer Pearson qualifications
- annual visits to centres by Pearson for quality review and development of overarching processes and quality standards. Quality review and development visits will be conducted by an Pearson quality development reviewer
- annual visits by occupationally competent and qualified Pearson Standards Verifiers for sampling of internal verification and assessor decisions for the occupational sector
- the provision of support, advice and guidance towards the achievement of National Occupational Standards.

Centres are required to declare their commitment to ensuring quality and appropriate opportunities for learners that lead to valid and accurate assessment outcomes. In addition, centres will commit to undertaking defined training and online standardisation activities.

Annexe B: Centre certification and registration

Pearson Standards Verifiers will provide support, advice and guidance to centres to achieve Direct Claims Status (DCS). Pearson will maintain the integrity of Pearson NVQs through ensuring that the awarding of these qualifications is secure. Where there are quality issues identified in the delivery of programmes, Pearson will exercise the right to:

- direct centres to take action
- limit or suspend certification
- suspend registration.

The approach of Pearson in such circumstances is to work with the centre to overcome the problems identified. If additional training is required, Pearson will aim to secure the appropriate expertise to provide this.

What are the access arrangements and special considerations for the qualifications in this specification?

Centres are required to recruit learners to Pearson qualifications with integrity.

Appropriate steps should be taken to assess each applicant's potential and a professional judgement should be made about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Pearson's policy on learners with particular requirements.

Pearson's policy on access arrangements and special considerations for Pearson qualifications aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the 2010 Equality Act) without compromising the assessment of skills, knowledge, understanding or competence. Please refer to *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational Qualifications* for further details. qualifications.pearson.com

Annexe C: Assessment requirements/strategy

Introduction

Semta, the Sector Skills Council for the Science Engineering Manufacturing Technologies

Sector, has produced this Unit Assessment Strategy to:

- assist Assessors, Internal Verifiers and External Verifiers
- encourage and promote consistent assessment of NVQ units
- promote cost effective assessment plans

This document also provides definitions for:

- the qualifications and experience required for Assessors and Verifiers
- the assessment environment and notes on simulation/replication.
- access to units

and requirements relating to:

- carrying out assessments
- performance evidence
- assessing knowledge and understanding

The importance and value in which employers and learners place on undertaking NVQ units will provide a key measure of [Semta's] success with this unit assessment strategy. Another key success factor will be [Semta's] partnership with the relevant Awarding Organisations.

Assessor Requirements to Demonstrate Effective Assessment Practice

Assessment must be carried out by competent Assessors that as a minimum must hold the Level 3 Award in Assessing Competence in the Work Environment. Current and operational Assessors that hold units D32 and/or D33 or A1 and/or A2 as appropriate to the assessment being carried out, will not be required to achieve the Level 3 Award as they are still appropriate for the assessment requirements set out in this Unit Assessment Strategy. However, they will be expected to regularly review their skills, knowledge and understanding and where applicable undertake continuing professional development to ensure that they are carrying out workplace assessment to the most up to date National Occupational Standards (NOS)

Assessor Technical Requirements

Assessors must be able to demonstrate that they have verifiable, relevant and sufficient technical competence to evaluate and judge performance and knowledge evidence requirements as set out in the relevant unit learning outcomes and associated assessment criteria.

This will be demonstrated either by holding a relevant technical qualification or by proven industrial experience of the technical areas to be assessed. The assessor's competence must, at the very least, be at the same level as that required of the learner(s) in the units being assessed.

Assessors must also be:

Fully conversant with the Awarding Organisation's assessment recording documentation used for the NVQ units against which the assessments and verification are to be carried out, other relevant documentation and system and procedures to support the QA process.

Verifier Requirements (internal and external)

Internal quality assurance (Internal Verification) must be carried out by competent Verifiers that as a minimum must hold the Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practices. Current and operational Internal Verifiers that hold internal verification units V1 or D34 will not be required to achieve the Level 4 Award as they are still appropriate for the verification requirements set out in this Unit Assessment Strategy. Verifiers must be familiar with, and preferably hold, either the nationally recognised Assessor units D32 and/or D33 or A1 and/or A2 or the Level 3 Award in Assessing Competence in the Work Environment.

External quality assurance (External Verification) must be carried out by competent External Verifiers that as a minimum must hold the Level 4 Award in the External Quality Assurance of Assessment Processes and Practices**.** Current and operational External Verifiers that hold external verification units V2 or D35 will not be required to achieve the Level 4 Award as they are still appropriate for the verification requirements set out in this Unit Assessment Strategy. Verifiers must be familiar with, and preferably hold, either the nationally recognised Assessor units D32 and/or D33 or A1 and/or A2 or the QCF Level 3 Award in Assessing Competence in the Work Environment.

External and Internal Verifiers will be expected to regularly review their skills, knowledge and understanding and where applicable undertake continuing professional development to ensure that they are carrying out workplace Quality Assurance (verification) of Assessment Processes and Practices to the most up to date National Occupational Standards (NOS).

Verifiers, both Internal and External, will also be expected to be fully conversant with the terminology used in the NVQ units against which the assessments and verification are to be carried out, the appropriate Regulatory Body's systems and procedures and the relevant Awarding Organisation's documentation, systems and procedures within which the assessment and verification is taking place.

Specific technical requirements for internal and external verifiers

Internal and external verifiers of this qualification must be able to demonstrate that have verifiable, sufficient and relevant industrial experience, and must have a working knowledge of the processes, techniques and procedures that are used in the relevant sector/occupation.

The tables on the following page show the recommended levels of technical competence for assessors, internal verifiers, and external verifiers.

Technical Requirements for Assessors and Verifiers

Position	Prime activity requirements	Support activity requirements	Technical requirements (see notes)
Assessor	Assessment Skills	IV Systems	Technical competence in the areas covered by the QCF units being assessed
Internal Verifier	Verification Skills	Assessment Knowledge	Technical understanding of the areas covered by the qualifications
External Verifier	Verification skills	Assessment Understanding	Technical awareness of the areas covered by the qualifications

Notes

1 Technical competence is defined here as a combination of practical skills, knowledge, and the ability to apply both of these, in familiar and new situations, within a real working environment.

2 Technical understanding is defined here as having a good understanding of the technical activities being assessed, together with knowledge of relevant Health & Safety implications and requirements of the assessments.

3 Technical awareness is defined here as a general overview of the subject area, sufficient to ensure that assessment and portfolio evidence are reliable, and that relevant Health and Safety requirements have been complied with.

4 The competence required by the assessor, internal verifier and external verifier, in the occupational area being assessed, is likely to exist at three levels as indicated by the shaded zones in the following table.

Technical Competence	An ability to discuss the general principles of the competences being	An ability to describe the practical aspects of the competence	An ability to demonstrate the practical competences being

Required by:	assessed	being assessed	assessed
Assessor			
Internal Verifier			
External Verifier			

Assessment Environment

The evidence put forward for this unit can only be regarded valid, reliable, sufficient and authentic if achieved and obtained in the working environment and be clearly attributable to the learner. However, in certain circumstances, simulation/replication of work activities may be acceptable.

- The use of high quality, realistic simulations, which impose pressures which are consistent with workplace expectations, should only be used in relation to the assessment of the following:-
    - rare or dangerous occurrences, such as those associated with health, safety and the environment issues, emergency scenarios and rare operations at work;
    - the response to faults and problems for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence;
    - aspects of working relationships and communications for which no opportunity has presented for the use of naturally occurring workplace evidence of learner's competence.
- Simulations will require prior approval from the specific Awarding Organisation and should be designed in relation to the following parameters: -
    - the environment in which simulations take place must be designed to match the characteristics of the working environment;
    - simulations which are designed to assess competence in dealing with emergencies, accidents and incidents must be verified as complying with relevant health, safety and environmental legislation by a competent health and safety/environmental control officer before being used;
    - simulated activities should place learners under the same pressures of time, access to resources and access to information as would be expected if the activity was real;
    - simulated activities should require learners to demonstrate their competence using real plant and equipment;
    - simulated activities which require interaction with colleagues and contacts should require the learner to use the communication media that would be expected at the workplace;
    - for health and safety reason simulations need not involve the use of genuine substances/materials. Any simulations which require the learner to handle or otherwise deal with materials substances/should ensure that the substitute take the same form as in the workplace

Simulations/replications should be designed in relation to a realistic work environment, having an acceptable level of appropriate equipment and operating to Good Laboratory Practice (GLP)/Good Control Laboratory Practice (GCLP) and/or Good Manufacturing Practice (GMP)/Current Good Manufacturing Practice (CGMP) standards. It may involve the use of inert substitutes for dangerous compounds or microbiological materials.

Access to Assessment

There are no entry qualifications or age limits required by learners to undertake the NVQ units unless this is a legal requirement of the process or the environment. Assessment is open to any learner who has the potential to achieve the assessment criteria set out in the units.

Aids or appliances, which are designed to alleviate disability, may be used during assessment, providing they do not compromise the standard required.

Carrying Out Assessment

The NVQ units were specifically developed to cover a wide range of activities. The evidence produced for the units will, therefore, depend on the learners choice of "bulleted items" listed in the unit assessment criteria.

Where the assessment criteria gives a choice of bulleted items (for example 'any three from five'), assessors should note that learners do not need to provide evidence of the other items to complete the unit (in this example, two) items, particularly where these additional items may relate to other activities or methods that are not part of the learners normal workplace activity or area of expertise.

Minimum Performance Evidence Requirements

Performance evidence must be the main form of evidence gathered. In order to demonstrate consistent, competent performance for a unit, performance evidence must be provided, and must be sufficient to show that the performance requirements of the unit have been carried out to the prescribed standards. It is possible that some of the scope items may be covered more than once. The assessor and learner need to devise an assessment plan to ensure that performance evidence is sufficient to cover all the specified scope items and which maximises the opportunities to gather evidence. Where applicable, performance evidence maybe used for more than one unit.

The most effective way of assessing competence, especially for the performance statements in relation to scope items, is through direct observation of the learner. Assessors must make sure that the evidence provided reflects the learner's competence and not just the achievement of a training programme.

Evidence that has been produced from team activities, for example, cleaning equipment, is only valid when it clearly relates to the learners specific and individual contribution to the activity, and not to the general outcome(s).

Each example of performance evidence will often contain features that apply to more than one unit, and can be used as evidence in any unit where appropriate.

Performance evidence must be a combination of:

- outputs of the learner's work, such as items that have been processed or worked on, and documents produced as part of a work activity

together with:

- evidence of the way the learner carried out the activities such as witness testimonies, assessor observations or authenticated learner reports, records or photographs of the work/activity carried out, etc.

Competent performance is more than just carrying out a series of individual set tasks. Many of the units contain statements that require the learner to provide evidence that proves they are capable of combining the various features and techniques. Where this is the case, separate fragments of evidence would not provide this combination of features and techniques and will not, therefore, be acceptable as demonstrating competent performance.

If there is any doubt as to what constitutes valid, authentic and reliable evidence, the internal and/or external verifier should be consulted.

Assessing knowledge and understanding

Knowledge and understanding are key components of competent performance, but it is unlikely that performance evidence alone will provide enough evidence in this area. Where the learner's knowledge and understanding (and the handling of contingency situations) is not apparent from performance evidence, it must be assessed by other means and be supported by suitable evidence.

Knowledge and understanding can be demonstrated in a number of different ways. Semta expects oral questioning and practical demonstrations to be used, as these are considered the most appropriate for these units. Assessors should ask enough questions to make sure that the learner has an appropriate level of knowledge and understanding, as required by the unit.

Awarding Organisations may choose other methods, which must be supported by a suitable rationale

Evidence of knowledge and understanding will not be required for those bulleted items in the assessment criteria that have not been selected by the learner.

The achievement of the specific knowledge and understanding requirements of the units cannot simply be inferred by the results of tests or assignments

from other units, qualifications or training programmes. Where evidence is submitted from these sources, the assessor must, as with any assessment, make sure the evidence is valid, reliable, authentic, directly attributable to the learner, and meets the full knowledge and understanding requirements of the unit.

Where oral questioning is used the assessor must retain a record of the questions asked, together with the learner's answers.

Awarding Organisations may choose other methods, which must be supported by a suitable rationale.

Witness testimony

Where observation is used to obtain performance evidence, this must be carried out against the unit assessment criteria. Best practice would require that such observation is carried out by a qualified Assessor. If this is not practicable, then alternative sources of evidence may be used.

For example, the observation may be carried out against the assessment criteria by someone else that is in close contact with the learner. This could be a team leader, supervisor, mentor or line manager who may be regarded as a suitable witness to the learner's competency. However, the witness must be technically competent in the process or skills that they are providing testimony for, to at least the same level of expertise as that required of the learner. It will be the responsibility of the assessor to make sure that any witness testimonies accepted as evidence of the learner's competency are reliable, auditable and technically valid.

Quality Control of Assessment

General

There are two major points where an Awarding Organisation interacts with the Centre in relation to the External Quality Control of Assessment and these are:

- Approval - when a Centre take on new qualifications/units, the Awarding Organisation, normally through an External Verifier (EV) ensures that the Centre is suitably equipped and prepared to deliver the new units/qualification
- Monitoring - throughout the ongoing delivery of the qualification/units the Awarding Organisation, through EV monitoring and other mechanisms must maintain the quality and consistency of assessment of the units/qualification

Approval

In granting Approval, the Awarding Organisation, normally through its External Verifiers (EV) must ensure that the prospective Centre:

- Meets the requirements of the Qualification Regulator
- Has sufficient and appropriate physical and staff resources
- Meets relevant health and safety and/or equality and access requirements
- Has a robust plan for the delivery of the qualification/units

The Awarding Organisation may visit the Centre to view evidence or may undertake this via other means.

The Awarding Organisation must have a clear rationale for the method(s) deployed.

Monitoring

The Awarding Organisation, through EV monitoring and other mechanisms must ensure:

- that a strategy is developed and deployed for the ongoing Awarding Organisation monitoring of the Centre. This strategy must be based on an active risk assessment of the Centre. In particular the strategy must identify the learner's, assessors and Internal Verifier sampling strategy to be deployed and the rationale behind this
- that the Centre's internal quality assurance processes are effective in learner's assessment
- that sanctions are applied to a Centre where necessary and that corrective actions are taken by the Centre and monitored by the Awarding Organisation/EV
- that reviews of Awarding Organisation's external auditing arrangements are undertaken

Awarding Organisations are required to provide to SEMTA, on request, details of the strategies, rationales and reviews detailed above.

Notes:

a) It is recognised that some Awarding Bodies provide supplementary guidance and documentation to centres to support the quality of assessment and verification practice of N/SVQs.

Annexe D: Additional requirement for qualifications that use the term 'NVQ' in a qualification title

For information please go to www.ofqual.gov.uk to access the document *'Operating rules for using the term 'NVQ' in a qualification title'*.

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For information about Edexcel, BTEC or LCCI qualifications visit qualifications.pearson.com