BTEC Level 2

Specification

BTEC Firsts

Pearson BTEC Level 2 Certificate, BTEC Level 2 Extended Certificate and BTEC Level 2 Diploma in Horticulture

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Issue 3

A PEARSON COMPANY

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This specification is Issue 3. Key changes are sidelined. We will inform centres of any changes to this issue. The latest issue can be found on the Pearson website: www.edexcel.com

These qualifications were previously entitled:

Edexcel BTEC Level 2 Certificate in Horticulture (QCF)

Edexcel BTEC Level 2 Extended Certificate in Horticulture (QCF)

Edexcel BTEC Level 2 Diploma in Horticulture (QCF)

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Contents

BTEC First qualification titles covered by this specification

Pearson BTEC Level 2 Certificate in Horticulture

Pearson BTEC Level 2 Extended Certificate in Horticulture

Pearson BTEC Level 2 Diploma in Horticulture

These qualifications have been accredited to the national framework (QCF) and are eligible for public funding as determined by the Department for Education (DfE) under Sections 96 and 97 of the Learning and Skills Act 2000.

The qualification titles listed above feature in the funding lists published annually by the DfE and the regularly updated website www.education.gov.uk. The Qualifications Accreditation Number (QAN) should be used by centres when they wish to seek public funding for their learners. Each unit within a qualification will also have a unit code.

The qualification and unit codes will appear on the learners' final certification documentation.

The QANs for the qualifications in this publication are:

Pearson BTEC Level 2 Certificate in Horticulture	501/0121/3
Pearson BTEC Level 2 Extended Certificate in Horticulture	501/0122/5
Pearson BTEC Level 2 Diploma in Horticulture	500/9934/6

These qualification titles will appear on learners' certificates. Learners need to be made aware of this when they are recruited by the centre and registered with Edexcel.

What are BTEC Firsts?

BTEC First qualifications are undertaken in further education and sixth-form colleges, schools and other training providers, and have been since they were introduced in 1983. Their purpose, approaches to teaching, learning and assessment are established and understood by teaching professionals, employers and learners alike.

The BTEC First qualifications within this specification:

- Pearson BTEC Level 2 Certificate in Horticulture
- Pearson BTEC Level 2 Extended Certificate in Horticulture
- Pearson BTEC Level 2 Diploma in Horticulture.

But for clarity and continuity they are referred to generically as BTEC First qualifications, where appropriate and maintain the same equivalences, benchmarks and other articulations (for example SCAAT points) as their predecessor qualifications. The following identifies the titling conventions and variations between the (predecessor) and new specifications.

Predecessor BTEC Firsts (accredited 2006)	QCF BTEC Firsts (for delivery from September 2010)
Edexcel Level 2 BTEC First Diploma	Pearson BTEC Level 2 Diploma
Edexcel Level 2 BTEC First Certificate	Pearson BTEC Level 2 Extended Certificate
Not applicable	Pearson BTEC Level 2 Certificate

BTEC Firsts are Level 2 qualifications designed to provide specialist work-related qualifications in a range of sectors. They give learners the knowledge, understanding and skills that they need to prepare for employment. The qualifications also provide career development opportunities for those already in work. Consequently they provide a course of study for full-time or part-time learners in schools, colleges and training centres.

BTEC Firsts provide much of the underpinning knowledge and understanding for the National Occupational Standards for the sector, where these are appropriate. They are supported by the relevant Standards Setting Body (SSB) or Sector Skills Council (SSC). A number of BTEC Firsts are recognised as Technical Certificates and form part of the Apprenticeship Framework. They attract achievement and attainment points that equate to similar-sized general qualifications.

On successful completion of a BTEC First qualification, learners can progress to or within employment and/or continue their study in the same, or related, vocational area.

Total Qualification Time

For all regulated qualifications, Pearson specifies a total number of hours that it is expected the average learner will be required to undertake in order to complete and show achievement for the qualification: this is the Total Qualification Time (TQT).

Within this, Pearson will also identify the number of Guided Learning Hours (GLH) that we expect a centre delivering the qualification will need to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, such as lessons, tutorials, online instruction, supervised study giving feedback on performance.

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.

These qualifications also have a credit value, which is equal to one tenth of TQT. Pearson consults with users of these qualifications in assigning TQT and credit values.

This suite of BTEC Level 2 qualifications is availble in the following sizes:

- Certificate – ISO TQT – (15 credits, 90 GLH)
- Extended Certificate – 300 TQT – (30 credits, 180 GLH)
- Diploma – 600 TQT – (60 credits, 360 GLH)

Pearson BTEC Level 2 Certificate – 15 credits

The 15-credit BTEC Level 2 Certificate offers a specialist qualification that focuses on particular aspects of employment within the appropriate vocational sector. The BTEC Level 2 Certificate is a qualification which can extend a learner's programme of study and provide a vocational emphasis. The BTEC Level 2 Certificate is broadly equivalent to one GCSE.

The BTEC Level 2 Certificate is also suitable for more mature learners, who wish to follow a vocational programme of study as part of their continued professional development or who want to move to a different area of employment.

Pearson BTEC Level 2 Extended Certificate – 30 credits

The 30-credit BTEC Level 2 Extended Certificate extends the specialist work-related focus from the BTEC First Award and covers the key knowledge and practical skills required in the appropriate vocational sector. The BTEC Level 2 Extended Certificate offers flexibility and a choice of emphasis through the optional units. It is broadly equivalent to two GCSEs.

The BTEC Level 2 Extended Certificate offers an engaging programme for those who are clear about the area of employment that they wish to enter. These learners may wish to extend their programme through the study of a related GCSE, a complementary NVQ or another qualification. These learning programmes can be developed to allow learners to study complementary qualifications without duplication of content.

For adult learners the BTEC Level 2 Extended Certificate can extend their experience of work in a particular sector. It is a suitable qualification for those wishing to change career or move into a particular area of employment following a career break.

The predecessor qualification to the BTEC Level 2 Extended Certificate is the Pearson Level 2 BTEC First Certificate accredited onto the National Qualifications Framework, which has the same equivalences, overall size and focus to the revised accredited qualification.

Pearson BTEC Level 2 Diploma – 60 credits

The 60-credit BTEC Level 2 Diploma extends the specialist work-related focus from the BTEC Level 2 Extended Certificate. There is potential for the qualification to prepare learners for employment in the appropriate vocational sector and it is suitable for those who have decided that they wish to enter a particular area of work. It is broadly equivalent to four GCSEs.

Some learners may wish to gain the qualification in order to enter a specialist area of employment or to progress to a Level 3 programme. Other learners may want to extend the specialism they studied on the BTEC Level 2 Certificate or the BTEC Level 2 Extended Certificate programme.

The predecessor qualification to the BTEC Level 2 Diploma is the Pearson Level 2 BTEC First Diploma accredited onto the National Qualifications Framework, which has the same equivalences, overall size and focus to the revised accredited qualification.

Key features of the BTEC Firsts in Horticulture

The BTEC Firsts in Horticulture have been developed in the environmental and land-based sector to:

- provide education and training for learners interested in employment and/or further education in the environmental and land-based and/or associated sectors
- give opportunities for employees who currently work in agricultural and land management industries to achieve a nationally recognised Level 2 vocationally-specific qualification
- give full-time learners the opportunity to enter employment in the environmental and land-based sector or to progress to vocational qualifications such as the Pearson BTEC Level 3 Nationals in Horticulture
- give learners the opportunity to develop a range of skills and techniques, personal skills and attributes essential for successful performance in working life.

Rationale for the BTEC Firsts in Horticulture

The BTEC Firsts in Horticulture have been developed to provide entry and progression into and within the plant production and amenity industries that fall within the environmental and land-based sector. Lantra, the Sector Skills Council for the environmental and land-based industries, has identified knowledge, understanding and technical skills that employers will need from learners entering the sector in the coming years. Pearson have included these in the development of units that make up these qualifications.

These qualifications are part of a wide suite of environmental and land-based qualifications that Pearson offers; they are designed primarily for 14 to 19 year old learners seeking employment and/or further learning in the sector. They are also available to other learners who may already have experience within the sector but seek a nationally recognised qualification as part of their career development. The qualifications are aimed at those interested in plant production and plant roles. The qualifications are made up of discrete 5 and 10 credit units of learning that give learners explicit recognition of their learning in education and work. BTEC First qualifications are free to be delivered and assessed in a range of traditional and contemporary models such as full time, part time and e-learning, tutors are free to create innovative and creative assessments that fit local requirements whilst maintaining a national standard.

National Occupational Standards

BTEC Firsts are designed to provide much of the underpinning knowledge and understanding for the National Occupational Standards (NOS), as well as developing practical skills in preparation for work and possible achievement of NVQs in due course. NOS form the basis of National Vocational Qualifications (NVQs). BTEC Firsts do not purport to deliver occupational competence in the sector, which should be demonstrated in a work context.

Each unit in the specification identifies links to elements of the NOS.

The Pearson BTEC Level 2 Firsts in Horticulture relate to the following NOS:

- Level 2 Production Horticulture
- Level 2 Amenity Horticulture.

Rules of combination for Pearson BTEC Level 2 First qualifications

The rules of combination specify the:

- total credit value of the qualification
- the minimum credit to be achieved at the level, or above, of the qualification
- the mandatory unit credit
- the optional unit credit
- the maximum credit that can come from other BTEC units in this qualification suite.

When combining units for a BTEC First qualification, it is the centre's responsibility to ensure that the following rules of combination are adhered to.

Pearson BTEC Level 2 Certificate

1 Qualification credit value: a minimum of 15.

2 Minimum credit to be achieved at, or above, the level of the qualification: 8.

Pearson BTEC Level 2 Extended Certificate

1 Qualification credit value: a minimum of 30 credits.

2 Minimum credit to be achieved at, or above, the level of the qualification: 16 credits.

Pearson BTEC Level 2 Diploma

1 Qualification credit value: a minimum of 60 credits.

2 Minimum credit to be achieved at, or above, the level of the qualification: 31 credits.

3 Mandatory unit credit: 20.

4 Optional unit credit: 40.

5 A maximum of 10 optional credits can come from other BTEC units to meet local needs.

Pearson BTEC Level 2 Certificate in Horticulture

The Pearson BTEC Level 2 Certificate in Horticulture is 15 credits and has 90 guided learning hours (GLH) that consists of a minimum of one optional unit from Group A (5 credits) the remaining credit may then be selected from units in Group A or B.

Pearson BTEC Level 2 Certificate in Horticulture			
Unit	**Group A** **Choose a minimum of 5 credits**	**Credit**	**Level**
1	Understand the Basic Principles of Plant Science	**5**	**2**
2	Understand the Basic Principles of Soil Science	**5**	**2**
3	Setting Out from a Plan	**5**	**2**
Unit	**Group B**		
5	Establish and Maintain Plants Outdoors	**10**	**2**
8	Participate in Horticultural Crop Production Outdoors	**10**	**2**
11	Undertake Nursery Stock Production	**10**	**2**
12	Participate in Protected Horticultural Plant Production	**10**	**2**
14	Maintain Winter and Summer Sports Turf Surfaces	**10**	**2**
17	Participate in Propagation Techniques	**10**	**2**

Pearson BTEC Level 2 Extended Certificate in Horticulture

The Pearson BTEC Level 2 Extended Certificate in Horticulture is 30 credits and has 180 guided learning hours (GLH) that consists of a minimum of one optional unit from Group A (5 credits), the remaining credit may then be taken from Groups A or B.

Pearson BTEC Level 2 Extended Certificate in Horticulture			
Unit	**Group A** **Choose a minimum of 5 credits**	**Credit**	**Level**
1	Understand the Basic Principles of Plant Science	**5**	**2**
2	Understand the Basic Principles of Soil Science	**5**	**2**
3	Setting Out from a Plan	**5**	**2**
Unit	**Group B**		
5	Establish and Maintain Plants Outdoors	**10**	**2**
6	Environmental and Land-based Business	**10**	**2**
7	Participate in Providing Estate Maintenance	**10**	**2**
8	Participate in Horticultural Crop Production Outdoors	**10**	**2**
9	Construct Landscape Foundations and Surfaces	**10**	**2**
10	Undertake Specialist Land-based Machinery Operations	**10**	**2**
11	Undertake Nursery Stock Production	**10**	**2**
12	Participate in Protected Horticultural Plant Production	**10**	**2**
13	Presentation and Service Retailing in the Land-based Sector	**10**	**2**
14	Maintain Winter and Summer Sports Turf Surfaces	**10**	**2**
15	Introduction to Land-based Machinery Operations	**10**	**2**
16	Understand the Principles of Sports and Amenity Turf Maintenance	**10**	**2**
17	Participate in Propagation Techniques	**10**	**2**
18	Tractor Driving	**5**	**2**
19	Introduction to Animal and Plant Biology	**10**	**2**

Pearson BTEC Level 2 Diploma in Horticulture

The Pearson BTEC Level 2 Diploma in Horticulture is 60 credits and has 360 guided learning hours (GLH) that consists of two mandatory units, plus a minimum of one optional unit from Group A (5 credits) and remaining units from Group A or B providing for a combined total of 60 credits and 360 guided learning hours (GLH) for the completed qualification.

Pearson BTEC Level 2 Diploma in Horticulture			
Unit	**Mandatory units**	**Credit**	**Level**
4	Undertake Work Related Experience in the Land-based Industries	**10**	**2**
5	Establish and Maintain Plants Outdoors	**10**	**2**
Unit	**Group A** **Choose a minimum of 5 credits**		
1	Understand the Basic Principles of Plant Science	**5**	**2**
2	Understand the Basic Principles of Soil Science	**5**	**2**
3	Setting Out from a Plan	**5**	**2**
Unit	**Optional units**		
6	Environmental and Land-based Business	**10**	**2**
7	Participate in Providing Estate Maintenance	**10**	**2**
8	Participate in Horticultural Crop Production Outdoors	**10**	**2**
9	Construct Landscape Foundations and Surfaces	**10**	**2**
10	Undertake Specialist Land-based Machinery Operations	**10**	**2**
11	Undertake Nursery Stock Production	**10**	**2**
12	Participate in Protected Horticultural Plant Production	**10**	**2**
13	Presentation and Service Retailing in the Land-based Sector	**10**	**2**
14	Maintain Winter and Summer Sports Turf Surfaces	**10**	**2**
15	Introduction to Land-based Machinery Operation	**10**	**2**
16	Understand the Principles of Sports and Amenity Turf Maintenance	**10**	**2**
17	Participate in Propagation Techniques	**10**	**2**
18	Tractor Driving	**5**	**2**
19	Introduction to Animal and Plant Biology	**10**	**2**

Assessment and grading

In BTEC Firsts all units are internally assessed.

All assessment for BTEC First qualifications is criterion referenced, based on the achievement of all the specified learning outcomes.

Each unit within the qualification has specified assessment and grading criteria which are to be used for grading purposes. A summative unit grade can be awarded at pass, merit or distinction:

- to achieve a 'pass' a learner must have satisfied all the pass assessment criteria
- to achieve a 'merit' a learner must additionally have satisfied all the merit grading criteria
- to achieve a 'distinction' a learner must additionally have satisfied all the grading distinction criteria.

Grading domains

The assessment and grading criteria are developed in relation to grading domains which are exemplified by a number of indicative characteristics at the level of the qualification.

There are four BTEC First grading domains:

- application of knowledge and understanding
- development of practical and technical skills
- personal development for occupational roles
- application of generic skills.

Please refer to *Annexe B* which shows the merit and distinction indicative characteristics.

Guidance

The purpose of assessment is to ensure that effective learning has taken place to give learners the opportunity to:

- meet the assessment and grading criteria and
- achieve the learning outcomes within the units.

All the assignments created by centres should be reliable and fit for purpose, and should be built on the unit assessment and grading criteria. Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the specified criteria. Centres should enable learners to produce evidence in a variety of different forms including written reports, graphs, posters, along with projects, performance observation and time-constrained assessments.

Centres are encouraged to emphasise the practical application of the assessment and grading criteria, providing a realistic scenario for learners to adopt, and making maximum use of practical activities and work experience. The creation of assignments that are fit for purpose is vital to achievement and their importance cannot be over-emphasised.

The assessment and grading criteria must be indicated clearly on fit for purpose assignments. This gives learners focus and helps with internal verification and standardisation processes. It will also help to ensure that learner feedback is specific to the assessment and grading criteria.

When looking at the unit assessment and grading criteria grids and designing assignments, centres are encouraged to identify common topics and themes.

The units include guidance on appropriate assessment methodology. A central feature of vocational assessment is that it allows for assessment to be:

- current, ie to reflect the most recent developments and issues
- local, ie to reflect the employment context of the delivering centre
- flexible to reflect learner needs, ie at a time and in a way that matches the learner's requirements so that they can demonstrate achievement.

Calculation of the qualification grade

Pass qualification grade

Learners who achieve the minimum eligible credit value specified by the rule of combination will achieve the qualification at pass grade (see *Rules of combination for Pearson BTEC Level 2 First qualifications*).

Qualification grades above pass grade

Learners will be awarded a merit or distinction or distinction* qualification grade by the aggregation of points gained through the successful achievement of individual units. The number of points available is dependent on the unit level and grade achieved, and the credit size of the unit (as shown in the 'points available for credits achieved at different levels and unit grades' below).

Points available for credits achieved at different levels and unit grades

The table below shows the **number of points scored per credit** at the unit level and grade.

Unit level	Points per credit		
	Pass	Merit	Distinction
Level 1	3	4	5
Level 2	**5**	**6**	**7**
Level 3	7	8	9

Learners who achieve the correct number of points within the ranges shown in the 'qualification grade' table will achieve the qualification merit or distinction or distinction* grade.

Qualification grade

Qualification	Points range above pass grade		
	Merit	Distinction	Distinction*
BTEC Level 2 Certificate	85-94	95-99	100 and above
BTEC Level 2 Extended Certificate	170-189	190-199	200 and above
BTEC Level 2 Diploma	340-379	380-399	400 and above

Please refer to *Annexe G* for examples of calculation of qualification grade above pass grade.

Quality assurance of centres

Pearson's qualification specifications set out the standard to be achieved by each learner in order to be awarded the qualification. This is covered in the statement of learning outcomes, and assessment and grading criteria in each unit. Further guidance on delivery and assessment is given in the Essential guidance for tutors section in each unit. This section is designed to provide additional guidance and amplification related to the unit to support tutors, deliverers and assessors and to provide for a coherence of understanding and a consistency of delivery and assessment.

Approval

Centres that have not previously offered BTEC qualifications will first need to apply for, and be granted, centre approval before they can apply for approval to offer the programme.

When a centre applies for approval to offer a BTEC qualification they are required to enter into an approvals agreement.

The approvals agreement 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. Sanctions and tariffs may be applied if centres do not comply with the agreement. Ultimately, this could result in the suspension of certification or withdrawal of approval.

Centres will be allowed 'accelerated approval' for a new programme where the centre already has approval for a programme that is being replaced by the new programme.

The key principles of quality assurance are that:

- a centre delivering BTEC programmes must be an approved centre and must have approval for programmes or groups of programmes that it is operating
- the centre agrees as part of gaining approval to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; it must abide by these conditions throughout the period of delivery
- Pearson makes available to approved centres a range of materials and opportunities intended to exemplify the processes required for effective assessment and examples of effective standards. Approved centres must use the materials and services to ensure that all staff delivering BTEC qualifications keep up to date with the guidance on assessment
- an approved centre must follow agreed protocols for standardisation of assessors and verifiers; planning, monitoring and recording of assessment processes; and for dealing with special circumstances, appeals and malpractice.

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

Pearson monitors and supports centres in the effective operation of assessment and quality assurance. The methods which it uses to do this for these BTEC First and National programmes:

- ensuring that all centres have completed appropriate declarations at the time of approval, undertaking approval visits to centres where necessary
- requiring all centres to appoint a Lead Internal Verifier for designated groups of programmes and to ensure that this person is trained and supported in carrying out that role
- requiring that the Lead Internal Verifier completes compulsory online standardisation related to assessment and verification decisions for the designated programme
- assessment sampling and verification, through requested samples of assessments, completed assessed learner work and associated documentation
- overarching review and assessment of a centre's strategy for assessing and quality assuring its BTEC programmes.

Pearson Quality Assurance Handbook

Centres should refer to the *Handbook for Quality Assurance for BTEC Qualifications*, issued annually, for detailed guidance.

An approved centre must make certification claims only when authorised by Pearson and strictly in accordance with requirements for reporting.

Centres that do not fully address and maintain rigorous approaches to quality assurance will be prevented from seeking certification for individual programmes or for all BTEC First and National programmes. Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.

Programme design and delivery

BTEC First qualifications consist of mandatory and optional units. Optional units are designed to provide a focus to the qualification and give more specialist opportunities in the sector.

In BTEC Firsts each unit has a number of guided learning hours and centres are advised to take this into account when planning the programme of study associated with this specification.

Mode of delivery

Pearson does not define the mode of study for BTEC Firsts. Centres are free to offer the qualifications using any mode of delivery (such as full time, part time, evening only, distance learning) that meets their learners' needs. Whichever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists delivering the units. This is particularly important for learners studying for the qualification through open or distance learning.

Learners studying for the qualification on a part-time basis bring with them a wealth of experience that should be utilised to maximum effect by tutors and assessors. The use of assessment evidence drawn from learners' work environments should be encouraged. Those planning the programme should aim to enhance the vocational nature of the qualification by:

- liaising with employers to ensure a course relevant to learners' specific needs
- accessing and using non-confidential data and documents from learners' workplaces
- including sponsoring employers in the delivery of the programme and, where appropriate, in the assessment
- linking with company-based/workplace training programmes
- making full use of the variety of experience of work and life that learners bring to the programme.

Resources

BTEC Firsts are designed to prepare learners for employment in specific occupational sectors. Physical resources need to support the delivery of the programme and the proper assessment of the learning outcomes and should, therefore, normally be of industry standard. Staff delivering programmes and conducting the assessments should be familiar with current practice and standards in the sector concerned. Centres will need to meet any specific resource requirements to gain approval from Pearson.

Where specific resources are required these have been indicated in individual units in the *Essential resources for tutors* sections.

Delivery approach

It is important that centres develop an approach to teaching and learning that supports the specialist vocational nature of BTEC First qualifications and the mode of delivery. Specifications give a balance of practical skill development and knowledge requirements, some of which can be theoretical in nature. Tutors and assessors need to ensure that appropriate links are made between theory and practical application and that the knowledge base is applied to the sector. This requires the development of relevant and up-to-date teaching materials that allow learners to apply their learning to actual events and activity within the sector. Maximum use should be made of the learner's experience.

An outline learning plan is included in every unit as guidance which demonstrates one way to plan the delivery and assessment of the unit. The outline learning plan can be used in conjunction with the programme of suggested assignments.

Where the qualification has been designated and approved as a Technical Certificate and forms part of an Apprenticeship scheme, particular care needs to be taken to build strong links between the learning and assessment for the BTEC First qualification and the related NVQs and Functional Skills that also contribute to the scheme.

Meeting local needs

Centres should note that the qualifications set out in this specification have been developed in consultation with centres and employers and the Sector Skills Councils or the Standards Setting Bodies for the relevant sector. Centres should make maximum use of the choice available to them within the optional units to meet the needs of their learners, and local skills and training needs.

In certain circumstances, units in this specification might not allow centres to meet a local need. In this situation, Pearson will ensure that the rules of combination allows centres to make use of units from other BTEC specifications. Centres are required to ensure that the coherence and purpose of the qualification is retained and to ensure that the vocational focus is not diluted.

Limitations on variations from standard specifications

The flexibility to import standard units from other BTEC Firsts is limited to a total of 25 per cent of the qualification credit value (see *Rules of combination for Pearson BTEC Level 2 First qualifications*).

These units cannot be used at the expense of the mandatory units in any qualification.

Additional and specialist learning

Additional and specialist learning (ASL) consists of accredited qualifications at the same level as, or one level above, the Diploma course of study. The ASL may include BTEC qualifications which are also available to learners not following a Diploma course of study.

Qualifications for ASL must be selected from the ASL catalogue through the National Database of Accredited Qualifications (NDAQ). The catalogue includes qualifications which have the approval of the Diploma Development Partnership (DDP) and will expand over time as more qualifications are approved. To access the catalogue go to www.ndaq.org.uk and select 'Browse Diploma Qualifications'.

Further units may be added to qualifications within the catalogue and centres undertaking, or preparing to undertake, ASL should refer regularly to the Pearson website for information regarding additions.

Functional Skills

BTEC Firsts give learners opportunities to develop and apply Functional Skills.

Functional Skills are offered as stand-alone qualifications at Level 2. See individual units for opportunities to cover ICT, Mathematics and English Functional Skills.

Personal, learning and thinking skills

Opportunities are available to develop personal, learning and thinking skills (PLTS) within a sector-related context. PLTS are identified in brackets after the unit pass criteria to which they are associated and they are also mapped in *Annexe C*. Further opportunities for learners to demonstrate these skills may also be apparent as learners progress throughout their learning.

Access and recruitment

Edexcel's policy regarding access to its qualifications is that:

- they should be available to everyone who is capable of reaching the required standards
- they should be free from any barriers that restrict access and progression
- there should be equal opportunities for all wishing to access the qualifications.

Centres are required to recruit learners to BTEC qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualification and that the qualification will meet their needs. Centres should take appropriate steps to assess each applicant's potential and make a professional judgement about their ability to complete the programme of study successfully 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.

Centres will need to review the entry profile of qualifications and/or experience held by applicants, considering whether this profile shows an ability to progress to a Level 2 qualification. For learners who have recently been in education, the profile is likely to include one of the following:

- a BTEC Level 1 qualification in an environmental and land-based subject or a related vocational area
- a standard of literacy and numeracy supported by a general education equivalent to four GCSEs at grade D-G
- other related Level 1 qualifications
- related work experience.

More mature learners may present a more varied profile of achievement that is likely to include experience of paid and/or unpaid employment.

Restrictions on learner entry

Most BTEC First qualifications are for learners aged 14 years and over.

In particular sectors the restrictions on learner entry might also relate to any physical or legal barriers, for example people working in health, care or education are likely to be subject to police checks.

Pearson BTEC Level 2 Firsts are listed on the DfE funding lists Section 96 and Section 97.

Access arrangements and special considerations

Pearson's policy on access arrangements and special considerations for BTEC and Pearson NVQ qualifications aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the 1995 Disability Discrimination Act and the amendments to the Act) without compromising the assessment of skills, knowledge, understanding or competence.

Further details are given in the policy document *Access Arrangements and Special Considerations for BTEC and Pearson NVQ Qualifications*, which can be found on the Pearson website. This policy replaces the previous Pearson policy (Assessment of Vocationally Related Qualification: Regulations and Guidance Relating to Learners with Special Requirements, 2002) concerning learners with particular requirements.

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Pearson encourages centres to recognise learners' previous achievements and experiences whether at work, home or at leisure, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning.

RPL enables recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be sufficient, reliable and valid.

Unit format

All units in Pearson BTEC Level 2 First qualifications have a standard format. The unit format is designed to give guidance on the requirements of the qualification for learners, tutors, assessors and those responsible for monitoring national standards.

Each unit has the following sections.

Unit title

The unit title will appear on the learner's Notification of Performance (NOP).

Level

All units and qualifications have a level assigned to them, which represents the level of achievement. There are nine levels of achievement, from Entry Level to Level 8. The level of the unit has been informed by the level descriptors and, where appropriate, the National Occupational Standards (NOS) and/or other sector/professional benchmarks.

Credit value

In BTEC First qualifications each unit consists of a credit value; learners will be awarded credits for the successful completion of whole units.

A credit value specifies the number of credits that will be awarded to a learner who has achieved all the learning outcomes of the unit.

Guided learning hours

Guided learning hours for the unit as defined on page 3.

Aim and purpose

The aim provides a clear summary of the purpose of the unit and is a succinct statement that summarises the learning outcomes of the unit.

Unit introduction

The unit introduction gives the reader an appreciation of the unit in the vocational setting of the qualification, as well as highlighting the focus of the unit. It gives the reader a snapshot of the unit and the key knowledge, skills and understanding gained while studying the unit. The unit introduction also highlights any links to the appropriate vocational sector by describing how the unit relates to that sector.

Learning outcomes

Learning outcomes state exactly what a learner should 'know, understand or be able to do' as a result of completing the unit.

Unit content

The unit content identifies the breadth of knowledge, skills and understanding needed to design and deliver a programme of learning to achieve each of the learning outcomes. This is informed by the underpinning knowledge and understanding requirements of the related NOS. The content provides the range of subject material for the programme of learning and specifies the skills, knowledge and understanding required for achievement of the pass, merit and distinction grading criteria.

Each learning outcome is stated in full and then the key phrases or concepts related to that learning outcome are listed in italics followed by the subsequent range of related topics.

Relationship between content and assessment criteria

The learner must have the opportunity within delivery of the unit to cover all the unit content.

It is not a requirement of the unit specification that all of the content is assessed. However, the indicative content will need to be covered in a programme of learning in order for learners to be able to meet the standard determined in the assessment and grading criteria. The merit and distinction grading criteria enable the learner to achieve higher levels of performance in their acquisition of knowledge, understanding and skills.

Content structure and terminology

The information below shows how the unit content is structured and gives the terminology used to explain the different components within the content.

- Learning outcome: this is shown in bold at the beginning of each section of content.
- Italicised sub-heading: it contains a key phrase or concept. This is content which must be covered in the delivery of the unit. Colons mark the end of an italicised sub-heading.
- Elements of content: the elements are in plain text and amplify the sub-heading. The elements must be covered in the delivery of the unit. Semi-colons mark the end of an element.
- Brackets contain amplification of elements of content which must be covered in the delivery of the unit.
- 'eg' is a list of examples, used for indicative amplification of an element, (that is, the content specified in this amplification could be covered or could be replaced by other, similar material).

Assessment and grading grid

Each grading grid gives the assessment and grading criteria used to determine the evidence that each learner must produce in order to receive a pass, merit or distinction grade. It is important to note that the merit and distinction grading criteria require a qualitative improvement in a learner's evidence and not simply the production of more evidence at the same level.

Essential guidance for tutors

This section gives tutors additional guidance and amplification to aid understanding and a consistent level of delivery and assessment. It is divided into the following sections.

- *Delivery* – explains the content's relationship with the learning outcomes and offers guidance about possible approaches to delivery. This section is based on the more usual delivery modes but is not intended to rule out alternative approaches.
- *Outline learning plan* – the outline learning plan has been included in every unit as guidance and demonstrates one way in planning the delivery and assessment of a unit. The outline learning plan can be used in conjunction with the programme of suggested assignments.
- *Assessment* – amplify the nature and type of evidence that learners need to produce in order to pass the unit or achieve the higher grades. This section should be read in conjunction with the grading criteria.
- *Suggested programme of assignments* – the table shows how the suggested assignments match and cover the assessment grading criteria.
- *Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications* – sets out links with other units within the qualification. These links can be used to ensure that learners make connections between units, resulting in a coherent programme of learning. The links show opportunities for integration of learning, delivery and assessment.
- *Essential resources* – identifies any specialist resources needed to allow learners to generate the evidence required for each unit. The centre will be asked to ensure that any requirements are in place when it seeks approval from Pearson to offer the qualification.
- *Employer engagement and vocational contexts* – gives a short list of agencies, networks and other useful contacts for employer engagement and for sources of vocational contexts.
- *Indicative reading for learners* – gives a list of learner resource material that benchmarks the level of study.

Units

Unit 1: Understand the Basic Principles of Plant Science

Unit code: T/600/9808

Level 2: BTEC First

Credit value: 5

Guided learning hours: 30

Aim and purpose

This unit aims to provide learners with an understanding of the principles of plant selection, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

Every aspect of the horticulture industry relies on scientists to ensure the continued improvement and understanding of plant science to create a better quality plant for a number of different purposes, for example bigger flowers or hardier cereal plants. Scientists are people who have the desire to understand the world around them and they long to solve problems as well as trying to explain things in the world around us. A lot of scientific discoveries have both added to our knowledge of the world around us as well as allowing us to turn our knowledge into useful applications.

So, why study plants? Plants are what sustains the Earth. By understanding plants we can use them to our benefit. We can find new medicinal cures, produce better quality food, prevent plant disease and continue to improve our plant production methods.

This unit aims to provide a basic scientific understanding of plant biology for learners who are interested in land-based careers, those wanting to study climate or the environment and those interested in plant health benefits and food production. This unit is also useful as a basis for those hoping to become botanists or plant scientists who will study plants, fungi, algae – their structure, growth, reproduction, distribution and diseases. So, if you are observant, good at problem solving and interested in plants then plant science is for you!

Learning outcomes

On completion of this unit a learner should:

1 Know the physical structure of plants

2 Understand the development and physiology of plants.

Unit content

1 Know the physical structure of plants

Plant structures and function: external structures (roots, shoots, stem, leaves, buds, flowers, fruits, seeds); internal structures (cell structure, cytoplasm, organelles, parenchyma, collenchyma, sclerenchyma, xylem tissue, phloem tissue, cambium); specialised cells, tissues and organs (pericycle, endodermis, lenticels, cotyledons, stolons, rhizomes, storage organs); use of plants related to their structures

2 Understand the development and physiology of plants

Plant growth and development: life cycle types (ephemeral, annual, biennial, perennial); definition of monocotyledon and dicotyledon and examples of plant species in both; process and stages of germination; types of germination eg epigeal, hypogeal; effects of photoperiod and temperature on reproductive growth; flower structures; pollination and fertilisation; seed production and dispersal; fruit formation; dormancy; asexual and vegetative reproduction; meristems; cell division; formation of roots, shoots, buds, leaves and tillers; function of major plant nutrients and deficiency symptoms (nitrogen, phosphorus, potassium, magnesium, sulphur); function of minor nutrients and trace elements; deficiency symptoms of minor nutrients and trace elements eg sodium, iron, manganese, zinc, copper, molybdenum, boron, cobalt

Physiology: photosynthesis equation; structure and function of chloroplasts; function of pigments eg chlorophyll; factors influencing the rate of photosynthesis eg temperature, humidity, light intensity, position within the canopy, water availability; compensation points; manipulation of limiting factors to enhance plant performance eg weed control, carbon dioxide enrichment, climate control, irrigation, drainage; definition of aerobic and anaerobic respiration; equation for aerobic respiration; structure and function of mitochondria; factors influencing the rate of respiration eg temperature, water availability, seasonal growth; controlled growing environments eg hydroponics

Water uptake, movement and loss: eg osmosis, diffusion, transpiration, plasmolysis, translocation; factors influencing rates of uptake and loss eg humidity, wind speed

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 identify the organs of plants	**M1** explain the function of specialised cells within plants	D1 discuss how plant physiology can be manipulated to purpose.
P2 describe the main tissues of plants		
P3 identify the functions of leaves, stems, roots and flowers		
P4 summarise the processes involved in growth and development	**M2** describe how and why water uptake can vary in plants.	
P5 summarise the processes involved in plant reproduction [IE, RL, EP]		
P6 define the terms: ◊ ephemeral ◊ annual ◊ biennial ◊ perennial as they relate to plant life cycles		
P7 describe the characteristics of stages of plant growth. [TW, SM]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical and written assessments, visits to suitable collections and will links to work related experience placements.

Site visits and guest expert speakers may also be appropriate and the learner can be introduced to the work of botanists and plant scientists. If possible a visit to a centre such as the John Innes Centre would be ideal to support the learner in applying knowledge as well as seeing manipulation of plant physiology in action. Most providers will have access to basic scientific equipment, for example microscopes and bioviewers that can be used to see sections of plants. Data logging equipment can be used to show limiting factors in photosynthesis and this equipment is fairly common in school, college or university science departments. Most providers will have access to a range of plants that can be studied but specimens can be bought in or site visits can be arranged. Another area of possible field work involves visiting a controlled growing environment and carrying out organised practical work. A visit that shows hydroponics working or another soil-less system would be good for the learners to reinforce the fact that plant mass is not from soil and plants will grow in other media. The rest of the unit is very much linked to knowledge gained from level 2/GCSE science courses and as such many scientific practicals, for example looking at osmosis in potato chips, the effects of mineral deficiency on duckweed, a potometer are all suitable ways of explaining ideas to the learner. Material can however be delivered by a wide range of techniques including lectures, discussions, seminar presentations, supervised practicals and research using the internet and/or library resources. Delivery should stimulate, motivate, educate and enthuse learners.

Any site visits should be checked for suitability and a risk assessment of activities carried out. Centres such as the John Innes Centre and charities such as the RHS run very well-organised and well-funded education departments that provide centres with the opportunity to have a supported visit to a number of different sites; they provide expert guidance on the specific location as well as sometimes being able to tailor-make sessions and practical work. It would be beneficial if learners and supervisors of sites/centres were made aware of the requirements of this unit before any activities so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to use better quality microscopes and view images from scanning electron microscopes showing the detail of tiny structures in plants. The learner should be encouraged to ask for observation records and/or witness statements to be provided as evidence of this as well as taking and annotating photographs and keeping a diary from any site visits. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives **an indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit
Assignment 1: New Job, New Roles (P1, P2, P3, M1) Introduction to assignment. Investigation of plant structure and function
Research, lectures, guided practical work on plant structures
Assignment 2: The Work Adds Up (P4, P5, M2) Introduction to assignment.
Research, lectures, guided practical work on plant growth
Assignment 3: Fame! (P6, P7, M2) Introduction to assignment
Research, lectures, guided practical work on plant physiology
Assignment 4: A New Area to the Centre (D1) Introduction to the assignment. Introduction to physiological manipulation
Internet research, site visits, library research, guest lectures, demonstrations and guided practical work
Unit evaluation

Assessment

For P1, learners must identify the organs of plants. This could be assessed by a 'game' style task that gets learners to match names to parts. Learners could label a given diagram; they could make a model of a plant to use with younger learners or written tasks can be undertaken.

P2 requires learners to describe plant tissues. This could take the form of a pictorial presentation with notes, an annotated poster, laboratory book or project.

For P3, learners should identify the functions of structures in the plant. This could be assessed by a question and answer session with the tutor, an annotated series of diagrams, a revision clip session, for example BBC Bitesize, a gardening magazine article for beginners, a web page article.

P4 requires learners to explain plant growth and development and factors that affect them. This may be completed during a site visit and be assessed by witness statement or observation record. If a site visit or guest speaker session is not possible then learners could prepare a presentation, a booklet, a guide for learners, a mock section of a revision guide or a web page for a plant nursery.

For P5, learners must explain plant reproduction. The assessment for this can take the same form as P4 or P3.

P6 requires learners to define a series of terms relating to plant life cycles. This can be assessed by the pupils producing a documentary style piece which can be filmed or written as a storyboard, a presentation, a series of annotated photographs/diagrams that explain the terms.

P7 requires the learner to provide information on the stages of plant growth. This criterion can also be assessed as P4 or P3.

For M1, learners must explain the function of specialised cells. For this learners could construct models of specialised cells and either talk about each in an interview or display them with a set of descriptive note cards; this could also be assessed as a written task or as a set of posters.

For M2, the learner could carry out a series of practicals that can be photographed. The practical can be supported by results tables, graphs and conclusions. Learners could also complete an internet research project feeding back to the tutor or after practical work a presentation could be given or written piece produced.

D1 can be assessed as a series of notes or a diary by the learner about site visits to centres where physiological manipulation occurs. This could also be assessed as a mock business plan appealing for financial backers and explaining the science behind the project. Written assessment is also an option.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1	New Job, New Roles	You have recently got a job at the John Innes Centre. You have experience in botany and plant science and your first job is to update the section of the centre's website entitled Introduction to Plant Science.	Production of a variety of web pages
P4, P5, M2	The Work Adds Up	Your next task is to compare new varieties of tomatoes and see how these compare to standard species. Your tests will involve seeing how the plants grow, watering demands and environmental factors that affect them.	Practical notes Photographs Witness statements
P6, P7, M2	Fame!	A TV wildlife programme wants to film a programme on different plants and how they grow. You have been assigned to support the crew as scientific support.	Note cards for the crew Storyboards Scripts
D1	A New Area to the Centre	Your boss has decided to set up an area using alternative media to grow plants. You must try different media and report on their success.	Practical notes Report Annotated photographs

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Understand the Basic Principles of Soil Science	Understand the Principles of Soil Science
Undertake Nursery Stock Production	Understand the Principles of Plant Science
Participate in Protected Horticultural Plant Production	Understand the Principles of Advanced Horticultural Science
Participate in Propagation Techniques	
Element CU76.1 Maintain the health of plants outdoors	

Essential resources

There are many opportunities for practical and experimental work in this unit. Therefore there should be access to adequate field and laboratory facilities for the investigation of plant structures, germination, photosynthesis, osmosis and transpiration. A suitable range of plants and plant material should be available for learners to study.

There should be access to light microscopes to study cell structures. Learners should have access to current health and safety regulations and equipment. Links with, for example, farmers and growers will enable access to a range of plant types and growing regimes.

Learners should be given access to computers for research and presentation of assignments.

Employer engagement and vocational contexts

Learners would benefit from having access to a working plant science or botany laboratory. Often this can be achieved by creating links with local businesses or charitable organisations who may even benefit from taking on students. Local authorities can be a useful source of information, as can business education alliances. Charitable and government organisations can often provide guest speakers to attend and give lectures as well as demonstrations, normally for a minimal cost.

Indicative reading for learners

Textbooks

Barnes C and Poore N – *Plant Science in Action* (Hodder Arnold, 1994) ISBN 978-0340600993

Cutler D, Botha T and Stevenson D – *Plant Anatomy: An Applied Approach* (Blackwell Publishing, 2007) ISBN 978-1405126793

Davies B, Eagle D and Finney B – *Soil (Resource Management Series)* (Farming Press, 2002) ISBN 978-0852365595

Graham I – Soil *(Earth's Precious Resources Series)* (Heinemann Library, 2004) ISBN 978-0431115542

Green N P O, Stout G W and Taylor D J – *Biological Science 1 and 2, 3rd Edition* (Cambridge University Press, 1997) ISBN 978-0521561785

Hay R K M – *Chemistry for Agriculture and Ecology* (Blackwell Science, 1981) ISBN 978-0632006991

Hill-Cottingham P and Hill-Cottingham D – *Plant Science (Biology Advanced Studies Series)* (Blackie Schools, 1992) ISBN 978-0174481980

Lockhart J A R et al – *Lockhart and Wiseman's Introduction to Crop Husbandry, 7th Edition* (Butterworth-Heinemann, 1993) ISBN 978-0080420028

Raven P, Johnson G, Singer S and Losos J – *Biology, 7th Edition* (McGraw-Hill Higher Education, 2004) ISBN 978-0072921649

Ridge I – *Plants* (Oxford University Press, 2002) ISBN 978-0199255481

Roberts M, Reiss M and Monger G – *Biology: Principles and Processes* (Nelson Thornes, 2004) ISBN 0174481764

Soffe R – *The Agricultural Notebook, 20th Edition* (Blackwell Science, 2003) ISBN 978-0632058297

Stern K – *Introductory Plant Biology, 9th Edition* (McGraw-Hill Education, 2002) ISBN 978-0070122055

Journals

Arable Farming

Crops

Crop Science

Landwards

Websites

www.agrifor.ac.uk	AgriFor
www.bbsrc.ac.uk	Biotechnology and Biological Sciences Research Council
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.hse.gov.uk	Health and Safety Executive
www.images.botany.org	Botanical Society of America Online Image Collection
www.jic.ac.uk	The John Innes Centre
www.lantra.co.uk	Lantra Sector Skills Council
www.rothamsted.ac.uk	Rothamsted Research
www.s-cool.co.uk	S-cool
www-saps.plantsci.cam.ac.uk	Science and Plants for Schools
www.sebiology.org	The Society for Experimental Biology

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	carrying out internet and library research, questioning experts
Reflective learners	evaluating work completed
Team workers	participating in group tasks for analysis
Self-managers	meeting deadlines
Effective participators	completing group tasks.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Creative thinkers	applying techniques studied to the working environment
Reflective learners	suggesting improvements to techniques
Team workers	practising techniques
Self-managers	producing written work on time
Effective participators	participating in team activities.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	carrying out internet research writing presentations
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching mineral deficiency comparing data from data logging practical work
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	presenting written work presenting data
Bring together information to suit content and purpose	displaying data from practical work
Present information in ways that are fit for purpose and audience	giving presentations
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	making calculations and data logging results from scientific practical work
Identify the situation or problem and the mathematical methods needed to tackle it	making calculations and data logging results from scientific practical work
Select and apply a range of skills to find solutions	interpreting practical data
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	data analysis
Draw conclusions and provide mathematical justifications	interpreting results
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	giving presentations, video, blogs, group presentations
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reading information as part of internet and library research
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	completing reports, diaries and other assessments.

Unit 2: Understand the Basic Principles of Soil Science

Unit code: H/600/9819

Level 2: BTEC First

Credit value: 5

Guided learning hours: 30

Aim and purpose

This unit aims to provide learners with an understanding of the principles of soil science. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Unit introduction

This unit aims to focus learners' attention and interest on the important aspects regarding practical soil management with an environmentally aware approach that is demanded today. For this reason the unit has a practical approach that is directly related to current management issues regarding care of the soil. Learners will be shown how to assess soil pH, recognise how organic matter helps to improve yields as well as soil structure, and the use of fertilisers.

Learning outcomes

On completion of this unit a learner should:

1 Be able to assess the physical and chemical characteristics of soils

2 Understand the physical properties of soils

3 Understand the chemical properties of soils and fertilisers.

Unit content

1 Be able to assess the physical and chemical characteristics of soils

Characteristics of soils: soil types (eg clay, sand, loam, silt); soil pH and lime; soil texture; soil horizons and profiles; soil structure; soil structure damage; requirements of cross-compliance

2 Understand the physical properties of soils

Soil formation and components: silicates; types of rocks; weathering; soil formation; soil properties (eg air, water, minerals, organic matter)

Soil water: movement of soil water (eg uptake by plant, loss); drainage; soil water terminology (eg percolate, transpiration, water table, field capacity, leaching, aquifer)

Soil organic matter: components of organic matter (eg macro and micro organisms, plant material, humus); the carbon cycle; the nitrogen cycle

3 Understand the chemical properties of soils and fertilisers

Chemical properties of soils: soil colloids; (eg ions, anions, cations); cation exchange; nutrient uptake by plants; nutrient loss; micro nutrients; macro nutrients; influence of pH on plant growth

Chemical properties of fertilisers: types of fertiliser (eg organic including green manures, inorganic, liquid, gaseous, straights, compounds); major elements; minor elements; fertiliser breakdown in the soil (eg nitrification, nitrates, leaching); fertiliser ratios and plant food (eg nutrient weight analysis)

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P1	identify the horizons in a soil profile	**M1**	discuss the use of soil and fertilisers for a selected plant		
P2	analyse samples of soil to determine: ◊ textural class ◊ pH [IE, SM]				
P3	describe the formation, characteristics, texture and component parts of soils				
P4	explain how soil structure and the balance of soil air and water affect the growth of plants				
P5	explain factors relating to soil water; sources, availability, effects on various soil types and terms associated with the water balance [IE, EP, TW]				
P6	explain how organic matter and soil organisms contribute to soil structure and fertility				

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P7 state the nutrient requirements of plants and their individual effects on growth: ◊ micro-nutrients ◊ macro-nutrients		**D1** evaluate the fertiliser programme for a specified plant.
P8 state the typical symptoms of nutrient deficiencies in plants: ◊ micro-nutrients ◊ macro-nutrients		
P9 explain how pH affects plant growth and methods of adjusting the pH to meet specific requirements		
P10 explain the principles of cation and anion exchange capacity in the soil and their relationship to texture and organic matter		
P11 explain the categories and terminology used to describe fertilisers		
P12 define the terms Plant Nutrient Ratio and Nutrient Weight Analysis.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable collections and will have links to industrial experience placements.

This unit aims to deliver a sound practical approach to the soil and its environment as well as the theoretical approach that will be necessary at times. As a result, tutors will need to plan carefully the timing and approach of some of the assessments especially where local needs and planting methods dictate. Tutors must aim to show learners that the whole aspect of plant growth depends totally on a thorough understanding and continual monitoring of the soil and its environment.

Learning outcome 1 necessitates learners identifying different soils, their characteristics and horizons or layers in a soil profile. It would be useful for tutors to try to arrange for soil profile pits to be dug (either by hand or machine) at different sites for a temporary period of time in order to study different soil horizons. Learners need to understand how soils can vary not only from area to area, but in the same area too.

Learning outcome 2 attempts to provide more detail for the learner as to the nature of soil components and characteristics. Soil structure is an important feature of this outcome and indeed forms an important aspect of current legislative soil management procedures.

Learning outcome 3 deals with chemical properties of soil and fertiliser usage, both organic and inorganic.

Learners need to develop their knowledge of macro nutrients and micro nutrients, cation and anion exchange and how these relate to plant growth. Learners will need to make choices about appropriate plant feeds.

Delivery could include site visits, practical investigations, laboratory work, lectures and guest speakers.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction to unit and unit overview.
Assignment 1: Soils and Soil Characteristics (P1, P2, M1) Briefing.
Practical session: field walks to observe soil types, assessment of soil texture, recognise soil profiles and horizons, identify soil structure.
Theory session: types of soils, measuring soil pH, soil texture, soil profiles, soil structure, requirements for cross-compliance.
Assignment 2: Factors Affecting Soil Structure (P3, P4, P5, P6, D1) Briefing.
Practical session: soil structure and the environment, identify soil structure damage, sustainable methods, field drainage, assess soil organic matter.

Topic and suggested assignments/activities and/assessment
Theory session: factors affecting soil structure, sustainable systems, soil water, drainage, soil organic matter.
Assignment 3: Fertilisers and Plant Growth (P7, P8, P9, P10, P11, P12, M2, D2) Briefing.
Practical session: assist in applying fertilisers, fertiliser ratios, identify machinery.
Theory session: nutrient uptake, cation exchange, types of fertilisers, function of fertilisers, calculate crop requirements and application rates.
Unit evaluation.

Assessment

For P1, learners must be able to identify the main soil horizons in a soil profile. They should be able to identify plant root development through the profile, the colour of the soil horizons, presence or absence of organic matter, signs of any pan or impediment to drainage and root growth.

For P2, learners must be able to analyse soil texture for clay, sand and loam soils as well as any local variations such as silt. They must also be able to collect soil samples using the standard 'zigzag' method and test the samples for pH using standard equipment.

For P3, learners must describe how soils are formed, the soil components with their percentage values for air, water, mineral and organic matter content.

For P4, learners must be able to explain how soil structure and environment affects plant growth.

For P5, learners must explain the importance of soil water. They should be able to state the various sources of water, describe the water holding capacity of different soils, the influence of soil organic matter, and how water is both taken up and lost by the plant.

For P6, learners must be able to state the main soil micro organisms such as bacteria, actinomycetes, protozoa and how organic matter contributes to soil fertility.

For P7 and P8, learners must provide information on the main nutrients and their function for plant growth and must include nitrogen, phosphate, potash and others such as calcium and magnesium.

For P9, learners must explain how plant growth is affected according to the soil pH, such as the tolerance of potatoes in acid soils compared to brassicas.

For P10 learners must provide information on cation and anion exchange and soil. They must also state the methods of adjusting pH to emet specific requirements.

For P11, learners must show that they are familiar with terminology used to categorise fertilisers such as straights and compound types.

For P12 learners must define Plant Nutrient Ratio and Nutrient Weight Analysis.

For M1, learners are to discuss soil and fertiliser use for a selected plant

For D1, learners must evaluate the effect of a fertiliser programme. They should list all the fertilisers used, the amounts and benefits. They must also refer to any environmental impact of fertiliser usage.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1	Soils and Soil Characteristics	Before planting you need to assess the soil in order to determine the best possible conditions required for your crops to grow well. You will learn to recognise soil horizons, take soil samples to determine the pH level and assess worm populations which reflect the amount or lack of organic matter	Practical observation Written evidence Monitoring activity
P3, P4, P5, P6	Factors Affecting Soil Structure	Successful growth is dependant on a supply of water and a sound soil structure. You will study different structures and determine the effects of either machinery or animals on soil structure	Practical observation Written evidence Monitoring activity
P7, P8, P9, P10, P11, P12, D1	Fertilisers and Plant Growth	You will study the components that make up fertilisers used in the UK, how they influence both plant growth and their effects on the environment	Practical observation Written evidence Monitoring activity

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Element CU76.1 Maintain the health of plants outdoors	Understand the Principles of Soil Science
Understand the Basic Principles of Plant Science	Understand the Principles of Plant Science
Establish and Maintain Plants Outdoors	Understand the Principles of Advanced Horticultural Science
Undertake Nursery Stock Production	
Participate in Protected Horticultural Plant Production	

Essential resources

There are opportunities for practical work in this unit as well as the associated theory work. Therefore there should be access to adequate field and laboratory facilities for the investigation of soil textures, soil profiles, horizons, pH testing, structures, worm populations and the environmental effects of farming on the soil.

Employer engagement and vocational contexts

Links with local farmers and growers will widen the scope and experience for learners to study a broader range of soil types and cropping systems, even though a centre's own farm enterprise might be used for most of the study in the unit. Of special benefit would be where local farmers have a more sensitive approach to the care of the soil as reflected in their cropping and use of machinery.

Indicative reading for learners

Textbooks

Bell B – *Farm Machinery* (Old Pond Publishing, 2005) ISBN 978-1903366684

Cutler D, Botha T and Stevenson D – *Plant Anatomy: An Applied Approach* (Blackwell Publishing, 2007) ISBN 978-1405126793

Davies B, Eagle D and Finney B – *Soil (Resource Management Series)* (Farming Press, 2002) ISBN 978-0852365595

DEFRA – *Fertiliser Recommendations for Agricultural and Horticultural Crops RB209, 8th Edition* (The Stationery Office Books, 2008)

Eash N, Green C – *Soil science simplified* (Blackwell Publishing, 2008) ISBN 13 9780-813818238

Graham I – *Soil (Earth's Precious Resources Series)* (Heinemann Library, 2004) ISBN 978-0431115542

Journals

Crops

Farmers Guardian

Farmers Weekly

Websites

www.agrifor.ac.uk	AgriFor
www.bayercropscience.co.uk	Bayer Crop Science
www.cranfield.ac.uk/soil	National Soil Resources Institute
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.efma.org	European Fertiliser Manufacturers Association
www.environment-agency.gov.uk	The Environment Agency
www.hse.gov.uk	Health and Safety Executive
www.lantra.co.uk	Lantra
www.rothamsted.ac.uk	Rothamsted Research

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	learning to identify different soil and the problems arising
Reflective learners	trying to produce solutions to practical problems
Team workers	engaged in practical activities and work experience
Self-managers	monitoring and observing regularly to produce a report
Effective participators	engaged in practical activities and work experience.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	shown different growing systems
Creative thinkers	producing their own solutions to specific problems
Reflective learners	producing their own solutions to specific problems.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	involved in identifying soil index and/or GPS results
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	calculating rates of fertiliser application and amounts used
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting solutions to practical problems faced by plant growers regarding the use of fertilisers.
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	

Unit 3: Setting out from a Plan

Unit code: D/600/9866
Level 2: BTEC First
Credit value: 5
Guided learning hours: 30

Aim and purpose

This unit aims to provide learners with an understanding of the principles of setting out from a plan, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

The ability to be able be able to read a plan, and also set out from it is essential for the installation of a number of hard and soft landscape features. These skills are essential for a number of career paths in various sectors of the horticulture industry which includes both the landscaping and amenity sector.

The unit focuses on developing and improving the learner's understanding of the various techniques used for interpreting from a scale plans and setting out from them, with a strong emphasis on practical activities which also includes assessment of the learners practical abilities.

On completion of the unit learners will have a thorough understanding and be able to carry out a range of planning and setting out activities which will include both theoretical and practical elements and learners will be given the opportunity to use a variety of techniques in a wide range of situations.

Learners will need to be able to demonstrate that they can read different types of plans and then transfer this information to the ground using a range of different tools and materials including lines, chains, tape measures, laser levels etc.

Learners will be able to set out a range of different features of different shapes and sizes including paved and decking areas, paths, fence and wall lines, trees, and a variety of different borders including the marking out of the plants within them.

As well as the marking out of level areas learners will also be able to set out various features on uneven ground, and also set and mark out steps, ramps, raise areas etc, by setting out falls and rises using the correct equipment.

Learning outcomes

On completion of this unit a learner should:

1 Be able to transfer information from plans to the ground

2 Be able to prepare sites for landscaping

3 Understand the setting out of lines, shapes and levels from scale plans.

Unit content

1 Be able to transfer information from plans to the ground

Plans: different scales, scale rulers, planting plans, complete site plans, hard landscaping feature plans

Tools and materials: surveying chains; tape measures; measuring wheels; lines; marking paint; marking cones; canes; pegs

Features: seating areas; pathways fence and wall lines, beds and borders including island beds

Shapes: straight; curved; square; rectangular; square; hexagonal; circular; oval; ellipse

Planting types: single specimen plants: ie trees; shrub and herbaceous borders; spring and summer bedding; carpet beds

Health and safety: risk assessments; site evaluation

2 Be able to prepare sites for landscaping

Plans: different scales, scale rulers, planting plans, complete site plans; hard landscaping feature plans

Tools and materials: laser levels; theodolites; ranging poles; surveying chains; tape measures; measuring wheels; lines; marking paint; marking cones; canes; pegs

Features: steps; ramps; seating areas; pathways fence and wall lines, beds and borders including island beds

Health and safety: risk assessments; site evaluation

3 Understand the setting out of lines, shapes and levels from scale plans

Scale plans: different scales, scale rulers, planting plans, complete site plans, hard landscaping feature plans

Tools and materials: theodolites; ranging poles; surveying chains; tape measures; measuring wheels; lines; marking paint; marking cones; canes; pegs

Skills: reading a plan; transfer of information from plan; marking out; interpreting levels

Health and safety: risk assessments; site evaluation

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 transfer dimensions accurately from scale plans onto the ground using triangulation, running lines and offsets [IE, CT, TW, SM, EP]	**M1** explain what triangulation; trilateration; running lines and offsets means and how these is used when setting out from a plan	**D1** design a simple carpet bed and describe how this is transferred from the plan and what setting out techniques are used
P2 set out geometric shapes on the ground from scaled plans, to include rectangles, circles, hexagons and ellipses		
P3 set out irregular shapes on the ground from plans		
P4 mark out the positions of plants and features from a plan		
P5 set out and establish level rectangular areas [IE, TW, SM, EP]	**M2** design and implement a scale plan for installing a set of steps from one level to another	**D2** identify and evaluate the different techniques used when setting out falls and rises along a line, and the advantages and disadvantages of each technique
P6 set out falls and rises along a line [IE, TW, SM, EP]		
P7 set out a rectangular area to a fall [IE, TW, SM, EP]		
P8 describe methods of marking lines and curves onto the ground. [SM, RL, CT, IE]	**M3** for each of the methods of marking out lines identified describe a feature or situation where they could be used and how this would be implemented.	**D3** describe and evaluate the advantages and disadvantages of different techniques used for marking lines and curves onto the ground.

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve both practical assessments and written assessment, with the majority of the practical assessments being undertaken at the delivery centre.

Learners will also need access to IT facilities, as learners will need to record the information they have gathered and preferably they should have access to mobile computer technology, so that information can be uploaded in the field.

However it is essential as far as possible that learners have access to the latest equipment and that delivery should stimulate, motivate, educate and enthuse learners and utilise the framework of personal, learning and thinking skills.

Although off site visits and work placements are not essential it is necessary though that the unit has industry related links and to this effect, visiting speakers from landscape companies, landscape architects and persons involved with setting out from a plan for both hard and soft landscape features should be used.

Safe working practices are essential, when delivering this unit, and it is essential that tutors stress the importance of safe working practices, legal obligations and effective management to ensure that all operations have a minimal impact on the environment.

Health and safety during both classroom and practical sessions must be stressed and it is essential that full risk assessments are undertaken prior to any practical activity.

Tutors should consider integrating the delivery, private study and assessment for this unit with other relevant units and assessment instruments learners are taking as part of their programme of study.

All three of the learning outcomes are linked together and learners on completion of this unit will be able to interpret information on plans, and be able to set from a plan and understand the methods and techniques used.

Learning outcome 1 and 2 are likely to be delivered through formal lectures including outside speakers, demonstration, practical sessions and independent learner research. Learners will initially be taught how to interpret plans using scale rulers and recognise the information on them and the methods required to transfer this information to the ground which includes level areas but also raised and sloping areas. Delivery will include formal lectures and demonstrations and student research could also be used with learners using the internet in order to study and research a number of different types of plans. This will then lead to practical activities where learners will then transfer the information from the plans and set out for a combination of both hard and soft landscape features, and emphasis should also be made to environmental impact and health and safety and as with all practical activities a full risk assessment should be undertaken.

Learning outcome 3 requires learners to be able to understand the techniques and methods used which should be directly linked to outcomes 1 and 2 and this will include theory sessions leading to learner led research where learners can investigate other situations where this is used. It is also important for this part of the unit that outside speakers are used in order to give the learners a greater understanding. Also as with the other parts of the units practical activities should also be included which can be linked to other practical activities.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an indication of the volume of learning it would take the average learner to achieve the learning outcomes. It is indicative and is one way of achieving the credit value.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Learning outcome 1:Transfer of Information from Plans (P1, P2, P3, P4, M1, D1)
Theory sessions
Practical activities
Learner research
Visiting speakers
Learning outcome 2: Prepare Sites for Landscaping (P5, P6, P7, M2, D2)
Theory sessions
Practical activities
Individual and group work on assessment and research
Learning outcome 3: Interpretation of Lines, Shapes and Levels and the Use of Scale Plans (P8, M3, D3)
Theory sessions
Visiting speakers
Practical activities
Learner research
Unit review

Assessment

For P1, P2, P3, P4 this relates to reading and understanding plans and then transferring this information to the ground and therefore could be assessed by the tutor during practical sessions. If this format is used then suitable evidence from guided learning activities would be observation records and question and answer sheets completed by learners and tutor. Also learners should compile a portfolio of evidence which could include, a diary of practical activities undertaken, photographic evidence, information completed by the tutor. Learner reports regarding the activities carried out and relevant risk assessments.

The size and complexity of the assessment should be the same for all learners and the plans and tasks should be agreed between the tutor and learners prior to commencement. It is imperative health and safety and learners recognition of ways of minimising environmental impact is included as part of the observations.

For P5, P6, P7 this could be assessed through practical activities and the same assessment methods could be used as for P1, P2, P3, P4 and the evidence could be presented in the same format.

For P8, this requires learners to describe methods of marking lines and curves onto the ground, and for this learners could produce an instruction manual or poster, specifically designed for people new to marking and setting out.

For M1, learners are required to explain what triangulation; trilateration; running lines and offsets means and how these are used when setting out from a plan and must include advantages and disadvantages of each of them. Evidence could be gathered by the tutor using questioning and observation sheets during practical activities.

For M2, learners are required to design and implement a scale plan for installing a set of steps from one level to another and this should then be included in the portfolio of evidence produced for P5, P6, p7 and once the plan has been approved by the tutor, then learners can set out from the plan and this could be assessed by the tutor using observation sheets.

For M3, the evidence for this can be included within the instruction manual/poster. As the evidence required is linked to the marking/setting out described.

For D1, learners are required to design a simple carpet bed and describe how this is transferred from the plan and what setting out techniques are used and tutors can gather evidence for this through observation and recording their findings on observation sheets.

For D2, learners are required to identify and evaluate the different techniques used when setting out falls and rises along a line, and the advantages and disadvantages of each technique and this could be assessed using questioning during practicals or through a written report.

For D3, learners are required to describe and evaluate the advantages and disadvantages of different techniques used for marking lines and curves onto the ground and this could be included wither the manual or poster which has been compiled for P8, M3, D3.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1, D1	Transfer of Information from Plans	During practical sessions you will be required to transfer a range of different information from scale plans to the ground and this will include, shapes, lines, landscape feature and the setting out of a variety of planting schemes.	Practical
P5, P6, P7, M2, D2	Prepare Sites for Landscaping	During practical sessions working in pairs you will be required to prepare sites for landscaping by surveying the site setting levels, using appropriate equipment and by using plans and instructions supplied by the tutor.	Practical
P8, M3, D3	Interpretation of Lines, Shapes and Levels and the use of Scale Plans	You work for a landscape consultancy firm and you have been instruction by a large landscaping firm to produce a practical manual which can be issued to their current workforce including new employees to assist them when setting out from a plan.	Written

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Participate in Providing Estate Maintenance	Understand the Principles and Practices of Landscape and Garden Design
Construct Landscape Foundations and Surfaces	Construct Horizontal Landscape Surface

Essential resources

Learners will need access to the appropriate environment or facilities and equipment required for the activities.

Employer engagement and vocational contexts

For this unit it is essential that the plans used are of sufficient quality and accuracy of those which would be used by landscapers when undertaking contract work and setting out from plans, and also the areas chosen must match the different types of ground which learners would come across in the work place.

In addition to this learners need to come into contact with people involved in this process in order to enthuse them and reinforce learning therefore close links with landscape professionals should be forged, and regular guest speakers should be included in the scheme of work.

Indicative reading for learners

Textbooks

Ekin M – *Wooden Garden Structures a complete guide* (Crowood Press 2006) ISBN 18616268378

Littlewood M – *Landscape Detailing, Volume 1, Enclosures, 3rd Edition* (Architectural Press, 1993) ISBN 0750613041

Littlewood M – *Landscape Detailing, Volume 2, Surfaces, 3rd Edition* (Architectural Press, 1993) ISBN 0750613033

Williams R – *The Garden Planner* (Frances, Lincoln Publishers, 1998) ISBN 071121218X

Wilson A – *The Book of Garden Plans* (Mitchell, Beazley 2004) ISBN 1840007346

Journal

BBC Gardens Illustrated Journal

Websites

www.bbc.co.uk/gardening	BBC gardening site
www.rhs.org.uk	Royal Horticultural Society
www.l-i.org.uk	The Landscape Institute

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	analyse and evaluate information from plans undertaking setting out activities
Creative thinkers	generating ideas and exploring possibilities whilst creating an instruction manual
Reflective learners	analysing their own performance whilst participating in practical activities and identifying strengths and areas for improvement
Team workers	working with others and taking responsibility whilst carrying out practical setting out activities
Self-managers	whilst producing a portfolio for the practical activities by organising time and resources whist working towards set goals and tasks organising and constructing instruction manual
Effective participators	identifying changes in level of terrain and plotting falls and rises.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	researching information for instruction manual gathering and recording information
Creative thinkers	applying and exploring ideas whist undertaking practical activities
Reflective learners	assessing theirs and others ability to gather and record information and data required
Team workers	during practical activities work with others to achieve common goals
Self-managers	organise and prioritise tasks whist researching and collating information
Effective participators	whist undertaking practical activities, participate in activities and apply knowledge and understanding learnt from other lessons and activities.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching the internet for information and data required for the instruction manual gathering and recording information which is collected during practical activities producing portfolio data producing instruction manual
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	gather and prepare information and format into a portfolio and instruction manual
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	using mathematical analysis whist setting out from the plan calculate size and volume when setting out
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	calculating and checking setting out on ground working out falls and rises
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	discussions with other learners whilst carrying out practical activities and undertaking research.
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	

Unit 4: Undertake Work Related Experience in the Land-based Industries

Unit code: H/600/9335

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

The learner will undertake work related experience in a land-based context. This will involve talking to and listening to experienced practitioners. They will explore the purpose and structure of an organisation and understand how and why change may occur. They will develop the ability to assess their work performance and identify opportunities for further development.

Unit introduction

Work experience is an important part of any vocational course.

Learners on vocational courses should have experience of the type of work that they hope to do and an idea of the expectations of those who may employ them. Actual work experience may be gained by a number of routes, for example as part of an industrial placement whilst at college; whilst working on a planned daily or weekly basis on the college's commercial and/or educational facilities; whilst undertaking voluntary work within the industry; as previous relevant and current work experience in the industry; or as a member of a group of learners invited to carry out practical work in, for example, a country park, farm or animal care centre. All of the above may be useful in gathering evidence against the grading criteria for this unit.

Work related experience should not just involve actually undertaking activities in a work environment. Talking to, listening to and watching those with experience of particular industries and/or situations is a very valid way of beginning to understand the work involved and what is required of the employee

Learning outcomes

On completion of this unit a learner should:

1 Know the range and scope of job roles within an environmental and land-based industry

2 Be able to use relevant documents and skills relating to work experience

3 Be able to plan and review self-development during work experience

4 Be able to report on the work experience.

Unit content

1 Know the range and scope of job roles within an environmental and land-based industry

Environmental and land based industry: range of sectors represented eg production (livestock, crops), leisure/tourism, equestrian, forestry/arboriculture, fishery management, aqualculture, farriery, floristry, fencing, gamekeeping, animal care/welfare, conservation, countryside management, land-based engineering, landscaping and horticulture

Job roles: the range of roles available within the chosen sector

2 Be able to use relevant documents and skills relating to work experience

Documents: job advertisement; CV; covering letter; application form; job/role description; essential and desirable personal requirements; using these documents in appropriate way

Skills: identification of skills required to work in the sector eg interpersonal skills, communication, technical knowledge, practical skills; use of skills

3 Be able to plan and review self-development during work experience

Personal skills: identify own skills

Planning self-development: methods of reviewing own development needs eg skills audit

Self-development: methods of reviewing self development eg meeting/discussion with supervisor, self-review

4 Be able to report on the work experience

Evidence required: description of employer's business; description of employees' roles; pictorial evidence about the employer/site eg maps, plans, photos, leaflets; description of how the business makes income; your own role within the organisation and tasks you carried out

Methods of presentation: verbal, written, visual

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P1	describe different types of jobs within an environmental and land-based industry [IE]	**M1**	prepare a person specification for a job in the chosen sector	**D1**	review a job application against a given person specification
P2	describe the skills and qualifications required for different types of jobs within an environmental and land-based industry [CT]				
P3	locate three advertisements for jobs from different sources available within the environmental and land-based industry [IE]	**M2**	identify common themes from three job advertisements		
P4	produce an application for work experience in environmental and land-based sector [SM]				
P5	prepare for an interview for work experience	**M3**	prepare questions to be used in a job interview.	**D2**	prepare a job advertisement.
P6	undertake an interview for work experience				

Assessment and grading criteria			
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P7	review own skills and experience against the requirements for a specific industry		
P8	prepare a self-development plan for work experience [RL]		
P9	review self-development plan during and after work experience [RL]		
P10	gather and prepare evidence during the work experience		
P11	present information to others on work experience.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve both practical and written assessment, and most importantly will have links to industrial experience placements.

Tutors could use a wide range of techniques including lectures, discussions, seminar presentations, visiting speakers, site visits and practicals, research using the internet and/or library resources and the use of personal and/or industrial experience. Delivery should stimulate, motivate, educate and enthuse learners.

Work placements should be monitored regularly to ensure the quality of the learning experience. Learners and supervisors should be aware of the requirements of this unit before any work-related activities, so that naturally occurring evidence be collected at the time. Learners should be encouraged to ask for observation records and/or witness statements to be provided as evidence. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Learners would benefit from work experience. This could be as part of an industrial placement whilst at college; daily or weekly work at the college's commercial and/or educational facilities; voluntary work within the sector, for example in an animal care centre, country park, farm, estate, garden centre.

Tutors could integrate the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments used in the learner's programme of study. Learners must be given supported time to plan and review their own development. Learners should do a minimum of 150 hours or related study/work to complete this unit successfully. Learners could keep a diary/log to show that they have achieved the requirement of completing their work experience. Tutors should encourage as wide a range of experience as possible so that learners develop relevant knowledge and skills.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an indication of the volume of learning it would take the average learner to achieve the learning outcomes. It is indicative and is one way of achieving the credit value.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
Assignment 1: Advertising a Job in the Land-based Sector (P1, P2, P3, M1, M2, M3, D1, D2) Introduction of brief.
Theory session.
Research the industry and roles, research advertisements, write person specification, prepare questions, review job application, prepare job advert.
Assignment 2: Getting a Job in the Land-based Sector (P4, P5, P6) Introduction of brief.
Theory session.
Compete job application, prepare answers to likely questions, undertake interview.

Topic and suggested assignments/activities and/assessment
Assignment 3: Workplace Self-Development (P7, P8, P9)
Introduction of brief.
Theory session.
Review own skills, prepare self-development plan, review self-development plan
Assignment 4: My Work Experience Placement (P10, P11)
Introduction of brief.
Theory session.
Gather information, prepare and present information.

Assessment

For P1, learners must describe different types of jobs within an environmental and land-based industry. This should be a sector of the industry in which the learner has an interest or which relates to their vocational or chosen course of study or intended future career.

P2 requires learners to describe the skills and qualifications required for different types of jobs within an environmental and land-based industry. The evidence could focus on two or three different jobs from within the same sector and describe both the common skills and qualifications as well as the areas where the requirements differ.

For P3, learners must locate three advertisements for jobs from different sources available within the environmental and land-based industry. They must provide evidence that they have looked at three different sources for these advertisement.

P4 must include evidence that the learner can produce an application for work experience in the environmental and land-based sector. This could be done on a pro forma application designed by the learners themselves or one provided by the tutor.

For P5, learners must prepare for an interview for work experience. They will evidence this by providing a list of answers to questions which it is considered are likely to be asked by an interviewer. These questions may be provided/suggested by the tutor or could be drawn up by the learner. The evidence could be presented in the form of an interview (see P6) or could be presented as written answers or an audio recording of them practicing the answers.

To meet P6, learners will undertake an interview for work experience, where they will have the opportunity to present their answers to the questions they prepared for P5, and to show other aspects of preparation such as appropriate personal presentation, and asking appropriate questions. This could either be evidenced via mock interviews with other learners acting as the interview panel and using the evidence they have prepared for M1 and M3, or it could be evidenced by a real interview for a work experience placement, supported by a witness statement from the interviewer.

For P7, learners will provide evidence that they can review their own skills and experience against the requirements for a specific industry. This can be linked closely with the evidence presented for P2, with the learner identifying their 'skills gap' either through a skills audit or similar.

To evidence P8, learners will need to prepare a self development plan for their work experience placement. This could be done on a pro forma provided by, or in a format suggested by the tutor. The plan will identify areas of improvement that the learners need to develop during their work experience, and show how the learners are going to do this.

For P9, learners need to review the self-development plan during and after work experience. Evidence could be in the form of witness statements or tutor observations to show that the plan had been discussed and reviewed, that progress to date has been discussed and how future progress may occur.

To meet P10, learners must gather and prepare evidence during the work experience. This evidence will cover the content.

For P11, learners must present information to others on work experience. This can be done in any suitable format – it may be a poster with photos, leaflets, learner-prepared text about the employer, it could be a verbal presentation with accompanying slides/pictorial evidence or it could be an audio-visual presentation made at the placement.

For M1, learners need to prepare a person specification for a job in the chosen sector. The specification could be based on one of the advertisements researched in P3, and should show the major skills, qualities and qualifications required for that role, and an indication of whether these are essential or desirable.

To evidence M2, learners are required to identify common themes from three job advertisements – what are the main areas of commonality, are there things that all three have? It may also be that learners consider what differences there are between the advertisements. This could be presented in a poster format with annotations to show areas of difference/similarity.

For M3, learners need to prepare questions to be used in a job interview. This can be the same job for which the person specification has been produced. It is expected that a list of at last 10 questions is prepared.

For D1, learners must review a job application against a given person specification. This could be an application which has been produced by other learners for the purposes of meeting criterion P4, or it could be an example application form provided by the tutor.

To meet D2, learners will prepare a job advertisement. This will link in with the evidence required for P3 and M2 and could advertise the role for which the person is being sought in M1.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, M2, M3, D1, D2	Advertising a Job in the Land-based Sector	You work for an employer in the land-based sector and are in the position of taking on a new staff member. Your manager has asked you to see what other roles exist with other similar employing organisations and what sort of skills and qualifications they are looking for, by sourcing different advertisements and identifying common themes in them. Once you have found that out, it is then your responsibility to write a person specification for the role you will advertise, prepare an advertisement to attract applicants, review an application against your criteria, and plan the questions you would ask in an interview.	Verbal or written report
P4, P5, P6	Getting a Job in the Land-based Sector	You are looking for your first job in the land-based sector. You need to complete an application form for a job you would like to do, prepare for an interview by coming up with a list of questions you would want answered and having a job interview.	Application form List of questions Interview
P7, P8, P9	Workplace Self-Development	To progress within any employment, self development is an essential feature. This requires you to have a clear idea about what employers need from their employees and the skills and experience you have already got and those you need to build. You then need to prepare a plan to show how you might build the required skills and experience and to review this plan during and after work experience.	Report on what employers require of employees in the chosen sector Self-development plan Evidence of review of the plan during and after work experience

Criteria covered	Assignment title	Scenario	Assessment method
P10, P11	My Work Experience Placement	In order to inform other learners about your work experience placement, you need to provide them with information about it such as a description of the employer's business, a description of the other employees' roles, pictures of the organisation or site, a description of how the business makes income and a description of what you did while you were there.	Report on work experience placement

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Establish and Maintain Plants Outdoors	Undertake and Review Work Experience in the Land-based Industries
Participate in Horticultural Crop Production Outdoors	
Undertake Nursery Stock Production	
Participate in Protected Horticultural Plant Production	

Essential resources

Learners require supervised access to suitable sites for work experience. Centres may need to provide transport to suitable sites. First aid facilities and appropriately trained staff are essential where practical activities are undertaken. For work placements away from the college, staff time must be made available as per individual college policies relating to work placements.

Employer engagement and vocational contexts

This unit focuses on skills and experience to be developed through preparing for, and undertaking, work experience. Centres are encouraged to create and develop links with local employers who can provide appropriate work experience.

Indicative reading for learners

Textbooks

James J – *You're Hired! Interview: Tips and Techniques for a Brilliant Interview* (Trotman, 2009) ISBN 978-1844551781

Mills C – *You're Hired! CV: How to write a Brilliant CV* (Trotman, 2009) ISBN 978-1844551774

Websites

Countryside Jobs Service	www.countryside-jobs.com
Farmers Weekly	www.fwi.com
Horticultural Careers	www.growcareers.info
Landbased Jobs online	www.land-force.org.uk/index.aspx
Lantra	www.lantra.org.uk
Lantra Competency Framework	www.ruralslp.co.uk/index.aspx
UK Countryside and Nature Conservation	www.naturenet.net

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	researching jobs within the sector researching job advertisements and evaluating their relevance completing a job application preparing for, and participating in, a job interview gathering and preparing evidence during work experience
Creative thinkers	describing the skills and qualifications required for a job in the land-based sector
Reflective learners	preparing and reviewing a self development plan presenting information to others on their work experience reviewing their own skills and experience
Self-managers	carrying out research.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Team workers	working with others to carry out interviews.

Functional skills – Level 2

Skill	When learners are …
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching roles within the sector researching job advertisements
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching roles within the sector researching job advertisements
ICT – Develop, present and communicate information	
Bring together information to suit content and purpose	developing a presentation about work experience
Present information in ways that are fit for purpose and audience	making the presentation about work experience
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	taking part in work experience making presentation about work experience
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	writing person specifications for job.

Unit 5: Establish and Maintain Plants Outdoors

Unit code: T/600/9968

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to provide learners with an understanding of how to establish and maintain plants outdoors, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

This unit is an introduction to amenity horticulture. It covers the basic knowledge and skills those entering this aspect of the horticultural industry will need. It covers ground preparation, planting, plant maintenance and health.

The unit begins by looking at how ground can be prepared using different tools and equipment, and then moves on to exploring the methods of planting which take account of each plant's individual needs. Learners will also develop the skills needed to maintain plants and trees, including pruning, weed control, plant health and mulching.

Learners will have the opportunity to work with a range of plants throughout the unit extending their knowledge of plant names and gaining an understanding of their needs, covering trees, shrubs, conifers, climbing and herbaceous plants.

Learners will be given the opportunity to familiarise themselves with the health and safety aspects of horticultural practices, the equipment and materials used and the associated issues. They will also learn how to keep themselves and others around them safe whilst carrying out practical tasks and how to fill out risk assessment forms.

Learning outcomes

On completion of this unit a learner should:

1 Be able to prepare ground to receive plants

2 Be able to plant woody and herbaceous plants

3 Be able to maintain the health of plants outdoors

4 Know how to maintain the health of plants outdoors.

Unit content

1 Be able to prepare ground to receive plants

Preparing for cultivation: assessment of site eg size, texture and structure of soil, surroundings, obstacles, hazards; selection of appropriate tools

Methods of cultivation: single digging; double digging; rotavating; reasons for using different cultivation methods, affects of cultivation on plants eg tilth, soil structure, levelling, depth; seasonal issues and timing; incorporation of organic matter

Safe use of tools: hand tools eg trowel, spade, fork; safe use of pedestrian operated machines eg self-propelled cultivator, self-propelled rotary mower, strimmer, self-propelled turf cutter; health and safety; personal protective equipment (PPE); risk assessment

2 Be able to plant woody and herbaceous plants

Plant selection: types of stock available for planting eg bare rooted, root balled, containerised and container grown; quality of plant for planting eg root and leaf condition, health; height and spread

Planting technique: correct spacing; size of hole; applying fertiliser; back filling; firming; final finish; immediate aftercare eg irrigation, top dressing, mulch, support (if required)

Plant type: trees; shrubs; climbers and wall shrubs; evergreen and deciduous; herbaceous perennials and grasses

3 Be able to maintain the health of plants outdoors

Maintaining plants: comply with health and safety legislation and codes of practice eg personal protective equipment (PPE), risk assessment, safe working distances; comply with relevant environmental legislation and codes of practice eg disposal of waste items

Threats to plant health: pests; diseases; disorders; nutrient deficiencies; mechanical damage; environmental damage eg frost, wind, heat, excess water, drought

Weed control: reasons for controlling weeds; perennial weeds; annual weeds; pernicious weeds; hand weeding; use of chemicals for weed control; disposal of removed weeds; safe use of tools and equipment

Feeding and watering: types of fertilisers eg organic, inorganic, solid, liquid, straight, compound; application of fertilisers eg hand, spreader, watering can, sprayer, dilutor; irrigation requirement; irrigation systems; timing of irrigation

Surface cultivation: mechanical eg hoeing, raking, safe use of tools, reasons for mulching plants; organic and inorganic materials used for mulching

Pruning: reasons for pruning; formative pruning; routine pruning; timing of pruning; pruning of roses, shrubs and hedging at varying stages of growth eg juvenile, before and after flowering, mature plants; disposal of cut material; equipment use and maintenance; safe use of tools and equipment

4 Know how to maintain the health of plants outdoors

Maintaining plant health: factors affecting plant health and survival eg frost, drought, pests, diseases, shade, exposure, extreme temperatures, grazing animals; recognition of symptoms eg leaf damage, discolouration of foliage, wilt, bud/leaf drop, weak or uneven growth; methods of control eg cultural, chemical, physical, biological

Maintaining plant growth: supporting plants, pruning techniques; selection and safe use of pruning equipment; timing of pruning operations, risk assessments of maintenance operations; personal protective equipment

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 assess a site to determine the preparation required and identify hazards [IE, TW, CT, SM, EP]		
P2 prepare land for planting by hand cultivation methods [TW, SM]	**M1** assess risks associated with land preparation	**D1** describe a soil profile
P3 prepare land for planting safely using pedestrian operated machines [TW, SM]		**D2** report on the difference between cultivating land by hand and by machine
P4 explain how tilth, soil structure, depth of preparation, seasonality and timing of cultivations affect the establishment of plants [IE, CT]		
P5 select plant material in an appropriate condition for planting [TW]	**M2** explain how to recognise if plants are in an appropriate condition for planting	
P6 plant a range of woody and herbaceous plants [SM]	**M3** identify a range of woody and herbaceous plants	
P7 provide immediate aftercare for new plantings [SM]		
P8 explain why planting depth and firming have a significant effect on establishment [IE, CT]		
P9 maintain plants in a way which complies with environmental and health and safety legislation and codes of practice [IE, TW, SM]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P10 identify a range of threats to plant health: ◊ pests ◊ diseases ◊ disorders ◊ unfavourable conditions ◊ weeds [IE]	**M4** explain the importance of weeding and correct disposal of arisings	
P11 promote and maintain healthy growth using all the following methods: ◊ feeding ◊ watering ◊ surface cultivation ◊ mulching [CT, SM]	**M5** recommend types of mulch for given situations	
P12 prune plants using appropriate techniques, according to species, time of year, stage of development [CT, SM]		
P13 describe how to recognise signs of damage or threats to plant health and the appropriate method of control [IE, CT]	**M6** identify, from given examples, plant problems from signs of damage	**D3** recommend appropriate methods of control for the identified plant problems.
P14 state how seasonal weather conditions and soil condition affect plant growth and health [IE, CT]		
P15 describe the methods used to maintain/control plant growth [IE, CT]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P16 explain the relationship between pruning and plant species, to include ◊ timing ◊ types of material for removal ◊ method ◊ positioning of cuts. [IE, CT]	**M7** describe most annual maintenance requirements for given plants.	

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve a variety of teaching and learning techniques including practical observations, lectures, discussions, demonstration, presentations, off site visits, practical activities, research using the internet and/or library resources, guest speakers personal and industrial experience.

Work placements should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities are undertaken, so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to undertake maintenance of a planted landscape and they should ask for observation records and/or witness statements to be provided as evidence. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Whichever delivery methods are used, it is essential that tutors stress the importance of health and safety and environmental issues, with risk assessments being undertaken before any practical activities. Learners should not be required to undertake tasks that are beyond their physical capabilities. Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may be taking as part of the programme of study.

Learners begin this unit by preparing the ground to receive plants. Ground preparation should include different methods of cultivation and the use of different tools suited to each method. The use of pedestrian operated equipment must be carefully taught ensuring appropriate health and safety measures and PPE are utilised. This is likely to be delivered through formal lectures, supervised off site visits and practical work. Learners must be taught in a safe learning environment with appropriate risk assessments being carried out before they begin each practical task. Visiting expert speakers could add to the relevance of the subject for learners. For example, a landscape gardener could talk about their work and the importance of correct ground preparation and planting.

After preparing ground learners are required to plant woody and herbaceous plants. These should be locally significant plants and cover those plants listed in the unit content. Learners should be taught the different uses of each plant within a landscape or landscapes, immediate aftercare requirements, what can affect their establishment and their common and botanical names. This is likely to be delivered through lectures, scenarios and supervised practical work.

When maintaining plants, learners should fully understand and apply safe working practices Risk assessments should be completed before any practical tasks. Learners should understand how environmental protection regulations apply to their practical work.

Learners will need access to plant materials displaying symptoms of damage from locally significant pests, diseases and disorders. Guided and independent research may be used to broaden learners' practical observations.

Learners will also require access to plants for pruning practice as detailed in the unit content.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
Assignment 1: Ground Preparation (P1, P2, P3, P4, M1, D1, D2) Tutor introduces the assignment.
Theory-based sessions: introduction to health and safety to develop underpinning knowledge of the possible hazards and risks involved in practical activities and current environmental legislation and codes of practice for correct waste disposal. How to assess site before work commences. Preparing ground, cultivation, soil structure and tilth.
Independent research sessions.
Practical demonstrations, observations and assessments on ground preparation to include safe use of hand tools and pedestrian operated machinery, PPE and risk assessment.
Personal study.
Assignment 2: Planting and Aftercare (P5, P6, P7, P8, M2, M3) Tutor introduces the assignment.
Theory session: identification of plant types, selecting plants, planting theory, aftercare.
Practical demonstrations, observations and assessments on planting a broad range of plants and their aftercare.
Personal study.
Independent research sessions.
Assignment 3: Plant Health and Care (P9, P10, P11, P13, P14, M4, M5, M6, D3) Tutor introduces the assignment.
Theory sessions: identifying risks to plant health, promoting healthy growth in plants, recognising problems and recommending methods to control/maintain plant growth.
Classroom activities: identification of pests, diseases, disorders and weeds.
Personal study.
Independent research sessions.
Assignment 4: Pruning (P12, P15, P16, M7) Tutor introduces the assignment brief.
Theory sessions: pruning in relation to species, time of the year, development, types of material for removing, maintaining and controlling plant growth.
Practical demonstrations, observations and assessments on pruning, supporting and correct disposal of waste.
Personal study.
Tutorial 1:1 help and guidance.
Unit review.

Assessment

Learners will need to meet all the pass assessment criteria to successfully complete this unit.

For P1, sites for preparation should be identified by the tutor and should be the same for all learners to make sure assessment is fair. Assessment of sites could take the form of check sheets or a list of jobs to undertake with hazards clearly identified.

P2 will be covered through supervised practical activities using only hand cultivation tools. Suitable evidence from guided activities would be observation records completed by the learner and tutor. If this is assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor. Guidance on the use of observation records and witness statements is provided on the Pearson website.

It is expected that assessment for P3 would be in the same format as for P2 but covering pedestrian operated machines.

For P4, learners should explain how the factors listed in the Grading grid influence plant establishment. Evidence could be in the form of verbal answers to structured questions,

P5, P6 and P7 link well together in practical activities, where possible plants used should be the same for all learners to ensure assessment is fair. Suitable evidence from guided activities would be observation records completed by the tutor. If this is assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor, and linked to P9.

P8 should link directly to the plants planted in P6, and evidence could take the form of verbal or written answers to structured questions.

For P9, it is expected that learners wear PPE and work at safe distances while maintaining plants. Environmental legislation should be enforced with tutors observing correct disposal of waste after practical activities. Evidence for P9 will link directly to observations in P2, P5, P3, P6, P7 and P12.

Evidence for P10, P11, P13 and P14 could be linked in a project on the health of plants. Identification of threats to plant health should cover those listed in the unit content and reflect local conditions. Practical activities should be carried out at the correct time of year. Suitable evidence from guided activities would be observation records completed by the tutor. If this is assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor.

P12 should be linked to P9 with practical activities taking place at the correct time of year and related to other criteria in this unit. Suitable evidence from guided activities would be observation records completed by the tutor. If this is assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor.

P15 and P16 could be linked to understand pruning. A pictorial presentation with notes, using appropriate software, flipcharts or OHPs would be suitable evidence.

M1 links to P2 and P3 where learners must individually complete risk assessments for the practical tasks. Evidence could be in the form of risk assessment sheets completed appropriately.

M2 links to P5 where learners should apply their explanation to the practical work undertaken. Evidence could be in the form of verbal questioning after the practical activity or a short report.

Evidence for M3 evidence could be in the form of a plant portfolio and should include all those planted in P6.

M4 could be linked to the project for P10, P11, P13 and P14 or take the form of a customer information leaflet.

For M5, recommendations could be in the form of customer factsheets but should be for given situations as stated by the tutor. This could link to the project for P10, P11, P13 and P14.

M6 could be assessed during a visual test given by the tutor or via short-answer questions, and linked to the project for P10, P11, P13 and P14.

For M7, learners could present a maintenance year planner which could be included in the project for P10, P11, P13 and P14 or completed as an annotated poster.

An annotated poster of a soil profile could provide evidence for D1.

D2 should link directly to P2, P3, M1 and M2 and be in the form of a short report or in a table format.

D3 links directly to M6 where learners recommend appropriate planting methods for control of plant problems identified. Evidence could be included in the plant portfolio.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1, D1, D2	Ground Preparation	Preparing the ground to a high standard to receive plants is essential to ensure plants have the soil conditions they need to thrive. You will have the chance to gain skills in using hand tools and pedestrian operated machines while working safely at all times.	Check sheets Practical observations Risk assessments Verbal questioning
P5, P6, P7, P8, M2, M3	Planting and Aftercare	Working with a range of plants including, trees, shrubs, conifers, climbers and herbaceous this assignment covers planting, aftercare and maintenance.	Practical observations Risk assessments Annotated poster Report
P9, P10, P11, P13, P14, M4, M5, M6, D3	Plant Health and Care	There are many threats to plant health and many of those will be covered within this assignment. You will have the opportunity to identify a range of threats, gain understanding of how to recognise the signs of threat and how to control it.	Plant health project Customer factsheet Maintenance planner
P12, P15, P16, M7	Pruning	Keeping plants under control is a skill which requires an understanding of plant types and times of the year to get it right. During this assignment you will undertake practical work using correct tools and equipment safely and study the theory behind effective pruning and plant control.	Practical observations Pictorial presentation

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Element CU76.1 Maintain the health of plants outdoors	Undertake and Review Work Experience in the Land-based Industries
Element L2.1 Prepare ground for establishing plants	
PH3 Monitor and maintain the growth and development of crops	Undertake Identification, Selection and Use of Ornamental Plants
Undertake Work Related Experience in the Land-based Industries	
Undertake Nursery Stock Production	
Understand the Basic Principles of Plant Science	
Understand the Basic Principles of Soil Science	

Essential resources

Supervised access to landscaped grounds or ornamental garden areas is essential for this unit. Facilities used for practical activities must be of sufficient size and resourced adequately for the planned activities.

A range of trees, shrubs, conifers, climbers and herbaceous plants must be available for learners to use in plant identification and maintenance as well as for looking at plant health problems. Other necessary equipment includes hand tools and pedestrian operated machinery.

Indicative reading for learners

Textbooks

Adams C R and Early M P – *Principles of Horticulture* (Butterworth-Heinemann, 2004) ISBN 978-0750640435

Brickell C – *RHS Encyclopaedia of Gardening* (Dorling Kindersley, 2007) ISBN 978-1405314541

Coutts J and Edwards A – *Encyclopaedia of Horticulture* (Akashdeep Publishing House, 2004) ISBN 978-8171580156

Hessayon D G – *Pest and Weed Expert* (Expert books, 2007) ISBN 978-0903505628

Hessayon D G – *The Tree and Shrub Expert* (Expert Books, 1993) ISBN 978-0903505178

Spence I – *RHS Gardening Through the Year: Your Month-By-Month Guide to what to do when in the Garden* (Dorling Kindersley 2009) ISBN 978-1405347396

Titchmarsh A – *Alan Titchmarsh How to Garden: Pruning and Training* (BBC Books, 2009) ISBN 978-1846074004

Websites

www.bbc.co.uk/gardening	BBC Gardeners World
www.defra.gov.uk	Department of Food, Environment and Rural Affairs
www.environment-agency.gov.uk	The Environment Agency
www.hse.gov.uk	The Health and Safety Executive
www.horticulture.org.uk	The Institute of Horticulture
www.lantra.org.uk	Lantra Sector Skills Council
www.rhs.org.uk	The Royal Horticultural Society

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	assessing a site for ground preparation explaining factors which affect plant establishment maintaining plants within health and safety and environmental legislation
Creative thinkers	assessing a site for ground preparation explaining factors which affect plant establishment promoting healthy plant growth
Team workers	assessing a site for ground preparation preparing land for planting
Self-managers	assessing a site for ground preparation preparing land for planting planting a range of woody and herbaceous plants
Effective participators	assessing a site for ground preparation presenting information on pruning.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	producing a year planner
Creative thinkers	making recommendations
Reflective learners	Reporting on the differences between hand cultivating and using machines
Team workers	providing help and support to peers during tasks
Self-managers	completing risk assessments disposing of waste correctly
Effective participators	identifying problems in plants.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching information for their project on plant health
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching information for their project on plant health
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	designing maintenance check sheets presenting leaflets and tables produce a risk assessments for practical tasks producing a plant portfolio
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	producing pictorial presentation on pruning
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	producing a pictorial presentation on pruning

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	producing a risk assessment for practical tasks
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	producing a risk assessment for practical tasks
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	producing a pictorial presentation on pruning responding to verbal questioning
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	producing customer fact sheets producing a maintenance planner
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	report writing producing an annotated poster.

Unit 6: Environmental and Land-based Business

Unit code: F/600/9357

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to provide learners with an understanding of the principles of business within the environmental and land-based business, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

Understanding how businesses and organisations fit into the land-based industry provides a foundation of knowledge from which more specialist study can follow. The environmental and land-based industries are wide-ranging, covering employment in many sectors.

Learners will investigate the different types of businesses and organisations in their specialist sector of the environmental and land-based industries, their characteristics and influences. Learners will look at current trends and issues affecting their industry.

All businesses operate within a framework of statutory legislation and other codes of practice. Learners will investigate a range of UK and EU legislation that impacts on their sector and employment within it.

To operate effectively, organisations need to perform a wide range of business and administrative tasks. Learners will develop skills in performing a range of tasks concerned with finance and banking, marketing and general administration. They will also consider how information technology can be used to perform a range of these tasks.

Learning outcomes

On completion of this unit a learner should:

1 Know an industry within the environmental and land-based sector

2 Know the relevant legislation and codes of practice within the environmental and land-based sector

3 Know common business operations

4 Be able to carry out simple administrative tasks.

Unit content

1 Know an industry within the environmental and land-based sector

Structure: features and characteristics of the industry – size, employment, main activities, geographical influence, economic contribution; different types of businesses and organisations and the type of goods and services they provide; size of these businesses/organisations eg numbers employed, area of land, size of enterprises; any regional differences; allied industries (what they are, the goods and services they supply and the role they play); trends and issues currently affecting the industry

Principal organisations and trade associations: roles and aims of key selected organisations in the industry statutory eg Department for Environment Food and Rural Affairs (DEFRA), Health and Safety Executive, Department for Business Innovation and Skills, Environment Agency, Food Standards Agency; non-governmental, major land-owning or representative eg The Royal Society for the Prevention of Cruelty to Animals (RSPCA), British Veterinary Association, Royal Horticultural Society, Institute of Groundsmanship, Lantra Sector Skills Council, British Horse Society, National Farmers Union, National Trust

2 Know the relevant legislation and codes of practice within the environmental and land-based sector

Legislation and codes of practice: UK legislation – consideration of the main relevant current legislation relating to an industry in the land and environment sector eg Agriculture Tenancies Act 1995, Wildlife and Countryside Act 1981, Animal Health Act 2002, The Welfare of Animals (Transport) (Amendment) Order 1999, Environment Protection Act 1990, Environment Act 1995, Control of Pesticides Regulations 1986, Riding Establishments Act 1970, Horse Passports (England) Regulations 2004, Control of Dogs Order 1992, Dangerous Dogs Act 1991; codes of practice eg five freedoms welfare of farm or companion animals, Code of Good Agricultural Practice; European legislation – relevant European directives eg relating to employment, the environment and the specific industry in the land and environment sector

Employment law: the main relevant current legislation relating to employment eg Health and Safety at Work Act 1974, Control of Substances Hazardous to Health Regulations 1991, Working Time Regulations 1998, Disability Discrimination Acts 1995 and 2005, Employment Act 2002, National Minimum Wage Act 1998, Race Relations (Amendment) Act 2000, Sex Discrimination Act 1975

3 Know common business operations

Common IT software: examples of business uses of word processor (eg letters, notices), spreadsheets (eg records, timesheets), database (eg records), graphics (eg advertisements, posters), email; advantages and disadvantages of using IT for business tasks

Common business tasks: financial and banking – taking payments by cash and cheque, ordering procedure for supplies, invoices, types of bank account (current, savings, business account), loans, overdraft, methods of payment (cheques, standing order, direct debit, electronic/internet); marketing – ways to promote a business (advertisements, promotional events, referral/word of mouth, importance of customer care), preparation of promotional materials; administrative tasks – file documents, complete simple records (eg production, customers), check stock levels and complete stock control records, complete simple single entry cash analysis book, communicate using written and electronic media; importance of accuracy, confidentiality, security and data back up of business records

4 Be able to carry out simple administrative tasks

Prepare, present, sort and retrieve information: use of IT and paper filing systems, completion of simple business records, preparation of business documents (eg letters, advertisements)

Accounting and administrative tasks: completion of orders, invoices, cheques, complete stock records, single entry cash analysis book; purpose of accounting and administrative tasks

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 describe the structure of one industry within the environmental and land-based sector covering: ◊ size ◊ employment ◊ main activities ◊ geographical influence ◊ economic contribution [IE]	**M1** explain the roles of principal organisations within an industry in the environmental and land-based sector	**D1** discuss how legislation and statutory and representative organisations affect a specified business in the environmental and land-based sector
P2 identify the principal organisations and trade associations within an industry in the environmental and land-based sector [IE]		
P3 identify the main UK or European legislation and codes of practice relating to one industry within the environmental and land-based sector [IE]	**M2** explain the objectives and purpose of important current UK or European legislation for the environmental and land-based industry	
P4 identify key requirements of current employment law on the environmental and land-based sector [IE]		

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P5	describe how common IT software can be used in everyday business operations	**M3**	explain the advantages and disadvantages of using IT for common business tasks	**D2**	discuss the importance of accuracy, security, confidentiality and data back up when completing business tasks.
P6	state the purpose and operation of common business tasks: ◊ financial and banking ◊ marketing ◊ administrative tasks				
P7	use appropriate methods to prepare, present, sort and retrieve information [CT]	**M4**	explain the purpose of specified administrative and accounting tasks.		
P8	carry out simple accounting and administrative tasks appropriate to the business. [SM]				

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical and written assessments, and will have links to industrial experience placements.

In learning outcome 1 learners will study the structure of their industry. They will require the opportunity to investigate the range of businesses and their products/services, and also the ancillary businesses on which the primary businesses depend. They could relate these ideas to a specific business, whilst also investigating the range of businesses found locally and nationally. They will need access to any published data on the size and economic importance of their industry. Learners will also find out about the principal organisations and trade associations concerned with their industry, and will investigate the roles and impact of selected organisations. They will need support in investigating some of the key trends and issues facing their industry and how it is responding. Delivery of this outcome would be enriched by speakers from selected organisations.

Learning outcome 2 examines the UK and European legal framework affecting businesses in the particular land-based industry. Learners are not expected to become legal experts, but to develop an awareness of the main pieces of legislation and how they impact on business in their industry. They will need to investigate their legal rights and responsibilities as employees within the workplace.

In learning outcome 3 learners will identify how common IT software can be used to perform a range of everyday business operations. Some of these are common to all businesses (for example sending emails), but tutors should ensure that examples are vocationally relevant to the subject area of the learners. It is anticipated that delivery will include the opportunity for learners to develop their IT skills so that they gain a better understanding of the use of IT software. Learners will benefit from completing tasks using the range of software, and by careful planning, these tasks could provide evidence for P7 and P8, for example use of word processor and graphics programmes to produce a marketing poster, a spreadsheet for stock inventory and valuation. Learners will need to find out about day-to-day business activities involving finance and banking. It would help learners to have opportunity to study a range of records (financial and non-financial) that are kept in a specific business, and how these are maintained and used.

Learning outcome 4 links closely with learning outcome 3, and gives learners the opportunity to practically engage in business operations and tasks. This should include preparing a range of business outputs using the IT applications listed, which could relate to other items in the content, for example advertisements, posters, specific records appropriate to businesses in their industry. It will be important for learners to have the opportunity to practice completion of paper-based records and ensure that both IT and paper records are filed appropriately. The importance of accuracy, confidentiality, security and regular back up of data should be stressed.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
Assignment 1: Industry Structure and Organisations (P1, P2, M1) Tutor introduces the assignment.
Classroom theory session and discussion: Structure of an industry in the environmental and land-based sector: activities and types of business, ancillary businesses, regional variations.
Theory session: size of the industry and economic data, development of the industry and current issues.
Classroom activity: use of industry magazines, publications and internet to identify principal organisations and trade associations.
Guest speaker: role of statutory and representative organisations.
Assessment completion and support.
Assignment 2: Legislation (P3, P4, M2, D1) Tutor introduces the assignment.
Theory session: UK and EU legislation and codes of practice relating to an environmental and land-based industry.
Classroom activity: importance of codes of practice.
Theory and supported research: Requirements of employment law.
Visit/guest speaker: how legislation and organisations affect a business in the sector.
Assessment completion and support.
Assignment 3: Business Tasks and Operations (P5, P6, P7, P8, M3, M4, D2) Tutor introduces the assignment.
Use of IT for common business tasks; application of word processor, email, spreadsheets, database and graphics software.
Financial and banking tasks – making and receiving payment, business bank accounts, ordering and invoicing.
Marketing – ways to advertise and promote a business, customer care and referral business.
Administrative – paper and electronic filing systems, stock check, business documents, simple business records, importance of confidentiality and security.
Assessment completion and support.
Unit review.

Assessment

For P1, learners need to describe the structure of one industry within the environmental and land-based sector. This must include the main activities and types of businesses that are found, including ancillary businesses, and regional variations. They should describe the size of the industry, making reference to any available data on employment and economic output. The evidence could be presented as a report or illustrated poster.

P2 requires learners to identify the principal organisations and trade associations within an industry in the environmental and land-based sector. Evidence should cover at least three different organisations, including one statutory, one non-governmental and one representative organisation. It should detail the name, contact details, aims and objectives of each organisation in relation to the land-based industry sector. Evidence could be a report, annotated poster, or verbal presentation.

For P3, learners need to identify the main UK or European legislation and codes of practice relating to one industry within the environmental and land-based sector. Evidence should include at least three important and relevant pieces of UK or EU legislation and/or codes of practice. It should provide the full title and date, and briefly summarise the main requirements of the legislation in relation to the industry. Evidence may be a report or guidance booklet.

For P4, learners need to identify key requirements of current employment law on the environmental and land-based sector. Evidence should include at least two important and relevant pieces of UK and/or EU legislation. It should provide the full title and date, and briefly summarise the main requirements of the legislation in relation to the industry. Evidence may be a report or guidance booklet.

P5 requires learners to explain how common IT software can be used in everyday business operations. This must cover word processor, email, spreadsheet, database and graphics software. Evidence may be a verbal or written report, poster or leaflet.

For P6, learners must state the purpose and operation of common business tasks. For financial and banking this will include how businesses make and receive payments, order supplies and raise invoices. Marketing must include suitable ways to advertise and promote a business. Administrative tasks should include paper and electronic filing, simple records relevant to the industry sector, and stock control. Evidence may be in the same format as P5.

For P7 and P8, learners must carry out simple accounting and administrative tasks appropriate to the business and use appropriate methods to prepare, present, sort and retrieve information. Evidence must include all of the content listed; some of this could be IT generated.

For M1, learners need to extend work completed for P1 and P2 to explain the roles of principal organisations within one environmental and land-based industry. Evidence should include an explanation of the roles of at least three organisations (including at least one statutory and one non-governmental) presented in the same format as P1 or P2.

For M2, learners must explain the objectives and purpose of important current United Kingdom or European legislation for the land-based industry. Evidence should cover one piece of employment legislation and one other relevant piece of legislation. These could have been used for evidence towards P3 and P4 and presented in the same format.

For M3, learners are required to explain the advantages and disadvantages of using IT for common business tasks. Evidence could be a verbal or written report, poster or leaflet.

For M4, learners must explain the purpose of four of the tasks completed for P7 and P8. The tasks could be selected by the tutor, or agreed through discussion with the learner. Evidence could be in the same format as M3.

For D1, learners need to discuss the impact of legislation, statutory and representative organisations on the industry. Evidence should consider one piece of legislation and two organisations in detail, including positive or negative impacts and ways that the legislation and organisations affect working practices in the industry.

D2 requires learners to discuss the importance of accuracy, security, confidentiality and data back up when completing business tasks. Evidence should include legal as well as practical reasons, and describe ways in which accuracy can be checked and security and confidentiality ensured. Evidence may be in the same format as M3.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1	Industry Structure and Organisations	You are taking part in marketing your industry sector to school leavers. You need to create a poster that gives an overview of your industry and the roles of the principal organisations and trade associations.	Poster
P3, P4, M2, D1	Legislation	You need to produce a factsheet for someone starting a business in the industry that informs them of some basic legal requirements. Include the effect of the legislation on the business operations, and the impact of statutory and representative organisations on their working practices.	Factsheet
P5, P6, P7, P8, M3, M4, D2	Business Tasks and Operations	You need to assist a business manager in performing a range of tasks, making use of IT. Create a guidance leaflet for the work experience student who is helping you which includes the purpose of the tasks, the advantages and disadvantages of using IT, and the importance of accuracy, security, confidentiality and data back up.	Portfolio of practical tasks and underpinning knowledge Guidance leaflet

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertake Work Related Experience in the Land-based Industries	Business Management in the Land-based Sector
Presentation and Service Retailing in the Land-based Sector	Participate in Business Planning and Improvement in the Land-based Sector

Essential resources

Learners will need to be able to access relevant information about their industry, through personal contacts, work experience or case study visits. They will also need access to IT, administrative and accounting records for completion.

Employer engagement and vocational contexts

This unit provides an opportunity for learners to gain an overview of one industry within the environment and land-based sector. They will also gain valuable experience in completing administrative and accounting tasks, including using IT. Learners would benefit from a range of guest speakers and industry visits.

Indicative reading for learners

Textbooks

Carysforth C – *NVQ Level 2 Business and Administration* (Heinemann 2006) ISBN 978-0435463335

Fardon, Nuttall and Prokopiw – *GCSE Applied Business* (Osborne Books, 2002) ISBN 978-1872962320

Gookin D – *Word 2007 for Dummies* (John Wiley & Sons, 2006) ISBN 978-9043013703

Seliet H – *BTEC Introduction to Business* (Heinemann 2005) ISBN 978-0435401214

Wang W – *Office 2007 for Dummies* (John Wiley & Sons, 2006) ISBN 978-9043013666

Websites

British Horse Society	www.bhs.org.uk
British Equestrian Trade Association	www.beta-uk.org
Business Studies Teaching Resources	www.bized.co.uk
Business Link	www.businesslink.gov.uk
Country Land and Business Association	www.cla.org.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Horticultural Trades Association	www.the-hta.org.uk
Lantra Sector Skills Council	www.lantra.co.uk
Meat and Livestock Commission	www.mlc.org.uk
NetRegs – environmental regulations	www.netregs.gov.uk
National Farmers' Union	www.nfuonline.com
UK Agriculture	www.ukagriculture.com

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	investigating the structure of an industry in the land-based sector researching organisations researching legislation affecting the sector investigating business bank accounts
Creative thinkers	presenting information about an industry using IT software to perform business operations preparing and presenting information
Reflective learners	discussing the importance of customer care
Self-managers	carrying out accounting and administrative tasks.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Team workers	working with others to complete a stock check
Self-managers	completing assignment work to deadlines.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	using software to perform business operations
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	filing electronic information
Follow and understand the need for safety and security practices	maintaining security and back-up copies of information
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	preparing promotional material compiling a stock valuation preparing a database of business information
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	writing a business letter
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	preparing invoices
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	preparing business records
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching legislation affecting the industry
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	completing assignments on the industry, trends and issues affecting it.

Unit 7: Participate in Providing Estate Maintenance

Unit code: Y/600/9364

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to provide learners with an understanding of the principles of estate skills and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Unit introduction

Developing skills in estate maintenance is fundamental for learners studying any land-based qualification. Workers in many different jobs need to be able to carry out construction, maintenance and repair work on a variety of structures and surfaces. This unit develops these practical skills, together with the required underpinning knowledge.

This unit aims to develop practical skills in the use of hand tools and equipment, together with those required to maintain boundaries and surfaces or habitats in the context of the industry sector being studied by the learner. Learners will work both independently and in group situations to refine their individual skills and abilities.

Throughout this unit learners will be made aware of the health and safety implications of the work they are carrying out and its possible impact on the environment. They will learn the importance of risk assessment, keeping themselves and those around them safe and using personal protective equipment. They will also gain an overview of environmental and health and safety legislation and the consequences of not adhering to these.

Learning outcomes

On completion of this unit a learner should:

1 Be able to select, transport and use a range of hand tools and equipment for estate maintenance

2 Be able to maintain estate boundaries

3 Be able to maintain surfaces or habitats

4 Know how to work safely and minimise environmental damage.

Unit content

1 Be able to select, transport and use a range of hand tools and equipment for estate maintenance

Selection of hand tools and equipment: for maintenance tasks eg hammer, spanner, saw, spade, shovel, yard brush, fork, rake, loppers, secateurs, shears, pickaxe, wire cutters, wire strainers, trowel, mallet, half moon edging iron, bolster chisel, paint brush, wheelbarrow, string line, tape measure, ladder, spirit level, fence post driver

Tool and equipment use: safe methods of use, checks and maintenance, safe manual handling, tool and equipment transportation, safe storage

Safety: current legislation eg Health and Safety at Work Act 1974, safe working practices including manual handling techniques and working distances; personal protective equipment (PPE), risk assessment

2 Be able to maintain estate boundaries

Boundaries: relevant to the land-based sector being studied eg Hedgerows, walls (eg retaining, free standing, dry-stone), ditches, canal/river banks, fencing (eg post and rail, chestnut paling, chain link, post and wire, electric, panel, closeboard, temporary, security, picket, rabbit, deer, hurdle, trellis)

Maintenance and repairs: pre maintenance checks, relevant safe routine maintenance and repair techniques using correct tools and equipment (eg trimming hedges, clearing ditches, restoring banks, repairs to walls and fences), safe working practices, correct disposal of waste, personal protective equipment (PPE), risk assessment

3 Be able to maintain surfaces or habitats

Surfaces: relevant to the land-based sector being studied eg woodchip, concrete, gravel, soil, stone, grass, paving eg block, slab; sand, rubber, bitumen, decking, resin, temporary

Habitats: relevant to the land-based sector being studied eg woodland, scrub, grassland, marsh, salt marsh, sand dune, fen, heathland, mire, bog, flush, swamp, standing water, running water, arable land

Maintenance or repairs: pre maintenance checks, relevant safe maintenance and repair techniques using correct tools and equipment (eg adding surface, applying a surface treatment, clearing or restoring a habitat), safe working practices, correct disposal of waste, personal protective equipment (PPE), risk assessment

4 Know how to work safely and minimise environmental damage

Health and safety legislation: relevant current legislation eg Health and Safety at Work Act 1974, Reporting of Incidents, Control of Substances Hazardous to Health (COSHH) 2002, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR); reasons for legislation, accident reporting, consequences of accidents at work, personal protective equipment (PPE), risk assessments, safe manual handling techniques

Environmental legislation and codes of practice: relevant current legislation and codes of practice eg Environment Act 1995, Environmental Damage and Liability Regulations 2009, Waste Management (England and Wales) Regulations 2006; reasons for legislation and codes of practice; role of relevant authorities eg Environment Agency, local authorities

Problems presented by services: risk of damage to pipes (eg water, gas, sewage), cables (eg telephone, electricity); location of pipes and cables; methods to locate pipes and cables; disconnection of services; planning work to avoid pipes and cables; lack of services for work completion (eg water, telephone, electricity)

Environmental damage: pollution (to water courses, through litter or debris, noise); damage to habitats; wastage of resources; ways of minimising damage

Waste disposal: safe disposal of organic waste eg recycling, composting, chipping, burning; safe disposal of inorganic waste eg recycling, discarding safely, landfill

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P1	select appropriate tools and equipment for specific estate maintenance tasks [SM]	**M1**	explain the importance of correct tool selection, transport, usage and maintenance	**D1**	discuss the purpose of practical work completed suggesting further maintenance work required
P2	lift tools and equipment safely using appropriate techniques [TW]				
P3	transport and use tools and equipment safely [TW]				
P4	maintain and store tools and equipment according to instructions				
P5	assess the condition of boundaries to determine maintenance requirement [CT]	**M2**	plan and carry out the maintenance and repair tasks to agreed timescales and specification		
P6	carry out routine maintenance of boundaries safely				
P7	carry out routine repairs of boundaries safely				
P8	dispose of waste materials in line with instructions [TW]				

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P9 assess the condition of surfaces or habitats to determine the maintenance requirement	**M3** plan and carry out the maintenance or repair tasks to agreed timescales and specification	**D2** discuss how to plan and carry out specified estate maintenance tasks to overcome problems and demonstrate responsible working practices.
P10 carry out appropriate maintenance or repairs of surfaces or habitats		
P11 state the current environmental and health and safety legislation and codes of practice [RL]		
P12 describe how to overcome problems presented by services	**M4** explain the importance of planning estate maintenance work.	
P13 describe how environmental damage can be minimised		
P14 describe how organic and inorganic waste may be disposed of. [EP]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

The delivery of this unit is likely to have a highly practical content, with learners given sufficient time to develop their practical skills. Delivery of the underpinning knowledge is likely to involve a range of techniques, including classroom-based sessions, visits, guest speakers and links to appropriate work experience.

Health and safety and environmental protection should be covered at the beginning of this unit as this will allow the learner to develop underpinning knowledge of the possible hazards and risks involved in their practical activities. The use of a safety officer or an outside speaker would be able to back up theory with up-to-date legislative requirements and also indicate service providers. A clear link to risk assessments should follow so they can be completed prior to undertaking practical tasks. Tutors should be up to date on the key aspects of legislation and ensure that practical activities are carried out safely and legally. Learners should understand how laws affect them while working practically both in the centre and in the workplace.

When using hand tools the tool should be set in context of the industry being studied. It is expected that tutors will cover all tools listed while working practically. This can be achieved by demonstration, supervised practical activities and observation, however if this is not possible the tool should be identified and examples of use given. Safe use, storage and transportation of tools can be achieved through practical activities and observations within the tool shed/workshop and should be backed up with care and maintenance tasks.

The estate maintenance of boundaries, surfaces and habitats are closely related with their delivery. The techniques of this delivery should be varied, but must be practically based to meet the criteria. Learners should have the opportunity to identify different types of boundaries, surfaces or habitats which are already established in order to link theory and practice. This may have to be achieved on visits to different businesses within their own area of study. Learners will also need access to practical areas where they can put into practice those skills learnt in the classroom. It is essential that learners understand the importance of the environmental issues that surround their practical tasks and deal with waste accordingly throughout their work.

It is expected that learners will investigate the uses of boundaries fully, identifying the purpose of those maintained in earlier tasks. During classroom-based lessons, active problem solving tasks can be used to cover all listed problems that may occur during estate maintenance activities in the unit content. Learners should have access to a range of path materials to cover both fluid and hard components. Those that cannot be practically accessed should be identified while on visits or via research.

Learners may have the opportunity to contribute to the maintenance of boundaries, surfaces or habitats while on work placements. They should be encouraged to ask for observation records and/or witness statements to be provided as evidence. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Tutors should not expect learners to do physical tasks that are beyond their physical capabilities.

Tutors could integrate the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments in the learners programme of study.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
Assignment 1: Being Safe and Considering the Environment (P11, P12, P13, P14, M4, D2) Tutor introduces the assignment.
Theory-based sessions: Introduction to health and safety to develop underpinning knowledge of the possible hazards and risks involved in their practical activities. Accident reporting, consequences of accidents at work, personal protective equipment (PPE), risk assessments, safe manual handling techniques.
Practical: carrying out a risk assessment.
Theory-based sessions: current environmental legislation and codes of practice, environmental protection and waste disposal.
Site visit: potential problems presented by services, disposing of waste, environmental good practice.
Personal study, assessment completion and support.
Assignment 2: Tools and Equipment (P1, P2, P3, P4, M1) Tutor introduces the assignment.
Theory session: introduction to tools, types and purpose.
Practical sessions: selecting tools and equipment for tasks.
Theory session: safe lifting principles, how to apply in practice, how to transport safely.
Practical sessions: safe lifting and transport of tools and equipment.
Theory: maintenance and storage of tools and equipment, reasons why important, how to carry out checks and maintenance.
Practical sessions: maintenance and storage of tools and equipment.
Assignment 3: Boundary Maintenance (P5, P6, P7, P8, M2) Tutor introduces the assignment.
Theory session: assessing maintenance needs and purpose of boundaries, types of maintenance and repair for different boundary types.
Visits to see examples of different boundaries and maintenance required.
Practical demonstrations, activities and assessments on boundaries.
Assignment 4: Surface or Habitat Maintenance (P9, P10, M3, D1) Tutor introduces the assignment.
Classroom session: types of surface and habitat.
Practical session: assessing condition of surfaces/habitats.
Theory session: planning maintenance of surfaces/habitats.
Practical sessions: maintenance and repair of surfaces/habitats.
Unit review.

Assessment

Learners will need to meet all the pass criteria to successfully complete this unit.

Assessment of P1, P2, P3, P4 could be linked. Learners are required to demonstrate the selection (P1), safe lifting (P2), transportation and use (P3) and maintenance (P4) of at least four hand tools or pieces of equipment. Evidence for this criterion should be linked to the work being done for P6, P7, P8 and P10. The range of hand tools provided for evidence will therefore vary in relation to the work that is being carried out for these criteria during practical activities. Suitable evidence from guided activities would be observation records completed by the learner and tutor. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor. Guidance on the use of observation records and witness statements is provided on the Pearson website.

For P5, learners need to assess the condition of boundaries for maintenance requirement; assessment could be in the form of individual oral questioning or maintenance planning sheets. A minimum of two boundaries should be included. These may be selected by the tutor or agreed through discussion with the learner.

Assessment of P6, P7, P8 could, as indicated above, be linked with P1, P2, P3, P4 with suitable projects and with assessment evidence in the same format. It is expected that learners will work with at least two different boundaries, for assessment purposes, from the unit content list.

For P9, learners are required to assess the condition of surfaces or habitats for maintenance requirement; assessment could be in the form of individual oral questioning or maintenance planning sheets. A minimum of two surfaces or habitats should be included. These may be selected by the tutor or agreed through discussion with the learner.

Assessment of P10 could be linked with P1, P2, P3, P4 with suitable projects. It is expected that learners will work with at least two different surfaces or habitats, for assessment purposes, from the unit content list.

For P11, learners will be expected to state current health and safety and environmental legislation and codes of practice. Learners should investigate various levels of the laws relating to the individual, other employees and the employer. Evidence for this could take the form of a pictorial presentation with notes, using appropriate software, flipcharts or OHPs, an annotated poster or leaflet, or as answers to short answer questions.

For P12, learners will need to know the services they may encounter whilst carrying out estate maintenance work, describe problems these present and how these could be overcome. Evidence could be a written or verbal report, or annotated plans of an area showing services and how problems may be overcome.

For P13, learners need to describe how environmental damage can be minimised. A leaflet, annotated poster or project can be used, and could be linked to assessment for P4.

For P14, learners need to identify and describe a range of methods for disposing of organic and inorganic waste. Evidence should bear in mind the legislative controls, and the desire to minimise environmental damage. Evidence could be in the same format as for P3.

In addition to the pass criteria above learners wishing to gain a merit grade will have to meet all merit criteria.

For M1, learners are required to explain the importance of correct tool selection, transport, usage and maintenance. Evidence may be a verbal or written report, leaflet or presentation.

Assessment of M2 links to work completed for P5, P6, P7 and P8. To achieve M2 learners need to have demonstrated planning of the maintenance and repair tasks, and the work needs to have been completed to a high standard. This is expected to include the learner working independently, having a logical approach to completing the task, showing responsibility for the environment and checking their own work.

Assessment of M3 links to work completed for P9 and P10. To achieve M3 learners need to have demonstrated planning of the maintenance or repair tasks, and the work needs to have been completed to

a high standard, as for M2.

Assessment of M4 could be an extension of work completed for P11, P12, P13 and P14. Learners are required to explain the importance of planning estate maintenance work, particularly in overcoming the potential problems identified in the pass criteria. Evidence may be a verbal or written report, leaflet or presentation.

In addition to the merit criteria above learners wishing to gain a distinction grade will have to meet all distinction criteria.

For D1, learners are required to review the work they have completed for the pass and merit criteria, and suggest further maintenance work required. These suggestions should include maintenance of tools and equipment, boundaries and surfaces/habitats. Evidence may be a presentation, report, leaflet or guidance booklet.

For D2, learners are required to discuss how to plan and carry out two estate maintenance tasks to overcome problems and demonstrate responsible practices. The tasks chosen may be selected by the tutor or agreed through discussion with the learner. This assessment links to the pass and merit criteria, and the discussion should include, for example, how to plan to work within the legislation, minimise environmental damage, overcome problems and use appropriate tools safely and effectively. Evidence may be in the same format as D1.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P11, P12, P13, P14, M4, D2	Being Safe and Considering the Environment	You are working for a land-based business, and have been told a school pupil is planning to work alongside you for their work experience. Create a guidance leaflet for them which explains why planning estate maintenance work is important. Include the legislation that affects your work, how to overcome problems presented by services, how to dispose of waste and minimise environmental damage. Your leaflet should also show how to plan and carry out two tasks to overcome problems and demonstrate responsible practices.	Leaflet
P1, P2, P3, P4, M1	Tools and Equipment	You are helping a busy countryside ranger with their work. You will be asked to select appropriate tools and equipment, lift them safely, transport and use them, and then maintain and store them. Create some notes for your work experience pupil explaining the importance of correct tool selection, transport usage and maintenance.	Observation records Witness statements Guidance notes

Criteria covered	Assignment title	Scenario	Assessment method
P5, P6, P7, P8, M2	Boundary Maintenance	In your role you have been asked to plan and carry out routine repairs and maintenance of two boundaries. Before starting, assess the condition of the boundaries to plan the work needed. You will need to dispose of any waste in line with instructions.	Observation records Photographic evidence
P9, P10, M3, D1	Surface or Habitat Maintenance	Having completed the boundary tasks to such a high standard you have now been asked to maintain or repair two surfaces or habitats. Before starting, assess the condition to determine the work needed. After completing these tasks, discuss the purpose of the work completed and suggest further maintenance required.	Observation records Photographic evidence Verbal report

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Element CU19.1 Construct and maintain boundaries Element CU19.2 Construct and maintain paths	Undertake and Review Work Experience in the Land-based Industries
Element CU20.1 Maintain structures and surfaces	Manage Soil Water
Element CU2.2 Maintain good standards of health and safety for self and others	Maintain Turf in Parks and Gardens
Element CU23.1 Construct, maintain and repair paths	Undertake Estate Skills
Undertake Work Related Experience in the Land-based Industries	
Maintain Winter and Summer Sports Turf Surfaces	

Essential resources

Access to an area of land where practical work can be carried out is essential. Centres may need to provide transport for learners to travel to suitable sites. First aid facilities and appropriately trained staff are essential for such visits. Also required is a sufficient range and quantity of hand tools and materials to allow the tasks to be undertaken safely.

Ideally, tasks should be carried out 'for real' but, where this is not possible, temporary work is permissible. Powered machinery can be used where appropriate.

Employer engagement and vocational contexts

This unit focuses on the skills of estate maintenance and will provide learners with a basic knowledge of undertaking tasks on boundaries and surfaces or habitats. Learners will be encouraged to develop an understanding of health and safety while working and will consider environmental protection and ways of minimising damage in addition. Centres are encouraged to develop links with local businesses within the sector being studied so learners can experience the day-to-day running of a busy estate via guest speakers and visits.

Indicative reading for learners

Textbooks

Agate E – *Fencing: A Practical Handbook* (BTCV, 2001) ISBN 978-0946752294

Agate E – *Footpaths: A Practical Handbook* (BTCV, 2001) ISBN 978-09467523 17

Agate E – *Toolcare: A Maintenance and Workshop Manual* (BTCV, 2000) ISBN 978-0946752249

Agate E – *Tree Planting and Aftercare: A Practical Handbook* (BTCV, 2001) ISBN 978-0946752256

Agate E – *Woodlands: A Practical Handbook* (BTCV, 2002) ISBN 978-0946752331

Brooks A and Agate E – *Hedging: A Practical Handbook* (BTCV, 1998) ISBN 978-0946752171

Brooks A and Agate E – *Waterways and Wetlands*: A Practical Handbook (BTCV, 2001) ISBN 978-0946752171

Brooks A, Adcock S and Agate E – *Dry Stone Walling*: A Practical Handbook (BTCV, 1999) ISBN 978-0946752195

Butterfield, W H – *Making Fences Walls and Hedges* (BiblioBazaar, 2009) ISBN 978-110871322

Key R – *Garden Surfaces: 20 Projects for Paths, Decks, Steps Patios and Edgings* (Laurel Glen Publishing, 2003) ISBN 978-1571458247

Kindersley, D – Walls and Fences *(RHS Practicals) 2nd revised edition* (Dorling Kindersley, 2003) ISBN 978-0751348620

MacLean M – *New Hedges for the Countryside* (Farming Press Books and Videos, 1990) ISBN 978-0852362426

Negus J and Bradley V – *Garden Tools: An Illustrated Guide to Choosing, Using and Maintaining* (Carroll & Brown Publishers Limited; illustrated edition, 2001) ISBN 978-1903258231

Sutherland W J – *Managing Habitats for Conservation, 1st edition* (Cambridge University Press, 1995) ISBN 978-0521447768

Other publications

Health and Safety Executive leaflets eg *Manual Handling Assessment Charts* (HSE, 2003)

Websites

www.btcv.org.uk	British Trust for Conservation Volunteers
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.fwag.org.uk	Farm Wildlife and Advisory Group
www.hse.gov.uk	Health and Safety Executive
www.lantra.co.uk	Lantra Sector Skills Council
www.naturalengland.org.uk	Natural England
www.rhs.org.uk	Royal Horticultural Society

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	reporting how to overcome problems faced while working describing how to overcome typical problems that may occur during estate maintenance activities
Creative thinkers	assessing the condition of boundaries, surfaces or habitats to determine maintenance requirement
Reflective learners	reviewing the purposes of different types of boundaries presenting current environmental and health and safety legislation and codes of practice
Team workers	taking responsibility for the environment carrying out maintenance tasks safely
Self-managers	selecting appropriate tools equipment for specific estate maintenance tasks lifting, transporting, maintaining and storing tools and equipment safely using appropriate techniques
Effective participators	reporting how to overcome problems faced while working reporting on how environmental damage can be minimised.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	investigating key points of the current environmental and health and safety legislation and codes of practice
Creative thinkers	applying techniques to maintenance tasks
Reflective learners	evaluating own performance action planning and target setting for future activities
Team workers	peer help and support during tasks
Self-managers	completing risk assessment
Effective participators	investigating problems that occur when lifting incorrectly.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	presenting information on current environmental and health and safety codes of practice
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching the internet for current environmental and health and safety codes of practice
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	designing maintenance planning sheets presenting leaflets and pamphlets producing a risk assessments for practical tasks
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	presenting information on current environmental and health and safety codes of practice
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	producing a risk assessment for practical tasks
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	producing a risk assessment for practical tasks
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting information on current environmental and health and safety codes of practice
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching for current environmental and health and safety codes of practice
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	reporting how to overcome problems faced while working reporting on how environmental damage can be minimised describing how to overcome typical problems that may occur during estate maintenance activities describing appropriate situations for paths reviewing the purposes of different types of boundaries producing a risk assessment for practical tasks.

Unit 8: Participate in Horticultural Crop Production Outdoors

Unit code	**H/600/9979**
Level 2:	**BTEC First**
Credit value:	**10**
Guided learning hours:	**60**

Aim and purpose

This unit aims to provide learners with an understanding of the principles of how to participate in horticulture crop production outdoors, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

The growing of commercial crops is an important sector within the horticulture industry. A wide range of crops, such as fruit, vegetables, flowers and bulbs, are produced by commercial or production horticultural businesses. This unit will enable learners to develop skills and knowledge within horticultural crop production situations. On successful completion of the unit learners will be able to demonstrate an understanding of how plants interact with their environment.

Many of the skills developed in this unit are transferable to other plant-based sectors of the environmental and land-based and related sectors. Specifically, learners will have the opportunity to develop skills in establishing and maintaining a range of horticultural crops, and harvesting and selling produce.

Learners will undertake practical tasks in a commercial crop production context and develop their knowledge of many aspects of plant science that underpin horticulture.

Please note that hardy ornamental nursery stock is not covered in this unit.

Learning outcomes

On completion of this unit a learner should:

1 Know how to produce crops outdoors

2 Be able to prepare sites and plant crops outdoors

3 Be able to maintain and harvest outdoor crops

4 Be able to prepare cropping schedules for outdoor crops.

Unit content

1 Know how to produce crops outdoors

Production techniques and facilities: choice of field/site; availability of irrigation; tools and equipment; plant health eg pest control, weed control, disease control; waste management; risk assessment; relevant current legislation and codes of practice; health and safety

Planting material: use of different types of planting material eg seeds, module plants, bulbs; preparation of plant material; seed/plant treatments; hygiene; health and safety

2 Be able to prepare sites and plant crops outdoors

Preparation: site preparation (clearing and cleaning); hygiene; waste disposal; ground cultivation; soil testing; tools and equipment eg rotavator, spade, hoes; production requirements eg timescales; health and safety

Planting: propagation of planting material; preparing propagation medium; hand/mechanical planting; correct planting eg spacing, depth, orientation; health and safety; risk assessment; relevant current legislation and codes of practice

3 Be able to maintain and harvest outdoor crops

Maintaining: techniques for maintaining crops eg irrigation, nutrition, weed control, trimming, training and supporting; problems which can occur in outdoor crops eg nutrient problems, damaged plants, identification and control of common pests and diseases (biological, chemical and cultural); maintenance of hygiene; growth and development records for crops; correct use of hand tools

Harvesting: manual/mechanical methods of harvesting crops; quality of crop harvested; methods of preparing harvested crops eg handling, grading, packing, containerising, labelling, cleaning and drying; customer requirements; health and safety; risk assessment; relevant current legislation and codes of practice

4 Be able to prepare cropping schedules for outdoor crops

Planning crops schedule: timescale eg weekly, monthly; seasonal variations; impact of geographical location; labour and resource requirements; customer requirements

Scheduling crops: crop rotation, propagation, weaning off (acclimatisation), planting, fertilising/adding nutrients; factors affecting crop establishment eg seasonality, timing, nutrient status of ground/growing media, supply of water/moisture, crop varieties, weather conditions, pests and diseases

Monitoring crops: health status; irrigation requirements; nutritional requirements; estimating harvesting time; in relation to crop schedules

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 describe the soil and cultivation requirements of outdoor crops	**M1** explain the importance of correctly preparing sites for growing outdoor crops	**D1** evaluate methods of producing specified commercial horticultural crops and make recommendations for improvement.
P2 describe the maintenance requirements of outdoor crops [IE]	**M2** describe the factors which affect the successful production of specified commercial horticultural crops	
P3 prepare sites to receive outdoor crops		
P4 sow and plant crops outdoors	**M3** describe factors affecting plant establishment	
P5 maintain healthy and safe working practices		
P6 maintain the growth and development of plants outdoors		
P7 harvest outdoor crops	**M4** outline factors involved in maintaining the quality of outdoor crops during harvesting	**D2** compare manual and mechanical methods of harvesting a specified horticultural crop.
P8 prepare and grade for sale outdoor crops		
P9 prepare cropping schedules for outdoor crops, including plant raising for specific crops [RL, SM]	**M5** explain factors which should be considered in a cropping plan/schedule which may affect a specified crop's establishment, growth and yield.	**D3** evaluate the cropping schedules and make recommendations for improvement.
P10 prepare contingency plans for outdoor crops. [CT, EP]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable enterprises and will link to work experience placements.

Tutors delivering this unit have opportunities to use as wide a range of techniques as possible. Lectures, discussions, seminar presentations, site visits, supervised practicals, research using the internet and/or library resources and the use of personal and/or industrial experience would all be suitable. Delivery should stimulate, motivate and educate learners.

Work placements should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities are undertaken, so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to prepare ground or growing media for planting, plant and care for a specified commercial horticultural crop and they ask for observation records and/or witness statements to be provided as evidence. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Whichever delivery methods are used, it is essential that tutors stress the importance of health and safety and environmental issues and the need to manage the resource using legal methods.

Risk assessments must be undertaken before any practical activities. Learners should not be required to undertake tasks that are beyond their physical capabilities.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may also be taking as part of the programme of study.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview to the unit and relevance to the industry.
Assignment 1: Principles of Crop Production (P1, M1, M2, D1) Tutor introduces the assignment.
Introduce methods and techniques of outdoor horticultural crop production. Learners identify the factors which affect the production of specified commercial horticultural crops. Discuss the importance of health and safety and plant health regulations.
Assignment 2: Crop Establishment (P3, P4, P5, M3) Tutor introduces the assignment.

Topic and suggested assignments/activities and/assessment
Principles of crop establishment: theory session: introduce different methods and techniques. Learners prepare site for producing specified commercial horticultural crop and carry out necessary propagation of plant material. Discuss important factors affecting plant establishment eg choice of planting material, variety and spacing. Learners establish an outdoor crop and record its performance.
Assignment 3: Crop Maintenance and Harvesting (P2, P6, P7, P8, M4, D2) Tutor introduces the assignment.
Discuss the maintenance requirements of the chosen crop from Assignment 2. Learners review the performance of the crop material they have planted. Practical sessions: crop inspections to be carried out at specified intervals and any problems identified and solutions discussed. Learners compare harvesting methods used in different outdoor crops. Learners harvest and prepare specified crops for marketing.
Assignment 4: Cropping Schedules (P9, P10, M5, D3) Tutor introduces the assignment. Discuss factors to be considered when producing a crop plan/schedule. Learners prepare a cropping plan/schedule for a specified commercial horticultural crop in a format agreed with the tutor. Learners to evaluate plan and suggest improvements.
Unit review.

Assessment

For P1, learners must describe the soil and cultivation requirements of outdoor crops. Tutors should identify a minimum of three crops through discussion with learners. Evidence could take the form of a pictorial presentation with notes or a PowerPoint presentation.

For P3 and P4, learners should prepare site and propagate plants (if necessary) in readiness for planting/sowing the crop. Tutors should identify the crop through discussion with learners. Evidence could be tutor observations during practical activities and through learners keeping a crop production diary.

For P2, P5 and P6 learners should describe the general aftercare requirements for outdoor crops and give details of the procedures to follow to produce a healthy crop as identified in P3 and P4. Learners will continue to keep records in their diaries. Evidence could be provided through a discussion with the tutor and the production of a crop diary.

For P7 and P8, learners should harvest and prepare for sale a specified horticultural crop to meet given objectives. Tutors should choose the horticultural crop. The plants may be the same as those used to provide evidence for other grading criteria. Where possible, the plants and objectives used as evidence for these criteria should be the same for each learner to ensure assessment is fair. Evidence may be in the same format as for P3 and P4.

For P9 and P10, learners must prepare a cropping plan/schedule for a specified horticultural crop, identify potential problems and suggest improvements. Tutors should identify the specified crops or agree them in discussion with learners. Crops may be the same as those used to provide evidence for other grading criteria. Evidence could take the form of a cropping plan produced in a format agreed with the tutor.

For M1, learners should explain the importance of correctly preparing sites for growing outdoor crops. Learners could include examples of site preparation in their evidence that they have been involved in or seen during delivery of this unit. Evidence could take the form of a pictorial presentation with notes or a PowerPoint presentation.

For M2, learners are required to describe the factors which affect the successful production of specified commercial horticultural crops. Crops may be decided by the tutor, or agreed in discussion with learners and may be the same as those used to provide evidence for other grading criteria. Evidence may be in the same format as for M1.

For M3, learners must describe factors which influence planting/sowing and plant establishment, for example choice of planting material, variety, crop spacing, environmental factors. Tutors should choose the crops or agree them in discussion with learners and they may be the same as those used to provide evidence for other grading criteria. Where possible, the crops used should be the same for each learner to ensure assessment is fair. Evidence could be provided through discussion with the tutor and/or the production of a written report.

For M4, learners must outline factors involved in maintaining crop quality during harvesting. Tutors should choose the crops or agree them in discussion with learners and they may be the same as those used to provide evidence for other grading criteria. Where possible, the crops used should be the same for each learner to ensure assessment is fair. Evidence may be in the same format as for M3.

For M5, learners must explain factors which should be considered in a cropping plan/schedule which may affect a specified crop's establishment, growth and yield. Tutors should identify the specified crop, or agree it in discussion with learners and they may be the same as those used to provide evidence for other grading criteria. Where possible, the crops used should be the same for each learner to ensure assessment is fair. Evidence may be in the same format as for M1.

For D1, learners are required to evaluate methods of production for specified commercial horticultural crops and make recommendations for improvement. Tutors should identify the specified crops, or agree them in discussion with learners and may be the same as those used to provide evidence for other grading criteria. Where possible, the crops used should be the same for each learner to ensure assessment is fair. Evidence may be in the same format as for M1.

For D2, learners are required to compare manual and mechanical methods of harvesting a specified horticultural crop. Tutors should identify the specified crop, or agree it in discussion with learners and may be the same as that used to provide evidence for other grading criteria. Where possible, the crop used should be the same for each learner to ensure assessment is fair. Evidence may be in the same format as for M1.

For D3, learners must evaluate the cropping schedules produced in P9 and make recommendations for improvement. Evidence could take the form of updated cropping schedules with identified improvements.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, M2, D1	Principles of Crop Production	Introduce methods and techniques of outdoor horticultural crop production. Learners should identify the factors which affect the production of specified commercial horticultural crops. Discuss the importance of health and safety and plant health regulations.	Pictorial presentation
P3, P4, P5, M3	Crop Establishment	Establish a crop and record and review its performance.	Crop production diary Practical observation and assessment
P2, P6, P7, P8, M4, D2	Crop Maintenance and Harvesting	Learners to review the performance and harvest the crop. Crop inspections to be carried out at specified intervals, problems identified and solutions discussed.	Pictorial presentation Crop diary Discussions with the tutor
P9, P10, M5, D3	Cropping Schedules	Discuss factors to be considered when producing a crop plan/ schedule. Learners to prepare a cropping plan/schedule for a specified horticultural crop.	Pictorial presentation and cropping plan

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertake Work Experience in the Land-based Industries	Undertake and Review Work Experience in the Land-based Industries
Undertake Nursery Stock Production	Undertake Horticultural Production Techniques – Outdoors
Participate in Protected Horticultural Plant Production	
Introduction to Animal and Plant Biology	
PH1 Clear and prepare sites for planting crops PH2 Set out and establish crops PH3 Monitor and maintain the growth and development of crops PH4 Harvest and prepare intensive crops CU79 Identify, collect and prepare plants for dispatch	

Essential resources

Centres offering this unit should ensure that learners have supervised access to appropriate resources, either at the centre or at nearby commercial premises. Facilities required for this unit must include access to a range of crop production resources. Sufficient cropping areas and a range of plant types are required to provide adequate experience of the working environment. The facilities must represent those found in professional horticulture in the local area, and should give learners the opportunity to develop their practical ability.

The equipment and consumables needed include a range of plants including both edible and ornamental crops, a suitable propagation area and media, hand tools, pedestrian controlled equipment, packing and grading facilities, crop support and irrigation equipment.

Employer engagement and vocational contexts

This unit focuses on practical aspects of commercial horticultural crop production and will give learners the background knowledge of a variety of crops and techniques used in commercial crop production. Centres are encouraged to create and develop links with local nurseries and garden centres. This could be via visits from nursery staff or horticulturalists or visits to commercial growers. When learning about the skills and techniques involved in horticultural crop production learners could be encouraged to gain work experience with a local nursery.

Indicative reading for learners

Textbooks

Archer J – *Crop Nutrition and Fertilizer Use* (Farming Press Books and Videos, 1988) ISBN 978-0852361757

Biggs T – *Growing Vegetables (RHS. Encyclopaedia of Practical Gardening)* (Mitchell Beazley, 1999) ISBN 978-1840001525

Dawson P – *A Handbook for Horticultural Students* (Peter Dawson, 1994) ISBN 978-0952591115

Gerrard J – *Fundamentals of Soils* (Routledge, 2000) ISBN 978-0415170048

Hamrick D (editor) – *Ball Redbook: Crop Production* (Ball Publishing, 2003) ISBN 1883052351

Lockhart JAR et al – *Lockhart and Wiseman's Crop Husbandry* (Woodhead Publishing, 2002) ISBN 1855735490

Ministry of Agriculture, Fisheries and Food – *Fertiliser Recommendations: For Agricultural and Horticultural Crops* (The Stationery Office, 2000) ISBN 0112430589

Salt B – *Vegetables: The Practical Guide to Success, Second Edition* (Batsford, 2000) ISBN 978-0713486216

Journals

The Grower

Horticulture Week

Websites

www.hse.gov.uk	Health and Safety Executive
www.ishs.org	International Society for Horticultural Science
www.nfu.org.uk	National Farmers Union
www.rhs.org.uk	Royal Horticultural Society
www.soilassociation.org	Soil Association

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	researching background information on techniques and applying these techniques to their practical work
Creative thinkers	using results from observations of the chosen crop to review its performance and suggest improvements
Reflective learners	using results from practicals to review and amend, if necessary
Self-managers	organising the resources required for crop production
Effective participators	discussing options for dealing with crop problems with their tutor.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	researching cropping techniques using a variety of sources of information
Reflective learners	analysing the performance of the production method and suggesting improvements
Self-managers	monitoring and caring for the outdoor crop.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching the internet for the appropriate information on crop production methods
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	producing written assessments using ICT programmes
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	evaluating success of a particular production method by calculating yield
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting their report on the techniques used in horticultural crop production
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	completing a written report on maintaining quality in a crop.

Unit 9: Construct Landscape Foundations and Surfaces

Unit code	**R/600/9959**
Level 2	**BTEC First**
Credit value:	**10**
Guided learning hours:	**60**

Aim and purpose

This unit aims to give learners an understanding of the principles of how to construct landscape foundations and surfaces, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

Almost all gardens need basic construction work at some point whether it is levelling a surface for a paved patio or creating a concrete path. Most landscape companies and their clients would expect the landscaper to be multi-skilled and be able to turn their hand to any task required on a garden build.

Garden designers are often expected to supervise the work on a build and so must fully understand the principles and practices of hard landscape construction in order to specify and supervise work on site. Further more, many people are designing and constructing their own gardens. With financial restraints many people build their first gardens by themselves.

This unit covers basic hard landscape construction skills. Learners will develop the skills needed to interpret a hard landscape plan and transfer this plan to the ground. They will be able to prepare a site, excavate and install appropriate foundation layers for hard surfaces and lay both a concrete surface and unit paving. Learners will be able to assess the drainage requirements of hard landscape surfaces and will understand how drainage problems may be overcome.

Hard landscaping involves a number of hazards for the landscaper, the public and the environment, for example the caustic properties of cement and the dangers surrounding excavations or mixing concrete. Health and safety and environmental protection will be emphasised throughout the unit. Learners will be able to appreciate the consequences of their work and will understand and adopt safe working practices.

Learning outcomes

On completion of this unit a learner should:

1 Be able to transfer information from plans to the ground

2 Be able to prepare sites for landscaping

3 Know how drainage and foundations are installed

4 Be able to lay concrete

5 Be able to install paving.

Unit content

1 Be able to transfer information from plans to the ground

Marking out: mark out different shapes eg square, circle, rectangle, diamond; mark reference points from a design using different techniques eg tape, pegs, surveying equipment; marking out straight lines, simple and multiple curves

Using a plan: interpret a site plan and recognise key reference points in the build area; recognise features on a build from scale drawings; transfer measurements from a scale drawing to the ground

2 Be able to prepare sites for landscaping

Preparing the site: locate the site and ensure it is safe and secure; identify, protect and mark out underground services on a build; select and use the correct tools and equipment to carry out the job effectively and efficiently; clear weeds and debris from the site; dispose of any waste arising safely and responsibly; minimise damage to retained plants and other features

Leveling: position levels and excavations on the site to marks within specified tolerances; excavate to an accurate level for works; clear debris effectively, safely and tidily; re-instate levels as appropriate to works; safe working practices; appropriate personal protective equipment

3 Know how drainage and foundations are installed

Drainage: recognise where drainage is required; the differences between surface and sub-surface drainage; different types of drainage systems; consequences of impeded drainage; tools and materials used to install drainage systems; safe working practices; appropriate personal protective equipment

Foundations: specifications for foundations (dimensions, materials, degree of compaction) appropriate to the expected use and the context in which it is set; construction of foundations in accordance with the specification; safe working practices; appropriate personal protective equipment

4 Be able to lay concrete

Mixing concrete; materials and equipment; mixing by hand and with a powered mixer; concrete and motar mixes; methods of curing and protecting concrete

Laying concrete: establishing levels; installing shuttering; poring and handling mixed concrete;; finishes and protects/cures; problems which may affect concrete eg frost, rain, high temperatures; safe working practices; appropriate personal protective equipment; current guidelines and legislation covering the handling of cement

5 Be able to install paving

Paving: different types of paving eg natural stone, pressed, precast, bricks, concrete paviors; foundations required for different types of paving; methods of laying paving eg five spot, sand bed, full mortar bed methods; patterns and bondings; methods used to join, point and finishing paving

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 set out geometric and irregular shapes on the ground from scaled plans, to include right angles and circles	**M1** explain why accurate setting out is important in hard landscape construction	**D1** assess the accuracy of different methods of setting out from a plan
P2 describe methods of marking out lines and curves onto the ground [IE]		
P3 set out and establish rectangular areas to a level and a fall		
P4 excavate and install foundations for subsequent works		
P5 describe methods of locating underground services before excavation [IE]		
P6 describe the required dimensions and methods of installing foundations for paths, patios and driveways, to include shuttering, formation and sub-grades	**M2** explain how the specifications of foundations vary with expected use	
P7 describe materials used in foundations to include granular fill, geo-membranes, blinding layers and concretes		
P8 describe drainage methods, tools and materials	**M3** identify problems that may be encountered when installing drainage	**D2** assess the effectiveness of different drainage methods

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P9 mix and lay concrete safely to include site preparation and formwork [TW, SM, EP]		
P10 explain the uses, mixes and finishes of concrete in a range of situations	**M4** describe the advantages and disadvantages of different mixes of concrete	**D3** recommend improvements to a given area of concrete
P11 lay rigid and flexible paving materials safely [TW, SM, EP]	**M5** identify problems that may occur when laying paving.	**D4** assess an area of paving with recommendations for improvement.
P12 describe the advantages and disadvantages of a range of paving materials, bond patterns and edging materials.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

This unit can be delivered using a number of different techniques but the key principle is to ensure that all tasks are carried out with health and safety in mind. Risk assessments should be carried out before learners attempt any tasks. A good way for learners to gain experience in the construction and landscaping areas of horticulture is through a work placement. If a long-term placement is not possible then site visits, guest speakers, residential visits and carrying out tasks on site can motivate learners. Tutors should visit any work placements, check health and safety and make sure that all relevant insurance is completed before learners start work on a placement. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities are undertaken, so that naturally occurring evidence can be collected at the time.

Learning outcome 1 requires learners to transfer information from a plan to a site. This will mainly be delivered through demonstrations and learner practice. A work placement with specialist landscapers would be beneficial. If work placements are available, learners could work with learners following a garden design programme to transfer designers' prepared plans.

Learning outcome 2 requires learners to prepare a site for the construction of hard landscape surfaces. Learners must be able to identify and deal with potential hazards and clear the site of unwanted plants, weeds and debris in a safe and environmentally responsible manner. Learners should be expected to keep the work area tidy and to minimise damage to retained plants and features.. Demonstrations and supervised practical work are an ideal way for learners to achieve this learning outcome.

Learning outcome 3 requires learners to understand how the specification for foundations depends on the location and intended use of the finished surface. They will follow agreed specifications to install foundations. This learning outcome can be linked to learning outcomes 4 and 5.

For this outcome learners will recognise the need for adequate drainage and appreciate the variety of drainage systems that are available to the landscape gardener. This aspect could be delivered through lectures, demonstration and independent learner research. Site visits and talks with drainage engineers would also be valuable teaching tools for this outcome.

Learning outcome 4 requires learners to mix concrete by hand and using a powered mixer. Learners should be able to install appropriate shuttering to the required levels, pour and tamp the mixed concrete and protect it from adverse conditions. Learners will be able to demonstrate how different finishes may be achieved. They need to understand the caustic nature of concrete and cement and handle, store and dispose of these materials safely.

This outcome could be delivered through demonstration and learner practice or as part of a work placement. Site visits are also helpful to broaden learners' experience.

For learning outcome 5 learners need to install rigid and flexible paving. They will select the correct paving material for specified situations and uses and install the appropriate paving in a safe and efficient manner. Learners should be able to demonstrate the different bond patterns and describe their uses. Learners should be able to point and finish laid paving appropriate to the paving material and its situation. They should describe different pointing and finishing techniques and indicate where they might be appropriate.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview to the unit.
Assignment 1: Getting a Plan Off Paper (P1, P2, P3, M1, D1) Introduction to assignment.
Demonstrations and supervised practical work introducing how to use a plan and transfer information from the plan or work experience to a site.
Assignment 2: Installing Firm Foundations (P4, P5, P6, M2) Introduction to assignment.
Supervised practical work, demonstrations with supporting or alternatively a work placement can be used.
Assignment 3: Adding Drainage (P7, P8, M3, D2) Introduction to assignment.
Internet research, lectures and practical sessions.
Assignment 4: Laying Concrete (P9, P10, M4, D3) Introduction to the assignment.
Supervised practical, demonstrations and lectures.
Assignment 5: Laying a Path (P11, P12, M5, D4) Introduction to the assignment.
Supervised practical work, demonstrations, lectures.
Unit review.

Assessment

To achieve a pass grade, learners must achieve the 16 pass criteria listed In the grading grid.

For P1, learners must be able to set out regular, geometric shapes on the ground from a plan. A work diary, witness statements or observation records will form the basis of the evidence. Guidance on the use of observation records and witness statements is provided on the Pearson website.

For P2, learners must show that they can mark out irregular shapes on the ground. Again this can be assessed by the tutor or work placement supervisor. A work diary, witness statements or observation records will form the basis of the evidence.

For P2, learners must describe methods of marking out lines and curves. This could be completed as an information leaflet, industry booklet, poster, presentation or a collection of annotated internet research.

For P3, learners must be able to mark out a rectangle area to a given level and fall. This is a practical task that could be assessed by direct tutor or work supervisor observation, supported by witness statements.

For P4, learners should provide evidence that they have prepared a site by excavating and installing foundations. Evidence can be provided through a learner diary, observation records, photographic and video evidence.

For P5, learners should describe how to locate and mark underground services before excavation. Evidence for this can be a set of detailed notes, presentation, leaflet, poster or observed role play.

For P6, learners must describe dimensions and methods of installing foundations for hard landscape surfaces. Evidence can be in the form of annotated diagrams, an instruction video, a leaflet, a DIY podcast, or annotated internet research.

For P7, learners must describe the materials that can be used in foundations. Evidence can be in the form of a leaflet, poster, booklet, DIY video, observed interview, verbal questions and answers.

For P8, different methods of drainage should be described as well as the tools and materials used. Evidence for this could come from a DIY video, podcast, information leaflet, mock interview, or poster.

P9 requires learners to mix and lay concrete. Evidence could come from a learner diary, observation records and witness statements. P9 can be taught in conjunction with P11 and evidence can take the same form.

For P10, learners must explain uses, mixes and finishes of concrete. Evidence can again take the form of a leaflet, information video, poster or series of annotated flow diagrams.

For P11, learners must lay areas of rigid and flexible paving. Evidence for this will be a learner diary, observation records and witness statements.

P12 could be assessed together with evidence produced as a leaflet, poster, video, or question and answer session.

To achieve a merit grade, learners must meet all of the pass grade criteria and the five merit grade criteria.

For M1, learners must explain why accurate setting out from a plan is important when installing hard landscape surfaces. Evidence can be a DIY video, podcast, information leaflet, or verbal presentation.

For M2, learners need to demonstrate their understanding of how the specifications for foundations vary according to their location and the intended final use of the surface. Evidence could be through an information pamphlet, a video, or digital or verbal presentation.

For M3, learners should be able to identify the problems likely to be encountered when installing drainage for hard surfaces. Evidence could be from verbal questions and answers or in the form of a video, digital or verbal presentation.

For M4, learners must describe advantages and disadvantages of different concrete mixes and explain where each mix would be appropriate. Evidence could be from verbal questions and answers or in the form of a video, digital or written presentation.

For M5, learners should identify the problems likely to be encountered when installing paving. Evidence could be from verbal questions and answers or in the form of a video, digital or verbal presentation.

For a distinction grade learners must achieve all of the pass and merit grade criteria and the four distinction grade criteria.

For D1, learners must assess the accuracy of the methods they have used to mark out shapes. They should comment on how this could be improved and alternative methods available. Evidence can be in the form of written notes based on a work diary, lecture, poster, leaflet, PowerPoint presentation/slideshow.

For D2, learners should assess the effectiveness of the different drainage options for hard surfaces. Evidence could take the same form as for D1.

D3 and D4 can also be taught in conjunction with each other and learners need to evaluate areas of concrete and paving. Learners should comment on improvements that could be made and describe how the work could be carried out. Evidence can take the same form as for D1.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, D1	Getting a Plan Off Paper	Either a work placement or learners work with trainee garden designers.	Witness statements Observations Learner diary
P4, P5, P6, M2	Installing Firm Foundations	The garden has been planned and the customer has decided to allow the landscaping team to finish the project. Learners will work as a team to install foundations for hard surfaces.	Witness statements Observations Learner diary
P7, P8, M3, D2	Adding Drainage	The site is poorly drained and excess rain water needs to be removed from the surfaces.	A video, poster, leaflet
P9, P10, M4, D3	Laying Concrete	Learners will work as a team to mix and lay concrete to meet the design brief.	Witness statements Observations Learner diary
P11, P12, M5, D4	Laying a Path	Learners will work as a team to install areas of rigid and flexible paving such as a drive, a patio or a garden path.	Witness statements Observations Learner diary

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertake Work-related Experience in the Land-based Industries	Understand the Principles and Practices of Landscape and Garden Design
Environmental and Land-based Business	Manage Soil Water
Undertake Specialist Land-based Machinery Operations	Construct and Establish Sports and Amenity Turf Areas
Maintain Winter and Summer Sports Turf Surfaces	Construct Horizontal Landscape Surfaces
Understand the Principles of Sport and Amenity Turf Maintenance	
Unit L1 Site preparation Unit L15 Install and maintain drainage systems Unit L24 Construct hard landscape components Unit CU19 Construct and maintain boundaries and paths	

Essential resources

Learners will need access to a sufficiently large clear, secure and level area for marking out and to sufficient areas in which to carry out excavations and construction. Covered areas are especially useful to allow work to carry on in bad weather.

They will also need access to the appropriate equipment such as measuring and setting out equipment (for example tapes, pins, lines); levelling equipment (for example pegs, spirit levels, laser levels); hand tools for mixing and laying concrete and paving; powered tools for mixing and laying concrete and paving (for example mixers, vibrating plates) and appropriate Personal Protective Equipment

Learners will sufficient materials in order to practise all practical tasks and access to written and electronic research facilities.

Employer engagement and vocational contexts

Learners would benefit from having access to a working environment. Often this is achieved by creating links with local businesses or charitable organisations who may benefit from taking on learners. Local authorities can be a useful source of information as can business education alliances. Charitable organisations can often provide guest speakers to give lectures as well as demonstrations.

Indicative reading for learners

Textbooks

Blake J – *An Introduction to Landscape Design and Construction* (Gower, 1999) ISBN 978-0566077692

Key R – *Garden DIY surfaces* (Murdoch Books, London, 2001) ISBN 978-1853918131

Wiles R – *The Garden Handyman* (Marshall Cavendish Ltd, 1985) ISBN 978-0863072758

Websites

www.concrete.org.uk	Concrete Society
www.concretecentre.com	Concrete Centre
www.lantra.co.uk	Lantra Sector Skills Council
www.lbcnc.org.uk	Land Based Colleges National Consortium
www.rhs.org.uk	Royal Horticultural Society

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	carrying out internet research and individual work on placement
Team workers	practising tasks and completing work-based activities and group presentations
Self-managers	meeting targets and producing written work
Effective participators	participating in group tasks, applying techniques to new situations.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	investigating alternative methods of construction
Creative thinkers	applying techniques whilst working in a team environment
Reflective learners	assessing your their performance, reviewing work and suggesting improvements
Team workers	completing tasks which involve teamwork
Effective participators	helping to train others and implementing improvement plans.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching methods of completing construction tasks
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	comparing a variety of available materials and companies
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	comparing a variety of available materials and companies
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	presenting notes using ICT
Present information in ways that are fit for purpose and audience	presenting information as a podcast or slideshow
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	making a podcast or information video
Mathematics	
Identify the situation or problem and the mathematical methods needed to tackle it	transferring plans onto the ground
Select and apply a range of skills to find solutions	using scales on plans.

Unit 10: Undertake Specialist Land-based MachineryOperations

Unit code: J/600/9599

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to introduce learners to the skills and knowledge associated with specialist land-based machinery and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Unit introduction

This unit is aimed at learners who may wish to take up a career in the wide ranging land-based sector especially where skills are needed for using specialist machinery and equipment such as is found on farms, construction sites, horticultural and sports ground management, arboricultural and forestry industries. The unit emphasises practical skills using relevant machinery covering the essential skills of preparing, operating and maintaining equipment and machinery. Learners will firstly learn to recognise the different machinery that is available to use for a range of tasks. They will then learn how to prepare the machinery, use it in realistic situations and finally maintain it ready for use again. Learners will also learn the important legislative and environmental requirements that are increasingly important in the land-based industry of today.

Centres must adhere at all times to learner health and safety both in the workshop and the field situation.

Learning outcomes

On completion of this unit a learner should:

1 Understand safe working principles when using equipment and machinery

2 Be able to maintain land-based equipment and machinery

3 Be able to prepare land-based equipment and machinery for use

4 Be able to operate land-based equipment and machinery.

Unit content

1 Understand safe working principles when using equipment and machinery

Safe working principles: personal hygiene (eg use of barrier cream); risk assessments; accident statistics; types of specialist machinery; pre-start checks; mounting and dismounting where applicable; cold starting; fuelling procedures (eg keep tank full overnight, bleeding air from pipes); power take off (PTO) procedures (eg guards, speeds, removal of shaft); hydraulics (eg couplings, hoses, spool valves); interpret decals; interpret odometer; locate main controls (eg gauges, levers, buttons for electronics, pedals, dipsticks); ground conditions (eg hard, soft, wet, slope); use of gears and speed; use of manufacturers' handbooks

Legislation: Health and Safety at Work Act 1974 (HASAWA); Control of substances hazardous to health 1989 (COSHH); Manual Handling Operations Regulations (192); Personal Protective Equipment (PPE); Reporting of Injuries and Dangerous Occurrences Regulations (1995) RIDDOR; Provision and Use of Work Regulations 1998 (PUWER); age to drive on road; transporting; transport loads (eg height, ropes and ratchet straps); mud on road

2 Be able to maintain land-based equipment and machinery

Prepare machine or power unit: pre-start checks (eg oil, coolant, diesel); tyres; battery; maintenance schedule (eg handbook); wheels (eg check wheel nuts, wheel widths to match machine); fore-loader (where applicable); drawbar; tools relevant to machine preparation; use and interpretation of instruction manual

Prepare equipment and machinery: appropriate connections for attachment (eg top link, PTO, hydraulic pipes, drawbar, linch pins, clips); check working parts (eg nuts and bolts, shear bolts, tines, discs, bearings, coulters, blades, belts, gearbox oil, grease points, electrical connections, guards)

3 Be able to prepare land-based equipment and machinery for use

Operate machine or power unit: select appropriate gear to match ground/road conditions; transport safely to site; warning signals; safe operational requirements (eg confined space, slope, wet, frost)

Operate equipment and machinery: lift in and out of work; use of headlands; adjustments in work (eg forward speed, top link, stabiliser bars, PTO speed, depth control, differential lock, clutch control, external controls), use of manufacturer's handbooks and instruction manual

4 Be able to operate land-based equipment and machinery

Maintenance: interpret operator handbook for service/maintenance schedules (eg oil, fuel, filters, tyre pressures, coolant, lubrication); check and replace worn parts; cleaning; workshop safety (eg axle stands, PPE, blocks); storage of machinery; waste disposal; record keeping

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P1	select appropriate equipment for land-based tasks	**M1**	justify the selection of machinery for given tasks	**D1**	evaluate the use of machinery and equipment for a specified task
P2	explain why manufacturers' instructions should be followed when working with land-based equipment and machines				
P3	explain the legal and environmental requirements associated with specific machines				
P4	identify the controls/devices/ instruments and other health and safety requirements for land-based machinery and equipment				
P5	identify routine maintenance for land-based equipment and machines using manufacturers' instructions	**M2**	explain appropriate legal and environmental considerations when using a specified machine		
P6	identify hazards and comply with risk assessments during maintenance activities				
P7	carry out different routine maintenance activities safely on a range of equipment and machines				
P8	record maintenance activities in an appropriate format				

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P9	carry out adjustments on land-based equipment and machines to meet specific requirements prior to use	**M3**	monitor use of specified machinery and equipment	**D2**	produce a breakdown of costs for the replacement of parts on a specified machine.
P10	explain the benefits of correct adjustment of equipment and machines				
P11	carry out pre-start checks, including fuelling [IE, TW, SM, EP]				
P12	operate equipment and machines safely and efficiently for different land-based activities [IE, TW, SM, EP]	**M4**	list parts needed to maintain a specified machine.		
P13	achieve the desired results when operating land-based equipment and machines. [IE, TW, SM, EP]				

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve both practical and written assessment, visits to suitable collections and will have links to industrial experience placements.

The unit focuses on learners being able to identify, prepare, use and maintain a wide range of machinery and equipment as found in today's land-based sector. Tutors should therefore endeavour to offer learners this wide range, even though in their specific locality such a range may not be seen or used so easily. Where there is a shortfall, tutors should aim to offer the learner the experience of recognising and using other machinery through visits to demonstrations, dealers, talks and work experience.

The tutor might wish to bear in mind the seasonality of machinery use such as in a horticultural unit's production cycle, sports turf and ground management where heavy use is made of the site according to the sporting season, special tree-felling or logging operations at different times of year, in order for learners to experience at first hand the range of machinery available. Tutors must therefore plan carefully the whole programme according to both seasonality and machinery in their locality. Tutors need to plan their assessment schedule carefully so that it covers not just learners operating machinery at a certain time of year, but throughout the course duration and to include, where appropriate, any work experience.

Learners will be preparing and maintaining various machinery in a workshop setting and so tutors must adhere to all health and safety procedures throughout the course duration. A strict policy of appropriate PPE must be enforced at all times. This will obviously need to be repeated when learners are in working situations in the field and on visits. Learners should experience how workshops are organised, the range of tools and equipment available for machinery maintenance as well as consumables such as lubricants, filters and other items needed.

Learning outcome 1 covers the recognition of a wide range of machinery and equipment. Tutors will need to plan how they will offer learners the wide choice of machinery available. They might at this stage plan a visit to a local dealer, or to a working demonstration or show. Tutors need to emphasise the important environmental aspects of using machinery such as soil structure and other environmental damage.

Learning outcome 2 is about preparing machinery and equipment and therefore will have an element of workshop experience to offer. Tutors must ensure that learners become familiar with using the wide variety of tools available in a modern workshop. Learners need to experience a variety of machines and powered vehicles and be able to recognise and locate the different instruments, controls and signs or decals such as found on machinery. There is an increasing use of electronic instruments and controls in modern tractors and machinery, and so tutors need to be able to offer learners this choice. Tutors should bear in mind the range of tasks that they might be able to offer the learner, such as setting up a plough for field use, preparing other cultivating machinery, specialist fencing equipment, aerating turf, or calibrating a fertiliser spreader. The machinery selected for D1 should be different for that in D2, so tutors need to plan carefully for the assessments.

Learning outcome 3 involves learners using machinery and equipment in the field. The ideal setting is either through work experience or at a centre's own enterprise. Tutors should endeavour to allow learners maximum experience of a range of machinery. Tutors might be in a position to integrate learner experience with a centre's own enterprise or with a local employer that can complement the range of machinery offered. Where possible learners should be in a position to use the machinery that they helped prepare in learning outcome 2. Tutors might wish to use seasonal tasks for this outcome such as those that take place in early/late spring in order that learners can be in a position to complete the merit and distinction criteria offered. Grounds management equipment including mowers, aerators, slitters and de-thatchers would be appropriate to cover here. Other tasks to offer might include fertiliser spreading, stump removal after tree felling, strimming, rolling.

Learning outcome 4 is a logical follow on to the previous outcome. Where possible, tutors should involve learners to maintain equipment that has been experienced, such as that in learning outcome 1 or 3. Tutors need to plan the timing of this outcome so that learners can complete all relevant assessments. It may be necessary for tutors to plan for this outcome to be done after autumn work is finished, when there are tasks to be completed such as replacing worn parts.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction to unit and unit overview.
Assignment 1: Plan and Select Machinery (P1, P2, P3, P4, M1) Briefing.
Practical session: identify machinery, equipment, decals, instruments and gauges, pedals, levers, interpret handbook where relevant, observe/assist in using machinery for cultivations.
Theory session: identify and describe machinery for different purposes, interpret handbook, explain legal and environmental requirements when using machinery and equipment.
Assignment 2: Prepare Machinery and Equipment Safely (P5, P6, P7, P8, M2) Briefing.
Practical session: prepare machinery and equipment for specified tasks safely, check parts for wear, interpret manufacturers' instructions, workshop safety, workshop tools, lubricate and fuel ready for use.
Theory session: legislation and environmental considerations for using machinery and equipment.
Theory session: recognise working parts of a range of machinery and equipment, reasons for correct preparation of machinery and equipment, fuel and lubricants.
Assignment 3: Use Machinery Safely (P9, P10, P11, M3, D2) Briefing.
Practical session: carry out specified practical/site operations with machinery and equipment safely.
Theory session: working parts of machinery and equipment, ground/soil conditions needed for efficient working of machinery, necessary adjustments during operation.
Assignment 4: Maintain Machinery Safely (P12, P13, M4, D1) Briefing.
Practical session: workshop safety, maintain specified machinery, identify and replace worn parts, use workshop tools safely.
Theory session: interpret manufacturers' handbook, workshop tools and equipment, health and safety, maintenance schedules, records and job cards.
Unit review.

Assessment

For P1, learners need to see a range of different machines and to show that they recognise them. Machines selected should cover machinery for the relevant specialist operations such as cultivations, drilling/planting, fertiliser application, fencing, compost mixing, potting machines, sports ground maintenance, tree felling, specialist harvesting and storage. This could be assessed both direct observation and use of the internet/ books where machines are specific to a locality.

For P2, learners need to explain the purpose of following machinery manufacturers' instructions. P3 requires learners to explain legislation covering age restriction, roadworthiness, health and safety issues, and environmental issues associated with specific machines. These could be evidenced through an assignment or report.

For P4, learners must be able to identify correctly a range of commonly used instruments, levers, pedals and decals found on machinery. They should also be able to state specific health and safety issues relevant to specified machinery.

For P5, learners need to be able to identify routine maintenance for land-based machinery that need specific preparation prior to use. This must include pre-start checks on tractors/forklifts as well as use of lubricants such as grease and oils, nuts and bolts for tightness. Tutors may also include other machinery such as setting up a plough, drill, fertiliser spreader, post-hole borer, potting machine, compost mixer, fence-post ram, tree felling and harvesting machinery. For P6, learners need to identify hazards and comply with risk assessments during maintenance activities.

For P7, learners must be able to carry out checks on oil reservoirs (both engine and hydraulic oil), coolant, fuel, tyres and battery as well as re-fuel a machine as a minimum.

For P8 and P9, learners must be able to carry out field adjustments on machinery safely and to record maintenance work. Evidence for P5, P6, P7, P8 and P9 could be in the form of practical observation records and completed records.

For P10, learners need to explain the benefits of correct adjustments of machinery or equipment.

P11 could be assessed at the same time as P10 and form part of a risk assessment activity.

P12 can be assessed as an on-going exercise that learners perform during the year. Emphasis must be placed on health and safety at all times.

P13 could form part of a workshop diary, recording maintenance activities that are carried out at specific times of year. Learners should be encouraged to use either standard software programmes or recording templates that are centre devised.

For M1, in order to justify the selection of machinery for a specified task, learners are expected to be able to present clear, logical and cogent reasons for using machinery. They must show evidence that they have compared other machinery and evaluated all considerations including environmental impacts.

For M2, learners must explain the legislative and environmental considerations when using a specified machine for example pesticide application equipment. Tutors need to ensure that learners are given similar or the same machinery in order to ensure fairness of assessment.

For M3, learners are to monitor machinery use over a specified period of time, which must be the same for all learners. Evidence could be in the form of an assignment or report that links to M4 and/or D2.

For M4, learners are required to show that they can list all the necessary parts needed for replacement for a specified machine.

For D1, learners are to evaluate how machinery and equipment was used for a specified task. Learners should not expect to use the same machinery as in learning outcome 1, but choose from a range of machinery that might be used later on in the course. For example learners might evaluate the use of machinery for planting, lifting and harvesting, or producing a seedbed for turf. They must include all the machinery used, and associated machinery, and to evidence understanding in matching capacities and work rates to the machinery used.

For D2, learners should use the same machinery as that selected for M4 in order for there to be a logical progression. Costs should include not just a list of parts, but also show the allocation of labour and time needed for the machine repair.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1	Plan and Select Machinery	Identify a range of machinery. Interpret instruments and handbook instructions. Plan for the use of machinery for a specified task and justify your choice.	Practical observation Written evidence
P5, P6, P7, P8, M2	Prepare Machinery and Equipment Safely	Identify machinery to be used for a specified task. Prepare the machinery according to manufacturers' instructions. Interpret legal and environmental requirements.	Practical observation Written evidence
P9, P10, P11, M3, D2	Use Machinery Safely	Carry out field operations for specified tasks using machinery safely and efficiently. Evaluate the use of specified machinery.	Practical observation Written evidence
P12, P13, M4, D1	Maintain Machinery safely	Carry out maintenance of machinery. Interpret manufacturers' instructions. Identify and replace worn parts. Produce a list of parts needed. Produce a cost of both replacement parts and labour.	Practical observation Written evidence

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Unit 4: Undertake Work-related Experience in the Land-based Industries	Advanced Nursery Stock Production

Essential resources

Learners will need access to a variety of machinery and equipment, a workshop or suitable work area with the necessary safety equipment and fields or similar where they can gain practice and be assessed. Instruction books and relevant workshop tools will be essential. Workshop areas should also include all the relevant consumables such as oil, filters, belts, nuts and bolts that will be needed for the course duration. Access to and use of all of these resources should form part of the learners' experience. Tutors must ensure that the working areas provide a safe environment for learners. An area for washing hands and storage of clothes/PPE should also be on hand.

Employer engagement and vocational contexts

Tutors should endeavour to promote links with their own centre's farm, with other local dealers and farmers who are willing to cooperate with offering work experience or visits to learners. Where there are local employers involved, tutors must ensure that strict adherence to health and safety is carried out so that learners can work in safety. Learners should also be given opportunities to do national proficiency training and assessment as relevant to their age and experience, such as telescopic forklift, tractor driving and handling, quad bike handling, Pesticide Applications 1 and 2 as well as any other opportunities for further training.

Indicative reading for learners

Textbooks

Arthur J – *Practical Greenkeeping* (Kyodoe Co Ltd, 2003) ISBN 978-0907583042

Bell B – *Farm Machinery* (Old Pond Publishing, 2005) ISBN 1903366682

Culpin C – *Farm Machinery* (Blackwell Science, 1992) ISBN 978-0632031597

HSE – *Safeguarding Agricultural Machinery* (1998) ISBN 978-0717624003

Shippen J – *Basic Farm Machinery* (Butterworth-Heinemann, 1980) ISBN 978-0080249117

Journals

AME (Amenity, Machinery & Equipment)

Farm Contractor

Farmers Weekly

Forestry Journal

Profi

The Landscaper

Websites

www.bagma.com	BAGMA
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.environment-agency.org.uk	Environment Agency
www.fwi.co.uk	Farmers Weekly
www.hse.gov.uk	Health and Safety Executive
www.lantra.org.uk	Lantra Sector Skills Council
www.profi.co.uk	Profi

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	engaged in practical training, monitoring, visits and work experience
Team workers	involved in practical sessions, work experience
Self-managers	engaged in monitoring, visits, work experience and independent research
Effective participators	involved in practical sessions, work experience.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	monitoring use of machinery
Creative thinkers	carrying out their own research and monitoring
Reflective learners	carrying out their own research and monitoring
Team workers	involved in work experience, visits
Self-managers	involved in work experience, national proficiency tests.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	engaged in using the internet for presentation purposes
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	calculating speeds, distances, areas covered for a variety of machinery calibrating specific machinery for quantities of fertiliser to be used in the field calculating amounts of manure spread over given areas
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	engaged in group and independent discussions involving the selection, planning, using and maintaining machinery.
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	

Unit 11: Undertake Nursery Stock Production

Unit code: L/600/9913

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to give learners an understanding of the principles of how to undertake nursery stock production, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

Nursery stock production is an essential element of the horticultural industry. In order to carry out basic maintenance procedures within this area, it is important to have the knowledge and practical skills needed to prepare, plant and maintain a range of nursery stock plants ready for sale.

This unit gives learners the skills to enable them to assist in the production of nursery stock, gaining knowledge of plants that are commonly found in the UK. Learners will also be able to follow plants through the production cycle from establishment and care to collection and despatch.

This unit also explores the factors that influence successful establishment of nursery stock plants including plant health and aftercare. Appropriate tools and equipment will be explored and how these are used safely will be covered through demonstrations and supervised practical work. Health and safety considerations will also be a key aspect of work carried out with appropriate risk assessments being completed before supervised practical activities.

Learning outcomes

On completion of this unit a learner should:

1 Know nursery stock plant and their use

2 Be able to prepare for and carry out planting

3 Be able to maintain the growth and development of nursery stock plants

4 Be able to collect and prepare plants for despatch.

Unit content

1 Know nursery stock plant and their use

Plant types: plant identification by common and botanical names (including trees, shrubs, herbaceous perennials, ferns, grasses); definition by plant form/life cycle (for example: tree, shrub, sub-shrub, herbaceous perennial, bi-ennial, annual, monocarpic, fern, evergreen, deciduous); definition of tree sizes (for example seedling, transplant, whip, feathered, half standard, standard, heavy/extra heavy standard, semi-mature); definition by growing environment (for example xerophytic, aquatic, bog plant, alpine, coastal, shade loving, hardy, half-hardy, tender)

Methods: definition of type by production method (bare rooted/open ground, root balled, container grown, containerised, micro-propagated)

Equipment: definition of type by container size (eg P7, P9, liner, 2 litre, 5 litre, 10 litre)

Customer requirements: plant species and variety (eg eventual size, hardiness, soil type, moisture requirement, toleration of adverse conditions); size of stock (for example in 2 or 5 litre pots, standard or semi-mature trees)

2 Be able to prepare for and carry out planting

Sites: outdoor sites (for example open ground, container beds); environmental factors affecting planting (climate, micro-climate, pollution, exposure, shade)

Housing and equipment: tools and equipment (for example hand tools, barrows and trailers, mini tractors, mechanised potting and plant handling equipment); protected structures (for example tunnels, shade houses); health and safety

Planting and potting: methods of preparing planting sites; open ground planting techniques (for example on ridges, on the level); potting techniques (for example soft potting, mechanised potting); plant grading and pruning; positioning of the plant material including spacing, depth, orientation and firmness; inspection of plant material for pests, diseases, environmental damage; levels of hygiene; health and safety, risk assessments, personal protective equipment (PPE)

Media and waste: soil conditions for open ground planting (for example soil texture, structure, pH, drainage potential, soil temperature, timeliness); potting composts (mixes, nutrient levels, handling, storage); responsible disposal of waste

3 Be able to maintain the growth and development of nursery stock plants

Plant health: hygiene; possible problems (for example moisture and nutrient levels, pest damage, disease, environmental damage); weed control;

Application systems: irrigation; nutrients; plant protection materials; biological agents

Manipulation of plant development: plant spacing; formative training; supporting, growth regulants; quality standards

Unwanted growth: dealing with unwanted growth (pruning, trimming); disposal of unwanted plant material correctly in line with environmental considerations

Health and safety: potential hazards; personal protective equipment (PPE); risk assessments

4 Be able to collect and prepare plants for despatch

Bare root and container grown/containerised plants: despatch documentation; customer requirements (for example: timescale, category of stock required, botanical name, size, grade, quantity);

Plant handling; selection; transportation of plants; timescales for collection; preparation for despatch (for example: removal of weeds, unwanted growth, grading out of unsuitable plants, wrapping bare root stock); cleaning (pots); labelling; packing

Methods of transporting plants: condition of the plants before despatch; maintaining health and condition during transportation; systems of record keeping; health and safety

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 identify nursery stock plant types by common and botanical names [SM]	**M1** recommend plants for given environmental requirements	**D1** explain the process of preparing plants and outdoor sites before planting
P2 describe the sizes and specifications of nursery stock plants		
P3 describe how customer requirements may vary with locality and plant use [IE, CT]		
P4 prepare sites and plants for potting and planting into open-ground [TW, SM]	**M2** describe the factors which may affect successful planting and establishment of new plants	
P5 pot on and plant out nursery stock plants [TW, SM]		
P6 provide immediate aftercare and suitable environmental conditions [TW, SM]		
P7 use tools and equipment safely [TW, SM]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P8 maintain the growth and development of plants in open ground and containers [TW, SM]	**M3** report on common pests and diseases that attack nursery stock plants	**D2** evaluate planting methods used making recommendations for improvements.
P9 control unwanted plant growth [TW, SM]		
P10 dispose of waste materials correctly from a specified task [TW, SM, CT]		
P11 collect plants for sale or display as required, in line with instruction [TW, SM, CT]	**M4** collect and prepare plants for a specified scenario meeting given objectives.	
P12 lift and prepare open-ground material for sale [TW, SM]		
P13 complete records related to orders [IE, TW, CT, SM]		
P14 work according to best health and safety practice.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical and written assessment and should stimulate, motivate and educate learners. Tutors delivering this unit should use as wide a range of techniques as possible. Lectures, discussions, presentations, off site visits, practicals, research using the internet and/or library resources and the use of personal and/or work experience would all be suitable.

Work placements should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities are undertaken, so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to prepare a site for planting and they should ask for observation records and/or witness statements to be provided as evidence. If assessed directly by the tutor, suitable evidence from guided activities would be observation records completed by the learner and tutor. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Health and safety issues relating to working with nursery stock, and the associated tools and equipment, must be stressed and reinforced regularly. Hazards and risk should be identified with risk assessments being completed before any practical activities.

Tutors could consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may also be taking as part of the programme of study.

This unit includes theory and practical topics where the majority of the time is spent on practical work in the nursery, handling and working with plants. Underpinning knowledge should be provided through formal classroom delivery, guided and independent learner research.

Learners will explore the different types of nursery stock, learn about botanical nomenclature and consider customer requirements. The plant range is likely to be influenced by local needs but must include those that are common in the UK. Learners should know how to link different plant species with customer requirements, considering the environment and the local climatic conditions that plants will be subjected to. It is expected that learners will learn how to categorise and measure nursery stock correctly. Botanical nomenclature is an important aspect of the nursery industry and should be given appropriate coverage.

During this unit learners will prepare for and carry out planting of nursery stock and maintain growth and development. This should cover open ground and protected environments. Hygiene and plant health problems should be covered adequately along with plant manipulation. Delivery is likely to involve lectures, demonstrations of using tools and equipment and supervised practical work. Risk assessments, where appropriate, and safe and efficient techniques should be demonstrated. Learners will need to know how planting and maintenance of nursery stock can be influenced for the better. This will take in local climatic considerations, customer requirements and other environmental factors such as soil quality. Learners should understand how good environmental practice, for example the safe and ethical disposal of waste, should be implemented. Visits to open ground and protected nursery stock sites could help to inspire learners.

In terms of the collection and preparation of nursery stock plants, learners need to know how to interpret despatch documentation as well as ascertaining and catering for customer requirements. In preparing plants for despatch, learners need to know how to transport plants in a way which maintains quality and minimises damage. This is likely to be delivered using lectures, discussion, demonstrations, simulation and supervised practical work. A visiting speaker could add relevance, for example a nursery manager could talk about issues that arise in the collection and despatch of nursery stock plants.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit
Assignment 1: Plant Portfolio (P1, M1) Tutor introduces the assignment
Theory-based sessions: introduction to botanical nomenclature, know nursery stock plant types and range of plants in each type
Independent research sessions
Personal study
Assignment 2: Selling Plants and Customer Requirements (P2, P3, P11, P12, P13, M4, D1) Tutor introduces the assignment
Theory session: collect and prepare plants for despatch. Introduction to customer requirements, keeping records and selling plants
Classroom activities
Practical demonstrations, observations and assessments on labelling, displaying and selling plants and keeping records of sales.
Personal study
Assignment 3: Working with Nursery Stock (P4, P5, P6, P7, P8, P9, P10, P14, M2, M3, D2) Tutor introduces the assignment
Theory session: prepare for and carry out planting, maintain the growth and development of nursery stock plants
Practical demonstrations, observations and assessments on preparation of areas and plants, planting, maintenance and plant development
Personal study
Tutorial 1:1 help and guidance
Unit review

Assessment

For P1, learners need to identify nursery stock plant types by common and botanical names. Learners are expected to provide evidence for the different plant species, hybrids or cultivars in each of the plant groups listed in the unit content. Where possible, the species used as evidence should be the same for each learner to ensure assessment is fair. Evidence could take the form of a pictorial presentation with notes (possibly using appropriate software or OHPs), plant portfolio project or response to short-answer questions asked while working practically.

For P2, learners are required to describe the sizes and specifications of nursery stock. Evidence could be in the form of a customer leaflet or annotated poster.

P3 asks learners to describe how customer requirements may vary with locality and plant use, case studies and work related tasks could be used for this criterion with tutors ensuring that learners all have the same tasks so assessment is fair.

For P4, learners will prepare sites and plants for potting and planting through practical activities. It is expected that learners will cover the plant types listed in the unit content. These may be the same plants used to provide evidence for other grading criteria. Where possible, the types and size of plants used as evidence should be the same for each learner to ensure assessment is fair. Evidence from guided practical activities would be observation records completed by the learner and tutor and accompanied by appropriate work logs or other relevant learner notes. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor. Guidance on the use of observation records and witness statements is provided on the Pearson website.

P5 and P6 link directly to P4 and the same assessment techniques can be used.

P7 links with P4, P5 and P6 where learners must use a range of tools and equipment safely while working practically. This criterion could be assessed directly by the tutor during practical activities.

For P8, throughout the unit, learners are required to maintain growth and development of plants. This should take place at different times of the year, where possible, and cover the plants listed in the unit content. These may be the same plants used to provide evidence for other grading criteria within this unit. Where possible, the types and size of plants used as evidence should be the same for each learner to ensure assessment is fair.

P9 and P10 could be linked to P4, P5, P6, P7 and P14 and assessed practically in the same format covering all aspects listed within the unit content.

P11 requires learners to collect plants for sale or display, in line with instructions. This could involve written or verbal instruction by the tutor or workplace provider. The criterion could be assessed directly by the tutor during practical activities via observation records completed by the learner and tutor. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor.

P12 links to P7, P9 and P11 and the same assessment techniques can be used.

For P13, suitable records should be given to learners to complete as evidence. These could relate directly to earlier criteria or be simulation activities.

For M1, learners must recommend plants for given environmental requirements. Learners must cover a minimum of three different environments in this context and this might be evidenced through a presentation linked to P1.

For M2, evidence could be a report, essay or annotated poster. The factors that may affect planting should cover all the listed in the unit content.

For M3, learners should investigate common pests and diseases affecting nursery stock plants and report on these either in a report style paper or an easy to follow customer leaflet. M4 could be assessed in a similar format to P11.

For D1, evidence in the form of a report with pictures could be linked to P4.

For D2, the evaluation and recommendations for improvements can be an addition to a report, linking to P5.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1	Plant Portfolio	This assignment investigates nursery stock plants by producing a portfolio stating plant names botanically and each plant's requirement. Pictures or drawings could back up work throughout.	Plant portfolio
P2, P3, P11, P12, P13, M4, D1	Selling Plants and Customer Requirements	Customer requirements are diverse and this assignment will give learners the knowledge to recommend nursery stock plants to meet these requirements. It will also look at labelling, displaying and selling plants and keeping records of sales.	Customer leaflet Case studies Practical observations Completing records Annotated poster
P4, P5, P6, P7, P8, P9, P10, P14, M2, M3, D2	Working With Nursery stock	In order to be able to carry out basic nursery practical tasks it is important to acquire the knowledge and skills needed to prepare ground and plant and maintain a range of nursery stock plants. This assignment will give learners the necessary skills and ensure all work is carried out using safe working practices with risk assessments completed before each practical task.	Practical observations Witness statements Risk assessments Report Customer leaflet Pictorial report

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertake Work-related Experience in the Land-based Industries	Manage Advanced Nursery Stock Production
Undertake Specialist Land-based Machinery Operations	
PH2 Set out and establish crops PH3 Monitor and maintain the growth and development of crops CU79 Identify, collect and prepare plants for dispatch	

Essential resources

A well-equipped nursery stock facility is essential for completion of this unit, together with the selection of tools and equipment listed in the unit content and a broad range of locally significant plants. Access to local nurseries in the surrounding area will help to contextualise certain parts of this unit for learners.

Employer engagement and vocational contexts

This unit focuses on nursery stock production and learners are encouraged to develop an understanding of the risks and hazards involved in working in their chosen sector, including health and safety of themselves, other employees, employers and their customers. Centres are encouraged to develop links with local nurseries, so that learners can experience what it would be like to work within this area. This could be through off site visits or guest speakers.

Indicative reading for learners

Textbooks

Avent T – *So You Want to Start a Nursery* (Timber Press Aug 2003) ISBN 978-0881925845

Brickell C, Joyce D – *RHS Pruning and Training* (Dorling Kindersley 2006) ISBN 978-1405315265

Brown G E and Kirkham T – *The Pruning of Trees, Shrubs, and Conifers* (Timber Press 2004) ISBN 978-0881926132

Hessayon D G – *The Tree and Shrub Expert* (Transworld Publishers, London 1999) ISBN 978-0903505178

Hillier Nurseries (Winchester England) – *The Hillier Manual of Trees and Shrubs* (David & Charles 2007) ISBN 978-0715326640

Johns T – *Perfect Customer Care* (Random House Business Books; 2nd New edition of Revised edition 2003) ISBN 978-1844131532

Lamb K, Kelly J, Bowbrick P – *Nursery Stock manual: Grower Manual 1* (Grower Books, 1995) ISBN 978-1899372041

Journals

Horticulture Week

The Grower

Websites

www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.environment-agency.gov.uk	Environment Agency
www.horticulture.org.uk	Institute of Horticulture
www.lantra.org.uk	Lantra
www.rhs.org.uk	Royal Horticultural Society

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	describing customer requirements completing records related to plant orders
Creative thinkers	describing customer requirements disposing of waste correctly collecting plants for sale or display completing records related to plant orders
Team workers	preparing plants and sites potting on and planting out providing plant aftercare using tools and equipment safely
Self-managers	identifying nursery stock plant types preparing plants and sites potting on and planting out providing plant aftercare.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	stating plant requirements recommending plants for given situations reporting on pests and diseases that attack nursery stock
Creative thinkers	recommending plants for given situations describing factors that affect successful planting explaining processes
Reflective learners	evaluating planting methods and recommending improvements
Team workers	completing risk assessments
Self-managers	recommending plants for given situations completing risk assessments
Effective participators	recommending plants for given situations evaluating planting methods and recommending improvements.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	completing their plant portfolio creating the delivery form and invoice
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	producing a risk assessments for practical tasks producing a customer leaflet on common pests and diseases that affect nursery stock plants creating the delivery form and invoice producing a report, with pictures, explaining the process of preparing plants and outdoor sites before planting
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	producing a customer leaflet on common pests and diseases that affect nursery stock plants
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	completing records
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	describing the sizes and specifications of nursery stock completing records reporting on the reasons for disposing waste correctly evaluating planting methods producing a report, with pictures, explaining the process of preparing plants and outdoor sites before planting.

Unit 12: Participate in Protected Horticultural Plant Production

Unit code	**Y/600/9977**
Level 2:	**BTEC First**
Credit value:	**10**
Guided learning hours:	**60**

Aim and purpose

This unit aims to provide learners with an understanding of the principles of protected horticultural plant production, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

Protected crop production has an important role within a number of areas of horticulture. This unit will enable learners to develop skills and knowledge needed within protected horticultural crop production situations. Successful completion of the unit will allow learners to demonstrate an understanding of how plants interact with their environment.

Many of the skills developed during this unit are transferable to other plant-based sectors of the horticultural industry. Specifically, learners will have the opportunity to develop skills in establishing and maintaining a range of protected crops, and in harvesting and marketing or displaying produce.

Learners will have the opportunity to undertake practical tasks within protected crop production facilities in a commercial context, which will enable them to learn about many aspects of plant science that underpin horticulture. For example, learners could observe the effects of variations in temperature, humidity and light that can be created in contrasting environments within glasshouses, polytunnels and cloches, as well as the use of fleece materials to protect crops outdoors.

Learning outcomes

On completion of this unit a learner should:

1 Know the range of protected growing environments used in horticultural plant production

2 Be able to establish crops in protected plant production situations

3 Know how to maintain plants in protected plant production situations

4 Be able to maintain plants in protection and prepare them for sale or display.

Unit content

1 Know the range of protected growing environments used in horticultural plant production

Types of protected environments: glasshouses (eg Venlo, Dutch light, wide span), polytunnels (single and multi-span, Spanish tunnels), cloches, agricultural fleece; temperature control (heating systems, thermal screens)

Control of protected environments: humidity control (ventilation, damping down); control of light levels (shading, supplementary/replacement lighting); automatic watering/feeding systems; integrated control systems; temperature control; use of protected environments to extend season; use of protected environments to improve plant health, growth and yield

Growing systems: soil based; containerised; hydroponic (eg rockwool, nutrient film technique)

2 Be able to establish crops in protected plant production situations

Establishing crops: the positioning of crops in terms of plant density and orientation; planting techniques in relation to growing media; nutrient and moisture requirements at establishment; purpose and use of records; types of growing media and their relationship to crop growth and development

Plant material: identification of plant material suitable for planting and sources of supply; methods used to transport and prepare plant material for planting

Other considerations: safe use of equipment used for establishing protected crops; relevant current health and safety legislation and codes of practice; organic standards and principles

3 Know how to maintain plants in protected production situations

Maintaining protected crops: techniques for maintaining protected crops eg irrigation, nutrition, trimming, training and supporting; specified environmental conditions for crops; maintenance of hygiene; problems which can occur in protected crops eg moisture and nutrient problems, damaged plants and excessive or inappropriate growth, identification and control of common pests and diseases (biological, chemical and cultural); growth and development records for protected crops; reasons for keeping records of environmental conditions; correct use of tools and equipment; organic standards; use of computers and other equipment for monitoring environmental conditions; safe working practices (including hazards related to the handling of equipment and materials such as fertilisers and artificial growing media); relevant current legislation and codes of practice

4 Be able to maintain plants in protection and prepare them for sale or display

Harvesting and preparation for sale: necessary conditions of crops for harvesting; safe and effective methods for harvesting crops (manual and mechanical); maintaining the quality of the crop during harvesting; acceptable rates of harvesting in the commercial sector; importance of maintaining health, safety and hygiene during harvesting; methods for preparing harvested crops including handling, grading, packing (individual, small scale, large scale), labelling, conditioning, cooling, cleaning and drying

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 list advantages and disadvantages of glasshouses and polythene tunnels in which to produce plants	**M1** compare the use of different types of protected environments in the production of specified horticultural crops	**D1** explain how the use of protected environments can extend the availability of specified crops
P2 describe construction and cladding materials used in protected cropping structures		
P3 describe the factors affecting the growing environment and how these are monitored [IE, SM]	**M2** explain how the environment can be manipulated to improve the health, growth and yield of protected crops	
P4 prepare sites, containers, growing media and plants in readiness for planting [CT, RL, SM]		
P5 pot young plant material so as to optimise success and minimise waste		
P6 set out and provide aftercare to plants following potting	**M3** describe how aftercare of plants following potting will determine crop quality at harvest	

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P7 recognise problems in plant production caused by moisture, nutrition, physical damage and excessive or inappropriate growth [RL, EP]		**D2** describe actions that could be taken to minimise problems in plant production
P8 describe methods of irrigation and liquid feeding	**M4** describe the suitability of different irrigation and liquid feeding methods for a specific crop.	**D3** discuss how irrigation and plant nutrition methods affect quality at harvest.
P9 recognise different types of unwanted growth and the response that is required		
P10 describe how plant maintenance activities relate to the production schedule		
P11 water plants by hand and automatic methods		
P12 maintain plants in production situations by appropriate methods so as to optimise success and minimise waste		
P13 harvest or collect and prepare plants for sale or display.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable collections and will links to work experience placements.

Tutors delivering this unit have opportunities to use as wide a range of techniques as possible. Lectures, discussions, seminar presentations, site visits, supervised practicals, research using the internet and/or library resources and the use of personal and/or industrial experience would all be suitable. Delivery should stimulate, motivate and educate learners.

Learners should have access to suitably equipped protected production environments in which to practise and perfect their practical growing skills. Learners could work individually or in small groups to produce edible and ornamental crops, to an agreed schedule, from crop establishment through to harvesting. The crops selected may reflect those grown by local commercial producers.

Work placements should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities are undertaken, so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to prepare ground or growing media for planting, plant and care for a specified commercial horticultural crop in a protected environment and they should ask for observation records and/or witness statements to be provided as evidence. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Whichever delivery methods are used, it is essential that tutors stress the importance of health and safety and environmental issues and the need to manage the resource using legal methods.

Risk assessments must be undertaken before any practical activities. Learners should not be required to undertake tasks that are beyond their physical capabilities.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may also be taking as part of the programme of study.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview to the unit and relevance to the industry.
Assignment 1: Protected Environments (P1, P2, P3, M1, M2, D1) Tutor introduces the assignment brief.
Introduce types of structures and facilities; learners to describe both structures and the equipment and techniques for environmental control. Discuss the importance of health and safety.
Assignment 2: Crop Establishment (P4, P5, P6, M3, D2) Tutor introduces the assignment brief.
Principles of crop establishment: theory session: introduce different methods and techniques. Learners prepare ground and growing media for planting specified horticultural crops grown in protected environments. Describe important factors affecting plant establishment eg choice of planting material, variety and spacing. Learners establish a crop in a protected environment and record its performance.
Assignment 3: Crop Maintenance (P7, P8, P9, P10, P11, M4, D3) Tutor introduces the assignment brief.
Describe the maintenance requirements of the chosen crop from assignment 2. Learners to review the performance of the crop material they established. Practical sessions: crop inspections to be carried out at specified intervals and any problems identified and solutions suggested.
Assignment 4: Harvesting and Marketing (P12,P13) Tutor introduces the assignment brief. Theory session: commercial harvesting methods and techniques. Learners describe harvesting methods used in protected crops. Learners harvest and prepare specified protected crops for marketing.
Unit review.

Assessment

For P1 and P2, learners must describe protective structures and facilities suitable for crop production and list the merits/drawbacks of each type. Evidence could take the form of a pictorial presentation with notes or a PowerPoint presentation.

For P3 learners need to describe the factors affecting the growing environment and how these are monitored. Evidence could be in the same format as for P1 and P2.

For P4, learners should prepare sites, containers, growing media and plants in readiness for planting the crop. For P5, they need to pot young plant material safely, optimising success and minimising waste. Tutors should identify the crop through discussion with learners. For P6, learners need to set out and provide aftercare to plants. Learners could continue to keep records in their diaries. Evidence could be through tutor observations during practical activities and learners keeping a crop production diary.

For P7 and P9, learners will provide information on problems associated with protected plant production. Learners need to identify strategies for dealing with problems that occur. Learners will continue to keep records in their diaries. Evidence could take the form of a pictorial presentation with notes or a PowerPoint presentation.

For P8 and P10, learners must describe how plant maintenance activities relate to the production schedule for their chosen crop. Evidence could be provided through discussion with the tutor and/or the production of a written report.

For P11, P12 and P13, learners need to demonstrate appropriate maintenance methods including pruning/trimming; training/twisting; weed control; removing dead/damaged unwanted plant growth where relevant. Evidence could be in the form of answers to questions asked during practical sessions which are appropriately evidenced using observation records and/or the crop production diary.

For M1, learners are required to compare the use of different types of protected environments in producing specified horticultural crops. These may be the same as those used to provide evidence for other criteria. Learners could include in their evidence examples of protected environments that they have been involved in or seen during the delivery of this unit. Evidence could take the form of a pictorial presentation with notes or PowerPoint presentation.

For M2, learners are required to explain how the protected environment may be manipulated to improve the quality and yield of a specific crop. For M3 learners need to provide information on how plant aftercare determines crop quality at harvest.

For M4, learners should describe how different methods of irrigation and liquid feeding are suited to a specific crop in a specified growing regime (for example overhead watering versus low level systems for cut flowers under glass).

Evidence could be provided through the development of an assignment or report on protected plant production relating to evidence from practical activities carried out.

For D1, learners are required to explain how the environment can be manipulated to extend the availability of specified protected crops. Tutors should identify the specified crops, or agree them in discussion with learners. The crops may be the same as those used to provide evidence for other grading criteria. Evidence could be provided in the same format as for M3.

For D2, learners should be able to suggest ways in which problems in plant production could be avoided or minimised. Evidence could be provided through discussion with the tutor.

For D3, learners should discuss how crop quality at harvest may be influenced by the irrigation and plant nutrition regime adopted during plant production. Evidence could be provided through discussion with the tutor.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, M2, D1	Protected Environments	Introduce types of structures and facilities and analyse these, describe techniques for environmental control and the importance of health and safety.	Pictorial presentation Written report
P4, P5, P6, M3, D2	Crop Establishment	Establish a crop in a protected environment and record and review its performance.	Crop production diary Practical observation and assessment
P7, P8, P9, P10, P11, M4, D3	Crop Maintenance	Review the performance of the crop they established. Crop inspections to be carried out at specified intervals, any problems identified and solutions discussed.	Pictorial presentation Crop diary Discussions with the tutor
P12, P13	Harvesting and Marketing	Harvest and prepare specified protected crops for marketing.	Practical observation and assessment. Written evidence

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertake Work-related Experience in the Land-based Industries	Undertake and Review Work Experience in the Land-based Industries
Environmental and Land-based Business	Undertake Horticultural Production Techniques – Protected
Participate in Horticultural Crop Production	Undertake Identification, Selection and Use of Ornamental Plants
Undertake Nursery Stock Production	
PH1 Clear and prepare sites for planting crops PH2 Set out and establish crops PH3 Monitor and maintain the growth and development of crops PH4 Harvest and prepare intensive crops CU79 Identify, collect and prepare plants for dispatch	

Essential resources

Centres offering this unit should ensure that learners have supervised access to appropriate resources, either at the centre or at nearby commercial premises. Facilities required for this unit must include access to a range of protected crop production resources. Sufficient cropping areas and plant types are required so that learners have adequate experience of the working environment. Facilities must reflect those found in professional horticulture businesses in the local area, and should give learners the opportunity to develop their practical ability.

The equipment and consumables required include glasshouses and/or polythene tunnels, a range of plants including edible and ornamental crops, a range of suitable growing media, hand tools, pedestrian controlled equipment, packing and grading facilities, crop support and irrigation equipment.

Employer engagement and vocational contexts

This unit focuses on practical aspects of protected plant production and will give learners background knowledge covering a variety of protective structures and techniques used in commercial crop production. Centres are encouraged to create and develop links with local nurseries and garden centres. This could be through visits from nursery staff or horticulturalists or visits to commercial growers. When learning about the skills and techniques involved in protected plant production, learners could be encouraged to gain work experience with a local nursery.

Indicative reading for learners

Textbooks

Adams C R and Early M P – *Principles of Horticulture* (Butterworth-Heinemann, 2004) ISBN 978-0750660884

Biggs M, Cushnie J, Flowerdew B and Swithinbank A – *Gardener's Question Time Techniques and Tips for Gardeners* (London: Kyle Cathie Ltd, 2005) ISBN 978-1856265706

Biggs T – *Growing Vegetables (RHS. Encyclopaedia of Practical Gardening)* (Mitchell Beazley, 1999) ISBN 978-1840001525

Dawson P – *A Handbook for Horticultural Students* (Peter Dawson, 1994) ISBN 978-0952591115

Hessayon D G – *The New Vegetable and Herb Expert* (Expert Books, 1997) ISBN 978-0903505468

Salt B – *Gardening Under Plastic – How to Use Fleece, Films, Cloches and Polytunnels* (BT Batsford Ltd, 2001) ISBN 978-0713484489

Salt B – *Vegetables: The Practical Guide to Success, Second Edition* (Batsford, 2000) ISBN 978-0713486216

Journals

Horticulture Week

The Grower

Websites

www.ishs.org	International Society for Horticultural Science
www.nfu.org.uk	National Farmers Union
www.rhs.org.uk	Royal Horticultural Society
www.soilassociation.org	Soil Association (organic growing)

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	researching background information on protective structures and techniques
Creative thinkers	using results from observations of the chosen crop to review its performance and suggest improvements
Reflective learners	using results from observations of the chosen crop to review its performance
Self-managers	organising resources required for crop production
Effective participators	discussing options with their tutor for dealing with crop problems.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	researching protected cropping techniques using a variety of sources of information
Reflective learners	analysing the performance of the production method and suggesting improvements
Self-managers	monitoring and caring for the protected crop.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	using the internet to research appropriate information on protected cropping techniques
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	producing written assessments using ICT programmes
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	evaluating the success of a particular production method by calculating percentage of unmarketable plants
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting their report on the facilities and techniques used in protected plant production.
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	

Unit 13: Presentation and Service for Retailing in the Land-based Sector

Unit code: A/600/9356

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

The learner will be able to plan the layout of a land-based retail outlet. The learner will know the products and services offered by a given land-based retail outlet, along with how they are stocked. Practical skills of how to display products will also be demonstrated. Health and safety considerations of the store will be discussed. The learner will also demonstrate appropriate customer care skills.

Unit introduction

Working within a land-based retail environment will be varied and challenging especially at busy times of the year. Ever changing products, seasonal demand and the needs of customers are essential to the success of retail businesses.

This unit covers the planning and layouts used within retail outlets, products and services available and the preparation and display of products for sale. It also looks at the key areas of customer service and care. It is therefore essential that this unit is delivered in the context of the land-based sector being studied.

Throughout this unit learners will be made aware of the health and safety implications of the work they are carrying out and legislation relating to the subject. Learners will develop skills in a range of customer care activities including processing payments and investigating customer satisfaction.

On completion of this unit learners will have a basic understanding of working within a retail environment and demonstrate skills that relate to their own area of study. The unit will also prepare learners for a range of vocational jobs within retail and will provide a sound foundation for further study at a higher level.

Learning outcomes

On completion of this unit a learner should:

1 Be able to design a suitable layout for a land-based retail outlet

2 Understand the products and services provided by a land-based retail outlet

3 Be able to prepare and display products for sale

4 Be able to demonstrate appropriate customer care skills.

Unit content

1 Be able to design a suitable layout for a land-based retail outlet

Retail outlets: eg superstore, shop, stall, discount store, in store franchise

Planning layout: space available, ease of movement, display areas, product positioning, styles of layout and evaluation

Health and safety: considerations eg access egress, fire and accident procedures, first aid facilities, risk assessment, waste disposal

Current legislation: Sale of Goods Act 1979, Trade Descriptions Act 1968, The Supply of Goods and Services Act 1982, Sunday Trading Act 1994, Health and Safety at Work Act 1974; Pet Animals Act 1951

2 Understand the products and services provided by a land-based retail outlet

Land-based retail outlets: eg garden centre, nursery, florists, pet shop, tack shop, feed supplier, DIY store, Machinery outlet, farm shop

Products and services: types of products, types of services available, seasonal and non-seasonal products; factors affecting choice eg cost, profit margin, lifespan and care of products both perishable and non-perishable, marketing, availability, personal preference, delivery

3 Be able to prepare and display products for sale

Prepare products for sale: preparation of products both perishable and non-perishable eg adding packaging, wrapping or trims to improve appearance and shelf life, removing damaged products; clear labelling eg price in line with relevant current legislation, attracting customers eg sales, loyalty products, marketing

Display products for sale: types of display eg themed, point of sale, window, racks, shelves; principles of display eg colour, texture, shape; health and safety eg tidiness, shelf life

Maintenance of products: stock control, stock rotation, shelf life, tidiness of displays, presentation, disposal of spoilt products and those that have reached their sell-by date

4 Be able to demonstrate appropriate customer care skills

Processing payments: procedures for payment by cash, cheques, debit and credit cards including chip and pin payments, correct procedures for handling payments, completing documentation eg purchases made on business accounts, basic checks for fraudulent payments with cash, cards, cheques, using a cash register; security

Dealing with customers: how to greet customers both on the telephone and in person, presentation of self, interpreting body language, own use of body language, bringing out the selling points, offering assistance and advice, creating and closing a sale, dealing with difficult customers and situations

Customer satisfaction: quality and availability of products and services, quality of customer care skills, value for money, methods of identifying customer satisfaction eg questionnaire, analysis of complaints

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 plan the layout for a land-based retail outlet [IE, SM]	**M1** complete risk assessments for given land-based retail outlet	
P2 report on the health and safety and legislative requirements of a retail outlet [SM]		
P3 justify the layout of land-based retail outlet		
P4 review products and/or services in a given land-based retail outlet [IE]	**M2** suggest ways to add value to perishable and non perishable products	
P5 evaluate factors influencing choice of products and services for a given land-based retail outlet [IE, RL]		
P6 describe the stocking requirements of products being sold in given land-based retail outlet		
P7 prepare products for sale [TW, SM]	**M3** complete maintenance checks for given land-based retail outlet	**D1** explain how given displays attract customers
P8 display products for sale [TW, SM]		
P9 maintain displays within a given land-based retail outlet [TW, SM]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P10 perform customer care related activities ◊ processing payments ◊ dealing with customers ◊ customer satisfaction [TW, SM]	**M4** demonstrate appropriate customer service skills to meet given objectives.	**D2** produce easy to follow guidelines on customer care.
P11 describe the importance of customer care in land-based retail outlets. [CT]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Tutors delivering this unit have opportunities to use an extensive range of teaching techniques including, lectures, discussions, simulation, role playing, case studies, site visits and practical activities, research using the internet and/or library resources and the use of personal and/or industrial experience. Delivery of this unit should stimulate, motivate and educate the learner.

Health and safety issues relating to work must be stressed and regularly reinforced, and risk assessments must be undertaken prior to practical activities. Learners should be taught safe working practices by demonstration and supervised practical work. Thereafter they should be given sufficient time and guidance to develop practical skills. The underpinning principles of customer care explored in this unit should be related to practical work undertaken and referred to during practical work in order to help learner's associate theory and practice.

The first part of the unit will cover the design and layouts used in land-based retail outlets. Planned visits to a variety of these within the land-based sector being studied will be a useful. This will aid learning and should include activities that encourage learners to explore the scope and significance of work in different types of retail outlet. Centres may use their own retail facilities if they are appropriate to the sector being studied. Visiting expert speakers, for example a manager from those listed in the content, garden centre, nursery, florists, pet shop, tack shop, feed supplier, DIY store, machinery outlet or farm shop could talk about their work and the designs they use. Emphasis should be placed on the health and safety and environmental aspects of the design, in order to increase learner awareness of their responsibilities.

Through a range of formal lectures, discussions, supervised practicals and simulations, learners will develop their knowledge of the main products and services within the industrial sector. It is expected that learners look at the factors that affect customer product choice and the product advice that is given to customers by retail staff or from the product itself. Off site visits to retail outlets, especially during seasonal times could form part of the delivery. Visiting expert speakers could add insight into the subject and embed further skills and knowledge.

When preparing and displaying products techniques should be varied, combining theory and practical sessions. Formal lectures, discussions, simulations and role playing, practicals and presentations by learners could form part of the delivery. Theory should be linked to the practical situation found in appropriate retail outlets. Relevant visits or visiting speakers could add relevance of the subject to the learners.

Customer care skills can be formed via formal lectures, demonstrations, simulations, case studies, role play and supervised practicals. Learners will also be able to develop knowledge and skills through work placement or by working in a centre's own retail facilities (if appropriate). It is expected that learners will develop knowledge of appropriate responses to customers within a range of situations. Visiting a customer service department at a range of outlets will allow expert speakers to talk about the importance of their work.

Learners may have the opportunity to contribute to parts of this unit and its criteria while on work placements. They should be encouraged to ask for observation records and/or witness statements to be provided as evidence. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Tutors should integrate the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments in the learner's programme of study.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit
Assignment 1: Retail Outlet Design (P1, P2, P3, M1)
Tutor introduces assignment
Theory based sessions: safety at work, developing under pinning knowledge of the risks and hazards within retail outlets
Theory based sessions: land-based retail outlets, design, products and services
Off site visits
Personal study
Assignment 2: Prepare and Display Products for Sale (P4, P5, P6, P7, P8, P9, M2, M3, D1)
Tutor introduces assignment
Theory based sessions: preparation and display
Practical demonstrations, observations and assessments on preparation and display
Work-based activities
Personal study
Assignment 3: Customer Care (P10, P11, M4, D2)
Tutor introduces assignment
Theory based sessions: customer care activities
Practical demonstrations, observations and assessments on customer care activities
Personal study
Tutorial 1:1 help and guidance
Unit review

Assessment

All assessment and grading criteria are based around retailing for land-based outlets, where possible these should be related to a real outlet with links to the centre however centres are able to make use of good quality case study materials for those tasks that cannot be undertaken within a real retail context.

Learners will need to meet all pass criteria to successfully complete this unit.

For P1, learners have to plan a layout for a land-based retail outlet. Tutors may either choose the retail outlet or may agree it with the learner. It must, however, be linked to the land-based sector being studied.

P2 looks at the health and safety and legislative requirements of a retail outlet. Learners should investigate laws relating to themselves, customers and the general public, other employees and the employer in the context of a selected outlet. It is expected that the evidence to this criterion should be linked to the retail outlet in P1.

P3 requires learners to review the main products and services that are available in a given land-based retail outlet. This could again be the same retail outlet as used in P1.

Evidence for P1, P2 and P3 could take the form of a retail planning project including an annotated poster showing plans.

P4 requires learners to review the products and/or services of a given land-based outlet in terms of what's available, when its available and how they are presented. Evidence could be in the form of a report. P5 and P6 requires a simple evaluation of the factors that influence choice of products and services and description of stocking requirements for a given outlet. Evidence for this could be linked to P4 and follows neatly the review of products undertaken. Where possible the size and complexity of the tasks should be the same for each learner to ensure fairness of assessment.

P7 and P8 require learners to prepare and display products for sale. Where possible the number and quantity of products in each category should be the same for each learner to ensure the fairness of assessment. Simulation exercises could be used to obtain evidence for these criteria. However, it could be assessed directly by the tutor during practical activities within a retail outlet. If this format is used, suitable evidence from guided activities would be observation records completed by the learner and tutor. If assessed during a work placement, witness statements should be provided by a suitable representative and verified by the tutor. Guidance on the use of observation records and witness statements is provided on the Pearson website. n addition risk assessments should be completed for all practical tasks.

For P9, learners are required to maintain displays and should be linked to P7 and P8 and assessed in the same format as these.

P10 requires learners to perform the customer care related activities of process payments and serve customers. It must be linked to the land-based sector being studied by the learner. Where possible the payments and customers should be the same for each learner to ensure fairness of assessment. Tutors may use difficult customers or scenarios during the assessment process, but they should be the same and fair to all learners. Evidence for this criterion may be gathered in a manner similar to that described for P7 and P8.

P11 requires learners to describe the importance of customer care in land-based retail outlets, this could be achieved using a report style or a leaflet aimed at a new employee for instance.

In addition to the pass criteria above learners wishing to gain a merit grade will have to complete all merit tasks.

M1 requires learners to complete risk assessments for the given Land based retail outlet linking with the P2 criteria.

For M2, simulation exercises could be used to obtain evidence for this criterion and may be linked directly to the retail outlet used in providing evidence for other criteria. It must, however, be linked to the land-based industrial sector being studied by the learner. Where possible the products should be the same for each learner to ensure fairness of assessment. Evidence for this could be in short answer structure questions or through observations completed by tutor/employer and learner.

M3 will require learners to complete a maintenance checklist, this should be related to the retail outlet identified in P1 and could take the form of a table included in the project.

For M4, simulation exercises could be used to obtain evidence and this may be linked directly to the retail outlet used in providing evidence for other criteria. Objectives should cover correct processing of payments and good customer service including greeting, own presentation, use of body language, assisting with sales and difficult customers. Evidence is likely to be through observations completed by tutor/employer.

In addition to the merit criteria above learners wishing to gain a distinction grade will have to complete all distinction tasks.

D1 requires learners to given valid explanations of how displays attract customers covering key points. Evidence could be in the form of an advertising poster or flyer highlighting the key points.

For D2, learners need to develop some easy to follow guidelines on ensuring customer satisfaction and dealing with complaints. This could be in the form of an annotated poster or new employee guide to customer care.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1	Retail Outlet Design	The layout and products of retail outlets will not only attract the customer but keep them coming back. In this assignment you will acquire the knowledge to plan a layout and review products of a retail outlet suitable for your own area of study. You will also give consideration to the health and safety and legislation involved.	Retail planning project Risk assessments Annotated poster showing plans
P4, P5, P6, P7, P8, P9, M2, M3, D1	Prepare and Display Products for Sale	A practical based assignment in which you will be required to prepare and display actual products for sale as well as add value. Maintenance checks, correct disposal of waste and evaluation skills will also be gained	Observation records Witness statements Risk assessments
P10, P11, M4, D2	Customer Care	Customers are the reason you have a retail outlet. In this assignment you will perform customer care related activities including processing payments, demonstrating good customer service and describing ways of attracting the customer.	Observation records Witness statements Leaflet Flyer Employee guide and questionnaire

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Environmental and Land-based sector suite. This unit has particular links with the following unit titles in the land-based suite:

Level 2	Level 3
Undertake Work Related Experience in the Land-based Industries	Undertake and Review Work Experience in the Land-based Industries
Establish and Maintain Plants Outdoors	Undertake Retail Merchandising for the Land-based Sector
Undertake Nursery Stock Production	

Essential resources

Access to a retail environment with a range of equipment and products is essential for the delivery of this unit and must relate the learners own area of study. Ideally this would be a commercial environment, but centres may use a simulated environment if necessary.

Internet access and support should be available too.

Employer engagement and vocational contexts

This unit focuses on retail design and customer care. Learners will be encouraged to develop an understanding of the risks and hazards while working in their chosen sector including health and safety of themselves, other employees, employers and their customers. Centres are encouraged to develop links with local businesses within the land-based retail sector, so that learners can experience what it would be like to work within this area. This could be via off site visits or guest speakers.

Indicative reading for learners

Textbooks

Barrow C – *The Essence of Small Business* (FT Prentice Hall, 1998) ISBN 978-0137486410

Cox R and Brittain P – *Retailing: An Introduction* (FT Prentice Hall, 2004) ISBN 978-0273678199

Hammond R – *Smart Retail: Turn Your Store into a Sales Phenomenon, 2nd edition* (Prentice Hall; 2007) ISBN 978-0273712770

Johns T – *Perfect Customer Care, 2nd new edition of Revised edition* (Random House Business Books, 2003) ISBN 978-1844131532

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are …
Independent enquirers	planning the layout for a retail outlet exploring from different perspectives reviewing products and/or services
Creative thinkers	describing the importance of customer care
Reflective learners	evaluating factors influencing choice of products and services
Team workers	preparing products for sale displaying products for sale
Self-managers	report on the health and safety and legislative requirements completing risk assessments preparing products for sale.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	justifying the layout of retail outlets describing ways to attract customers
Creative thinkers	completing maintenance checklists describing ways to attract customers
Reflective learners	suggesting ways to add value to products making recommendations for change with design
Self-managers	completing risk assessments suggesting ways to add value to products
Effective participators	making recommendations for change with design.

Functional Skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	presenting information on planning a layout for land-based retail outlet
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching the internet for health and safety and legislative requirements of a retail outlet
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	designing tables for maintenance plans presenting leaflets, flyers, posters producing risk assessments produce easy to follow guidelines on customer satisfaction and dealing with complaints
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	presenting project on planning retail outlets
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	produce a risk assessment for practical tasks
Use appropriate checking procedures and evaluate their effectiveness at each stage	measure retail outlet sizes before planning their design
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	producing a risk assessment for practical tasks measuring retail outlet sizes before planning their design
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting information on planning a layout for land-based retail outlet demonstrating good customer service
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reviewing products being sold in land-based retail outlets
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	report on the health and safety and legislative requirements of a retail outlet describe the stocking requirements of products being sold in given land-based retail outlet describe the importance of customer care in land-based retail outlets.

Unit 14: Maintain Winter and Summer Sports Turf Surfaces

Unit code A/600/9972

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to provide learners with an understanding of the principles of the maintenance of winter and summer sports turf and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Unit introduction

As sport is one of the largest and most successful aspects of the leisure industry it is imperative that the surfaces which are played upon are maintained to the highest standard possible. Regardless of the level of competition or participants' level of skill, all surfaces must be maintained effectively and efficiently to ensure the enjoyment and safety of the competitors.

This unit covers the maintenance of both winter and summer sports surfaces as their maintenance requirements can be very different. Learners will take part in practical activities and carry out theoretical work which will allow them to show that they can undertake a range of maintenance tasks successfully and understand why these tasks are required They will consider the implications of current health and safety legislation and appreciate how to carry out maintenance operations in ways that minimise adverse impacts on the environment.

On completion of this unit learners will be able to apply skills to manage and maintain both winter and summer surfaces to a standard acceptable to each sports governing body, prepare these surfaces for play and monitor the effects of any maintenance practices.

Learners will carry out maintenance which reflects the sports surfaces accessible at their centre, or at local sporting facilities.

Learning outcomes

On completion of this unit a learner should:

1 Be able to maintain and renovate winter sports surfaces to sustain or improve the level of quality

2 Be able to maintain and renovate summer sports surfaces to sustain or improve the level of quality

3 Understand the requirements for specific sports surfaces

4 Be able to monitor and assess the quality of sports surfaces.

Unit content

1 Be able to maintain and renovate winter sports surfaces to sustain or improve the level of quality

Turf maintenance operations: mowing with powered pedestrian equipment; scarification and aeration; using manual and powered pedestrian equipment; topdressing using manual and pedestrian powered equipment; rolling using pedestrian equipment; switching/brushing; applying fertiliser by hand and using pedestrian equipment; irrigation; pest; disease, weed and moss control

Turf renovation: over seeding by hand and using pedestrian equipment; lifting turf, patching and plugging by hand; forking up by hand

Health and safety: relevant current legislation; risk assessment; personal protective equipment (PPE); environmental good practice (minimisation of impacts)

Sports surfaces: football, rugby (league and union) field hockey, golf, race courses

2 Be able to maintain and renovate summer sports surfaces to sustain or improve the level of quality

Turf maintenance operations: mowing with powered pedestrian equipment; scarification and aeration; using manual and powered pedestrian equipment; topdressing using manual and pedestrian powered equipment; rolling using powered equipment; switching/brushing; applying fertiliser by hand and using pedestrian equipment; irrigation; pest; disease, weed and moss control.

Turf renovation: over seeding by hand and using pedestrian equipment; lifting turf, patching and plugging by hand; forking up by hand.

Health and safety: relevant current legislation; risk assessment; personal protective equipment (PPE); environmental good practice (minimisation of impacts)

Sports surfaces: cricket, bowls, tennis or croquet; athletics (field and track); horse racing (jumps and flat)

3 Understand the requirements for specific sports surfaces

Surface requirements: surface response to ball, animal or player;, speed; bounce, trueness; degree of consolidation; moisture content; durability

Turf quality: grass species; sward density; height of cut; direction of cut; soil characteristics (texture, structure, water infiltration and drainage requirements); permissible repairs.

Line markings and equipment: line marking equipment and compounds; safe handling and storage of marking compounds; markings required by specific sports; how to set out sports equipment in a way which meets the needs of the sport and the standard of the event

4 Be able to monitor and assess the level of quality of sports surfaces

Turf grass: playability and performance (ball bounce, ball behaviour, ball roll, traction/grip, surface evenness, estimation of sward density); possible effects of maintenance, repair and renovation

Surface inspection: standards and monitoring for sports surfaces; requirements of relevant governing bodies

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 maintain winter pitches safely using trailed, mounted or ride on equipment	**M1** identify correct timings for winter sports surface maintenance tasks	**D1** compare the efficiency and sustainability of selected maintenance tasks for winter sports surfaces
P2 demonstrate how to measure and mark out a winter sports pitch		
P3 set out equipment and materials required for the sport		
P4 carry out renovation activities to winter sports pitches safely	**M2** explain the most suitable repair and renovation methods for selected problem areas	**D2** compare repair and renovation methods in terms of efficiency, cost and sustainability
P5 mow summer sports surfaces safely with pedestrian operated equipment		
P6 prepare a summers sports surface ready for play		
P7 scarify, aerate and top-dress a summer sports surface safely		
P8 repair summer pitches by over-seeding and patching		
P9 comply with current legislation when renovating and maintaining turf surfaces		
P10 state the objectives of the range of activities used to prepare and maintain winter and summer sports surfaces [IE, CT]	**M3** describe how ground conditions will affect maintenance operations	
P11 explain how the type of machine and frequency of use affects the turf surface [IE]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P12 identify Performance Quality Standards that are appropriate to specific surfaces	**M4** explain the importance of ensuring that the surface meets the required standard.	**D3** discuss how maintenance operations may be manipulated to achieve specific quality standards.
P13 explain the benefits of monitoring the quality of turf surfaces		
P14 use at least 16 appropriate Performance Quality Standards to monitor the level of quality of a turf surface [TW]		
P15 interpret the results of monitoring activities		
P16 identify any remedial action that may be required.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable sporting venues and facilities and will link to work experience placements.

Tutors delivering this unit have opportunities to use as wide a range of techniques as possible. Lectures, discussions, seminar presentations, site visits, supervised
practicals and internet and/or library-based research would all be suitable. Delivery should stimulate, motivate, educate and enthuse learners. Adequate time should be given to cover sports surface, and the related practical task, in sufficient breadth and depth.
Whichever delivery methods are used, it is essential that tutors stress the importance of safe working practices, the potential impact turf maintenance can have on the environment and the need to manage the resource using approved methods.
Health and safety issues relating to working on sports turf surfaces must be stressed and regularly reinforced and risk assessments must be undertaken before practical activities. Adequate PPE must be provided and used following the production of suitable risk assessments.

Learning outcome 1 covers the maintenance of winter sports turf surfaces for example: football, rugby, hockey, golf, horse racing. Delivery is likely to be formal lectures, discussion, site visits, supervised practical sessions and independent learner research. Learners should have access to the surfaces and cover the operations listed in the unit content to develop the skills needed in the practical sessions. Ongoing monitoring and assessment of progress should be documented and discussed with learners. Visiting expert speakers could add to the relevance of the subject for learners. For example, a head greenkeeper/groundsman of a national venue or a drainage contractor could talk about their work, the situations they face and the methods they use.

Learning outcome 2 covers the maintenance of summer sports turf surfaces for example cricket, tennis, athletics, bowls Delivery is likely to be formal lectures, discussion, site visits, supervised practical sessions and independent learner research. Learners should have access to the surfaces and cover the operations listed in the unit content to develop the skills needed in the practical sessions. Ongoing monitoring and assessment of progress should be documented and discussed with learners. Visiting expert speakers could add to the relevance of the subject for learners. For example, a head greenkeeper/groundsman of a national venue or a drainage contractor could talk about their work, the situations they face and the methods they use.

Learning outcome 3 covers setting and marking out sports turf surfaces and the requirements of the sport from the surface being maintained. Delivery is likely to be formal lectures, discussion, site visits, supervised practical sessions and independent learner research. Visits to a variety of sites could enhance learners' appreciation of the range of sports turf and work carried out in sports turf industries.

Learning outcome 4 covers how to monitor and assess both how the surface reacts to the given sport and how the sport being played reacts to the surface. Delivery is likely to be formal lectures, discussion, site visits, supervised practical sessions and independent learner research.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Practical sessions maintaining and monitoring sports surfaces
Introduction to Assignment 1
Assignment 1: Maintenance of Winter Sports Surfaces (P1, P2, P3, P4, M1, M2, D1, D2)
Practical sessions marking out sports surfaces
Introduction to Assignment 2
Assignment 2: Prepare for Play (P5, P6, P7, P8, P9)
Practical sessions on identification of and repair/renovation and monitoring of areas in need of repair
Theory session on maintaining sports surfaces
Theory sessions on marking out sports surfaces
Theory sessions on identification of and repair/renovation of areas in need of repair
Introduction to Assignment 3
Assignment 3: Post Match/Season Renovations (P10, P11, P12, P13, P14, P15, P16, M3, M4, D3)
Various field trips to sports facilities
Independent sessions on monitoring playability and performance
Unit evaluation

Assessment

To achieve P1, learners must carry out maintenance operations on selected winter sports surfaces. Tutors should identify the sports surfaces and objectives or agree them through discussion with learners. Where possible to ensure assessment is fair the size and complexity of the task should be the same for all learners. This could be assessed directly by the tutor during practical activities. If this format is used then all practical work should be evidenced by learners and authenticated by the tutor.

To achieve P2, learners must measure and mark out winter sports pitches from scratch. The specific pitches to be marked out will be selected through discussion with their tutor and should reflect the types of pitches most likely to be encountered by learners. To ensure assessment is fair the size and complexity of the task should be the same for all learners.

To achieve P3, learners must to set out equipment and materials to enable the sport to be played within the confines of the associated rules. This can be evidenced and recorded by learners but must be authenticated by the tutor. Learners must set out equipment for both winter and summer sports

To achieve P4, learners must carry out renovation and repair activities on selected areas of winter sports turf. The areas will be in need of repair and learners need to use all the techniques listed under the Unit content.. To ensure assessment is fair the areas should be the same in size and complexity for each learner.

For P5, P7, P8 and P9 learners must maintain and repair summer pitches using all the techniques listed in the unit content as relevant to the situation.

For P6, learners must mark prepare a summer sports surface ready for play, this is likely to involve a cricket wicket. Where appropriate, cricket wickets may be included within P5, P7 and P8. This could be assessed directly by the tutor during practical activities. If this format is used then all practical work should be evidenced by learners and authenticated by the tutor.

For P10, learners should be able to list the objectives of pitch preparation and maintenance operations and link specific objectives to specific operations. This unit could be assessed by verbal questioning in conjunction with P5, P7 and P8.

For P11, P12 and P13 learners must provide information on sport surface requirements; this could be assessed as part of an assignment or report on sports turf surfaces.

For M1, learners are required to identify correct timing and frequency of maintenance operations for winter sports surfaces. It is expected that learners will use the practical tasks carried out for P1. Evidence could be a written report or presentation.

For M2, learners must explain repair and renovation methods available to the industry and how they can be used efficiently and effectively for selected problem areas. These methods can the same as used within P4.

For M3, learners will describe how prevailing ground conditions (for example drought, water logging, frost) influence the timing and type of maintenance operations to be undertaken.

For M4, learners must explain why it is important for sports pitches to meet the appropriate quality standards. Learners should be able to explain how quality specifications may vary according to the level at which the sport is being played for example a schools cricket wicket compared to a county standard wicket. Evidence could take the form of verbal answers to questions asked whilst carrying out practical work or as a short written report.

For D1, learners must compare the efficiency and sustainability of maintenance practices carried out on winter sports surfaces. These practices may be the same ones as for P1 and evidence could be in a written format.

For D2 learners must compare repair and renovation methods in terms of efficiency, cost and sustainability.

For D3, learners should discuss how maintenance operations may be manipulated to achieve particular performance objectives, for example how to increase/decrease the speed of a golf green. Evidence may be presented verbally or as a short written report.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1, M2, D1, D2	Maintenance of Winter Sports Surfaces	Continue and assist with the regular maintenance of winter sports pitches.	Practical and written report
P5, P6, P7, P8, P9	Prepare for Play	Ensure that the pitch is ready for play by marking out and placing furniture before the activity.	Practical and written report
P10, P11, P12, P13, P14, P15, P16, M3, M4, D3	Post Match/Season Renovations	Following the activity ensure that the playing surface is in a suitable condition. At the end of the season, carry out any maintenance work that you deem necessary to return the surface to being fit for purpose.	Practical and written report

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertake Work-related Experience for the Land-based Industries	Manage Winter and Summer Sports Turf Surfaces
Participate in Horticultural Crop Production Outdoors	
Undertake Nursery Stock Production	
L5 Maintain the health of sports turf L6 Present, maintain and repair sports turf for play	

Essential resources

Learners will need access to winter and summer sports surfaces and the relevant equipment required for setting up (for example goal posts and nets, hurdles, starting blocks).

They will also need access to sports turf maintenance equipment including hand tools (for example lutes, shovels, forks, switches and brushes, drainage forks); pedestrian equipment (for example rollers, fertiliser distributors, line markers) and powered equipment (for example pedestrian cylinder and rotary mowers, ride-on cylinder mowers, scarifiers, aerators).

The supply of consumables (for example top dressing, fertilisers, grass seed, line marking compound) should be sufficient to allow all learners to undertake practical activities.

In terms of quality, learners require access to quality measurement tools such as sports balls and footwear, quadrats, mirror gauges, and performance quality testing tools.

Employer engagement and vocational contexts

Links with local sports facilities will give learners opportunities to broaden their experience and possibly provide opportunities to gain practical experience. Internationally famous sports venues such as Wimbledon, Wembley and the Millennium Stadium are also often willing to host visiting parties of learners. Links with professional organisations such as the Institute of Groundsmanship and the Sports Turf Research Institute will allow learners to access information on current research and development and possibly provide guest speakers. All learners should be encouraged to attend the annual Saltex Event.

Indicative reading for learners

Textbooks

Adams W A and Gibbs R J – *Natural Turf for Sport and Amenity: Science and Practice* (Wallingford: CABI, 1994) ISBN 978-0851987200

Hayes P, Evans R D C, Isaacs S P – *The Care of the Golf Course* (Bingley: STRI., 1992) ISBN 978-1873431023

Hope F – *Turf Culture* (Blandford Press, 1978) ISBN 978-0304318544

Nikolai T A – *The superintendents guide to controlling putting green speed* (New Jersey: Wiley, 2005) ISBN 978-0471472728

Turgeon A J – *Turfgrass Management* (New Jersey: Prentice Hall, 2000) ISBN 978-0835978859

Journals

Pitchcare

The Greens Section Record

The Journal of the Sports Turf Research Institute

Websites

www.iog.org	Institute of Groundsmanship
www.stri.co.uk	Sports Turf Research Institute

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	carrying out research into sports surface requirements
Creative thinkers	asking questions about sports surface requirements
Team workers	collaborating with others when monitoring turf quality.

Unit 15: Introduction to Land-based Machinery Operations

Unit code: T/600/9596

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to introduce learners to the skills and knowledge associated with land-based machinery operations and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

Unit introduction

This unit is aimed at learners who may wish to take up a career in the land-based sector especially where skills are needed for using tractors or other similar powered vehicles together with the associated machinery and equipment. The unit emphasises practical skills using tractors, power units and machinery covering the essential skills of preparing, operating and maintaining tractors, equipment and machinery. Learners will firstly learn to recognise the different machinery that is available to use for a range of tasks. They will then learn how to prepare the machinery, use it in realistic situations and finally maintain it ready for use again. Learners will also learn the important legislative and environmental requirements that are increasingly important in the land-based industry of today.

Learning outcomes

On completion of this unit a learner should:

1 Understand safe working principles when using equipment and machinery

2 Be able to prepare land-based equipment and machinery for use

3 Be able to operate land-based equipment and machinery

4 Be able to maintain land-based equipment and machinery.

Unit content

1 Understand safe working principles when using equipment and machinery

Safe working principles: personal eg use of barrier cream; risk assessments; accident statistics; pre-start checks; mounting and dismounting; cold starting; fuelling procedures eg keep tank full overnight, bleeding air from pipes; power take off (PTO) procedures (eg guards, speeds, removal of shaft); hydraulics eg couplings, hoses, spool valves; interpret Decals; interpret odometer; locate main controls eg gauges, levers, buttons for electronics, pedals, dipsticks; ground conditions eg hard, soft, slope; use of gears and speed; use of manufacturers' handbooks

Machinery selection: identification and justification of machinery and equipment suitable to operations eg crop production, groundcare; pesticide application equipment

Legal and environmental considerations: current relevant legislation eg Health and Safety at Work Act 1974 (HASAWA), Control of substances hazardous to health 1989 (COSHH), Manual Handling Operations Regulations (1992); Personal Protective Equipment (PPE); age to drive on road; transport widths; transport loads (eg height, ropes and ratchet straps); mud on road

2 Be able to prepare land-based equipment and machinery for use

Tractor/power unit preparation: pre-start checks eg oil, coolant, diesel; tyres; battery; maintenance schedule eg handbook; wheels eg check wheel nuts, wheel widths to match machine; fore-loader (where applicable); drawbar

Equipment and machinery preparation: appropriate connections for attachment eg top link, PTO, hydraulic pipes, drawbar, linch pins and clips; check working parts eg nuts and bolts, shear bolts, tines, discs, bearings, coulters, blades, belts, gearbox oil, grease points, electrical connections

3 Be able to operate land-based equipment and machinery

Tractor/power unit operation: selection of appropriate gear to match ground/road conditions; transport safely to site; warning signals

Equipment and machinery operation: lift in and out of work; use of headlands; carry out adjustments in work (eg forward speed, top link, stabiliser bars, PTO speed, depth control, differential lock)

4 Be able to maintain land-based equipment and machinery

Maintenance: interpretation of operator handbook for service/maintenance schedules eg oil, fuel, filters, tyre pressures, coolant, lubrication; check and replacement of worn parts; cleaning; workshop safety eg axle stands, PPE, blocks; storage; waste disposal; record keeping; costs (parts, labour)

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 select appropriate equipment for land-based tasks	**M1** explain appropriate legal and environmental considerations when using a given machine	**D1** justify the selection of machinery for a specified task
P2 explain why manufacturers' instructions should be followed when working with land-based equipment and machines [IE]		
P3 explain the legal and environmental requirements associated with specific machines		
P4 identify the controls/devices/ instruments and other health and safety requirements for machinery and equipment		
P5 carry out adjustments on land-based equipment and machines to meet specific requirements prior to use	**M2** present maintenance requirements for a specified machine	
P6 explain the benefits of correct adjustment of equipment and machines		
P7 carry out pre-start checks, including fuelling		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P8 operate equipment and machines safely and efficiently for different land-based activities	**M3** monitor the use of machinery and equipment for a specified task	**D2** evaluate the use of machinery and equipment for a specified task.
P9 carry out activities to achieve the desired results when operating land-based equipment and machines		
P10 identify routine maintenance for land-based equipment and machines using manufacturers' instructions [EP]	**M4** produce a cost breakdown for replacing worn parts for a specified machine.	
P11 identify hazards and comply with risk assessments during maintenance activities [SM]		
P12 carry out different routine maintenance activities safely on a range of equipment and machines [TW]		
P13 record maintenance activities in an appropriate format.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

All centres must comply with the requirements of relevant current legislation and codes of practice, for example the Prevention of Accidents to Children in Agriculture Regulations 1998; and associated Approved Codes of Practice, for example the Health and Safety Executive *Preventing Accidents to Children in Agriculture*. Learners must be made aware of, and have access to, relevant health and safety legislation and know the importance of the use of risk assessment appropriate to each situation. Appropriate risk assessment must precede all practical machinery activities, learners must work in a safe manner at all times when using equipment or working with machinery. Learners must be supervised at all times and tutors must not request learners undertake tasks that are beyond their physical capabilities.

Delivery of this unit will involve both practical assessment and written assessment, visits to suitable collections and will have links to industrial experience placements.

The unit focuses on learners being able to identify, prepare, use and maintain a wide range of machinery and equipment as found on today's farms, countryside and horticultural units. Tutors should therefore endeavour to offer learners this wide range, even though in their specific locality such a range may not be seen so easily. Where there is a shortfall, tutors should aim to offer the learner the experience of recognising and using other machinery through visits to demonstrations, dealers, talks and work experience.

The tutor might wish to bear in mind the seasonality of tractor, power unit and machinery use. Tutors must therefore plan carefully the whole programme according to both seasonality and machinery in their locality. Tutors need to plan their assessment schedule carefully so that it covers not just learners operating machinery at a certain time of year, but throughout the course duration and to include, where appropriate, any work experience.

Learners will be preparing and maintaining various machinery in a workshop setting and so tutors must adhere to all health and safety procedures throughout the course duration. A strict policy of appropriate PPE must be enforced. This will obviously need to be repeated when learners are in working situations in the field and on visits. Learners should experience how workshops are organised, the range of tools and equipment available for machinery maintenance as well as consumables such as lubricants, filters and other items needed.

Learning outcome 1 covers the recognition of a wide range of machinery and equipment. Tutors will need to plan how they will offer learners the wide choice of machinery available. They might at this stage plan a visit to a local dealer, or to a working demonstration. Tutors need to emphasise the important environmental aspects of using machinery such as soil structure damage.

Learning outcome 2 is about preparing machinery and equipment and therefore will have an element of workshop experience to offer. Tutors must ensure that learners become familiar with using the wide variety of tools available in a modern workshop. Learners need to experience a variety of tractors and powered vehicles and be able to recognise and locate the different instruments, controls and signs or decals such as found on machinery. There is an increasing use of electronic instruments and controls in modern tractors and machinery, and so tutors need to be able to offer learners this choice.

Learning outcome 3 involves learners using machinery and equipment in the field. The ideal setting is either through work experience or at a centre's farm, horticultural unit or estate. Tutors should endeavour to allow learners maximum experience of a range of machinery. Tutors might be in a position to integrate learner experience with a centre's farm or with a local farmer, horticultural unit or countryside/nature park that can complement the range of machinery offered. Where possible, learners should be in a position to use the machinery that they helped prepare in outcome 2.

Learning outcome 4 is a logical follow on to the previous outcome. Where possible, tutors should involve learners to maintain equipment that has been experienced, such as that in learning outcome 1 or 3. Tutors need to plan the timing of this outcome so that learners can complete all relevant assessments. It may be necessary for tutors to plan for this outcome to be done after equipment and machine use in order that there are real maintenance tasks to be undertaken.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction to unit and unit overview.
Assignment 1: Machinery Selection (P1, P2, P3, P4, D1) Briefing.
Practical session: identify machinery, equipment, decals, instruments and gauges, pedals, levers, interpret handbook where relevant, observe/assist in using machinery for cultivations.
Theory session: identify and describe machinery for different purposes, interpret handbook, explain legal and environmental requirements when using machinery and equipment.
Assignment 2: Safe Machinery and Equipment Preparation (P5, P6, P7, M1) Briefing.
Practical session: prepare machinery and equipment for specified tasks safely, check parts for wear, interpret manufacturers' instructions, workshop safety, workshop tools, lubricate and fuel ready for use.
Theory session: legislation and environmental considerations for using machinery and equipment.
Theory session: recognise working parts of a range of machinery and equipment, reasons for correct preparation of machinery and equipment, fuel and lubricants.
Assignment 3: Safe Machinery and Equipment Operation (P8, P9, M3, D2) Briefing.
Practical session: carry out specified practical operations with machinery and equipment safely.
Theory session: working parts of machinery and equipment, ground/soil conditions needed for efficient working of machinery, efficient operation, safety, necessary field adjustments.
Assignment 4: Safe Machinery Maintenance (P10, P11, P12, P13, M2, M4) Briefing.
Practical session: workshop safety, maintain specified machinery, identify and replace worn parts, use workshop tools safely.
Theory session: interpret manufacturers' handbook, workshop tools and equipment, health and safety, maintenance schedules, records and job cards.
Unit review.

Assessment

For P1, learners need to select appropriate equipment for given land-based tasks. Learners must cover a minimum of three different tasks. For agricultural learners, machines selected could cover machinery for cultivations, drilling/planting, crop health, fertiliser manure application, harvesting and storage. For horticulture and countryside learners, machines could include mowers, strimmers and ground care equipment. Evidence could be captured through direct observation.

For P2, learners need to be able to explain reasons for following relevant manufacturers' instructions in relation to a minimum of two given pieces of equipment and/or machine.

For P3, learners must explain legal and environmental requirements; this must include relevant legislation covering age restriction, roadworthiness, health and safety issues and environmental issues associated with a minimum of two specific machines.

For P4, learners must be able to identify correctly a range of commonly used instruments, levers, pedals and decals found on machinery. They must state specific health and safety issues relevant to a minimum of two specified machines. Evidence for P2, P3 and P4 could be through an assignment or recorded observation using practical activities.

Health and safety must be paramount in any practical assessment.

For P5, learners need to be able to adjust parts of a given piece of machinery that need specific preparation prior to use. This should include use of lubricants such as grease and oils, nuts and bolts for tightness.

For P6, learners need to explain reasons for correct adjustment and preparation of machinery.

For P7, learners must be able to carry out pre-start checks on oil reservoirs (both engine and hydraulic oil), coolant, fuel, tyres and battery as well as re-fuel a machine as a minimum.

For P8 and P9, learners must be able to operate machinery safely, carry out necessary adjustments. For example if they are creating a seedbed, they should be able to use the relevant machinery and comment on the work produced as to whether the ground is suitable for drilling/planting. For horticulture this might cover the setting up and use of a potting machine. Countryside learners might use a post hole rammer for fencing. Evidence for P5 through P9 is likely to be through the use of observation records during practical assessments. As a minimum learners should operate two different machines.

For P10, learners need to recognise when machinery or equipment needs maintenance, such as oil and filter changes on a tractor or power unit, replacing worn cultivator or mower parts.

P11 could be assessed at the same time as P10 and be evidenced through completed risk assessments.

P12 can be assessed as an on-going exercise that learners perform during the year.

P13 could form part of a learners' workshop diary, recording maintenance activities that are carried out at specific times of year.

For M1, learners must explain legislative and environmental reasons for specifying use of machinery. For example, for agriculture, tutors could select either manure or fertiliser applicators for learners, who then need to describe NVZ and field margin requirements such as deflectors that avoid fertiliser in the hedgerow. Tutors need to ensure that learners are given the same machinery in order to have fairness of assessment. For horticulture and countryside relevant equipment should be chosen, this may include chose of power units to reduce environmental impact.

For M2, learners are required to show that they can organise the maintenance requirements of a specified machine including a list of all the necessary replacement parts needed.

For M3, learners need to monitor machinery use over a specified period of time, which must be the same for all learners. Evidence for M2 and M3 could be through a completed monitoring and maintenance record.

For M4, learners could use the same machinery as that selected for M2. Costs should include parts, allocation of labour and time needed for the machine repair.

For D1, in order to justify the selection of machinery for a specified task learners are expected to be able to present clear, logical and cogent reasons for using machinery. They must show evidence that they have compared other machinery and evaluated all considerations including environmental impacts.

For D2, learners are to evaluate how machinery and equipment was used for a specified task. For agriculture, for example, learners might evaluate the use of machinery for forage harvesting grass, planting potatoes, or producing a seedbed for a spring planted crop. For horticulture this might include compost preparation and potting equipment. Countryside might use equipment for preparing a surface, planting, fencing or grounds maintenance. They must include all the machinery used, including any associated machinery, and to evidence understanding of the need to match capacities and work rates of the machinery used.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, D1	Machinery Selection	You are employed at a dealership as a machinery apprentice. You need to select appropriate machinery for three separate purposes and justify your selection. You must identify instruments and health and safety requirements for two of these machines including appropriate legal and environmental considerations.	Practical observation Written evidence
P5, P6, P7, M1	Safe Machinery and Equipment Preparation	For a given machine you have been asked to prepare the machinery according to manufacturers' instructions. You need to make adjustments prior to use and explain the reasons for these and carry out all necessary pre-start checks.	Practical observation Written evidence
P8, P9, M3, D2	Safe Machinery and Equipment Operation	You must carry out practical operations for specified tasks using machinery safely and efficiently.	Practical observation Written evidence
P10, P11, P12, P13, M2, M4	Safe Machinery Maintenance	Carry out maintenance of machinery. Interpret manufacturers' instructions. Identify and replace worn parts. Produce a list of parts needed. Produce a cost of both replacement parts and labour.	Practical observation Written evidence

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Element CU27.1 Prepare equipment and machines for maintenance Element CU27.2 Carry out maintenance procedures	Undertaking Land-based Machinery Operations
Participate in Providing Estate Maintenance	Undertake Estate Skills
Undertake Specialist Land-based Machinery Operations	
Tractor Driving	

Essential resources

Learners will need access to a variety of machinery and equipment, a workshop or suitable work area with the necessary safety equipment and fields or similar where they can gain practice and be assessed. Instruction books and relevant workshop tools will be essential. Workshop areas should also include all the relevant consumables such as oil, filters, belts, nuts and bolts that will be needed for the course duration. Access to and use of all of these resources should form part of the learners' experience. Tutors must ensure that the working areas provide a safe environment for learners. An area for washing hands and storage of clothes/PPE should also be on hand.

Employer engagement and vocational contexts

Tutors should endeavour to promote links with their own centre's farm, with other local dealers and farmers who are willing to cooperate with offering work experience or visits to learners. Where there are local employers involved, tutors must ensure that strict adherence to health and safety is carried out so that learners can work in safety. Learners should also be given opportunities to do national proficiency training and assessment as relevant to their age and experience, such as telescopic forklift, tractor driving and handling, quad bike handling, Pesticide Applications 1 and 2 as well as any other opportunities for further training.

Indicative reading for learners

Textbooks

Bell B – *Farm Machinery* (Old Pond Publishing, 2008) ISBN 978-1903366684

Bell B and Cousins S – *Machinery for Horticulture, 2nd edition* (Old Pond Publishing, 1997) ISBN 978-0852363690

Culpin C – *Farm Machinery* (Blackwell Science, 1992) ISBN 978-0632031597

Journals

Farm Contractor

Farmers Weekly

Horticultural Week

Profi

Websites

Department for Environment Farming and Rural Affairs	www.defra.gov.uk
Environment Agency	www.environment-agency.org.uk
Farmers Weekly	www.fwi.co.uk
Health and Safety Executive	www.hse.gov.uk
Lantra	www.lantra.co.uk
Reed Business International	www.rbi.co.uk

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	identifying questions to answer relating to the importance of manufacturers' instructions
Team workers	collaborating with others when carrying out routine maintenance activities
Self-managers	identifying hazards and complying with risk assessments showing flexibility when priorities change
Effective participators	proposing practical ways forward for the maintenance of machinery.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	monitoring use of machinery
Creative thinkers	carrying out their own research and monitoring
Reflective learners	carrying out their own research and monitoring
Team workers	involved in work experience, visits
Self-managers	involved in work experience, national proficiency tests
Effective participators	on work experience.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	engaged in using the internet for presentation purposes
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	calculating speeds, distances, areas covered for a variety of machinery calibrating specific machinery for quantities of fertiliser to be used in the field calculating amounts of manure spread over given areas
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	engaged in group and independent discussions involving the selection, planning, using and maintaining machinery.
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	

Unit 16: Understand the Principles of Sports and Amenity Turf Maintenance

Unit code: K/600/9854

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to provide learners with an understanding of the principles of sports and amenity maintenance and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Unit introduction

The use of turf for general amenity, recreation and sports continues to grow, as does the requirement for turf professionals with the knowledge and expertise needed to maintain turf to the correct standard, depending on its use.

The unit focuses on developing and improving learner understanding of sports and amenity turf maintenance and renovation and includes assessment of their practical abilities.

On completion of the unit learners will have a thorough understanding of, and be able to carry out, a range of sports and amenity turf maintenance activities. This will include both theoretical and practical activities and learners will have the opportunity to use a wide range of turf machinery and equipment.

Learning outcomes

On completion of this unit a learner should:

1 Understand the effects of sports and amenity turf maintenance activities

2 Understand the irrigation and nutrition of sports and amenity turf

3 Understand sports and amenity turf renovation activities

4 Understand the use of Performance Quality Standards.

Unit content

1 Understand the effects of sports and amenity turf maintenance activities

Sports turf: football; rugby; hockey; cricket; golf

A*menity turf:* ornamental lawns; recreational lawns; parkland; housing areas; road verges

Maintenance activities: mowing; strimming; edging; spiking; scarifying; slitting; top dressing; over seeding; rolling; switching; brushing; marking; pest and disease control; weeding; health and safety; risk assessment; personnel protective equipment (PPE); environmental good practice (minimisation of impact)

Machinery: pedestrian rotary and cylinder mowers; ride on rotary and cylinder mowers; spikers, scarifiers, edging machines; hand held and tractor mounted sprayers; tractor mounted equipment including rollers, brushes, harrows etc.

Hand tools: rakes; scrake; garden rollers; besom; tru-lute; drag mat; hand held spikers; shears; edging iron

2 Understand the irrigation and nutrition of sports and amenity turf

Sports turf: football; rugby; hockey; cricket; golf

Amenity turf: ornamental lawns; recreational lawns; parkland; housing areas; road verges

Irrigation: pop-up sprinklers; watering can; hose pipe; static sprinkler; oscillating sprinkler; travelling sprinkler; standard nozzle sprinkler; rotary sprinkler; pulse-jet sprinkler; sprinkler hose

Nutrition: organic and inorganic fertilisers; major nutrients; minor nutrients

Fertiliser equipment: hand application; liquid dilutor; mechanical distributor

3 Understand sports and amenity turf renovation activities

Sports turf: football; rugby; hockey; cricket; golf

Amenity turf: ornamental lawns; recreational lawns; parkland; housing areas; road verges

Renovation techniques: seeding; turfing; chitting

Types of repairs: bare patches; worn areas; broken edges; re-edging; bumps; hollows; suckers; tree roots; weed infested lawns

Grass types: Agrostis spp; Festuca spp; Poa spp; Lolium perenne; Cynosurus cristatus; Phleum pratense; Phleum bertolonii

4 Understand the use of Performance Quality Standards

Standards: high; standard; basic

Performance quality: adequate grass cover; herbage; surface level and the ability to maintain water including irrigation; pest and disease profile; presentation quality; playing quality

Turf surfaces: winter sports; summer sports, general amenity areas used for sports

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 explain the effects of the range of turf maintenance activities on the development of the sward: ◊ seasonal factors ◊ weather ◊ soil conditions [IE]	**M1** outline annual maintenance for a given sports and amenity area	**D1** specify irrigation and fertiliser requirements for spring, summer, autumn and winter application for a range sports and amenity surfaces
P2 explain how different settings and frequencies of use affect the growth and density of the sward		
P3 describe the use of specific equipment in the preparation of turf surfaces		
P4 describe portable and permanent irrigation systems for turf and the reasons for their use [IE, RL, TW, EP, SM]	**M2** describe the use of given irrigation and fertiliser application equipment including their calibration	
P5 describe why fertilisers are applied to different turf surfaces: ◊ benefits ◊ limitations [IE, CT]		
P6 compare irrigation and fertiliser use with natural and artificial rootzones		

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P7	describe a range of renovation activities to meet the needs of specific sports and amenity turf uses	**M3**	compare a range of renovation activities carried out on different types of surface	**D2**	identify the role of governing bodies and professional organisations involved with turf maintenance and performance quality standards.
P8	identify turf and weed grasses by seed and vegetative characteristics as appropriate to species [IE, RL, TW, EP, SM]				
P9	explain the benefits and limitations of Performance Quality Standards	**M4**	explain the difference between high, standard and basic turf surfaces and how these are maintained to the appropriate quality standards.		
P10	select appropriate standards for specific turf uses				
P11	describe the relevance of sustainability for a natural turf surface.				

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable collections and will link to work experience placements.

The use of as wide a range of techniques as possible is essential which could include lectures, seminars, site visits, turf maintenance practicals, and internet and/or library-based research. Delivery should stimulate, motivate, educate and enthuse learners and utilise the framework of personal, learning and thinking skills.

Work experience either at the delivery centre or as a work placement, or even better a combination of both, is essential and needs to cover the full range of maintenance activities involving sports and amenity turf. Work experience placements need to be monitored regularly to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit and the assessment procedures to be used before the placement. This enables work providers to schedule work so learners have the opportunity to carry out the full range of maintenance and renovation activities covered within this unit, so that naturally occurring evidence can be collected at the time. Evidence should be gathered using observation records and witness statements and it is recommended that learners keep an up-to-date diary. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Safe working practices are essential, whichever delivery methods are chosen, and it is essential that tutors stress the importance of safe working practices, legal obligations and effective management to ensure turf maintenance operations have a minimal impact on the environment.

Health and safety, during both classroom and practical activities, must be stressed and it is essential that full risk assessments are undertaken before any practical activity.

Tutors should consider integrating the delivery, private study and assessment for this unit with other relevant units learners are undertaking as part of their programme of study.

Learning outcomes 1 and 2 are linked as they both are involved with the actual maintenance of a variety of amenity and sports turf surfaces. Learning outcome 3 covers the renovation activities used within these areas. For all three of these learning outcomes, although there is some theory, it is anticipated that the majority of learning will be through practical activity and assessment will be linked to these activities.

Learning outcomes 1 and 2 are likely to be delivered using a variety of practical sessions which will include the full range of maintenance techniques used to maintain a sports or amenity turf area. This should include all year round maintenance and schemes of work should be adapted to cater for this. This should be backed up by a series of lectures and discussions with learners in order to provide the underpinning knowledge required to undertake the practical elements. The impact on the environment and health and safety will play an important part in these activities. All practical activities should cover both sports and amenity areas and can be carried out at the delivery centre's site. However it will also be beneficial to organise sufficient visits to other sites where turf maintenance operations are undertaken in order that learners can see and compare as many different maintenance techniques as possible. Lectures and talks by representatives from turf maintenance specialists such as head greenkeepers, head gardeners and council maintenance team managers should be encouraged and linked to the standards set by industry. This will encourage, interest, motivate and enthuse learners and also encourage further research.

Learning outcome 3 should be delivered using similar methods and assessment techniques as for learning outcomes 1 and 2 as it is focused on practical activities. The areas for renovation should include both sports and amenity areas and cover the full range of renovation techniques. Where there are insufficient areas on site to maintain, visits to alternative areas or work placements should be arranged.

Learning outcome 4 is likely to be delivered through formal lectures, demonstration, site visits, practical sessions and independent learner research. Learners will initially be taught about performance quality standards through lectures, with the environmental impact and health and safety legislation being emphasised. This will then lead to learner research and practical activities regarding gathering and collating information in relation to PQS. This should be linked to the practical activities undertaken for learning outcomes 1, 2 and 3.

Lectures and talks by representatives from governing bodies and professional organisations will also encourage, interest and motivate/enthuse learners.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduce and overview of the unit.
Assignment 1: Sports and Amenity Turf Maintenance (P1, P2, P3, M1) Tutor introduces the assignment.
Theory sessions – health and safety, risk assessments, environmental impact issues.
Theory sessions – turf maintenance techniques including maintenance plans.
Practical activities – turf maintenance on both sports and amenity areas.
Visiting speakers.
Site visits to sports turf facilities.
Assignment 2: Irrigation and Nutrition of Sports and Amenity Turf (P4, P5, P6, M2, D1) Tutor introduces the assignment.
Theory sessions – turf nutrition including nutrients, organic and inorganic fertilisers, COSHH assessments, environmental impact.
Theory sessions – irrigation techniques including both permanent and movable systems, environmental impact and techniques used to minimise water usage. Maintenance of irrigation systems.
Practical activity – calibration and application of fertilisers.
Practical activity – setting out and operating irrigation equipment.
Practical activity – maintenance of irrigation equipment.
Visiting speakers.
Site visits to sports turf facilities.
Assignment 3: Renovation Activities and Seed and Grass Identification (P7, P8, M3) Tutor introduces the assignment.
Theory sessions – renovation activities.
Theory sessions – grass types and identification techniques for grasses and seed.
Practical activity – grass and grass seed identification.
Practical activity – renovation of sports and amenity turf.
Visiting speakers.

Topic and suggested assignments/activities and/assessment
Site visits to amenity and sports turf facilities.
Assignment 4: Implementation of Performance Quality Standards (P9, P10, P11, M4, D2) Tutor introduces the assignment.
Theory sessions – performance quality standards; what they are, how they are implemented, monitored, organisations and governing bodies.
Learner research.
Practical activities – the practical elements for learning outcome are best delivered and tied in with the practical activities for learning outcomes 1, 2, 3.
Visiting speakers.
Unit review.

Assessment

P1, P2 and P3 relate to maintenance techniques and learners could compile a portfolio of evidence which could include a diary of practical activities undertaken, photographic evidence and/or a report regarding the activities carried out.

For P4, learners could complete a pictorial poster or leaflet describing both portable and permanent irrigation systems and the reasons for their use.

For P5 and P6, individual learners could prepare and deliver a presentation explaining why fertilisers are applied to a turf surface and the benefits and limitations of different types of fertilisers. This should be linked to the practical activities learners undertake and their findings from these activities. Therefore it is important that learners have the opportunity to record their findings and this could be carried out by learners using tough books or other similar devices to record information, or by time being allowed at the end of the session for learners to use IT resources to record information.

For P7 and P8, learners need to identify a range of different turf grasses and seed. For the purpose of assessment, the turf grasses and seed chosen need to be the same for each learner to ensure assessment is fair. Learners are required to identify six turf grasses and six seeds using their full botanical names, which in relation to the actual grasses will include genus, species, cultivar, but genus is sufficient for seed identification. This could be assessed through answers recorded on identification sheets completed by learners.

For P9, P10 and P11 evidence could be presented within an explanatory leaflet showing what Performance Quality Standards are, and explaining their benefits and limitations, and also listing the various quality standards. This information could be linked to the practical activities learners have undertaken.

For M1, learners could produce an annual maintenance plan for a sports and amenity turf area, selected and agreed with the tutor. This should include maintenance of both a sports and amenity area and could be linked to the areas which have been maintained as part of the practical activities.

M2 could be assessed during practical activities with learners talking through the use of appropriate fertiliser and irrigation application equipment and their calibration. Evidence could be recorded on observation and question and answer sheets.

M3 could be linked to P7 and P8. Learners could produce a report evaluating the range of renovation techniques.

For M4, learners are required to explain the difference between high, standard and basic turf surfaces and how these are maintained to the appropriate quality standards. Assessment for this can be linked to the practical activities for learning outcome 1. Alternatively, the information could be included within evidence produced for P9, P10 and P11.

For D1, learners need to specify irrigation and fertiliser requirements for spring, summer, autumn and winter application for a range sports and amenity surfaces. Learners must cover a minimum of two different sports and amenity surfaces. Evidence for this could be produced as a report and findings could relate to practical activities learners have undertaken either at the delivery centre or during work experience.

For D2, learners are required to identify the role of governing bodies and professional organisations involved with turf maintenance and performance quality standards. The evidence for this could be included within evidence produced for P9, P10 and P11.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1	Sports and Amenity Turf Maintenance	Learners are required to carry out a full year's maintenance programme on selected sports and amenity turf areas and produce a portfolio of evidence, which could be shown to a prospective employer.	Practical observation and portfolio
P4, P5, P6, M2, D1	Irrigation and Nutrition of Sports and Amenity Turf	The correct choice and use of both fertilisers and irrigation techniques is imperative for the health and vitality of grass sward. Therefore learners are required to evaluate the different types of irrigation equipment and fertilisers available and carry out trials regarding their use. The purpose of this assignment is to produce a portfolio of evidence which would include a poster or leaflet, presentation and report regarding fertiliser and irrigation trials which could be used with new recruits into the industry to highlight the importance and use of a wide range of irrigation equipment and fertilisers.	Practical observation Leaflet Poster Presentation
P7, P8, M3	Renovation Activities and Seed and Grass	Learners are required to carry out renovation of both a sports and amenity turf area for an agreed purpose. It is imperative that anyone involved with turf maintenance can identify both turf grasses and grass seed and identification of these will form part of the assessment.	Practical observation Report Identification test

Criteria covered	Assignment title	Scenario	Assessment method
P9, P10, P11, M4, D2	Implementation of Performance Quality Standards	A thorough understanding of Performance Quality Standards is essential for anyone working in sports turf maintenance and this understanding should be both practical and theoretical. Learners are required to produce an explanatory leaflet. on Performance Quality Standards which can be given to anyone involved with turf maintenance and renovation as guidance. Also learners will be required to carry out turf maintenance practicals and explain and demonstrate how Performance Quality Standards are applied.	Practical linked to learning outcome 1 and the leaflet

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertake Work-related Experience in the Land-based Industries	Manage Amenity Turf
Environmental and Land-based Business	Manage Winter and Summer Sports Turf Surfaces
Undertake Specialist Land-based Machinery Operations	
Introduction to Animal and Plant Biology	
Unit L5 Maintain the health of sports turf Unit L6 Present, maintain and repair sports turf surfaces for play	

Essential resources

Access to IT facilities, including internet access, is also required in order for learners to carry out research, record information and undertake the theory elements of the assignments.

Access to a range of amenity and sports surfaces is essential, as is access to the full range of equipment, machinery and materials required to carry out these tasks. Learning outcome 4 has a more theoretical element to it, as it deals with Performance Quality Standards (PQS), although this will be directly linked to the practical activities carried out for learning outcomes 1, 2 and 3.

Employer engagement and vocational contexts

In order to deliver this unit it is essential that centres have close links with turf maintenance specialists such a golf courses, winter and summer sports turf providers and local authorities, in order that visits can be arranged, work placements organised and guest lecturers can be utilised.

Also, centres need to create and develop links with governing bodies and professional organisations and learners need to be encouraged to join as student members. Guest speakers, technical information and workshops from these organisations could be used.

Indicative reading for learners

Textbooks

Arthur J – *Practical Greenkeeping* (Kyodo Printing Co, 1997) ISBN 978-0907583127

Beard J – Turf Management for Golf Courses. 2nd Edition (An Arbor Press, 2001) ISBN 978-1575040929

Brown S – *Sports Turf and Amenity Grassland Management* (Crowood Press, 2005) ISBN 978-1861267900

Journals

The Greenkeeper

The Groundsman

Horticulture Week

Turf Professional

Websites

www.bigga.org.uk	The British and International Golf Greenkeepers Association
www.hse.gov.uk	Health and Safety Executive
www.iog.org	The Institute of Groundsmanship
www.pitchcare.com	Pitchcare
www.the-gtc.co.uk	The Greenkeepers Training Committee
www.stri.co.uk	The Sports Turf Research Institute

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	analysing and evaluating performance quality standard information undertaking fertiliser and irrigation trials
Creative thinkers	generating ideas and exploring possibilities whilst creating a calendar of work and a specification
Reflective learners	analysing their performance whilst participating in work experience and practical activities and identifying strengths and areas for improvement
Team workers	working with others and taking responsibility whilst carrying out turf maintenance activities
Self-managers	organising time and resources whilst working towards set goals and tasks when producing a grounds maintenance portfolio
Effective participators	monitoring and evaluating the maintenance of sports surfaces and investigating and recommending improvements and change in practices for different surfaces.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	researching performance quality standard tables investigating performance quality standard data gathering and recording information
Creative thinkers	applying and exploring ideas whist undertaking work experience
Reflective learners	assessing their and others' ability to gather and record the required information and data
Team workers	working with others to achieve common goals during practical and work experience activities
Self-managers	organising and prioritising tasks whilst researching and collating information
Effective participators	participating in activities and applying knowledge and understanding learned from other lessons and activities whilst on work experience and during practicals.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	using the internet to research information and data required for the management of sports turf gathering and recording information collected during practical activities producing work calendars, specifications and portfolio data producing leaflets and posters
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	gathering and preparing information and formatting it into a presentation
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	using mathematical analysis whilst using performance quality standard tables calculating the frequency of activities
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	calibrating fertilisers working out irrigation requirements
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting information to other learners
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	gathering information using internet, textbooks and trade journals in order to compile reports, leaflets, posters, portfolios and prepare for presentations
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	producing reports, leaflets and other written information.

Unit 17: Participate in Propagation Techniques

Unit code: Y/600/9865

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to provide learners with an understanding of the principles of propagation techniques, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Unit introduction

As a gardener, plant propagation is one of the most satisfying, fun and rewarding aspects of gardening. With a little bit of knowledge and a willingness to try different techniques a person can increase their plant stock greatly. As a gardener you will always want to change plants, remove old ones and try new ones. Propagating plants for yourself gives you an affordable way of doing this.

There are some techniques that require a degree of skill but with a bit of practice anyone can develop this skill and create more plants. It also gives you the opportunity to get close to your plants, to see what they are doing and to check that they are ok.

This unit aims to teach the learner some techniques by which you can increase plant numbers by using seed and vegetative propagation. Certain very desirable plants can only be propagated by certain techniques and in some cases will never come true from seed so it is vital if you are a fan of certain plants such as *Primula auricula* that you learn vegetative techniques to increase your stock. The unit is very practical based and the learner should get to practice techniques and propagate a variety of different plants in different ways.

Learning outcomes

On completion of this unit a learner should:

1 Know how to propagate plants by vegetative means

2 Be able to propagate plants by vegetative methods

3 Know how to propagate plants from seed

4 Be able to propagate plants from seed.

Unit content

1 Know how to propagate plants by vegetative means

Propagation: techniques eg stem cuttings (soft wood, greenwood, semi-ripe wood, deciduous hardwood, evergreen hardwood), leaf cuttings, root cuttings; layering (tip, simple, serpentine, stooling, air), division (offsets, crowns, suckers, bulbs/rhizomes/tuberous roots; budding and grafting; when to propagate vegetatively; properties of propagated plants; advantages and disadvantages of propagated plants; limitations of vegetative propagation; conditions required eg temperature, moisture, light, fertilisation, establishment

2 Be able to propagate plants by vegetative methods

Carrying out propagation: techniques eg stem cuttings (soft wood, greenwood, semi-ripe wood, deciduous hardwood, evergreen hardwood), leaf cuttings, root cuttings; layering (tip, simple, serpentine, stooling, air), division (offsets, crowns, suckers, bulbs/rhizomes/tuberous roots; budding and grafting

Factors influencing vegetative propagation: plant physiology; selection of cutting material eg genetic potential, juvenility, nutritional status of cutting material, health of cutting, timing, etiolation, temperature manipulation; hygiene requirements; health and safety

3 Know how to propagate plants from seed

Techniques: seed selection and catalogues; seed treatment eg priming, pelleting, dusting and coating; treatments to overcome dormancy; harvesting and collection; germination in the protected environment, sowing and aftercare eg when, how, pricking out, potting on; germinating seeds in the open eg broadcast seeding, seed drills, thinning seedling

Factors influencing seed propagation: advantages and disadvantages; hygiene eg to prevent damping off; external environmental factors eg water, gases, temperature, light; dormancy

4 Be able to propagate plants from seed

Carrying out propagation: seed treatment eg priming, pelleting, dusting and coating; harvesting and collection; germination in the protected environment, sowing and aftercare eg, pricking out, potting on; germinating seeds in the open eg broadcast seeding, seed drills, thinning seedlings

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P1	list advantages and disadvantages of vegetative propagation	**M1**	explain the ideal conditions for vegetative propagation of named species	**D1**	evaluate the techniques used in the production of plants by vegetative propagation
P2	describe methods for collecting propagation material				
P3	describe the use of division, cuttings and grafting as methods to propagate plants				
P4	describe the conditions required for effective establishment of propagation material [IE]				
P5	collect and store propagation material safely	**M2**	discuss reasons for your success rate of vegetative propagation including improvements that can be made		
P6	propagate plants by division, cuttings and grafting safely				
P7	handle propagation material to optimise success and minimise waste				

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P8 state advantages and disadvantages of propagation from seed	**M3** explain the ideal conditions for propagation by seed for named species	**D2** evaluate the techniques used in the production of plants by propagation by seed.
P9 describe the categories and sources of seeds		
P10 describe timing and methods of sowing seed indoors and outdoors		
P11 describe the importance of hygiene in seed propagation		
P12 prepare containers and outdoor seed beds for seed sowing	**M4** discuss the benefits of different seed sowing techniques for different named species.	
P13 sow seeds by broadcasting in containers and in drills outside [EP,TW]		
P14 provide relevant aftercare following germination of seeds. [RL,TW, SM]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable collections and will have links to industrial experience placements. Guidance on the use of observation records and witness statements is provided on the Pearson website.

Site visits and guest expert speakers may also be appropriate and the learner can be introduced to the work of botanists and plant nurserymen. If possible a visit to a plant nursery or other centre would be ideal to support the learner in applying knowledge as well as seeing the large scale production of plants using a variety of propagation techniques in action. Providers should have access to the basic equipment needed in order to propagate plants and ensure good hygiene eg cleaning solutions for tools, sharp knives (safety must be emphasized), rooting hormone (organic products are available). Other pieces of equipment may be needed for the sowing of seed but a number of these can be hired or seen when visiting farms, nurseries or other suitable establishments. Collection of material for the learner to practice vegetative propagation techniques must be taken from a suitable plant, a suitable site and always with the permission of the land owner.

Most providers will have access to a range of plants that can be studied but specimens can be bought in or site visits can be arranged. Another area of possible field work involves visiting a controlled growing environment and carrying out organised practical work. A visit that shows very large scale crop production would be good for the students to reinforce that plant production is a vital part of industry and feeding the country. A crop used for bio-diesel or that is sold to a supermarket may be interesting to visit to see the newer equipment being used to increase production efficiency and decrease the labour needed to manage crops. The rest of the unit is very much linked to trying and practicing the techniques studied to propagate plants. Material can however be delivered by a wide range of techniques including lectures, discussions, seminar presentations, supervised practicals and research using the internet and/or library resources. Delivery should stimulate, motivate, educate and enthuse learners.

Any site visits should be checked for suitability and a risk assessment of activities carried out. Charities and organisations such as the RHS and Garden organic run very well organised and well funded education departments that provide schools with the opportunity to have a supported visit to a number of different sites and provide expert guidance on the specific location as well as sometimes being able to tailor make sessions and practical work. It would be beneficial if learners and supervisors of sites/centres were made aware of the requirements of this unit prior to any activities so that evidence can be collected at the time. For example, learners may have the opportunity to try different propagation techniques such as plant tissue culture, look at a plant cell bio-reactor or be able to use large and expensive equipment. The learner should be encouraged to ask for observation records and/or witness statements to be provided as evidence of this as well as taking and annotating photographs and keeping a diary from any site visits.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview to the unit.
Assignment 1: Working for the Nursery (P1, P2, P3, P4, M1, D1) Introduction to assignment.
Research, supervised practical work, site visits.
Assignment 2: New Stock (P5, P6, P7, M2) Introduction to assignment.
Guided site visits, supervised practical work, written work, research.
Assignment 3: Trying New Things (P8, P9, P10, P11, M3, D2) Introduction to assignment.
Supervised practical sessions, site visits, internet research, lectures and guest speakers, industrial placement.
Assignment 4: Growing the New Species (P12, P13, P14, M4) Introduction to the assignment.
Research, guest speakers, internet research, written work.
Unit evaluation.

Assessment

To achieve a pass grade, learners must meet the 14 pass criteria listed on the grading grid.

For P1, learners must list advantages and disadvantages of vegetative propagation. This can be assessed as a written task, a poster, a web page, a page from a diy guide for gardeners.

P2 requires learners to describe methods for collecting propagation material. This could be assessed as a written task, an observed interview, a practical assessment with the learner describing what they are doing, a web video guide.

P3 requires learners to describe the use of division, cuttings and grafting as methods to propagate plants. This can be assessed as an annotated poster, a page from a technical guide, a web page, a video blog or as a written piece.

For P4, learners must describe the conditions required for effective establishment of propagation material. This can be assessed in a similar way to P2.

P5 requires learners to collect material for propagation and as a practical task is best assessed by observation records, witness statements, learner notes and a learner diary.

P6 and P7 require the learner to propagate plants by division, cuttings and grafting safely as well as handling propagation material to optimise success and minimise waste. P6 and P7 can be assessed in a similar way to P5.

P8 requires the learner state advantages and disadvantages of propagation from seed. This can be assessed in a similar way to P1.

For P9, the learner must describe the categories and sources of seeds. This is a good opportunity for the learner to familiarise themselves with seed catalogues which can be great fun to look through. They can use the internet and other resources to put together a written piece on the wide range of products available.

P10 and P11 require the learner to describe timing and methods of sowing seed indoors and outdoors as well as describing the importance of hygiene in seed propagation. These can be assessed in a similar way to P3.

For P12, P13 and P14 the learner must, Prepare containers and outdoor seed beds for seed sowing, Sow seeds by broadcasting in containers and in drills outside as well as Provide relevant aftercare following germination of seeds. All of these tasks are practical skills that should have been developed during the unit and assessment can be in a similar way to P5.

To achieve a merit grade, learners must meet all of the pass grade criteria and the four merit grade criteria.

For M1, the learner must explain the ideal conditions for vegetative propagation of named species. This can be assessed as a practical activity or a written task. The learner can describe conditions whilst completing a practical or a piece of written work can be completed.

For M2, the learner must discuss reasons for your success rate of vegetative propagation including improvements that can be made. This can be assessed as a written piece which includes tables and graphs demonstrating them success rate of practical work undertaken or a collection of notes with supporting photographs and written explanations.

M3 requires the learner to explain the ideal conditions for propagation by seed for named species. Again, this can be assessed in a similar way to P3 but can also be filmed as a part of a TV programme.

M4 requires the learner to discuss the benefits of different seed sowing techniques for different named species. This can be assessed in a similar way to P1.

To achieve a distinction grade, learners must meet all of the pass and merit grade criteria and the two distinction grade criteria.

For D1, the learner must evaluate the techniques used in the production of plants by vegetative propagation. This can be assessed as a written piece, a presentation, a web page, a page from a gardening magazine or a video guide for others.

D2 requires the learner to evaluate the techniques used in the production of plants by propagation by seed. This can be assessed in a similar way to D1.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1, D1	Working for the Nursery	You have recently been employed at a specialist plant nursery. You have been asked to look at how the nursery grows and reproduces its plants vegetatively.	Written task Presentation Poster
P5, P6, P7, M2	New Stock	The nursery must prepare its stock for the main growing and sales season. You must assist and support the nursery in making new stock ready for the rush.	Practical observations Diary Observation records Witness statements.
P8, P9, P10, P11, M3, D2	Trying New Things	The nursery is also looking at trying new varieties by seed this year. You are asked to look for the seed and suggest varieties as well preparing for growing them at the nursery.	Written task, presentation, poster
P12, P13, P14, M4	Growing the New Species	You must now try to grow the species by seed that you have prepared for.	Practical observations Diary Observation records Witness statements.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
CU72 Propagate plants by vegetative methods CU73 Propagate plants from seed	Manage Plant Propagation Activities
Participate in Horticultural Crop Production Outdoors	Understand and Carry Out Identification, Planting and Care of Trees
Participate in Protected Horticultural Plant Production	

Essential resources

There are many opportunities for practical and experimental work in this unit. Therefore there should be access to adequate field and laboratory facilities for the vegetative propagation of plants, areas to sow seed, equipment to provide suitable conditions for germination and space to store all of the material once collected. A suitable range of plants and plant material should be available for learners to study.

There should be access to a wide variety of seeds to try different sowing techniques. Learners should have access to current health and safety regulations and equipment. Links with, for example, farmers and growers will enable access to a range of plant types and growing regimes.

Learners should be given access to computers for research and presentation of assignments.

Employer engagement and vocational contexts

Learners would benefit from having access to a working plant science, nursery or botany laboratory. Often this can be achieved by creating links with local businesses or charitable organisations who may even benefit from taking on students. Local authorities can be a useful source of information as can business education alliances. Charitable and government organisations can often provide guest speakers to attend and give lectures as well as demonstrations normally for a minimal cost.

Indicative reading for learners

Textbooks

Baker and Ward – *Auriculas* (Batsford, 1995) ISBN 978-0713473667

Brickell C – *The encyclopedia of gardening* (Dorling Kindersley, 2007) ISBN 978-1405322270

Dirr M A – *Reference Manual of Woody Plant Propagation: From Seed to Tissue Culture* (Timber Press, 2009) ISBN 978-1604690040

Guest A – *The Auricula* (Garden Art Press, 2009) ISBN 978-1870673624

Hartman and Kester – *Hartmann and Kester's Plant Propagation: Principles and Practices* (Prentice Hall, I 2010) ISBN 978-0135014493

Hollobone J – *Propagation Techniques* (New Holland Publishers Ltd, 2008) ISBN 978-1845379902

Macdonald B – *Practical Woody Plant Propagation for Nursery Growers* (Timber Press, 2000) ISBN 978-0881928402

McMillan B – *Plant Propagation* (Mitchell Beazley, 1999) ISBN 978-1840001563

Toogood A – *RHS Propagating Plants* (Kindersley, 2006) ISBN 978-1405315258

Journals

American Society for Horticultural Science

Journal of Applied Horticulture

NZ Journal of Crop and Horticultural Science

The Journal of Horticultural Science and Biotechnology

Websites

www.bbc.co.uk/gardening/basics/techniques	BBC gardening site
www.letsgogardening.co.uk	Information site
www.rhs.org.uk	Royal Horticultural Society

A great deal of websites are available that have video guides on propagation techniques as well as step by step guides.

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	carrying out internet research, library research, and questioning experts
Reflective learners	evaluating work completed
Team workers	group tasks for analysis
Self-managers	meeting deadlines
Effective participators	completing group tasks.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Creative thinkers	applying techniques studied to the working environment
Reflective learners	suggesting improvements to techniques
Team workers	practising techniques
Self-managers	producing written work on time
Effective participators	participating in team activities.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching propagation techniques using the internet
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	presenting written work and data
Bring together information to suit content and purpose	displaying data from practical work
Present information in ways that are fit for purpose and audience	presentations
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	calculating to dilute plant food and for seed success rate
Select and apply a range of skills to find solutions	interpreting practical data
Use appropriate checking procedures and evaluate their effectiveness at each stage	data analysis
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	interpreting results
Draw conclusions and provide mathematical justifications	calculations from scientific practical work

Skill	When learners are …
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presentations, video, blogs, group presentations
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reading information as part of internet and library research
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	completing reports, diaries and other assessments.

Unit 18: Tractor Driving

Unit code: D/600/9835
Level 2: BTEC First
Credit value: 5
Guided learning hours: 30

Aim and purpose

This unit aims to provide learners with an understanding of the principles of tractor driving and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Unit introduction

This unit is designed for learners who, as part of their chosen career within the land-based industry, will be required to operate tractors, self-propelled and tractor mounted or trailed machines.

It is designed for learners from agriculture, countryside management, forestry, horticulture and ground care sectors. Centres will base delivery and assessment on the equipment that applies to the chosen area of study. Appropriate tractors, all terrain vehicles, off road utility vehicles and self-propelled ground care vehicles could be used providing the requirements for attaching equipment and connecting operating systems can be covered.

On successful completion of this unit, learners will be able to operate land-based machines safely and effectively, carrying out a range of tasks commonly associated with the machine. Learners will begin by identifying key components and controls, carrying out pre-start checks and basic maintenance and ensuring the machine is fit for use. Learners will demonstrate the safe operation of the machine without attachments and in a confined area to demonstrate safe movement and control.

This will progress to the hitching and safe use of the machine with commonly used attachments. Learners will also be able to attach transport equipment and demonstrate safe use of the tractor functions. All centres must comply with the requirements of relevant, current legislation and codes of practice for example the Prevention of Accidents to Children in Agriculture Regulations 1998 and the associated Approved Code of Practice *Preventing Accidents to Children in Agriculture* (especially paragraphs 22 to 27).

Learning outcomes

On completion of this unit a learner should:

1 Know key components and operator controls on a tractor

2 Know the relevant legislation and codes of practice for tractor driving

3 Be able to carry out simple maintenance tasks and settings to a tractor

4 Be able to operate a tractor and attachments.

Unit content

1 Know key components and operator controls on a tractor

Key components: components requiring operator attention; fuel system components, air filtration system components, engine cooling system components; cold start devices; wheels/tyres and axles; lubrication points; transmission units, power take off systems; hydraulic and fluid reservoirs; hitching and attachment points, electrical and hydraulic connections

Operator controls: steering, clutches and brake controls, transmission and hydraulic controls, electrical controls, operator ergonomics and comfort, instrumentation and warning devices

2 Know the relevant legislation and codes of practice for tractor driving

Legislation: road transport legislations, Road Traffic Act, 1998; Health and Safety at Work Act, 1974; Provision and Use of Work Equipment Regulations, 1998; Control of Noise at Work Regulations, 2005; Environment Act, 1995; Construction and Use Regulations, 1986

Codes of practice: highway code; manufacturers' recommendations; risk assessments; use of PPE

3 Be able to carry out simple maintenance tasks and settings to a tractor

Maintenance tasks: pre-start checks for site work and road transport operations; fuel levels/re-fuelling procedures, moisture traps, air filtration, engine and transmission oil levels, steering/brake fluid levels, coolant levels and radiator screens, screen wash fluid; windows and rear view mirrors, wheel fastener torque settings, tyre pressures, bulbs, fuses and drive belt.

Tractor settings: seat fore/aft position, seat height, seat suspension, seat rotation for fieldwork; rear view vision; cab environment, heat, cool air, air conditioning; wheel track and suspension settings, drawbar, hitch and linkage settings

4 Be able to operate a tractor and attachments

Operate tractor: correct start procedures; neutral control positions, safety start switches, transmission gear selection, speed; manoeuvres, gradients, power take off drive engagement; use of hydraulic controls, electrical systems, hitching and attaching machines; ground conditions, field procedures, marker systems, tramlining, global positioning systems

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P1	name the key components that make up the build of a current tractor [IE]	**M1**	explain the relevance of the key components in relation to other components		
P2	identify and explain the purpose of all controls and instrumentation of a modern tractor				
P3	outline the relevant legislation that apply to tractor driving [IE]	**M2**	explain the consequences of not complying with current legislation and codes of practice		
P4	outline the relevant codes of practice that apply to tractor driving				
P5	define the limitations imposed on young or inexperienced tractor drivers				
P6	carry out pre-start checks on a tractor	**M3**	explain the consequences of failing to maintain a tractor	**D1**	carry out all maintenance in accordance with manufacturers' recommendations, selecting and using PPE correctly
P7	perform pre-operational maintenance tasks prior to undertaking tractor driving operations				
P8	carry out adjustments to the tractor to match the tractor to the operator				
P9	prepare the tractor to accept a range of selected attachments				

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P10 drive a tractor safely and efficiently around to meet given objectives [RL, SM, EP]	**M4** operate tractor and attachments safely with minimum assistance.	**D2** carry out all operations in accordance with all legislation, codes of practice, and following acceptable working practices.
P11 safely hitch selected attachments to a tractor		
P12 operate tractors and attachments safely to meet given objectives [RL, SM, EP]		
P13 prepare tractors and attachments for storage ensuring they are ready for future use. [RL, SM, EP]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key			
	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

All centres must comply with the requirements of relevant current legislation and codes of practice eg the Prevention of Accidents to Children in Agriculture Regulations 1998; and associated Approved Codes of Practice eg the Health and Safety Executive 'Preventing Accidents to Children in Agriculture'. Learners must be made aware of, and have access to, relevant health and safety legislation and know the importance of the use of risk assessment appropriate to each situation. Appropriate risk assessment must precede all practical machinery activities, learners must work in a safe manner at all times when using equipment or working with machinery. Learners must be supervised at all times and tutors must not request learners undertake tasks that are beyond their physical capabilities.

Tutors delivering this unit have the opportunity to use a wide range of delivery methods, including lectures, seminars, and discussions to draw on learners' experiences. Emphasis should be on supervised practical sessions to build learners' confidence and competence in tractor and machine operations. A wide range of delivery methods should stimulate and enthuse learners to maintain high levels of motivation and learning.

Tutors should consider integrating the delivery, private study and assessment relating to this unit with any other relevant units and assessment instruments learners may also be taking as part of their programme of study.

Learning outcome 1 looks at the key components of a tractor that an operator needs to be aware of. These key components are likely to be addressed when carrying out pre-start checks, pre-operational maintenance and operational settings and adjustments. Where possible, tutors should enable learners to focus on a range of different tractors rather than on tractors they are already familiar with. Learners should be able to state function and operation of the identified key components.

Learning outcome 2 looks at relevant current legislation that applies to tractor operations. Learners should be made aware of the applicable legislation and have the opportunity to research details using different resources. Codes of practice relevant to tractor operations will be researched and evidenced in the same way. Learners will also need to understand the consequences of an operator not complying with legislation and codes of practice.

Learning outcome 3 requires learners to develop basic maintenance skills that will enable them to check and prepare a tractor for a period of work. Where possible, the tutor should allow maintenance tasks to be performed on the tractors used for driving practice so that learners can familiarise themselves with the chosen tractors. It is essential that learners understand the consequences of a lack of or incorrect maintenance and how this may affect productivity and performance. Learners will be required to develop an understanding of operator/tractor compatibility and to adjust tractor components and settings to suit the individual operator. Learners also need to understand the settings and adjustments required to attach and hitch a variety of machines.

Learning outcome 4 requires learners to carry out basic vehicle manoeuvres safely and efficiently. Learners will develop an understanding of the tractor's capabilities, and suitability for a range of tasks. Learners will operate the tractor smoothly and safely with regard for health and safety at all times. Once learners have demonstrated the basic skills of tractor operation, they will be required to attach a range of machines safely using recommended methods. Machines will be trailed by fixed drawbar and automatic hitch, 3 point rear linkage mounted, and the range of machines should include power drive shaft attachment, hydraulic and electrical service connections.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an **indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction to unit.
Health and safety issues.
Legislation and codes of practice.
Assignment 1: Key components, Instruments and Controls (P1, P2, M1)
Investigate key components, instruments and controls.
Pre-start checks and initial driving practice.
Assignment 2: Legislation and Codes of Practice (P3, P4, P5, M2)
Carry out basic maintenance on tractors.
Carry out settings and adjustments, change and set hitches and linkages.
Assignment 3: Tractor Maintenance and Settings (P6, P7, M3, D1)
Hitch a range of machines.
Manoeuvring and operating practice.
Assignment 4: Tractor Driving and Operations (P10, P11, P12, P13, M4, D2)
Development of driving and operating techniques.
Unit review.

Assessment

For P1 and P2, learners will be expected to name all the key components, instruments and controls of a current, modern tractor that an operator is likely to encounter when carrying out pre-start checks, basic maintenance and practical operations with tractors and machines. A range of tractors may be used if a modern tractor is not available. Tutors could record evidence using a centre-devised observation record sheet.

For M1, learners will be expected to explain the function and purpose of all key components, controls and instruments addressed in P1 and P2. Tutors could extend the observation record sheet to record evidence or devise a separate sheet where P1, P2 and M1 evidence is to be assessed at different times.

For P3, P4 and P5, learners could produce a written list that identifies the range of current legislation and codes of practices associated with the field operation and road transport of tractors and machines.

For M2, learners could produce a written account of the consequences for the operator, equipment and environment if legislation and codes of practice are not complied with.

For P6 and P7, learners need to carry out pre-start checks on a chosen tractor and prepare the tractor for fieldwork operations. Any discrepancies resulting from checks could be reported to the tutor/supervisor and actions decided before the tractor is used. Learners will carry out basic maintenance tasks as instructed by the tutor/assessor. All practical tasks must be performed in accordance with manufacturers'

recommendations and using appropriate operator manuals. For P8 learners need to carry out adjustments to the tractor to match the tractor to the operator. Evidence for these criteria could be through completed job cards, signed and dated by both assessor and learner. Job cards could include information that identifies the tractor, the maintenance tasks completed and consumable items used.

For M3, learners will be required to explain the consequences for equipment, the operator and work rate expectations of a lack of or incorrect maintenance. If this is assessed orally during the practical maintenance sessions, tutors could record evidence by way of suitable centre-devised evidence records.

For D1, learners will carry out all maintenance tasks safely and effectively in accordance with manufacturers' procedures and tolerances, selecting and using appropriate PPE correctly where required.

For P10, learners need to carry out safe and efficient manoeuvres with their chosen tractor to demonstrate competence in the use of tractor controls. For P9 and P11 learners will be required to demonstrate safe and efficient methods of attaching and hitching a range of machines in preparation for field operations. For P12 and P13 learners must operate tractors and attachments safely to meet given objectives and prepare these for storage. Tutors could record evidence on a suitably formatted evidence record sheet and give written feedback, and discuss action planning for reassessment where required.

For M4, learners will be required to complete practical tasks using tractor and attachments, including initial field settings, manoeuvring tractor and machines around a set course to meet given objectives and operating machines in simulated situations. All tasks must be performed safely and to meet objectives outlined by the tutor/assessor. Tutors will record evidence in the same way as for P10 on an extended or separate evidence record sheet.

For D2, learners are required to complete all practical tasks with regard to relevant current legislation and codes of practice. Learners will demonstrate a high level of competence with the minimum of supervision and assistance. Tutors could record evidence in the same way as for P10 on an extended or separate evidence record sheet

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1	Key Components, Instruments and Controls	Explain key components, instruments and controls for a range of different tractors to potential operators who have no experience of tractor driving.	Verbal Q and A Handbook Observation Assessor checklists
P3, P4, P5 M2	Legislation and Codes of Practice	Explain the range of legislation and codes of practice which apply to a range of tractor fieldwork and road transport operations. Learners will explain the consequences of not complying with legislation and codes of practice	Written report

Criteria covered	Assignment title	Scenario	Assessment method
P6, P7, M3, D1	Tractor Maintenance and Settings	Carry out pre-start checks, basic maintenance activities according to manufacturers' instructions and adjust and prepare the tractor for operation. Learner to select, explain and use PPE.	Practical assessment Q and A Handbook Observations.
P10, P11, P12, P13, M4, D2	Tractor Driving and Operations	Complete tractor manoeuvring tasks as directed, hitch or attach a range of different machines and carry out operational tasks safely and efficiently with the minimum of assistance and guidance. Learners will carry out all tasks considering health and safety requirements at all times and in line with relevant legislation and codes of practice.	Practical assessments Q and A Assessor checklists

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertake Specialist Land-based Machinery Operations	Undertaking Land-based Machinery Operations
Introduction to Land-based Machinery Operation	

Essential resources

Learners will require access to learning resources in order to research legislation and codes of practice.

A range of modern tractors, ATV, utility vehicles, self-propelled grounds care equipment and suitable machines should be available so learners can complete assessment tasks.

The corresponding manufacturers' handbooks for tractors and machines should also be available.

A suitable maintenance area and tools and equipment to carry out basic tractor maintenance tasks is required, together with a suitable driving area to allow learners to carry out basic manoeuvres with tractors, hitch and operate machines.

Employer engagement and vocational contexts

Where possible, learners should have relevant work experience to increase their operational development in a commercial situation where it is otherwise difficult or unrealistic to simulate ground conditions and obstacles in the field.

Indicative reading for learners

Textbooks

Bell B – *Farm Machinery* (Old Pond Publishing, 2005) ISBN 978-1903366684

Cairns B – *The Farmers and Groundsmans Guide to Planning Vehicle and Machinery Maintenance* (The Crowood Press LTD) ISBN 978-18479711O4

Culpin C – *Farm Machinery, 12th edition* (Blackwell Scientific, 1992) ISBN 978-0632031580

Witney B – *Choosing and Using Farm Machinery, First Edition* (Longman Higher Education, 1988) ISBN 978-0470210284

Journal

Profi

Other material

Manufacturers' publications and manuals

Lubrication charts and data sheets

Websites

www.bagma.com	British Agricultural and Garden Machinery Association
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.hse.gov.uk	Health and Safety Executive

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	explaining the relevance of the key components in relation to other components explaining the consequences of not complying with current legislation and codes of practice operating tractor and attachments safely with the minimum of assistance
Reflective learners	operating tractor and attachments safely with the minimum of assistance
Self-managers	operating tractor and attachments safely with the minimum of assistance
Effective participators	explaining the consequences of a lack of maintenance of a tractor.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	arranging work placement opportunities
Creative thinkers	choosing appropriate tractors and machines
Reflective learners	practising tractor and machine hitching and manoeuvring tasks, assessing own progress and trying out different methods to develop competence and confidence
Team workers	working as a group during tractor and machine practice sessions, encouraging each other to try out different strategies
Effective participators	completing maintenance tasks before putting tractors and machines to work.

Functional skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	selecting and using manufacturers' online instruction manuals
Follow and understand the need for safety and security practices	preparing to carry out practical operations using the internet to research legislative information
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching legislation and codes of practice
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	performing maintenance tasks on tractors
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	following manufacturers' information in operator manuals when researching operator controls and performing maintenance tasks
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	producing researched evidence relating to legislation and codes of practice.

Unit 19: Introduction to Animal and Plant Biology

Unit code: R/600/9783

Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to provide learners with an understanding of the principles of animal and plant biology. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Unit introduction

Biology is the science of life and living organisms. It shows us how an animal can breathe or why a plant needs light. When working with animals and/or plants we need to know how to help them to grow and live: the study of cells, systems and structures provides the key to many different aspects of animal and plant care and use such as growth, maintenance of health and reproduction.

The concepts of animal and plant biology introduced in this unit are designed to give a solid knowledge base upon which the learner can build in a variety of ways.

Learning outcomes

On completion of this unit a learner should:

1 Know the classification of organisms and the structure of the cell

2 Understand the requirements for nutrition and growth of animals and plants

3 Know the main systems and structures in animals and plants

4 Understand the processes of reproduction and heredity in animals and plants.

Unit content

1 Know the classification of organisms and the structure of the cell

Classification of organisms: characteristics of living organisms; binomial nomenclature; identification keys

Cell biology: comparative structure and function of plant and animal cells (cell wall, cell membrane, cytoplasm, vacuole(s), chloroplasts, nucleus, mitochondria, ribosomes); basic cell specialisation (eg sperm, red blood cell, guard cells, pollen); cells, tissues, organs, systems

2 Understand the requirements for nutrition of animals and plants

Nutritional requirements: aerobic and anaerobic respiration, growth, repair; gestation, lactation in mammals

Nutritional components and sources: water, minerals, process of photosynthesis and limiting factors (plants); water, fibre, carbohydrates, lipids, proteins, vitamins, minerals (animals)

Symptoms of nutritional deficiencies: nitrogen, phosphorous and magnesium deficiencies (plants); copper, vitamin D, calcium, magnesium (animals)

3 Know the main systems and structures in animals and plants

Plants: shoot system: leaf structure, buds, stems and flowers and fruits; auxins and phototropism; root system: roots, tubers and rhizomes; vascular system: xylem and phloem

Animals: Circulatory system: heart, blood vessels and blood components; respiratory system: trachea, bronchi and lungs; digestive system: oesophagus, stomach, small intestine, large intestine, rectum, anus; excretory system: kidneys, ureters, bladder and urethra; nervous system: CNS and PNS; endocrine system: ovaries/testes, adrenal, pancreas, thyroid, pituitary, hypothalamus; skeletal system

Transport of substances: diffusion, osmosis

4 Understand the main processes of reproduction and heredity in animals and plants

Reproduction in animals: structure and function of male and female reproductive systems (mammalian); sexual and asexual reproduction; oviparous and viviparous reproduction; life cycles

Reproduction in plants: *asexual:* stolons, rhizomes, bulbs, corms, tubers; leaves and roots; sexual – flowering and non-flowering plants

Heredity: functions of chromosomes, genes and alleles; mitosis and meiosis; genetic diagrams, monohybrid inheritance of characteristics (heterozygous and homozygous crosses to F2 generation, examples of complete dominance only)

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 identify the components of a plant cell or an animal cell [IE]	**M1** devise a key to identify similar organisms	**D1** describe the structure and functions of specialised animal and plant cells
P2 describe the functions of the main organelles [IE]		**D2** explain the process of cellular respiration
P3 identify a specified organism using an identification key		
P4 identify the requirements for nutrition and growth in animals and plants [IE]	**M2** describe the nutritional requirements for optimum growth of selected species	
P5 describe the sources of nutrition for animals and plants [IE]		
P6 identify the main biological systems in animals and plants	**M3** describe the processes of diffusion and osmosis in animals and plants	**D3** compare the circulatory systems of animals and plants
P7 describe how a specified system functions in animals and plants		
P8 describe the life cycles of animals and plants [IE]	**M4** describe the advantages and disadvantages of asexual and sexual reproduction in plants and animals.	**D4** outline how knowledge of methods of reproduction can be applied for commercial purposes.
P9 state how characteristics are inherited. [IE]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

There are many opportunities for delivering this unit and as wide a range as possible should be utilised in order to motivate and engage the learner. Lectures, laboratory practical sessions, discussions, seminar presentations, library research and use of the internet should all play a part in stimulating enthusiasm for learners.

The unit links to many other specialist units and tutors could integrate the delivery and private study relating to this within the teaching of relevant units in the learner's programme of study.

Learning outcome 1 introduces the learner to classification of living things and the components of the eukaryotic cell. The learner should be presented with many opportunities to use keys, identifying photographs or drawings of species as well as living specimens – this could be incorporated into activities or field trips. Understanding how cells work together is of fundamental importance in biology – examining slides under the microscope, independent learner research into cell types and functions, viewing animations of cells and labelling drawings of blank cells are some of the many ways this outcome can be delivered.

Learning outcome 2 covers nutrition and growth for animals and/or plants. It is likely to be delivered through formal lectures, practical sessions and seminars.

For animals, learners could review their own diets, identifying why we need to eat and how different nutritional components function. They could then apply these concepts to two specified animal species. Learners could monitor an animal species from birth to two or three months old, or during gestation, and collect data on growth (for example size, weight). Small groups of learners could be provided with samples of feedstuffs in order to identify nutritional components in each.

For plants, the same concept of balanced nutritional intake could be demonstrated. Lectures and practical sessions involving plant trials could be used to introduce the concepts of plant nutritional components and the effects of a lack of any of these. A field trip to two contrasting habitats could demonstrate the influence of nutrition on plant species (one habitat should be an extreme environment for example moorland or salt marsh). Learners could analyse different soil types using soil testing kits.

Learning outcome 3 requires learners to know the main biological systems in animals and plants. Dissection work could be undertaken in order for the learner to appreciate the complex relationships between organ systems, though the use of high quality audio-visual resources may be equally valid.

Learning outcome 4 covers reproduction and heredity in animals and plants. Lectures backed up by learner research into different life cycles could provide an appropriate start. Lectures on sexual and asexual reproduction could be enhanced by the use of good quality visual/audiovisual materials to show sexual and asexual reproduction. Plant propagation methods (cuttings or growing runners) could be used to demonstrate asexual reproduction in plants. Specimen samples (for example seeds, flowers, tillers) could be used, as well as a visit to a commercial business in which reproduction is managed (for example a plant propagation unit or a livestock unit).

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction to unit.
Assessment of prior learning.
Characteristics of living organisms (making up acronyms etc).
Classification, using familiar objects before living organisms.
Using keys for living things.
Common names, language barriers, binomial system.
Assignment 1: Classification Keys (P1, M1) Tutor introduces brief.
Field work incorporating keys – stream or pond life (evidence may be used for assignment if suitable).
Personal study.
Characteristics of cells (link back to living things).
Cell components and basic functions.
Cell specialisations, guided internet research to find micrographs, short stories on cell types.
Labelling pictures of cells, both ideal and specialised.
Assignment 2: Cell Structure (P2, P3, D1, D2) Tutor introduces brief.
Personal study.
Individual support.
Section review.
Plant systems and structures (celery in food dye demonstration; plant dissections, labelling of blank diagrams).
Plant structure and function, with bonus bingo game.
Assignment 3: Biological Systems and Structures (P6, P7) Tutor introduces brief.
Transport of substances – diffusion (potassium permanganate crystals in water; air freshener sprayed at one end of room and time for scent to reach other end noted), osmosis (carrot or potato discs in various concentrations of sugar solutions, weighed before and after to note change; visking tubing separating strong sugar solution and pure water, test for starch at beginning and end of session to note change).
Lab practical analysis write-up.
Assignment 4: Transport of Substances in Animals and Plants (M3) Tutor introduces brief.
Personal study.
Animal systems – circulatory, respiratory, digestive and excretory (labelling, functions).
Animal systems – nervous and endocrine (reflex tests; senses).
Animal and plant systems – notes and practice.
Assignment 5: Circulatory Systems (D3) Tutor introduces brief.
Personal study.
Individual support.

Topic and suggested assignments/activities and/assessment
Introduction to nutrition – human based at first, expand to animals.
Assignment 6: Animal and Plant Nutrition (P4, P5, M2) Tutor introduces brief.
Examining food labels – learners to obtain – research on what common feedstuffs contain (animals).
Functions of nutritional components.
Requirements of animals – maintenance, gestation and lactation.
Lab practical (use common (basic) food tests for starch, fat and protein to feedstuffs known to contain high levels of each: learners to match up the component to the correct feedstuff).
Requirements of plants – nutritional components, examining fertiliser labels.
Photosynthesis and limiting factors.
Personal study.
Lab practical set-up (investigate factors that limit photosynthesis – light, carbon dioxide).
Nutritional deficiencies in plants (symptoms to be described and specimens to be examined).
Nutritional deficiencies in animals (symptoms to be described and photographic/video evidence to be examined).
Lab practical analysis of results.
Personal study.
Assignment 7: Animal and Plant Reproduction (P8, P9, M4, D4) Tutor introduces brief.
Reproduction – life cycles in animals and plants; oviparous and viviparous reproduction in animals; links to industry.
Asexual reproduction in animals and plants, role of chromosomes, mitosis.
Sexual reproduction in plants – flowering and non-flowering plants (link back to classification; virtual/actual flower dissections). Labelling of blank diagrams.
Sexual reproduction in animals; structure of male and female reproductive systems in mammals.
Blank diagrams of plant and animal structures to complete, first with notes and then without.
Meiosis (link back to specialised cells and role of chromosomes; use modelling clay/basic animations to illustrate; compare and contrast with mitosis).
Monohybrid inheritance of characteristics – genetic diagrams; links to industry.
Completing genetic diagram problems.
Section review.
Personal study.
Individual support.
Unit review.

Assessment

P1 is closely associated with P2 and may be assessed at the same time. Suitable evidence could be in the form of an annotated poster or diagrams of ideal animal and plant cells identifying cellular components and describing each of the structures labelled.

P3 requires the learner to identify an organism using a key. This may be one that has been provided by the tutor and should be of sufficient complexity that the learner is not able to simply guess. Field work could be used to gain evidence and observation record sheets completed by both the learner and the tutor would be suitable evidence.

P4 must link the nutritional requirements to at least one plant and one animal with a basic reference to the role of each in the selected species. If assessment is at the same time as P5, this may be a more logical approach. Evidence for P4 may be an illustrated essay, a presentation with notes or leaflet advising owners of selected species.

P5 requires the learner to describe the sources of nutrition for selected species. One animal and one plant species should be selected either by the tutor or through discussion with learners. The sources of nutrition must be related to the nutritional components required by the species. P5 could be assessed in the form of a poster, leaflet or article for a hypothetical magazine. P5 may also be assessed alongside P4 in the form of a project.

For P6, one animal species and one plant species should be used. The main organs and organ systems in the animal must be identified; the main structures and systems should be identified in the plant. Evidence for this may take the form of an annotated poster or series of diagrams or pictorial presentation.

For P7 the learner must describe how a specified system functions in animals and plants. This could be linked to assessment for P6.

P8 and P9 require learners to provide information on life cycles and inheritance. The role of genes and alleles must be included Suitable evidence for this could be an annotated poster or essay including a genetic diagram.

To achieve a merit grade, learners must fulfil all of the pass grade criteria and the four merit grade criteria.

M1 requires the learner to devise a key to identify similar organisms. These may be plants or animals, with the number of decision-making branches to be more than 2 and less than 10. The final, functioning, key should be sufficient evidence.

For M2, the learner must produce an account of the nutritional requirements for optimum growth in selected species. One animal and one plant species must be selected, either by the tutor or through discussion with learners. Optimum growth in animals may be taken as either juvenile growth to adulthood or the nutrition of the dam during gestation. M3 could be assessed alongside P8. Suitable evidence for M3 would include an illustrated essay, annotated feed/fertiliser plan or presentation with notes.

For M3 a full description of the processes of diffusion and osmosis must be given by the learner. At least one context must be given for each process in one animal and one plant Evidence for M2 may be in the form of an illustrated essay, annotated poster or hypothetical magazine article.

M4 requires the learner to describe the advantages and disadvantages of asexual and sexual reproduction in plants and animals. At least one advantage and one disadvantage of each type of reproduction must be given per species. Only one animal and one plant species is required. M4 could be assessed alongside P10, P11 and D4 as part of an illustrated essay. Other suitable evidence would include presentations, annotated posters or leaflets.

For a distinction grade learners must achieve all of the pass and merit grade criteria and the four distinction grade criteria.

D1 can be achieved through describing the structure and function of specialised animal and plant cells. Two specialised cells from animals and a further two from plants must be given as examples: structure should be clearly linked to function. Evidence for D1 may take the form of a pictorial presentation, illustrated essay or annotated poster. D1 may also be assessed alongside P2 and P3.

D2 must include both word and chemical equations for aerobic and anaerobic respiration. Examples should be drawn from both the plant and animal kingdoms to illustrate the requirements and conditions for each type of respiration to take place, but the overall criterion does not require a particular species to be discussed. D3 may be assessed as an extension to P8.

D3 requires the learner to compare the circulatory systems of animals and plants. Diagrams should be used to illustrate the similarities and differences of each transport system. One (vascular) plant species and one mammalian animal species must be used as examples, which may be selected by the tutor or through discussion with learners. Suitable evidence would include an annotated poster, illustrated essay or pictorial presentation with notes. This criterion may be assessed alongside or as an extension to P4.

D4 requires the learner to outline how knowledge of methods of reproduction can be applied for commercial purposes. One example from commercial plant propagation (such as at a nursery, seed company or horticultural laboratory) and one example from commercial animal production (such as animal breeders or dairy farmers) must be described. Suitable evidence would be an illustrated essay, article for a hypothetical magazine, or a presentation with notes.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1	Classification Keys	Identify the four specimens provided using a key. Ensure you check carefully: all four will need to be correct in order to pass the task! Your tutor will provide you with 10 specimens of animals and/or plants. Study them carefully and refer to your notes: now create a classification key that someone else may use to identify each specimen down to its correct species.	Written/practical element
P2, P3, D1, D2	Cell Structure	Produce an annotated poster to inform others about the structure of animal and plant cells. You should include Describe the adaptations of specialised cells, linking their structures to their functions (at least two animal cells and two plant cells must be covered).	Written
P6, P7	Biological Systems and Structures	Produce a poster showing the main organs/structures in animals and plants. You should draw an outline of your selected species and label the organs and structures of each. Include on the poster a description of the biological system each labelled structure belongs to.	Written
M3	Transport of Substances in Animals and Plants	Write an illustrated essay describing the processes of diffusion and osmosis in animals and plants. Make sure you include why these processes are important for both animals and plants, using examples.	Written
D3	Circulatory Systems	Prepare a presentation comparing the circulatory systems in animals and plants. You should include photographs and/or diagrams to show the circulatory systems, including a description of the vessels used and the methods by which substances are circulated.	Written/presented

Criteria covered	Assignment title	Scenario	Assessment method
P4, P5, M2	Animal and Plant Nutrition	Put together a set of revision notes for other people in your class to use. You should cover the following sections: • Where your selected animal gets i) carbohydrates ii) protein • Why animals and plants require nutrients • How you would identify plants that were not gaining enough i) nitrogen ii) phosphorous iii) magnesium • How you would know if an animal was not gaining enough i) copper ii) calcium iii) magnesium.	Written
P8, P9, M4, D4	Animal and Plant Reproduction	Write an illustrated essay describing how reproduction takes place in animals and plants. You need to cover stages in asexual and sexual reproduction for your selected species, with diagrams to show the organs involved. You must also include a genetic diagram to show how a characteristic can be inherited from parents to the F2 generation. This should be introduced clearly and definitions of all technical terms used must be given. Describe the advantages and disadvantages of both asexual and sexual reproduction for each species you have described. Include a section describing the advantages that knowledge of methods of reproduction bring to commercial plant producers and breeders of animals. This does not have to be limited to the species you have already described.	Written

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Environmental and Land-based sector suite. This unit links with all BTEC First land-based units involved with the understanding and management of living organisms.

Essential resources

Identification keys relevant to the species being studied; sufficient laboratory and library resources; access to multimedia computers and the internet.

Employer engagement and vocational contexts

Any plant- or animal-based laboratory, veterinary surgery or horticultural nursery work setting will be of benefit.

Indicative reading for learners

Textbooks

Dallas S E – *Animal Biology and Care, 2nd Edition* (Blackwell Publishing Ltd., 2006) ISBN 978 1405137959

Dodds J – *Biology at a Glance* (Manson Publishing Ltd, 2006) ISBN 978 1840760866

Parsons R – *GCSE Biology Revision Guide* (Coordination Group Publications Ltd., 2007) ISBN 978 1841466385

Roberts M B V – *Biology for Life for GCSE* (Nelson Thornes Ltd, 2000) ISBN 978 0174480969

Websites

www.bbc.co.uk/schools/gcsebitesize	BBC GCSE Bitesize
www.biologyreference.com/	Biology Reference
www.biotopics.co.uk/plants/psfac2.html	BioTopics (photosynthesis experiment protocols)
www.naturegrid.org.uk/children.html	Canterbury Environmental Education Centre (useful for field work)
www.defra.gov.uk	DEFRA
www.societyofbiology.org/education/educational-resources	Institute of Biology (educational resources)
www.kew.org/learn/resources.html	Kew Gardens educational resources
www.saburchill.com/chapters/chap0031.html	The Open Door Website
www.s-cool.co.uk/gcse/biology.html	S-Cool GCSE revision website
plant-hormones.info	Plant-Hormones

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are …
Independent enquirers	using a key to identify organisms describing the main functions of cell organelles describing the main organs in animals describing the main structures in plants identifying sources of nutrition for selected species.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	carrying out research into commercial applications of reproductive methods in animals and plants analysing results of laboratory practical investigations
Reflective learners	comparing animal and plant cells contrasting different methods of reproduction in animals and plants
Team workers	working in groups to carry out laboratory practical investigations
Self-managers	working independently in laboratory practical sessions organising time and resources to give presentations.

Functional Skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	word processing notes to accompany electronic presentations
Manage information storage to enable efficient retrieval	saving information from internet sources to include in tasks or assignments
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	finding information about different keys in or
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	using the internet to research relevant sources of nutrition for selected species
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	producing written assignments
Bring together information to suit content and purpose	producing written assignments
Present information in ways that are fit for purpose and audience	producing written assignments, presentations and articles for hypothetical magazines
Mathematics	
Identify the situation or problem and the mathematical methods needed to tackle it	producing genetic diagrams
Select and apply a range of skills to find solutions	analysing genetic diagrams
Use appropriate checking procedures and evaluate their effectiveness at each stage	analysing genetic diagrams
Draw conclusions and provide mathematical justifications	analysing genetic diagrams

Skill	When learners are …
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting information about structure, nutrition or reproduction in selected species
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	carrying out research for written assignments/oral presentations
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	producing written assignments.

Further information

For further information please call Customer Services on 020 7010 2188 (calls may be recorded for training purposes) or visit our website (www.pearson.com). Alternatively please email TeachingLandBasedStudies@pearson.com

Useful publications

Further copies of this document and related publications can be obtained by contacting us:

Telephone: 0845 172 0205
Email: publications@linney.com

Related information and publications include:

- Functional Skills publications – specifications, tutor support materials and question papers
- the current publications catalogue and update catalogue.

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

NB: Most 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

Lantra
Lantra House
Stoneleigh Park
Coventry CV8 2LG

Telephone: 0845 707 8007
Email: connect@lantra.co.uk

Professional development and training

Pearson supports UK and international customers with training related to 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 in effective and efficient quality assurance systems.

The national programme of training we offer can be viewed on our website (www.edexcel.com/training). You can request customised training through the website or by contacting one of our advisers in the Training from Pearson UK to discuss your training needs.

Calls may be recorded for training purposes.

The training we provide:

- is active – ideas are developed and applied
- is designed to be supportive and thought provoking
- builds on best practice.

Our training is underpinned by the LLUK standards for those preparing to teach and for those seeking evidence for their continuing professional development.

Annexe A

The Pearson BTEC qualification framework for the environmental and land-based sector

Progression opportunities within the framework.

Level	General qualifications	BTEC full vocationally-related qualifications	BTEC Short Courses	NVQ/occupational
5		Pearson BTEC Level 5 HND Diplomas in Animal Management, Environmental Conservation, Horse Management, Horticulture		
4		Pearson BTEC Level 4 HNC Diplomas in Animal Management, Environmental Conservation, Horse Management, Horticulture		
3	Pearson Level 3 Diploma in Environmental and Land-based Studies	Pearson BTEC Level 3 Certificates, Subsidiary Diplomas, Diploma and Extended Diplomas in Horticulture, Animal Management, Blacksmithing and Metalworking, Countryside Management, Fish Management, Floristry, Forestry and Arboriculture, Horse Management, Horticulture, Land-based Technology		Diploma in Work-based Environmental Conservation
2	Pearson Level 2 Diploma in Environmental and Land-based Studies	Pearson BTEC Level 2 Certificate, Extended Certificate and Diploma in Agriculture, Animal Care, Blacksmithing and Metalworking, Countryside and Environment, Fish Husbandry, Floristry, Horse Care, Horticulture, Land-based Technology		Diploma in Work-based Environmental Conservation

Level	General qualifications	BTEC full vocationally-related qualifications	BTEC Short Courses	NVQ/occupational
1	Pearson Level 1 Diploma in Environmental and Land-based Studies	BTEC Foundation Learning in Land-based Studies		
Entry		BTEC Foundation Learning in Land-based Studies		

Annexe B

Grading domains: BTEC Level 2 generic grading domains

Grading domain 1	Indicative characteristics – merit	Indicative characteristics – distinction
Application of knowledge and understanding (Learning outcome stem *understand* or *know*)	• Show depth of knowledge and development of understanding in given situations (for example explain why, make judgements based on analysis). • Apply and/or select relevant concepts. • Apply knowledge to different contexts. • Apply knowledge to non-routine contexts (ie assessor selection). • Make comparisons. • Show relationships between pass criteria.	• Synthesise knowledge and understanding across pass/merit criteria. • Evaluate concepts/ideas/actions. • Analyse/research and make recommendations. • Judges implications of application of knowledge/understanding. • Applies knowledge and understanding to complex activities/contexts.
Grading domain 2	**Indicative characteristics – merit**	**Indicative characteristics – distinction**
Development of practical and technical skills (Learning outcome stem *be able to*)	• Use advanced techniques/processes/ skills successfully. • Act under limited supervision/ demonstrate independence (note: pass cannot require support). • Apply to non-routine activities. • Demonstrate within time and/or resource constraints. • Produce varied solutions (including non-routine). • Modify techniques/processes to situations.	• Demonstrate creativity/originality/own ideas. • Apply skill(s) to achieve higher order outcome. • Select and use successfully from a range of advanced techniques/ processes/skills. • Reflects on skill acquisition and application. • Justifies application of skills/methods. • Makes judgements about risks and limitations of techniques/processes. • Innovates or generates of application of techniques/processes for new situations.

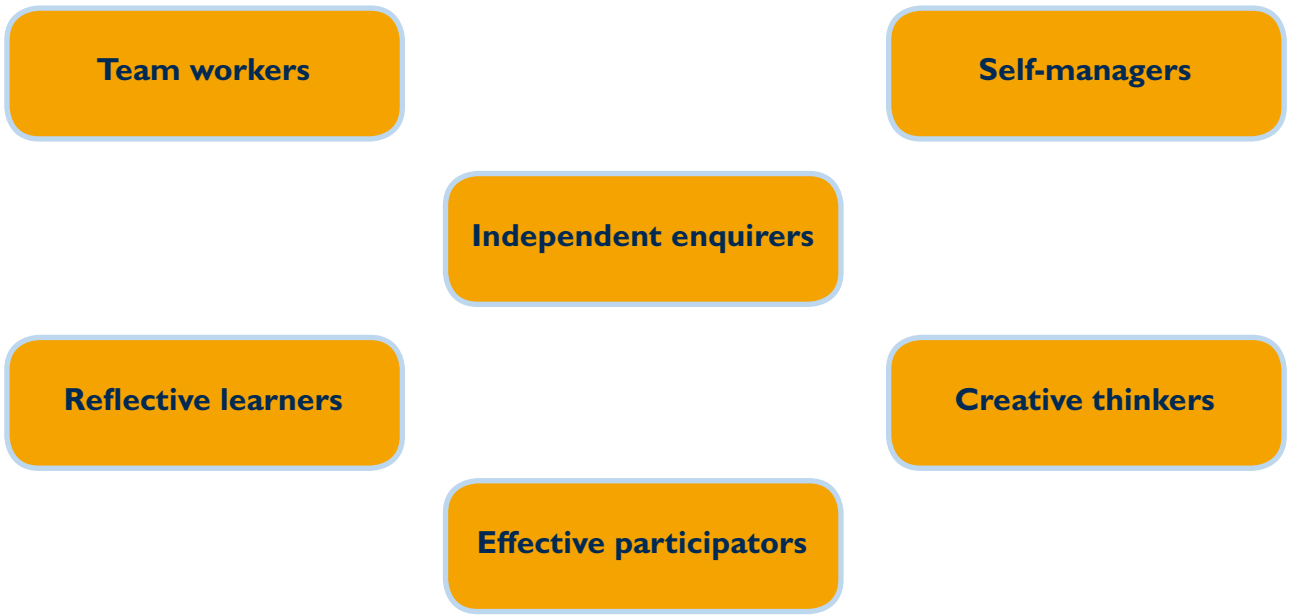
Grading domain 3	Indicative characteristics – merit	Indicative characteristics – distinction
Personal development for occupational roles (Any learning outcome stem)	• Takes responsibility in planning and undertaking activities. • Reviews own development needs. • Finds and uses relevant information sources. • Acts within a given work-related context showing understanding of responsibilities. • Identifies responsibilities of employers to the community and the environment. • Applies qualities related to the vocational sector. • Internalises skills/attributes (creating confidence).	• Manages self to achieve outcomes successfully. • Plans for own learning and development through the activities. • Analyses and manipulates information to draw conclusions. • Applies initiative appropriately. • Assesses how different work-related contexts or constraints would change performance. • Takes decisions related to work contexts. • Applies divergent and lateral thinking in work-related contexts. • Understands interdependence.
Grading domain 4	**Indicative characteristics – merit**	**Indicative characteristics – distinction**
Application of generic skills (Any learning outcome stem)	• Communicates using appropriate technical/professional language. • Makes judgements in contexts with explanations. • Explains how to contribute within a team. • Makes adjustments to meet the needs/ expectations of others (negotiation skills). • Select and justify solutions for specified problems.	• Presents self and communicates information to meet the needs of a typical audience. • Takes decisions in contexts with justifications. • Produces outputs subject to time/ resource constraints. • Reflects on own contribution to working within a team. • Generate new or alternative solutions to specified problems.

Annexe C

Personal, learning and thinking skills

A FRAMEWORK OF PERSONAL, LEARNING AND THINKING SKILLS 11-19 IN ENGLAND

The framework comprises six groups of skills that, together with the Functional Skills of English, mathematics and ICT, are essential to success in learning, life and work. In essence the framework captures the essential skills of: managing self; managing relationships with others; and managing own learning, performance and work. It is these skills that will enable young people to enter work and adult life confident and capable.



The titles of the six groups of skills are set out below.

For each group there is a focus statement that sums up the range of skills. This is followed by a set of outcome statements that are indicative of the skills, behaviours and personal qualities associated with each group.

Each group is distinctive and coherent. The groups are also inter-connected. Young people are likely to encounter skills from several groups in any one learning experience. For example an independent enquirer would set goals for their research with clear success criteria (reflective learner) and organise and manage their time and resources effectively to achieve these (self-manager). In order to acquire and develop fundamental concepts such as organising oneself, managing change, taking responsibility and perseverance, learners will need to apply skills from all six groups in a wide range of learning contexts 11-19.

The Skills

Independent enquirers

Focus:

Young people process and evaluate information in their investigations, planning what to do and how to go about it. They take informed and well-reasoned decisions, recognising that others have different beliefs and attitudes.

Young people:

- identify questions to answer and problems to resolve
- plan and carry out research, appreciating the consequences of decisions
- explore issues, events or problems from different perspectives
- analyse and evaluate information, judging its relevance and value
- consider the influence of circumstances, beliefs and feelings on decisions and events
- support conclusions, using reasoned arguments and evidence.

Creative thinkers

Focus:

Young people think creatively by generating and exploring ideas, making original connections. They try different ways to tackle a problem, working with others to find imaginative solutions and outcomes that are of value.

Young people:

- generate ideas and explore possibilities
- ask questions to extend their thinking
- connect their own and others' ideas and experiences in inventive ways
- question their own and others' assumptions
- try out alternatives or new solutions and follow ideas through
- adapt ideas as circumstances change.

Reflective learners

Focus:

Young people evaluate their strengths and limitations, setting themselves realistic goals with criteria for success. They monitor their own performance and progress, inviting feedback from others and making changes to further their learning.

Young people:

- assess themselves and others, identifying opportunities and achievements
- set goals with success criteria for their development and work
- review progress, acting on the outcomes
- invite feedback and deal positively with praise, setbacks and criticism
- evaluate experiences and learning to inform future progress
- communicate their learning in relevant ways for different audiences.

Team workers

Focus:

Young people work confidently with others, adapting to different contexts and taking responsibility for their own part. They listen to and take account of different views. They form collaborative relationships, resolving issues to reach agreed outcomes.

Young people:

- collaborate with others to work towards common goals
- reach agreements, managing discussions to achieve results
- adapt behaviour to suit different roles and situations, including leadership role
- show fairness and consideration to others
- take responsibility, showing confidence in themselves and their contribution
- provide constructive support and feedback to others.

Self-managers

Focus:

Young people organise themselves, showing personal responsibility, initiative, creativity and enterprise with a commitment to learning and self-improvement. They actively embrace change, responding positively to new priorities, coping with challenges and looking for opportunities.

Young people:

- seek out challenges or new responsibilities and show flexibility when priorities change
- work towards goals, showing initiative, commitment and perseverance
- organise time and resources, prioritising actions
- anticipate, take and manage risks
- deal with competing pressures, including personal and work-related demands
- respond positively to change, seeking advice and support when needed
- manage their emotions, and build and maintain relationships.

Effective participators

Focus:

Young people actively engage with issues that affect them and those around them. They play a full part in the life of their school, college, workplace or wider community by taking responsible action to bring improvements for others as well as themselves.

Young people:

- discuss issues of concern, seeking resolution where needed
- present a persuasive case for action
- propose practical ways forward, breaking these down into manageable steps
- identify improvements that would benefit others as well as themselves
- try to influence others, negotiating and balancing diverse views to reach workable solutions
- act as an advocate for views and beliefs that may differ from their own.

PLTS performance indicator (suggested recording sheet)

Name:	Date:				
	Level of success 1 = low, 5 = high				
Independent enquirers					
Identify questions to answer and problems to resolve	1	2	3	4	5
Plan and carry out research, appreciating the consequences of decisions	1	2	3	4	5
Explore issues, events or problems from different perspectives	1	2	3	4	5
Analyse and evaluate information, judging its relevance and value	1	2	3	4	5
Consider the influence of circumstances, beliefs and feelings on decisions and events	1	2	3	4	5
Support conclusions, using reasoned arguments and evidence	1	2	3	4	5
Creative thinkers					
Generate ideas and explore possibilities	1	2	3	4	5
Ask questions to extend their thinking	1	2	3	4	5
Connect their own and others' ideas and experiences in inventive ways	1	2	3	4	5
Question their own and others' assumptions	1	2	3	4	5
Try out alternatives or new solutions and follow ideas through	1	2	3	4	5
Adapt ideas as circumstances change	1	2	3	4	5
Reflective learners					
Assess themselves and others, identifying opportunities and achievements	1	2	3	4	5
Set goals with success criteria for their development and work	1	2	3	4	5
Review progress, acting on the outcomes	1	2	3	4	5
Invite feedback and deal positively with praise, setbacks and criticism	1	2	3	4	5
Evaluate experiences and learning to inform future progress	1	2	3	4	5
Communicate their learning in relevant ways for different audiences	1	2	3	4	5

Team workers					
Collaborate with others to work towards common goals	1	2	3	4	5
Reach agreements, managing discussions to achieve results	1	2	3	4	5
Adapt behaviour to suit different roles and situations, including leadership roles	1	2	3	4	5
Show fairness and consideration to others	1	2	3	4	5
Take responsibility, showing confidence in themselves and their contribution	1	2	3	4	5
Provide constructive support and feedback to others	1	2	3	4	5
Self-managers					
Seek out challenges or new responsibilities and show flexibility when priorities change	1	2	3	4	5
Work towards goals, showing initiative, commitment and perseverance	1	2	3	4	5
Organise time and resources, prioritising actions	1	2	3	4	5
Anticipate, take and manage risks	1	2	3	4	5
Deal with competing pressures, including personal and work-related demands	1	2	3	4	5
Respond positively to change, seeking advice and support when needed	1	2	3	4	5
Manage their emotions, and build and maintain relationships.	1	2	3	4	5
Effective participators					
Discuss issues of concern, seeking resolution where needed	1	2	3	4	5
Present a persuasive case for action	1	2	3	4	5
Propose practical ways forward, breaking these down into manageable steps	1	2	3	4	5
Identify improvements that would benefit others as well as themselves	1	2	3	4	5
Try to influence others, negotiating and balancing diverse views to reach workable solutions	1	2	3	4	5
Act as an advocate for views and beliefs that may differ from their own	1	2	3	4	5

Note to learner: The circled number represents an indication of your PLTS performance so far.

Note to tutor: Indicate the level of success by circling the appropriate number during your feedback with the learner.

Summary of the PLTS coverage throughout the programme

Personal, learning and thinking skills	Unit						
	1	2	3	4	5	6	7
Independent enquirers	✓	✓	✓	✓	✓	✓	
Creative thinkers			✓	✓	✓	✓	✓
Reflective learners	✓	✓	✓				
Team workers	✓	✓	✓		✓		✓
Self-managers	✓	✓	✓	✓	✓	✓	✓
Effective participators	✓	✓	✓		✓		
✓ – opportunities for development							

Personal, learning and thinking skills	Unit						
	8	9	10	11	12	13	14
Independent enquirers	✓	✓	✓	✓	✓	✓	✓
Creative thinkers	✓			✓	✓	✓	✓
Reflective learners	✓				✓	✓	
Team workers		✓	✓	✓		✓	✓
Self-managers	✓	✓	✓	✓	✓	✓	
Effective participators	✓	✓	✓		✓		
✓ – opportunities for development							

Personal, learning and thinking skills	Unit				
	15	16	17	18	19
Independent enquirers	✓	✓	✓	✓	✓
Creative thinkers					
Reflective learners		✓	✓	✓	
Team workers	✓	✓	✓		
Self-managers	✓	✓	✓	✓	
Effective participators	✓	✓	✓	✓	
✓ – opportunities for development					

Annexe D

Wider curriculum mapping

Study of the Pearson BTEC Level 2 Firsts in Horticulture gives learners opportunities to develop an understanding of spiritual, moral, ethical, social and cultural issues as well as an awareness of citizenship, environmental issues, European developments, health and safety considerations and equal opportunities issues.

The Pearson BTEC Level 2 Firsts in Horticulture makes a positive contribution to wider curricular areas as appropriate.

Spiritual, moral, ethical, social and cultural issues

The qualification contributes to an understanding of:

- spiritual issues – for example moral and ethical issues involved in the use of plants in natural and managed environments
- social and cultural issues – for example issues around role of plants in society and the natural environment.

Citizenship issues

Learners undertaking the Pearson BTEC Level 2 Firsts in Horticulture will have the opportunity to develop their understanding of citizenship issues, for example public and private involvement in parks, gardens and food production.

Environmental issues

Learners undertaking the Pearson BTEC Level 2 Firsts in Horticulture will have the opportunity to develop their understanding of environmental issues throughout the units.

European developments

Much of the content of the Pearson BTEC Level 2 Firsts in Horticulture applies throughout Europe even though delivery is in a UK context.

Health and safety considerations

The Pearson BTEC Level 2 Firsts in Horticulture are practically based and health and safety issues are encountered throughout the units.

Equal opportunities issues

Equal opportunities issues are implicit throughout the Pearson BTEC Level 2 Firsts in Horticulture.

Wider curriculum mapping

Level 2

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13	Unit 14
Spiritual														
Moral and ethical				×		×							×	
Social and cultural				×	×	×							×	
Citizenship issues					×									
Environmental issues	×	×		×	×	×	×	×	×	×	×	×	×	×
European developments														
Health and safety considerations	×	×		×	×			×	×	×	×	×	×	×
Equal opportunities issues				×	×	×	×							

	Unit 15	Unit 16	Unit 17	Unit 18	Unit 19
Spiritual					
Moral and ethical					
Social and cultural					
Citizenship issues					
Environmental issues	×	×	×	×	×
European developments					
Health and safety considerations	×	×	×	×	×
Equal opportunities issues					

Annexe E

National Occupational Standards/mapping with NVQs

The grid below maps the knowledge covered in the Pearson BTEC Level 2 Certificate, Extended Certificate and Diploma in Horticulture against the underpinning knowledge of the Level 2 NVQ in Landscaping, Level 2 NVQ in Production Horticulture, Level 2 in Amenity Horticulture.

KEY

✓ indicates that the Pearson BTEC Level 2 Firsts cover all of the underpinning knowledge of the NVQ unit

\# indicates partial coverage of the NVQ unit

a blank space indicates no coverage of the underpinning knowledge

	Units																		
NVQs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
Level 3 NVQ Common Units																			
CU2.2							#												
CU19.1,2							#		#										
CU20.1							#												
CU23.1							#												
CU27.1,2															#				
CU72																	#		
CU73																	#		
CU76.1	#	#			#														
CU79								#			#	#							
Level 3 NVQ in Landscaping																			
L1									#										
L2.1					#														

	Units																		
NVQs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
L5														#		#			
L6														#		#			
L15									#										
L24									#										
Level 3 NVQ in Production Horticulture																			
PH1								#				#							
PH2								#			#	#							
PH3					#			#			#	#							
PH4								#				#							

Annexe F

Unit mapping overview

BTEC First in Horticulture legacy (specification end date 31/08/2010)/new versions of the BTEC First qualifications in Horticulture (specification start date 01/09/2010) – the BTEC Level 2 Certificate in Horticulture, BTEC Level 2 Extended Certificate in Horticulture and the BTEC Level 2 Diploma in Horticulture

Old units \ New units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13	Unit 14	Unit 15	Unit 16	Unit 17	Unit 19
Unit 1				F														
Unit 2						P												
Unit 3					P													
Unit 4	P	P																F
Unit 5							F											
Unit 6								F										
Unit 7			P						P									
Unit 8										F								
Unit 9											P						P	
Unit 10												F						
Unit 11													P					
Unit 12														P		P		
Unit 13															F			
Unit 14																		

KEY

P – Partial mapping (some topics from the old unit appear in the new unit)

F – Full mapping (topics in old unit match new unit exactly or almost exactly)

X – Full mapping + new (all the topics from the old unit appear in the new unit, but new unit also contains new topic(s))

Unit mapping in depth

BTEC First in Horticulture legacy (specification end date 31/08/2010)/new versions of the BTEC First qualifications in Horticulture(specification start date 01/09/2010) – the BTEC Level 2 Certificate in Horticulture, BTEC Level 2 Extended Certificate in Horticulture and the BTEC Level 2 Diploma in Horticulture.

New units		Old units		Mapping/comments (new topics in italics)
Number	**Name**	**Number**	**Name**	
Unit 1	Understand the Basic Principles of Plant Science	**Unit 4**	Introduction to Animal and Plant Biology	Animal biology removed from unit. Focus on plant science. Physiology of plants.
Unit 2	Understand the Basic Principles of Soil Science	**Unit 4**	Introduction to Animal and Plant Biology	Animal and plant biology removed from unit. Focus on soil science.
Unit 3	Setting out from a Plan	**Unit 7**	Basic Landscape Construction	Drainage and Concreting/paving removed. New focus on understanding of setting out.
Unit 4	Undertake Work Related Experience in the Land-based Industries	**Unit 1**	Work Related Experience in Horticulture	Reporting on work experience.
Unit 5	Establish and Maintain Plants Outdoors	**Unit 3**	Amenity and Decorative Horticulture	Decorative horticulture removed from unit. Focus on amenity horticulture. Health maintenance of plants outdoors.
Unit 6	Environmental and Land-based Business	**Unit 2**	Horticulture Industry and Organisations	Know common business operations and simple administrative tasks.
Unit 7	Participate in Providing Estate Maintenance	**Unit 5**	Practical Land-based Skills	N/A
Unit 8	Participate in Horticultural Crop Production Outdoors	**Unit 6**	Commercial Horticultural Crop Production	N/A
Unit 9	Construct Landscape Foundations and Surfaces	**Unit 7**	Basic Landscape Construction	Laying concrete and installing paving split from one learning outcome into two.
Unit 10	Undertake Specialist Land-based Machinery Operations	**Unit 8**	Introduction to Specialist Land-based Machinery	N/A
Unit 11	Undertake Nursery Stock Production	**Unit 9**	Horticultural Plants Nursery Stock Production	More focus on nursery business. Customer requirements.
Unit 12	Participate in Protected Horticultural Plant Production	**Unit 10**	Protected Horticultural Crop Production	N/A

New units		Old units		Mapping/comments (new topics in italics)
Number	**Name**	**Number**	**Name**	
Unit 13	Presentation and Service for Retailing in the Land-based Sector	**Unit 11**	Land-based Retail and Customer Service	Students are now required to plan, design and justify the layout for a land based retail outlet. Previously only required to be able to describe an efficient layout.
Unit 14	Maintain Winter and Summer Sports Turf Surfaces	**Unit 12**	Turf Establishment and Maintenance	Focus on winter and summer sports turf and their requirements. Maintaining and assessing the quality of sports surfaces.
Unit 15	Introduction to Land-based Machinery Operations	**Unit 13**	Land-based Machinery Operation	Maintenance of land based equipment and machinery.
Unit 16	Understand the Principles of Sports and Amenity Turf Maintenance	**Unit 12**	Turf Establishment and Maintenance	Focus on the understanding of amenity and sports turf. Irrigation and nutrition of sports and amenity turf. Performance quality standards.
Unit 17	Participate in Propagation Techniques	**Unit 9**	Horticultural Plants Nursery Stock Production	Nursery stock production removed. Focus on propagation techniques.
Unit 18	Tractor Driving	**-**	N/A	N/A
Unit 19	Introduction to Animal and Plant Biology	**Unit 4**	Introduction to Animal and Plant Biology	N/A

Annexe G

Examples of calculation of qualification grade above pass grade

Pearson will automatically calculate the qualification grade for your learners when your learner unit grades are submitted.

The generic examples below demonstrate how the qualification grade above pass is calculated using the following two tables which are also shown in the section earlier on in the specification *Calculation of the qualification grades above pass grade*.

Points available for credits achieved at different levels and unit grades

The table below shows the **number of points scored per credit** at the unit level and grade.

Unit level	Points per credit		
	Pass	Merit	Distinction
Level 1	3	4	5
Level 2	5	6	7
Level 3	7	8	9

Learners who achieve the correct number of points within the ranges shown in the 'qualification grade' table below will achieve the qualification merit or distinction or distinction* grade.

Qualification	Points range above pass grade		
	Merit	Distinction	Distinction*
BTEC Level 2 Certificate	85–94	95–99	100 and above
BTEC Level 2 Extended Certificate	170–189	190–199	200 and above
BTEC Level 2 Diploma	340–379	380–399	400 and above

Example 1

Achievement of pass qualification grade

A learner completing a 15-credit Pearson BTEC Level 2 Certificate achieves the credit required to gain a pass qualification grade and does not achieve the points to gain a merit grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	2	5	Pass	5	5 × 5 = 25
Unit 2	2	5	Pass	5	5 × 5 = 25
Unit 3	2	5	Merit	6	5 × 6 = 30
Qualification grade totals		15	Pass		80

Example 2

Achievement of merit qualification grade

A learner completing a 15-credit Pearson BTEC Level 2 Certificate achieves the points required to gain a merit qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	2	5	Pass	5	5 × 5 = 25
Unit 2	2	5	Merit	6	5 × 6 = 30
Unit 3	2	5	Merit	6	5 × 6 = 30
Qualification grade totals		15	Merit		85

Example 3

Achievement of distinction qualification grade

A learner completing a 15-credit Pearson BTEC Level 2 Certificate achieves the points required to gain a distinction qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	2	5	Merit	6	5 × 6 = 30
Unit 2	2	5	Merit	6	5 × 6 = 30
Unit 3	2	5	Distinction	7	5 × 7 = 35
Qualification grade totals		15	Distinction		95

Example 4

Achievement of merit qualification grade

A learner completing a 30-credit Pearson BTEC Level 2 Extended Certificate achieves the points required to gain a merit qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	2	5	Merit	6	5 × 6 = 30
Unit 2	2	5	Pass	5	5 × 5 = 25
Unit 3	2	5	Distinction	7	5 × 7 = 35
Unit 6	2	10	Pass	5	10 × 5 = 50
Unit 8	3	5	Pass	7	5 × 7 = 35
Qualification grade totals		30	Merit		175

Example 5

Achievement of merit qualification grade

A learner completing a 60-credit Pearson BTEC Level 2 Diploma achieves the points required to gain a merit qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	2	5	Merit	6	5 × 6 = 30
Unit 2	2	5	Pass	5	5 × 5 = 25
Unit 3	2	5	Distinction	7	5 × 7 = 35
Unit 6	2	10	Merit	6	10 × 6 = 60
Unit 9	1	5	Merit	4	5 × 4 = 20
Unit 10	2	10	Distinction	7	10 × 7 = 70
Unit 11	2	10	Merit	6	10 × 6 = 60
Unit 14	2	10	Merit	6	10 × 6 = 60
Qualification grade totals		60	Merit		360

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For more information on Pearson and BTEC qualifications please visit our website: www.edexcel.com