

# Unit 24: Undertake Advanced Arboricultural Practices

<b>Unit code:</b>	<b>A/600/9843</b>
<b>QCF Level 3:</b>	<b>BTEC National</b>
<b>Credit value:</b>	<b>10</b>
<b>Guided learning hours:</b>	<b>60</b>

## ● Aim and purpose

This unit aims to provide learners with an understanding of advanced arboricultural practices and how these can be put into 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

Advanced arboricultural practice will develop learner understanding of arboricultural operations and enhance their specialist skills. The unit covers the principal areas of tree inspection, tree pruning, dismantling operations and advanced felling.

Learning will focus on both theoretical and practical aspects with relevant legislation and best practice embedded into all tasks and operations. Progressive policies, new technologies and contemporary methods will be examined to enable learners to become effective practitioners in the arboriculture industry.

## ● Learning outcomes

**On completion of this unit a learner should:**

- 1 Be able to carry out aerial inspections of trees
- 2 Be able to carry out pruning operations within tree canopies
- 3 Understand how to dismantle trees.

# Unit content

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## 1 Be able to carry out aerial inspections of trees

*Visual tree assessment:* the significance of tree defects, data recording of tree inspection, inspection of installed support systems (bracing); health and safety

*Codes of practice and legislation:* Arboriculture and Forestry Advisory Group (AFAG) guides, A Guide to Good Climbing Practice (Arboricultural Association), Management of Health and Safety at Work Regulations, Lifting Operations and Lifting Equipment Regulations, Provision and Use of Work Equipment Regulations, Work at Height Regulations, Wildlife and Countryside Act

*Inspection of wildlife in trees:* relevant legislation and legal responsibilities (eg Wildlife and Countryside Act, Habitats Regulations), nesting birds, identification of bat habitat

*Tree climbing equipment:* throw lines and bags, ropes, harnesses, climbing hardware (eg karabiners, micro-pulleys, friction devices), knots, personal protective equipment (PPE), performance criteria of climbing equipment

*Tree access techniques:* body thrusting, foot-locking, use of ladders, use of mobile elevated work platforms (MEWP); health and safety

*Moving around the canopy and work positioning:* changing of anchor points, use of multiple anchor points, redirects, slings; practical skills development; health and safety

## 2 Be able to carry out pruning operations within tree canopies

*Codes of practice, standards and legislation:* British Standard 3998: Recommendations for Tree Work, trees protected by the Town and Country Planning Act (trees under tree preservation orders, trees within conservation areas)

*Tree pruning techniques:* natural target pruning, reduction cuts, pruning of co-dominant stems, coronet cuts

*Tree pruning operations:* timing of pruning operations, crown cleaning, crown thinning, crown raising, crown reduction, restoration pruning, conservation pruning; health and safety

*Practical skills development:* to include knowledge of relevant industry competencies

## 3 Understand how to dismantle trees

*Rigging equipment:* ropes, pulleys, lowering devices, slings, wire core flip-lines, performance criteria of rigging equipment, cycles to failure, load forces in rigging operations

*Branch removal:* free fall techniques, the use of natural and false anchors for rigging systems, equipment selection, use of lowering ropes, use of lowering devices, use of zip-lines, use of cranes in arboriculture; health and safety

*Section felling of stems:* climbing with spikes, shock loads in stems, equipment selection, systematic lowering of stem sections; health and safety

*Stump removal:* stump grinding, chemical treatment of stumps, accelerated decay of stumps, use of winches to remove stumps; health and safety

*Teamwork in arboriculture:* role specific responsibilities, communication on an arboricultural work site, skills progression within an arboricultural team

*Practical skills development:* knowledge of relevant industry competencies

## 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:
<p><b>P1</b> discuss factors relevant to the inspection of trees from the ground</p>	<p><b>M1</b> evaluate specialist equipment used to aid work positioning in the tree</p>	<p><b>D1</b> discuss the practical implications of legislation relating to aerial arboricultural operations</p>
<p><b>P2</b> carry out pre-climbing assessment of a tree</p>		
<p><b>P3</b> review the methods and equipment commonly used to safely access, position and move within the canopy of a tree [IE]</p>		
<p><b>P4</b> select and inspect appropriate specialist equipment and working methods to access trees safely and move effectively within the canopy [IE]</p>		
<p><b>P5</b> access the canopy of the tree safely and effectively move within the canopy to inspect trees [CT, RL]</p>		
<p><b>P6</b> assess trees requiring preventative or remedial works and produce a schedule of work to meet the requirements for those trees [EP]</p>		

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:
<p><b>P7</b> summarise current codes of practice and legislation appropriate to aerial tree works</p>	<p><b>M2</b> explain how pruning operations can be used to reduce conflicts between trees and urban infrastructure</p>	
<p><b>P8</b> explain the variety and appropriateness of pruning cuts</p>		
<p><b>P9</b> explain how current theory on wound responses in trees informs and directs pruning methods and techniques</p>		
<p><b>P10</b> review specialist equipment and techniques available for aerial tree works [IE]</p>		
<p><b>P11</b> select and inspect appropriate specialist equipment and working methods to access trees safely and move effectively to carry out preventative and remedial pruning in tree canopies</p>		
<p><b>P12</b> access the canopy of the tree safely and effectively move within the canopy to carry out preventative and remedial pruning in tree canopies [CT, RL]</p>		

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:
<p><b>P13</b> describe the tools and equipment available for dismantling trees, in a variety of situations</p>	<p><b>M3</b> discuss measures to increase the safe working life of arboricultural equipment</p>	<p><b>D2</b> describe in detail how sustainable practice can be integrated into arboricultural operations.</p>
<p><b>P14</b> select and inspect appropriate specialist equipment to dismantle trees</p>		
<p><b>P15</b> access the canopy of trees safely and effectively move within the canopies to remove all branches [CT, RL, TW]</p>	<p><b>M4</b> explain the importance of teamwork, good communication and role specific responsibilities in arboricultural operations.</p>	
<p><b>P16</b> explain how to remove branches and fell the main stems. [CT, RL, TW]</p>		

**PLTS:** This summary references where applicable in the pass criteria, in the square brackets, the elements of the personal, learning and thinking skills. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

<b>Key</b>	IE – independent enquirers CT – creative thinkers	RL – reflective learners TW – team workers	SM – self-managers EP – effective participators
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# Essential guidance for tutors

## Delivery

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

Tutors are encouraged to use a wide range of delivery methods, including lectures, discussions, seminar presentations, site visits, practical workshops, internet and/or library-based research. Learners should also have access to a virtual learning environment (VLE) which will promote independent learning, provide a vehicle for learner differentiation, a store for lecture notes, self-assessment activities and links to online resources. Delivery should stimulate, motivate, educate and enthuse learners.

Visiting expert speakers, either internal or external, should form part of the delivery. For example, speakers could include an arboricultural contractor, equipment manufacturer or representative from a trade association.

Health and safety issues relating to the inspection, pruning and removal of trees must be stressed and reinforced regularly. Risk assessments must be undertaken before site visits or practical activities with any items of equipment. Adequate personal protective equipment (PPE) must be provided if this is industry best practice.

A range of practical sites will be required to ensure learners experience realistic work-based scenarios in order to develop their skills. A lead tutor should be supported by experienced instructors if necessary. The tutor/instructor: learner ratio should be maintained at  $\leq 1:6$ .

Due to the seasonal nature of tree growth processes and development, learners should be given the opportunity to work with trees throughout the year. Approaches to inspection, pruning and dismantling operations can be modified by canopy status.

Tutors are encouraged to 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.

## 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
Inspection of trees and their surroundings. Core lecture supported by practical workshop focusing on tree defects, habitat potential of trees, rooting environment, conflicts with urban infrastructure and data recording.
<b>Assignment 1: Advanced Arboricultural Skills</b> (P1, P2, P4, P5, P11, P12, P14, P15, P16)
Tree climbing best practice: seminar or workshop.
Tree work accident simulation: workshop focusing on realistic accident scenario which allows investigation of cause, application of legislation, and evaluation.
Work positioning: practical workshop(s) focusing on skill development.

Topic and suggested assignments/activities and/assessment
Pruning legislation, equipment, timing, cuts and operations. Core lecture supported by demonstrations.
Pruning trees: practical workshop(s) focusing on skill development.
Specialist equipment for dismantling operations. Core lecture or seminar focusing on equipment selection, performance criteria and safe use (including demonstration of load forces created in rigging operations using a dynamometer).
Branch removal: practical workshop(s) focusing on skill development.
Section felling of stems: practical workshop(s) focusing on skill development.
Advanced felling operations. Core lecture supported by demonstration or use of video library.
<b>Assignment 2: Advanced Arboricultural Practice Notes</b> (P3, P6, P7, P8, P9, P10, P13, M1, M2, M3, M4, D1, D2)
Sustainability in arboriculture. Core lecture supported by a practical workshop using mobile timber harvesting equipment.
Approved contractor schemes: workshop delivered by relevant industry body.
Independent learning structured using the assessment criteria.
Independent skills and competency assessment.
Unit review.

## Assessment

To achieve P1, learners must discuss factors relevant to the inspection of trees from the ground. This will include important tree defects, the significance of the defects identified and the significance of surrounding landscape features/infrastructure. Evidence could be tutor discussion records on an appropriately designed pro forma.

For P2, learners must carry out a pre-climbing inspection in accordance with industry best practice. Evidence could be tutor observation records.

To achieve P3, learners must review the relative value of a wide range of climbing equipment and discuss the appropriateness of different methods of accessing a canopy. Evidence could be a written assignment.

P4 requires learners to independently select and inspect appropriate specialist equipment for canopy access and work positioning. Evidence could be tutor observation records.

For P5, learners must access and move within different areas of the tree canopy safely and in full accordance with industry best practice. Evidence could be tutor observation records.

To achieve P6, learners must assess an individual or group of trees needing arboricultural management and produce a written schedule of work to meet particular objectives.

For P7 learners need to summarise current codes of practice and legislation which have a direct influence on arboricultural operations. Evidence could be a written assignment.

To achieve P8, learners must explain how to prune back to a lower order branch/stem, reduce a branch in length and prune co-dominant stems, and when these pruning cuts are appropriate. Evidence could be a written assignment.

P9 requires learners to explain how wound response in trees is linked to pruning methods, identify bad practice in pruning operations and show how this has influenced British Standards (BS 3998). Evidence could be a written assignment.

To achieve P10, learners must review the relative value of specialist equipment used for a range of aerial arboricultural operations. Evidence could be a written assignment.

For P11, learners need to independently select and inspect appropriate specialist equipment and working methods used for a range of aerial arboricultural operations. Evidence could be tutor observation records.

To achieve P12 learners must access a tree canopy safely and carry out pruning tasks within a tree canopy to meet specified management objectives. Evidence could be tutor observation records.

For P13, learners must describe the range of tools and equipment used for dismantling trees in a variety of different situations where spatial restrictions apply. Evidence could be a written assignment.

To achieve P14, learners must independently select and inspect appropriate specialist equipment used to dismantle trees. Evidence could be tutor observation records.

For P15, learners must access the canopy safely and take a systematic approach to the removal of branches using a range of free fall, hand held cutting techniques and lowering systems. All operations must be carried out in accordance with industry best practice. Evidence could be tutor observation records.

To achieve P16, learners must safely section fell a stem using free fall, hand held and lowering techniques. Learners should show proficiency in the use of climbing spikes or false crotches to lower stem sections. All operations must be carried out in accordance with industry best practice. Evidence could be tutor observation records.

To achieve M1, learners must evaluate specialist equipment used to aid work positioning in a tree. This may include, but is not limited to, harness design, slings, re-directs, secondary climbing lines and climbing spikes. Evidence could be a written assignment.

For M2, learners must explain how different pruning operations can be used to reduce identified conflicts between trees and urban infrastructure. It is recommended that at least three different pruning operations are covered. Evidence could be a written assignment.

For M3, learners need to discuss the performance criteria (for example safe working loads, elasticity of ropes and heat resistance) of a range of specialist equipment and identify work practices which can extend the safe working life of the equipment. Work practices which can reduce the safe working life of equipment should also be discussed (for example contamination of ropes with chemicals, consistent use of ropes close to maximum load forces). Evidence could be a written assignment.

To achieve M4, learners must explain the value of teamwork, good communication and role specific responsibilities in an arboricultural team. This should include, but is not limited to, crew leader, climber, groundsperson. Evidence could be a written assignment.

For D1, learners must discuss the significance of legislation relating to aerial arboricultural operations. This should include, but is not limited to, health and safety legislation, tree protection orders (TPOs), working in conservation areas (CAs) and legislation relating to habitat protection. Evidence could be a written assignment.

To achieve D2, learners must describe in detail how sustainable practice can be integrated into arboricultural operations. This may include ideas relating to biofuels and biolubricants, disposal of arboricultural arisings, harvesting or urban timber for niche markets, tree replacement policies and modification of work practices. Learners should be encouraged to seek opportunities to engage with the future challenges faced by, and opportunities in, the arboricultural industry. Evidence could be a written assignment.



## 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 Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P4, P5, P11, P12, P14, P15, P16	Advanced Arboricultural Skills	You will develop advanced arboricultural skills through a series of practical workshops. You will learn practical competence in pruning, dismantling and felling trees.	Practical workshops. Tutor observation records.
P3, P6, P7, P8, P9, P10, P13, M1, M2, M3, M4, D1, D2	Advanced Arboricultural Practice Notes	Prepare a working document which provides an overview of fundamental arboricultural practice. This can then be synthesised in a case study to produce a specific schedule of work.	A written assignment in the form of a booklet including tables, diagrams and images.

## 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
Carry Out Ground-based Arboricultural Operations	TW26 Carry out off ground arboriculture operations TW31 Carry out advanced off ground arboricultural operations TW32 Survey and inspect trees
Undertake Tree Climbing and Pruning Operations	Undertake Arboricultural Skills

## Essential resources

- Access to a wide range of trees on practical work sites
- A range of climbing kits which have been inspected in accordance with the Lifting Operations and Lifting Equipment Regulations
- Personal protective equipment to meet industry best practice requirements
- Rigging equipment
- Multiple handsaws and top handled chainsaws
- Multiple ground chainsaws
- Skilled and experienced staff.

## Employer engagement and vocational contexts

Contractors with a proven track record of delivering a range of high quality arboricultural operations should be invited to share their experiences with learners. Trade associations may be invited to discuss approved contractor status and its relevance in demonstrating organisational competency for the purposes of securing work contracts.

### Indicative reading for learners

#### Textbooks

Blair D – *Arborist Equipment: A Guide to the Tools and Equipment of Tree Maintenance and Removal*, 2nd edition (International Society of Arboriculture, 1999) ISBN 9781881956136

British Standard 3998 – *Recommendations for Tree Work* (British Standards Institute) ISBN 0580171701

Brown G E – *The Pruning of Trees, Shrubs and Conifers*, 2nd edition with revisions and additions by Tony Kirkham (Timber Press, 2009) ISBN 9781604690026

Cottam M, McKeown L and White C – *A Guide to Good Climbing Practice* (Arboricultural Association, 2005) ISBN 9780900978395

European Arboricultural Council – *European Tree Worker* (Patzner Verlag, 2005) ISBN 3876171091

Gilman E – *An Illustrated Guide to Pruning: 2nd edition* (Delmar Thomson Learning, 2002) ISBN 978-0766822719 Also available as an ebook on [www.ebrary.com](http://www.ebrary.com)

Harris R W, Clark J R and Matheny N P – *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines, 4th Edition* (Prentice Hall, 2003) ISBN 9780130888822

Hartman J R, Sall M A and Pirone T P – *Tree Maintenance* (Oxford University Press, 2000) ISBN 9780195119916

Jepson J – *To Fell a Tree: A Complete Guide to Successful Tree Felling and Woodcutting Methods* (Beaver Tree Publishing, 2009) ISBN 9780975525296

Jepson J – *The Tree Climber's Companion* (Beaver Tree Publishing, 2000) ISBN 9780615112909

Lilly S J and Kotwica B – *Tree Climbers' Guide*, 3rd edition (International Society of Arboriculture, Printec Press, 2005) ASIN B000VT3FT1

Lilly S J and Donzelli P S – *The Art and Science of Practical Rigging* (International Society of Arboriculture, 2001) ISBN 978881956280

Lingens D – *Tree Climbers Knotbook* (Schlauverlag, 2006) ISBN 3981041712

Shigo A L – *Tree Pruning: A Worldwide Photo Guide* (Shigo and Trees Associates, 1989) ISBN 9780943563084

Shigo A L – *Modern Arboriculture* (Shigo and Trees Associates, 1991) ISBN 9780943563091

## **Journals and periodicals**

*Arboricultural Journal*

*Arboriculture and Urban Forestry*

*Arborist News*

*Essential Arb*

## **Other publications**

*Arboricultural Newsletter*

## **Websites**

[www.aie.org.uk](http://www.aie.org.uk)

Arboricultural Information Exchange

[www.forestry.gov.uk](http://www.forestry.gov.uk)

Forestry Commission

[www.hse.gov.uk/agriculture/forestry.htm](http://www.hse.gov.uk/agriculture/forestry.htm)

Health and Safety Executive — Tree Work Information

[www.hse.gov.uk/treework/](http://www.hse.gov.uk/treework/)

Health and Safety Executive — Tree Work Health and Safety

[www.isa-arbor.com](http://www.isa-arbor.com)

International Society of Arboriculture

[www.trees.org.uk](http://www.trees.org.uk)

Arboriculture 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 ...
<b>Independent enquirers</b>	reviewing and selecting methods and equipment for arboricultural operations
<b>Creative thinkers</b>	accessing the canopy of a tree and performing either pruning or dismantling operations
<b>Reflective learners</b>	developing individual skill sets in arboricultural operations
<b>Team workers</b>	collaborating with team members to achieve work objectives safely adapting their behaviour in relation to different roles and responsibilities within the team
<b>Self-managers</b>	listening and responding positively to instruction from more experienced colleagues in relation to their advanced arboricultural skills
<b>Effective participators</b>	presenting a persuasive case for the use of a particular approach to achieving work objectives.

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 ...
<b>Independent enquirers</b>	providing written justification for a particular work approach
<b>Creative thinkers</b>	generating ideas to integrate sustainable practice into the arboricultural industry
<b>Reflective learners</b>	inviting feedback from written and practical exercises
<b>Team workers</b>	developing leadership roles on the work site taking on responsibility for particular tasks providing constructive support and feedback for colleagues and working towards common objectives with others
<b>Self-managers</b>	organising and structuring assessed work
<b>Effective participators</b>	engaging with the challenges and future opportunities within arboriculture.

## ● Functional Skills — Level 2

Skill	When learners are ...
<b>ICT – Use ICT systems</b>	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	investigating current theory on wound responses in trees and how this relates to pruning methods and techniques
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	producing a schedule of work for trees requiring preventative or remedial works
Manage information storage to enable efficient retrieval	investigating current theory on wound responses in trees and how this relates to pruning methods and techniques
<b>ICT – Find and select information</b>	
Select and use a variety of sources of information independently for a complex task	investigating current theory on wound responses in trees and how this relates to pruning methods and techniques
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	investigating current theory on wound responses in trees and how this relates to pruning methods and techniques
<b>ICT – Develop, present and communicate information</b>	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> <li>• text and tables</li> <li>• images</li> <li>• numbers</li> <li>• records.</li> </ul>	producing a schedule of work for trees requiring preventative or remedial works
Bring together information to suit content and purpose	producing a schedule of work for trees requiring preventative or remedial works
Present information in ways that are fit for purpose and audience	producing a schedule of work for trees requiring preventative or remedial works
Evaluate the selection and use of ICT tools and facilities used to present information	producing a schedule of work for trees requiring preventative or remedial works
<b>English</b>	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	discussing factors relevant to the inspection of trees from the ground
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	investigating current theory on wound responses in trees and how this relates to pruning methods and techniques
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	summarising current codes of practice and legislation appropriate to aerial tree works.