

Pearson
BTEC Level 1
Introductory in
**Applied
Science**



Specification

First teaching from September 2019

Pearson BTEC Level 1 Introductory Award in Applied Science
Pearson BTEC Level 1 Introductory Certificate in Applied Science
Pearson BTEC Level 1 Introductory Diploma in Applied Science

**Pearson
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Introductory Award
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Issue 4

Edexcel, BTEC and LCCI qualifications

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This specification is Issue 4. Key changes are sidelined. We will inform centres of any changes to this issue. The latest issue can be found on our website.

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Welcome

With a track record built over 30 years of learner success, BTEC qualifications are widely recognised and respected. They provide progression to the workplace either directly or via study at higher levels. Proof comes from YouGov research, which shows that 62% of large companies have recruited employees with BTEC qualifications.

Why are BTECs so successful?

BTECs embody a fundamentally learner-centred approach to the curriculum, with a flexible, unit-based structure. In this new BTEC Introductory Suite, the focus is on the development of both transferable and sector skills. The development of these skills is key in helping progression to further study – whether that be to other BTECs, to apprenticeships or to training. As we expect many learners to be studying functional skills or GCSEs alongside their BTEC we also offer support skills in English and maths.

When creating the BTEC Introductory Suite, we worked with colleges to ensure that learners' needs were met. The colleges told us that it is essential that Level 1 learners develop key progression skills in areas such as problem solving, communication and research.

We have addressed this through:

- offering a BTEC Introductory Award, a BTEC Introductory Certificate and a BTEC Introductory Diploma, each has a clear and distinct purpose, so there is something to suit every learner's choice of study programme and progression plan
- new skills-focused content closely aligned with what centres need in supporting their learners to become part of a skilled workforce
- graded assessments in every unit to help learners progress to the next stage of their personal journey, whether to further education or to the world of work.

A word to learners

Today's BTEC Introductory qualifications will demand a lot of practical work from you. You will complete a range of units, be organised, take assessments that will demonstrate your skills and keep a portfolio of your assignments. You can feel proud in achieving a BTEC because, whatever your plans, success in your BTEC Introductory Award, Certificate or Diploma will help you progress to the next stage of your learning.

Good luck, and we hope you enjoy your course.

Summary of BTEC Level 1 Introductory Award, Certificate and Diploma in Applied Science Issue 4 changes

Summary of changes made between the previous issue and this current issue	Page number
The wording under <i>Section 8 Final grading and awarding</i> subsection <i>Calculation of the qualification grade</i> has been updated to clarify current practice in ensuring maintenance and consistency of qualification standards.	Page 153
The wording in <i>Section 9 Administrative arrangements</i> subsections <i>Learner malpractice</i> and <i>Teacher/centre malpractice</i> have been updated to clarify suspension of certification in certain circumstances.	Page 158

Summary of BTEC Level 1 Introductory Award, Certificate and Diploma in Applied Science Issue 2 and 3 changes

Summary of changes made between Issue 2 and Issue 3	Page number
The BTEC Level 1 Introductory Award in Applied Science has been added to the specification title.	Title page
The BTEC Level 1 Introductory Award in Applied Science has been added to the Welcome message.	Welcome page
References to the BTEC Level 1 Introductory Award in Applied Science have been added to the <i>Overview of the BTEC Introductory qualifications</i> pages.	Pages 1 and 2
The BTEC Level 1 Introductory Award in Applied Science has been added to <i>Section 1 Qualification Purpose and Objectives</i> .	Pages 6 and 7
In <i>Section 1 Qualification purpose and objective, Who are the qualifications for?</i> has been changed to include all learners.	Page 6
The structure for the BTEC Level 1 Introductory Award in Applied Science has been added to <i>Section 2 Structure</i> and the structures for the Certificate and Diploma have been updated.	Pages 8 and 9
Learning aim B has been reworded.	Page 117
Three new units have been added to the specification. <i>ASc13 Exploring Biology</i> , <i>ASc14 Exploring Chemistry</i> and <i>ASc15 Exploring Physics</i> .	Pages 117-140
The BTEC Level 1 Introductory Award in Applied Science has been added to <i>Section 4 Planning your programme</i> .	Page 141
Detail on understanding the qualification grades for the BTEC Level 1 Introductory Award in Applied Science has been added to <i>Section 8 Understanding the Qualification Grade</i> .	Pages 158-160
References to internal units have been removed from <i>Points available for units</i> .	Page 159

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

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Overview of the BTEC Introductory qualifications

This specification contains the units and information you need to deliver the new Pearson BTEC Level 1 Introductory Award, Certificate or Diploma in Applied Science. It includes all the units for these qualifications. This specification also signposts additional handbooks and policies.

These qualifications are part of the new suite of BTEC Introductory qualifications offered by Pearson. This suite has been designed primarily for pre-16 to 19+ learners who wish to achieve at Level 1 qualification in preparation for future study. The qualifications are not designed to lead directly to employment but will maximise opportunities for learners to progress by focusing on the development of transferable and sector-related skills. The qualifications have been designed explicitly to meet the needs of this group of learners in terms of content, assessment and progression. For learners who do not want to specialise in one particular sector, we offer a Vocational Studies qualification in the Award, Certificate and Diploma sizes. The Vocational Studies qualification gives learners the opportunity to study units from across the sectors.

The qualifications have been created in line with the ethos and recommendations of study programmes for pre-16 to 19+ year olds and recommendations from centres. The qualifications are designed to meet Ofqual requirements.

All qualifications across the suite share common core units as these units contain the generic attributes learners need to be able to progress to further study. The qualification titles are given below with the size of the qualification in guided learning hours (GLH).

These new graded qualifications provide a broad introduction to a sector and give learners the opportunity to demonstrate increased skill levels. Learners will develop the necessary transferable and sector skills to progress more quickly. The qualifications prepare learners for progression to Level 2 BTECs or other study programmes. They provide for progression by either meeting entry requirements in their own right or by being accepted alongside other qualifications at the same level and adding value to them, typically alongside maths and English studies.

In the applied science sector the qualifications are:

Pearson BTEC Level 1 Introductory Award in Applied Science (70 GLH)
(Qualification Number 603/5131/7)

Pearson BTEC Level 1 Introductory Certificate in Applied Science (180 GLH)
(Qualification Number 603/0935/0)

Pearson BTEC Level 1 Introductory Diploma in Applied Science (360 GLH)
(Qualification Number 603/0937/4).

The information in this specification is correct at the time of publication.

Qualifications, sizes and purposes at a glance

Title	Size and structure	Summary purpose
Pearson BTEC Level 1 Introductory Award in Applied Science	70 GLH Two units must be achieved, of which one must be taken from Core Skills (Group A), Developing a Personal Progression Plan and one unit from the sector options (Group B).	Designed for learners wishing to gain an introduction to a chosen vocation area. The Award offers the opportunity for learners to study a sector unit and plan for their next steps by completing the mandatory unit: <i>Developing a Personal Progression Plan</i> .
Pearson BTEC Level 1 Introductory Certificate in Applied Science	180 GLH Five units must be achieved, of which two must be taken from the Core Skills (Group A), and three from Sector Skills (Group B).	Designed for learners who may be ready to progress quickly to further study, the Certificate offers a basic introduction to the applied science sector. It could form part of a study programme that includes other appropriate subjects such as English and maths.
Pearson BTEC Level 1 Introductory Diploma in Applied Science	360 GLH Ten units must be achieved, of which four must be taken from the Core Skills (Group A), and six from Sector Skills (Group B).	Designed to be taken over one year, giving learners the opportunity to develop a range of skills in the applied science sector and supporting progression to further study. It could be a substantial vocational qualification within a study programme that includes other appropriate subjects such as English and maths.

Total Qualification Time

For all regulated qualifications, Pearson specifies a total number of hours of study that it is expected learners will be required to undertake in order to complete the qualification: this is the Total Qualification Time (TQT). This is calculated for the average learner. Within TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we expect a centre delivering the qualification to provide.

Guided learning means activities, such as lessons, tutorials, supervised study and supervised assessments, that directly involve tutors and assessors in teaching, supervising and invigilating learners. TQT includes other required learning such as private study, preparation for assessment and undertaking assessment when not directly under supervision.

The Pearson BTEC Level 1 Introductory Award in Applied Science is a qualification having:

- Total Qualification Time: 75 hours
- Guided Learning: 70 hours.

The Pearson BTEC Level 1 Introductory Certificate in Applied Science is a qualification having:

- Total Qualification Time: 190 hours
- Guided Learning: 180 hours.

The Pearson BTEC Level 1 Introductory Diploma in Applied Science is a qualification having:

- Total Qualification Time: 390 hours
- Guided Learning: 360 hours.

Centres should take note of these hours in planning their programme but may use their professional judgement to determine the provision of guided learning and study time across the units.

Qualification and unit content

Pearson has developed the content of the new BTEC Introductory qualifications through consultation with further education representatives and other centres that deliver qualifications at this level. This has helped us to design qualifications with a focus on skills development rather than knowledge, therefore avoiding duplication of learning at a higher level and focusing on the broader skills that learners need for progression.

The purpose of these qualifications is to develop the transferable skills, attributes and behaviours needed for learners to progress to further study and ultimately to employment. The qualifications are designed to be delivered in an applied way, bringing together appropriate content with practical and technical skills.

As a Level 1 qualification, the pass standard requires learners to complete routine, simple and directed tasks by applying their knowledge and skills. It is expected that learners complete tasks fully under supervision, direction or with guidance. At merit and distinction levels learners may be expected to complete tasks in greater detail or with greater confidence or independence.

Transferable skills coverage

The development of transferable and sector skills is the main focus. We intend for every learner to have the opportunity to develop key transferable skills through both core and sector units. This will help learners to appreciate how the transferable skills they develop in their core units can be contextualised in the sector they are studying. On completion of their course, learners will have developed a set of transferable and sector skills that will benefit them whatever their chosen progression route. The transferable skills covered in the units are summarised in the grid below.

Communication <ul style="list-style-type: none">• Writing, speaking and listening to others• Using body language to help communication• Using communication for different purposes• Communicating in a variety of ways, including electronic and social media
Working with others <ul style="list-style-type: none">• Setting common goals• Showing respect for others in the team and valuing their contributions• Listening to others in the team, being open minded• Taking on roles and responsibilities
Problem solving <ul style="list-style-type: none">• Identifying issues by being able to examine information• Dealing with change• Decision making to find solutions• Staying with a problem until it is resolved• Using IT to help solve problems
Managing information <ul style="list-style-type: none">• Collecting and using information from different sources• Determining relevance and accuracy of information• Organising information• Representing information in different ways• Using IT to present and store information
Self-management and development <ul style="list-style-type: none">• Setting goals and planning ahead• Being proactive and flexible• Being resilient and able to work under pressure• Monitoring performance and devising strategies for improvement• Using IT for time management

Sector skills coverage

The sector units introduce learners to some broad sector skills and to some underpinning knowledge of a vocational sector. This will help learners to prepare for progression and ensures that the approach to delivery is practical, active, contextualised and skills based.

Functional skills

The units in this specification signpost opportunities for learners to develop functional skills in English and mathematics.

Assessment

Assessment is designed to fit the purpose and objective of the qualification and all units are internally assessed – giving learners the opportunity to demonstrate skills developed in applied scenarios. There is a range of assessment styles suited to skills- and sector-based qualifications at this level. All units are graded to encourage skills development and performance.

These qualifications consist of two types of unit. Group A units are the core skills units, they cover content designed to reflect the skills and behaviours needed to progress to further study. Group B units are made up of sector units containing sector-specific content to enable learners to develop sector-specific skills and some knowledge to support progression to the next stage of vocational learning.

Units from Group A and Group B may assess the same transferable skills. Where this occurs, you may opt to deliver these units simultaneously. This is acceptable providing the delivery is planned appropriately and that all learning aims for both types of unit are met and covered in the assessment. You are not permitted to deliver a unit and then use the learner's evidence from the unit to achieve another unit.

Internally-assessed units

All units in these qualifications are internally assessed and subject to external standards verification. This means that you set and assess the assignments that provide the final summative assessment for each unit – you can use the examples and support that we give in the units. If you are not an approved centre already, before you assess you will need to become one in order to register learners. You will need to prepare to assess using the guidance in *Section 7*.

In line with the requirements and guidance for internal assessment, you select the most appropriate assessment styles according to the learning set out in the unit. This ensures that learners are assessed using a variety of styles to help them develop a broad range of transferable skills. Learners could be given opportunities to:

- carry out practical tasks
- present information that they have gathered
- keep working logbooks, records and reflective journals
- practise English and mathematical skills
- take part in oral or written presentations
- take part in role play, interviews and other activities.

You will make grading decisions based on the requirements and supporting essential guidance given in the units. See *Section 5* for rules on resubmission and retakes.

Language of assessment

Assessment of the internal units for these qualifications will be available in English. All learner work must be in English. A learner taking the qualifications may be assessed in British sign language where it is permitted for the purpose of reasonable adjustment. For information on reasonable adjustments see *Section 6*.

Grading for units and qualifications

Units are assessed using a grading scale of Distinction, Merit, Pass and Unclassified. Grading has been introduced at this level as a result of feedback from users and practitioners of BTEC qualifications.

All units contribute proportionately, based on the Guided Learning (GLH) to the overall qualification grade.

Qualifications in the suite are graded using a scale of P to D, **or** PP to DD. Please see *Section 9* for more details. The relationship between qualification grading scales and unit grades will be subject to regular review as part of Pearson's standards monitoring processes on the basis of learner performance and in consultation with key users of the qualifications.

1 Qualification objectives and purpose

Pearson BTEC Level 1 Introductory Award, Certificate and Diploma in Applied Science

In this section you will find information on the purpose of the qualifications and how their design meets that purpose. On our website we publish a Statement of Purpose for each qualification. These Statements are designed to guide you and potential learners to make the most appropriate choice about which qualification is most suitable at recruitment.

What is the purpose of these qualifications?

The Pearson BTEC Level 1 Introductory Award, Certificate and Diploma in Applied Science are designed around practical skills and tasks that place an emphasis on learners demonstrating what they can do rather than what they know in theory. The qualifications give learners the opportunity to acquire and develop generic, transferable and sector-specific skills in order to complete tasks and demonstrate a level of achievement that enables them to progress to further learning.

The Award offers a basic introduction to the applied science sector and could be studied alongside other subjects.

The Certificate offers an introduction to the applied science sector and could be studied alongside other subjects in a study programme.

The Diploma gives learners the opportunity to develop a broader range of skills in the applied science sector.

Who are these qualifications for?

The Pearson BTEC Level 1 Introductory Award, Certificate and Diploma in Applied Science are primarily for all learners who want to continue their education and develop their skills for progression to further learning and, ultimately, to employment.

The Award is suitable for learners studying part time or for those who wish to study a vocational qualification alongside other qualifications and activities as part of their study programme.

The Certificate is designed for learners who may be ready to progress quickly to further study.

The Diploma is designed to be taken over one year, as a substantial vocational qualification in a study programme.

What do these qualifications cover?

The content of these qualifications has been developed in consultation with further education colleges and other providers to ensure that the qualifications support progression to further learning and training. All learners taking these qualifications will study core units that focus on key transferable skills such as research and planning, time management and working with others. Learners will also take a number of sector units. The content of the sector units offers a broad introduction to the skills and knowledge within that sector, allowing the delivery to be practical and active in order to engage learners. For applied science, the units cover topics such as investigating crime scene evidence, measuring waves used in technology and investigating variations in plants and animals.

What could these qualifications lead to?

These qualifications prepare learners for further learning at a higher level in applied science.

The development of transferable skills means that learners can also choose a study programme from alternative sectors. For example, these qualifications in applied science could lead to Pearson BTEC Level 2 qualifications in the sector and Level 2 qualifications in other sectors.

How do these qualifications enable learners to progress?

The mode of delivery and assessment in the units is designed to build awareness of a sector and the skills required to work in it. Learners will be given contexts and scenarios to help them develop skills and to acquire knowledge through application. Learners will not develop all the knowledge and skills needed to enter the labour market in a given sector but will develop pre-employability skills and contextualised knowledge to allow them to progress to further learning and training and, ultimately, to become successful in their chosen sector.

The Award, Certificate and Diploma all contain a mandatory unit: *Developing a Personal Progression Plan*, that enables learners to consider their next steps in learning.

How do the Award, Certificate and Diploma sizes differ in purpose?

The Award is suitable for learners studying part time or for those who want an introduction to a vocational qualification alongside other qualifications and activities as part of their study programme.

The Certificate is suitable for learners studying part time or for those who wish to study a vocational qualification alongside other qualifications and activities as part of their study programme.

The Diploma is twice the size of the Certificate and will form a substantial element of a learner's study programme. By providing a broader sector experience, the Diploma will suit learners who have a clear indication of the sector they wish to study further. The Diploma encourages learners to take on some individual research, enabling them to be further prepared for higher-level learning.

2 Structure

Pearson BTEC Level 1 Introductory Award in Applied Science

Two units must be achieved, one of which must be Developing a Personal Progression Plan (Group A) and one unit from the sector options (Group B)

Pearson BTEC Level 1 Introductory Award in Applied Science			
Unit reference	Unit title	GLH	Type
Core	Group A units – learners must complete one unit		
A2	Developing a Personal Progression Plan	30	Core
Sector	Group B units – learners must complete one unit		
ASc5	Testing the Quality of Products	40	Sector
ASc6	Carrying Out a Scientific Experiment	40	Sector
ASc7	Investigating Variations in Plants and Animals	40	Sector
ASc8	Measuring Waves Used in Technology	40	Sector
ASc9	Practical Actions to Protect the Environment	40	Sector
ASc10	Making a Chemical Product	40	Sector
ASc11	Testing the Properties of Products	40	Sector
ASc12	Investigating Crime Scene Evidence	40	Sector
ASc13	Exploring Biology	40	Sector
ASc14	Exploring Chemistry	40	Sector
ASc15	Exploring Physics	40	Sector

Pearson BTEC Level 1 Introductory Certificate in Applied Science

Learners must complete both core units and three sector units.

Pearson BTEC Level 1 Introductory Certificate in Applied Science			
Unit reference	Unit title	GLH	Type
Core	Group A units – learners must complete both units		
A1	Being Organised	30	Core
A2	Developing a Personal Progression Plan	30	Core
Sector	Group B units – learners must complete three units		
ASc5	Testing the Quality of Products	40	Sector
ASc6	Carrying Out a Scientific Experiment	40	Sector
ASc7	Investigating Variations in Plants and Animals	40	Sector
ASc8	Measuring Waves Used in Technology	40	Sector
ASc9	Practical Actions to Protect the Environment	40	Sector
ASc10	Making a Chemical Product	40	Sector
ASc11	Testing the Properties of Products	40	Sector
ASc12	Investigating Crime Scene Evidence	40	Sector
ASc13	Exploring Biology	40	Sector
ASc14	Exploring Chemistry	40	Sector
ASc15	Exploring Physics	40	Sector

Pearson BTEC Level 1 Introductory Diploma in Applied Science

Learners must complete all core units and six sector units.

Pearson BTEC Level 1 Introductory Diploma in Applied Science			
Unit reference	Unit title	GLH	Type
Core	Group A units – learners must complete all units		
A1	Being Organised	30	Core
A2	Developing a Personal Progression Plan	30	Core
A3	Working with Others	30	Core
A4	Researching a Topic	30	Core
Sector	Group B units – learners must complete six units		
ASc5	Testing the Quality of Products	40	Sector
ASc6	Carrying Out a Scientific Experiment	40	Sector
ASc7	Investigating Variations in Plants and Animals	40	Sector
ASc8	Measuring Waves Used in Technology	40	Sector
ASc9	Practical Actions to Protect the Environment	40	Sector
ASc10	Making a Chemical Product	40	Sector
ASc11	Testing the Properties of Products	40	Sector
ASc12	Investigating Crime Scene Evidence	40	Sector
ASc13	Exploring Biology	40	Sector
ASc14	Exploring Chemistry	40	Sector
ASc15	Exploring Physics	40	Sector

3 Units

Understanding your units

The units in this specification set out our expectations of assessment in a way that helps you to prepare your learners for assessment.

Each unit in the specification is set out in a similar way. This section explains how the units work. It is important that all tutors, assessors, internal verifiers and other staff responsible for the programme read and are familiar with the information given in this section.

Section	Explanation
Unit number	The numbering of the core units is sequential from A1–A4. The numbering of the sector units is preceded by an abbreviation of the sector plus the number of the unit, e.g. ASc1, ASc2.
Unit title	This is the formal title used and it appears on certificates.
Level	All units are at Level 1 as outlined in the Ofqual level descriptors.
Unit type	This shows whether a unit is a core or sector unit. See structure information in <i>Section 2</i> for full details.
GLH	Units may have a value of 30 or 40 Guided Learning Hours GLH. This indicates the number of hours of teaching, directed activity and assessment expected.
Unit in brief	A brief formal statement of the content and the skills learners will develop through the unit. You can use this in summary documents, brochures etc.
Unit introduction	This is designed with learners in mind. It indicates why the unit is important, how learning is structured and how learning might be applied when progressing to further education.
Unit summary	This section helps tutors to see at a glance the main content and skills in the unit presented against the learning aims. The suggested assessment evidence is suitable to fulfil the requirements of the unit.
Functional skills	This table summarises opportunities for functional skills development in the unit.
Unit content	This section sets out the required teaching content of the unit. Content is compulsory except when an 'e.g.' is given. Learners should be asked to complete summative assessment only after the teaching content for the unit has been covered.
Learning aims	Learning aims help to define the scope and style of learning of the unit. They define the context within which the learner develops their skills and how they will demonstrate those skills.
Assessment criteria	Each learning aim has assessment criteria to explain the achievement required to obtain Pass, Merit and Distinction grades. A glossary of the terms used in the assessment criteria is given in <i>Appendix 1</i> . All assessors need to understand our expectations of the terms used.

Section	Explanation
Essential information for assessment decisions	This section gives holistic guidance on the learning aims and associated assessment criteria. It explains what the learner must provide as evidence to reach the Pass, Merit and Distinction standard. This section also gives examples and clarification.
Essential resources	This section lists specific resources that are essential for teaching and assessing the unit. For information on support resources see <i>Section 10</i> .
Delivery guidance	This section gives suggestions of ways of delivering the unit. It offers ideas of practical activities in sector contexts that can be used to help develop relevant skills and to encourage learner progress.
Suggested assessment activity	This section suggests scenarios and tasks that can be used in summative assessment activities.

Index of units

This section contains all the units developed for these qualifications. Please refer to *page 8* to check which units are available for the applied science qualifications.

Unit A1: Being Organised	15
Unit A2: Developing a Personal Progression Plan	23
Unit A3: Working with Others	31
Unit A4: Researching a Topic	39
Unit ASc5: Testing the Quality of Products	47
Unit ASc6: Carrying Out a Scientific Experiment	55
Unit ASc7: Investigating Variations in Plants and Animals	63
Unit ASc8: Measuring Waves Used in Technology	71
Unit ASc9: Practical Actions to Protect the Environment	81
Unit ASc10: Making a Chemical Product	91
Unit ASc11: Testing the Properties of Products	99
Unit ASc12: Investigating Crime Scene Evidence	107
Unit ASc13: Exploring Biology	117
Unit ASc14: Exploring Chemistry	125
Unit ASc15: Exploring Physics	133

Unit A1: Being Organised

Level: **1**

Unit type: **Core**

Guided learning hours: **30**

Unit in brief

Learners will develop key techniques to help organise their work and priorities and manage their time effectively.

Unit introduction

How often do you run out of time to do tasks? Do you ever miss the bus or turn up late for college? Being organised and being able to manage your time is essential for success in your education.

From creating to-do lists and filing systems to setting up your phone for alerts and alarms, this unit will introduce you to ways that will help you to plan and use your time effectively, as well as organising yourself and your work. After learning and practising these techniques, you will have the opportunity to put them into practice over a period of time, reviewing how successful they were and whether they improved your organisational skills.

The skills you learn in this unit are key for progression to the next stage in your education. They are also crucial for work and life.

Learning aims

In this unit you will:

- A** Explore techniques to improve own organisational skills
- B** Review the use of techniques to improve own organisational skills.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Explore techniques to improve own organisational skills	<ul style="list-style-type: none"> Techniques to improve organisation 	<ul style="list-style-type: none"> A planner for a two-week period. Supporting documentation that demonstrates the techniques used.
B Review the use of techniques to improve own organisational skills		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> This unit can be delivered in a sector context. 	<ul style="list-style-type: none"> Organisational skills Time management Use of ICT management tools 	<ul style="list-style-type: none"> Planning Managing information

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> Write clearly and coherently, including an appropriate level of detail. Ensure written work includes generally accurate punctuation and spelling, and that meaning is clear.
Maths	<ul style="list-style-type: none"> Solve problems requiring calculations with common measures, including time and money.

Unit content

Knowledge and sector skills

Techniques to improve organisation

Learners will practice skills and techniques to improve their organisation over a period of time before final assessment.

- Time-management techniques:
 - produce daily or weekly to-do lists or action plans to meet deadlines
 - prioritise tasks
 - create a checklist of tasks that need to be completed, reviewing it regularly
 - consider how long each task might take
 - use free calendar software to keep timings of lessons and work
 - allow a little extra time in case longer is spent on one task than expected
 - foresee problems and plan ways to overcome them
 - review priorities.
- Organisational techniques:
 - ensure there is access to required resources to complete tasks such as notebooks, pens, laptops, tablets
 - use organisational stationery such as folders, dividers, highlighters
 - set up and manage a filing system of work and emails to allow for quick and easy access
 - use alerts on phones and other digital devices
 - use project plans and spreadsheets for organisation and budgeting
- Planners to organise time:
 - different types of planner such as wall planners, calendars, electronic and/or online planners
 - using them daily, weekly or monthly
 - keeping them updated and reviewing the priorities.
- Review own time-management and organisational skills through identifying:
 - strengths and weaknesses of techniques used
 - why some techniques worked better than others
 - ways to improve own time management and organisation.

Transferable skills

- Planning: using time-management techniques.
- Managing information: prioritising information received and using ICT to organise and manage time.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Explore techniques to improve own organisational skills		
A.P1 Use limited techniques to improve own organisational skills.	A.M1 Use appropriate techniques to improve own organisational skills.	A.D1 Use appropriate and effective techniques to improve own organisational skills.
Learning aim B: Review the use of techniques to improve own organisational skills		
B.P2 Identify the techniques used to improve own organisational skills, giving outline examples.	B.M2 Review the techniques used, giving some examples of how they improved own organisational skills.	B.D2 Review the techniques used, giving detailed examples of how they improved own organisational skills.

Essential information for tutors

Units from Group A and Group B may assess the same transferable skills. Where this occurs, you may opt to deliver these units simultaneously. This is acceptable providing the delivery is planned appropriately and that all learning aims for both types of unit are met and covered in the assessment. You are not permitted to deliver a unit and then use learners' evidence from the unit to achieve another unit.

Essential information for assessment decisions

For distinction standard, learners:

- demonstrate that they have tried out a full range of techniques to organise themselves. This could include evidence of prioritising tasks, to-do lists, action planning with detailed timings, screenshots of folder organisation and online calendar alerts, as well as time allocated for homework
- will review the success of the techniques they used, giving full examples of how they improved their own organisation, making some links on how they could use the techniques again.

For merit standard, learners:

- demonstrate that they have used a range of mostly suitable techniques for the tasks they have to complete. This could include evidence of to-do lists, some basic action planning with timings and perhaps some evidence of the use of ICT features to organise their time
- will provide a review that outlines the techniques used. They will give some relevant examples, demonstrating some reflection on how the use of these techniques improved their own organisation.

For pass standard, learners:

- demonstrate that they have used a small number of simple organisational techniques, e.g. to-do lists and phone alerts and perhaps some folder management
- will list the techniques they used and will provide some outline examples of how they may use them again.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Prioritising tasks

Learners begin this workshop in small groups to complete a task. Tutors can give different scenarios for each group to work with. Ideally, the tasks should be familiar topics to learners such as planning a shopping trip at the weekend. Learners will need to consider where they are going, how they will get there, what it will cost and how much time they have. Using the information, learners can then make a list of the tasks in order of priority and timing.

Suggested time: about 2 hours.

Planning your time

Tutors explain the importance of planning time to meet deadlines. Learners fill in a blank timetable page, identifying when their lessons are and when they have deadlines for work to be completed.

Suggested time: about 1 hour.

Use of own devices to help organisation

Tutors ask learners to investigate what they have on their phones or other devices that could help to organise their time. This could include phone alerts, free software or a calendar.

Suggested time: about 1 hour.

Filing and folders

Tutors talk through the importance of naming and labelling folders (electronic and hard copies) for ease of reference and access. This could be through colour coding, using stickers or labels. Learners work through their folders, using some of the filing and labelling techniques they have learned.

Suggested time: about 2 hours.

Using a planner to organise own time

Tutors talk through the various types of planner that could be used to organise own time such as wall planners, calendars, electronic and/or online planners. They also talk through how they can be used daily, weekly or monthly to prioritise key tasks and plan ahead.

In pairs, learners fill in a weekly planner for their partner, talking through what the key priorities are for the week for each of them and identifying ways to manage their time.

Each person presents the planner for their partner.

Suggested time: about 2 hours.

Meeting deadlines in your sector

Learners plan their time around the date for completing a particular activity or task on their course.

They make a list of key tasks and show how long each one could take. They then start at the hand-in date and work back to the beginning of the project.

Learners then use the plan and monitor its effectiveness as they progress through it. Learners should also build in contingencies and consider what obstacles there may be to prevent them achieving the end goal on time.

Suggested time: about 3 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

You have been asked to produce a planner for a set period of time during your course. The time period should be between two and four weeks. Your planner should identify days and times in the week that are blocked out for lessons, work, and sport and leisure activities. You should then demonstrate how you are going to organise yourself and the available time to complete all the tasks you need to in a given timeframe to ensure that you meet all the deadlines.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

Complete a study plan for a particular assignment or activity in your sector units.

Unit A2: Developing a Personal Progression Plan

Level: **1**

Unit type: **Core**

Guided learning hours: **30**

Unit in brief

Learners will develop the skills and behaviours needed to progress to the next stage in their learning, identifying progression opportunities and creating a plan to enable them to get there.

Unit introduction

What would you like to do when you finish this course? Perhaps you would like to spend more time learning about the subject you are studying at the moment? Or you may want to do something completely different. Before you decide what your next step is, you need to know what you are good at, what your interests are and what your end goal is.

This unit will help you find out what opportunities are available to you and how to get to the next stage. You will carry out a self-audit, identifying what your strengths are and what you need to develop to be able to meet your progression goals. You will learn how to set goals and plan ways to achieve them. You will then produce a personal progression plan to help you reach the next step in your life.

The skills you develop in this unit will be good preparation when applying for another course or training programme.

Learning aims

In this unit you will:

- A** Explore the skills and behaviours needed to meet personal progression goal
- B** Produce a progression plan to meet intended progression goal.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
<p>A Explore the skills and behaviours needed to meet personal progression goal</p>	<ul style="list-style-type: none"> • Benefits and purpose of developing a progression plan • Finding out about progression opportunities • Setting a progression goal • Identifying the skills and behaviours needed to meet progression goal • Reviewing own skills and behaviours against progression goal • Creating a progression plan 	<ul style="list-style-type: none"> • Audit of skills and behaviours. • Personal progression plan.
<p>B Produce a progression plan to meet intended progression goal</p>		
<p>Key teaching areas include:</p>		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • Learners can reflect on the sector skills they have developed when considering their progression goal. 	<ul style="list-style-type: none"> • Sources of information about progression opportunities and requirements • Producing a progression plan 	<ul style="list-style-type: none"> • Written communication • Managing information

There are opportunities to develop functional skills in this unit:

Functional skills	
<p>English</p>	<ul style="list-style-type: none"> • Make relevant and extended contributions to discussions, allowing for and responding to others' input. • Prepare for and contribute to the formal discussion of ideas and opinions.

Unit content

Knowledge and skills

Benefits and purpose of developing a progression plan

- Gives direction and focus to short-term and long-term goals.
- Sets out the key steps to achieve progression goal.
- Allows for discussion with others, e.g. tutors, parents, peers.
- Gives time for reflection on what is achievable and realistic.

Finding out about progression opportunities

- Progression opportunities such as to further learning, work or apprenticeships.
- Local sources of information about potential progression routes such as colleges, careers fairs.
- Sources of advice and guidance for progression.
- Tutor advice.
- Careers advice.
- Entry requirements such as baseline entry qualifications, an entry interview, portfolio.

Setting a progression goal

- Matching own skills and behaviours with progression goals.
- Deciding on the next step, e.g. using SMART (specific, measurable, achievable, realistic, time-bound) targets.
- Using research findings to identify the requirements to meet goals.
- Setting a progression goal to work towards.

Identifying the skills and behaviours needed to meet progression goal

- Skills needed to meet progression goal:
 - transferable skills, e.g. communication, working with others, problem solving
 - employability skills, e.g. IT skills, being able to drive.
- Behaviours needed for progression goal, e.g. reliability, efficiency, being trustworthy.
- Qualifications needed for progression, e.g. level of English and maths.

Reviewing own skills and behaviours against progression goal

- Carrying out a self-audit of skills and behaviours using past experience of education and learning.
- Gathering feedback from others about own strengths and areas for improvement.
- Attitudes and behaviours needed for progression.

Creating a progression plan

To include:

- short-term and long-term progression goals
- identification of key activities needed to move towards the progression goal
- key actions to improve skills and behaviours
- key milestones to achieve goal, e.g. interview dates, application deadlines
- realistic timelines to meet goal.

Transferable skills

- Written communication: filling out application forms, progression plan.
- Managing information: from the sources used to find out about possible progression routes.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Explore the skills and behaviours needed to meet personal progression goal		
A.P1 Identify an intended progression goal.	A.M1 Identify a clear progression goal with some details of the skills and behaviours needed to achieve it.	A.D1 Identify a realistic progression goal with details of the skills and behaviours needed to achieve it.
A.P2 Outline the skills and behaviours needed to meet personal progression goal.	A.M2 Identify how own skills and behaviours meet personal progression goal.	A.D2 Describe how own skills and behaviours meet personal progression goal.
Learning aim B: Produce a progression plan to meet intended progression goal		
B.P3 Produce an outline progression plan to meet intended progression goal.	B.M3 Produce a clear progression plan, identifying some steps towards meeting intended progression goal.	B.D3 Produce a detailed and achievable progression plan, identifying most of the steps needed to meet intended progression goal.

Essential information for tutors

Units from Group A and Group B may assess the same transferable skills. Where this occurs, you may opt to deliver these units simultaneously. This is acceptable providing the delivery is planned appropriately and that all learning aims for both types of unit are met and covered in the assessment. You are not permitted to deliver a unit and then use learners' evidence from the unit to achieve another unit.

Essential information for assessment decisions

For distinction standard, learners:

- set a progression goal that demonstrates evidence of focused research from different sources, showing a clear and detailed understanding of the skills and behaviours needed to achieve it
- carry out an insightful review of own skills and behaviours, using feedback from others and evidence of self-reflection on how own skills and behaviours match those needed to meet the progression goal
- produce a focused progression plan that gives details on the required skills, behaviours and qualifications and produce a detailed plan on the next steps needed to meet the progression goal.

For merit standard, learners:

- set a focused progression goal that demonstrates evidence of finding out information from different sources, showing some understanding of the skills and behaviours needed to achieve it
- carry out a review of own skills and behaviours, using some feedback from others and give some detail on how own skills and behaviours match those needed for the progression goal
- produce a coherent progression plan that outlines some of the skills, behaviours and qualifications needed to meet the goal and covers most of the steps needed to achieve it.

For pass standard, learners:

- set a broad progression goal that shows limited evidence of finding out information from sources
- list the skills and behaviours needed to meet the goal
- produce a basic progression plan that gives broad and unfocused information on how they intend to meet their progression goal.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

What are my progression opportunities?

In groups, learners discuss the progression opportunities that may be available to them. This can be supported by handouts about the local colleges, links to apprenticeship websites and local jobsites.

As a whole group, the progression opportunities can be listed on the board and the group can discuss what their initial ideas/plans are for the next stage.

Suggested time: about 1 hour.

Skills audit

Learners identify their own skills using a number of different techniques. They could list their own ideas first and then use commercially designed paper-based or online questionnaires. Ideally, learners should have the chance to do both. They can then compare results.

Learners list their skills in order of confidence. If the group know each other well, they could share their list with others to find out their opinion.

Suggested time: about 3 hours.

Appropriate behaviours for progression

Learners could begin the session by watching a video clip of people demonstrating different attitudes and behaviours. The group can then identify different attitudes and behaviours and talk about how they can affect other people's attitudes towards them.

Learners could role-play different scenarios that highlight the influence attitudes and behaviours can have on others, e.g. employers.

Suggested time: about 3 hours.

Local sources of information to identify progression opportunities

In small groups, learners carry out local research to find out where and how they can find out about progression opportunities. They could research online local newspapers and magazines, visit the library or careers service, websites, advice and guidance etc. Learners can collate their information to share with others in the class.

Suggested time: about 3 hours.

Opportunities to develop the skills and behaviours needed to progress

Tutors could invite speakers to talk about the value of volunteering and the skills that learners can develop, e.g. working in a charity shop, running a 5k and getting sponsors, being a youth leader, taking part in the Duke of Edinburgh's Award (DofE) scheme or sport's coach.

Suggested time: about 3 hours.

Setting goals

Learners will find out how to set simple goals that are achievable. Tutors could begin by helping learners set day-to-day goals, e.g. what they are planning to do that evening. Initially learners only need to set clear, achievable goals, however it will be valuable to consider measures and timescales.

Tutors can provide a list of potential goals and learners have to decide if they are clear and achievable.

Suggested time: about 3 hours.

Matching skills and behaviours to progression opportunities

Tutors give a range of course details, job advertisements and job descriptions for learners to review. Learners can then match their skills to the relevant course or job. They could initially work in small groups to identify the information they need from the text. Following the matching exercise, they can then decide if it would be realistic to apply for the course or job, if they would need to develop other skills before they could apply or if the course or job is not appropriate.

Suggested time: about 3 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

You have been asked to attend a progression interview with your tutor to discuss the next step in your learning. In preparation for this, you need to research the possible progression opportunities available to you. You should decide on one opportunity to focus on and produce an outline of the skills and behaviours needed for that particular progression goal and then match your own skills and behaviours to the goal. You should then produce a detailed progression plan, identifying the key areas you need to develop in order to meet your progression goal. Both of these documents will form a basis for the discussion with your tutor.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

You will need to produce a new audit and progression plan for a different progression opportunity.

Unit A3: Working with Others

Level: **1**

Unit type: **Core**

Guided learning hours: **30**

Unit in brief

Learners will develop skills in communication, teamwork and problem solving that will enable them to work effectively with other people on a given activity.

Unit introduction

A key part of being successful in work and study is the ability to work with other people. This includes being able to communicate, working together to solve problems and working in teams to achieve common goals.

In this unit, you will develop these skills and demonstrate how you use them. You will work with others to complete a given activity, agree roles and responsibilities, share ideas and support each other. Problems may come up as you work on the activity and you will need to find solutions to them. It can be difficult working with others and this unit gives you the opportunity to develop the skills and behaviours you need to be successful.

The skills you learn in this unit can be applied throughout your sector units and in broader contexts.

Learning aims

In this unit you will:

- A** Demonstrate the ability to work with others on a given activity
- B** Review own and others' performance on a given activity.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Demonstrate the ability to work with others on a given activity	<ul style="list-style-type: none"> Communicating with others Working with others to achieve common goals Carrying out an outline review of own and others' performance 	<ul style="list-style-type: none"> A log/blog that provides evidence of: <ul style="list-style-type: none"> role in a set activity where they have worked with others review of the activity. Witness statement from tutor.
B Review own and others' performance on a given activity		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> This unit can be delivered in a sector context. 	<ul style="list-style-type: none"> Ways to communicate effectively through listening and talking Building effective teams Ways to assess own performance How to plan to improve own performance 	<ul style="list-style-type: none"> Verbal communication Teamwork Problem solving

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> Make relevant and extended contributions to discussions, allowing for and responding to others' input. Make different kinds of contributions to discussions.

Unit content

Knowledge and sector skills

Communicating with others

- Taking part in discussions to decide ways to complete activity.
- Consideration of own verbal communication when working with others.
- Listening and responding appropriately to others.
- Contributing ideas and points of view.
- Accepting and giving positive and negative feedback.

Working with others to achieve common goals

- Identifying individual roles and responsibilities.
- Ensuring clear communication throughout the activity.
- Knowing appropriate behaviours for different situations.
- Working through problems and agreeing solutions together.
- Importance of respecting others who are working with you.
- Reviewing team and personal performance.
- Solving issues in teams.

Carrying out an outline review of own and others' performance

- Identifying own strengths in activity.
- Receiving feedback about own performance.
- Giving feedback to others on their performance.
- Outlining ways to improve own performance when working with others.

Transferable skills

- Verbal communication: working with others.
- Teamwork: working with others to complete an activity or achieve a goal.
- Problem solving: working together to overcome problems.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Demonstrate the ability to work with others on a given activity		
A.P1 Demonstrate limited communication skills when working with others to complete a given activity.	A.M1 Demonstrate appropriate communication skills when working with others to complete a given activity.	A.D1 Demonstrate effective communication skills when working with others to complete a given activity.
A.P2 Undertake an activity with others, taking some responsibility for own role within it.	A.M2 Undertake an activity with others, taking responsibility for own role within it.	A.D2 Undertake an activity with others, taking full responsibility for own role and making effective contributions.
Learning aim B: Review own and others' performance on a given activity		
B.P3 Produce an outline review of own performance during an activity.	B.M3 Review own performance during an activity, identifying own strengths and weaknesses, with reference to feedback.	B.D3 Review own performance during an activity, making suggestions for the future, with detailed reference to feedback.
B.P4 Deliver positive feedback to others that is relevant to the activity.	B.M4 Deliver positive and negative feedback to others, using examples from the activity.	B.D4 Deliver constructive feedback to others, using relevant examples from the activity.

Essential information for tutors

Units from Group A and Group B may assess the same transferable skills. Where this occurs, you may opt to deliver these units simultaneously. This is acceptable providing the delivery is planned appropriately and that all learning aims for both types of unit are met and covered in the assessment. You are not permitted to deliver a unit and then use learners' evidence from the unit to achieve another unit.

Essential information for assessment decisions

For distinction standard, learners:

- work with others successfully, taking ownership of their role in the activity and completing all their own activities while supporting others to achieve the team goal. Their communication skills will be clear and they will be understood by other members of their group to drive the activity forward. They will listen and respond to others, showing respect for their views
- complete a detailed review of their own performance during the activity. This could be written or a verbal recording that gives a detailed overview of the activities they completed. They will describe how they would work with others in the future, using supported examples from feedback they received from others. They will also demonstrate the ability to give positive and negative feedback to their peers in a clear and helpful way, using full examples from the activity.

For merit standard, learners:

- generally work well with others, taking responsibility for their own role in the activity and communicating with others when required, using appropriate language and demonstrating some ability to listen to the views of others
- complete a review of their own performance during the activity. This could be written or a verbal recording which identifies some of their strength and weaknesses, making some reference to the feedback they received from others. They will also demonstrate the ability to give some positive and negative feedback to their peers, using simple examples from the activity.

For pass standard, learners:

- show some ability to work with others, taking some responsibility for their own role in a activity, but not necessarily seeing the activities through to the end. Their communication with others may be minimal and only when necessary
- complete an outline of the role they carried out during the activity. This could be written or a verbal review with minimal attempt to review their own performance. They will attempt to give positive feedback to their peers, although this may be very basic and not linked to concrete examples from the activity.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

What makes a good team?

Tutors ask for examples from the group of any good and effective teams they can think of. For example, it could be the local netball team, a dance group or a professional football club. Smaller groups then choose one example from the list and identify two traits that make the team work well together. Examples could be:

- communication
- working together to solve problems
- understanding each other's roles and responsibilities.

Each group has to decide on the two traits they want to feed back to the group. Tutors list them all and then highlight the most prominent. Tutors ask how easy it was to decide as a group on the two traits they had to feed back on.

The group then discuss their experiences of working with others in the past, reflecting on their behaviours and making suggestions on how their team could have worked better.

Suggested time: about 1 hour.

What makes a bad team?

Tutors ask the group for examples of where they have seen or experienced bad teamwork, or of people not working well together. The group discuss the reasons why the team didn't work well together.

Tutors then show examples of bad teamwork, from TV shows like *The Apprentice* or *Big Brother*.

While the clips are being shown, the group write down everything they think has made the team not work properly. They then share their ideas with the whole group.

The whole group then reflects on the benefits of working well with other people and how they have to sometimes modify their behaviour to work effectively with other people.

Suggested time: about 1 hour.

Working in pairs

Tutors hand out photographs of celebrities, well-known people and sports men and women to each person in the group. They are not allowed to tell anyone who their picture is of.

Tutors then put the group in pairs, outside of friendship groups if possible. Then taking turns, one person asks questions about their partner's picture and their partner can only answer 'yes' or 'no'. They are given a time limit to find out the identity of their partner's celebrity.

Once the activity has finished, the tutor asks the group to reflect on how easy it was to communicate with someone when you only get yes or no answers. The group then reflects on how you have to phrase your questions to get the most information and also how to do this quickly under a time limit.

The activity could be repeated in different pairs.

Suggested time: about 1 hour.

Working with a group on an activity

The workshop can focus on building effective teams. There are a range of appropriate activities that learners can participate in.

For example, learners:

- work in small groups to build a tower that can support a marble. They are given drinking straws, sticky tape and a marble. The team that creates the highest tower wins
- work together to create a structure from balloons that will take the weight of one person in the group.

This type of workshop is ideal for discussing roles and responsibilities, participation, communication skills and problem solving.

Tutors could use a team-building activity at the beginning of each workshop instead of having a whole session focusing on this skill.

Suggested time: about 2 hours.

Communicating in teams

Working in groups, learners follow instructions to create an end product.

Learners will need to:

- check they understand what they need to do
- decide who is doing which task
- check progress and follow advice
- ask for help, if necessary
- respect each other's ideas and opinions
- solve problems.

At the end of this session, the group can discuss how effectively they communicated with each other, how well they worked together as a team, any issues they had and how they solved problems.

Suggested time: about 5 hours.

Relaying instructions to others

Learners can take part in a number of activities to develop effective communication skills.

For example working in pairs, learners prepare instructions for a simple task such as tying shoe laces. They then share this with another group of learners who then follow the instructions. If the instructions are clear, learners should be able to tie their shoes successfully.

Suggested time: about 1 hour.

Debating a topic with others

Tutors give learners a number of topics to discuss in small groups with some key questions.

The group has to firstly decide on the topic they want to discuss and decide on an 'observer' to observe and take notes on the groups' interactions. The group will then be given five minutes to discuss the topic and come to some agreement on the answers to the questions.

The group will decide on one person to feed back on the answers to the questions. The observer will then feed back on how the group interacted with each other and came to decisions.

The activity can be repeated with different people taking the 'observer' role.

The whole group then discuss what they have learned in this session about the views of others and the different roles that are taken in a group.

Suggested time: about 2 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

You will work together (in pairs or larger groups) to put on a small fundraising activity at college for a charity day.

In your group you need to discuss and agree:

- the type of activity you will put on
- who you need permission from
- the date the activity will be on
- the resources needed to put on the activity.

You will agree the roles for each member of the group, ensuring that each of you has an equal amount of responsibility. You need to set up a log/blog explaining your role in the group and your key responsibilities. You need to keep this updated throughout the process.

Once the activity is completed your group will carry out a peer assessment of the activity, discussing how successful you were in working together to put on the activity, writing up the discussions in your log/blog and making suggestions for how you can improve your skills and behaviours.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

You will work with a different group of people to produce a stand for the college open day.

Unit A4: Researching a Topic

Level: **1**

Unit type: **Core**

Guided learning hours: **30**

Unit in brief

Learners will develop the skills needed to carry out some outline research into an agreed topic. They will keep a record of their investigation and then present a summary of their findings.

Unit introduction

In this unit, you will have the opportunity to research a topic that interests you. It could be linked to something you have enjoyed in your sector, something that is happening in your local community or perhaps linked to what you would like to do in the future.

Before starting on your research you will need to decide on the focus for your topic. You will set up a research log to record the research tasks you carry out and the sources that you use.

When you have completed your research, you will summarise and present your findings.

You will use many of the skills you have developed already, such as planning, time management, research and presenting, as well as any sector skills and knowledge that you have learned.

All these skills are important for progressing to further qualifications.

Learning aims

In this unit you will:

A Carry out research into an agreed topic

B Present a summary of research findings into an agreed topic.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Carry out research into an agreed topic	<ul style="list-style-type: none"> • Selecting a suitable topic • Collecting information on topic • Keeping a research log • Presenting findings of research 	<ul style="list-style-type: none"> • Research log. • A summary of research findings.
B Present a summary of research findings into an agreed topic		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • The research topic can be in a sector context. 	<ul style="list-style-type: none"> • Ways to plan successfully • Identifying sources of information • How to research • Presentation methods 	<ul style="list-style-type: none"> • Planning • Finding out • Managing information • Communication

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> • Present information/points of view clearly and in appropriate language. • Present information in a logical sequence. • Use correct grammar, including correct and consistent use of tense. • Ensure written work includes generally accurate punctuation and spelling, and that meaning is clear.

Unit content

Knowledge and sector skills

Selecting a suitable topic

- Investigation could focus on the local community or area, linked to a sector, hobby or an extra-curricular activity.
- Agreeing investigation title and the scope of the research with tutor.
- Agreeing deadline.
- Ensuring topic is focused and manageable in the timescales.
- Identifying key actions and milestones for the investigation such as setting up a log, organising visits, deadline for completion.

Collecting information on topic

- Sources of information:
 - electronic media, e.g. blogs, podcasts, downloads, websites
 - printed media, e.g. newspapers/magazines/books
 - interviews
 - visits.
- Identifying and selecting the key points from research.

Keeping a research log

- Ongoing record of information researched.
- Information on research sources, methods and key findings.
- Ongoing record of information found out through a chosen medium such as a folder, blog, vlog (video blog).

Presenting findings of research

- Summarising key findings.
- Choosing presentation method, e.g. through a PowerPoint®, vlog, written handouts, oral questioning.
- Explaining findings in a clear and concise way.

Transferable skills

- Planning: identifying key tasks to complete.
- Finding out: information from research sources.
- Managing information: selecting the relevant information, choosing appropriate sources of information.
- Communication: through presentation of findings.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Carry out research into an agreed topic		
A.P1 Search for information on an agreed topic using given research sources.	A.M1 Search for information on an agreed topic using own and given sources.	A.D1 Carry out a focused and detailed search into an agreed topic.
A.P2 Select simple information from given sources on the agreed topic.	A.M2 Select mostly relevant information from sources on the agreed topic.	A.D2 Select relevant information from sources that link clearly to the agreed topic.
Learning aim B: Present a summary of research findings into an agreed topic		
B.P3 Present an outline summary of research findings on an agreed topic.	B.M3 Present a clear summary of research findings on an agreed topic, with reference to some of the research sources used.	B.D3 Present a focused summary of research findings, with clear referencing to the research sources used.

Essential information for tutors

Units from Group A and Group B may assess the same transferable skills. Where this occurs, you may opt to deliver these units simultaneously. This is acceptable providing the delivery is planned appropriately and that all learning aims for both types of unit are met and covered in the assessment. You are not permitted to deliver a unit and then use learners' evidence from the unit to achieve another unit.

Essential information for assessment decisions

For distinction standard, learners:

- carry out research that remains focused on the agreed topic and uses a range of appropriate sources to collect information
- give a detailed breakdown of the sources they have used and select the most relevant information from them, demonstrating awareness of which sources were more reliable than others
- present their summary of research findings clearly, keeping the focus on the research topic. The summary will also reference in detail the research sources that were used.

For merit standard, learners:

- carry out research that remains mostly focused on the agreed topic but may become too broad in places. Some of the sources will have been given by tutors but some they have found for themselves
- outline the research sources used. They will select appropriate information for their topic. They will demonstrate some understanding of which sources are more reliable than others
- present their summary of research findings, remaining mostly focused on the agreed topic although may go off in other directions at some points. The summary will reference some of the research methods that were used.

For pass standard, learners:

- carry out basic research, using research sources that have been given by tutors
- produce a research log that gives incomplete information of the key tasks they have completed. They will select only simple and obvious information from the given sources
- present a basic summary of research findings that are mainly broad and unfocused. There will be little or no reference to the research methods used.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Choosing a topic to investigate

This is perhaps the hardest part of any project. Learners need to choose a topic that is interesting to them but not too big so that it becomes impossible to complete. In small groups, learners make a list of subjects or hobbies they are interested in. They can then ask each other questions about the topics or hobbies. This could begin to form a list of possible subjects for each project.

Alternatively, tutors could provide a list of potential topics for learners to choose from.

Suggested time: about 3 hours.

Deciding on outcomes

Learners can be given a list of outcomes and project titles. Their task will be to match the outcomes with the titles. They can then look at the results with other group members to see if they agree or have different answers. Tutors may want to include answers that will overlap with different topics.

Suggested time: about 3 hours.

Research sources

Tutors do a brief overview of what the difference is between a primary source and a secondary source. Tutors then give out a list of different research sources and learners work in pairs to decide whether it is primary or secondary. Learners feed back on their decisions.

Suggested time: about 2 hours.

Identifying the tasks that need to be completed

Learners plan a task list of the activities they need to complete. Tutors could produce a list of actions needed to complete a project in the wrong order and then, in groups, learners put them in the correct order. They will use the correct list to produce a to-do list of tasks to complete for their investigation.

Suggested time: about 3 hours.

Reviewing progress so far

As a group, learners will begin the session by reviewing what they have done so far. This should be a short presentation, depending on the number in the group. This activity is not intended to use the full time for the workshop. Learners can identify any problems they have had and how they have solved them, if they have. Other learners have the opportunity to ask questions about the project and share ideas.

Learners could record the review in their log.

Suggested time: about 3 hours.

What skills are you using?

This workshop will focus on the skills learners are using to carry out their project. Working in small groups, learners could identify different communication, planning, time-management and problem-solving skills. They can then share their results with the larger group.

Suggested time: about 3 hours.

How to present outcomes

Learners will investigate ways to present their research findings. They could experiment with vlogs or blogging software, and try out PowerPoint or Prezi.

They could also try using graphs, charts or illustrations to present information. Learners could work in small groups to decide which formats would be most appropriate for different topics.

Suggested time: about 3 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

You need to select a topic of your choice to carry out some research into. The topic could be an extension of something you have studied on your course or an interest or hobby that you would like to find out more about. You will discuss your ideas with your tutor and then come up with a title for your research. This should be focused and manageable in the time available to complete it. You will set up a research log to record what you are doing. This could be a folder, a blog or vlog. You will produce a to-do list of the tasks you need to complete in the timeframes given to you. While you carry out your research, you will keep an ongoing record of the sources and methods used to find out information. Finally you will summarise your key findings in a presentation method of your choice, making reference to the research sources you used.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

You will need to select a different topic for your research.

Unit ASc5: Testing the Quality of Products

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will carry out quality control tests and explore the importance of using standard test methods and standard product specification requirements.

Unit introduction

Quality control technicians carry out tests on products to make sure that they meet specification requirements, which can include measuring size, weight, colour or shape of the product, as well as health and safety requirements. For example, in a factory that produces thousands of mobile phones a day, the quality control technician will test that all the mobile phones are exactly the same and work to the required standard specification.

In this unit, you will carry out practical exercises related to the work of a quality control technician. You will set up a production line and test a product for quality. You will test some manufactured items using a standard test method and then check the results against the standard product specification requirements. Using the information from quality control testing, you will consider the cost of wastage, report on results and make a judgement as to the importance of quality control in industry.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Carry out quality control exercises
- B** Explore the risk of not meeting quality control standards.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Carry out quality control exercises	<ul style="list-style-type: none"> The purpose of quality control and how it is carried out Risks from not meeting quality control standards Presenting results of practical work 	<ul style="list-style-type: none"> Video evidence of learners carrying out quality control process, supported by observation records. Template for tallied wastage cost items compared to profits.
B Explore the risk of not meeting quality control standards		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> Selecting samples Testing against standard specification requirements Making observations, measurements and recordings Making a tally Using units 	<ul style="list-style-type: none"> Sampling processes Use of a tally chart Understanding of quality control process Consequences of poor quality control Types of work carried out by quality control technicians 	<ul style="list-style-type: none"> Money management Presenting information

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> Present information/points of view clearly and in appropriate language. Present information in a logical sequence. Use language, format and structure suitable for purpose and audience.
Mathematics	<ul style="list-style-type: none"> Identify and obtain necessary information to produce tally charts. Select mathematics in an organised way to work out cost of wasted items relative to profit. Solve problems requiring calculation with common measures, including money, length and weight. Collect and record discrete data and organise and represent the information as a report. Extract and interpret information from tally charts.

Unit content

Knowledge and sector skills

The purpose of quality control and how it is carried out

- Knowing the meaning of: quality control, production/assembly line, sampling, standard test method, product specification, product function, tally sheets, testing, e.g. pass/fail, visual inspection, defect, fault, accuracy, tolerance, qualitative, quantitative.
- Role of quality control technician during and after manufacture.
- Following standard test method to carry out tests safely.
- Making measurements of various quantities and qualities, e.g. length, weight, shape, colour, form, texture, electrical resistance.
- Use of correct units of measurement.
- Making test measurements by comparison with a standard or by using a specification to give a tolerance.
- Keeping a tally of high, low or correct items.
- Calculating the percentage of items that meet the specification.
- Cost of producing items that do not meet the specification.
- Comparing profits on items sold with cost of producing wasted items.

Risks from not meeting quality control standards

- Loss of revenue, e.g. due to poor sales, wastage of product not meeting the specification, design fault, need to recall.
- The risk of products going to market in unsafe conditions.
- Damage to company reputation.

Presenting results of practical work

- Reporting on results using appropriate ways to show the information collected, e.g. tally charts, tables, graphs such as bar chart, pie chart.
- Awareness of what type of graph is the most useful to display the information.

Transferable skills

- Money management: calculating the cost of poor quality and improving quality control; understanding and using whole numbers and decimals; solving problems requiring calculation; using a range of strategies to add, subtract, multiply and divide whole numbers and decimals; percentages.
- Presenting information: using appropriate ways to show the information collected, e.g. tally charts, tables, graphs such as bar chart, pie chart; awareness of what type of graph is the most useful to display the information.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Carry out quality control exercises		
A.P1 Carry out a basic quality control exercise to test a product against a standard.	A.M1 Carry out a quality control exercise to test a product against the specification.	A.D1 Carry out a quality control exercise to accurately test a product against the specification.
A.P2 Calculate the cost of wasted items.	A.M2 Calculate the cost of the goods produced and the cost of wasted items.	A.D2 Calculate the projected profit of the goods produced relative to the cost of wasted items.
Learning aim B: Explore the risk of not meeting quality control standards		
B.P3 Identify risks of not meeting quality control standards.	B.M3 Describe risks of not meeting quality control standards.	B.D3 Describe the risks of not meeting quality control standards and consider the benefits of effective quality control.

Essential information for tutors

Essential information for assessment decisions

For distinction standard, learners:

- carry out a quality control exercise according to a product specification, using measuring instruments with confidence to make accurate measurements and recordings
- present findings from practical work using tally sheets, charts or tables to show the costs and overall profit, and to show a comparison of the value of goods produced with the cost of wastage
- describe the risks and benefits associated with quality control standards, with detailed examples that relate in part to their practical work, and using the results from quality control exercises in relation to cost.

For merit standard, learners:

- carry out a quality control exercise according to a product specification, using measuring instruments to make measurements and recordings
- present findings from practical work using tally sheets, charts or tables to show the costs of the goods produced and the cost of wastage items, but showing no link between the relative costs
- describe the risks associated with quality control standards, with some examples that relate in part to their practical work.

For pass standard, learners:

- carry out a quality control exercise by comparison with a given standard, using measuring instruments to make measurements and recordings and following a basic procedure
- present findings from practical work, using a tally sheet, chart or table to show the costs of the wastage items
- identify the risks associated with quality control standards in the form of a list.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

YouTube™ videos of assembly/production lines, e.g. car assembly lines, electronic assembly lines, lipstick production lines, quality control technicians at work.

In pairs, learners write down three things they think are reasons for using quality control in manufacturing products.

In groups, they reduce this to the three most important reasons.

Each group's reasons are displayed and the class decides which points are the most important and why.

The tutor introduces the standard test by comparison and specification requirement.

Learners are given merchandising catalogues, online or paper-based, e.g. Screwfix®, Argos®, Avon®, Ikea®.

They work in pairs, with one finding an item and describing it (giving the specification) and the other finding the code to fit the specification. If the whole class has the same catalogue, this can be done as a quiz for teams.

Testing against a standard, learners work in pairs. Each pair is given a packet of straws cut to different lengths. A straw of standard length is given to each pair and they have to pass any straws that are the same length or longer and fail any which are shorter, keeping a tally of those that pass and those that fail.

Suggested time: about 6 hours.

Activity: Making a specification and using it to aid quality control on items produced

Learners produce a specification for an item that has been made by the tutor and that could be made on a production line.

Each learner uses a template (mathematical net) to make a 4 cm square gift box out of thin card. They select their own colour for the box and add decoration to the sides and top. Each learner makes a standard specification requirement. The specification has a drawing or photograph and gives size, shape, colour, what decoration has to go where etc.

In groups, learners look at all the specifications they have produced and decide on one that they can make.

Each group, with guidance, sets up a production line and makes 10 items according to the specification.

Each group carries out a quality control exercise on the items they have produced, tallying up those that fit the specification and look like the original. Each group decides how things could be improved, including what did/could have gone wrong. A nominated quality control technician briefly reports back to class and the process is evaluated. The class may conclude that some quality control at each stage would be better than just looking at the finished item. Learners repeat the process using quality control at each step and review the differences.

Suggested time: about 9 hours.

Activity: Making measurements of various quantities against a specification, keeping a tally and considering the cost of wastage

Learners complete measuring exercises and keep a tally to report on the quality control. Suggestions are below. They are observed by the tutor.

Learners measure the length of nails or screws (50 in a packet), with the length specified between two limits, and tally those good and out of tolerance.

Learners measure the weight of washers (50 in a packet), with the weight to be over a specified value, and tally those good and underweight. If the cost to produce a washer is 0.1p, how much does the wastage cost? If the profit on each washer is 0.2p, what is the profit on good washers after wastage?

Learners evaluate the shape and size of silver balls used for cake decoration. They make holes in card with a hole punch (0.5 cm), discarding any silver balls smaller than this (those which fall through the hole), and make a visual inspection for those not spherical. They tally those that are good, too small and not spherical. If each silver ball costs 0.02p to produce, how much does the wastage cost?

Learners measure electrical resistance. They use five packs of (usually 10 in a pack) 1 k Ω resistors, or similar. They use a multimeter on ohms and test for those that are within 1% tolerance and then those that are within 0.5% tolerance. They tally those in and out of tolerance. Cost to make 0.015p profit on good items 0.023p. Compare profit with wastage for each tolerance.

Learners evaluate colour, using the exemplar paint strips of a number of shades of white cut into 2 cm squares (about 50). They are given the standard colour square for comparison and use visual inspection to see if any tin of paint has been wrongly labelled as it is not the right colour. They tally the results and calculate the cost of wastage if one tin of paint costs £3.25 to produce. They also calculate the profit on a tin of paint if it is sold for £10.50 a tin. They compare the profit on the batch of paint with the cost of wastage.

Suggested time: about 12 hours.

Activity: Reporting on quality control findings and the importance of quality control in industry

Learners use tally sheets to produce charts or tables to show clearly the amount of wastage that was found when carrying out each of the exercises. They consider the cost of wastage compared to the profit made. They choose one of the exercises that they completed and use this exercise to outline the report that is to be made to a manager.

They use role play, observed by tutor, to practise feeding back information as a quality control technician that has to report to a manager. They give information about the quality control exercise that was carried out and judge if there are improvements that could be made and, if so, what the improvements are.

As each learner is completing their role-play exercise, the other learners try to find out how poor quality control can lead to loss of money for the company. They are given starting points on a worksheet and need to add to this with any information they can find. This could include poor sales, dissatisfied customers, goods that do not meet specifications, design faults, unsafe products, goods having to be recalled, legal actions.

Suggested time: about 8 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Centres are encouraged to vary the products that they use for each year of assessment.

Suggested scenario

As part of a fund-raising activity your centre is selling homemade food products, for example lollies, biscuits and so on, but they are concerned that although they are charging the same price for all of them they are not all the same weight. They ask you to do a quality control exercise on the weight of the food product compared to the specification and to give the shop manager a report.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

There is a charity bake sale at your centre, cakes and biscuits that are over a certain weight can be sold at full price, the others – below that weight – can be sold at half price only. You have been tasked with pricing the cakes using the specification for the weight and keeping a tally of those that do not meet the specification, to work out how much money has been lost.

Unit ASc6: Carrying Out a Scientific Experiment

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will develop the skills needed to plan for and carry out a scientific experiment and to present the results.

Unit introduction

Scientific experiments are important as every new idea has to be tried and tested. However, most scientists do not produce new things. Some scientists work in industrial laboratories and schools where they carry out experiments and take measurements to check the quality of manufactured goods. Science technicians work in hospital laboratories to determine blood groups. Although the tests that are carried out are different, there is always a plan that has to be followed, problems that have to be noted and results that have to be reported.

In this unit, you will learn about a range of laboratory apparatus (equipment) and how to take measurements with each piece of apparatus. You will plan how to carry out an experiment, using your knowledge of the apparatus that is available. The plan should be clear and have a diagram so that someone else could use the plan to repeat the experiment. You will then set up the apparatus, take measurements and obtain some results.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Plan and carry out a scientific experiment
- B** Present results of a scientific experiment.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Plan and carry out a scientific experiment	<ul style="list-style-type: none"> • Completing a plan considering safety issues • Identifying and selecting apparatus to measure quantities • Carrying out an experiment • Recording and presenting results 	<ul style="list-style-type: none"> • Plan of how to conduct experiment. • Tutor observation and witness statements. • Report to include results and conclusions.
B Present results of a scientific experiment		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • Setting up and using scientific apparatus • Taking measurements • Safety in the laboratory • Tabulating and interpreting experimental results 	<ul style="list-style-type: none"> • Scientific apparatus • Taking measurements • Steps involved in carrying out an experiment • Relationship between variables • Units of measurement 	<ul style="list-style-type: none"> • Planning • Managing information

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> • Present information/points of view clearly and in appropriate language.
Mathematics	<ul style="list-style-type: none"> • Add, subtract, multiply and divide whole numbers using a range of strategies. • Solve problems requiring calculation with common measures, including money, time, length, weight, capacity and temperature. • Extract and interpret information from tables, diagrams, charts and graphs.

Unit content

Knowledge and sector skills

Completing a plan considering safety issues

- Identifying the variables.
- Finding out what quantities have to be measured to carry out the experiment.
- Deciding which measuring instruments would be suitable for the measurements to be made.
- Trialling some measurements to see if they work.
- Deciding how the experiment can be made as accurate as possible, how many measurements are to be taken and if measurements need to be repeated.
- Making notes of all decisions made, outlining the way the experiment will be carried out.
- Checking the CLEAPSS® Student Safety Sheets to see if it is safe to carry out the experiment.
- Noting any changes needed to the plan to carry it out safely and taking all the required measurements.

Identifying and selecting apparatus to measure quantities

- Simple laboratory apparatus – metre rule, ruler, measuring tape, Vernier callipers beaker, test tube, conical flask measuring cylinders (variety of sizes), stop clock, clamp stand, clamp, thermometer, force meter (variety of maximum forces), laboratory electronic balance, kitchen scales, Bunsen burner, tripod, gauze.
- Identifying simple laboratory apparatus from 2D drawings.
- Selecting correct apparatus to make measurements of different lengths and volumes.

Carrying out an experiment

- Setting up apparatus as necessary to carry out an experiment.
- Using CLEAPSS Student Safety Sheets to establish if there are any safety requirements for the apparatus being used.
- Taking measurements using various tools of measurement – metre rules, measuring cylinders, stop clocks, thermometers, force meters and laboratory balances.
- Taking measurements in the context of an experiment.

Recording and presenting results

- Showing results taken from measurements in tabulated or graphic form.
- Creating a results table with the quantities and units that are to be measured.
- Presenting the results table in a logical order so a conclusion can be made.
- Displaying the results using a graph or bar chart to show the link between them.
- Providing verbal or written feedback on results, including methods used to carry out the experiment.

Transferable skills

- Planning: selecting appropriate apparatus and measuring instruments, identifying what is to be measured, steps to take, safety procedures to be followed, appropriate timescales for activities, how results will be recorded and when.
- Managing information: collecting and using information from experiments, displaying the results of the experiment in a variety of ways.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Plan and carry out a scientific experiment		
A.P1 Produce an outline plan in preparation to carry out a scientific experiment.	A.M1 Produce a detailed plan in preparation to carry out a scientific experiment.	A.D1 Produce a detailed and coherent plan to carry out a scientific experiment.
A.P2 Carry out a scientific experiment safely, following guidelines and procedures.	A.M2 Carry out a scientific experiment safely and correctly.	A.D2 Carry out a scientific experiment safely and confidently.
Learning aim B: Present results of a scientific experiment		
B.P3 Present an outline report of the results of a scientific experiment, using simple diagrams and data with annotations.	B.M3 Present a well-formatted report of the results of a scientific experiment, selecting the appropriate information.	B.D3 Present a detailed report of the results of a scientific experiment in a well-organised and logical format, drawing simple conclusions.

Essential information for tutors

Essential information for assessment decisions

For distinction standard, learners:

- produce a coherent plan for carrying out the experiment. The plan will be logical and organised so it is clear what will be carried out and why. It will include correct details of apparatus and measuring instruments needed, variables, how measurements are taken and the steps to be taken in setting up the apparatus and carrying out the experiment
- show they can follow procedures to carry out a scientific experiment safely and confidently through selecting and using the correct apparatus and measuring instruments according to their plan, carrying out most of the required steps successfully and obtaining sufficiently accurate results to meet most of the aims of the experiment. They will leave the work area clean and tidy and dispose of any waste safely and correctly
- produce a report that gives full details of the results of the experiment. Learners will display results without error to show a relationship between variables in detail, either graphically or in tabulated form, using the correct headings. Learners will include the methods used and the report will show clearly any conclusions that have been made.

For merit standard, learners:

- produce a detailed plan for conducting the experiment. The plan is clear about what will be carried out. The plan will include the main apparatus and measuring instruments needed, some detail as to how measurements will be taken and the main steps to be taken in setting up the apparatus and carrying out the experiment
- show they can follow procedures to carry out a scientific experiment by selecting and using apparatus and measuring instruments, carrying out some of the required steps successfully and obtaining results with an accuracy, i.e. for both variable, that meets most of the aim of the experiment
- produce a report that gives clear details of the results of the experiment. Learners will display results, with some error, to show a relationship between variables, either graphically or in tabulated form. The report will include some of the methods used and will draw on the appropriate results.

For pass standard, learners:

- produce a simple plan for conducting the experiment. The plan will include a list of apparatus and measuring instruments needed, basic details of the measurements to be taken and an outline of some of the steps to be taken in setting up and carrying out an experiment
- show they can follow guidelines and procedures to carry out a scientific experiment by using apparatus and measuring instruments to take scientific measurements and obtain results. However, they may not obtain results for all the activities carried out and the accuracy of the results may only meet some of the aims of the experiment
- produce a report that provides outline information of the results of the experiment and includes some basic diagrams and some brief annotations on the methods used.

Essential resources

For this unit, learners need access to a laboratory setting with relevant apparatus to conduct a scientific experiment.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Learners are presented with a selection of apparatus and use a worksheet to fill in the name of the apparatus, what it measures and the units it measures in. Tutors should discuss the names and uses of apparatus with learners. Afterwards, learners should be given correctly completed worksheets to use as a reference.

Learners are shown 2D drawings of apparatus and are asked to draw various pieces of apparatus that have been set up. Apparatus and chemicals must be used safely. Learners should be given the CLEAPSS Student Safety Sheets so that they can appreciate any risks involved in using apparatus and know how to check that work is being carried out safely.

Suggested time: about 6 hours.

Activity: Taking measurements

Learners need to be able to use stop clocks. If the whole class tries to measure the same thing, for example the time it takes to walk across the room, the wide variety of results should convince them that measurements are not necessarily accurate and that precision instruments do not guarantee accurate or precise readings.

The idea of average time and reaction time could be introduced here. The importance of reaction time can be demonstrated by measuring the time it takes for trolleys to run down a slope or the oscillations of a pendulum. Learners are shown how to measure with a metre rule, a measuring cylinder, force meter, balance, and thermometer. Tutors set up a number of things for learners to measure. Learners fill in a worksheet of results and then discuss the results in groups, talking about the reasons why they have different answers.

Suggested time: about 6 hours.

Activity: Taking measurements as accurately as possible

Learners are introduced to the idea of taking measurements as accurately as possible using different measures of length, volume, force or weight. Learners work together to measure things like the length of a corridor, width of a room, length of a textbook, thickness of a sheet of paper so that they can see the relevance of the different instruments that are used to measure length. Volume, weight and mass can be treated similarly. Tutors should introduce the idea of being in line with the measurement (no parallax).

Suggested time: about 6 hours.

Activity: Demonstrating how to start planning an experiment

Learners are introduced to the idea of taking measurements as part of an experiment where they have to work out what to measure, how to measure it and how to keep other variables the same. Tutors demonstrate a simple experiment and ask learners to suggest what should be changed, how they would measure, what is being changed (variables) and what they have to keep the same (controls).

Learners should be made aware that other people need to know what they are doing, how long it is going to take and how safe it is. To do this, they should produce a plan or keep a blog. Learners will note any changes to the plan as they go along and explain how they overcame any problems and tried to keep to time. Learners write a plan for the demonstration experiment.

Suggested time: about 6 hours.

Activity: Tabulation of results and use

Learners tabulate the results of their experiment. Before they do this, they need to decide on headings and give some units for the measurements. Learners can then take the readings from the results of their experiment and tabulate them. The results may just be put in order or may be put into a bar chart, or a line graph can be drawn to show the results. Learners are given sets of results to practise tabulation, bar charts and graphs.

Suggested time: about 4 hours.

Activity: Presenting results

Tutors demonstrate report writing and how the structure of a report should be. Learners are shown an example of a report that covers methods of investigation, results and conclusions.

Suggested time: about 2 hours.

Activity: Conducting an experiment

In pairs, learners carry out an experiment under the guidance of tutors. They will plan and conduct the experiment, taking readings, tabulating their results and producing a graph or bar chart to show what has been found out.

Suggested time: about 4 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

You are helping the laboratory technician. A tutor has asked you to carry out an experiment to show how temperature affects the time it takes for salt to dissolve in water. You need to put out all of the correct apparatus for the class practical. You will then conduct the experiment by planning, carrying out, obtaining results and finally presenting your findings in an appropriate format.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

Your science tutor knows you have a real interest in science. Your tutor has asked you to carry out an experiment to show how the length of a pendulum affects its time of swing so that you can put out all the apparatus needed for the class practical. You will then conduct the experiment by planning, carrying out, obtaining results and presenting the results in an appropriate format.

Unit ASc7: Investigating Variations in Plants and Animals

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will develop the skills needed to prepare and stain plant and animal cells, investigating variations by developing basic keys for identification.

Unit introduction

Do you know what all living things are made of? Probably not, but in this unit you can find out! Living things are made up of basic building blocks called cells – millions of them. You will look at plant and animal cells and see how they differ. To do this, you will need to develop your skills in preparing microscope slides and using a microscope to observe them.

It is the nucleus that controls the cell. The nucleus has genetic material in it, which determines how the cells will work and what they will develop into. This is how some variation happens. There are many varieties of plants and animals, and identifying them is often complex. You will carry out research into variation and produce keys to help identification of living things.

Carrying out practical and research work will produce data that you will need to record, manage and present in a manner that is easy to understand.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Carry out practical investigations into the variations in plants and animals
- B** Manage information when carrying out practical work.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Carry out practical investigations into the variations in plants and animals	<ul style="list-style-type: none"> • Introduction to basic keys • Using staining techniques when preparing slides • Variations in humans • Managing and presenting results of practical work 	<ul style="list-style-type: none"> • Learner logs to include evidence of the preparation of slides, supported by tutor observation. • Presentation of research into variation in an appropriate format. • Presentation of results of practical work in an appropriate form such as graphs, pie charts, identification keys.
B Manage information when carrying out practical work		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • Preparing slides • Investigating variation • Presenting results 	<ul style="list-style-type: none"> • How to make a slide using staining techniques • How to use a microscope to observe cells • Parts of plant and animal cells • Variation in humans • Preparation of identification keys 	<ul style="list-style-type: none"> • Finding out • Managing information

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> • Present information/points of view clearly and in appropriate language.
Mathematics	<ul style="list-style-type: none"> • Extract and interpret information from tables, diagrams, charts and graphs.

Unit content

Knowledge and sector skills

Introduction to basic keys

- Finding out about keys and how to construct them, e.g. branching, yes/no questions, couplets of questions.
- Identifying living organisms by their characteristics, e.g. leaf shapes, number of petals in flowers, number of legs and body divisions in insects and arachnids.
- Constructing keys to identify living organisms, e.g. plants by leaf shape, insects and arachnids, different types of vegetables or fruits, laboratory equipment such as glassware.

Using staining techniques when preparing slides

- Preparing and viewing slides, using simple stains of cells from plants and animals, e.g. cells of cheeks, onions, leaf, root hair, pollen.
- Looking at prepared cells that show greater variations, e.g. nerves, kidney tissue, liver tissue, skin, antennae of insects, membranes of insect wings.
- Finding out about the structural differences between plant and animal cells, e.g. cell walls, chloroplasts, vacuoles, cell membranes, shape of cells.
- Finding out about the role of the nucleus in terms of containing genetic material and controlling cell functions.

Variations in humans

- Finding out about variation that occurs in humans, e.g. left-and right-handed, skin colour, hair, height.
- Carrying out practical laboratory investigations and research to show variations, e.g. hand-span width, tongue rolling, ear-lobe types, eye colour, height, feet size, straight/curly hair.

Managing and presenting results of practical work

- Using appropriate ways to show the information collected, e.g. graphs such as line, bar chart, pie chart.
- Awareness of what type of graph and layout is used and why.
- Recognising the important features of a graph, e.g. units on the axes, whether a line graph is straight, and explaining what this means.

Transferable skills

- Finding out: researching plant and animal cells and how to set up and use identification keys using the internet and science books; research using practical laboratory work to show structural differences seen under a microscope; researching the role of the nucleus in all cells; practical laboratory work on inherited variations; using keys to identify living organisms.
- Managing information: managing information obtained from research by collecting and reviewing data; managing information obtained from practical laboratory research by collecting and reviewing data; managing information by presenting it in an appropriate layout.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Carry out practical investigations into the variations in plants and animals		
A.P1 Demonstrate application of a limited range of practical laboratory skills, including collecting some data.	A.M1 Demonstrate appropriate use of practical laboratory skills, including collecting relevant data.	A.D1 Demonstrate effective use of practical laboratory skills, including collecting a comprehensive set of accurate and relevant data.
Learning aim B: Manage information when carrying out practical work		
B.P2 Manage information when carrying out practical work, using simple layouts to show the data.	B.M2 Manage information when carrying out practical work, using well-formatted layouts to show the data.	B.D2 Manage information when carrying out practical work, using well-organised and logical layouts to show the data.

Essential information for tutors

Essential information for assessment decisions

For distinction standard, learners:

- prepare materials for use on slides effectively for at least one plant and one animal cell, and identify four differences between plant and animal cells using a microscope skilfully
- collect comprehensive data on a number of different variations in plants and animals in order to construct at least two keys. The data will be accurate and relate to relevant content (keys constructed are fit for purpose)
- find out about at least two types of human variation through practical investigation effectively and accurately
- use skills in managing and presenting data effectively, demonstrating confidence and capability, and using well-organised and logical layouts, such as line graphs, and/or pie and bar charts.

For merit standard, learners:

- prepare slides appropriately for at least one plant and one animal cell and investigate three differences between plant and animal cells using a microscope
- collect appropriate data on a number of different variations in plants and animals in order to construct at least two keys. Some relevant data is missing or non-relevant data is included. At least one of the two keys must be fit for purpose
- find out about at least two types of human variation through practical investigation using the most appropriate presentation method. The data collected may contain minor errors that do not affect the overall outcomes
- use skills in managing and presenting data, including the interpretation of data in well-formatted layouts.

For pass standard, learners:

- prepare slides for at least one plant and one animal cell, and use a microscope to look at slides to demonstrate that they understand what they can see, identifying one valid difference between a plant and an animal cell
- collect data involving a number of living organisms to show variations and, from this, construct at least one key that is suitable for use
- find out about at least two human variations through practical investigation with inaccuracies that affect the overall outcomes
- use skills in managing and presenting some data to demonstrate an awareness of different forms of data presentation but do not always choose the most appropriate layout.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Learners must be given the opportunity to work in a suitable laboratory where using microscopes and preparing slides is possible. It is expected that the tutor will need to demonstrate the simple use of a microscope with prepared slides. Learners will need to be taught or reminded of how to take material to be used for a slide and how to use the appropriate stain. The tutor may decide to show how to make a temporary slide after staining by using a cover slip. Observation of learners demonstrating preparation of microscope slides and use of a microscope is required during assessment.

Introduction to unit

Tutor-led discussion/demonstration about the use of keys to identify living organisms.

Learners discuss different types of identification keys and the attributes of different types of keys. Tutor helps learners to use some different types of keys using familiar objects (prepared keys needed).

Learners use some familiar objects to build an identification key, e.g. a random set of books, shoes worn by learners.

Learners practically construct and use keys to identify plants and animals.

Suggested time: about 5 hours.

Activity: Using microscopes in a laboratory

Tutor reminds learners about how to use a microscope, providing each learner with a worksheet with diagrams that they can follow, plus prepared slides to use.

Tutor shows learners how to carry out a risk assessment and they are given the opportunity to practise.

Learners practise making a slide, using a diagrammatic worksheet of techniques to follow, e.g. of onion cells, cheek cells etc. They use a simple stain such as iodine with the onion cell, if appropriate, and methylene blue with cheek cells.

Learners make further slides, e.g. of pollen and root hairs, and draw what they see on their slide.

Class time used so that learners can show their slides and explain what they have observed.

Tutor can use this time to start bringing out the differences between plant/animal cells.

Suggested time: about 7 hours.

Activity: Practical work in the laboratory

Learners use microscopes and slides, plus photomicrographs, to look at the cells of plants and animals in order to compare their gross structure. NB Access may be needed for computer photographs.

Learners discuss the differences found in their investigation between the plant and animal cells, including the function of the nucleus, and feed back to the whole class. The tutor summarises these points on a whiteboard.

Learners produce a summary sheet of the work.

NB BBC Bitesize has good illustrations to help tutors with any required explanations.

Suggested time: about 4 hours.

Activities: Data collection on variation

For the section on variation, learners can use any suitable and available subjects to investigate some or all of the factors suggested. Tutors are free to use other variations. It is not intended that learners become involved in genetics and inheritance but that they look at variations that can be seen.

Learners discuss, as a class, how to practically collect data and make a record, and how to present their results.

Learners practise collecting and using data, e.g. by carrying out a class exercise on data collection using their hand spans. Any other example can be used.

Suggested time: about 4 hours.

Activity: Practical work involving the collection of data

Learners carry out practical work on human variation, e.g. variation in hand-span width, tongue rolling, ear lobe attachment, eye colour, height, foot size.

Suggested time: about 6 hours.

Activity: Preparing and presenting results of research

Learners are observed collecting data on variation from their colleagues but they will also be expected to carry out an internet search so that they have both theoretical and practical data to deal with. Having shown their research skills, learners must show their skills in managing information and in dealing with the data collected. They are expected to present their data in a suitable way, using both written and mathematical presentations such as annotated charts, pie charts, graphs, etc. If it is appropriate to do so, learners use IT packages to help them present the data in a chosen form, e.g. pie chart.

Learners present their results as pie charts, bar graphs, line graphs, choosing the appropriate form and annotating the outcomes.

The tutor offers help and advice, especially with regard to the most appropriate chart etc. to use.

Suggested time: about 6 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

A discussion starts about what every living organism is made of and how to identify so many different plants and animals. Then one of your classmates says that boys are always taller than girls by the time they are adults. They give basketball players as an example. Another person in the class says this is not true and gives the height of jockeys in horse racing.

To settle the arguments, your tutor suggests some work on these topics, i.e. cells, identification keys and variation.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

Looking around the canteen at lunchtime you notice how different people are. You then start thinking about what living organisms are made of and how you can identify them all. You wonder how such variations have arisen and your tutor gives you a project that will help answer this question.

Unit ASc8: Measuring Waves Used in Technology

Level: **1**

Unit type: **Section (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will develop their knowledge of the light and sound waves used in technology, and gain practical skills in carrying out measurements on waves.

Unit introduction

Some waves are all around us all the time and, although we cannot see them or detect them, devices such as mobile phones, radios and televisions are able to do so. These devices transform the waves into light waves and sound waves so that we can talk to people on our mobile phones and see television pictures. Waves are used in hospitals for ultrasound scans, infrared imaging and for taking x-ray photographs. All of these waves carry energy – and can be very dangerous. We see this in the case of technology, for example when using x-rays, as well as in nature as when water waves contribute to powerful tsunamis that are produced by the movement of the seabed.

In this unit, you will learn that there are different sorts of vibrations that can cause waves and you will use models to show how these waves are produced. You will carry out experiments to find out how different types of waves behave, and what happens to the energy they carry as they travel away from where they have been produced. You will use measurements of light and sound intensities to find out how waves can be absorbed and reflected. You will use what you have learned about light and sound waves to help you understand about the many different waves that are produced and their applications in science and technology.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Carry out measurements on light and sound waves
- B** Present how light and sound waves are used in technology.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Carry out measurements on light and sound waves	<ul style="list-style-type: none"> Using models of different types of waves Measurements of waves Finding out about the applications of waves Presenting information about waves 	<ul style="list-style-type: none"> Recorded results or a completed template to show measurements supported by tutor observations. Poster illustrating some uses, limitations and dangers of waves.
B Present how light and sound waves are used in technology		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> Making models to show different wave motions Using models for demonstrations Using equipment safely Using instruments safely Making observations and measurements Managing own safety when making measurements and models 	<ul style="list-style-type: none"> Behaviour of waves Properties of waves Applications of waves Devices that use waves and their limitations The energy of a wave depends on the distance from the source 	<ul style="list-style-type: none"> Finding out Presenting information

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> Present point of view clearly and in appropriate language when working in a team. Identify the main points and ideas, and how they are presented in a variety of texts when finding out about waves and devices that use waves Utilise information contained in texts to produce a poster. Present information in a logical sequence. Use language, format and structure suitable for purpose and audience so that the poster gives peers useful information.
Mathematics	<ul style="list-style-type: none"> Identify and obtain necessary information to measure the features of a wave. Select mathematics in an organised way to show how the intensity of a wave changes with the distance from the source of the wave. Use simple formula expressed in words to find the frequency of a wave. Extract and interpret information to find the wavelength and amplitude of waves.

Unit content

Knowledge and sector skills

Using models of different types of waves

- Transverse, e.g. light, microwave, infrared, water waves.
- Longitudinal waves, e.g. sound, seismic P-waves.

Measurements of waves

- Terminology and units – wavelength, amplitude and frequency (hertz (Hz)).
- Counting the waves that pass a point in a given time.
- Using meters to measure waves, such as a:
 - light meter to measure the intensity of light
 - sound meter to measure the loudness of sound in decibels.
- Making measurements of intensity at different distances from a source using light and sound meters.
- Making measurements to find out about absorption of light and sound, using light meters and sound meters, e.g. absorption of sound waves by sound insulation materials.
- Seeing how the wave shown on a sound meter or cathode ray oscilloscope (CRO) changes as the frequency and loudness of the sound changes.
- Investigating how waves are reflected, e.g. light reflected by mirrors, echoes.

Finding out about the applications of waves

- Knowing the different types of waves and their properties.
- Demonstrating how intensity, absorption and reflection of waves apply to different events and technologies, e.g. in an ultrasound scan.
- Knowing how different devices use different types of waves, e.g. mobile phone.
- Limitations of these devices, e.g. mobile-phone reception.
- Dangers of waves, e.g. loud sounds at music concerts, bright light when arc welding (arc eye, skin burning), tsunamis.

Presenting information about waves

- Using appropriate ways to show the information collected, e.g. tables, graphs such as bar chart, line graph.
- Awareness of what type of graph is most useful to display the information.

Transferable skills

- Finding out: about the application of different waves used in technology, how different devices use different types of waves, and the limitations and dangers.
- Presenting information: using appropriate ways to show the information collected, e.g. tables, graphs such as bar chart, line graph, awareness of what type of graph is most useful to display the information.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Carry out measurements on light and sound waves		
A.P1 Make a simple measurement of a wave using an instrument.	A.M1 Make a range of measurements of a wave, using instruments.	A.D1 Make a range of accurate measurements of a wave, using instruments appropriately.
Learning aim B: Present how light and sound waves are used in technology		
B.P2 Carry out basic research on a use of a wave.	B.M2 Carry out relevant research on uses of waves.	B.D2 Carry out detailed and relevant research on uses of waves, including limitations and dangers.
B.P3 Present basic information, which demonstrates some aspects of the outcomes of the research.	B.M3 Present well-formatted information in an appropriate way, which demonstrates the outcomes of the research.	B.D3 Present detailed information in an accurate and logical way, which demonstrates the outcomes of the research.

Essential information for tutors

Essential information for assessment decisions

For distinction standard, learners:

- demonstrate competence in the use of measuring equipment by carrying out practical work using all apparatus confidently
- make observations and measurements with relevant units to give accurate values of wavelength, amplitude and frequency and make measurements using light and sound metres to show variations in intensity and absorption of waves
- find out about the uses of waves in technology, their limitations and dangers. Research will include detailed and relevant examples of a wide range of uses of waves related to technology
- communicate their findings by displaying data accurately and logically in tabulated and graphical formats.

For merit standard, learners:

- demonstrate the use of most of the measuring equipment by carrying out practical work using most apparatus appropriately
- make observations and measurements to give values of wavelength, amplitude and frequency of waves, and using light and sound meters to show variations in intensity and absorption
- appropriately obtain information about the uses of waves in technology. Research will include relevant examples of three different uses of wave related to technology
- communicate their findings by displaying data in a well-formatted way in tabulated and graphical formats.

For pass standard, learners:

- demonstrate basic use of one item of measuring equipment when carrying out practical work
- make observations and measurements, with guidance, to give a value of a wavelength, amplitude or frequency of a wave and recording results in a given template. They observe variations in intensity and absorption of waves using light and sound meters
- find out about the use of a wave. Research will be basic and related to one use in technology
- communicate their findings by displaying data in a basic format, such as a table or graph.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Tutor uses a photograph of water waves to get learners to think about words associated with waves.

Tutor uses a slinky to show the difference between transverse and longitudinal waves and introduces the ideas of wavelength, frequency and amplitude.

Learners take photographs or draw what they see.

Each group presents to the class what they have found out about one of the ways of making waves.

Tutor introduces learners to waves that are invisible but, as the effect of them can be felt and seen, must be present.

Tutor demonstrates using a laser beam, e.g. showered with dust, using a heat source, showing x-ray photographs, microwave ovens, mobile phones, Wi-Fi and radios (wireless).

Learners work individually on a worksheet that has photographs suggesting different waves. Learners name the waves and the group discusses which answers they believe to be correct and why.

Suggested time: about 3 hours.

Activity: Measuring the wavelength and amplitude of a wave

The whole class works together to produce a Mexican wave and videos it using a mobile phone. Guided by the tutor, learners analyse it to reveal that, although the individuals are moving up and down only, the wave is moving along and carrying energy with it.

Tutor shows a longitudinal wave using a slinky and asks groups to devise a way of modelling a longitudinal wave, either using the people in their group or using anything else they can think of. Learners then demonstrate their thinking to see if the model works.

Learners are shown a diagram of a transverse wave and the tutor explains how to find the wavelength and the amplitude.

In pairs, learners complete a worksheet, marking the amplitude and wavelength of waves shown on the sheet and measuring the values using rulers.

In pairs, learners use coloured counters to show the shape of a transverse wave as individual particles that move up and down. Using a sheet of A3 paper, a straight line, drawn in the centre of a sheet, represents where there is no displacement of the particles. Learners decide on the amplitude and wavelength for their model wave and mark them.

Learners use the counters to make the wave shape, measure the wavelength and amplitude, and photograph the model. This can also be done using felt counters on felt. NB Counters hold positions more easily.

Suggested time: about 6 hours.

Activity: Using sound meters and measuring frequency

Tutor introduces the sound waves that we hear as being quite different from the waves that are received by radios, televisions and mobile phones.

Tutor demonstrates that sound waves that travel through the air are caused by a vibration of particles, e.g. twanging a ruler with one end held firmly to the bench or sounding a tuning fork and touching it to the top of a plastic beaker of water.

Tutor gives learners tuning forks so that they may sound them and then touch them to their nose, or demonstrates using a loudspeaker with small polystyrene balls in it and a signal generator to make the balls jump about. Alternatively, they can demonstrate with trolleys connected with springs: when the first trolley is moved back and forth, the vibration travels down the row of trolleys.

The tutor shows sound waves on an oscilloscope screen or asks learners to load the app 'Decibel 10th' so that they can see the pattern that sound waves make.

The tutor relates the amplitude of the wave to its loudness, to how much energy the wave has and that it is measured in decibels.

The tutor explains that the pattern on the screen shows amplitude (loudness) vertically and gives a measure of frequency horizontally. The tutor explains that frequency is the number of waves that pass a point in a given time and that the unit used for frequency, hertz (Hz), is the number of waves that pass a point in one second. Using video footage, learners count water waves to find out how many waves pass a point in a given time.

The tutor sets a clock for the given time that will be used to count the number of waves that pass a point. Individually, learners count waves for the duration of the time that has been decided and write down their answer. The process is repeated, with the whole class counting waves and the most likely value is decided.

Suggested time: about 6 hours.

Activity: Measuring how loudness varies with distance from a sound

Learners use noise meters/sound meters or their mobile phones (with the 'Decibel 10th' app) to measure the loudness of sound in the classroom, at different points in the building or when an instrument is being played.

The tutor observes that learners can make measurements of the loudness of sound and understand that the measurement is in decibels.

Learners work in pairs, with each learner choosing a musical instrument, and use their research skills to find out which part of the instrument is vibrating to produce the sound and how the frequency (pitch) and loudness of the note produced can be changed. The information about each instrument is then told to their partner. Any learner/tutor who plays an instrument can bring it to class and demonstrate how frequency and loudness can be changed. Learners think about what they have found out.

Learners work in teams to show that the loudness of a sound changes as the distance from the sound is increased.

The tutor shows learners that they need to make measurements at 1 m, 2 m, 3 m and 4 m from the source.

Tutor uses a single sound source (with a point to which a string can be attached). Each learner has a device with which to find the intensity of sound and the means to record it. Learners, working in groups, use a ball of string, a metre rule and some sticky notes to make measurements at 1 m, 2 m, 3 m and 4 m from the source of sound, which will be switched on for 10 seconds.

Each group decides on their joint answer, using their results, and the tutor puts answers from groups together for a class discussion. This activity can be repeated for learners so that they improve their method.

Suggested time: about 6 hours.

Activity: Using light meters to measure the intensity, absorption and reflection of light

Tutor explains that light is a wave that cannot be seen. It bounces off an object, creating reflection, and this light reaches the eye and allows the object to be seen. Light is a transverse wave of the same type as radio waves, microwaves, infrared, ultraviolet and x-rays.

Learners use light meters (which can be downloaded as an app on to a mobile phone) to measure the light intensity at various points in a room.

Tutor observes that learners can use a light meter to take readings of light intensity.

Learners work in teams to measure the intensity of light at various distances from a light source. This needs to be done in a blacked-out room or in a room that has low lighting, where the intensity of the background light can be ignored. Each team needs a light source, metre rule, a light meter and a sheet to record their findings.

The tutor observes teamwork in operation.

Teams discuss what they have found out and tutor brings information together to show that the intensity of the light decreases as the distance from the source of light increases. The tutor introduces the fact that light is absorbed by various materials, and learners use sheets of greaseproof paper to show that the more sheets of greaseproof paper that are placed in front of the light source, the less light comes through because it is absorbed.

Learners work in teams. They are given a light source, small sheets of greaseproof paper and a light meter, and are asked to set up an experiment to show that the light meter reading does reduce when more sheets of greaseproof paper are put in front of the light source.

The tutor explains that light is also reflected and arranges for learners to work in teams to find out how light is reflected off various surfaces, e.g. mirrors, white paper, walls.

Suggested time: about 6 hours.

Activity: Finding out about wave uses, limitations and dangers

Tutor asks learners to research the uses, limitations and dangers of waves.

Each learner makes a list of the words that they would use to start their research on waves.

Learners then work in pairs, compare their lists and pick out the five most important words.

Three pairs come together as a team to compare their lists and pick out the five most important starting points for their research.

The tutor collates the starting points of research so that all groups can see and discuss.

Learners carry out their research, select relevant information and communicate their findings by displaying results in the form of tables and graphs.

Suggested time: about 6 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

Some people in the area who live in houses built near a motorway find it is too noisy in their gardens. They want wooden fences put up around the gardens to reduce the noise and have asked the local college/school to give information to local councillors to show that this strategy will reduce noise and to give a demonstration.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

The local football pitch is poorly lit and so is quite dark in the corners. The footballers want the council to provide extra lighting but it has been suggested that the lights that are there already could be put up higher rather than buying extra lighting. The football team has asked the college/school to provide a demonstration and to give information to local councillors to show that moving the lights higher will just make the whole pitch darker.

Unit ASc9: Practical Actions to Protect the Environment

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will demonstrate skills in planning, communication and working with others when developing practical ways to reduce the negative environmental impact of human activity.

Unit introduction

Have you ever wondered about how the things you do affect the world around you? Everyone uses energy and resources, and creates waste, just by carrying out everyday activities. This can have a negative impact on the environment – but you can do something about this! By taking some time to think about how what we do affects the environment, as individuals and as a society, we can make changes that protect the environment both today and for the future.

In this unit, you will work with others to explore and communicate the hands-on, practical things you can do to protect the environment. You will learn about the science behind the environmental impacts before looking at how we can make changes in society to reduce these impacts, for example on natural resources and to promote wildlife. You will also develop your planning and teamwork skills, looking at how you can take practical actions to help protect the environment, the ways in which it can be done and what difference it can make.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Work with others to plan and carry out practical actions to protect the environment
- B** Communicate the impact of practical actions to protect the environment.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
<p>A Work with others to plan and carry out practical actions to protect the environment</p>	<ul style="list-style-type: none"> • Key environmental issues, concerns and scientific impacts of human activity • Practical actions to protect the environment • Working with others to protect the environment 	<ul style="list-style-type: none"> • Photo journal, video clips or blog of the practical actions taken. • Learners' planning logs supported by tutor observations of learner contributions in a team. • Report to summarise practical actions taken and the science behind them.
<p>B Communicate the impact of practical actions to protect the environment</p>		
<p>Key teaching areas include:</p>		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • Investigative skills • Finding-out skills • Skills in linking science and society • Scientific communication and working with others 	<ul style="list-style-type: none"> • The science behind impacts and actions • Impacts of human activities on the environment • Ways in which negative impacts can be reduced by the individual and society 	<ul style="list-style-type: none"> • Communication • Working with others

There are opportunities to develop functional skills in this unit:

Functional skills	
<p>English</p>	<ul style="list-style-type: none"> • Make relevant and extended contributions to discussions, allowing for and responding to others' input. • Prepare for and contribute to the formal discussion of ideas and opinions. • Present information/points of view clearly and in appropriate language. • Write clearly and coherently, including an appropriate level of detail. • Use language, format and structure suitable for purpose and audience. • Ensure written work includes generally accurate punctuation and spelling and that meaning is clear.

Unit content

Knowledge and sector skills

Learners explore a range of environmental issues, relating the causes, impacts and actions to their scientific understanding.

Key environmental issues, concerns and scientific impacts of human activity

- How human activities can cause negative scientific impacts on the environment, including, where appropriate, how these can be measured.
- Air pollution caused by burning fuels for energy, heating or transport and the impact, e.g. global warming, chemical pollution.
- Land and waterway pollution, e.g. litter and chemicals and the impact, to include changes to biodiversity.
- Burdens on infrastructure and resources caused by overpopulation and the impact, e.g. increased road use and CO₂ emissions due to need for imported food.
- Deforestation, land cultivation, use of pesticides and fertilisers and the impact, e.g. extinction, loss of habitat and biodiversity.

Practical actions to protect the environment

How the following actions, which can help to protect the environment, can be carried out by individuals and society.

- Reducing the burden on the environment by using only what you need:
 - less energy, e.g. turning lights and electrical appliances off when not in use, walking or using public transport where possible, ensuring houses are well insulated to reduce heat loss, use of renewable energy sources, e.g. solar, wind, turbine
 - less water, e.g. using only the water needed while brushing teeth or boiling the kettle, installing water butts for watering plants or cleaning cars and washing windows
 - reducing packaging where possible to reduce transport costs and the need for landfill.
- Reusing non-biodegradable products where possible, e.g. carrier bags, finding alternative uses for products that would otherwise be thrown away (upcycling).
- Recycling, e.g. paper, metal, plastics, food.
- Using alternative technologies:
 - low-impact materials in construction, e.g. natural materials such as sheep's-wool insulation, responsibly-sourced timber, straw bales
 - renewable sources of electricity, e.g. solar power, wind turbines, hydroelectricity.
- Promoting biodiversity:
 - planting for bees, butterflies and birds
 - putting up bird boxes and other homes for wildlife.
- Using locally-sourced food and materials to reduce transport costs and fuel use.

Working with others to protect the environment

- Identifying individual roles and responsibilities.
- Ensuring clear communication throughout the activity.
- Knowing appropriate behaviours for different situations.
- Working through problems and agreeing solutions together.
- Importance of respecting others who are working with you.
- Solving issues in teams.

Transferable skills

- **Communication:** the ways in which people can be made aware of environmental issues and concerns; contributing to discussions; allowing for and responding to others' input; identifying the ways in which people can help to promote biodiversity and reduce their own individual impact on the environment, and the science behind this.
- **Working with others:** working with others to complete an activity or achieve a goal; knowing individual responsibilities; contributing to discussions on how on practical actions to protect the environment; working in a team to achieve a common goal; communicating with the rest of the team on how best to deal with problems.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Work with others to plan and carry out practical actions to protect the environment		
A.P1 Plan and implement some practical actions, taking some responsibility for own role within a team.	A.M1 Plan and implement practical actions efficiently, taking appropriate responsibility for own role within a team.	A.D1 Plan and implement practical actions confidently, taking full responsibility for own role and making effective contributions.
Learning aim B: Communicate the impact of practical actions to protect the environment		
B.P2 Communicate simple ideas about practical actions, outlining the scientific principles.	B.M2 Communicate relevant ideas about practical actions, using descriptions of scientific principles.	B.D2 Communicate complex ideas about practical actions, using explanations of the wider scientific principles.

Essential information for tutors

Learners must work in a team to plan and implement at least two practical actions that help to protect the environment.

Essential information for assessment decisions

For distinction standard, learners:

- plan confidently by considering the requirements and potential problems associated with carrying out practical actions
- demonstrate positive implementation of practical actions confidently and without the wastage of too much time and resources
- make effective contributions within a team, taking full responsibility for their own role and demonstrating an awareness of behaviours needed for different situations and when working through problems to agree solutions
- give a detailed consideration of the wider impact of human activities on the environment when communicating actions taken effectively. This will include a clear scientific explanation of how practical actions have helped to protect the environment.

For merit standard, learners:

- plan efficiently by considering the requirements associated with carrying out practical actions
- implement some appropriate practical actions efficiently, with an awareness of the need to minimise the wastage of time and resources
- make appropriate contributions within a team, taking responsibility for their own role and demonstrating some awareness of the need to resolve differences and agree solutions
- communicate information appropriately and in an understandable form when demonstrating how human activities can affect the environment, giving some scientific descriptions of how practical measures have helped to protect the environment.

For pass standard, learners:

- plan practical actions, demonstrating some understanding of the potential resources needed to carry out simple practical actions
- implement some practical actions, with limited awareness of the need to minimise the wastage of time and resources
- cooperate within a team and take some responsibility for their own role
- communicate simple ideas to others about the practical actions carried out, outlining the scientific principles behind them.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

In pairs, learners think about the activities they do every day and brainstorm the direct effects of these activities on the environment around them, identifying if the effects are positive or negative.

In small groups, learners:

- identify the sources of energy they use (including heating)
- make lists of the electrical appliances they use and how long they leave them on for (e.g. mobile-phone chargers).

The tutor uses this information as a starting point for discussing energy resources and how and where energy is produced.

Learners are tasked to carry out an audit of the energy use and recycling that takes place in their own homes. They discuss and compare their findings in a subsequent lesson.

Suggested time: about 2 hours.

Activity: Conservation – surveys of the environment

Learners are given data from surveys of wildlife numbers carried out by conservation organisations and are asked to think about what the results mean.

Learners plan their own simple surveys related to the environment (perhaps given a method to follow). They use these to carry out simple surveys such as the number of cars on a road, the amount of litter in given places, the amount of dust in a room (leaving slides with double-sided sticky tape on them in different places, which are then looked at under the microscope).

Suggested time: about 5 hours.

Activity: Measuring the negative impact of human activities

Learners annotate a large whiteboard with ideas about the possible negative and positive impacts that human activities have on the environment. The tutor could provide a number of focuses, such as harm to wildlife, issues around food production and building houses or roads.

In small groups, learners sort the ideas into those that are affected by individual actions, society or both. They then make suggestions about how these effects could be reduced.

The tutor leads a discussion relating to how much these suggestions may cost or make savings for individuals and society, in order to give learners a general idea of the subject.

Suggested time: about 2 hours.

Activity: Energy efficiency in homes

Learners work in a group to carry out research into energy efficiency in homes. They find out about what they can do to reduce the negative impact of energy loss before presenting their ideas to the whole class. The results of their presentations could be put together as a class project or display.

Suggested time: about 4 hours.

Activity: Conservation – homes for wildlife

In groups, learners make plans for, and take part in, activities that provide homes for wildlife, such as:

- putting up bird boxes
- designating areas for invertebrate life, e.g. identifying rotting logs as potential habitats
- selecting and planting plants in a wildlife garden.

Suggested time: about 6 hours.

Activity: How society can be more sustainable

A guest speaker, such as someone who specialises in sustainability or environmental policy from a local university or council, is invited to make a presentation. Learners prepare questions and use the sessions as a springboard for designing community-based sustainability initiatives that reduce the negative impact of society-wide human activities, such as:

- waste disposal and recycling
- reducing packaging use
- minimising food miles.

Suggested time: about 4 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

A wildlife charity has started a project to help raise awareness of the impact that humans can have on the environment. They know about the course you are on and feel that you have the skills that they need to help them. In a small team they would like you to plan for and carry out some practical actions that can help to protect the environment.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a resit assessment activity.

A fast-food chain has started to look into the take-away packaging it produces and the effect that litter from its stores has on the environment. They want to work with the local community to raise awareness and have requested help from your centre. In a small team they would like you to plan for and carry out some practical actions that can help to reduce the amount of litter in the local area.

Unit ASc10: Making a Chemical Product

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will develop their skills in planning and making a chemical product safely. They will also review their own performance and the fitness for purpose of the chemical product.

Unit introduction

Did you travel by car or bus today? Have you eaten salt on your food? Do you wear makeup? It may surprise you to know that the petrol used in vehicles, the salt on your food and the makeup you wear are all chemical products. In fact, pretty much everything you own, use or wear is a chemical product! Research chemists investigate the best way to make chemical products. They need to know a range of techniques and choose which to use to be effective in making their products.

In this unit, you will develop your planning, time-management and practical skills to make a chemical product for use in the household, for example a soap, a disinfectant, a hand cream, a plastic. You will think about how you will make your product, what equipment you will need, how long it will take and what methods to use when carrying out an experiment safely. You will learn practical experimental skills and how to improve your practical techniques. You will also review the product you have made and your own personal performance skills, so that you can improve them in future.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Plan and make a chemical product
- B** Review own performance and fitness for purpose of a chemical product.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Plan and make a chemical product	<ul style="list-style-type: none"> Chemical products for use in the household Factors to consider when planning to make a chemical product Practical skills and techniques needed to make a chemical product 	<ul style="list-style-type: none"> Plan recorded in a report or learner log. Photographs of final chemical product supported by tutor observations. Report or recorded discussion about learner performance.
B Review own performance and fitness for purpose of chemical product		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> Practical skills, including measuring, weighing, heating, filtering, working safely Using equipment, including pipettes, Bunsen burners, hot plates, water baths, glassware, filter funnels, balances, thermometers 	<ul style="list-style-type: none"> Techniques needed to make product Simple chemical reactions Health and safety procedures, including risk assessments 	<ul style="list-style-type: none"> Planning Reviewing product and own performance

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> Write clearly and coherently, including an appropriate level of detail. Present information in a logical sequence. Use language, format and structure suitable for purpose and audience. Use correct grammar, including correct and consistent use of text. Ensure that written work includes generally accurate punctuation and spelling, and that the meaning is clear.
Mathematics	<ul style="list-style-type: none"> Add, subtract, multiply and divide whole numbers using a range of strategies. Solve problems requiring calculation with common measures, including money, time, length, weight, capacity and temperature. Convert units of measurement in the same system.

Unit content

Knowledge and sector skills

Chemical products for use in the household

- For example, soap, disinfectant, hand cream, plastics, e.g. made from potato starch, glue and borax.

Factors to consider when planning to make a chemical product

- Choosing appropriate equipment from equipment available.
- Resources, to include:
 - choosing appropriate starting materials
 - choosing appropriate quantities of materials
 - safety equipment, personal protective equipment (PPE).
- Timings.
- How much product is to be made.

Practical skills and techniques needed to make a chemical product

- Using equipment, to include:
 - glassware, e.g. test tube, boiling tube, conical flask, beaker, watch glass
 - measuring equipment, e.g. measuring cylinder, dropping pipette, spatula, balance, thermometer
 - other equipment, e.g. Bunsen burner, hot plate, water bath, stirring rod, tripod, gauze, heat-resistant mat, filter paper, filter funnel, Büchner funnel, test-tube rack, test-tube holder, kettle, indicator paper, pestle and mortar, petri dish, white tile.
- Skills and techniques, to include:
 - following standard procedures safely
 - observing, measuring, recording, e.g. weight, temperature, volume
 - heating, e.g. use of hot plate, Bunsen burner, water bath
 - stirring
 - other techniques, e.g. testing pH, drying, filtering, decanting
 - calculating, e.g. quantities of reactants to be used, amount of product made.
- Safety, to include:
 - using safety equipment, e.g. goggles, spectacles, protective clothing
 - behaving safely.
- Reviewing the chemical product:
 - whether it is fit for purpose
 - identifying improvements to the practical method that could improve the quality of the product.
- Reviewing own performance using given template:
 - suitability of plan
 - selecting and using appropriate equipment and materials
 - following method safely, stepwise and in correct sequence
 - using appropriate techniques
 - recommendations for improvements.

Transferable skills

- Planning: identifying the availability of resources and equipment needed to make the product in a given time frame, to include planned timings for each task.
- Reviewing product and own performance: testing that the product is fit for purpose, reviewing own strengths and weaknesses in performing the task, identifying improvements to method and to own performance.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Plan and make a chemical product		
A.P1 Produce an outline plan to make a chemical product.	A.M1 Produce a plan with some detail to make a chemical product.	A.D1 Produce a comprehensive plan to make a chemical product.
A.P2 Use some practical skills and equipment to make a chemical product.	A.M2 Use relevant practical skills and equipment to make a chemical product.	A.D2 Select and use effectively, practical skills and equipment to make a chemical product.
Learning aim B: Review own performance and fitness for purpose of a chemical product		
B.P3 Review own performance in making a chemical product, identifying own strengths.	B.M3 Review own performance in making a chemical product, describing its fitness for purpose and areas for improvement in own performance.	B.D3 Review own performance in making a chemical product, explaining its fitness for purpose and how it could be improved, and explaining how own performance could be further developed.

Essential information for tutors

Learners should be observed undertaking tasks and using both transferable skills and chemistry skills and procedures safely, at all times.

Essential information for assessment decisions

For distinction standard, learners:

- plan effectively to make a chemical product and explain how their plan will ensure that they can make the product successfully. The plan must be comprehensive and include appropriate equipment needed, calculations of the quantities necessary, steps to be taken to make the product, with timings and an explanation of their choices of equipment, resources and quantities
- demonstrate effective practical skills and use of equipment to make a chemical product that is usable and fit for purpose, to include measuring, heating, stirring and calculations
- review the product they have made and their performance, which will include whether the product is fit for purpose, a description of own strengths and weaknesses, giving specific examples and describing the improvements they could make to the chemical product and their own performance.

For merit standard, learners:

- demonstrate relevant planning skills to make a chemical product and describe how the method(s) they have chosen will help make the product successfully. They must produce a plan with some detail, including the appropriate equipment and steps to be taken to make the product, with timings and a description of their choices of equipment, resources and quantities
- demonstrate relevant use of practical skills and equipment to make a chemical product, to include measuring, heating and stirring
- review the product they have made and their performance, which will include some comments on whether the product is fit for purpose and an identification of own strength(s) and weakness(es).

For pass standard, learners:

- plan to make a chemical product and outline how the method(s) they have chosen will help make the product. They will have made some planning preparations to make a useful product, including the equipment and steps to be taken to make the product
- demonstrate some use of practical skills and equipment to make a chemical product, to include measuring, heating or stirring
- review the product they have made and their performance, which will include basic statements on whether the product is fit for purpose and an identification of own strength(s).

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

In small groups, learners think about the products they use in day-to-day life. They list them and discuss which they think are chemical products.

Learners look at a website for any major company that makes consumer products and list products made by these companies. Learners work in groups to research how some of these products are made in the laboratory.

Suggested time: about 3 hours.

Activity: Practical task – choosing equipment

Learners are given a range of equipment appropriate for making a chemical product. They work in groups to decide which piece of equipment is appropriate for weighing, measuring, mixing different substances, liquids and solids, and deciding the reasons why. A range of masses and volumes should be considered. Learners practise measuring and mixing.

Learners present to the group an explanation of why each piece of equipment would be used.

Suggested time: about 3 hours.

Activity: Practical task – practising skills

In pairs, learners follow given methods to practise skills such as heating, stirring, reading temperature and filtering, etc.

Practicals can include:

- separating salt from rock salt
- using pipettes to neutralise acid with an alkali and testing with pH paper or universal indicator
- precipitation reactions and the separating out of a precipitant.

Learners self-assess their performance using a checklist from the tutor as a prompt and suggest at least one way to improve.

Suggested time: about 10 hours.

Activity: Planning to make a product

Learners are given a planning template and use it to write a plan to make a named chemical product. The template should include equipment, resources, quantities, method and timings.

In small groups, learners produce a plan and feedback is given by the tutor.

Suggested time: about 6 hours.

Activity: Practical task – following a plan

Learners work in their groups to follow their plan to make a chemical product.

They should be encouraged to follow a basic scientific method template for reporting, e.g. aim, method, outcomes.

Suggested time: about 4 hours.

Activity: Reviewing chemical product and their performance

Learners are introduced to the idea of reviewing by looking at given plans and highlighting what details might be missing, e.g. estimated process timings, quantity calculations and so on.

Learners test to see if their product is fit for purpose. This can be done by checking it is safe by testing pH or testing that it works, e.g. that if it is a soap, it cleans.

The tutor provides a template that includes prompt questions for learners to use when reviewing their own performance.

Suggested time: about 4 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

This year you thought it would be fun to make presents for people rather than buying them so you have decided to make hand creams for your friends.

You and your classmates are going to produce enough hand cream for five friends to have a jar each.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

The art department at your centre wants to make collages using lots of different-coloured plastics. You will produce these plastics from potato and dye them using food colourings so that they have a range of coloured plastics to use.

You will research ways to make coloured plastics using potato starch and food dyes.

Unit ASc11: Testing the Properties of Products

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will develop the skills needed to carry out practical laboratory tests to find out about food and hygiene products.

Unit introduction

Does it matter if the food you eat is good for you or not? Are health professionals correct in telling you that cleaning your teeth or visiting the dentist are important? So many advertisements tell you that it is essential to use all their products to take care of your hair and skin, but have you ever analysed the contents of your shampoo or toothpaste? Or looked at what exactly is in that packet of burgers? Rather than making a judgement based solely on price, this unit gives you the opportunity to use your investigative skills and really look hard at some of the products you use or eat.

In this unit, you will review what you put on your skin and your hair, as well as what you are consuming. Many things can affect your body and your health, for example diets that lack certain vitamins, eating the wrong food or simply eating too much. You will carry out practical work, testing products to find out about food groups, as well as testing those products you use for personal hygiene purposes.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Carry out tests to find out the content of food and hygiene products
- B** Present information related to product testing.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Carry out tests to find out the content of food and hygiene products	<ul style="list-style-type: none"> • Product content and testing • Presenting results from practical tests 	<ul style="list-style-type: none"> • Recorded results or a completed template to show the content of products, supported by tutor observations. • Scientific presentation of findings from product/food tests, e.g. in the form of a poster.
B Present information related to product testing		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • General practical laboratory skills • Health and safety risk assessment skills • Testing for food groups • Testing hygiene products for pH values • Testing toothpaste for abrasives 	<ul style="list-style-type: none"> • Contents of common foods • Contents of some hygiene products • Food tests • Tests for pH, abrasive and antibacterial contents of common hygiene products 	<ul style="list-style-type: none"> • Finding out • Presenting information

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> • Make relevant and extended contributions to discussions, allowing for and responding to others' input. • Present information/points of view clearly and in an appropriate form.

Unit content

Knowledge and sector skills

Product content and testing

- Finding out about the major food groups and their uses in the human body.
- Finding out about the use of vitamins, minerals, water, fibre and salt in the human body.
- Finding out about the pH values of shampoos, abrasive chemicals in toothpaste and the antibacterial properties of shampoos and toothpastes.
- Finding out what at least three common foods consist of by carrying out practical tests for simple sugars, proteins, starches and fats.
- Practical testing of food, to include:
 - sugars, e.g. Benedict's solution for simple sugars
 - proteins, e.g. biuret test
 - starches, e.g. iodine test
 - fats, e.g. emulsion test, grease spot.
- Practical testing of hygiene products, to include:
 - pH value of shampoo, soaps, skin products and toothpaste
 - abrasive qualities of toothpaste/exfoliating soaps
 - antibacterial properties, e.g. of skin products, shampoos and toothpaste
 - lathering properties of shampoos, toothpaste and soap in hard and soft water.

Presenting results from practical tests

- Collecting and using information from tests.
- Displaying the results in an appropriate way, e.g. table or pie chart of product content.

Transferable skills

- Finding out: researching the main food groups, the pH value of some hygiene products and the abrasive qualities of toothpaste through practical testing.
- Presenting information: collecting and using information from tests, displaying the results in an appropriate way.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Carry out tests to find out the content of food and hygiene products		
A.P1 Demonstrate application of a limited range of practical laboratory skills.	A.M1 Demonstrate appropriate use of practical laboratory skills, following guidelines and procedures.	A.D1 Demonstrate effective and accurate use of practical laboratory skills, following guidelines and procedures.
Learning aim B: Present information related to product testing		
B.P2 Present basic information, demonstrating some aspects of the outcomes of the tests and research.	B.M2 Present well-formatted information in an appropriate way, demonstrating the outcomes of the tests and research.	B.D2 Present detailed information in an accurate and logical way, demonstrating the outcomes of the tests and research.

Essential information for tutors

For distinction standard, learners:

- demonstrate their practical skills by carrying out work independently and accurately, following guidelines and procedures for practical laboratory tests (pointers and suggestions rather than detailed steps), and completing all the tasks set without errors
- carry out four food tests effectively and accurately on at least three common foods, and on three suitable hygiene products, in order to show antibacterial (any product, e.g. soap, toothpaste, shampoo, skin-care product), abrasive (toothpaste) and pH values (must include a shampoo, soap, toothpaste)
- use the data collected from their practical work to present the details of their findings in a logical and accurate way to demonstrate the outcomes of the work completed.

For merit standard, learners:

- demonstrate their practical skills by carrying out the work appropriately, following guidelines and procedures for practical laboratory tests, and completing all the tasks set with minimal errors
- use appropriate practical skills that enable them to successfully carry out the four food tests on at least three common foods, and on three suitable hygiene products, in order to show antibacterial (any product, e.g. soap, toothpaste, shampoo, skin-care product), abrasive (toothpaste) and pH values (must include a shampoo, soap, toothpaste)
- use the data collected from their practical work to present well-formatted findings in an appropriate way to show the outcomes of the work completed.

For pass standard, learners:

- carry out the practical laboratory tests with guidance, demonstrating a limited range of laboratory skills with some errors that affect the results. The tutor may be required to help learners because of possible safety concerns or misunderstanding of the instructions
- carry out the four food tests on three common foods, and on the three suitable hygiene products, in order to show antibacterial (any product, e.g. soap, toothpaste, shampoo or skin-care product), abrasive (toothpaste) and pH values (a shampoo, soap or toothpaste)
- attempt to use the data collected from their practical work in order to present what the outcomes of the tests have shown. The methods chosen may not be the most appropriate and the information presented will consist of a basic outline of results.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Tutor-led presentation and discussion on major food groups and the types of food in which they are present. To help the discussion, tutor has groups of foods/packets of food etc. to show the class.

Group discussion on the role of the food groups in the human body, each group of learners can take a particular food group.

Class discussion about the food groups and their roles in the body. Use a spider diagram etc. to summarise the discussion.

Tutor-led discussion with the whole class on personal hygiene products and what they claim to do. Include skin products, soaps, toothpastes and shampoos. Tutor has examples for the class to examine.

Class groups look at the containers of these products and what they contain. Do they have components in common?

Class summarises the outcomes of their discussions and decides on the best methods of presentation.

Learners show managing information skills throughout this work on the unit.

Suggested time: about 6 hours.

Activity: Practical laboratory work on testing food groups

Tutor supervises and observes all practical work and completes risk assessments (modelling the process to learners so that they may also take part if appropriate) as part of health and safety compliance.

Tutor demonstrates tests on pure food groups so that learners have a base with which to compare their results. Learners use practical work to investigate the four food groups by carrying out food tests on simple sugars, proteins, starches and fats, using everyday food products.

Learners refer back to their discussion of food products in the introduction activity to link the contents on the packets of food with their food tests.

NB Additional time for practical work may be required so that tests may be repeated if there are poor or incomplete results (due to some foods containing, for instance, complicated sugars, which Benedict's test does not react to).

Tutor leads a class discussion about the test outcomes, relating what they have found back to their first discussion session.

Suggested time: about 6 hours.

Activity: Practical laboratory work on testing hygiene products

Tutor supervises and observes all practical work and completes risk assessments to comply with health and safety regulations, with learners taking part if appropriate.

The tutor refers back to the introductory activity where learners looked at the contents of the packets of products. Tutor reminds learners that only some of the chemicals in hygiene products can be tested.

Tutor demonstrates the use of pH meters/universal indicator/other pH indicators. Learners use practical work to test the pH value of shampoo, soap, skin products and toothpaste, as these products come into contact with the skin. Learners establish what these pH values mean in terms of neutral, acid or alkaline, and the implications for them being used on the skin.

Tutor demonstrates how to infect an agar plate/growth media. Learners use practical work to test the antibacterial properties of products, e.g. toothpaste, soap and skin products, shampoo. Learners examine the growth media to see the extent of the growth.

Tutor demonstrates the abrasive qualities of toothpaste and exfoliating soaps. Learners use practical work to test the abrasive qualities of toothpastes and exfoliating soaps, carrying out the appropriate tests on at least three hygiene products.

Suggested time: about 8 hours.

Activity: Practical laboratory work on testing hygiene products

Tutor supervises and observes all practical work and completes risk assessments to comply with health and safety regulations, with learners taking part if appropriate.

Tutor demonstrates the lathering properties of soap, shampoo and toothpaste in hard and soft water. Learners use practical work to test this.

Learners each decide the best way to present the results of all their practical work on hygiene products.

Suggested time: about 4 hours.

Activity: Transferable skills of managing information

Tutor leads a discussion on how learners should present the results of their practical work and their research, e.g. PowerPoint®, types of graphs, posters, presentations to groups using visual aids.

Depending on the degree of supervision required, learners use this session to complete their work ready for assessment or to take advantage of further guidance in order for their practical work and research to be presented in an agreed format.

This session could also be used to repeat experiments that learners did not complete earlier on.

Suggested time: about 5 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

After a 'fun run' to raise money for a local charity, and while you are getting your breath back, the question of the best food to eat to top up your energy levels is raised. Someone else complains about being covered in mud (it was a wet and muddy run!) and the best way of getting clean.

You decide to carry out some product tests on food groups and hygiene products.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

A local supermarket has had a complaint about their own-brand food and hygiene products. They have asked you to check the food groups contained in the food product identified in the complaint and the various qualities of the three hygiene products (toothpaste, shampoo and soap) identified in the complaint.

You may need to repeat aspects of your practical work if necessary by testing a different set of foods and different shampoos, soap products and toothpastes.

Unit ASc12: Investigating Crime Scene Evidence

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will find out about the procedures used in collecting and analysing crime scene evidence. They will use skills to search for, select and produce information.

Unit introduction

Have you ever watched a TV crime series where evidence is collected from the scene of a crime? Would you like to know what procedures the forensic scientists use to analyse it?

In this unit, you will find out about the procedures involved in collecting and analysing crime scene evidence and the importance of following these procedures correctly. You will have the opportunity to look at evidence from a simulated crime scene and then draw your own conclusions about what the evidence tells you about what may have taken place. You will use your skills to select and produce information on the procedures you find out about and the conclusions you came to.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Use procedures to collect and analyse crime scene evidence
- B** Present conclusions drawn from simulated crime scene evidence.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Use procedures to collect and analyse crime scene evidence	<ul style="list-style-type: none"> • Procedures for collecting crime scene evidence • Analysing crime scene evidence • Drawing conclusions and presenting them 	<ul style="list-style-type: none"> • Notes/blog on the types of procedures used to collect and analyse crime scene evidence. • Presentation of a profile based on a simulated crime scene.
B Present conclusions drawn from simulated crime scene evidence		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • Procedures to collect and analyse crime scene evidence • Analysing crime scene evidence and drawing conclusions • Searching for information on procedures • Producing information on procedures and own conclusions 	<ul style="list-style-type: none"> • Sources of information about procedures to collect and analyse crime scene evidence • Collecting and packaging physical and biological evidence without contaminating the crime scene • Analysing crime scene evidence • Drawing and producing conclusions 	<ul style="list-style-type: none"> • Managing information • Presenting information

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> • Make relevant and extended contribution to discussions, allowing for and responding to others' input. • Find out and produce information clearly and in an appropriate way.

Unit content

Knowledge and sector skills

Procedures for collecting crime scene evidence

- Crime scene – where a crime took place or another location where evidence of the crime may be found that may provide physical clues of the crime.
- How to behave around a crime scene, e.g. wearing the correct clothing, ensuring access is restricted and controlled, taking care not to contaminate evidence or the scene.
- Types of crime scene evidence such as fingerprints, footprints, clothing and hair fibres and other physical evidence, e.g. drinks cans, cigarette ends.
- Process for fuming of latent fingerprints using dusting equipment with powder and a soft brush: cyanoacrylate fuming of latent fingerprints using dusting.
- Taking accurate photographs or adhesive casts of footprints.
- Process of casting (making impressions) of latent footprints, e.g. adhesive method.
- Packaging and labelling evidence correctly without contaminating it.
- Keeping records of evidence collected by documenting as notes, photographs and physical evidence.

Analysing crime scene evidence

- Interpreting types of fingerprint: loop, whorl and arch and how this can be used in the identification of an offender.
- Scientific techniques: type, e.g. flame tests, microscopic analysis, colour tests, chromatography, colorimetry.
- Types of shoe and size of footprint, photographs and adhesive cast.
- Interpreting footprint to identify offender.

Drawing conclusions and presenting them

- Drawing conclusions from crime scene evidence, to include the type of crime, where the crime was committed based on the physical evidence found at the scene, likelihood of the crime happening in a certain way.
- Presenting conclusions through: an offender profile, a presentation, report, verbal report.

Transferable skills

- Finding information: sources of information, planning and preparing to carry out research, e.g. questions to ask guest speakers, methods of secondary research available, skills for searching for information, factors to be aware of when searching for information, e.g. is information up to date?
- Presenting information: selecting, using and organising information on the procedures used to collect and analyse crime scene evidence, producing conclusions drawn for crime scene evidence, to include identifying key points, making notes, summarising information, and organising information in a structured and clear format.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Use procedures to collect and analyse crime scene evidence		
A.P1 Use simple procedures to collect and analyse evidence from a simulated crime scene.	A.M1 Use appropriate procedures to collect and analyse evidence from a simulated crime scene.	A.D1 Use appropriate procedures confidently to collect and analyse evidence from a simulated crime scene.
Learning aim B: Present conclusions drawn from simulated crime scene evidence		
B.P2 Produce outline conclusions drawn from crime scene evidence for a simulated crime scene.	B.M2 Produce detailed conclusions drawn from crime scene evidence for a simulated crime scene.	B.D2 Produce detailed and valid conclusions drawn from crime scene evidence for a simulated crime scene.
B.P3 Present conclusions, using simple diagrams and data with annotations.	B.M3 Present conclusions, selecting appropriate information and using well-formatted diagrams and data.	B.D3 Present conclusions effectively, selecting information from a wide range of procedures in a well-organised and logical format

Essential information for tutors

Essential information for assessment decisions

For distinction standard, learners:

- use appropriate procedures effectively that enable most of the required information to be collected, e.g. procedures relating to footprints and fingerprints, packaging and labelling physical evidence correctly without contaminating it, recording most of the evidence in an appropriate format, e.g. notes, photographs. Learners will be confident in following the procedures with no need for prompting, demonstrating a clear understanding of what needs to be carried out and why
- produce conclusions that are detailed and well organised. The information gives a clear and detailed account of how they drew conclusions from the evidence, e.g. what evidence was present, what evidence was not present, the information the evidence gives about what could have taken place, showing a clear understanding of the steps to follow and the factors to take into account
- select an appropriate and clear format so that the information presented is logical and easy to follow, without the need for clarification.

For merit standard, learners:

- use procedures that are appropriate for the crime scene and enable most of the required information to be collected, e.g. procedures relating to footprints and fingerprints, packaging physical evidence without contaminating it, although they may not label the evidence correctly, recording some of the evidence in an appropriate format, e.g. notes, photographs. Learners will demonstrate an understanding of what needs to be carried out but may not always make links as to why and may need some prompting
- produce detailed conclusions. The information shows how learners drew conclusions from the evidence, e.g. what evidence was present, some indication of the information the evidence gives about could have taken place, showing an understanding of the main steps to follow and some of the factors to take into account
- select a format that is clear, so minimal clarification is needed.

For pass standard, learners:

- use procedures for the crime scene that enable an outline of the required information to be collected, e.g. procedures relating to footprints and fingerprints, packaging physical evidence, recording basic details of evidence. Learners will demonstrate some understanding of what needs to be carried out but may not always complete all the steps in a procedure and are likely to need prompting
- produce simple conclusions. The information gives brief information as to how learners drew conclusions from the evidence, e.g. main evidence present, showing some understanding but links between the evidence and what information it gives may not be clear and some clarification may be needed
- use basic formatting to present their conclusions, accompanied with some outline annotations that identify some of their conclusions.

Essential resources

For this unit, learners will need access to:

- information about the procedures used to collect and analyse crime scene evidence
- appropriate tools, equipment, materials and PPE needed to carry out practical activities safely
- a science laboratory equipped with a fume cupboard and standard laboratory apparatus.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

A game of Cluedo or questions such as 'How would you know someone has been in your bedroom?' could be used as a starter. Learners are shown age-appropriate footage of a collection of crime scene evidence. Tutors ask learners questions about what they know about crime scene investigation. In groups, learners participate in a mind-map activity, identifying different types of crime scene contexts and the evidence that may be collected from them.

In groups, learners research and discuss ways to conduct tests and reasons for fingerprinting, foot printing and collecting evidence. Learners present this evidence to their peers. Footage of crime scene investigations could be shown to identify items that need to be collected.

Suggested time: about 6 hours.

Activity: Collecting evidence

Tutors could lead a whole-class discussion on the main procedures used to collect evidence and the factors that need to be taken into account, for example not contaminating the crime scene.

Learners could take part in a 'spot the difference' activity. Tutors prepare the venue with a number of different items as evidence, for example drinks cans, makeup, hair samples and soil samples. Evidence markers can be used to cordon off three or four areas for group work. Each group of learners is assigned a crime scene and asked to collect and document the evidence by placing it into plastic bags and labelling them appropriately. After the activity, learners discuss the issues that could arise from this evidence collection and how these issues could be overcome, for example contamination. Groups will place the evidence back to the original areas and will rotate and repeat the task above, ensuring that there is no contamination by using gloves and coveralls provided.

Suggested time: about 6 hours.

Activity: Analysing fingerprints

Learners are shown footage on fingerprinting techniques. Guest speakers could be invited from the public services to demonstrate fingerprinting. Tutors can show learners different types of fingerprints: loop, whorl and arch. Tutors can then demonstrate how to fume (dust) for fingerprints using a glass surface where one or two learners have left their fingerprints. The demonstration could include the dusting, cyanoacrylate and iodine methods.

In pairs, learners practise taking fingerprints of their partner on glass using the different processes of fuming. They identify what type of fingerprints their partner has. Learners practise reading the different fingerprints of their peers by comparing them to prepared images of their fingerprints. Learners could then go to a public area in the place of education and practise identifying different types of fingerprints by fuming in the different ways.

Suggested time: about 6 hours.

Activity: Analysing footprints

Learners can be asked to step into a sandbox to leave their shoe prints. They then try to identify the shoe type and size by looking at the shoe print and identify who the shoes belong to. In groups, learners carry out the same experiment by testing other groups in the same way. Learners take photographs of footprints and share with their peers, who could be encouraged to identify shoe size and type of shoe of all class members. Tutors demonstrate the adhesive method of casting and learners practise this. Learners could also use their skills to identify footprint casting outside of the classroom.

Suggested time: about 6 hours.

Activity: Using scientific procedures

Tutors demonstrate how scientific procedures such as chromatography and microscopic examination can be used to analyse evidence.

Learners could work in pairs to examine strands of each other's hair under a microscope and record what sort of information this provides. Tutors could then facilitate a whole-class discussion, looking at how this information could be used as part of a crime scene investigation.

A second practical could focus on chromatography. Tutors could produce a 'mock' note found at a crime scene and give learners a number of pens, one of which created the note. In groups, learners could then carry out basic steps to identify the correct pen.

Suggested time: about 6 hours.

Activity: Drawing conclusions

Tutors lead a whole-class discussion about the steps to follow and factors to take into account when drawing conclusions from crime scene evidence.

Learners are given different types of evidence and work in groups to draw conclusions. The groups present their findings to the whole class. Tutors could refer back to Cluedo and remind learners of the activity and then discuss how they would know that Professor Plum was guilty. What evidence is there to draw the conclusion?

Suggested time: about 6 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

Your tutor will give you information about a simulated crime such as a burglary. You will need to find out about the procedures used to collect and analyse evidence at crime scenes and then use the procedures that are most appropriate for the case study.

From the evidence in the case study you will need to draw conclusions, showing how you used the evidence to come to conclusions about what happened. You will then present your conclusions in an appropriate and clear format.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity.

You will need to carry out the above activities in relation to a different simulated crime scene.

Unit ASc13: Exploring Biology

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will develop the skills needed to carry out and present their findings from different scientific experiments in Biology, investigating the differences between living organisms.

Unit introduction

Do you think a plant can breathe? Can fungus grow? Why can some people roll their tongue while others can't?

Biology is the science that studies life and living organisms and how they interact with each other and the environment. Plants, animals and humans are all made up of cells. All life processes such as moving and breathing are carried out in cells. The cells work together to help the living organism grow, move, breathe, reproduce and much more.

In this unit you will find out about the variations between living organisms. Flowers can have different shaped petals and leaves while some animals have adapted their bodies to allow them to swim while others cannot. In this unit, you will use identification keys to help you identify different plants and animals.

Carrying out practical work will be an important part of your learning for this unit. You will use different types of scientific apparatus and present your results.

The transferable and sector skills you develop in this unit can enable you to progress to further learning. They will also support you in completing the core skills units in Group A of the qualification.

Learning aims

In this unit you will:

- A** Investigate differences in living organisms
- B** Present results of scientific experiments into differences in living organisms.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Investigate differences in living organisms	<ul style="list-style-type: none"> • Living organisms • Introduction to basic keys for identification purposes 	<ul style="list-style-type: none"> • Learner logs to include evidence of the preparation of slides, supported by tutor observation. • Presentation of results into variation in an appropriate format.
B Present results of scientific experiments into differences in living organisms	<ul style="list-style-type: none"> • Variations in humans • Use of microscope • Steps involved in carrying out an experiment 	
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • Preparing slides • Investigating differences • Recording and presenting results of practical work • Safety in the laboratory 	<ul style="list-style-type: none"> • Definition of living organisms • Scientific apparatus • Differences between plant and animal cells • Variation in humans 	<ul style="list-style-type: none"> • Problem solving • Managing information

There are opportunities to develop functional skills in this unit:

Functional skills	
English	Present information/points of view clearly and in appropriate form.
Mathematics	Extract and interpret information from tables, diagrams, charts and graphs.

Unit content

Knowledge and sector skills

Types of living organisms

- Types of living organisms e.g. fish, plants, animals, fungus, bacterium, humans.
- Life processes e.g. ability to convert food into energy, growth, excretion, reproduction, breathe, sensitivity and can move.
- Characteristics of living organisms e.g. composed of a single cell or a complex of cells that work together to carry out the various processes of life.
- Function of and differences between plant and animal cells e.g. nucleus, cytoplasm, cell membrane, mitochondria, vacuole, chloroplast and cell wall.
- How new cells develop.

Differences in humans

- Variations in humans, e.g. height, skin colour, ear lobes, feet size, hair colour, left and right handed.
- Role of genes in inheritance e.g. chromosomes, allele, dominant recessive, mutations.
- Investigations to show variations, e.g. eye colour, tongue rolling, hand-span width, thick/thin hair.

Scientific experiments

- Selection and use of simple laboratory apparatus – slides, slide cover, microscope, pipette, test tube.
- Safety, to include: using safety equipment, e.g. goggles, spectacles, protective clothing behaving safely.
- Preparing and viewing slides, using simple stains of cells from plants and animals, e.g. cells of cheeks, leaf, stem, seeds, pollen, onions.
- Looking at prepared cells that show greater variations, e.g. nerves, kidney tissue, liver tissue, skin, antennae of insects, membranes of insect wings.
- Finding out about the structural differences between plant and animal cells, e.g. cell walls, chloroplasts, vacuoles, cell membranes, shape of cells.
- Finding out about the role of the nucleus in terms of containing genetic material and controlling cell functions.
- Laboratory housekeeping e.g. personal protective equipment, cleaning equipment after use, appropriate storage.

Basic keys for identification purposes

- Different types of keys for identification, e.g. yes/no questions, flow charts with text and/or illustrations, branching.
- Using keys to identify living organisms by their characteristics, e.g. leaf shape, leaf patterns, flower shape, colour, number of legs, body divisions, wings or no wings.

Transferable skills

- Problem solving: practical laboratory work to find out the differences between plant and animal cells and why it may happen, using identification keys to name living organisms.
- Managing information: using different sources to find out additional information about living organisms, sharing findings with others to check relevance and accuracy of findings, organising results to present to others.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Investigate differences in living organisms		
A.P1 Conduct scientific experiments to find out about the differences in living organisms.	A.M1 Conduct effective scientific experiments to find out about the differences in living organisms.	A.D1 Conduct comprehensive scientific experiments to find out about the differences in living organisms.
Learning aim B: Present results of scientific experiments into differences in living organisms		
B.P2 Present findings of results showing the differences in living organisms.	B.M2 Present findings of the results, showing accurate information about the differences between living organisms.	B.D2 Present findings of results, show comprehensive information about the differences between living organisms.

Essential information for tutors

Essential information for assessment decisions

For distinction standard, learners:

- prepare work area and select appropriate equipment. They will understand the prospective results and the purpose of the experiment. They will carry out focused scientific experiments safely and confidently with minimal supervision
- present their summary of findings clearly, keeping the focus on differences between living organisms. They will demonstrate accurate use of identification keys.

For merit standard, learners:

- carry out preparation of the work area and select some appropriate equipment. They will demonstrate some understanding of the prospective results and the purpose of the experiment. They will carry out scientific experiments safely and appropriately. Learners will carry out experiments with minimal supervision
- present their summary of findings, remaining mostly focused on differences between living organisms. They will demonstrate appropriate use of identification keys.

For pass standard, learners:

- carry out preparation of the work area and selection of appropriate equipment with tutor support. They will demonstrate limited awareness of the prospective results and the purpose of the experiment. They will carry out scientific experiments safely and with tutor support
- present their summary of findings, that are mainly broad on differences between living organisms. They will make some reference to identification keys.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Working in pairs, learners will complete a worksheet that challenges them to work out what is a living organism and what is not. There are illustrations of an animal, a tree, a rock, a robot and an Echo device. Learners need to decide which ones can move, breathe, grow, reproduce, eat, and sense things. They can share their responses with the larger group. Learners can then be encouraged to think about other living organisms and create a visual aid to remind them of the meaning of the term 'living organisms' and 'life processes'.

Suggested time: about 2 hour.

Activity: Microscope skills

To help learners identify individual cells they can look at a prepared slide of a plant root tip. The root should show the area of cell division just behind the root cap and the area of cell elongation in the older part of the root.

Suggested time: about 6 hours.

Activity: Identification keys

Working in small groups, learners create their own identification key using a topic that they are very familiar with e.g. dog, cat, hamster, rabbit, fox and fish. They can then share them with the other groups in the class to see how effective their key was. Learners could extend this work but being given a number of different common weeds to identify using the RHS website.

Suggested time: about 3 hours.

Activity: DNA

Working in small groups, learners can find out as much as they can about DNA using the internet and other given resources. Some topics can be given to focus their research, e.g. Who discovered DNA, When was it discovered? What is DNA?, How is this information used today? Learners should be encouraged to include words such as nucleus, gene, chromosome, inheritance. Learners can share their findings with the larger group.

Suggested time: about 6 hours.

Activity: Practical workshops

Learners should have the opportunity to carry out a range of experiments to help their understanding of the differences in living organisms e.g. Put a grape into a deflated balloon and fill with water. Tie off the balloon. This can be used to represent an animal cell. Similar models can be made to represent plant cells.

Suggested time: about 12 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

You have been invited to take part in a survey that your local conservation group is working on. They would like you to map the vegetation and wildlife found in a given piece of land to find out the diversity of plants and animals in the area.

While working at the site you will:

- carry out scientific experiments to identify the diversity of plants and animals, from the given piece of land. Use different scientific apparatus to conduct the experiments.

When you present your findings, you will need to give a description of the site and the results of your experiment, using identification keys and what they showed about the animals in the given piece of land.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity:

The assessment should essentially be the same, i.e. scientific experiments, identification keys, scientific apparatus, but using a different area of land.

If the area of land chosen is near water, it is essential that the appropriate health and safety precautions are taken before and during the task.

Unit ASc14: Exploring Chemistry

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will develop their skills in preparing for and making a product safely that involves different chemical processes.

Unit introduction

Many people are talking about single-use plastic and how it is creating significant damage to our environment but have you ever wondered how plastic is made? We also know that plants take nutrients from the soil so over time the quality of the soil becomes poorer. Our world population is increasing so we need to find efficient ways to enrich the soil to improve the quality and quantity of the food we eat. If you leave your bike out in the rain for a few days, you will begin to see rust forming on the metal parts. Making plastics, developing fertilisers and observing how metal and water react together are just some examples of the science of chemistry.

In this unit you will find out about some of the principles behind chemistry such as evaporation, freezing, melting points and light reflection. You will have the opportunity to make a product for yourself and be able to explain what chemical processes are happening as you make it.

This unit will help you to develop skills to progress to qualifications in different sectors as well as to progress to other qualifications in construction. The skills you develop in this unit will be useful in completing units in group A.

Learning aims

In this unit you will:

- A** Explore key concepts of chemistry
- B** Prepare a product using different chemical processes.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Explore key concepts of chemistry	<ul style="list-style-type: none"> • Key concepts of chemistry • Scientific principles • Practical skills and methods used to make a chemical product 	<ul style="list-style-type: none"> • Presentation of findings about chemical concepts • Tutor observations and witness statements • Photographs of final chemical product supported by tutor observations
B Prepare a product using different chemical processes		
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • Investigative skills • Following instructions to make a chemical product • Selecting, setting up and using scientific apparatus • Health and safety procedures 	<ul style="list-style-type: none"> • Chemical concepts • Simple equations • Techniques needed to make a chemical product • Chemical reactions • Scientific apparatus • Risk assessment • Health and safety procedures 	<ul style="list-style-type: none"> • Managing information • Problem solving

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> • Present information/points of view clearly and in appropriate form. • Present information in a logical sequence.
Mathematics	<ul style="list-style-type: none"> • Solve problems requiring calculation with common measures, including money, time, length, weight, capacity and temperature. • Extract and interpret information from tables, diagrams, charts and graphs.

Unit content

Knowledge and sector skills

Key concepts of chemistry

- Atomic structure e.g. atoms, nucleus, protons, neutrons, electrons, particles.
- Formulae and equations e.g. how scientists use symbols and formulae to represent elements, ions and compounds, examples of simple word equations and balanced chemical equations.
- Ionic compounds e.g. relationship between ions, atoms and electrons; how an ionic compound is formed.
- Periodic table, e.g. purpose of the periodic table, groups that share similar characteristics, know symbols for common elements.
- Metals and non-metals e.g. differences between metal and non-metal e.g. shiny/dull, high melting point/low melting point, malleable/ brittle; metallic structure and bonding; position on the periodic table.
- Solids, liquids and gases e.g. differences between solids, liquids and gases; how solids become liquid and then a gas.
- Scientific principles, e.g. evaporation, solutions, suspensions, solvents, solubility, melting point, boiling point, acid, alkali, pH, saponification, hydrophilic, hydrophobic, colour, light, reflection.

Safe use of scientific apparatus

- Scientific apparatus, to include:
 - glassware, e.g. test tube, boiling tube, conical flask, beaker, watch glass, stirring rod
 - measuring equipment, e.g. measuring cylinder, dropping pipette, spatula, balance, thermometer
 - other equipment, e.g. Bunsen burner, hot plate, water bath, tripod, gauze, heat-resistant mat, filter paper, filter funnel, Büchner funnel, test-tube rack, test-tube holder, kettle, indicator paper, pestle and mortar, petri dish, white tile.
- Safety, to include: using safety equipment, e.g. goggles, spectacles, protective clothing, behaving safely, safe handling of chemicals.
- Risk assessment, e.g. identifying potential hazards and ways to minimise risk.
- Hazard symbols, e.g. what they mean and typical hazards, information about how to work safely.
- Safety procedures, e.g. personal protective equipment, e.g. goggles, spectacles, gloves, protective clothing; handling liquids using appropriate apparatus.
- Housekeeping, e.g. cleaning apparatus, correct storage, disposal of waste products, reporting damaged apparatus.

Making products using chemical processes

- Selecting scientific apparatus, equipment and materials.
- Making product e.g. soap or shampoo, glue, plastics, synthetic fibres.
- Observing and noting the chemical changes as product is made.

Transferable skills

- Managing information: collecting and using information from different sources, following instructions when using different types of scientific instruments, using information to reach conclusions.
- Problem solving: identifying issues by being able to examine information given, finding different ways to solve problems.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Explore key concepts of chemistry		
A.P1 Search for information on an agreed concept of chemistry using given sources.	A.M1 Search for information on an agreed chemical concept using own and given sources.	A.D1 Carry out a focused and detailed search into an agreed chemical concept using own and given sources.
Learning aim B: Prepare a product using different chemical processes		
B.P2 Follow instructions to safely prepare a product using given scientific apparatus, demonstrating limited housekeeping skills.	B.M2 Follow instructions to prepare a product by setting up and using given apparatus correctly, demonstrating appropriate housekeeping skills.	B.D2 Follow instructions to prepare a product by setting up and using chosen apparatus correctly, demonstrating competent housekeeping skills.

Essential information for tutors

Essential information for assessment decisions

For distinction standard, learners:

- carry out research that remains focused on an agreed chemical concept and uses a range of appropriate sources to collect information
- give a detailed breakdown of the sources they have used and select the most relevant information from them, demonstrating awareness of which sources were more reliable than others
- prepare a product that shows accuracy when following instructions
- demonstrate competence in selecting, setting up and using scientific apparatus confidently when carrying out practical work
- demonstrate confident and competent housekeeping skills on completion of the practical work, e.g. cleaning apparatus, storing it appropriately, putting materials away correctly, leaving PPE clean, recording damaged equipment, disposing or recycling of waste correctly.

For merit standard, learners:

- carry out research that remains mostly focused on the agreed chemical concept but may become too broad in places. Some of the sources will have been given by tutors but some they have found for themselves
- outline the research sources used. They will select appropriate information for their agreed chemical concept. They will demonstrate some understanding of which sources are more reliable than others
- demonstrate setting up and the use of most of the scientific apparatus when carrying out practical work
- demonstrate appropriate housekeeping skills on completion of the practical work, e.g. returning apparatus in good condition but not always clean, flagging most equipment that needs repair or replacing, disposing or recycling of waste on most occasions.

For pass standard, learners:

- carry out basic research on a given chemical concept, using sources that have been given by tutors
- select only simple and obvious information from the given sources
- prepare a product using the given instructions but with some errors and with the need for guidance
- demonstrate the basic use of given items of scientific equipment when carrying out practical work but with the need for guidance
- demonstrate limited housekeeping skills after practical work e.g. returning apparatus.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Working in small groups, learners think about the practical application of chemistry in the home. In small groups, learners identify:

- the sources of energy they use
- cleaning materials they may use in their home e.g. washing liquid, cleaning fluids, polish
- supplements taken to improve health e.g. calcium, magnesium, iron
- cooking processes e.g. freezing, boiling.

The tutor can use this information as a starting point for discussing chemical concepts.

Suggested time: about 2 hours.

Activity: Safe use of scientific apparatus

Tutors set out a range of scientific apparatus that learners will use as they progress through the unit. Learners will be given a worksheet to complete. The information gathered will include the name of the apparatus, possible uses, potential hazards when using the equipment and ways to minimise the risk. Learners will share their responses with the whole group and add information they may have missed on their own worksheet. Learners will receive a correct information sheet at the end of the task to use for reference.

Learners are shown 2D drawings of apparatus and are asked to draw various pieces of apparatus that have been set up. Apparatus and chemicals must be used safely. Learners can be given the information leaflets so that they can appreciate any risks involved in using apparatus and know how to check that work is being carried out safely.

Suggested time: about 8 hours.

Activity: Periodic Table

Using different sources learners can find out what the period table is, who developed it and how it is structured. The group can then find out the symbols for the most common elements. Working in pairs or small groups, learners can find out about a different element and then share their findings with the rest of the group. A large blank version of the period table could be made available to the group who could then complete it as they learn more about individual elements. As a follow up to this activity, learners can begin to use the symbols to write simple equations.

Suggested time: about 4 hours.

Activity: Demonstrating and carrying out simple chemical experiments

Learners will be given a number of opportunities to find out answers to different questions, e.g. At what temperature does chocolate melt? If you add colouring, salt or other ingredients to water will it still freeze? Learners will be encouraged to suggest reasons for their results.

Suggested time: about 10 hours.

Activity: Make a 3D model of an atom

Following on from an introduction about atoms from the tutor, learners are then asked to create an atom using a range of materials. They need to clearly show the major parts of the atom with empty space between the nucleus and electrons. Each part will be clearly labelled. Learners can refer to their notes, handouts, worksheets and other resources for information. When they complete the model they will explain what they have done, to the rest of the group.

Suggested time: about 8 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

Your friend's birthday is coming up soon and you would like to make some natural soap for them. You will use different sources to find out what chemical processes are taking place as you make the product.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity:

The assessment should essentially be the same, i.e. making a product and researching information but using a different product.

Unit ASc15: Exploring Physics

Level: **1**

Unit type: **Sector (Applied Science)**

Guided learning hours: **40**

Unit in brief

Learners will find out about different aspects of physics. They will develop skills needed to construct simple electric circuits and take electrical measurements.

Unit introduction

Physics is used in everyday life and in the science laboratory. In this unit you will learn some of the basic principles of physical science and it will help you to apply these principles to a range of practical situations.

Electrical power is readily transferred and controlled, and is therefore used in many industrial, service and domestic devices. If you are working as a technician you will need to be familiar with basic electric circuits so that you can handle electrical equipment safely. You will have the opportunity to gain hands-on experience of using practical devices and test instruments.

Many scientific applications are used as part of space programmes. For example, environmental monitoring and modern astronomy both involve remote sensing. You will have the opportunity to explore some of the instrumentation used, and appreciate the benefits that it brings.

This unit will help you to develop skills to progress to qualifications in different sectors as well as to progress to other qualifications in construction. The skills you develop in this unit will be useful in completing units in group A.

Learning aims

In this unit you will:

- A** Explore different aspects of physics
- B** Construct simple electric circuits safely and take electrical measurements.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Explore different aspects of physics	<ul style="list-style-type: none"> • Energy stores and energy transfers • Application of radiation and waves 	<ul style="list-style-type: none"> • Presentation of findings about an aspect of physics • Tutor observations and witness statements • Photographic or video evidence of an electrical circuit and measurements used
B Construct simple electric circuits safely and take electrical measurements	<ul style="list-style-type: none"> • Structure and dynamic nature of the universe • Electrical circuits • Health and safety when working with electricity 	
Key teaching areas include:		
Sector skills	Knowledge	Transferable skills
<ul style="list-style-type: none"> • Investigative skills • Setting up and using scientific apparatus • Taking measurements • Safety in the laboratory • Managing own safety 	<ul style="list-style-type: none"> • Scientific apparatus • Taking measurements • Steps involved in creating electrical circuits • Properties of waves • Devices used to measure waves • Units of measurement 	<ul style="list-style-type: none"> • Managing information • Problem solving

There are opportunities to develop functional skills in this unit:

Functional skills	
English	<ul style="list-style-type: none"> • Present information/points of view clearly and in appropriate language • Present information in a logical sequence.
Mathematics	<ul style="list-style-type: none"> • Solve problems requiring calculation with common measures, including money, time, length, weight, capacity and temperature. • Extract and interpret information from tables, diagrams, charts and graphs

Unit content

Knowledge and sector skills

Energy stores and energy transfers

- Importance of energy stores and energy transfers, including:
 - chemical, e.g. fuel and oxygen
 - kinetic e.g. in a moving object
 - gravitational e.g. due to the position of an object in a gravitational field
 - elastic, e.g. in a stretched or compressed spring
 - thermal
 - mechanically e.g. when a force moves through a distance
 - electrically
 - by heating because of a temperature difference
 - by radiation, e.g. light, microwaves, sound.
- Measuring energy transfers e.g. energy conservation, power, efficiency, economic costs, unit (Joule).

Waves

- Waves e.g. transverse, e.g. light, microwave, infrared, water waves, longitudinal waves – sound, seismic P waves.
- Measurements e.g. wavelength, amplitude and frequency e.g. hertz (Hz).
- Using meters to measure waves, such as a:
 - light meter to measure the intensity of light
 - sound metre to measure the loudness of sound in decibels.
- Seeing how the wave shown on a sound meter or cathode ray oscilloscope (CRO) changes as the frequency and loudness of the sound changes.
- Investigating how waves are reflected, e.g. light reflected by mirrors, echoes.

Electricity

- Safety, to include: using safety equipment, e.g. goggles, spectacles, protective clothing behaving safely.
- Components e.g. ammeter, voltmeter, battery, resistor, bulb, cell, wire.
- Basic circuit theory, including:
 - the need for a complete circuit
 - current (mA, A), voltage (mV, V), resistance (Ω)
 - simple series and parallel circuits
 - use of ammeter, voltmeter, multi-meter to take measurements.
- Power supplies, including:
 - types of battery, e.g. rechargeable, non-rechargeable
 - solar cells
 - simple generators, e.g. bicycle dynamo, rotating a coil in a permanent magnetic field.

Physics and the environment

- Uses of physics e.g. predict the weather, analyse contents of atmosphere, find out how the sun's radiation interacts with gases in our atmosphere, measure heat inputs and outputs from space.
- Scientific equipment to monitor change in our environment, e.g. remote sensing, equipment using passive and active sensors, satellites, weather sensors, telescopic cameras, solar wind power.

Transferable skills

- **Managing information:** collecting and using information from different sources, following instructions when using different types of scientific instruments, using information to reach conclusions.
- **Problem solving:** identifying issues by being able to examine information given, finding different ways to solve problems.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Explore different aspects of physics		
A.P1 Search for information on an agreed aspect of physics using given sources.	A.M1 Search for information on an agreed aspect of physics using own and given sources.	A.D1 Carry out a focused and detailed search into an agreed aspect of physics using own and given sources.
Learning aim B: Construct simple electrical circuits safely and take electrical measurements		
B.P2 Construct a simple electrical circuit and measure its effectiveness, using equipment and tools safely.	B.M2 Construct an adequate electrical circuit and measure its effectiveness, using equipment and tools safely.	B.D2 Construct a comprehensive electrical circuit and measure its effectiveness, using equipment and tools safely.

Essential information for tutors

Essential information for assessment decisions

For distinction standard, learners:

- carry out research that remains focused on an agreed aspect of physics and uses a range of appropriate sources to collect information
- give a detailed breakdown of the sources they have used and select the most relevant information from them, demonstrating awareness of which sources were more reliable than others
- construct a safe electrical circuit that shows accurate measuring and marking out and a complete circuit
- demonstrate competence in the use of measuring equipment by carrying out practical work using all apparatus confidently.

For merit standard, learners:

- carry out research that remains mostly focused on the agreed aspect of physics but may become too broad in places. Some of the sources will have been given by tutors but some they have found for themselves
- outline the research sources used. They will select appropriate information for their agreed aspect of physics. They will demonstrate some understanding of which sources are more reliable than others
- construct a safe electrical circuit that shows some accuracy in measuring and marking out and a complete circuit
- demonstrate the use of most of the measuring equipment by carrying out practical work using most apparatus appropriately.

For pass standard, learners:

- carry out basic research on a given aspect of physics, using sources that have been given by tutors
- select only simple and obvious information from the given sources
- construct a safe electrical circuit that shows evidence of some measuring and marking out with some errors and the need for guidance
- demonstrate basic use of one item of measuring equipment when carrying out practical work.

Essential resources

Learners will need access to examples of different types of measuring equipment.

Delivery guidance

It is recommended that practical activities are used in the delivery of this unit to help learners develop both the core and sector skills. The following are suggestions for activities and workshops that tutors can use in preparation for the final assessment and are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Learners can share their understanding of what physics is about. Their ideas can be presented as a poster that can then be referred back to as they progress through the unit. When the unit is complete, learners may go back to their initial ideas and note how their perceptions have changed.

Suggested time: about 1 hour.

Activity: Waves

The group works together to produce a Mexican wave and videos it using a mobile phone. Guided by the tutor, learners analyse it to reveal that, although the individuals are moving up and down only, the wave is moving along and carrying energy with it. Tutor shows a longitudinal wave using a slinky and asks groups to devise a way of modelling a longitudinal wave, either using the people in their group or using anything else they can think of. Learners then demonstrate their thinking to see if the model works. Learners are shown a diagram of a transverse wave and the tutor explains how to find the wavelength and the amplitude. In pairs, learners complete a worksheet, marking the amplitude and wavelength of waves shown on the sheet and measuring the values using rulers. In pairs, learners use coloured counters to show the shape of a transverse wave as individual particles that move up and down. Using a sheet of A3 paper, a straight line, drawn in the centre of a sheet, represents where there is no displacement of the particles. Learners decide on the amplitude and wavelength for their model wave and mark them. Learners use the counters to make the wave shape, measure the wavelength and amplitude, and photograph the model. This can also be done using felt counters on felt. NB Counters hold positions more easily.

Suggested time: about 6 hours.

Activity: Staying safe when working with electricity

Learners can watch a health and safety video to demonstrate the potential hazards of working with electricity. Working in groups, learners can suggest ways to minimise the risk. This will include the use of appropriate personal protective equipment and other control measures such as power isolation.

Suggested time: about 8 hours.

Activity: Measuring equipment

For this activity, tutors will demonstrate how to use different types of equipment to measure electricity. They will explain the purpose of each piece of equipment. Learners will then have the opportunity to use the equipment themselves.

Suggested time: about 3 hours.

Activity: Constructing an electrical circuit

It is essential that learners understand the health and safety procedures when working with electricity. Learners are given details of the electrical circuit they will make and appropriate tools and equipment will be available. Learners will work on their own to create and test the circuit.

Suggested time: about 3 hours.

Suggested assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity.

Suggested scenario

The centre where you are training is having an open day. Your supervisor wants you to carry out research on two aspects of physics in order to promote the unit you are working on to encourage others to join the group. You will need to:

- search for information about aspects of physics from a range of sources
- make a simple communication system based on a switch, power supply and a remote indicator lamp
- measure the effectiveness of the circuit using appropriate equipment.

If a retake assessment is necessary, an alternative activity must be used. The following is an example of a retake assessment activity:

The assessment should essentially be the same, but using different sources.

4 Planning your programme

How do I choose the right BTEC Introductory qualification for my learners?

BTEC Introductory qualifications come in three sizes, the Award, the Certificate and the Diploma, each with a specific purpose. You will need to assess learners carefully to ensure that they start on the right size of qualification to fit into their study programme. Some learners might start on the Award size, progress to the Certificate size and then on to the larger Diploma. They may then progress to a BTEC Level 2 qualification. Learners who have a clear idea of the sector they would like to study, could start on the Diploma qualification. All three sizes allow for learners to take complementary qualifications such as maths and English alongside their BTEC Introductory qualification.

It is not advised that learners take two Award or Certificate qualifications from different sectors. If learners want to study across two or more sectors, then you should consider offering a Pearson BTEC Level 1 Introductory Vocational Studies Certificate or Diploma. The Vocational Studies qualifications give learners a flavour of a number of different vocational sectors. When learners are recruited, you need to give them accurate information on the title and focus of the qualification for which they are studying.

Is there a learner entry requirement?

There are no formal entry requirements but all learners recruited should be able to access a Level 1 programme. As a centre, it is your responsibility to ensure that learners who are recruited make reasonable progress and are likely to achieve at this level.

Learners are most likely to succeed if they:

- have the personal motivation to succeed at this level and to progress to further study and, ultimately, to employment
- are willing to improve their maths and English skills.

What is involved in becoming an approved centre?

All centres must be approved before they can offer these qualifications, this is so that they are ready to assess learners and so that we can provide the support that it is needed. Further information is given in *Section 7*.

What level of sector knowledge is needed to teach these qualifications?

We do not set any requirements for tutors but recommend that centres assess the overall skills and knowledge of the teaching team to ensure that they are relevant and up to date. This will give learners a rich programme to prepare them for progression.

What resources are required to deliver these qualifications?

As part of your centre approval you will need to show that the necessary material resources and work spaces are available to deliver the qualifications. For some units, specific resources are required.

Which modes of delivery can be used for these qualifications?

You are free to deliver BTEC Introductory units using any form of delivery that meets the needs of your learners. We recommend making use of a wide variety of modes, including some direct instruction in classrooms or vocational environments, practical work, group- and peer work, private study and e-learning.

Support

It is important that you give learners opportunities for learning that are active, engaging and directly relevant to their study. To support you in this, each unit has delivery guidance and suggestions for the summative assessment activity.

What support is available?

We will provide a generic delivery guide which will give suggestions for how to deliver the core units and the transferable skills across the suite. This will be available to download on our website.

To support you in planning your assessments you will be allocated a Standards Verifier early on in the planning stage. See *Section 5* for further details.

5 Assessment

Introduction

All units in this specification are internally assessed and externally verified.

In administering assessments, you, as the centre, need to be aware of the specific procedures and policies that apply, for example for registration, entries and results. Information with signposting to relevant documents is given in *Section 7*.

This section gives an overview of the key features of internal assessment and how you, as an approved centre, can offer it effectively. The full requirements and operational information are given in the *Pearson Quality Assurance Handbook*. All members of your assessment team need to refer to this document.

For BTEC Introductory qualifications it is important that you can meet the needs of learners by providing a programme that is practical and which will develop transferable and sector skills in a vocational context. Centres can tailor programmes to meet local needs and use links with local organisations and the wider vocational sector.

We have addressed the need to ensure that the time allocated to final assessment of internal units is reasonable so that there is sufficient time for teaching and learning, formative assessment and development of transferable skills.

When internal assessment is operated effectively it is challenging, engaging, practical and up to date. It must also be fair to all learners.

Principles of internal assessment

Our approach to internal assessment for these qualifications will be broadly familiar to experienced centres. It offers flexibility in how and when you assess learners, provided that you meet assessment and quality assurance requirements. You will need to take account of the requirements of the unit format, explained in *Section 3*, and the requirements for delivering assessment.

In developing an overall plan for delivery and assessment for the programme you will need to consider the order in which you deliver units, whether delivery is over short or long periods and when assessment can take place.

Assessment through assignments

For internally-assessed units, the format of assessment is an assignment taken after the content of the unit or part of the unit, has been delivered. An assignment may take a variety of forms, including practical and written types and can be split into tasks. An assignment is a distinct activity completed independently by learners that is separate from teaching, practice, exploration and other activities that learners complete with direction from, and formative assessment by, tutors.

An assessment is issued to learners as an assignment brief with a defined start date, a completion date and clear requirements for the evidence that the learner needs to provide. There may be specific observed practical components during the assignment period. Assignments can be divided into tasks and may require several forms of evidence. A valid assignment will enable a clear and formal assessment outcome based on the assessment criteria.

Assessment decisions through applying unit-based criteria

Assessment decisions for BTEC Introductory qualifications are based on the specific criteria given in each unit and set at each grade level. To ensure that standards are consistent in the qualification and across the suite as a whole, the criteria for each unit have been defined according to a framework. The way in which individual units are written provides a balance of assessment of understanding, and sector- and transferable skills appropriate to the purpose of qualification.

The assessment criteria for a unit are hierarchical and holistic. For example, if a Merit criterion requires the learner to 'describe' and the related P criterion requires the learner to 'outline', then to satisfy the M criterion a learner will need to cover both 'outline' and 'describe'. The unit assessment grid shows the relationships of the criteria so that assessors can apply all the criteria to the learner's evidence at the same time. In *Appendix 1* we have set out a definition of terms that assessors need to understand.

Assessors must show how they have reached their decisions using the criteria in the assessment records. When a learner has completed all the assessment for a unit then the assessment team will give a grade for the unit. This is given according to the highest level for which the learner is judged to have met all the criteria. Therefore:

- to achieve a Distinction, a learner must have satisfied all the Distinction criteria (and therefore the Pass and Merit criteria); these define outstanding performance across the unit as a whole
- to achieve a Merit, a learner must have satisfied all the Merit criteria (and therefore the Pass criteria) through high performance in each learning aim
- to achieve a Pass, a learner must have satisfied all the Pass criteria for the learning aims, showing coverage of the unit content and therefore attainment at Level 1 of the national framework.

The award of a Pass is a defined level of performance and cannot be given solely on the basis of a learner completing assignments. Learners who do not satisfy the Pass criteria should be reported as having an Unclassified grade. See *Section 8* for further information on grading.

The assessment team

It is important that there is an effective team for internal assessment. There are three key roles involved in implementing assessment processes in your centre, each with different interrelated responsibilities, the roles are listed below. Full information is given in the *Pearson Quality Assurance Handbook*.

- The Lead Internal Verifier (the Lead IV) for the BTEC Introductory suite has overall responsibility for the programme across all sectors delivered in their centre. The Lead IV ensures the record keeping, assessment and internal verification meet our requirements and liaise with our Standards Verifier. The Lead IV registers with Pearson annually. The Lead IV acts as an assessor, supports the rest of the assessment team, makes sure that they have the information they need about our assessment requirements and organises training, making use of our guidance and support materials.
- Internal Verifiers (IVs) oversee all assessment activity in consultation with the Lead IV. They check that assignments and assessment decisions are valid and that they meet our requirements. IVs will be standardised by working with the Lead IV. Normally, IVs are also assessors but they do not verify their own assessments.
- Assessors set or use assignments to assess learners to national standards. Before taking any assessment decisions, assessors participate in standardisation activities led by the Lead IV. They work with the Lead IV and IVs to ensure that the assessment is planned and carried out in line with our requirements.

Effective organisation

Internal assessment needs to be well organised so that the progress of learners can be tracked and so that we can monitor that assessment is being carried out in line with national standards. It is particularly important that you manage the overall assignment programme and deadlines to make sure that learners are able to complete assignments on time.

Learner preparation

To ensure that you provide effective assessment for your learners, you need to make sure that they understand their responsibilities for assessment and the centre's arrangements.

From induction onwards, you will want to ensure that learners are motivated to work consistently and independently to achieve the requirements of the qualifications. Learners need to understand how assignments are used, the importance of meeting assignment deadlines, and that all the work submitted for assessment must be their own.

You will need to give learners a guide that explains how assignments are used for assessment, how assignments relate to the teaching programme, and how they should use and reference source materials, including what would constitute plagiarism. The guide should also set out your approach to operating assessment, such as how learners must submit work and request extensions.

Setting effective assignments

Setting assignments

In setting your assignments, you need to work with the guidance given in the *Essential information for tutors* section of a unit. This section gives you information on assessment decisions, with suggested scenarios for assessments. In designing your own assignment briefs you should bear in mind the following points.

- We recommend that you create a single assignment for the whole unit that incorporates skills and related content. This assignment may be broken into tasks.
- A learning aim must always be assessed as a whole and must not be split into two or more tasks.
- The assignment must be targeted to the learning aims but the learning aims and their associated criteria are not tasks in themselves. Criteria are expressed in terms of the outcome shown in the evidence.
- Assignments must be structured to allow learners to demonstrate the full range of achievement at all grade levels. Learners need to be treated fairly by being given the opportunity to achieve a higher grade if they have the ability.
- As assignments provide a final assessment, they will draw on the specified range of teaching content for the learning aims. The specified teaching content is compulsory. The evidence for assessment need not cover every aspect of the teaching content, as learners will normally be given particular examples, case studies or contexts in their assignments. For example, if a learner is carrying out one practical performance, or a visit to an organisation, then they will address all the relevant range of content that applies in that instance.

Providing an assignment brief

A good assignment brief is one that, through providing challenging and realistic tasks, motivates learners to provide appropriate evidence of their ability.

An assignment brief should have:

- a vocational scenario or context, this could be a simple situation or a full, detailed set of vocational requirements that motivates the learner to apply their learning through the assignment
- clear instructions to the learner about what they are required to do, normally that could be set out through a series of tasks
- an audience or purpose for which the evidence is being provided.

Forms of evidence

BTEC Introductory units allow for a variety of forms of evidence to be used, provided that they are suited to the type of learning aim and the learner being assessed. For most units, the practical demonstration of skills is necessary. The units give you information to suggest what would be suitable forms of evidence and to give learners the opportunity to apply a range of transferable and sector skills. Centres may choose to use different suitable forms for evidence to those proposed. Overall, learners should be assessed using varied forms of evidence.

Full definitions of types of assessment are given in *Appendix 1* but some of the main types of assessment are:

- oral or written presentations with assessor questioning
- practical assessments with observation records and supporting evidence
- recordings of role play, interviews and other activity
- work logbooks, reflective journals.

The form(s) of evidence selected must:

- allow the learner to provide all the evidence required for the learning aim(s) and the associated assessment criteria at all grade levels
- allow the learner to produce evidence that is their own independent work
- allow a verifier to independently reassess the learner to check the assessor's decisions.

For example, when you are using performance evidence, you need to consider how supporting evidence can be captured through recordings, photographs or task sheets.

Centres need to take particular care in ensuring that learners produce independent work.

Making valid assessment decisions

Authenticity of learner work

Once an assessment has begun, learners must not be given feedback on progress towards fulfilling the targeted criteria.

An assessor must assess only learner work that is authentic, i.e. learners' own independent work. Learners must authenticate the evidence that they provide for assessment through signing a declaration stating that it is their own work.

Assessors must ensure that evidence is authentic to a learner through setting valid assignments and supervising them during the assessment period. Assessors must take care not to provide direct input, instructions or specific feedback that may compromise authenticity.

Assessors must complete a declaration that:

- the evidence submitted for this assignment is the learner's own
- the learner has clearly referenced any sources used in the work
- they understand that false declaration is a form of malpractice.

Centres can use Pearson templates or their own templates to document authentication.

During assessment, an assessor may suspect that some or all of the evidence from a learner is not authentic. The assessor must then take appropriate action using the centre's policies for malpractice. Further information is given in *Section 7*.

Making assessment decisions using criteria

Assessors make judgements using the criteria. The evidence from a learner can be judged using all the relevant criteria at the same time. The assessor needs to make a judgement against each criterion that evidence is present and sufficiently comprehensive.

Assessors should use the following information and support in reaching assessment decisions:

- the explanation of key terms in *Appendix 1*
- your Lead IV and assessment team's collective experience, supported by the standardisation materials we provide.

Pass, Merit and Distinction criteria all relate to individual learning aims.

Dealing with late completion of assignments

Learners must have a clear understanding of the centre policy on completing assignments by the deadlines that you give them. Learners may be given authorised extensions for legitimate reasons, such as illness at the time of submission, in line with your centre policies.

For assessment to be fair, it is important that learners are all assessed in the same way and that some learners are not advantaged by having additional time or the opportunity to learn from others. Therefore, learners who do not complete assignments by your planned deadline or the authorised extension deadline may not have the opportunity to subsequently resubmit.

Issuing assessment decisions and feedback

Once the assessment team has completed the assessment process for an assignment, the outcome is a formal assessment decision. This is recorded formally and reported to learners.

The information given to the learner:

- must show the formal decision and how it has been reached, indicating how or where criteria have been met
- may show why attainment against criteria has not been demonstrated
- must not provide feedback on how to improve evidence.

Resubmission of improved evidence

An assignment provides the final assessment for the relevant learning aims and is normally a final assessment decision, except where the Lead IV approves one opportunity to resubmit improved evidence based on the completed assignment brief.

The Lead IV has the responsibility to make sure that resubmission is operated fairly. This means:

- checking that a learner can be reasonably expected to perform better through a second submission, having met the initial deadline. For example, that the learner has not performed as expected
- making sure that giving a further opportunity can be done in such a way that it does not give an unfair advantage over other learners, for example through the opportunity to take account of feedback given to other learners
- checking that the assessor considers that the learner will be able to provide improved evidence without further guidance and that the original evidence submitted remains valid.

Once an assessment decision has been given to the learner, the resubmission opportunity must have a deadline within 15 working days in the same academic year.

A resubmission opportunity must not be provided where learners:

- have not completed the assignment by the deadline without the centre's agreement or have submitted work that is not authentic.

A learner who has not achieved the level of performance required to pass the relevant learning aims after resubmission of an assignment may be offered a single retake opportunity using a new assignment. The retake may only be achieved at a pass.

The Lead Internal Verifier must only authorise a retake of an assignment in exceptional circumstances where they believe it is necessary, appropriate and fair to do so. For further information on offering a retake opportunity you should refer to the *BTEC Centre Guide to Assessment*. We provide information on writing assignments for retakes on our website (www.btec.co.uk/keydocuments).

Planning and record keeping

For internal processes to be effective, an assessment team needs to be well organised and keep effective records. The centre will work closely with us so that we can quality assure that national standards are being satisfied.

The Lead IV should have an assessment plan, produced as a spreadsheet. When producing their plan, the assessment team may wish to consider:

- the time available to undertake teaching and carry out assessment, taking account of when learners may complete external assessments and when quality assurance will take place
- the completion dates for different assignments
- who is acting as IV for each assignment and the date by which the assignment needs to be verified
- setting an approach to sampling assessor decisions through internal verification that covers all assignments, assessors and a range of learners
- how resubmission dates can be scheduled.

The Lead IV will also maintain records of assessment undertaken. The key records are:

- verification of assignment briefs
- learner authentication declarations
- assessor decisions on assignments, with feedback given to learners
- verification of assessment decisions.

Examples of records and further information are given in the *Pearson Quality Assurance Handbook*.

6 Administrative arrangements

Introduction

This section focuses on the administrative requirements for delivering a BTEC qualification. It is of particular value to Quality Nominees, Lead IVs, Programme Leaders and Examinations Officers.

Learner registration and entry

Shortly after learners start the programme of learning, you need to make sure that they are registered for the qualification and that appropriate arrangements are made for internal assessment. Refer to our *Information Manual* (available on our website) for information on making registrations for the qualification.

Learners can be formally assessed only for a qualification on which they are registered. If learners' intended qualifications change, for example if a learner decides to choose a qualification from a different sector, then you must transfer the learner appropriately.

Access to assessment

All assessments need to be administered carefully to ensure that all learners are treated fairly, and that results and certification are issued on time to allow learners to progress to chosen progression opportunities.

Our equality policy requires all learners to have equal opportunity to access our qualifications and assessments, and that our qualifications are awarded in a way that is fair to every learner. We are committed to making sure that:

- learners with a protected characteristic (as defined by the Equality Act 2010) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic
- all learners achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational Qualifications*.

Administrative arrangements for internal assessment

Records

You are required to retain records of assessment for each learner. Records should include assessments taken, decisions reached and any adjustments or appeals. Further information can be found in our *Information Manual*. We may ask to audit your records so they must be retained as specified.

Reasonable adjustments to assessment

A reasonable adjustment is one that is made before a learner takes an assessment to ensure that they have fair access to demonstrate the requirements of the assessments. You are able to make adjustments to internal assessments to take account of the needs of individual learners. In most cases this can be achieved through a defined time extension or by adjusting the format of evidence. We can advise you if you are uncertain as to whether an adjustment is fair and reasonable. You need to plan for time to make adjustments if necessary.

Further details on how to make adjustments for learners with protected characteristics are given on our website in the document *Supplementary guidance for reasonable adjustment and special consideration in vocational internally assessed units*.

Special consideration

Special consideration is given after an assessment has taken place for learners who have been affected by adverse circumstances, such as illness. You must operate special consideration in line with our policy (see previous paragraph). You can provide special consideration related to the period of time given for evidence to be provided or for the format of the assessment if it is equally valid. You may not substitute alternative forms of evidence to that required in a unit, or omit the application of any assessment criteria to judge attainment. Pearson can consider applications for special consideration in line with the policy.

Appeals against assessment

Your centre must have a policy for dealing with appeals from learners. These appeals may relate to assessment decisions being incorrect or assessment not being conducted fairly. The first step in such a policy could be a consideration of the evidence by a Lead IV or other member of the programme team. The assessment plan should allow time for potential appeals after assessment decisions have been given to learners. If there is an appeal by a learner you must document the appeal and its resolution. Learners have a final right of appeal to Pearson but only if the procedures that you have put in place have not been followed. Further details are given in our policy *Enquiries and Appeals about Pearson Vocational Qualifications*.

Dealing with malpractice in assessment

Malpractice means acts that undermine the integrity and validity of assessment, the certification of qualifications, and/or that may damage the authority of those responsible for delivering the assessment and certification.

Pearson does not tolerate actions (or attempted actions) of malpractice by learners, centre staff or centres in connection with Pearson qualifications. Pearson may impose penalties and/or sanctions on learners, centre staff or centres where incidents (or attempted incidents) of malpractice have been proven.

Malpractice may arise or be suspected in relation to any unit or type of assessment within the qualification. For further details regarding malpractice and advice on preventing malpractice by learners please see *Centre Guidance: Dealing with Malpractice*, available on our website.

Note that the procedures we ask you to adopt vary between units that are internally assessed and those that are externally assessed. There is no external assessment in this qualification.

Internally-assessed units

Centres are required to take steps to prevent malpractice and to investigate instances of suspected malpractice. Learners must be given information that explains what malpractice is for internal assessment and how suspected incidents will be dealt with by the centre. The *Centre Guidance: Dealing with Malpractice* document gives full information on the actions we expect you to take.

Pearson may conduct investigations if we believe that a centre is failing to conduct internal assessment according to our policies. The above document gives further information, examples and details the penalties and sanctions that may be imposed.

In the interests of learners and centre staff, centres need to respond effectively and openly to all requests relating to an investigation into an incident of suspected malpractice.

Tutor/centre malpractice

Heads of Centres are required to inform Pearson's Investigations Team of any incident of suspected malpractice by centre staff, before any investigation is undertaken. Heads of Centres are requested to inform the Investigations Team by submitting a JCQ M2(a) form (downloadable from www.jcq.org.uk/malpractice) with supporting documentation to pqsmalpractice@pearson.com. Where Pearson receives allegations of malpractice from other sources (for example Pearson staff or anonymous informants), the Investigations Team will conduct the investigation directly or may ask the head of centre to assist.

Incidents of maladministration (accidental errors in the delivery of Pearson qualifications that may affect the assessment of learners) should also be reported to the Investigations Team using the same method.

Heads of Centres/Principals/Chief Executive Officers or their nominees are required to inform learners and centre staff suspected of malpractice of their responsibilities and rights; see 6.15 of *JCQ Suspected Malpractice in Examinations and Assessments Policies and Procedures*.

Pearson reserves the right in cases of suspected malpractice to withhold the issuing of results and/or certificates while an investigation is in progress. Depending on the outcome of the investigation results and/or certificates may be released or withheld.

You should be aware that Pearson may need to suspend certification when undertaking investigations, audits and quality assurances processes. You will be notified within a reasonable period of time if this occurs.

Sanctions and appeals

Where malpractice is proven we may impose sanctions or penalties.

Where learner malpractice is evidenced, penalties may be imposed such as:

- disqualification from the qualification
- being barred from registration for Pearson qualifications for a period of time.

If we are concerned about your centre's quality procedures we may impose sanctions such as:

- working with you to create an improvement action plan
- requiring staff members to receive further training
- placing temporary blocks on your certificates
- placing temporary blocks on registration of learners
- debarring staff members or the centre from delivering Pearson qualifications
- suspending or withdrawing centre approval status.

The centre will be notified if any of these apply.

Pearson has established procedures for centres that are considering appeals against penalties and sanctions arising from malpractice. Appeals against a decision made by Pearson will normally be accepted only from Heads of Centres (on behalf of learners and/or members or staff) and from individual members (in respect of a decision taken against them personally). Further information on appeals can be found in our *Enquiries and Appeals* policy, on our website.

In the initial stage of any aspect of malpractice, please notify the Investigations Team by email via pqsmalpractice@pearson.com who will inform you of the next steps.

Certification and results

Once a learner has completed all the required components for a qualification, the centre can claim certification for the learner, provided that quality assurance has been successfully completed. For the relevant procedures please refer to our *Information Manual*. You can use the information provided on qualification grading to check overall qualification grades.

Results issue

Learner results will then be issued to centres. The result will be in the form of a grade. You should be prepared to discuss performance with learners, making use of the information we provide and post-results services.

Post-assessment services

It is possible to transfer or reopen registration in some circumstances. The *Information Manual* gives further information.

Additional documents to support centre administration

As an approved centre you must ensure that all staff delivering, assessing and administering the qualifications have access to this documentation. These documents are reviewed annually and are reissued if updates are required.

- *Pearson Quality Assurance Handbook*: this sets out how we will carry out quality assurance of standards and how you need to work with us to achieve successful outcomes.
- *Lead Verifier Reports*: these are produced annually and give feedback on the overall performance of learners.
- *Information Manual*: this gives procedures for registering learners for qualifications, transferring registrations, entering for external assessments and claiming certificates.
- *Regulatory policies*: our regulatory policies are integral to our approach and explain how we meet internal and regulatory requirements. We review the regulated policies annually to ensure that they remain fit for purpose. Policies related to this qualification include:
 - adjustments for candidates with disabilities and learning difficulties, access arrangements and reasonable adjustments for general and vocational qualifications
 - age of learners
 - centre guidance for dealing with malpractice
 - recognition of prior learning and process.

This list is not exhaustive and a full list of our regulatory policies can be found on our website.

7 Quality assurance and centre approval

Centre and qualification approval

As part of the approval process, your centre must make sure that the resource requirements listed below are in place before offering the qualification.

- Centres must have appropriate physical resources (for example equipment, IT, learning materials, teaching rooms) to support the delivery and assessment of the qualification.
- Staff involved in the assessment process must have relevant expertise and/or occupational experience.
- There must be systems in place to ensure continuing professional development for staff delivering the qualification.
- Centres must have in place appropriate health and safety policies relating to the use of equipment by learners.
- Centres must deliver the qualification in accordance with current equality legislation.
- Centres should refer to the teacher guidance section in individual units to check for any specific resources required.

Continuing quality assurance and standards verification

We produce the *Pearson Quality Assurance Handbook* on an annual basis. It contains detailed guidance on the quality processes required to underpin robust assessment and internal verification.

The key principles of quality assurance are that:

- a centre delivering BTEC programmes must be an approved centre, and must have approval for the programmes or groups of programmes that it is delivering
- 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, through online standardisation, 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, for the planning, monitoring and recording of assessment processes, and for dealing with special circumstances, appeals and malpractice.

The approach of quality-assured assessment is through a partnership between an approved centre and Pearson. We will make sure that each centre follows best practice and employs appropriate technology to support quality-assurance processes, where practicable. We work to support centres and seek to make sure that our quality-assurance processes do not place undue bureaucratic processes on centres. We monitor and support centres in the effective operation of assessment and quality assurance.

The methods we use to do this for BTEC Introductory qualifications include:

- making sure that all centres complete appropriate declarations at the time of approval
- undertaking approval visits to centres
- making sure that centres have effective teams of assessors and verifiers who are trained to undertake assessment
- assessment sampling and verification, through requested samples of assessments, completed assessed learner work and associated documentation
- an overarching review and assessment of a centre's strategy for delivering and quality-assuring its BTEC programmes.

Centres that do not fully address and maintain rigorous approaches to delivering, assessing and quality assurance cannot seek certification for individual programmes or for any BTEC Introductory programmes. An approved centre must make certification claims only when authorised by us and strictly in accordance with requirements for reporting.

Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.

8 Understanding the qualification grade

This section explains the rules that we apply in providing an overall qualification grade for each learner. It shows how all the qualifications in this sector are graded.

The final grade awarded for a qualification represents a holistic performance across all of the qualification. As the qualification grade is an aggregate of the total performance, there is some element of compensation in that a higher performance in some units will be balanced by a lower outcome in others.

In the event that a learner achieves more than the required number units, the core units along with the sector units with the highest grades will be used to calculate the overall result, subject to the eligibility requirements for that particular qualification title.

Awarding and reporting for the qualification

The awarding and certification of these qualifications will comply with Ofqual requirements.

Eligibility for an award

To achieve any qualification grade, learners must:

- complete and report an outcome for all units within a valid combination (NB: Unclassified (U) is a permitted unit outcome), and
- achieve the minimum number of points at a grade threshold, and
- achieve sufficient Guided Learning Hours at Pass or above, see table below.

Qualification	Required Guided Learning Hours at Pass or above
Award	70
Certificate	140
Diploma	280

It is the responsibility of a centre to ensure that a correct unit combination is adhered to. Learners who do not achieve sufficient points for a Certificate or a Diploma may be eligible to achieve a smaller sized qualification in the same suite provided they have completed the correct combination of units, met the appropriate qualification grade points threshold and have met the requirement for guided learning a Pass or above.

Calculation of the qualification grade

The qualification grade is an aggregation of a learner's unit level performance. The BTEC Introductory suite comprises Level 1 qualifications which are awarded at the grade ranges shown in the table below.

Qualification	Available grade range
Award	P to D
Certificate	P to D
Diploma	PP to DD

The *Calculation of Qualification Grade* table, shown further on in this section, indicates the minimum thresholds for calculating these grades. The table will be kept under review over the lifetime of the qualification. In the event of any change, centres will be informed before the start of teaching for the relevant cohort and an updated table will be issued on our website.

Pearson will monitor the qualification standard and reserves the right to make appropriate adjustments.

Learners who do not meet the minimum requirements for a qualification grade to be awarded will be recorded as Unclassified (U) and will not be certificated. They may receive a Notification of Performance for individual units. Our *Information Manual* gives full information of this process.

Points available for units

The table below shows the number of **points** available for units. For each unit, points are allocated depending on the grade awarded.

	Unit size	
	30 GLH	40 GLH
U	0	0
Pass	6	8
Merit	12	16
Distinction	18	24

Claiming the qualification grade

Subject to eligibility, Pearson will automatically calculate the qualification grade for your learners when the internal unit grades are submitted and the qualification claim is made. Learners will be awarded qualification grades for achieving the sufficient number of points within the ranges shown in the relevant *Calculation of Qualification Grade* table for the cohort

Calculation of qualification grade

Applicable for registration from 1 September 2019.

Award		Certificate		Diploma	
70 GLH		180 GLH		360 GLH	
Grade	Points threshold	Grade	Points threshold	Grade	Points threshold
U	0	U	0	U	0
P	14	P	36	PP	72
				MP	96
M	22	M	60	MM	120
				DM	158
D	36	D	96	DD	196

The table is subject to review over the lifetime of the qualification. The most up-to-date version will be issued on our website.

Examples of grade calculations based on table applicable to registrations from September 2019

Example 1: Achievement of an Award with a D grade

	GL	Grade	Unit points
Unit 1	30	Distinction	18
Unit 7	40	Distinction	24
Totals	70	D	36

The learner has sufficient points for a D grade

Example 2: Achievement of an Award with a P grade

	GL	Grade	Unit points
Unit 1	30	Pass	6
Unit 7	40	Pass	8
Totals	70	P	14

The learner has met the minimum requirement for 70 GL at Pass or above

The learner has sufficient points for a P grade

Example 3: An Award graded unclassified

	GL	Grade	Unit points
Unit 1	30	U	0
Unit 7	40	Distinction	24
Totals	70	P	24

The learner has a U in Unit 1

The learner has sufficient points for a M but has not met the minimum requirement for 70 GL

Example 4: Achievement of a Certificate with a D grade

	GL	Grade	Unit points
Unit 1	30	Distinction	18
Unit 2	30	Pass	6
Unit 5	40	Distinction	24
Unit 6	40	Distinction	24
Unit 7	40	Distinction	24
Totals	180	D	96

The learner has sufficient points for a D grade

Example 5: Achievement of a Certificate with a P grade

	GL	Grade	Unit points
Unit 1	30	U	0
Unit 2	30	Merit	12
Unit 5	40	Pass	8
Unit 6	40	Pass	8
Unit 7	40	Pass	8
Totals	180	P	36

The learner has met the minimum requirement for 140 GL at Pass or above

The learner has sufficient points for a P grade

Example 6: A Certificate graded Unclassified

	GL	Grade	Unit points
Unit 1	30	U	0
Unit 2	30	Distinction	18
Unit 5	40	Distinction	16
Unit 6	40	U	0
Unit 7	40	Pass	8
Totals	180	U	42

The learner has a U in Units 1 and 6

The learner has sufficient points for M but has not met the minimum requirement for 140 GL at Pass or above

Example 7: A Diploma graded Unclassified

	GL	Grade	Unit points
Unit 1	30	U	0
Unit 2	30	Distinction	18
Unit 3	30	Pass	6
Unit 4	30	Pass	6
Unit 5	40	Pass	8
Unit 6	40	U	0
Unit 7	40	U	0
Unit 8	40	Distinction	24
Unit 9	40	Distinction	24
Unit 10	40	Distinction	24
Totals	360	U	110

The learner has not met the minimum requirement for 280 GL at Pass or above

The learner has sufficient points for MP but has not met the minimum requirement for 280 GL at Pass or above

Example 8: Achievement of a Diploma with a DD grade

	GL	Grade	Unit points
Unit 1	30	Merit	12
Unit 2	30	Merit	12
Unit 3	30	Distinction	18
Unit 4	30	Distinction	18
Unit 5	40	Distinction	24
Unit 6	40	Distinction	24
Unit 7	40	Distinction	24
Unit 8	40	Distinction	24
Unit 9	40	Distinction	24
Unit 10	40	Merit	16
Totals	360	DD	196

The learner has sufficient points for a DD grade

Example 9: Achievement of a Diploma with a PP grade

	GL	Grade	Unit points
Unit 1	30	U	0
Unit 2	30	Merit	12
Unit 3	30	Pass	6
Unit 4	30	Pass	6
Unit 5	40	U	0
Unit 6	40	Pass	8
Unit 7	40	Pass	8
Unit 8	40	Pass	8
Unit 9	40	Merit	16
Unit 10	40	Pass	8
Totals	360	PP	72

The learner has met the minimum requirement for 280 GL at Pass or above

The learner has sufficient points for a PP grade

9 Resources and support

Our aim is to give you support to enable you to deliver BTEC Introductory qualifications with confidence. You will find resources to support teaching and learning, and professional development on our website.

Support for setting up your course and preparing to teach

Delivery Guide

The free guide gives you important advice on how to choose the right course for your learners and how to ensure you are fully prepared to deliver the course. It explains the key features of BTEC Introductory qualifications (for example how to deliver and assess transferable and sector skills). It covers guidance on assessment and quality assurance and includes teaching tips and ideas, assessment preparation and suggestions for further resources.

Support for teaching and learning

Pearson Learning Services provides a range of engaging resources to support BTEC qualifications, including:

- textbooks in e-book and print formats
- teaching and assessment packs, including e-learning materials via the Active Learn Digital Service.

Teaching and learning resources are also available from a number of other publishers. Details of Pearson's own resources and of all endorsed resources can be found on our website.

Support for assessment

Sample assessment materials for internally-assessed units

We do not prescribe the assessments for the internally-assessed units. Rather, we allow you to set your own, according to your learners' preferences.

Training and support from Pearson

People to talk to

There are lots of people who can support you and give you advice and guidance on delivering your BTEC Introductory qualifications. They include:

- Standards Verifiers – they can support you with preparing your assignments, ensuring that your assessment plan is set up correctly, and support you in preparing learner work and providing quality assurance through sampling
- Subject Advisors – available for all sectors. They understand all Pearson qualifications in their sector and so can answer sector-specific queries on planning, teaching, learning and assessment
- Curriculum Development Managers (CDMs) – they are regionally based and have a full overview of the BTEC qualifications and of the support and resources that Pearson provides. CDMs often run network events
- Customer Services – the 'Support for You' section of our website gives the different ways in which you can contact us for general queries. For specific queries, our service operators can direct you to the relevant person or department.

Training and professional development

We provide a range of training and professional development events to support the introduction, delivery, assessment and administration of BTEC Introductory qualifications. These sector-specific events, developed and delivered by specialists, are available both face to face and online.

Appendix 1 Glossary of terms used for internally-assessed units

This is a summary of the key terms used to define the requirements in the units.

Term	Definition
Accurate	Perform processes and procedures without error.
Coherent	Logically consistent.
Collaborate	Work jointly with others.
Competent	Having the necessary knowledge or skill to do something suitably or sufficiently in amount or extent.
Comprehensive	Full, covering a range of factors.
Confident	Demonstrate secure application of skills or processes.
Consistent	Able to reliably repeat an action that progresses towards achieving an aim.
Creative	Use techniques, equipment and processes to express ideas or feelings in new ways.
Demonstrate	Carry out and apply knowledge, understanding and/or skills in a practical situation.
Describe	Give a clear account that includes all the relevant features and characteristics – ‘painting a picture with words’.
Effective	Show control over techniques, equipment and processes to efficiently meet the details and broad aims of a requirement.
Explain	Work shows clear details and gives reasons and/or evidence to support an opinion, view or argument. Learners can show comprehension of origins, functions and objectives of a subject and its suitability for purpose.
Identify	Indicate the main features or purpose of something by recognising it and/or being able to discern and understand facts or qualities.
Insightful	Being perceptive and discerning.
Outline	Learners’ work, performance or practice provides a summary or overview or a brief description.
Reflect	Think carefully and review information and/or performance – includes articulating ideas, concepts, activities, findings or features.
Review	Assess formally, appraising existing information or prior events with the intention of instituting change if necessary.

Term	Definition
Show	Learners' work, performance or practice presents evidence using knowledge, understanding and skills.
State	Learners express the condition of, or facts about something definitely or clearly.
Summarise	Learners express the condition of, or facts about something definitely or clearly.

This is a key summary of the types of evidence used for BTEC Introductory Suite of qualifications.

Type of evidence	Definition and purpose
Vocational context	A specific example to which all learners must select and apply knowledge. Used to show application to a realistic context where direct experience cannot be gained.
Development log	A record kept by learners to show the process of development. Used to show method, self-management and skill development.
Performance	A defined and constrained opportunity to perform, to show skills in a structured context and where the focus is on the skills/process rather than the specific outcome.

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