

SPECIFICATION



BTEC Tech Award in ENGINEERING Level 1/Level 2

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ISSUE 3



Pearson BTEC Level 1/Level 2 Tech Award in Engineering

Specification

First teaching September 2017

Issue 3

Edexcel, BTEC and LCCI qualifications

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This specification is Issue 3. Key changes are sidelined. We will inform centres of any changes to this issue. The latest issue can be found on our website.

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Pearson BTEC Tech Awards – introduction

About the BTEC Tech Award suite

Tech Awards have been developed by Pearson to give learners at Key Stage 4 in England, Northern Ireland and Wales the opportunity to study one or more vocational areas as part of their curriculum. We have developed the qualifications in consultation with secondary school and further education representatives, and subject specialists to ensure that they engage and prepare learners for either academic or vocational progression post-16.

As part of a Key Stage 4 programme, learners will be studying a broad range of GCSEs, including English, mathematics and science. The BTEC Tech Award suite has been designed to allow learners to draw on the knowledge and skills acquired from these subjects where relevant. When studying for a 'BTEC', learners can use the knowledge and skills from GCSEs, giving them the opportunity to apply their academic knowledge to everyday and work contexts.

The BTEC Tech Award suite is an introduction to vocational learning. The qualifications give learners the opportunity to build skills that show an aptitude for further learning, both in the sector and more widely. The approach to the suite is based on well-established BTEC assessment approaches that are proven to be successful in building skills and motivating learners to engage fully with challenging study. There is no limit to progression options as the skills acquired are applicable to a range of post-16 study options.

The BTEC Tech Award suite differs from other BTECs designed to be taken post-16 as the qualifications offer a basis for further study, rather than meeting all the vocational requirements that learners need to progress directly to a job role in a defined occupational area. The focus is on building skills to show aptitude and improving understanding of progression options so that learners who achieve one or more of the qualifications are equipped to go on to become work ready for an occupation post-16.

About recognition as Department for Education technical awards

The BTEC Tech Award suite has been designed to meet the Department for Education (DfE) requirements for qualifications to be offered as technical awards for 14–16-year-olds.

The DfE has set out characteristics for technical awards through which vocational qualifications can be recognised as part of performance measures in the open category of Progress 8. To be recognised as technical awards, it is expected that qualifications will focus on developing sector-specific knowledge and technical skills in a practical learning environment. It is also expected that the qualifications form part of a Key Stage 4 learning programme that enables both academic and vocational progression.

About the engineering sector

The UK is regarded as a world leader in engineering, which covers a wide range of exciting and rapidly developing areas such as renewable energy, space, low carbon, aerospace, automotive, agri-food and bioscience. People with engineering skills are always in demand. Between 2010 and 2020, engineering companies are projected to have 2.74 million job openings.

Summary of Pearson BTEC Level 1/Level 2 Tech Award in Engineering Issue 3 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 45
The points thresholds have been updated in the Calculation of grade table.	Page 46
Example 2 has been updated as a Merit award.	Page 47
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 51

Summary of Pearson BTEC Level 1/Level 2 Tech Award in Engineering Issue 2 changes

Summary of changes made between Issue 1 and Issue 2	Page number
Reference to learners in Northern Ireland and Wales was included in the Pearson BTEC Tech Awards – introduction section.	Introduction
Reference to CCEA Regulation and Qualifications Wales was included in Section 8, paragraph 2.	Page 45

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1 Pearson BTEC Level 1/Level 2 Tech Award in Engineering – purpose

Who is the qualification for?

The Pearson BTEC Level 1/Level 2 Tech Award in Engineering (Qualification Number: 603/0829/1), is for learners who want to acquire technical knowledge and technical skills through vocational contexts by studying mechanical, electrical/electronic and engineering design as part of their Key Stage 4 learning. The qualification recognises the value of learning skills, knowledge and vocational attributes to complement GCSEs. The qualification will broaden the learners experience and understanding of the varied progression options available to them.

What does the qualification cover?

The Award gives learners the opportunity to develop sector-specific knowledge and skills in a practical learning environment. The main focus is on four areas of equal importance, which cover the:

- development of key engineering practical and technical skills, such as research, observation, measurement, making, using computer-aided design (CAD) and disassembly
- knowledge of key engineering sectors (mechanical, electrical/electronic and engineering design) and the interrelation of each in industry
- knowledge of the stages involved in planning and implementing an engineering project
- knowledge and skills involved in the investigation of solutions to engineering problems in response to a given brief.

This Award complements the learning in GCSE programmes such as GCSE Design and Technology by broadening the application of design and make tasks, working with an engineering brief, testing and evaluation.

What can the qualification lead to?

Study of the qualification as part of Key Stage 4 learning will help learners to make more informed choices for further learning, either generally or in this sector. The choices that learners can make post-16 will depend on their overall level of attainment and their performance in the qualification.

Learners who generally achieve at Level 2 across their Key Stage 4 learning might consider progression to:

- A Levels as preparation for entry to higher education in a range of subjects
- study of a vocational qualification at Level 3, such as BTEC National in Engineering, which prepares learners to enter employment or apprenticeships, or to move on to higher education by studying a degree in an engineering area.

Learners who generally achieve at Level 1 across their Key Stage 4 learning might consider progression to:

- study at Level 2 post-16 in a range of technical routes designed to lead to work, to progression to employment, to apprenticeships or to further study at Level 3. For these learners, the attitudes and the reflective and communication skills covered in this qualification will help them achieve
- study of engineering post-16 through the study of a Technical Certificate. Learners who perform strongly in this qualification compared to their overall performance should strongly consider this progression route as it can lead ultimately to employment in the engineering sector.

2 Structure

Total Qualification Time

For all regulated qualifications, Pearson specifies a total number of hours that it is estimated learners will require to complete and show achievement for the qualification: this is the Total Qualification Time (TQT). Within TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we estimate a centre delivering the qualification might provide. Guided learning means activities such as lessons, tutorials, online instruction, supervised study and giving feedback on performance that directly involve teachers and assessors in teaching, supervising and invigilating learners. Guided learning includes the time required for learners to complete external assessment under examination or supervised conditions.

In addition to guided learning, other required learning directed by teachers or assessors will include private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

The Pearson BTEC Level 1/Level 2 Tech Award in Engineering has:

- Total Qualification Time: 160 hours
- Guided Learning Hours: 120 hours.

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

Components

Learners are required to complete and achieve all three components in the qualification.

Pearson BTEC Level 1/Level 2 Award in Engineering				
Component number	Component title	GLH	Level	How assessed
1	Exploring Engineering Sectors and Design Applications	36	1/2	Internal
2	Investigating an Engineering Project	36	1/2	Internal
3	Responding to an Engineering Brief	48	1/2	External Synoptic

The three components focus on the assessment of knowledge, skills and practices. These are all essential to developing a basis for progression and, therefore, learners need to achieve all components in order to achieve the qualification.

The components are interrelated and they are best seen as part of an integrated whole rather than as totally distinct study areas. Learners will normally take this qualification over a two-year period or longer. This means that they must be given the opportunity to build their confidence in understanding the sector, vocational contexts and vocational attributes over a long period during the course of study before they are assessed. As the interrelated components are not linked to occupational roles, certification is not available at component level.

Assessment

The three components in the qualification give learners the opportunity to develop broad knowledge and understanding of engineering sectors and technical skills in designing and making at Levels 1 and 2.

Internal assessment

Components 1 and 2 are assessed through internal assessment. Internal assessment for these components has been designed to relate to achievement of application of the conceptual underpinning for the sector through realistic tasks and activities. This style of assessment promotes deep learning through ensuring the connection between knowledge and practice. The components focus on:

- the development of core knowledge and understanding of engineering sectors, their interconnections and how they relate to the roles of employees in engineering industries
- knowledge and skills of the stages involved in planning and implementing an engineering project
- the development and application of skills such as problem solving, design, creativity, communication and collaboration.

Internal assessment is through assignments that are subject to external standards verification. For setting assignments, we provide authorised assignment briefs and guidance in each component. This means that you can adapt materials to your local contexts and assess assignments that provide the valid and rigorous final summative assessment for each component.

You will make grading decisions based on the requirements and supporting guidance given in the components. For further information on using and assessing through assignments, including resubmissions, see *Section 5*.

External synoptic assessment

There is one external assessment, Component 3, it provides the main synoptic assessment for the qualification. Component 3 builds directly on Components 1 and 2, and enables learning to be brought together and related to a real-life situation.

Component 3: Responding to an Engineering Brief requires learners to apply performance skills and techniques in response to a brief and stimulus developing group performance workshop for a selected audience.

The design of this external assessment ensures that there is sufficient stretch and challenge, enabling the assessment of knowledge and understanding at the end of the learning period.

The external assessment is based on a key task/key tasks that requires learners to demonstrate that they can identify and use effectively an appropriate selection of skills, techniques, concepts, theories and knowledge from across the whole qualification in an integrated way.

The external assessment takes the form of a set task/external assessment taken under supervised conditions, which is then marked and a grade awarded by Pearson. Learners are permitted to resit the external assessment once during their programme by taking a new assessment. The external assessment comprises 40 per cent of the total GLH of the qualification and is weighted accordingly in the calculation of the overall qualification grade. This component should be delivered and assessed at the end of the course of study.

Component	Description of task	Availability
Component 3: Responding to an Engineering Brief	<ul style="list-style-type: none"> • Task set and marked by Pearson, completed under supervised conditions. • The set task is made up of two parts and will be completed in two hours for Part 1 and one and a half hours for Part 2. • Both parts of the set task are completed during a one-week period timetabled by Pearson. • 60 marks. 	Feb and May/June from 2019 onwards

Language of assessment

Assessment of the internal and external components 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 9*.

Grading of the qualification

This qualification has a grading scale that fully encompasses achievement at Levels 1 and 2 of the Regulated Qualifications Framework. This enables learners of all abilities to receive appropriate recognition of their achievement and will motivate them to improve and progress during their period of learning and formative assessment. This grading scale also gives clearer information for progression providers on the capability of learners to succeed in post-16 study programmes.

Internally-assessed components are assessed using a grading scale ranging from Level 1 Pass to Level 2 Distinction. Centres report outcomes at five grade points. Please see *Section 5* for guidance on how to assess. Each component has detailed information on how to assess across the grades.

The externally-assessed component is marked and awarded on a continuum, using grading descriptors set at Level 1 Pass, Level 2 Pass and Level 2 Distinction. The outcome is reported at six grade points from Level 1 Pass to Level 2 Distinction. Learners will also receive a points score.

The difference in the grade scale for internal and external components reflects how the final component discriminates performance more fully. This is because of the synoptic nature of the assessment, in which a Level 1 Distinction grade is one where there is evidence at Level 2 in part but does not draw consistently on content across the breadth of the qualification.

The qualification is graded over seven grades from Level 1 Pass to Level 2 Distinction*. Learners must achieve all components at Level 1 Pass or above in order to be awarded a qualification. The overall grade is a direct aggregation of performance across individual components, with each component weighted according to GLH. Please see *Section 8* for more information on the approach we are using to grade qualifications.

The relationship between qualification-grading scales and component grades will be subject to regular review as part of Pearson's standards monitoring processes. Reviews are carried out on the basis of learner performance and in consultation with key users of the qualification.

3 Components

Understanding your components

The components in this specification set out details of all the knowledge and skills a learner must acquire and the assessment requirements that will support you in preparing your learners.

The components help you to undertake assessment and quality assurance effectively.

The tables here explain the key terms used for the internal and external components. It is important that all teachers, assessors, internal verifiers and other staff responsible for the programme read and digest this section.

Internal components

Section	Explanation
Component in brief	A brief description of the content of the component. Can be used in summary documents, brochures, etc.
Component introduction	This is designed with learners in mind. It indicates why the component is important and how learning is structured, it might be applied when progressing to further study.
Learning aims	These define the scope of the knowledge and skills that a learner will acquire in the component.
Teaching content	This states the knowledge and skills that must be taught. All content is mandatory and includes some examples, denoted as 'e.g.', of what must be delivered.
Suggestions for delivery	This gives you guidance on how you may choose to approach delivery of the components in the qualification.
Essential information for setting assignments	This gives you information on how full assignments can be developed for each learning aim.
Assessment criteria	Assessment criteria state the levels of achievement that a learner must demonstrate in their assessment to meet the learning aims. Assessment criteria are used by assessors to determine grading levels for an assessment.
Essential information for assessment decisions	This section gives guidance on the evidence that learners are expected to provide to reach the Level 1 Pass, Merit and Level 2 Pass, Merit and Distinction standards. It also gives examples and clarification.
Resource requirements	This section lists any specific resources that you need to be able to teach and assess. For information on support resources see <i>Section 10</i> .

External components

Section	Explanation
Component in brief	A brief description of the content of the component. Can be used in summary documents, brochures, etc.
Component introduction	This is designed with learners in mind. It indicates why the component is important and how learning is structured, it might be applied when progressing to further study.
Summary of assessment	Sets out the type of external assessment used and the way it is used to assess achievement.
Assessment outcomes	These show the hierarchy of knowledge, understanding, skills and behaviours assessed.
Essential content	This gives the content that must be taught for the externally-set task/external assessment. Content will be sampled through the external assessment over time.
Grade descriptors	We use grade descriptors when making judgements on grade boundaries. You can use them to understand what we expect to see from learners at particular grades.

Component 1: Exploring Engineering Sectors and Design Applications

Levels: **1/2**

Assessment type: **Internal**

Guided learning hours: **36**

Component in brief

Learners will explore the links between the various engineering sectors and the role of design in the production of engineered products.

Introduction

A range of people with different skill sets work together during the production of electrical, electronic and mechanical engineered products, such as mobile phones and mountain bikes.

In this component, you will develop knowledge and understanding of the engineering industry, the interconnections within engineering sectors, and how these are integrated to enable organisations to find solutions to real-life problems.

You will explore the role that design applications play in the production of engineered products. Through practical exercises, you will produce solutions to problems using different combinations of design and modelling engineering skills.

This component will support you in progressing to a Level 2 or 3 qualification in a range of engineering sectors, for example aerospace, automotive, electrical, electronic, manufacturing, marine, mechanical or telecommunications. You will develop transferable skills such as problem solving, communication and aspects of critical thinking, all of which will support your progression to Level 2 or 3 vocational or academic qualifications.

Learning aims

- A** Understand engineering sectors, products and organisations, and how they interrelate
- B** Explore engineering skills through the design process.

Teaching content

Learning aim A: Understand engineering sectors, products and organisations, and how they interrelate

A1 Engineering sectors, engineered products and interconnections

Learners will examine the interconnection between engineering sectors and engineered products.

- Engineering definition in context: the safe application of technical and practical knowledge to transform ideas and materials (as part of a team) into products.
- The need for people who are qualified in an engineering discipline and if possible are experts in more than one discipline (e.g. electrical/electronics engineer), and can use their skills to help solve real-world problems.
- Engineering sectors, e.g. aerospace, automotive, communications, electrical/electronic, mechanical, environmental, transport, rail, marine.
- Engineered products from different sectors and combinations of sectors, e.g. aerospace (engines, wings, rotor blades, landing gear, fuselage, navigation systems), automotive (engines, suspension, braking system, fuel injection, engine management, cruise control), communications (satellite dish, smartphone, wireless router, transmission mast, set top box), electrical/electronic (drone, remote-controlled car/helicopter, television, games console, wireless speaker/headphones).

A2 Engineering organisations, functions, job roles and career progression

Learners will examine organisations, functions and job roles, developing their understanding of how these contribute to career progression in engineering.

- Examples of engineering organisations:
 - size, e.g. global/large, small to medium-sized enterprise (SME), small jobbing workshops
 - range of examples covering the sectors, e.g. research and development organisations, manufacturing organisations, service organisations.
- Specialist organisations in sectors, e.g. manufacturer of aircraft wings, hydraulic systems.
- Functions in organisations, e.g. research, design, planning, making, quality, marketing, selling, customer service, installation.
- Engineering job roles, e.g. maintenance technician, machine operator, aircraft fitter, design engineer, manufacturing engineer, installation engineer, process engineer, telecommunications engineer.
- Career progression opportunities, e.g. apprentice, operator, technician; technical, professional, management.
- Role definitions:
 - unskilled
 - skilled
 - technical
 - managerial.

Learning aim B: Explore engineering skills through the design process

B1 The design process

Through practical exercises, learners will produce solutions to problems using different combinations of engineering skills, including designing as part of the engineering design and make process.

The engineering design and make process: define the problem, develop possible solutions, choose a solution, design and model the solution, evaluate outcome of project, work in a team.

- Interpreting an engineering brief, e.g. physical requirements, aesthetics, size, function, performance requirements.
- Producing initial design proposals, e.g. researching existing products, producing design sketches in 2D and 3D, using creative thinking and evaluation techniques to generate the best solution given the brief.
- Computer-aided design (CAD) drawings using drawing, editing, modification and manipulation commands to generate engineering drawings and circuit diagrams on templates to the appropriate standard.
- Generating final design solution using 2D drawing techniques and 3D models, e.g. detailed drawings, circuit diagrams, 3D printing, physical modelling.
- Making final design solution decisions, e.g. selection of materials, selection of making techniques, considering quality requirements.
- How employees work in a team and peer review during the engineering design and make process with the customer as a focus, using generic skills, e.g. behaviours, attitudes, limitations, respect for others, professionalism, working relationships, collaborative skills.

Suggestions for delivery

Successful delivery of this component will allow learners to develop their knowledge and understanding of engineering sectors, engineered products and the engineering design process. You may choose to deliver this component before *Component 2*. Assignments can focus on each learning aim or you can combine them within or across components.

Essential information for setting assignments

The recommended structure for setting assignments is one for each learning aim, however you may combine learning aims within or across components. Suggested examples of how assignments may be set are outlined here. You should also refer to the authorised assignment briefs on our website. See *Section 5* of this specification for more information.

Learning aim A: Understand engineering sectors, products and organisations, and how they interrelate

Description

Learners will explore the interconnections between engineering sectors, organisations and job roles.

Example tasks

- From the list given to you, select an engineered product and:
 - research the engineering sectors in which two of the major components/assemblies have been manufactured
 - identify links between the sectors.
- For two identified sectors, identify an organisation and from its website investigate:
 - how many people it employs
 - how it is organised, e.g. is it single site in the UK or does it have manufacturing facilities in different countries
 - the different departments in the organisation and the links between them
 - job roles and career progression opportunities.

Evidence

Evidence must fully meet the requirements of the assessment criteria and could include:

- block diagrams showing interconnectivity
- written commentary
- researched information
- flow charts.

Learning aim B: Explore engineering skills through the design process

Description

Learners will produce a design proposal for an engineered product to meet the requirements of a customer.

Example tasks

- Look at the engineering brief and produce a specification for an engineered product that you think will meet its requirements.
- Using your specification as a starting point, investigate if there are any products on the market that would be suitable or are similar.
- Make 2D and 3D sketches of possible designs, review them against the customer brief, and select the best one to develop into a final design solution.
- Using a CAD package, produce 2D drawings of your design solution.
- Develop your solution into a 3D model, e.g. a 3D CAD drawing, physical model built from card or modelling compound, 3D printing.
- Put together a design proposal portfolio that contains the product specification, CAD drawings, images of models, information about materials and making processes, and quality standards.
- Set up a design review meeting with a number of your colleagues, present your portfolio and ask them what they think about your design proposal. Does it meet the requirements of the customer brief, can it be made, will it meet quality standards – these are some of the questions they may ask you.
- Now think about your design and the comments made by your colleagues. Have they identified any flaws in your design, do they think it meets the requirements of the customer brief, would your design benefit from being modified?
- Review the design proposal of one of your colleagues by sitting in on their design review meeting and give feedback to them.

Evidence

Evidence must fully meet the requirements of the assessment criteria and could include:

- a logbook/diary, to include design sketches and CAD drawings
- design proposal notes
- images of 3D models
- observation records
- peer review feedback forms.

COMPONENT 1: EXPLORING ENGINEERING SECTORS AND DESIGN APPLICATIONS

Assessment criteria

The assessment criteria determine the standard required to achieve the component.

Level 1 Pass	Level 1 Merit	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Understand engineering sectors, products and organisations, and how they interrelate				
A.1P1 Identify an engineering sector linked to a given engineered product.	A.1M1 Outline an engineering sector and an engineered product it produces.	A.2P1 Describe engineering sectors and an engineered product they produce.	A.2M1 Explain how engineers from different sectors generate an engineered product, with reference to sizes of organisations and the job roles involved.	A.2D1 Evaluate how engineers from different sectors cooperate to generate an engineered product, with reference to sizes of organisations and the job roles involved.
A.1P2 Identify an engineering organisation and a typical job role in it.	A.1M2 Outline an engineering organisation and a typical job role in it.	A.2P2 Describe different sized engineering organisations and typical job roles.		

Level 1 Pass	Level 1 Merit	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim B: Explore engineering skills through the design process				
B.1P3 Use CAD to prepare a final design solution, with limited reference to the engineering brief.	B.1M3 Use CAD to communicate a final design solution, with some reference to the engineering brief.	B.2P3 Produce design proposals, compare in relation to the engineering brief and use CAD to produce a final solution.	B.2M2 Produce design proposals, compare in relation to the engineering brief and develop an improved final solution using CAD and modelling.	B.2D2 Justify the development of an improved final solution and evaluate use of the design process, with reference to the engineering brief and peer review.
B.1P4 Identify some successful features of the design process, with limited reference to the engineering brief.	B.1M4 Outline successful features of the design process, with some reference to the engineering brief.	B.2P4 Describe successful features of the design process, with reference to the engineering brief and some reference to peer review.	B.2M3 Explain successful features of the design process, with reference to the engineering brief and peer review.	
Overall component grade				
Learner evidence satisfies all Level 1 Pass criteria.	Learner evidence satisfies either: all Level 1 Merit criteria or All Level 1 Pass criteria and B.2P3, B.2P4.	Learner evidence satisfies all Level 2 Pass criteria.	Learner evidence satisfies either: all Level 2 Merit criteria or All Level 2 Pass criteria and B.2D2.	Learner evidence satisfies all Level 2 Distinction criteria.

Please refer to *Section 5* of the specification for further guidance on internal assessment including how to apply criteria to evidence at Level 1 and Level 2.

Essential information for assessment decisions

Assessors must take account of these definitions and examples in reaching assessment decisions. It is important that learners are able to submit work that is their own. Best practice would be to use a number of engineering sectors and/or to assign learners to investigate different engineered products.

Learning aim A: Understand engineering sectors, products and organisations, and how they interrelate

Evidence for the assignment: learners will produce a written commentary with block diagrams or flow charts (or other similar evidence) to show an understanding of cooperation between engineering sectors for a given product.

At Level 2, learners will use appropriate research skills while investigating sectors and the roles within them, whereas at Level 1 these will not always be effective.

For Level 2 Distinction: learners will present a detailed evaluation of why an engineered product is made collaboratively by a number of different organisations of different sizes. Learners will show a detailed understanding of specialist engineering organisations in given sectors and the reasons why they are needed when producing a complex product.

Learners will present detailed reasons why engineers from different sectors, such as mechanical and electrical/electronic, cooperate to produce an engineered product that contains numerous components that link together.

Learners will present detailed explanations of why certain job roles are required when producing an engineered product so that activities can be carried out at the correct time and in the correct manner, and the skills of those involved are best utilised.

For Level 2 Merit: learners will present an explanation of why engineered products are made by a number of different organisations of different sizes. They will show an understanding of specialist engineering organisations in given sectors and the reasons why they are needed when producing a complex product.

Learners will present valid reasons why engineers from different sectors, such as mechanical and electrical/electronic, are needed to produce an engineered product made up from linked components.

Learners will present accurate explanations of why certain job roles are required when producing an engineered product so that activities can be carried out at the correct time and in the correct manner, and the skills of those involved are best utilised.

For Level 2 Pass: learners will present a description that may contain errors of why making an engineered product can involve different organisations of different sizes. They will describe different engineering sectors and a product manufactured by them. Learners will accurately describe job roles in engineering organisations.

For Level 1 Merit: learners will outline an engineering sector and an engineered product it produces. Learners will produce an outline of an engineering organisation in terms of size and how it is structured, giving an outline of a selected engineering job role. There can be some inaccuracies in the outlines.

For Level 1 Pass: learners will identify an engineering sector linked to a given engineered product. They will identify an engineering organisation in terms of size and identify a selected engineering job role.

Learning aim B: Explore engineering skills through the design process

Evidence for the assignment: learners will produce a portfolio of design sketches/CAD drawings with screenshots, design proposal notes and images of 3D models.

During practical work, learners can record observations and results in logbooks or diaries.

At Level 2, learners will use appropriate engineering skills during practical tasks, whereas at Level 1 these will not always be appropriate.

Peer reviewing will be evidenced through learners' transcripts, review feedback forms or observation records.

For Level 2 Distinction: learners will produce sketches of a minimum of two design proposals. They will be detailed and include sufficient information so that a third party can make an informed decision about which proposal to develop into a detailed final design, meeting the requirements of the engineering brief. Learners will produce sketches that are fully dimensioned and set out to an appropriate standard. They will prepare design proposals that are significantly different.

Learners will display detailed annotation of sketches that show how each design fully meets the requirements of the engineering brief. They will select and justify the design proposal and present further ideas for its development. Learners will produce a final 2D CAD design using a full range of commands to a suitable standard. They will model a physical 3D solution that is accurate, using materials and techniques that are the most appropriate for the chosen design. Learners will present detailed, accurate reasons for their decisions when specifying materials, making processes and quality requirements.

Learners will evaluate the successful features of the design process, such as interpreting the brief, preparing design proposals, utilising all types of feedback and using a range of modification tools, again with reference to the engineering brief.

Learners will provide detailed feedback to other learners about their chosen design solution and justify how it relates to all elements of the engineering brief. Feedback will take the form of written commentary, graphics and verbal communication.

For Level 2 Merit: learners will produce sketches of a minimum of two design proposals that are detailed and include enough information for a third party to make a decision about which proposal to develop into a final design. They will produce sketches that may have some dimensional errors but can be easily understood.

Learners will annotate their design sketches so that there is enough information to show how each design meets the more important requirements of the engineering brief. Learners will produce a final 2D CAD design using a range of commands to a suitable standard. They will model a physical 3D solution that is accurate, using suitable materials and techniques.

Learners will explain the successful features of the design process, such as interpreting the brief, preparing design proposals, utilising feedback and using a range of modification tools, again with reference to the engineering brief.

Learners will consider feedback from other learners about their chosen design solution and explain how it relates to the engineering brief. Feedback will take the form of written commentary, graphics and verbal communication.

For Level 2 Pass: learners will produce sketches of a minimum of two design proposals that a third party can understand but the sketches may contain errors. Their sketches will include some dimensions and different views that may not be set out to an approved standard. They will produce design proposals that are different, although could show some similarities in approach. Annotation of sketches will be reviewed, using basic statements on how each proposal meets the requirements of the engineering brief. Not all of the elements of the engineering brief may be covered.

Learners will select the most appropriate design proposal to develop, giving reasons that may not always be related to the engineering brief. They will produce a final CAD design using a range of commands to a suitable standard.

COMPONENT 1: EXPLORING ENGINEERING SECTORS AND DESIGN APPLICATIONS

Learners will describe the successful features of the design process, such as interpreting the brief, preparing design proposals and using a range of modification tools, again with reference to the engineering brief.

Learners will consider feedback on their final design solution that is related to the engineering brief. Feedback could take the form of written commentary or verbal communication.

For Level 1 Merit: learners will produce a final CAD design using a suitable range of commands with some reference to the engineering brief. They will outline some of the successful features of the design process, such as the ability to use a range of modification tools, again with some reference to the engineering brief. Some minor mistakes will be evident in the CAD drawing.

For Level 1 Pass: learners will produce a final CAD design using a limited range of commands and with limited reference to the engineering brief. They will identify some of the successful features of the design process, such as the ability to edit or delete features, again with limited reference to the engineering brief. Some clear mistakes will be evident in the CAD drawing.

Resource requirements

For this component, learners must have access to:

- the internet to carry out research about engineering organisations
- case studies for a number of well-known companies – national and local to centre
- 2D and 3D CAD packages, e.g. AutoCAD®, SolidWorks®, Pro/DESKTOP, Multisim™, DraftSight®
- modelling materials such as card, moulding compound
- an interactive presentation facility.

Component 2: Investigating an Engineering Project

Levels: **1/2**

Assessment type: **Internal**

Guided learning hours: **36**

Component in brief

Learners will investigate the selection of materials, proprietary components, making processes and disassembly of a given engineered product. They will plan, reproduce, inspect and test a single component.

Introduction

This component builds on the knowledge and skills you have learned and used in *Component 1*. The manufacture of an engineered product involves design, the correct selection of materials, components and the making processes.

This component will give you an understanding of the types and properties of metallic and polymeric materials, and proprietary components commonly used in engineered products. You will acquire an understanding of the selection of materials, proprietary components, making processes and disassembly of a given engineered product. You will then plan, reproduce, inspect and test a single component.

This component will support you in progressing to a Level 2 or 3 qualification in a range of engineering sectors, for example aerospace, automotive, electrical, electronic, manufacturing, marine, mechanical or telecommunications. You will develop transferable skills such as problem solving, communication and aspects of critical thinking, all of which will support your progression to Level 2 or 3 vocational or academic qualifications.

Learning aims

- A** Understand materials, components and processes for a given engineered product
- B** Investigate a given engineered product using disassembly techniques
- C** Plan the manufacture of and safely reproduce/inspect/test a given engineered component.

Teaching content

Learning aim A: Understand materials, components and processes for a given engineered product

Learners will investigate the materials, components and processes used in the production of engineered products.

A1 Materials

- Engineering material categories:
 - ferrous, e.g. mild steel, wrought iron, stainless steel
 - non-ferrous, e.g. aluminium, titanium, copper, silver, zinc
 - thermosetting polymers, e.g. phenol-formaldehyde, polyimides, polyurethane
 - thermoforming polymers, e.g. polyethylene, polypropylene, acrylic.
- Properties of engineering materials:
 - strength
 - hardness
 - toughness.
- Characteristics of engineering materials, such as:
 - machinability
 - workability
 - durability.

A2 Components

- Types of components, such as:
 - proprietary, e.g. rivet, nut and bolt, screw, key, mechanical fixings, electronic components, such as resistors, capacitors, fuses, diodes
 - product specific, e.g. bush, flange, printed circuit board (PCB).
- Characteristics of components, e.g. permanent/semi-permanent, sizes/dimensions, surface roughness, values, fixing methods.

A3 Processes

Types of engineering processes:

- cutting, e.g. drilling, sawing, filing, shearing
- shaping, e.g. turning, milling
- forming, e.g. forging, casting, extruding, moulding, folding, bending
- joining, e.g. fastening, bonding, soldering, brazing.

Learning aim B: Investigate a given engineered product using disassembly techniques

Learners will investigate engineered products by using practical engineering skills and techniques, such as disassembly and assembly, observation and measurement.

B1 Practical engineering skills

- Observing and recording skills, such as an examination of:
 - visual features
 - surface features
 - mass
 - colour
 - degradation
 - identification marks.
- Measurement skills, such as:
 - measuring diameter
 - measuring linear dimensions
 - use of comparative techniques
 - knowledge of component values, e.g. resistors.
- Appraisal/interpretation skills, such as justifications and reasoning.

B2 Disassembly techniques

- Safe use of disassembly techniques, to include:
 - removal of semi-permanent fixings
 - parts removal and layout
 - replacement of non-reusable consumables or fixings.
- Safe use of tools and equipment – disassembly/reassembly tools with settings.

B3 Product design specification (PDS)

Requirements in terms of:

- size and mass
- product life and reliability
- performance/function/service requirements
- economic and making considerations
- implications of standards and legislation.

COMPONENT 2: INVESTIGATING AN ENGINEERING PROJECT

Learning aim C: Plan the manufacture of and safely reproduce/inspect/test a given engineered component

Learners will produce solutions to problems using different combinations of practical engineering skills, including making as part of the engineering design and make process.

C1 Engineering make process

- Defining the problem.
- Developing possible solutions.
- Choosing a solution.
- Making using engineering processes.
- Inspecting and testing chosen solution.
- Evaluating outcome of project.

C2 Develop a production plan

- Developing a production plan, to include:
 - health and safety
 - operations/processes
 - inspection, testing and quality standards
 - equipment/tools
 - materials and components
 - quantity, e.g. one-off, batch, mass production.
- Awareness of risks and hazards for making processes.
- Safe preparation, good housekeeping and close down of the work area.
- Making skills associated with the product to be produced, e.g. choosing suitable tools, appropriate set up of the work area/machine, adaptation according to inspected outcomes.
- Skills in observing and recording techniques, e.g. in process measurement and comparison.

Suggestions for delivery

Successful delivery of this component will allow learners to develop their knowledge and understanding of planning and implementing an engineering project. They will learn how to disassemble, test and evaluate engineered products.

You may choose to deliver this component following on from *Component 1*. Assignments can focus on each learning aim or you can combine them within or across components.

Essential information for setting assignments

The recommended structure for setting assignments is one for each learning aim, however you may combine learning aims within or across components. Suggested examples of how assignments may be set are outlined here. You should also refer to the authorised assignment briefs on our website. See *Section 5* of this specification for more information.

Learning aim A: Understand materials, components and processes for a given engineered product

Description

Learners will investigate the materials, components and processes used in the production of engineered products.

Example tasks

- Look at the given assembly and detail drawings and identify all the components.
- For each component, consider whether it is a proprietary component, such as a mechanical fixing, or if it has been processed from raw material, e.g. a turned shaft or a folded bracket.
- Investigate the properties of the materials that have been used to make the components.
- Investigate the making processes used to make the components.

Evidence

Evidence must fully meet the requirements of the assessment criteria and could include a portfolio of notes and images.

Learning aim B: Investigate a given engineered product using disassembly techniques

Description

Learners will prepare a product design specification (PDS) for an engineered product by investigating its construction and manufacture.

Example tasks

- Select an engineered product and investigate its purpose/function.
- Use hand tools and work safely to dismantle the product.
- Lay out the parts, label them and identify the function of each one. For parts that have been machined/formed, measure their dimensions and record on simple sketches.
- For the product, write a product design specification (PDS).

Evidence

Evidence must fully meet the requirements of the assessment criteria and could include:

- a logbook
- photographs with notes
- observation record(s)
- tabulated inspection/dimensional data.

Learning aim C: Plan the manufacture of and safely reproduce/inspect/test a given engineered component

Description

Learners will reproduce a component from the previously dismantled product using the same materials and making processes.

Example tasks

- Using the information gathered, prepare a plan for the safe making of a reproduction of a component from the product previously dismantled.
- Prepare a list of the tools and materials to make the component.
- Risk assess the processes to be used.
- Make the component.
- Quality inspect the component.

Evidence

Evidence must fully meet the requirements of the assessment criteria and could include:

- portfolio of notes
- a logbook
- a process chart
- a risk assessment template
- an observation record
- inspection records – numerical, visual.

Assessment criteria

The assessment criteria determine the standard required to achieve the component.

Level 1 Pass	Level 1 Merit	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Understand materials, components and processes for a given engineered product				
A.1P1 Identify engineering materials from each category and proprietary components.	A.1M1 Describe engineering materials from each category and proprietary components.	A.2P1 Describe engineering materials and proprietary components used in given engineered products.	A.2M1 Explain why engineering materials and proprietary components are used in given engineered products.	A.2D1 Evaluate engineering materials, proprietary components and processes used when making given engineered products.
A.1P2 Identify an engineering process from each type.	A.1M2 Describe an engineering process from each type.	A.2P2 Describe engineering processes used to make given engineered products.	A.2M2 Explain why engineering processes are used to make given engineered products.	
Learning aim B: Investigate a given engineered product using disassembly techniques				
B.1P3 Disassemble an engineered product and produce a basic product design specification.	B.1M3 Disassemble an engineered product, identify the main components and produce a product design specification.	B.2P3 Systematically disassemble an engineered product, describe the main components and produce a product design specification.	B.2M3 Systematically disassemble an engineered product, describe the purpose of each of its main components and produce a detailed and realistic product design specification.	B.2D2 Systematically disassemble an engineered product, describe how each of its main components links together and justify a detailed product design specification.

COMPONENT 2: INVESTIGATING AN ENGINEERING PROJECT

Level 1 Pass	Level 1 Merit	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim C: Plan the manufacture of and safely reproduce/inspect/test a given engineered component				
C.1P4 Create a basic plan to produce an engineered component.	C.1M4 Create a plan to produce an engineered component that covers processes, equipment and materials.	C.2P4 Create a plan to produce an engineered component in a suitable sequence that covers processes, equipment and materials.	C.2M4 Create a detailed plan to produce an engineered component in the correct sequence that covers the correct processes, equipment, materials and inspection techniques.	C.2D3 Evaluate the success of the planning and production of an engineered component and make recommendations for improvements to the process.
C.1P5 Produce an engineered component using a limited range of processes.	C.1M5 Produce an engineered component using a range of processes.	C.2P5 Produce an engineered component using a range of processes and inspect against given quality standards.	C.2M5 Effectively produce an engineered component using a range of processes and inspect against given quality standards to confirm compliance.	
Overall component grade				
Learner evidence satisfies all Level 1 Pass criteria.	Learner evidence satisfies either : all Level 1 Merit criteria or All Level 1 Pass criteria and C.2P4, C.2P5.	Learner evidence satisfies all Level 2 Pass criteria.	Learner evidence satisfies either : all Level 2 Merit criteria or All Level 2 Pass criteria and C.2D3.	Learner evidence satisfies all Level 2 Distinction criteria.

Please refer to *Section 5* of the specification for further guidance on internal assessment including how to apply criteria to evidence at Level 1 and Level 2.

Essential information for assessment decisions

Assessors must take account of these definitions and examples in reaching assessment decisions. It is important that learners are able to submit work that is their own. Best practice would be to assign learners to investigate different engineered products.

Learning aim A: Understand engineering materials, components and processes for a given engineered product

Evidence for the assignment: learners will develop a portfolio of notes or a written report that may include images and sketches.

At Level 2, learners will investigate materials, components and processes for a given engineered product. At Level 1, learners will investigate materials, components and processes without successfully linking them to an engineered product.

For Level 2 Distinction: learners will demonstrate a detailed understanding of the properties of ferrous, non-ferrous and polymeric materials, and how the properties influence the choice of making process when raw materials are transformed into products. Learners should appreciate that some metals are more difficult to cut than others, for example stainless and mild steel, but that their properties may dictate choice, for example stainless steel components working in corrosive conditions. Learners should appreciate that unless the process is simple, expensive vacuum forming dies will be required.

Learners will present a detailed evaluation of why a particular making process was chosen.

Learners will evaluate the reasons for using particular proprietary components such as fixing devices (permanent/semi-permanent) and electronic components when assembling components into a finished product. Learners should acquire information on aspects such as being able to disassemble products so that they can be serviced.

For Level 2 Merit: learners will present an accurate explanation of factors that influence choice when selecting materials for manufactured products.

Learners present an accurate explanation of how the correct engineering processes are chosen to make engineered products, considering factors such as machinability and formability.

Learners will present accurate reasons why particular proprietary components such as fixing devices and electronic components are used in a product made from assembled parts.

For Level 2 Pass: learners will present reasons why it is necessary to select the correct materials for products to be made using engineering processes such as wasting and forming. They should appreciate, for example, that some metals are difficult to cut, polymers are not always easy to bond using adhesives. Reasons should generally be accurate.

Learners will select the correct proprietary components such as mechanical fixings and electronic components to meet given assembly requirements.

For Level 1 Merit: learners will have limited understanding of how to choose a material and making process for given engineering components. They should describe the ease/difficulty of machining/forming materials, giving examples.

Learners will correctly describe two types of proprietary components, such as rivet and resistors.

For Level 1 Pass: learners will use line linking to correctly match the properties of engineering materials to images of simple components, for example strength to a steel bridge support. They will use line linking to correctly match material types to images of components.

Learners will correctly annotate images of proprietary components such as fixing devices and electronic components with their names.

Learners will correctly annotate images of engineering processes with the name of the process being carried out, for example turning, drilling, bending.

Learning aim B: Investigate a given engineered product using disassembly techniques

Evidence for the assignment: learners will implement a practical task with evidence in the form of a logbook or diary, photographs with notes or observation records.

At Level 2, learners will implement practical work safely and systematically (in the correct sequence), with tabulated inspection/dimensional data given, whereas at Level 1 there will be no use or a limited use of the correct sequence.

For Level 2 Distinction: learners will carry out the disassembly of an engineered product using correct tools and procedures that demonstrate a high level of competence. Components are to be systematically laid out and correctly labelled (name of component, material, function). Learners would be expected to make reference to an assembly drawing and other information about the product. Visual examination of each component, dimensional measurements and recording of information is to be carried out accurately. There should be no damage caused to components as the product is disassembled; it is not necessary for learners to reassemble the product but good practice dictates that this should be possible.

Learners will present a detailed description of how the components interrelate/interact. They will correctly interpret the dimensional and other data gathered from the disassembly activity. Learners will use this data to produce a product design specification (PDS) that meets given accuracy requirements. Learners will correctly justify the features of the PDS. The PDS will include dimensional constraints, functional requirements, operating performance, and economic and manufacturing considerations.

For Level 2 Merit: learners will carry out the disassembly of an engineered product using correct tools and following a logical sequence of events. The components will be laid out and correctly labelled. Learners would be expected to make reference to an assembly drawing or parts list of the product. Visual examination of each component, dimensional measurements and recording of information will be carried out accurately. There should be no damage caused to components as the product is disassembled; it is not necessary for learners to reassemble the product but good practice dictates that this should be possible.

Learners will correctly interpret the dimensional and other data gathered from the disassembly activity. They will use this data to produce a PDS that has sufficient detail to allow someone to make a copy of the product to a reasonable degree of accuracy; the copy will be dimensionally correct but not required to have all of the functionality of the original product. The PDS will include dimensional constraints, functional requirements, operating performance, and economic and manufacturing considerations.

For Level 2 Pass: learners will carry out the disassembly of an engineered product using correct tools. Components are to be laid out and correctly labelled. Learners would be expected to make reference to an exploded drawing or sketch of the product. The record of visual examination of each component can be limited, and dimensional measurements and recording of information can have errors. There can be minor damage caused to components as the product is disassembled, for example scratched surfaces; it is not necessary for learners to reassemble the product but good practice dictates that this should be possible.

Learners will correctly interpret the dimensional and other data gathered from the disassembly activity. They will use this data to produce a PDS that has sufficient detail to allow someone to make a copy of the product but not necessarily to a high degree of accuracy.

For Level 1 Merit: learners will dismantle the product and lay out the parts. Learner will use the correct tools and can cause minor damage to components, for example damaging the head of a screw or stripping a thread.

Learners will correctly record details of some of the parts, for example name, part number. They will correctly record basic dimensional data, for example overall dimensions.

Learners will use recorded data to produce a basic PDS that can be used by someone tasked to make a copy of the dismantled product. There may be some errors in the PDS but there should be enough information for someone to make a reasonably accurate copy of the product.

For Level 1 Pass: learners will dismantle the product and lay out the parts. Learners may use tools that are inappropriate, for example the wrong type of screw driver, and these may cause damage to components.

There may be labelling errors when recording details of the parts. Learners will record basic dimensional data, for example overall dimensions, which may have measurement errors.

Learners will use recorded data to produce a basic PDS that can be used as a starting point for someone hoping to make a copy of the dismantled product.

Learning aim C: Plan the manufacture of and safely reproduce/inspect/test a given engineered component

Evidence for the assignment: learners will plan and safely reproduce an engineered product with a portfolio of notes or logbook, which may include a process chart and observation records.

Practical work will be carried out safely and with the addition of a risk assessment from a given template.

At Level 2, learners will work safely and effectively, maintaining inspection records (both numerical and visual). At Level 1, learners will work safely and use a range of processes.

For Level 2 Distinction: learners will produce a detailed, accurate plan for the making of an engineered component. The plan will correctly specify health and safety requirements, operations/processes, materials, tools and equipment, and inspection requirements for the finished component.

Learners will follow the making plan to produce the engineered component to specification. They will work independently but confirm with the assessor that they are fully aware of the hazards involved when using engineering equipment.

Learners will accurately record inspection data and propose rectification action if specification details have not been achieved, for example dimensional errors. They present a detailed evaluation of the planning and making of the engineered product; if things have not turned out to plan, they will make recommendations as to how to improve the manufacture process in the future.

For Level 2 Merit: learners will produce an accurate plan for the making of an engineered component. The plan will correctly specify operations, materials, tools and equipment, and inspection requirements for the finished product.

Learners will follow the manufacturing plan to produce the engineered component that is to specification. They may deviate from the plan if it allows successful completion of manufacturing. They will work independently but may require input from the assessor to ensure that they are following correct safety procedures.

Learners will record inspection data and check against specification/quality standards. If standards have not been met, they will make suggestions about why things went wrong.

For Level 2 Pass: learners will produce a plan for the making of an engineered product. The plan will specify materials and proprietary components, tools and equipment, and inspection requirements for the finished component. There can be flaws in the plan but it should have enough information for a third party to stand a reasonable chance of making the component.

Learners will follow the manufacturing plan to produce the engineered component to specification. They may deviate if it allows successful completion of manufacturing. They may work with supervision from the assessor to ensure that they are following correct safe procedures

Learners will record inspection data and check against specification/quality standards.

COMPONENT 2: INVESTIGATING AN ENGINEERING PROJECT

For Level 1 Merit: learners will produce a simplistic plan that has some detail and may not have full clarity for someone using it.

Learners will demonstrate the use of at least three engineering processes, such as shearing, brazing and drilling.

For Level 1 Pass: learners will produce a simplistic plan that has very little detail and may require anyone following it to put their own interpretation on how to carry out the steps, for example tools and materials not specified.

Learners will demonstrate the use of at least two engineering processes, such as drilling and soldering.

Resource requirements

For this component, learners must have access to:

- materials database – properties and types
- hand tools, e.g. screwdrivers, spanners, pliers, soft-faced mallet, punch, files
- measuring equipment, e.g. rule, micrometer, callipers, multimeter
- mechanical workshop equipment, e.g. lathe, pedestal drilling machine, milling machine
- electrical workshop equipment, e.g. soldering iron, side cutters, pliers, mini drill.

Component 3: Responding to an Engineering Brief

Levels: **1/2**

Assessment type: **External synoptic**

Guided learning hours: **48**

Component in brief

Learners will investigate and create solutions to problems in response to given engineering briefs.

Introduction

This component builds on the knowledge and skills you have learned in *Components 1* and *2* and is synoptic.

You will be given engineering briefs with problems you need to respond to. Your response will include possible solutions that you will test against the brief. You will be given the opportunity to carry out tests, collect and analyse data, reflect on your findings, consider any issues, and suggest solutions.

This component will support you in progressing to a Level 2 or 3 qualification in a range of engineering sectors, for example aerospace, automotive, electrical, electronic, manufacturing, marine, mechanical or telecommunications. You will develop transferable skills such as problem solving, which will support your progression to Level 2 or 3 vocational or academic qualifications.

Summary of assessment

This external component builds on knowledge, understanding and skills acquired and developed in Components 1 and 2. Learners will apply developed skills in problem solving, design and communication to enable them to respond to engineering briefs.

A set task comprised of two parts worth 60 marks in total will be completed under supervised conditions. The supervised assessment period is two hours for Part 1 and one and a half hours for Part 2. Both parts of the set task are completed during a one-week period timetabled by Pearson. The assessment availability is February and May/June only. The first assessment is February 2019.

For assessment, learners will be given a brief to carry out a practical set task before completing the three activities based on the practical task. An additional task, consisting of two activities, will target higher-order, planning, redesign and evaluative skills, and relate to independent scenarios.

Sample assessment materials will be available to help centres prepare learners for assessment.

COMPONENT 3: RESPONDING TO AN ENGINEERING BRIEF

Assessment objectives

AO1 Understand how to respond to an engineering brief

AO2 Select skills and techniques in response to an engineering brief

AO3 Apply skills and techniques in response to an engineering brief

AO4 Evaluate and review the outcomes of the application of skills and techniques in response to an engineering brief

Essential content

Learners will be assessed on their ability to produce solutions to problems using combinations of engineering skills. It is expected that learners are able to draw on the skills developed across *Components 1* and *2*, interconnected with the principles below.

A Carry out a process to meet the needs of an engineering brief

Learners will develop an understanding of practical procedures and explore how to record, collect and interpret data in an engineering context.

A1 Carry out a process

- Following planned procedures.
- Using and testing a prototype/model.
- Assembling, handling and using materials, equipment and machinery.

A2 Recording the process

- Measuring and recording data with accuracy and precision, using appropriate units.
- Tabulating appropriate data in the correct format accurately and to a suitable degree of precision.
- Displaying appropriate data graphically with accuracy:
 - chart/graph
 - line/curve of best fit
 - axis
 - scaling
 - labelling.
- Observation skills, e.g. noting problems with practical activities.

A3 Interpretation of data

- Identifying anomalous results or sources of error.
- Comparison of trends/patterns in data, to include tables, charts and graphs.
- Evaluating the process, to include testing process used, recording/processing results.
- Drawing valid conclusions.
- Making recommendations related to engineering briefs.

B Provide a design solution for an engineered product against the needs of an engineering brief

Learners will develop an understanding of how to interpret a brief and explore design ideas, including their viability as a final solution.

B1 Interpretation of a given brief for an engineered product

- Analysing the existing product with reference to the brief.
- Dimensions and tolerances, to include linear, radial, surface finish.
- Physical form, to include 2D, 3D, flat, curved.
- Attributes, to include low resistance, sharp corners, moisture traps.
- Materials, e.g. aluminium, steels, polymers.
- Processes, e.g. fabrication, drilling.

COMPONENT 3: RESPONDING TO AN ENGINEERING BRIEF

B2 Redesign

- Identifying relevant issues with existing design.
- Design sketching, to include 2D, 3D, exploded diagrams, annotation, circuit diagrams.
- Design for manufacture, e.g. fabricate, forge, cast, machined.
- Design ideas, e.g. variation in form, variation in approach, use of different methods, use of different componentry.

B3 Evaluation

- Reviewing the credibility of the design ideas given the needs of the brief.
- Selecting the most appropriate design solution.
- Justification of the design solution.
- Justification of the processes to be used.

C Provide solutions to meet the needs of an engineering brief

Learners will develop an understanding of how to analyse information in an engineering context and will explore how to select a suitable solution and implement it to meet the brief.

C1 Analysing engineering information associated with the problem

- Types of engineering information, to include production data, engineering drawings, job cards.
- Interpreting patterns and trends related to the engineering information.
- Identifying issues and causes associated with the problem.

C2 Selecting a solution

- Possible solutions for current and/or potential issues, e.g. design, tooling, process.
- Extent to which these solutions have fulfilled their primary purpose.
- Any wider factors that need to be considered in order to meet the brief, e.g. resources, need for batch production, safety restrictions, environmental impact.
- Ways in which the solution might be improved on against its primary purpose and/or other factors.
- Using the best-fit approach to select the best solution.
- Identifying advantages and disadvantages/limitations/constraints.
- Justifying the best solution.
- Reflecting on processes and making recommendations for improvements to the best solution.

C3 Problem solution

- Resources required and their use, to include materials, tools, components, equipment, apparatus, e.g. instruments, sensors.
- Designs of solution, to include diagrams, sketches, including measurements, labels/annotation.
- Make processes, to include following the steps needed to create a prototype solution, e.g. rapid prototyping.
- Processes to follow, e.g. in relation to using tools and equipment, and health and safety.
- Manufacturing processes to use, e.g. casting, forging, welding, use of jigs and tools.
- Data collection requirements, to include what quantitative and qualitative data must be recorded, resource material, data sources.
- Data analysis and quality, to include trends, meeting specifications, possible solutions.
- Safety considerations, to include hazards and requirements of Control of Substances Hazardous to Health (COSHH) Regulations 2002 where appropriate.
- Considering timescales.

Grade descriptors

To achieve a grade, a learner is expected to demonstrate these attributes across the essential content of the component. The principle of best fit will apply in awarding grades.

Level 1 Pass

Learners are able to use a brief. They can show an awareness of health and safety procedures and are able to follow given procedures using materials, equipment and machinery provided. They are able to make observations and record results. Learners can use a simple analytical technique in order to produce a simple conclusion. They are able to suggest ways the given procedures can be improved.

Level 2 Pass

Learners are able to consider the brief, recognising problems that need to be solved. They can suggest a possible solution to meet the brief. They are able to recommend a plan for a solution that is feasible and in general will be technically correct. They are able to show an awareness of health and safety procedures. Learners are able to make appropriate observations and record results with some accuracy. They can use a range of analytical techniques in order to produce a conclusion. Learners are able to evaluate processes and solutions in relation to the brief.

Level 2 Distinction

Learners are able to analyse the brief, recognising the problems that need to be solved. They can suggest alternative solutions to meet the brief. They are able to recommend plans for alternative solutions that are feasible and provide a reflective account of possible solutions and recommendations that are technically correct. They are able to show an understanding of health and safety procedures. Learners are able to make appropriate observations and record results accurately. They can use a range of analytical techniques in order to produce detailed conclusions. Learners are able to evaluate processes and solutions in detail to ensure the brief is met.

4 Planning your programme

Is there a learner entry requirement?

As a qualification designed to be used in Key Stage 4, there are no formal entry requirements. It is assumed that learners are studying GCSEs and other BTEC Tech Award qualifications alongside this qualification. 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. Overall achievement can be improved by highlighting links between this qualification and other qualifications as part of a Key Stage 4 programme of learning, such as through project-based learning.

What level of sector knowledge is needed to teach this qualification?

We do not set any requirements for teachers 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 that will prepare them for progression.

What resources are required to deliver this qualification?

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

How does this qualification contribute to Key Stage 4 learning?

This qualification gives learners opportunities to apply learning from GCSE Design and Technology to vocational learning. For example, the skills developed in design and make activities can be applied when investigating engineered products and responding to an engineering brief.

What makes good vocational teaching?

The approach to vocational teaching must be led by what is right for the particular sector. Therefore, each component includes delivery guidance and suggested assessment tasks. Using this information, our free delivery guidance and the authorised assignment briefs, you can build a course that contextualises learning in real-life and/or employment scenarios. This draws naturally on the kind of broader attributes valued in the sector, for example problem solving while working in a workshop, as well as the more general skills needed in work that fit well with project-based learning, for example teamwork and independent learning.

5 Internal assessment

Principles of internal assessment

This section gives an overview of the key features of internal assessment and how you can offer it effectively. The full requirements and operational information are given in the *Pearson Quality Assurance Handbook*, available on our website. When internal assessment is operated effectively it is challenging, engaging, practical and up to date. It must also be fair to all learners and meet national standards.

In this qualification, there are two internally-assessed components. They will be assessed through assignments set by the assessment team using the guidance and examples we provide. As these components are graded spanning Level 1 and Level 2 of the Regulated Qualifications Framework, our well-established approach to BTEC assignments has been retained and adapted to the needs of these learners.

At the start of the learning period for this qualification, learners will be introduced to vocational contexts for their learning, often for the first time, and they will then build up a detailed appreciation of the sector and some of the technical skills required to succeed. This requires an extended period of learning and formative assessment that supports learners in understanding the context, developing skills and aptitudes. Learners will move on to undertake realistic vocational tasks involving wider attributes such as teamwork, presentation, self-management, research and analysis.

Formal assignments to assess performance are distinct periods of assessment that learners understand are being used to judge the learning aims. They will be separate from the practice and exploration activities that have been used during the learning period.

When setting assignments, you need to take account of the requirements of the component format as explained in *Section 2*. The assignments must relate to both Level 1 and Level 2.

For example:

- achievement at Level 1 is consistent with learners using basic information to complete a task, giving some indication of whether what has been done is successful
- achievement at Level 2 in the same task could require learning to demonstrate a broader understanding through solving straightforward problems related to the task, gathering information to help learners do that and commenting on how effective their actions have been.

Operating internal assessment

The assessment team

So that all assessment is planned and verified, it is important that there is an effective team for internal assessment. For these qualifications, it is likely that the team will be small but it is still necessary to ensure that the assessment process is followed. Full details are given in the *Pearson Quality Assurance Handbook*.

The key roles are:

- the Lead Internal Verifier (Lead IV) for the qualification has responsibility for planning, record keeping and standard setting for the qualification. The Lead IV registers with Pearson annually and organises training using our support materials
- Internal Verifiers (IVs) check that assignments and assessment decisions are valid and that they meet our requirements. In a small team, all people will normally be assessors and IVs. No one can verify their own actions as an assessor
- assessors set or use assignments to assess learners to national standards.

Planning and record keeping

The Lead IV should make sure that there is a plan for assessment of the two internal components and 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*.

Setting assignments

An assignment is issued to learners as an assignment brief with a defined start date, a completion date and clear requirements for the evidence that they need 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. We provide authorised assignment briefs and guidance in each component for setting assignments. You can adapt materials to your local contexts.

A valid assignment will enable a clear and formal assessment outcome based on the assessment criteria. In order to support you and to make sure that all learners nationally are being assessed fairly and consistently to the national standards, we give details in components on the assignments and in authorised assignment briefs to show how valid assignments can be set. You can choose to use the materials we provide or to adapt them to take account of your local circumstances, provided that assignments are verified.

When setting your assignments:

- provide a vocational scenario or context that motivates the learner to apply their learning for a purpose and audience
- give learners clear tasks and structures for evidence – the assessment criteria are not written for this purpose
- ensure that learners are drawing on the specified range of teaching content
- specify the type and quality of evidence that a learner should produce
- if a component contains synoptic assessment the planned components must allow learners to select and apply their learning using appropriate self-management of tasks.

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.

Full definitions of types of assessment are given in *Appendix 1*. Some of the main types of assessment are:

- oral or written presentations with assessor questioning
- practical assessments with observation records and supporting evidence
- work logbooks, reflective journals.

The form(s) of evidence selected must allow a verifier to check the assessor's decisions independently. For example, when you are using performance evidence, you need to consider how supporting evidence can be captured through recordings, photographs or task sheets.

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 learners 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.

Making valid assessment decisions

Assessment decisions through applying assessment criteria

Assessment decisions for these qualifications are based on the specific criteria given in each component. In order to apply the criteria, centres should be aware of the difference between Level 1 and 2 of the Regulated Qualifications Framework. At both levels, learners are expected to take responsibility to complete tasks completely and correctly. The differences include:

- **at Level 1** – completion of tasks using evidence that may be simple, structured, routine, using given information and using simple judgements and basic factual information
- **at Level 2** – completion of tasks using evidence that may be semi-structured or unstructured, using researched or analysed information, showing understanding, problem solving and using own judgement.

The way in which the learner has provided evidence against the tasks will indicate the level they are working at.

Each internal component shows how grades can be awarded using clear and unambiguous criteria. Each assignment shows a hierarchy of criteria that should be considered holistically to apply to the evidence. It should be understood that in each of the two levels a learner demonstrating achievement for a higher grade would need to do so through satisfying the lower grade criteria. For example, if a Level 2 Merit criterion requires the learner to 'compare' and the related Level 2 Pass criterion requires the learner to 'explain', then in making a comparison the learner will need to 'explain'.

When a learner has completed the assessment for a component, you can give a component grade.

Level 2 Distinction	A learner has satisfied all the Level 2 Distinction criteria for the component through: <ul style="list-style-type: none"> • outstanding performance that fully addresses all learning aims, with a sound grasp of facts and concepts, selection and interpretation of information, and fluent use of skills in more complex situations.
Level 2 Merit	A learner has shown high performance across the component through either : <ul style="list-style-type: none"> • having satisfied all the Level 2 Merit criteria for all learning aims or • having achieved all the Level 2 Pass criteria and showing an outstanding performance in the final assignment as defined by the Level 2 Distinction criteria.
Level 2 Pass	A learner has satisfied all the Level 2 Pass criteria for the learning aims through: <ul style="list-style-type: none"> • showing coverage and understanding of content at a good standard and appropriate skill demonstration.
Level 1 Merit	A learner has shown an acceptable standard across the component, addressing a range of content and demonstrating some understanding through either : <ul style="list-style-type: none"> • having satisfied all the Level 1 Merit criteria for all learning aims or • having achieved the Level 1 Pass criteria and showing a good standard of performance in the final assignment as defined by the Level 2 Pass criteria.
Level 1 Pass	A learner must satisfy all Level 1 Pass criteria for the learning aims through: <ul style="list-style-type: none"> • showing basic knowledge and ability to complete routine tasks.
U	A learner who does not satisfy all the Level 1 Pass criteria should be reported as having a U grade.

Making assessment decisions using criteria

As an assessor, you review authenticated learner work and make judgements on standards using the assessment criteria and the supporting information given in components and training materials. The evidence from a learner should be judged using all the relevant criteria. In making a judgement, you should consider whether evidence is present and sufficiently comprehensive.

Once the team has agreed the outcome, a formal assessment decision is recorded and reported to learners. The information given:

- must show the formal decision and indicate where criteria have been met
- may show where attainment against criteria has not been demonstrated
- must avoid giving direct, specific instructions on how the learner can improve the evidence to achieve a higher grade.

Authenticity of learner 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.

Once an assessment has begun, learners must not be given feedback that relates specifically to their evidence and how it can be improved, as learners must work independently.

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 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 9*.

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, for example that the learner has not performed as expected
- making sure that giving a further opportunity 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 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.

For assessment to be fair, it is important that learners are all assessed in the same way and that no learners are advantaged by having additional time or the opportunity to learn from others. Therefore, learners who do not complete assignments by the planned deadline or an authorised extension deadline (if one was given for specific circumstances) may not have the opportunity to subsequently resubmit. Similarly, learners submitting work that is not their own should not be given an opportunity to resubmit.

The outcome of any resubmission of the assignment by the learner is then recorded as the final decision.

A learner who has not achieved their expected level of performance in the relevant learning aims **after resubmission** of an assignment may be offered a single retake opportunity using a new assignment. The highest grade that may be awarded is Level 1 Pass.

The Lead IV must authorise a retake with a new assignment only in exceptional circumstances and, where 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).

6 Quality assurance

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 components 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 Tech Award 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, for example making sure that the synoptic component is placed appropriately in the delivery of the programme.

Centres that do not fully address and maintain rigorous approaches to delivering, assessing and quality assurance cannot seek certification for individual programmes or for the BTEC Tech Award qualifications. 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.

7 External assessment

Role of external assessment for the BTEC Tech Award suite

External assessment in the BTEC Tech Award suite comprises 40 per cent of the total qualification GLH. The external assessment is weighted to contribute the same proportion of the overall qualification grade. To ensure that the assessment is fully challenging and that the grading of the component reflects performance in a qualification as a whole, the assessment is synoptic and is taken at or near the end of a learner's programme. Our approach ensures that learners are able to show depth of understanding through being able to apply their conceptual and sector knowledge in practical contexts. The external assessment is rigorous but fully valid as preparation for progression to vocational qualifications.

This section gives an overview of the key features of external assessment and how you, as an approved centre, can offer it effectively.

External assessment

The *Summary of assessment* section in Component 3 sets out the specific arrangements for the external assessment. External assessment includes a task taken under supervised conditions. The expected evidence that must be submitted is explained in the component and sample assessment materials (SAMs). Your learners will undertake the external assessment during the period timetabled by Pearson.

Timing of external assessment

External assessment for this qualification is available in February and May/June from 2019 onwards. Learners are permitted to resit the external assessment once. In making entries for external assessment, you need to consider the nature of the external assessment and whether learners are likely to benefit more from a resit or from having a longer period to prepare. If a learner requires a resit then they must take a new external assessment task and will not be able to reuse any evidence from their first attempt.

Sample assessment materials

Each externally-assessed component has a set of sample assessment materials (SAMs) that accompanies this specification. SAMs are there to give you an example of what the external assessment will look like in terms of the feel and level of demand of the assessment.

The SAMs show the range of possible activity types that may appear in the actual assessments and give you a good indication of how the assessments will be structured. While SAMs can be used for practice with learners, as with any assessment, the content covered and specific details of the activities will vary in each assessment.

These sample assessments can be downloaded from our website. We will provide further materials over time to support assessment, for example sample marked learner work, further sample materials, examiner feedback.

Conduct of set tasks for external assessment

The external assessment is set and marked by Pearson. You need to ensure that learners are aware that they need to work independently and of the requirements for any external assessment.

We define degrees of control for assessments for BTEC qualifications as:

- **high control**
this is the completion of assessment in formal invigilated examination conditions
- **medium control**
this is completion of assessment, usually over a longer period of time, it may include a period of supervised conditions. The supervised conditions may allow learners to access resources, prepared notes or the internet to help them complete the task.

Further information on responsibilities for conducting external assessment is given in the document *Instructions for Conducting External Assessments (ICEA)*, available on our website, qualifications.pearson.com (search for *ICEA*).

Pearson marking and awarding grades

Marking

Pearson will allocate standardised examiners to mark the evidence remotely. Your Examinations Officer will be given guidance as to how to send this evidence to us or the examiner directly.

We review quality of marking throughout the marking period and ensure that our examiners mark to the agreed marking scheme during this time.

Awarding of grades

Awarding is used to set grade boundaries and ensure that standards are maintained over time. This is important, as we must ensure that learners have the same opportunity to achieve, regardless of the assessment opportunity. This means that grade boundaries can change across different assessment opportunities based on the raw marks but that the resulting grades are fair and consistent.

Results issue

Results are issued in line with advertised timeframes, which can be found in the 'key dates' section of our *Information Manual* available on our website: qualifications.pearson.com (search for *key dates*).

8 Final grading and awarding

Awarding and reporting for the qualification

This section explains the rules we apply in awarding a qualification and providing an overall qualification grade for each learner.

The awarding and certification of the qualification will comply with the requirements of the Office of Qualifications and Examinations Regulation (Ofqual), CCEA Regulation and Qualifications Wales.

Eligibility for an award

In order to be awarded a qualification, a learner must complete and achieve **all three components with a grade Level 1 Pass or above** and achieve the **minimum number of points** at a grade threshold.

Learners who do not pass all components shown in the structure will not achieve a qualification, even if they have enough points at a grade threshold.

Subject to eligibility, Pearson will automatically calculate the qualification grade for your learners when the internal component 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 the qualification grade

The final grade awarded for a qualification represents an aggregation of a learner's performance across 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 components may be balanced by a lower outcome in others.

The *Calculation of qualification grade* table, set out later in this section, shows how BTEC Tech Awards are awarded at seven grades from Level 1 Pass to Level 2 Distinction*. The table shows the minimum thresholds for calculating these grades. The table will be kept under review over the lifetime of the qualification. The most up to date table will be available in the latest version of the specification 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.

Points available for internal components

The table below shows the number of points available for internal components, depending on the grade awarded.

U	0
Level 1 Pass	9
Level 1 Merit	15
Level 2 Pass	22
Level 2 Merit	29
Level 2 Distinction	36

Points available for external components

Raw marks from external components will be awarded points based on performance in the assessment. Pearson will automatically calculate the points for the external component once the external assessment has been marked and grade boundaries have been set.

The points available at each grade in the external component is as follows:

U	0
Level 1 Pass	12-17
Level 1 Merit	18-23
Level 1 Distinction	24-29
Level 2 Pass	30-35
Level 2 Merit	36-41
Level 2 Distinction	42-48

Calculation of qualification grade table

Grade	Points threshold
Level 1 Pass	30
Level 1 Merit	44
Level 1 Distinction	58
Level 2 Pass	72
Level 2 Merit	95
Level 2 Distinction	105
Level 2 Distinction*	114

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

Examples of grade calculations based on table applicable to registrations from September 2017

Example 1: Achievement of an Award with an L1P grade

Component	Type	Grade	Points
1	Internal	Level 1 Pass	9
2	Internal	Level 1 Merit	15
3	External	Level 1 Merit	18
		Level 1 Pass	42

Example 2: Achievement of an Award with a Level 2 Merit grade

Component	Type	Grade	Points
1	Internal	Level 2 Merit	29
2	Internal	Level 2 Distinction	36
3	External	Level 2 Merit	36
		Level 2 Merit	101

Example 3: An unclassified result

Component	Type	Grade	Points
1	Internal	Level 2 Merit	29
2	Internal	U	0
3	External	Level 2 Merit	36
		U	65

The learner has a U in Component 2.

The learner has enough points for a Level 1 Distinction grade but has not met the minimum requirements for a Pass in all components.

9 Administrative arrangements

Introduction

This section focuses on the administrative requirements for delivering BTEC Tech Award qualifications. It will be of 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 and external assessment. You need to refer to our *Information Manual* for information on making registrations for the qualification and entries for external assessments.

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*.

The Pearson Equality and Diversity policy is on our website.

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 for 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 on our website in the document *Supplementary guidance for reasonable adjustment and special consideration in vocational internally assessed components*.

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 component, 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 and End Point Assessments*.

Administrative arrangements for external assessment

Entries and resits

For information on the timing of assessment and entries, please refer to the annual examinations timetable on our website. Learners are permitted to have one resit of an external assessment where necessary.

Access arrangements requests

Access arrangements are agreed with Pearson before an assessment. They allow learners with special educational needs, disabilities or temporary injuries to:

- access the assessment
- show what they know and can do without changing the demands of the assessment.

Access arrangements should always be processed at the time of registration. Learners will then know what type of arrangements are available in place for them.

Granting reasonable adjustments

For external assessment, a reasonable adjustment is one that we agree to make for an individual learner. A reasonable adjustment is defined for the individual learner and informed by the list of available access arrangements.

Whether an adjustment will be considered reasonable will depend on a number of factors, to include:

- the needs of the learner with the disability
- the effectiveness of the adjustment
- the cost of the adjustment; and
- the likely impact of the adjustment on the learner with the disability and other learners.

Adjustment may be judged unreasonable and not approved if it involves unreasonable costs, timeframes or affects the integrity of the assessment.

Special consideration requests

Special consideration is an adjustment made to a learner's mark or grade after an external assessment to reflect temporary injury, illness or other indisposition at the time of the assessment. An adjustment is made only if the impact on the learner is such that it is reasonably likely to have had a material effect on that learner being able to demonstrate attainment in the assessment.

Centres are required to notify us promptly of any learners that they believe have been adversely affected and request that we give special consideration. Further information can be found in the special requirements section on our website.

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 component or type of assessment within the qualification. For further details regarding malpractice and advice on preventing malpractice by learners please see the document *Centre guidance: Dealing with malpractice and maladministration in vocational qualifications*, available on our website.

Note that the procedures we ask you to adopt vary between internally-assessed components and those that are externally assessed.

Internally-assessed components

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 and maladministration in vocational qualifications* 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.

Externally-assessed components

External assessment means all aspects of components that are designated as external in this specification including preparation for tasks and performance. For these assessments, centres must follow the JCQ procedures set out in the latest version of *JCQ Suspected Malpractice in Examinations and Assessments* (www.jcq.org.uk).

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.

Learner malpractice

Heads of Centres are required to report incidents of any suspected learner malpractice that occur during Pearson external assessments. We ask that centres do so by completing a *JCQ Form M1* (available at www.jcq.org.uk/exams-office/malpractice) and emailing it and any accompanying documents (signed statements from the learner, invigilator, copies of evidence, etc.) to the Investigations Team at pqsmalpractice@pearson.com. The responsibility for determining appropriate sanctions or penalties to be imposed on learners lies with Pearson.

Learners must be informed at the earliest opportunity of the specific allegation and the centre's malpractice policy, including the right of appeal. Learners found guilty of malpractice may be disqualified from the qualification for which they have been entered with Pearson.

Teacher/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 Form M2a* (available at www.jcq.org.uk/exams-office/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 the JCQ document *Suspected Malpractice in Examinations and Assessments*.

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 about Pearson vocational qualifications and end point assessment 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:
 - *JCQ Adjustments for candidates with disabilities and learning difficulties, Access Arrangements and Reasonable Adjustments*
 - 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.

10 Resources and support

Our aim is to give you support to enable you to deliver the BTEC Tech Award suite 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

Schemes of Work

The free Schemes of Work give suggestions and ideas on how to teach the qualifications, they include teaching tips and ideas, assessment preparation and suggestions for further resources.

Course planner

High-level overview of how to plan teaching term by term over one or two years.

Support for teaching and learning

Pearson Learning Services provides a range of engaging resources to support BTEC qualifications, including:

- student textbooks in ebook and print formats
- teacher support, including slides, interactive activities and videos via the ActiveLearn Digital Service
- teaching and learning resources may also be available from a number of other publishers.

Details of Pearson's own resources and all endorsed resources can be found on our website.

Support for assessment

Sample assessment materials (SAMs) for externally-assessed components

Sample assessment materials are available for the externally-assessed component and can be downloaded from the Pearson Qualifications website. An additional set of sample assessment materials for the externally-assessed component will also be available, allowing your learners further opportunities for practice.

Sample assessment materials (SAMs) for internally-assessed components

We do not prescribe the assessments for the internally-assessed components. Rather, we allow you to set your own, according to your learners' preferences.

We do provide a service in the form of Authorised Assignment Briefs, which are approved by Pearson Standards Verifiers. They are available via our website or on myBTEC.

Sample marked learner work

To support you in understanding the expectation of the standard at each grade, examples of marked learner work at PM/MD grades linked to the Authorised Assignment Briefs will also be made available on our website.

Training and support from Pearson

People to talk to

There are many people who can support you and give you advice and guidance on delivering your BTEC Tech Awards. 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
- 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 Tech Awards. 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 components

This is a summary of the key terms used to define the requirements in the components.

Term	Definition
Accurate	Produce work competently, fit for purpose without significant error.
Adequate	Acceptable in quality or quantity.
Analyse	Examine methodically and in detail, typically in order to interpret.
Apply	Put knowledge, understanding or skills into action in a particular context.
Appropriate	Select and use skills in ways that reflect the aim.
Assess	Present a careful consideration of varied factors or events that apply to a specific situation or identify those that are the most important or relevant, and arrive at a conclusion.
Coherent	Logically consistent.
Collaborate	Work jointly with others to produce defined outcomes.
Communicate	To convey ideas or information to others.
Compare	Identify the main factors relating to two or more items/situations, explain the similarities and differences, and in some cases say which is best and why.
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, with no need for prompting.
Consistent	Able to repeat reliably an action that progresses towards achieving an aim.
Creative	Using techniques, equipment and processes to express ideas or feelings in new ways.
Define	State or describe exactly the nature, scope or meaning of something.
Demonstrate	Carry out and apply knowledge, understanding and/or skills in a practical situation.
Describe	Give a clear, objective account in their own words, showing recall, and in some cases application, of relevant features and information. Normally requires breadth of content coverage.
Detailed	Having additional facts or information beyond a simple response.
Discuss	Consider different aspects of a topic and how they interrelate and the extent to which they are important.

Term	Definition
Effective	Show control over techniques, equipment and processes to meet the details and broad aims of a requirement efficiently.
Evaluate	Bring together all information and review it to form a conclusion, drawing on evidence, including strengths, weaknesses, alternative actions, relevant data or information.
Explain	Provide details and give reasons and/or evidence to support an argument.
Explore	Try out the qualities of materials, techniques or processes through practical investigation, with some record of results.
Identify	Indicate the main features or purpose of something.
Independent	Capable of carrying out tasks from given information.
Investigate	Carry out research or trial activities to increase understanding of the application of factual information.
Justify	Give reasons or evidence to support an opinion.
Outline	Summarise or indicate the principal features of something or a brief description or explanation with main points.
Refine	Improve initial work, taking feedback into account.
Reflect	Think carefully and review information and/or performance, includes articulating ideas, concepts, activities, findings or features.
Review	Assess formally based on appropriate evidence or information with the intention of instituting change if necessary.
Secure	Well practised, confident in own ability and skills.
Select	Choose the best or most suitable option related to specific criteria or outcomes.
Show	Present using practical skills.
Simple	Well defined, routine, frequently occurring.
State	Express something definitely or clearly.
Summarise	Gathers together all of the main aspects of a given situation or experience in a condensed format.
Support	Guidance and instruction.



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