GCSE

WJEC GCSE
Design and Technology

Approved by Qualifications Wales

Specification

Teaching from 2026
For award from 2028

This Qualifications Wales regulated qualification is not available to centres in England.

Made for Wales.
Ready for the world.

WJEC would like to thank the students and teachers of Fitzalan High School, Cardiff and Llanwern High School, Newport for their participation in the creation of these covers.

This specification meets the requirements of the following regulatory documents published by Qualifications Wales:

- Made for Wales GCSE Qualification Approval Criteria which set out requirements for any new GCSE qualification Approved for first teaching from September 2025 and beyond.
- Standard Conditions of Recognition which contains the rules that all awarding bodies and their qualifications must meet when offering qualifications to learners in Wales.
- Approval Criteria for GCSE Design and Technology which sets out the subject specific requirements for Design and Technology from September 2026 and beyond.

CONTENTS

GCSE DESIGN AND TECHNOLOGY

SUMMARY OF ASSESSMENT

Unit 1: Design and Technology in the 21st Century
Digital examination: 1 hour 30 minutes
30% of qualification

80 marks

Summary of assessment
Questions requiring objective responses, short and extended answers assessing learners' knowledge and understanding of the core aspects of design and technology and **one** of the following pathways:

- engineering design
- fashion and textiles
- product design

Unit 2: Design Project
Non-examination assessment: Approximately 40 hours
70% of qualification

100 marks

Summary of assessment
A sustained design and make task, based on a contextual challenge set by WJEC, assessing learners' ability to:

- identify, investigate, analyse and outline design possibilities
- design and make prototypes and evaluate their fitness for purpose

Learners must select **one** of the following pathways:

- engineering design
- fashion and textiles
- product design

Learners must select the **same** pathway as chosen within Unit 1.

This is a linear qualification.

The qualification is not tiered.

Unit 2 can be completed any time once the relevant contextual challenges have been released and will be submitted to WJEC in the final year of the course. However, centres should ensure that assessment is completed only when learners have undertaken the necessary teaching and learning and developed the required skills and knowledge. Unit 1 will be examined in the final year of the course.

The first award of the qualification will be 2028.

Qualification Approval Number: C00/5167/8

GCSE DESIGN AND TECHNOLOGY

1 INTRODUCTION

1.1 Aims

The GCSE Design and Technology qualification supports learners to:

- understand the modern technologies, materials and practices used to create products and solutions that meet the needs and wants of users
- analyse and be inspired by existing products that inform the design and production of practical solutions which target end users and markets
- recognise the underlying technical principle, skills and knowledge that apply in chosen design pathways
- appreciate the importance of creativity, craftsmanship and innovation, applied throughout iterative design practices, in the design and creation of new products
- appreciate the factors that affect the needs and wants of users and how iterative design processes focus on meeting these to produce effective products
- describe ways in which design outcomes can have environmental and societal impacts that can be local, national and international
- use their knowledge, skills and understanding to influence their own decision when making and evaluating a product or prototype.

These aims are set out in Qualifications Wales' Approval Criteria.

1.2 Curriculum for Wales

This GCSE Design and Technology qualification is underpinned by the Curriculum for Wales framework and has been designed to ensure that learners can continue to make progress towards the four purposes whilst studying for this qualification. Central to this design are the principles of progression, along with the statements of what matters and those specific skills and concepts outlined in the Designing your Curriculum section of the Science and Technology Area of Learning and Experiences

In developing this qualification, we have considered where there are opportunities to embed the cross-curricular themes and where there are opportunities for integral skills and cross-curricular skills to be developed. Appendix A provides a simple mapping, and information to support teachers will be provided in the Guidance for Teaching.

We have also considered where the qualification can generate opportunities for integrating the learning experiences noted on page 42. The Guidance for Teaching will include further information on integrating these learning experiences into delivery.

The GCSE Design and Technology qualification supports the Curriculum for Wales by:

- Supporting the statements of what matters by giving learners the opportunity to:
  - be curious and search for answers to understand and predict phenomena
  - make informed decisions that affect our environment and well-being
  - consider the impact of their actions and of technological developments
  - apply their experiences, skills and knowledge to design and shape innovative engineered solutions
  - understand and control the interactions between material, structures, components and users
  - become enterprising problem solvers
  - make informed decisions about the future development and application of technology.

- Supporting the principles of progression by encouraging learners to:
  - increase their breadth and depth of knowledge by exploring and experiencing increasingly complex ideas and concepts
  - deepen their understanding of ideas, disciplines and experience
  - develop their ability to investigate, explore, problem-solve and design both in the physical and digital environments
  - make connections and transfer their learning into new contexts.

- Supporting the subject specific considerations for Design and Technology by giving learners the opportunity to consider:
  - a range of practical techniques (including taking measurements and making observations)
  - their conceptual and procedural knowledge of a range of materials and techniques through practical experiences to inform their design thinking
  - iterative design processes, including continual testing and evaluating
  - how to create prototypes that are fit for purpose.

1.3 Prior learning and progression

Although there is no specific requirement for prior learning, the qualification is designed primarily for learners between the ages of 14 and 16 and builds on the conceptual understanding learners have developed through their learning from ages 3 – 14.

The qualification allows learners to develop a strong foundation of knowledge, skills and understanding which supports progression to post-16 study and prepares learners for life, learning and work. The qualification provides a suitable foundation for the study of Design and Technology at either AS or A level. In addition, the specification provides a coherent, satisfying and worthwhile course of study for learners who do not progress to further study in this subject.

1.4 Guided learning hours

GCSE Design and Technology has been designed to be delivered within 120 – 140 guided learning hours. The qualification has been primarily designed as a 2-year programme for learners in years 10 and 11.

1.5 Use of language

As our understanding of diversity, equity, and inclusion evolves, so must our language. Updated terminology better reflects individual identities and fosters respect and accuracy. Language used should be specific as possible. Staying informed and adaptable is crucial, as inclusive language promotes dignity and equity. Recognising that language will continue to evolve, we will remain open to further amendments to ensure it accurately represents and supports all individuals. WJEC will inform centres of any amendments and the most up to date version of the specification will always be on the website.

1.6 Equality and fair access

The specification may be followed by any learner, irrespective of gender, ethnic, religious or cultural background. It has been designed to avoid, where possible, features that could, without justification, make it more difficult for a learner to access and achieve because they have a particular protected characteristic.

The protected characteristics under the Equality Act 2010 are age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex and sexual orientation.

Access arrangements and reasonable adjustments are made for eligible learners to enable them to access the assessments and demonstrate their knowledge and skills without changing the demands of the assessment.

Information on access arrangements and reasonable adjustments is found in the following document from the Joint Council for Qualifications (JCQ): Access Arrangements, Reasonable Adjustments: General and Vocational Qualifications. This document is available on the JCQ website (www.jcq.org.uk).

We will be following the principles set out in this document and, as a consequence of provision for reasonable adjustments, very few learners will encounter a complete barrier to any part of the assessment.

2 SUBJECT CONTENT

The GCSE Design and Technology qualification is available in the following pathways:

- Engineering Design
- Fashion and Textiles
- Product Design.

Learners are required to study **one** of these three pathways.

Both Unit 1: Design and Technology in the 21st Century and Unit 2: Design Project consist of:

- core knowledge and information that **all** learners are required to study to ensure they have a broad knowledge and understanding of design and technology
- in-depth content that is specific to learners' chosen pathway.

How to read the amplification

The amplification provided in the right-hand column, titled 'Further Information' uses the following five stems:

- 'Learners should know' is used when learners are required to demonstrate basic knowledge and understanding.
- 'Learners should be able to' is used when learners need to apply their knowledge and understanding to a practical situation or demonstrate application of practical skills and techniques.
- 'Learners should understand' is used when learners are required to demonstrate greater depth of knowledge and understanding, application of knowledge to familiar or unfamiliar contexts and analysis and evaluation of information for a given purpose.
- 'Learners should be aware of' is used when learners do not need to understand all aspects of the specified content in detail. Teachers should refer to Guidance for Teaching documents for further guidance on the depth and breadth to which this content should be taught.
- 'Learners are required to' is used to show the requirements of individual units.

The use of the word 'including' indicates that the specified content must be taught and could be subject to assessment.

The use of the words 'for example' or 'such as' indicates that the specified content is for guidance only, and alternative examples could be chosen.

Unit 1

Design and Technology in the 21st Century

On-screen examination – 1 hour 30 minutes
30% of qualification
80 marks

Overview of unit

The purpose of this unit is to:

- allow learners to demonstrate a wide range of knowledge, understanding and skills based on Design and Technology
- develop learners' understanding of the design, development, production and use of a range of products, both modern and historical
- provide opportunities for learners to analyse and evaluate links between principles of good design, existing solutions and technological knowledge.

This unit will focus on:

- developing an appreciation of the importance of creativity and innovation to good design practice
- analysing existing products that respond to the users' needs, wants and values
- developing learners' understanding of factors that affect and influence design including historical, social/cultural, environmental and economic.

Areas of content

1.1 Design and Technology in the 21st Century (Core Knowledge and Understanding)	
This area of study is relevant to **all** learners. In this section, learners will gain knowledge and understanding of: 1.1.1 New and emerging technologies 1.1.2 Modern and smart materials 1.1.3 Sustainable design 1.1.4 Energy storage and renewability 1.1.5 Contemporary design thinking; historical and cultural influences	
Content	Amplification

1.1.1
New and emerging technologies
	Learners should know:
	• how technology impacts product development including:
	  • about market pull
	  • about technology push.
	
	Learners should understand:
	• how new and emerging technologies can impact industry and enterprise
	• the advantages and disadvantages of computer aided design (CAD) including:
	  • augmented reality
	  • virtual reality
	  • artificial intelligence (AI)
	• the advantages and disadvantages of computer aided manufacture (CAM) including:
	  • laser cutting
	  • 3D printing
	  • 4D printing.

1.1.2
Modern and smart materials
	Learners should know:
	• about developments in modern and smart materials including:
	  • fibres, fabrics and plastics that respond to the environment or external stimuli
	  • photochromic
	  • thermochromic
	  • micro-encapsulation
	  • SMA – shape memory alloys
	  • Polymorph
	  • Biometrics.

1.1.3
Sustainable design
	Learners should know:
	• about the impact of design and technology on users, society, the environment and our world
	• about the importance of meeting today's needs without compromising the needs of future generations
	• about consumer rights and protection for consumers when purchasing and using products
	• about legislation including:
	  • British Standards Institute (BSI)
	  • International Standards Organisation (ISO)
	  • Trade Descriptions Act.
	
	Learners should be able to:
	• conduct a life-cycle analysis of a material or product including:
	  • the environmental impact from cradle to grave.
	
	Learners should understand:
	• the importance of sustainability and environmental responsibilities when designing and making products including:
	  • life cycle analysis (LCA)
	  • circular economy
	  • the 6 Rs of sustainability – rethink, reuse, recycle, repair, reduce, refuse
	  • carbon footprint
	  • sustainable design and built in/planned obsolescence
	  • the responsibilities of designers and manufacturers for example:
	  • the environment
	  • Fair Trade
	  • working conditions.
	• the impact products have on users and society, including:
	  • global responsibilities and its effects on people and culture
	  • moral and ethical factors related to the manufacture of products, the sale and use of products
	  • the Product Life Cycle (the product's commercial life) – introduction, growth, maturity, decline.

1.1.4
Energy storage and renewability
	Learners should know about:
	• renewable and non-renewable energy sources, including:
	  • wind/wind turbines
	  • solar/photovoltaic cells
	  • hydrogen fuel cells
	  • geothermal
	  • hydroelectric
	  • wood/biomass
	  • wave/tidal
	  • coal
	  • gas
	  • nuclear
	  • oil
	• the use of renewable energy sources for products, for example:
	  • wind-up and photovoltaic cells.
	
	Learners should understand:
	• issues surrounding the use of fossil fuels including coal, oil and gas
	• the advantages and disadvantages of renewable energy sources
	• the importance of using renewable energy sources in modern manufacturing production systems and manufacturing sites
	• how energy is generated and stored in a range of contexts including:
	  • motor vehicles for example:
	  • petrol/diesel
	  • electric
	  • household products for example:
	  • battery
	  • solar
	  • mains electricity.

1.1.5
Contemporary design thinking; historical and cultural influences
	Learners should be able to:
	• describe how history and culture can influence contemporary design thinking
	• identify and discuss works of past and present designers, including:
	  • Engineering Design pathway only:
	  • Lord Richard Rogers
	  • Mark Rober
	  • Fashion and Textiles pathway only:
	  • Sian O'Doherty
	  • Iris Van Herpen
	  • Product Design pathway only:
	  • Frank Lloyd Wright
	  • Alessi & Co.
	
	Learners should understand:
	• the cyclic process and principles that support the commercial development of products, including:
	  • design briefs

	• design specifications • user centred design • communication of ideas • modelling and testing ideas • working drawings and schedules • manufacturing specifications • quality control. • factors that influence design, including: • ergonomics • anthropometrics • economic • biomimicry.

1.1(a) Design and Technology in the 21st Century (Engineering Design)

This area of study is relevant to learners that have chosen **Engineering Design** as their pathway.

In this area of study, learners will gain knowledge and understanding of:

1.1.6 Ferrous and non-ferrous metals
1.1.7 Thermoforming and thermosetting polymers
1.1.8 Modern, smart and emerging materials and technology
1.1.9 Electronic and control systems
1.1.10 Forces and movement
1.1.11 Surface finishes and treatments
1.1.12 Stock forms of materials and components
1.1.13 Engineering manufacture and industry

Content	Amplification

1.1.6
Ferrous and non-ferrous metals
	Learners should know:
	• the classifications for ferrous metals and non-ferrous metals, including:
	• ferrous metals
	  • mild steel
	  • stainless steel
	  • high-speed steel.
	• non-ferrous metals, including:
	  • copper
	  • aluminium
	  • titanium.
	
	Learners should be able to justify and compare the suitability of above-named ferrous and non-ferrous metals for a product, including:
	• aesthetic appeal
	• physical properties
	• mechanical properties.
	
	Learners should understand:
	• the physical properties of the above-named ferrous and non-ferrous metals, including:
	  • melting point
	  • thermal and electrical conductivity.
	• the mechanical properties of the above-named ferrous and non-ferrous metals, including:
	  • tensile strength
	  • toughness
	  • plasticity
	  • malleability
	  • hardness.
	• commonly used industrial manufacturing processes for metals, including:
	  • cutting metals
	  • pillar drill to drill holes to various diameters
	  • tap and die
	  • hot/cold working of sheet metals
	  • extrusion
	  • casting.

1.1.7
Thermoforming and thermosetting polymers
	Learners should know:
	• the physical characteristics of thermoplastic and thermosetting plastics, including:
	• thermoplastics:
	  • acrylic
	  • polyvinyl chloride (PVC)
	  • acrylonitrile butadiene styrene (ABS)
	  • polylactic acid (PLA)
	  • nylon (polyamide)
	  • Styrofoam and blue foam modelling.
	• thermosetting plastics:
	  • urea formaldehyde
	  • epoxy resins.
	
	Learners should be able to:
	• explain the advantages and disadvantages of using polymers in products including:
	  • sourcing raw materials
	  • life cycle of polymer
	  • single use plastics.
	
	Learners should understand:
	• the physical properties of the named polymers including:
	  • thermal conductivity
	  • electrical conductivity/insulation.
	• the mechanical properties of the named polymers, including:
	  • tensile strength
	  • toughness
	  • plasticity
	  • malleability
	  • hardness.
	• non-biodegradable and biodegradable polymers
	• commonly used industrial manufacturing processes for plastics including:
	  • injection moulding
	  • vacuum forming
	  • extrusion
	  • laser cutter
	  • 3D printing.

1.1.8
Modern, smart and emerging materials and technology
	Learners should be able to:
	• compare and explain the use of smart materials that are more appropriate for a product or component
	• identify and explain the benefits and limitations of smart materials.
	
	Learners should understand:
	• the developments in modern and smart materials
	• materials that respond to the environment or external stimuli including:
	  • shape memory materials – polymers (SMP) and metals (SMA)
	  • thermochromic
	  • photochromic
	  • conductive polymers
	  • micro-encapsulation.
	• the physical and mechanical properties of named modern materials
	• the benefits and uses for modern materials including:
	  • carbon fibre
	  • glass reinforced polyester (GRP)
	  • titanium alloy
	  • Kevlar.
	• the benefits of electrical components that respond to the environment or external stimuli including:
	  • electroluminescent film or wire i.e. LCD
	  • piezoelectric materials
	  • Quantum Tunnelling Composite (QTC).
	• the advantages and disadvantages of using new and emerging technology in engineering including:
	  • Artificial Intelligence (AI) and Machine Learning (ML)
	  • robotics and automation
	  • 3D Printing (Additive Manufacturing)
	  • Internet of Things (IoT), including:
	  • Wi-Fi connectivity
	  • Bluetooth connection
	• that emerging technology can be seen as a driving force in product development.

1.1.9
Electronic and control systems
	Learners should know:
	• the ‘systems' approach – input, process, output
	• the use of feedback in a system
	• measurements within electronic circuits, including:
	  • voltage – volts
	  • current – amps
	  • resistance – ohms (Ω)
	  • capacitance – farads
	• the principles of a control system that use input data from digital and analogue components, including:
	  • push to make switch
	  • push to break switch
	  • micro switch
	  • reed switch
	  • thermistor

	• phototransistor • light dependent resistor (LDR) • microphone • proximity sensor. • about processing control devices, including: • transistor • thyristor • integrated circuit (ICs) • microcontroller • peripheral / programmable interface controller (PIC). • about output signal receivers, including: • buzzer & piezo • loudspeaker • bulbs • light emitting diode (LED) • liquid crystal display (LCD) • motors – dc motors, servo, stepper • solenoids. • about other commonly uses electrical components in circuits including: • resistors • variable resistors • capacitors • relays. Learners should be able to: • discuss and graphically communicate concepts, including: • circuit diagrams • block diagrams • flowcharts. • read, discuss and amend common system circuit diagrams, including: • transistor circuits • Darlington pair circuits • thyristor circuits • programmable interface controller (PIC) circuits • relay circuits – used to operate higher-powered circuits. • recognise the relationships between voltage, current and resistance and calculate ohms law • calculate basic potential divides in circuits. Learners should understand: • the importance of feedback within a system • the use of sub routines or macros to control systems • the benefits and limitations of programmable microcontrollers & peripheral interface controllers (PIC) • that programmable microcontrollers & peripheral interface controllers (PIC) can interface with other devices or systems • that programmable microcontrollers & peripheral Interface controllers (PIC) can be reprogrammed repeatedly.

1.1.10
Forces and movement
	Learners should know:
	• the types of movement: linear, reciprocation, rotary, oscillation
	• the principle of a mechanical device to transform input motion and force into a desired output motion and force
	• that a mechanical system can be defined as input, process, output
	• the levers classification, including:
	  • class 1 – fulcrum at the centre of the lever
	  • class 2 – load at the centre of the lever
	  • class 3 – effort at the centre of the lever.
	
	Learners should be able to calculate:
	• velocity ratio: RV of driver*diameter of driver = RV of driven*diameter of driven
	• velocity ratio for simple and compound gear systems: RV of driver*teeth on driver = RV of driven*teeth on driven
	• the rotational velocity
	• mechanical advantage
	• forces acting in simple lever systems using the principle of moments.
	
	Learners should understand:
	• mechanical systems that can:
	  • increase or decrease speed of movement
	  • change magnitude
	  • change direction of force
	  • change movement/rotation.
	• the function of mechanical products that have:
	  • pulley and belt systems
	  • simple and compound gear systems
	  • worm drive systems
	  • bevel gear systems
	  • rack and pinion
	  • ratchet and pawl
	  • levers and linkages
	  • crank and slider
	  • cams – pear shaped, eccentric, drop/snail.
	• the effects of different forces upon simple structures, including:
	  • tension forces
	  • compression forces
	  • torsion forces – twisting action
	  • bending forces.
	• the difference between static and dynamic forces in basic structures.

1.1.11
Surface finishes and treatments
	Learners should know:
	• how different surface treatments and finishes prolong material life and are sometimes used to improve aesthetic appeal.
	
	Learners should understand:
	• the advantages and disadvantages of thermosetting and thermoforming plastics
	• mechanical components and products often requiring additional surface treatments to assist functionality
	• metal surface treatments and finishing processes including:
	  • powder and plastic coating
	  • paint and primer.
	• surface finishes applied to electronic devices for functional or aesthetic purposes, including:
	  • instructions for the user / operating scale (on/off) for adjustable components
	  • the need for protective surface finishes (solder mask) for PCBs prevented unwanted soldering or oxidisation
	  • the use of used of protective finishes for different environments (protective encapsulation) prolongs function and product life.

1.1.12
Stock forms of materials and components
	Learners should know:
	• the different common forms that metals are available in, including:
	  • rod form – round, square & hexagonal
	  • tube form – round, square
	  • strip
	  • sheet
	  • angle
	  • channel.
	• the wide range of forms that plastic polymers are available in, including:
	  • powders
	  • granules
	  • pellets
	  • liquids
	  • films
	  • sheets
	  • extruded shapes.
	• the use of bought-in components, including:
	  • fasteners – nuts and bolts, screws, rivets, washers
	  • bearings
	  • mechanical components – spur gears, worm gears, belts, motors (dc motors, stepper, servo)
	  • electrical components.
	• the advantages and disadvantages of using standard form & bought-in materials/components.

1.1.13
Engineering manufacture and industry
	Learners should understand:
	• the different scales of production
	• different methods of manufacture and when each is appropriately used, including:
	  • one-off production
	  • batch production
	  • mass production
	  • Just in Time (JIT).
	• common methods, components and interfaces for prototype modelling and testing/simulating in engineering, including:
	  • CAD software – designing and simulating function and performance
	  • breadboard circuits
	  • strip/vero board circuits
	  • printed circuit boards (PCBs).
	• appropriate manufacturing methods and techniques when producing products or components related to the scale of production needed, including:
	  • templates
	  • jigs
	  • formers
	  • CAD/CAM.
	• the process of manufacturing PCB's, including:
	  • chemical processes (e.g., ferric chloride or ammonium persulfate) etching to remove unwanted copper from a copper-clad substrate
	  • mechanical CNC milling removes excess material.
	• the advantages and disadvantages of CAD/CAM in the production of a product and/or component
	• the advantages and disadvantages of through hole assembly and surface mount technology (SMT) and through-hole technology (THT) when manufacturing circuits
	• the different assembly processes for electrical circuits including:
	  • manually (by hand) for small-scale production
	  • automation (pick-and-place) manufacture.
	• the advantages and disadvantages of soldering techniques, including:
	  • hand soldering
	  • reflow soldering
	  • wave soldering.
	• the importance of quality control testing in industry to limit faults, including:
	  • in-circuit testing – electrical tests for component placement, polarity, and functionality.

1.1(b) Design and Technology in the 21st Century (Fashion and Textiles)

This area of study is relevant to learners that have chosen **Fashion and Textiles** as their pathway.

In this area of study, learners will gain knowledge and understanding of:

1.1.14 Natural, synthetic, blended and mixed fibres
1.1.15 Woven, knitted and non-woven textiles
1.1.16 Technical textiles
1.1.17 Modern, smart and emerging materials and technology
1.1.18 Stock forms of materials and components
1.1.19 Surface finishes and treatments
1.1.20 Specialist techniques and processes
1.1.21 The fashion and textile industry

Content	Amplification

1.1.14
Natural, synthetic, blended and mixed fibres
	Learners should know:
	• that all fibres have inherent properties, for example:
	  • strength
	  • elasticity
	  • absorbency
	  • durability
	  • insulation
	  • flammability
	  • water repellence
	  • anti-static
	  • resistance to acid, bleach and sunlight.
	• that fibres can be blended or mixed to improve the properties and uses of yarns and fabrics, for example:
	  • Blends: polyester and cotton, silk and viscose, hemp and cotton
	  • Mixture: cotton and wool, elastane with wool, nylon and cotton.
	• that polymers can be natural or synthetic
	• the difference between a fibre and a polymer
	• the differences between a thermoforming (thermoplastic) and thermosetting material or fibre
	• the properties of polymers, for example:
	  • weight
	  • hardness
	  • elasticity
	  • conductivity/insulation
	  • toughness
	  • strength.
	
	Learners should be able to distinguish between finite and non-finite fibres and explain the environmental impact of each named fibre.
	
	Learners should understand that fibres are classified according to their source, including:
	• natural fibres:
	  • animal fibres – wool/fleece including mohair, cashmere, angora, alpaca, llama

	• insect fibres – silk • plant (cellulosic) fibres – cotton, linen, hemp, jute, bamboo, soya. • synthetic fibres: • polyester • acrylic • nylon (polyamide) • elastane (Lycra®). • regenerated fibres: • viscose • acetate • lyocell • the difference between fibre types, including: • staple filaments • continuous filaments • textured yarns • novelty yarns for example chenille. Learners should be aware that the fibre type determines the fabric weight, flexibility, handle and end use of materials.
1.1.15 Woven, knitted and non-woven textiles	Learners should know: • that textile materials have different characteristics depending on the method of construction. Learners should be able to: • explain the advantages and disadvantages of each construction method and how they affect end use. Learners should understand: • that textile materials are made by different methods of construction, including: • woven: • plain • twill • satin • herringbone • pile. • knitted: • warp knit • weft knit. • non-woven: • thermal – heat and pressure • mechanical – needle punched • chemical – use of adhesives. • laminating methods, including: • use of breathable membranes • bonding foam to knitted or woven fabric • bonding plastic to cotton to simulate leather. • coated fabrics, for example: • PVC. • felting • quilting.

	Learners should be aware that the fibre source, yarn type, construction method and applied finishes all contribute to a textile fabric's characteristics and end use.

1.1.16
Technical textiles
	Learners should understand:
	• that fibres can be engineered with properties for a specific end purpose including:
	• Aramid fibres; including:
	  • Nomex
	  • Kevlar.
	• Carbon fibre
	• Geotextiles used in agriculture, construction and landscaping
	• Windproof materials made by very close weave construction.

1.1.17
Modern, smart and emerging materials and technology
	Learners should know about developments in modern and smart materials, including:
	• fibres, fabrics and plastics that respond to the environment or external stimuli, including:
	  • photochromic
	  • thermochromic
	  • micro-encapsulation
	  • phase changing materials (PCMs).
	• conductive threads and materials
	• electronic textiles (e-textiles) that contain electronic components and circuits, for example:
	  • heart rate monitors
	  • heating elements.
	• breathable materials, for example:
	  • Gore-Tex.
	• Microfibres, including:
	  • Modal®
	  • Tactel®.
	
	Learners should understand:
	• that emerging technology can be seen as a driving force in product development.

1.1.18
Stock forms of materials and components
	Learners should know:
	• that textile materials come in standard widths, including:
	  • 90cm
	  • 115cm
	  • 150cm
	  • 200cm
	  • 240cm.
	
	Learners should be able to:
	• estimate material quantities and costs based on best use of materials
	• calculate costs, sizes and quantities for components
	• identify different types of stock forms for textile components and explain their suitability/use in products including:
	  • fastenings:
	  • zips

	• buttons • buckles • Velcro • eyelets • ties • press studs. • threads: • embroidery • sewing • overlocker • conductive. • trims: • lace • braids • ribbon • tapes • cords • elastics • support, (for example boning) • beads • sequins • lights (LEDs). • select and justify the use of components in fashion and textile products.
1.1.19 Surface finishes and treatments	Learners should be able to: • select, describe and use a range of decorative techniques to embellish textile materials, including: • Dyeing: piece, dip, random, tie and dye, batik (as above) • Printing: silk screen, roller, block, marbling, digital ink-jet transfer (CAM) • Painting: felt tip, fabric paint, stencilling • Embroidery: including hand, free machine and computerised • Appliqué • Beadwork • Patchwork • Laser cutting and engraving • Quilting • 3D printing. Learners should understand: • the importance of applying specialist finishes to textile materials • that finishes are applied to textile materials for different reasons including: • aesthetic qualities: • colour • pattern • texture • lustre • weight.

	• physical:
	  • weave
	  • density
	  • drape.
	• economic:
	  • fibre content
	  • directional pile
	  • cost
	  • pattern match.
	• performance:
	  • strength
	  • durability
	  • safety
	  • stretch
	  • absorbency
	  • insulation
	  • water/windproof
	  • anti-static.
	• that a variety of finishing processes are applied to textile materials, including:
	  • to enhance aesthetic quality, for example:
	  • surface decoration
	  • brushing
	  • stain resistance (Scotchguard, Teflon).
	  • to enhance fabric life, for example:
	  • flame retardant
	  • to improve functionality:
	  • Shower proofing using PVA or PVC or wax
	  • crease resistance using resin
	  • waterproofing using silicones
	  • shrink resistance using chlorine treatment
	  • anti-static finish.

1.1.20
Specialist techniques and processes
	Learners should be able to:
	• identify and describe the correct specialist tools and equipment, including:
	  • different types of scissors
	  • different types sewing machines, including:
	  • computerised embroidery machines
	  • over locker.
	• identify and describe specialist techniques and processes to construct high quality prototypes, including:
	  • pattern language for lay plans including:
	  • lengthwise/crosswise folds
	  • cutting on the bias
	  • notches/balance marks
	  • grain lines
	  • tuck/pleat lines
	  • darts
	  • positions for pockets, buttons/holes
	  • centre front/back lines
	  • seam tolerance.
	  • methods of transferring pattern marks, including:
	  • tailor's chalk

	• tailor's tacking.
	• visual checks for pattern drop/match
	• correct use of thread, including:
	  • colour
	  • type
	  • shade
	  • stitch length.
	• selection of correct needle type for material
	• appropriate choice of construction techniques, including:
	  • joining: seams – plain, French, double stitched, overlocked, bound, neatening methods
	  • shaping: darts, princess line seams, gathers, tucks, pleats, casings (draw cord/elastic), use of elastic
	  • edge finishes: hems (types of), facings, piping, frills, binding.
	• identify and use style details, including:
	  • sleeves: raglan, set-in, gathered, short/long
	  • necklines: square, round, V, halter, sweetheart, boat
	  • collars: shirt, rever, roll, shawl
	  • pockets: patch, shaped, in-side seam
	  • fastenings: zips, buttons, buckles, Velcro, eyelets, ties, poppers
	  • pleats: knife, box, inverted, kick
	  • leg lengths: shorts, cropped, long.
	
	Learners should be aware of:
	• comparable industrial processes for mass production
	• industrial tools and equipment for large scale manufacture, for example, computerised lay planning and fabric spreading.

1.1.21
The fashion and textile industry
	Learners should understand:
	• the different scales of production
	• different methods of manufacture and when each is appropriately used, including:
	  • job production (custom-made, bespoke or one–off)
	  • batch production
	  • mass production
	  • Just in Time (JIT).
	• how manufacturing systems are organised, including:
	  • straight line production
	  • progressive bundle system (PBS)
	  • cell production.
	• the advantages and disadvantages to manufacturers and workers employed in each manufacturing system
	• how CAD/CAM is used in industry including the advantages/disadvantages, laser cutting, 3D printing
	• that different sectors exist within the fashion industry, including:
	  • street style fashion
	  • contemporary fashion

	◦ ready to wear (prêt-à-porter) ◦ designer ◦ haute couture. • the role of designers, image makers, trendsetters and influencers • fashion forecasting and predictions • the role of leading international fashion centres.

1.1(c) Design and Technology in the 21st Century (Product Design)

This area of study is relevant to learners that have chosen **Product Design** as their pathway.

In this area of study, learners will gain knowledge and understanding of:

1.1.22 Ferrous and non-ferrous metals
1.1.23 Natural and manufactured timbers
1.1.24 Thermoforming and thermosetting plastics
1.1.25 Modern, smart and emerging materials and technology
1.1.26 Specialist techniques and processes
1.1.27 Surface finishes and treatments
1.1.28 Stock forms of materials and components
1.1.29 Product manufacture and industry

Content	Amplification

1.1.22
Ferrous and non-ferrous metals
	Learners should be able to compare and explain the suitability of metals for a product, including:
	• aesthetic appeal
	• physical properties.
	
	Learners should understand:
	• the aesthetic and functional properties of ferrous metals, including:
	  • mild steel
	  • stainless steel
	  • high carbon steel.
	• the aesthetic and functional properties of non-ferrous metals, including:
	  • titanium
	  • aluminium
	  • copper
	  • brass.
	• the functional properties of the above-named ferrous and non-ferrous metals, including:
	  • melting point
	  • thermal and electrical conductivity.
	• the mechanical properties of the above-named ferrous and non-ferrous metals, including:
	  • tensile strength
	  • toughness
	  • density
	  • plasticity
	  • malleability
	  • hardness.

1.1.23
Natural and manufactured timbers
	Learners should be able to:
	• differentiate between a hardwood and softwood
	• differentiate between natural wood and man-made boards.
	
	Learners should understand:
	• the aesthetic and functional properties of hardwoods and softwoods, including:
	  • beech
	  • balsa
	  • scots pine
	  • parana pine.
	• the aesthetic and functional properties and strengths/weaknesses of manufactured boards, including:
	  • plywood
	  • medium density fibreboard (MDF).
	• the physical and working properties of hardwoods, softwoods and man-made boards, including:
	  • toughness
	  • flexibility
	  • strength
	  • absorbency
	  • surface finish
	  • colour.

1.1.24
Thermoforming and thermosetting plastics
	Learners should know:
	• how different surface treatments and finishes prolong material life and are sometimes used to improve aesthetic appeal.
	
	Learners should understand:
	• the aesthetic and functional properties of thermoforming and thermosetting polymers, including:
	  • acrylic
	  • styrofoam and other modelling foams
	  • acrylonitrile butadiene styrene (ABS)
	  • nylon
	  • epoxy resins.
	• the advantages and disadvantages of thermosetting and thermoforming plastics
	• the physical properties of thermoforming (thermoplastic) and thermosetting plastics, including:
	  • thermal conductivity
	  • electrical conductivity/insulation.
	• the mechanical properties of thermoforming (thermoplastic) and thermosetting plastics, including:
	  • tensile strength
	  • elasticity
	  • toughness
	  • plasticity
	  • malleability
	  • hardness.
	• the advantages and disadvantages of biopolymers and synthetic oil-based polymers.

1.1.25
Modern, smart and emerging materials and technology
	Learners should know about:
	• the developments in modern and smart materials, including:
	  • metals, plastics and electrical components that respond to the environment or external stimuli, including:
	  • photochromic and polymers
	  • thermochromic
	  • micro-encapsulation
	  • shape memory materials, for example, nitinol
	  • polymorph
	  • conductive polymers
	  • biometrics
	  • phase changing materials (PCM).
	  • composite materials and their application, including:
	  • carbon fibre
	  • glass reinforced plastic
	  • fibreglass.
	• how emerging technologies help enhance product development, their connectivity and their function, including:
	  • Bluetooth
	  • Wi-Fi
	  • the Internet of Things (IoT)
	  • the role of AI and machine learning in the development of products.
	
	Learners should understand:
	• that emerging technology can be seen as a driving force in product development.

1.1.26
Specialist techniques and processes
	Learners should know about:
	• wastage/addition, including:
	  • cutting materials to the required shape or contour
	  • tools and equipment to mark out, hold, cut, shape, drill and form materials
	  • jigs and formers to ensure accuracy in manufacture
	  • pilot, clearance, tapping, countersunk and counterbored holes
	  • marking out materials using a range of tools.
	
	• deforming/reforming, including:
	  • permanent and temporary metal joining methods, including:
	  • soldering
	  • nuts and bolts
	  • screws
	  • riveting
	  • lathe to turn materials
	  • wooden joining methods can be both permanent and temporary.
	
	• producing wooden products, including:
	  • joints – Frame: Mitre, dowel
	  • Box/carcass: butt lap.

	Learners should understand about:
	• CAM machines, including:
	  • laser cutters
	  • 3D printers.
	• plastics and how they can be joined in a permanent or temporary way, including:
	  • plastic welding
	  • nuts, bolts and washers
	  • screws
	  • rivets.
	• adhesives and the materials they are used on including:
	  • polyvinyl acetate (PVA) (wood to wood)
	  • contact adhesive
	  • epoxy resin (wood to other materials).
	• commonly used industrial manufacturing processes for metals, including:
	  • pillar drill to drill holes to various diameters
	  • extrusion
	  • casting.
	• commonly used industrial manufacturing processes for woods, including:
	  • sawing woods
	  • pillar drill to drill holes to various diameters
	  • lathe
	  • jointing
	  • veneering
	  • laminating.
	• commonly used industrial manufacturing processes for plastics, including:
	  • injection moulding
	  • vacuum forming
	  • extrusion
	  • laser cutter
	  • 3D printing.

1.1.27
Surface finishes and treatments
	Learners should know how different surface treatments and finishes prolong material life and can be used to improve aesthetic appeal.
	
	Learners should understand:
	• metal surface treatments and finishing processes, including:
	  • powder and plastic coating
	  • paint
	  • primer.
	• how natural timber and manufactured timbers and boards can be protected using:
	  • varnish
	  • wax
	  • paint
	  • sealants and primers.
	• the self-finishing nature of many thermosetting and thermoforming plastics.

1.1.28
Stock forms of materials and components
	Learners should know that:
	• natural timber is available in different sectional forms, various standard sizes (sawn or planed), for example:
	  • dowel
	  • plank
	  • board.
	• manufactured boards are commonly available in sheet form and in standard sizes and various thicknesses
	• standardised fixtures and fittings that allow for the manufacture of mass-produced products to be self-assembly, including:
	  • KDF (Knock-down fittings).
	• plastic polymers are available in a wide range of forms, including:
	  • powders
	  • granules.

1.1.29
Product manufacture and industry
	Learners should understand:
	• the different scales of production
	• different methods of manufacture and when each is appropriately used, including:
	  • job production (custom-made, bespoke or one–off)
	  • batch production
	  • mass production
	  • Just in Time (JIT).
	• the importance of CAM in modern high-volume production
	• the use of Ergonomics and Anthropometrics in the design and development of products
	• the role of leading national and international design organisations such as the Design Council.
	
	Learners should know:
	• how manufacturing systems are organised
	• the most appropriate scale of production
	• about continuous flow production.

Unit 2

Design Project

Non-examination assessment
70% of qualification
100 marks
Assessment duration: Approximately 40 hours

Overview of unit

The purpose of this unit is to:

- offer learners the opportunity to identify and solve 'real life' problems by designing and making products or systems that respond to the target markets' needs, wants and values
- offer learners the opportunity to apply the iterative design process while developing solutions, including the analysis, evaluation and refinement of ideas as they develop
- develop learners' ability to manufacture high quality, fully functioning prototypes, fit for purpose and fulfilling the needs, wants and values of the users.

This unit will focus on:

- the identification of a range of possible design opportunities
- the production of a clear design brief(s) and detailed specifications that allow design ideas to be generated, tested, developed and refined into quality proposals
- applying the iterative design process to provide creative and innovative solutions
- the production of quality final prototypes that solve identified problems, using appropriate tools, equipment and processes safely and effectively
- analysing and evaluating design solutions considering the end users' needs, wants and values.

Areas of content

2.1 Design Project (Core Knowledge and Understanding)

This area of study is relevant to **all** learners.

In this section, learners will gain knowledge and understanding of:

2.1.1 Contextual challenges and user-centred design
2.1.2 Research and investigation
2.1.3 Design briefs and specifications
2.1.4 Iterative design
2.1.5 Manufacturing prototypes
2.1.6 Analysing and evaluating design decisions and prototypes

Content	Amplification
2.1.1 Contextual challenges and user-centred design	Learners should understand: • that contexts are a starting point to inform possible outcomes • the principles of a user-centred design approach. Learners are required to: • identify problems and opportunities for design, and the development of possible briefs • identify potential user groups • consider the needs, wants and values of the end user(s).

2.1.2
Research and investigation
	Learners should be able to:
	• explore and investigate existing products and/or situations before deciding upon whether there is a real need for a product.
	
	Learners are required to:
	• conduct relevant research and investigation, including:
	  • research, for example:
	  • a client interview
	  • secondary research, for example:
	  • published demographic research
	  • collate data and use it to aid further work
	  • use collated data to inform possible specification points for designing.

2.1.3
Design briefs and specifications
	Learners should be able to:
	• write design briefs for specific needs, wants or interests
	• write specifications that are derived from their own investigations, including:
	  • the needs, wants and values of users
	  • qualitative and quantitative criteria.

2.1.4
Iterative design
	Learners should understand:
	• that designing does not take place in isolation, there are wider issues to be considered, including:
	  • ergonomics
	  • anthropometrics
	  • environmental
	  • social
	  • economic
	  • moral.
	• the constraints that influence the process of design and making
	• that the world around us can influence and inspire design and design thinking, including:
	  • biomimicry and the natural world
	  • inanimate objects for example architecture.
	• different design strategies that can be used to generate initial ideas and avoid design fixation, for example:
	  • collaboration – discover, define, develop, deliver
	  • user-centred design
	  • systems thinking.
	
	Learners are required to:
	• explore and develop their ideas using an iterative approach
	• communicate, record and justify design ideas, applying suitable techniques appropriate to endorsed pathways, for example:
	  • formal and informal 2D and 3D drawing
	  • system and schematic diagrams
	  • annotated sketches
	  • exploded diagrams
	  • fashion illustrations and fashion drawings
	  • fashion flats

	• models, samples, toiles • presentations • written notes • flow diagrams • working drawings • schedules • audio and visual recordings • mathematical modelling • computer-based tools, for example, AI.

2.1.5
Manufacturing prototypes
	Learners are required to:
	• design, develop and manufacture a prototype, which:
	  • responds to the needs and wants of the user
	  • is fit for purpose
	  • is of high quality
	  • exhibits good/excellent craftsmanship
	  • demonstrates functionality
	  • considers aesthetic values for example: feel, texture, shape, colour
	  • addresses marketability – in its current form or requires further development
	  • includes innovative features, for example, use of smart materials.
	
	NOTE: In the context of this unit, 'prototype' is used to describe all working solutions including products, models and systems.

2.1.6 Analysing and evaluating design decisions and prototypes	Learners are required to: • respond thoughtfully and make informed judgements when evaluating their own prototype • act on the views of others • make suggestions for improvements of their own prototype and how these modifications could be made • respond to feedback from others or clients and suggest improvements/modifications of their prototype.

2.1 (a) Design Project (Engineering Design)

This area of study is relevant to learners that have chosen **Engineering Design** as their pathway.

In this area of study, learners will gain knowledge and understanding of:
2.1.7 Materials and components
2.1.8 Marking out methods
2.1.9 Specialist techniques and processes
2.1.10 Surface treatments and finishes

Content	Amplification
2.1.7 Materials and components	Learners should be able to select and utilise the most suitable and appropriate materials and/or components to realise their selected prototype.

2.1.8
Marking out methods
	Learners should be able to:
	• use appropriate and accurate marking out methods to create a specific outcome, including:
	  • measure and mark out accurately
	• use a range of tools and equipment as appropriate, for example:
	  • steel rules
	  • scribers
	  • engineering squares
	  • punches
	  • odd-leg callipers
	• consider how to minimise waste and make allowances for effective cutting methods
	• employ accurate measuring techniques and establish reference points or datum faces
	• ensure precision in lines and surfaces
	• use centre squares or combination squares for marking the centres of round bars, and surface plates and Vee blocks for accurate measurements
	• implement accurate templates, jigs, and/or patterns
	• work within specified tolerances.

2.1.9
Specialist techniques and processes
	Learners should be able to:
	• select and use specialist techniques, hand tools, and appropriate machinery, for example:
	  • micrometres
	  • soldering equipment
	  • vernier callipers
	  • lathes
	  • vacuum formers
	  • laser cutters
	  • CNC machines
	  • 3D printers
	  • pillar drills.
	• recognise the importance of sub-assembling parts or components prior to applying any finishing processes
	• apply appropriate construction techniques for example:
	  • joining / fixings and adhesives
	  • manufacture quality prototypes.

	Learners should know:
	• about and adhere to all relevant health and safety regulations as appropriate to the environment they are working in
	• how to apply quality control and quality assurance checks.
	
	Learners should be aware of:
	• other techniques, materials, and/or components as appropriate to the prototype, for example:
	  • wastage
	  • addition
	  • deforming
	  • reforming.

2.1.10
Surface treatments and finishes
	Learners should be able to:
	• select and use appropriate surface finishing techniques for different materials, for example:
	  • adding ribs, textures, contours or user interface features for surface details,
	  • include specific features for components like LEDs, switches, variable resistors, display outputs, speakers and other appropriate control components.
	• utilise appropriate finishing techniques for electronic and mechanical systems to enhance functionality and product life, for example:
	  • polishing, painting or applying appropriate finishes to specific materials
	  • including user information such as on/off positions of switches
	  • produce and apply logos, graphics and decals for products
	  • including appropriate methods for accessing control systems of products, for example, battery compartments, or internal systems.
	• understand the importance of finishing techniques in protecting materials and enhancing their aesthetic qualities.

2.1 (b) Design Project (Fashion and Textiles)

This area of study is relevant to learners that have chosen **Fashion and Textiles** as their pathway.

In this area of study, learners will gain knowledge and understanding of:
2.1.11 Materials and components
2.1.12 Marking out methods
2.1.13 Specialist techniques and processes
2.1.14 Surface treatments and finishes

Content	Amplification
2.1.11 Materials and components	Learners should be able to select and utilise the most suitable and appropriate materials and/or components to realise their selected prototype.

2.1.12
Marking out methods
	Learners should be able to:
	• use appropriate and accurate marking out methods to create a specific outcome, including:
	  • measure and mark out accurately
	  • use a range of tools and equipment as appropriate, for example:
	  • rulers
	  • tape measure
	  • tailor's chalk
	  • tacking
	  • pins.
	• consider how to minimise waste and make allowances for effective cutting methods
	• measure standard seam allowances – 1.5cms or 15mm
	• use pattern language and marking, for example:
	  • darts
	  • pleats
	  • grain lines
	  • centre lines
	  • buttonholes.
	• use templates, and/or patterns
	• size and position of embellishments.

2.1.13
Specialist techniques and processes
	Learners should be able to:
	• select and use specialist techniques and processes to shape, construct and assemble a high-quality prototype, as appropriate to the materials and/or components being used
	• select and use hand tools and appropriate machinery to the material being shaped or worked, for example:
	  • fabric
	  • shears
	  • sewing machine
	  • over locker
	  • laser cutter.
	• apply appropriate construction techniques, for example:
	  • seam type
	  • edge finishes.

	Learners should know:
	• about and adhere to all relevant health and safety regulations as appropriate to the environment they are working in
	• how to apply quality control and quality assurance checks.
	
	Learners should be aware of:
	• other techniques, materials, and/or components as appropriate to the prototype, for example:
	  • wastage
	  • addition
	  • deforming
	  • reforming.

2.1.14
Surface treatments and finishes
	Learners should be able to:
	• select and utilise appropriate surface treatments and finishes for functional and aesthetic purposes for example:
	  • surface embellishments
	  • embroidery
	  • printing/colouring
	  • quilting.
	• use appropriate surface finishes for different materials
	• use appropriate finishes to protect and enhance aesthetic qualities and materials, for example:
	  • fixing colours
	  • appropriate seam finishes (internal and external)
	  • pressing.
	• understand the importance of finishing techniques in protecting material and enhancing their aesthetic qualities.

2.1(c) Design Project (Product Design)

This area of study is relevant to learners that have chosen **Product Design** as their pathway. This area of study is presented in four distinct topics.

In this area of study, learners will gain knowledge and understanding of:

2.1.15 Materials and components
2.1.16 Marking out methods
2.1.17 Specialist techniques and processes
2.1.18 Surface treatments and finishes

Content	Amplification
2.1.15 Materials and components	Learners should be able to select and utilise the most suitable and appropriate materials and/or components to realise their selected prototype.

2.1.16
Marking out methods
	Learners should be able to:
	• use appropriate and accurate marking out methods to create a specific outcome, including:
	  • measure and mark out accurately
	  • use a range of tools and equipment as appropriate, for example:
	  • ruler
	  • tape measure
	  • points and datum
	  • centre squares or combination squares for marking centres of round bars
	  • surface plates and Vee block
	  • use of accurate templates, jigs
	  • consider how to minimise waste and make allowances for effective cutting methods
	  • ensure precision in lines and surfaces
	  • work within specified tolerances.

2.1.17
Specialist techniques and processes
	Learners should be able to:
	• select and use specialist techniques and processes to shape, construct and assemble a high-quality prototype, as appropriate to the materials and/or components being used
	• select and use specialist techniques
	• select and use hand tools and appropriate machinery to the material being shaped or worked, for example:
	  • pillar drills
	  • lathes
	  • vacuum formers
	  • laser cutters
	  • CNC lathes
	  • 3D printers.
	• apply appropriate construction techniques, for example:
	  • joints or fixings
	  • adhesives.

	Learners should know:
	• about and adhere to all relevant health and safety regulations as appropriate to the environment they are working in
	• how to apply quality control and quality assurance checks.
	
	Learners should be aware of:
	• other techniques, materials, and/or components as appropriate to the prototype, for example:
	  • wastage
	  • addition
	  • deforming
	  • reforming.

2.1.18
Surface treatments and finishes
	Learners should be able to:
	• select and use appropriate surface treatments and finishes for functional and aesthetic purposes, for example:
	  • surface embellishments
	  • engraving
	  • etching
	  • vinyl stickers.
	• use appropriate surface finishes for different materials
	• use appropriate finishes to protect and enhance aesthetic qualities and materials, for example:
	  • primers and paint (including spray paint)
	  • wax
	  • removal of saw marks and polished edges on plastic
	  • dip coating.
	• understand the importance of finishing techniques in protecting materials and enhancing their aesthetic qualities.

Opportunities for integration of learning experiences

GCSE Design and Technology generates opportunities for the following learning experiences to be developed (experiences will not be directly assessed):

- engage with the work of designers to develop an appreciation of how design thinking is applied and of the diverse range of careers and occupations that use it
- engage with local developments, projects and initiatives that demonstrate how design thinking is applied and of the diverse range of careers and occupations that use it
- explore the ways in which design thinking has been used to solve problems nationally and across the world
- collaborate with others to understand the role that feedback can play in strengthening and testing design thinking, and of how teams can work together to solve complex problems
- experiment with materials in safe and controlled environments to understand their properties and possibilities
- gain awareness and appreciation of some of the different careers and work-related areas that draw upon design and technology.

Further amplification of the opportunities to develop cross-cutting themes, cross-curricular skills and integral skills can be found in Appendix A. The Guidance for Teaching will include further information on the opportunities provided by the qualification for teachers/centres to integrate these learning experiences into delivery.

3 ASSESSMENT

The Assessment Pack will include all detailed information relating to assessment.

3.1 Assessment Objectives and Weightings

Below are the assessment objectives for this specification. Learners must:

AO1
Demonstrate knowledge and understanding of the principles, materials, tools and techniques used in design and technology.

AO2
Apply knowledge and understanding of the principles, materials, tools and techniques used in design and technology.

AO3
Develop designs and tangible products.

AO4
Analyse and evaluate products and solutions in a range of design and technology contexts.

The table below shows the weighting of each assessment objective for each unit and for the qualification as a whole.

	AO1	AO2	AO3	AO4	Total
Unit 1	15%	15%	-	-	30%
Unit 2	-	15%	35%	20%	70%
Overall weighting	**15%**	**30%**	**35%**	**20%**	**100%**

3.2 Arrangements for non-examination assessment

Unit 2: Design Project

Learners must select the **same** design pathway as they selected for Unit 1: Design and Technology within the 21st Century. The three available pathways are:

- Engineering Design
- Fashion and Textiles
- Product Design.

Learners are required to complete a sustained design and make task, based on a contextual challenge set by WJEC, assessing learners' ability to:

- identify, investigate, analyse and outline design possibilities
- design and make prototypes and evaluate their fitness for purpose.

Learners may complete the unit at any time during the GCSE course once the contextual challenges are released on 1 April on Portal. However, centres should ensure that assessment is completed only when learners have undertaken the necessary teaching and learning and developed the required skills and knowledge.

The suggested assessment duration is approximately 40 hours.

The assessment contributes to 70% of the overall qualification and will be marked out of a total of 100 marks.

This unit will be assessed by the centre and externally moderated by WJEC.

4 MALPRACTICE

Before the course starts, the teacher is responsible for informing candidates of WJEC's regulations concerning malpractice. Candidates must not take part in any unfair practice in the preparation of work for GCSE Design and Technology.

Information regarding malpractice is available in our Guide to preventing, reporting and investigating malpractice.

All cases of suspected or actual malpractice must be reported immediately to WJEC (malpractice@wjec.co.uk). If candidates commit malpractice, they may be penalised or disqualified from the examinations.

In all cases of malpractice, centres are advised to consult the JCQ booklet Suspected Malpractice: Policies and Procedures.

5 TECHNICAL INFORMATION

5.1 Making entries

This is a linear qualification in which all assessments must be taken at the end of the course. Non-examination assessed units can be completed earlier in the course but must be submitted at the end of the course.

Assessment opportunities will be available in the summer series until the end of the life of this specification. Summer 2028 will be the first assessment opportunity.

A qualification may be taken more than once. Candidates must resit all examination units in the same series.

Learners who resit examination units can carry forward the marks they received for non-examination assessed units from the first time they attempted the qualification.

Marks for non-examination assessment (NEA) may be carried forward for the life of the specification. If a candidate resits an NEA unit (rather than carrying forward the previous NEA mark), it is the new mark that will count towards the overall grade, even if it is lower than a previous attempt (unless the mark is absent).

The entry codes appear below:

	Entry code	
	English medium	**Welsh medium**
WJEC GCSE Design and Technology (Engineering Design)	3481QS	3481CS
WJEC GCSE Design and Technology (Fashion and Textiles)	3482QS	3482CS
WJEC GCSE Design and Technology (Product Design)	3483QS	3483CS

The current edition of our Entry Procedures and Coding Information gives up-to-date entry procedures.

5.2 Grading, awarding and reporting

GCSE qualifications are reported on an eight point scale from A*-G, where A* is the highest grade. Results not attaining the minimum standard for the award will be reported as U (unclassified).

Appendix A: Opportunities for embedding elements of the Curriculum for Wales

Curriculum for Wales Strands	Unit 1	Unit 2
Cross-cutting Themes		
Local, National & International Contexts	✓	✓
Sustainability aspect of Local, National & International Contexts	✓	✓
Relationships and Sexuality Education		✓
Diversity		✓
Human Rights Education	✓	✓
Careers and Work-Related Experiences	✓	✓
Cross-curricular Skills - Literacy		
Listening	✓	✓
Reading	✓	✓
Speaking	✓	✓
Writing	✓	✓

Curriculum for Wales Strands	Unit 1	Unit 2
Cross-curricular Skills - Numeracy		
Developing Mathematical Proficiency	✓	✓
Understanding the number system helps us to represent and compare relationships between numbers and quantities	✓	✓
Learning about geometry helps us understand shape, space and position and learning about measurement helps us quantify in the real world	✓	✓
Learning that statistics represent data and that probability models chance help us make informed inferences and decisions	✓	✓
Digital Competence		
Citizenship	✓	✓
Interacting and Collaborating	✓	✓
Producing		✓
Data and Computational Thinking	✓	✓
Integral Skills		
Creativity and Innovation	✓	✓
Critical Thinking and Problem Solving	✓	✓
Planning and Organisation	✓	✓
Personal Effectiveness	✓	✓