



Design and Technology

GCSE 2012

D&T: Industrial Technology

Specification

J304 – Full Course

Version 2

May 2016



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DON'T FORGET – you can download a copy of this specification and all our support materials at www.ocr.org.uk/gcse2012

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Vertical black lines indicate a significant change to the previous printed version.

1 Introduction to GCSE in Design Technology: Industrial Technology

1.1 Introduction to the Innovator Design and Technology Suite

The Innovator Design and Technology suite comprises five Design and Technology GCSEs for the innovators of the future:

- Electronics and Control Systems
- Graphics
- Industrial Technology
- Resistant Materials
- Textiles Technology

All five specifications follow the same structure:

Unit 1: Introduction to designing and making

- Developing research and investigation skills
- Developing drawing skills where appropriate
- Modelling/Trialling
- Evaluating process/product

Unit 2: Making quality products

- Designing for a need
- Working with tools and equipment
- Making a product
- Evaluating the product

Unit 3: Sustainability and technical aspects of designing and making

- Consideration of products
- Consideration of the environment
- Consideration of society and economy
- Working with tools and materials
- Selecting processes
- Designing for success

These specifications provides an innovative and imaginative suite of qualifications rewarding flair and imagination and reflecting the contemporary use of materials and information technology. One key element of these specifications is to encourage candidates to recognise the contribution they can make to meeting human needs and the environment through careful consideration and selection of sustainable resources.

Candidates have the opportunity to work with design concepts and materials in ways which recognise the need for wise choices being made in terms of meeting the needs of people, society, and the environment. Taught as a suite of qualifications, there are opportunities for efficient use of both human and physical resources. Teachers can be confident in the knowledge that they are part of a team preparing candidates for a common goal.

Candidates wishing to follow a **Short Course in any D&T material area** should take **GCSE Design and Technology Product Design units A551 and A552**, details of which can be found in GCSE Design and Technology Product Design Specification J305.

Please be aware that with effect from September 2016, Food Technology will no longer be available as part of the Innovator Design and Technology suite. For centres looking for an alternative GCSE course to replace Food Technology, we would recommend our new GCSE (9-1) in Food Preparation and Nutrition (J309). Please visit www.ocr.org.uk for details. This Food Preparation and Nutrition qualification is for first teaching in September 2016 and first assessment in 2018.

1.2 Overview of GCSE Design and Technology: Industrial Technology (J304)

Unit A541: *Introduction to designing and making*

This unit involves candidates researching, designing and subsequently modelling a functional prototype.

Candidates must select a theme set by OCR (see Appendix A). This theme can be contextualised in order to suit centre-specific circumstances.

60 marks

30% of the total GCSE marks

Controlled assessment – 20 hours

This unit is internally assessed and externally moderated.

+

Unit A543: *Making quality products*

This unit focuses on the design and manufacture of a complete product from a theme set by OCR. (See Appendix A). This should involve the candidate in the identification of a suitable design opportunity, generation of design ideas showing creativity, modelling and skilful manufacture of a quality product recording the key stages/processes of making and critical evaluation.

60 marks

30% of the total GCSE marks

Controlled assessment – 20 hours

This unit is internally assessed and externally moderated.

+

Unit A545: *Sustainability and technical aspects of designing and making.*

This unit focuses on the knowledge, skills and understanding underpinning the design and manufacture of products made from metals and plastics.

80 Marks

40% of the total GCSE marks

1 hour 30 minutes written paper

Section A consists of **15** short questions and one question which may involve sketching, annotation, short sentences and extended writing. This section will focus on sustainability, product analysis and design.

Section B consists of **three** questions which may involve sketching, annotation, short sentences and extended writing. This section will focus on the technical aspects of working with equipment and the design of products.

This unit is externally assessed.

1.3 Guided learning hours

GCSE Design and Technology: Industrial Technology requires 120–140 guided learning hours in total.

1.4 Aims and learning outcomes

GCSE specifications in Design and Technology should encourage candidates to be inspired, moved and challenged by following a broad, coherent, satisfying and worthwhile course of study and gain an insight into related sectors, such as manufacturing and engineering. They should prepare candidates to make informed decisions about further learning opportunities and career choices.

GCSE specifications in Design and Technology must enable candidates to:

- actively engage in the processes of Design and Technology to develop as effective and independent learners
- make decisions, consider sustainability and combine skills with knowledge and understanding in order to design and make quality products
- explore ways in which aesthetic, technical, economic, environmental, ethical and social dimensions interact to shape designing and making
- analyse existing products and produce practical solutions to needs, wants and opportunities, recognising their impact on the quality of life
- develop decision-making skills through individual and collaborative working
- understand that designing and making reflect and influence cultures and societies, and that products have an impact on lifestyle
- develop skills of creativity and critical analysis through making links between the principles of good design, existing solutions and technological knowledge.

1.5 Prior learning/attainment

Candidates entering this course should have achieved a general educational level equivalent to National Curriculum Level 3, or an Entry Level 3 or Entry Level within the National Qualifications framework

Introduction to GCSE in Design Technology: Industrial Technology

2.1 Unit A541: *Introduction to designing and making*

This unit focuses on:

- developing research and investigation skills
 - developing drawing skills
 - modelling
 - evaluating process.
-

This unit aims to give candidates an introduction to designing and making devices that have been engineered to perform specific operations.

Candidates must select one of the published themes (see Appendix A) as a starting point for this controlled assessment unit. Once selected, the candidate will need to identify a specific product or starting point that is associated with the theme.

Candidates undertake research associated with the specific product before establishing their own design brief and detailed specification for an improved or similarly functioning product. They develop their design and use modelling before making and testing their prototype* and evaluating the making process. Throughout the process the candidate will record research and design developments using a portfolio to include photographs and other digital media.

In order to design, model, make and test their prototype* skilfully, candidates should undertake the processes outlined overleaf.

This unit is a controlled assessment unit. For further details see Section 4.

**In this context, a prototype is defined as the first example of a product that could be further developed or modified.*

Candidates will be assessed on their ability to:

Demonstrate creativity	<ul style="list-style-type: none"> • Use appropriate recording and drawing techniques including the use of ICT. • Identify complex associations linking principles of good design and technological knowledge. • Identify trends in existing products and fully evaluate them against the needs of the intended user.
Demonstrate designing skills	<ul style="list-style-type: none"> • Produce an appropriate and considered response to a design brief. • Produce a detailed specification for the product. • Use detailed notes and annotated drawings to record original design ideas. • Use appropriate making or trialling techniques to aid product development. • Use Computer Aided Design (CAD) to support design development. • Make reasoned decisions about materials / components.
Demonstrate good making skills	<ul style="list-style-type: none"> • Plan and organise activities. • Select appropriate materials / components. • Select appropriate equipment. • Work skilfully and safely to shape, and form finish materials and assemble components. • Complete a quality prototype*. • Apply knowledge of systems and control, digital media and new technologies as appropriate. • Demonstrate a practical and thorough understanding and ability in solving technical problems effectively and efficiently as they arise. • Record key stages in the making of the product.
Demonstrate critical evaluation skills	<ul style="list-style-type: none"> • Evaluate the processes involved in making the final prototype*. • Reflect on the evaluation and suggest modifications to improve the making process.

**In this context a prototype is defined as the first example of a product that could be further developed or modified.*

2.2 Unit A543: *Making quality products*

This unit focuses on:

- designing for a need
- working with tools and equipment
- making a product
- evaluating the product.

In this unit, candidates will further develop the skills and abilities gained while undertaking Unit A541, in order to design and make a fully functioning quality product. Candidates must select one of the published themes (see Appendix A) as a starting point for this controlled assessment unit. The type of project selected needs to be challenging but realistic in terms of the resources and time available. Candidates should be encouraged to consider their own needs/requirements or that of an identified user group as well as the situation in which the product will be used.

Candidates will be required to consider the focus of the design brief before developing a design specification. Candidates need to demonstrate their ability to plan, to develop creative and original design ideas and to carry out a range of practical activities.

Candidates will evaluate their ideas critically against the design specification in order to identify, with reasons, the chosen design proposal for product development. As a result of product development, candidates will be expected to give reasoned decisions for the materials and equipment required for the production of the final product. Throughout the task the candidate will record research, design developments and production using a portfolio to include photographs and other digital media.

Candidates will test and critically evaluate their final product against a product specification.

This unit is a controlled assessment unit. See Section 4 for further details.

Candidates will be assessed on their ability to:

Develop and demonstrate designing skills	<ul style="list-style-type: none"> • Use appropriate recording and drawing techniques. • Identify complex associations linking principles of good design and technological knowledge. • Produce a creative and considered response to a design brief. • Produce a detailed specification for the product. • Use detailed notes and annotated drawings to record original design ideas. • Use appropriate modelling or trialling techniques to aid product development. • Use ICT/CAD/CAM to support design development. • Apply knowledge of digital media and new technologies as appropriate. • Use drawing and annotation clearly to communicate details of the design chosen for prototype production.
Demonstrate good making/workshop skills	<ul style="list-style-type: none"> • Plan, organise and record key manufacturing activities by means of comprehensive notes and photographic evidence. • Make reasoned decisions about materials/components. • Select appropriate materials. • Select appropriate tools and equipment. • Work skilfully and safely to shape, form and finish materials and assemble components/ingredients. • Apply knowledge of systems and control, ICT and new technologies as appropriate. • Complete the product to a high standard. • Demonstrate a practical and thorough understanding and ability in solving technical problems effectively and efficiently as they arise.
Demonstrate critical evaluation skills	<ul style="list-style-type: none"> • Evaluate the product against the specification. • Undertake detailed testing and present meaningful conclusions.

2.3 Unit A545: Sustainability and technical aspects of designing and making

This unit focuses on:

- consideration of products
 - consideration of the environment
 - consideration of society and the economy
 - working with tools and materials
 - selecting processes
 - designing for success.
-

This unit focuses on the knowledge, skills and understanding underpinning the design and manufacture of products made from metals and plastics.

The assessment of this unit is through an externally set and externally marked test.

Candidates will need a knowledge and understanding of:

- trends and innovations in design and manufacture, labelling and packaging
- social, moral, cultural, economic, environmental and sustainability issues inherent in Design and Technology
- product life cycle and life cycle analysis (LCA)
- designing and making quality manufactured products
- planning production with consideration of the use of time and resources
- performance characteristics of different materials including 'smart' and modern materials
- tools and equipment, including new technologies, used to make quality manufactured products including industrial methods of production
- the impact made by new technologies on the design and manufacture of products
- processes and techniques used to make quality manufactured products, both decorative and functional
- the impact that the use of industrial technology has on the environment, including the need to consider sustainability
- health and safety issues.

Candidates will be assessed on their knowledge of:

The 6Rs

Recycle

- Materials that can be recycled – primary, secondary, tertiary.
- Products that use recycled materials.
- Disassembly - reprocessing materials for use in new products.

Reuse

- Products that can be reused for either the same or a new purpose.
- Products that can be adapted to suit an alternative use.

Reduce

- Life cycle of product(s)/eco footprint.
- Built-in obsolescence.
- Energy and waste of production process.
- Materials – waste.

Refuse

- Issues relating to sustainable design.
- Materials we should refuse to use.

Rethink

- How it is possible to approach design problems differently.
- An existing product that has become waste, e.g. utilising the materials or components for another purpose without processing it.

Repair

- Products that can/cannot be repaired, and consider issues of repair.

Product analysis and the design of products

Social issues

- Social development, through recognising the need to consider the views of others including people with disabilities when designing and discussing designed products.
- Anthropometrics and ergonomics.
- Signs and symbols giving valuable information about materials, products and safety issues.

Moral Issues

- Conditions of working.
- Protecting the safety of users of products.
- Ethical trading initiative (ETI).

Cultural issues

- Looking at, responding to and valuing the responses of others to design solutions.
- The impact of different cultures on modern products.

Environmental issues

- Understanding and being able to select materials, including 'smart' and 'modern' materials that are both suitable and sustainable.
 - The reduction in the common use of chemicals and materials dangerous to the environment, i.e. bleaches, CFCs, toxic materials.
 - Carbon footprint – transportation of materials and goods, energy usage in manufacture.
 - Carbon offsetting.
 - The need to dispose of redundant products and their packaging in a safe and environmentally friendly way.
-

Design issues

- Identifying how good design and product choice improves the quality of life.
 - Examining the way that designers respond to changing styles, taste, technological advances and environmental pressures.
 - Eco-design – the whole system of looking at a product from design to finished article, its use of materials and energy.
 - The globalisation of products.
-

Materials

The general classification of materials

- Metals and plastics in common use in school workshops and the manufacturing industry.
 - Availability and selection of appropriate specific materials for particular applications in one-off and quantity production.
 - Market forms of materials; standard shapes and sizes of metal sections; sheet, powder and granular plastics.
-

Performance characteristics of materials

- Properties and applications of ferrous metals and alloys – including mild steel, carbon steels, alloy steels, cast iron.
 - Properties and applications of non-ferrous metals and alloys – including aluminium, copper, tin, zinc, titanium, brass, bronze, aluminium alloys, hard and soft solders.
 - Properties and applications of thermoplastics – including ABS, polyethylene, polystyrene, PVC, nylon, acrylic, PET.
 - Properties and applications of thermosetting plastics – including GRP, urea formaldehyde, epoxy resins.
-

The conversion or altering of materials into other usable forms	<ul style="list-style-type: none"> • Heat treatment of ferrous metals – annealing and normalising; case hardening of mild steel; hardening and tempering. • Work hardening and annealing of non-ferrous metals. • Combining metals to produce alloys with specific properties.
'Smart' and modern materials	<ul style="list-style-type: none"> • Including composites, polymorph, shape memory alloys and polymers, thermochromic and photochromic materials; properties and typical applications. • Understand the impact made by 'smart' and modern materials on the design and manufacture of products. • Be aware of other 'smart' and modern materials as they become available. • Be aware of developments in the field of nanotechnology and evolving applications for nanomaterials, including nanopowders, nanotubes and nanofibres.
Form of materials and their selection	<ul style="list-style-type: none"> • Recognising the importance of understanding the physical and aesthetic properties of materials when selecting a material for a specific use, as well as considering cost issues.
Pre-manufactured Components	<ul style="list-style-type: none"> • Components needed in the manufacture of a product. • Candidates should be able to identify and suggest an application for a wide range of pre-manufactured components including: <ul style="list-style-type: none"> - commercially available components, such as temporary and permanent fastening devices, springs, gears, pulleys; standard sizes and common applications; practical and economic reasons for use.
Design	<ul style="list-style-type: none"> • Generate and record a range of innovative design solutions for a specific task/user need. • Evaluate and modify ideas. • Develop design proposals. • Use a range of skills to communicate ideas, including graphic techniques, ICT including CAD and digital technologies. • Understand the purpose of prototyping when designing and making products. • Identify a variety of materials used when prototyping, including card, Plasticard, foam board, Corriflute, MDF and Styrofoam. • Identify specific ergonomic requirements within a product and apply anthropometric data when designing and making products.

Product planning	<ul style="list-style-type: none">• Produce a detailed plan for manufacturing that includes information on:<ul style="list-style-type: none">- materials and manufactured items- tools and equipment- processes- health and safety- time schedules.• Plan work to make best use of materials, components, equipment and resources, including time and energy.• Be aware of problems that arise during production and have strategies to overcome them.
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Tools and equipment	<ul style="list-style-type: none">• Basic equipment; how to select the appropriate tool and use it safely and effectively.• Tools and equipment used for measuring and marking-out on metals and plastics.• Tools and equipment used in school workshops for wasting, forming, fabrication and finishing processes.• The use of jigs, fixtures, templates and patterns to aid quantity production.• Machine tools in the school workshop; construction and operating principles; recognition of machine parts and their application.• The appropriate selection and use of machine tools for specific processes in the school workshop and the manufacturing industry.• Care and maintenance of tools and equipment.• Safe use of hand and machine tools.• Safety checks to carry out on electrical equipment before use.• Checks before use, including correct settings on machines such as lathes, milling machines and pillar drills.
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Processes

- | | |
|-----------------------|--|
| Process and skills | <ul style="list-style-type: none"> • Understand a range of processes used to make products made from metals and plastics in the school workshop and manufacturing industry. In addition, candidates should be able to name tools and equipment appropriate to these processes, including: <ul style="list-style-type: none"> - preparing, marking out, measuring and testing; using a rule, try square, callipers, dividers, scriber, punches and templates - wasting; using methods such as sawing, filing, turning, milling, drilling, punching, shearing, threading, laser cutting. • Forming processes for metal – forging, bending, casting (sand, die and investment), extrusion, presswork. • Forming processes for plastics – line bending, vacuum forming, injection moulding, extrusion, rotational moulding, blow moulding, compression moulding, laminating. • Fabrication – assembly of component parts using temporary and permanent joining methods; screw threads, standard components, clip-together mouldings, knock-down fittings, riveting, hard and soft soldering, welding. • Finishing processes – self-finishing and applied surface finishes for protection and decoration including polishing, painting, plating, plastic coating. • Process planning – stages involved in carrying out processes accurately and effectively; application of flow charts, block diagrams and tables to show sequence of operations. |
| Computer applications | <ul style="list-style-type: none"> • Use CAD packages in the school environment for producing drawings and 2D/3D images. • Use on-screen modelling and manipulation of images. • Use text, database and graphics software appropriately in school and commercial situations. • Store and share data electronically. • Apply CAD/CAM to the designing and making of models and prototypes. • Apply CAD/CAM to one-off and quantity production. • Computer control machines (CNC), including lathes, milling machines, routers, machining centres, laser cutters, robots. • Computer control automated systems, including CIM/CIE, stock control, guided vehicles. |
-

Systems and control	<ul style="list-style-type: none">• Candidates should be able to: understand that a system has three elements; input – process – output.• Explain the importance of feedback in the operation of systems.• Identify and describe types of motion – linear, reciprocating, rotary, and oscillating.• Describe how mechanical systems are used to control and modify motion.• Show knowledge and understanding of mechanisms and their component parts, including levers, linkages, gear systems, belt and pulley systems.• Identify and describe practical applications of mechanical systems; mechanical advantage and velocity ratio.
Industrial production	<ul style="list-style-type: none">• Basic commercial production methods – the appropriate application of one-off, batch and high-volume production methods to the manufacture of products in an industrial environment.• The impact of new technologies including:<ul style="list-style-type: none">- the application of CAD/CAM- rapid prototyping and rapid manufacture.• Commercial manufacturing systems – concurrent engineering, computer-integrated manufacturing (CIM) and engineering (CIE), cell production, in-line assembly, just in time (JIT), logistics.• Rapid prototyping in an industrial context.
Health and safety	<ul style="list-style-type: none">• Understand the importance of personal safety when engaged in designing and making activities, including:<ul style="list-style-type: none">- personal protective equipment- machine guards- dust and fume extraction- waste disposal- accident procedures.• Understand basic risk-assessment procedures.• Identify design modifications needed to make products safer to use.

Quality	<ul style="list-style-type: none"> • Distinguish between quality of design and quality of manufacture. • Show how the quality of a product may be affected by materials and processes used in its manufacture. • Understand the importance of dimensional accuracy in component parts for assembly. • Select and use measuring equipment appropriately: callipers, micrometers, simple gauges. • Explain the need for and application of tolerances on working drawings. • Generate designs for jigs, fixtures, templates and patterns to control accuracy in batch production of products. • Describe simple quality-control checks to ensure accuracy and quality of finish.
Product evaluation	<ul style="list-style-type: none"> • Establish the function of commercially manufactured products; determine what the product was designed to do. • Determine the intended market or user of the product. • Identify the materials and components from which products are made; give reasons why specific materials have been used by referring to the working properties of materials. • Identify the process used to make the product. • Test their own and commercially manufactured products to determine fitness for purpose and identify improvements to the design, materials and processes used.

Delivery of the Unit

In this unit, candidates could develop their knowledge and understanding through:

- focused practical tasks that develop a range of technical skills and knowledge of materials and processes
- product analysis
- design-and-make assignments that include activities relating to and resources and industrial practices.
- group discussion, researching concepts and recording information, visits to particular Technology Innovation centres, museums and industry etc.

Evidence should be collected and recorded in the form of a research report (not assessed) which can be used at the end of the unit for examination preparation.

3.1 Assessment in GCSE Design and Technology: Industrial Technology

For GCSE Design and Technology: Industrial Technology candidates must take all **three** units.

30% of the total GCSE
Controlled assessment
Approx 20 hours
60 marks
Quality of written
communication is
assessed in this unit
(see Section 3.5).

The task will require the candidate to produce:

- a design specification
- a number of concise worksheets (A3, A4 or digital equivalent) showing design development, modelling and evaluation including annotations of materials, machinery and working practices used. This may include the use of ICT to support the designing process
- a prototype that can be evaluated
- digital images/photographs of any models or mock-ups used by the candidate when designing, modelling, testing or evaluating to exemplify key stages, materials and techniques used
- digital images/photographs showing sufficient detail of the prototype in use and the quality of the finished prototype
- a completed OCR cover sheet.

Tasks (worksheets, modelling and prototyping) will be conducted under informal teacher supervision within tight guidelines specified by OCR (see Section 4).

Teachers are required to ensure that candidates do not pursue the same 'theme' for their work as submitted or intended for submission for Unit A543.

In addition to the formal 20 hours controlled assessment, there should also be further teaching time to increase the candidates' depth of knowledge and understanding in preparation for the controlled assessment.

The task must allow the candidate to:

- develop and use research and investigation skills
- develop drawing skills
- use modelling
- produce a prototype
- evaluate the process.

Candidates must use appropriate ICT to help with their work. This might include CAD/CAM, control programs, data analysis, and ICT-based sources for research and design relevant to the task.

It is not expected that the prototype product should accompany the portfolio during the external moderation process.

This controlled assessment is marked internally and externally moderated.

Unit A543: *Making quality products*

30% of the total GCSE

Controlled assessment

Approx 20 hours

60 marks

Quality of written communication is assessed in this unit (see Section 3.5).

The task will require the candidate to produce:

- a production plan including design specification
- a number of concise worksheets (A3, A4 or digital equivalent) showing design development, modelling, testing and evaluation including annotations of materials, machinery and working practices used. This may include the use of ICT to support the designing process
- a product that can be evaluated
- digital images/photographs of any models or mock-ups used by the candidate when designing, modelling, testing or evaluating to exemplify key stages, materials and techniques used
- digital images/photographs showing sufficient detail of the final product in use and the quality of the final product
- a completed OCR cover sheet.

Tasks will be conducted under informal supervision within tight guidelines specified by OCR (see Section 4).

Teachers are required to ensure that candidates do not pursue the same 'theme' for their work as submitted or intended for submission for Unit A541.

In addition to the formal 20 hours controlled assessment, there should also be further teaching time to increase the candidates' depth of knowledge and understanding in preparation for the controlled assessment.

The task will allow the candidate to:

- design for a need
- work with tools and equipment
- make a product
- evaluate the product.

Candidates must use appropriate ICT to help with their work, including CAD/CAM, control programs, data analysis, and ICT-based sources for research and design relevant to the task.

It is not expected that the final product should accompany the portfolio during the external moderation process.

This controlled assessment is marked internally and externally moderated.

Unit A545: Sustainability and technical aspects of designing and making

40% of the total GCSE

1 hour 30 mins

Written paper

80 marks

Quality of written communication is assessed in this unit (see Section 3.5).

The paper will consist of questions that focus on sustainability and technical aspects of designing and making.

Section A consists of **15** short answer questions and **one** question which may involve sketching, annotation, short sentences and extended writing. This section will focus on sustainability, product analysis and design.

Section B consists of **three** questions which may involve sketching, annotation, short sentences and extended writing.

This section will focus on the technical aspects of working with materials, tools, equipment and the design of products.

This unit is externally assessed.

3.2 Assessment Objectives (AOs)

Candidates are expected to demonstrate their ability to:

AO1	Recall, select and communicate their knowledge and understanding in Design and Technology including its wider effects.
AO2	Apply knowledge, understanding and skills in a variety of contexts and in designing and making products.
AO3	Analyse and evaluate products, including their design and production.

3.2.1 AO weightings – GCSE Design and Technology: Industrial Technology

The relationship between the units and the assessment objectives of the scheme of assessment is shown in the following grid:

Unit	% of GCSE			Total
	AO1	AO2	AO3	
Unit A541: <i>Introduction to designing and making</i>	8	18	4	30%
Unit A543: <i>Making quality products</i>		25	5	30%
Unit A545: <i>Sustainability and technical aspects of designing and making</i>	26	7	7	40%
Total	34%	50%	16%	100%

For GCSE Design and Technology: Industrial Technology candidates must take all three units.

3.3 Grading and awarding grades

GCSE results are awarded on the scale A* to G. Units are awarded a* to g. Grades are indicated on certificates. However, results for candidates who fail to achieve the minimum grade (G or g) will be recorded as *unclassified* (U or u) and this is **not** certificated.

Most GCSEs are unitised schemes. When working out candidates' overall grades OCR needs to be able to compare performance on the same unit in different series when different grade boundaries may have been set, and between different units. OCR uses a Uniform Mark Scale to enable this to be done.

A candidate's uniform mark for each unit is calculated from the candidate's raw mark on that unit. The raw mark boundary marks are converted to the equivalent uniform mark boundary. Marks between grade boundaries are converted on a pro rata basis.

When unit results are issued, the candidate's unit grade and uniform mark are given. The uniform mark is shown out of the maximum uniform mark for the unit, e.g. 40/60.

The specification is graded on a Uniform Mark Scale. The uniform mark thresholds for each of the assessments are shown below:

(GCSE) Unit Weighting	Maximum Unit Uniform Mark	Unit Grade								
		a*	a	b	c	d	e	f	g	u
30%	60	54	48	42	36	30	24	18	12	0
40%	80	72	64	56	48	40	32	24	16	0

A candidate's uniform marks for each unit are aggregated and grades for the specification are generated on the following scale:

Qualification	Max Uniform Mark	Qualification Grade								
		A*	A	B	C	D	E	F	G	U
GCSE	200	180	160	140	120	100	80	60	40	0

The written paper will have a total weighting of 40% and controlled assessment a weighting of 60%.

A candidate's uniform mark for the paper will be combined with the uniform marks for the controlled assessments to give a total uniform mark for the specification. The candidate's grade will be determined by the total uniform mark.

3.4 Grade descriptions

Grade descriptions are provided to give a general indication of the standards of achievement likely to have been shown by candidates awarded particular grades. The descriptions must be interpreted in relation to the content in the specification; they are not designed to define that content. The grade awarded will depend in practice upon the extent to which the candidate has met the assessment objectives overall. Shortcomings in some aspects of the assessment may be balanced by better performance in others.

The grade descriptors have been produced by the regulatory authorities in collaboration with the awarding bodies.

3.4.1 Grade F

Candidates recall, select and communicate knowledge and understanding of basic aspects of Design and Technology, including its wider effects.

They apply limited knowledge, understanding and skills to plan and carry out simple investigations and tasks, with an awareness of the need for safety and precision. They modify their approach in the light of progress.

They review their evidence and draw basic conclusions.

3.4.2 Grade C

Candidates recall, select and communicate sound knowledge and understanding of Design and Technology, including its wider effects.

They apply knowledge, understanding and skills in a range of situations to plan and carry out investigations and tasks. They test their solutions, working safely and with precision.

They review the evidence available, analysing and evaluating some information clearly, and with some accuracy. They make judgements and draw appropriate conclusions.

3.4.3 Grade A

Candidates recall, select and communicate detailed knowledge and thorough understanding of Design and Technology, including its wider effects.

They apply relevant knowledge, understanding and skills in a range of situations to plan and carry out investigations and tasks effectively. They test their solutions, working safely and with a high degree of precision.

They analyse and evaluate the evidence available, reviewing and adapting their methods when necessary. They present information clearly and accurately, making reasoned judgements and presenting substantiated conclusions.

3.5 Quality of written communication

Quality of written communication is assessed in all units.

Candidates are expected to:

- ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
- use technical language as appropriate
- present information in a form that suits its purpose
- use an appropriate style of writing and, where applicable, specialist terminology.

This section provides general guidance on controlled assessment: what controlled assessment tasks are, when and how they are available; how to plan and manage controlled assessment and what controls must be applied throughout the process. More support can be found on the [OCR website](#).

Teaching and Learning

Controlled assessment is designed to be an integral part of teaching and learning. Activities which develop skills take place regularly in the workshop/studio, using a variety of appropriate resources (as chosen by the teacher). These opportunities will allow candidates to practise a wide range of tasks, which teachers can discuss with them and comment on their performance as appropriate. There are no restrictions regarding time or feedback to individual learners.

When all necessary teaching and learning has taken place and teachers feel that candidates are ready for assessment, candidates can be given the/should choose an appropriate controlled assessment task.

4.1 Controlled assessment tasks

All controlled assessment tasks for units A541 and A543 are set by OCR. (See appendix A)

Controlled assessment tasks will be available on Interchange and will be reviewed every two years. Guidance on how to access controlled assessment tasks from Interchange is available on the [OCR website](#).

Centres must ensure that candidates undertake a task applicable to the correct year of the examination.

Centres can choose one from a number of theme based tasks offered by OCR (see Appendix A). For each theme, a starting point is provided. For Industrial Technology, the starting points are quite specific to their themes and, as such, do not require contextualising further.

Controlled assessment tasks may be adapted by centres in ways which will not put at risk the opportunity for candidates to meet the assessment criteria, including the chance to gain marks at the highest level. For some units this may allow for little to be adapted other than cosmetic details, e.g. the description and nature of a company on which a task is based. For other units the medium in which the candidates are working may be a matter of choice. Each controlled assessment task (see Appendix A) will include a section that briefly specifies the type and degree of adaptation that is appropriate.

The same OCR controlled assessment task must NOT be used as practice material and then as the actual live assessment material. Centres should devise their own practice material using the OCR specimen controlled assessment materials as guidance.

Teachers **can**:

- explain the task
- advise on how the task could be approached
- advise on resources
- alert the candidate to key things that must be included in the final piece of work.

Teachers **must not**:

- comment on or correct the work
- practise the task with the candidates
- provide templates, model answers or feedback on drafts.

4.2 Planning and managing controlled assessment

Controlled assessment tasks are available at an early stage to allow planning time. It is anticipated that candidates will spend a total of about 20 hours in producing the work for unit A541 and about 20 hours in producing the work for unit A543. Candidates should be allowed sufficient time to complete the tasks.

Suggested steps are included below, with guidance on regulatory controls at each step of the process. Teachers must ensure that the control requirements indicated below are met throughout the process.

4.2.1 Preparation and research time

Preparation (informal supervision)

Informal supervision ensures that the work of the individual candidates is recorded accurately and that plagiarism does not take place. Assessable outcomes may be informed by group work, but must be an individual response:

- Introduction to the task (teacher led) 1 hour

Includes choice of tasks, possible approaches and sources of evidence, time allocations, programmes of work and deadlines, methods of working, control requirements.

Research (limited supervision)

Limited supervision means that candidates can undertake this part of the process without direct teacher supervision and outside the centre as required. Candidates are also able to work in collaboration during this stage. However, when producing their final piece of work, candidates must complete and/or evidence all work individually.

During the research phase candidates can be given support and guidance.

Research material can include fieldwork, internet or paper-based research, questionnaires, audio and video files etc. Candidates must be guided on the use of information from other sources to ensure that confidentiality and intellectual property rights are maintained at all times. It is essential that any material directly used from a source is appropriately and rigorously referenced.

4.2.2 Producing the final piece of work (formal supervision)

Formal supervision means under direct teacher supervision: the teacher must be able to authenticate the work and insist on acknowledgement and referencing of any sources used. Writing up is likely to be carried out over several sessions. Work must be collected and kept secure between sessions.

When supervising tasks, teachers are expected to:

- exercise continuing supervision of work in order to monitor progress and to prevent plagiarism
- exercise continuing supervision of practical work to ensure essential compliance with Health and Safety requirements
- ensure that the work is completed in accordance with the specification requirements and can be assessed in accordance with the specified marking criteria and procedures.

Candidates must work independently to produce their own final piece of work.

4.2.3 Presentation of the final piece of work

Candidates must observe the following procedures when producing their final piece of work for the controlled assessment tasks:

- tables, graphs and spreadsheets may be produced using appropriate ICT. These should be inserted into the report at the appropriate place
- any copied material must be suitably acknowledged
- quotations must be clearly marked and a reference provided wherever possible
- work submitted for moderation or marking must include a completed coversheet giving the following information:
 - centre number
 - centre name
 - candidate number
 - candidate name
 - unit code and title
 - assignment title.

Work submitted in digital format (CD or online) for moderation or marking must be in a suitable file structure as detailed in (Appendix B) at the end of this specification. Work submitted on paper must be secured by treasury tags or other suitable methods.

4.3 Marking and moderating controlled assessment

All controlled assessment units are marked by the centre assessor(s) using OCR marking criteria and guidance and are moderated by the OCR-appointed moderator. External moderation is either e-moderation where evidence is online or postal moderation.

4.3.1 Applying the marking criteria

The starting point for marking the tasks is the marking criteria (see section 4.3.4 *Marking criteria for controlled assessments* tasks). The criteria identify levels of performance for the skills, knowledge and understanding that the candidate is required to demonstrate. Before the start of the course, and for use at INSET training events, OCR provides exemplification through real or simulated candidate work which will help to clarify the level of achievement the assessors should be looking for when awarding marks.

4.3.2 Use of 'best fit' approach to marking criteria

The assessment task(s) for each unit should be marked by teachers according to the given marking criteria within the relevant unit using a 'best fit' approach. For each of the assessment criteria, teachers select one of the three band descriptors provided in the marking grid that most closely describes the quality of the work being marked.

Marking should be positive, rewarding achievement rather than penalising failure or omissions. The award of marks **must be** directly related to the marking criteria.

Teachers use their professional judgement in selecting the band descriptor that best describes the work of the candidate.

To select the most appropriate mark within the band descriptor, teachers should use the following guidance:

- where the candidate's work convincingly meets the statement, the highest mark should be awarded
- where the candidate's work *adequately* meets the statement, the most appropriate mark in the middle range should be awarded
- where the candidate's work *just* meets the statement, the lowest mark should be awarded.

Teachers should use the full range of marks available to them and award full marks in any band for work which fully meets that descriptor. This is work which is 'the best one could expect from candidates working at that level'. Where there are only two marks within a band the choice will be between work which, in most respects, meets the statement and work which just meets the statement. For wider mark bands the marks on either side of the middle mark(s) for 'adequately met' should be used where the standard is lower or higher than 'adequate' but not the highest or lowest mark in the band.

Only one mark per assessment criteria will be entered. The final mark for the candidate for the controlled assessment unit is out of a total of 60 and is found by totalling the marks for each of the marking criteria strands.

There should be clear evidence that work has been attempted and some work produced. If a candidate submits no work for the internally assessed units, then the candidate should be indicated as being absent from that unit. If a candidate completes any work at all for an internally assessed unit, then the work should be assessed according to the marking criteria and the appropriate mark awarded, which may be zero.

4.3.3 Annotation of candidates' work

Each piece of internally assessed work should show how the marks have been awarded in relation to the marking criteria.

The writing of comments on candidates' work, and coversheet, provides a means of communication between teachers during the internal standardisation and with the moderator if the work forms part of the moderation sample.

4.3.4 Marking criteria for controlled assessment tasks

Marking criteria for controlled assessment: Unit A541

0 marks = no response or no response worthy of credit

Unit A541: CREATIVITY

Basic ability	Sound ability	High ability
<ul style="list-style-type: none"> Identifies basic links between principles of good design and technological knowledge. Identifies basic trends in existing solutions and uses this limited understanding in a design context using appropriate techniques. 	<ul style="list-style-type: none"> Identifies sound links between principles of good design and technological knowledge. Identifies and demonstrates the significance of trends in existing solutions; interprets and applies this understanding in a design context using appropriate techniques. 	<ul style="list-style-type: none"> Identifies complex links between principles of good design and technological knowledge. (AO1) Identifies and demonstrates a thorough understanding of the significance of trends in existing solutions; reinterpret and applies this understanding in imaginative ways using appropriate techniques. (AO1)
[1 – 3]	[4 – 7]	[8 – 10]

Unit A541: DESIGNING

Basic ability	Sound ability	High ability
<ul style="list-style-type: none"> Provides a limited response to a brief and produces a basic specification for a prototype product. Produces basic design ideas and communicates these by using a limited range of strategies. 	<ul style="list-style-type: none"> Provides an appropriate response to a brief and produces a sound specification for a prototype product. Produces a sound range of creative design ideas and communicates these by using appropriate strategies. 	<ul style="list-style-type: none"> Provides an appropriate, detailed and considered response to a brief and produces a thorough specification for a prototype product. (AO2) Produces a comprehensive range of creative, original and developed design ideas and communicates these by using appropriate strategies. (AO2)
[1 – 4]	[5 – 10]	[11 – 14]

Unit A541: MAKING

Basic ability	Sound ability	High ability
<ul style="list-style-type: none"> Plans and organises basic activities. Selects and uses components and materials that are not always appropriate. Selects and uses hand and machine tools that are not always appropriate. Works safely but with limited competence to assemble, construct and finish materials and components to generate a prototype. Uses workshop/design studio facilities as instructed to realise the prototype. 	<ul style="list-style-type: none"> Plans and organises sound activities. Selects and uses materials that are mostly appropriate. Selects and uses hand and machine tools that are mostly appropriate. Works safely, effectively and with sound level of competence to assemble, construct and finish materials and components to achieve a good quality prototype. Selects and uses workshop/design studio facilities that are mostly appropriate to realise the prototype. 	<ul style="list-style-type: none"> Plans and organises complex activities. Selects and uses materials that are consistently appropriate. Selects and uses hand and machine tools that are consistently appropriate. (AO1/AO2) Works consistently safely, skilfully and competently to assemble, construct and finish materials and components to achieve a high quality prototype. (AO2) Consistently selects and uses workshop/design studio facilities appropriately to realise the prototype. (AO1/AO2)
[1 – 6]	[7 – 13]	[14 – 20]
<ul style="list-style-type: none"> Demonstrates limited and practical understanding and ability in solving a technical problem as it arises. 	<ul style="list-style-type: none"> Demonstrates a sound practical understanding and ability in solving technical problems as they arise. 	<ul style="list-style-type: none"> Demonstrate a thorough practical understanding and ability in solving technical problems effectively and efficiently as they arise. (AO2)
[1]	[2 – 3]	[4]
<ul style="list-style-type: none"> Records the making of the prototype by providing limited notes and photographic evidence. 	<ul style="list-style-type: none"> Records key stages involved in the making of the prototype product by providing sound notes and photographic evidence. 	<ul style="list-style-type: none"> Records key stages involved in the making of the prototype product; by providing comprehensive notes and photographic evidence. (AO2)
[1]	[2 – 3]	[4]

Unit A541: CRITICAL EVALUATION

Basic ability	Sound ability	High ability
<ul style="list-style-type: none"> • Basic evaluation of the modelling and prototyping process. • Limited use of specialist terms. • Answers may be ambiguous or disorganised. • Errors of spelling, punctuation and grammar may be intrusive 	<ul style="list-style-type: none"> • Sound evaluation of the making process which reflects on how to improve the modelling and prototyping process. • Some use of specialist terms, although these may not always be used appropriately. • Information presented for the most part in a structured format. • Occasional errors in spelling, punctuation and grammar that do not impede communication. 	<ul style="list-style-type: none"> • Critical evaluation of the processes involved in designing and making the prototype which reflects and suggests modifications to improve the modelling and prototyping process. (AO3) • Specialist terms will be consistently used appropriately and correctly. • Information consistently presented in a structured format. • Consistently accurate use of spelling, punctuation and grammar.
[1 – 2]	[3 – 5]	[6 – 8]

Marking Criteria for Controlled Assessment: Unit A543

0 marks = no response or no response worthy of credit

Unit A543: DESIGNING

Basic ability	Sound ability	High ability
<ul style="list-style-type: none"> Provides a limited response to a brief and produces a basic specification for a product. 	<ul style="list-style-type: none"> Provides an appropriate response to a brief and produces a sound specification for a product as a result of analysis. 	<ul style="list-style-type: none"> Provides an appropriate, detailed and considered response to a brief and produces a detailed specification for a product as a result of analysis. (AO2)
[1]	[2 – 3]	[4]
<ul style="list-style-type: none"> Produces basic design ideas and communicates these by using a limited range of strategies. 	<ul style="list-style-type: none"> Produces a sound range of creative design ideas and communicates these by using a range of strategies. 	<ul style="list-style-type: none"> Produces a wide range of creative, original and developed design ideas and communicates these by using a range of strategies. (AO2)
[1 – 5]	[6 – 8]	[9 – 12]

Unit A543: MAKING

Basic ability	Sound ability	High ability
<ul style="list-style-type: none"> Plans and organises basic activities. Selects and uses materials that are not always appropriate. Selects and uses hand and machine tools that are not always appropriate. Works safely but with limited competence to shape, form, assemble and finish materials and components when making the product. Uses workshop facilities as appropriate. The product is of a low quality and may not be successfully completed. 	<ul style="list-style-type: none"> Plans and organises sound activities. Selects and uses materials that are mostly appropriate. Selects and uses hand and machine tools that are mostly appropriate. Works safely and effectively with a sound level of competence to shape, form, assemble and finish materials and components when making the product. Selects and uses workshop facilities mostly appropriate. The product is completed to a good quality and meets most of the requirements of the final product specification. 	<ul style="list-style-type: none"> Plans and organises complex activities. Selects and uses materials that are consistently appropriate. (AO2) Selects and uses hand and machine tools that are consistently appropriate. (AO2) Works consistently safely, skilfully and competently to shape, form, assemble and finish materials and components when making the product. (AO2) Consistently selects and uses workshop facilities appropriately. (AO2) The product is completed to a high quality and fully meets the requirements of the final product specification. (AO2)
[1 – 9]	[10 – 17]	[18 – 24]
<ul style="list-style-type: none"> Demonstrates a limited practical understanding in solving technical problems as they arise. 	<ul style="list-style-type: none"> Demonstrates a sound practical understanding and ability in solving some technical problems as they arise. 	<ul style="list-style-type: none"> Demonstrates a thorough practical understanding and ability in solving technical problems effectively and efficiently as they arise. (AO2/AO3)
[1 – 2]	[3 – 4]	[5 – 6]
<ul style="list-style-type: none"> Records the making of the product by providing limited notes and photographic evidence. 	<ul style="list-style-type: none"> Records key stages involved in the making of the product by providing sound notes and photographic evidence. 	<ul style="list-style-type: none"> Records key stages involved in the making of the product by providing comprehensive notes and photographic evidence. (AO2)
[1 – 2]	[3 – 4]	[5 – 6]

Unit A543: CRITICAL EVALUATION

Basic ability	Sound ability	High ability
<ul style="list-style-type: none"> • Basic evaluation of the finished product with limited reference to the specification. • Undertakes limited testing the product in use with limited, if any, reflection on how to improve the product. • Limited use of specialist terms. • Answers may be ambiguous or disorganised. • Errors of spelling, punctuation and grammar may be intrusive. 	<ul style="list-style-type: none"> • Sound evaluation of the finished product with appropriate reference to the specification. • Undertakes some testing and usually reflects on how to improve the product. • Some use of specialist terms, although these may not always be used appropriately. • Information presented for the most part in a structured format. • Occasional errors in spelling, punctuation and grammar that do not impede communication. 	<ul style="list-style-type: none"> • Critical evaluation of the finished product against the specification. (AO3) • Undertakes detailed testing and presents meaningful conclusions leading to proposals for modifications to improve the product. (AO3) • Specialist terms consistently used appropriately and correctly. • Information consistently presented in a structured format. • Consistently accurate use of spelling, punctuation and grammar.
[1 – 2]	[3 – 5]	[6 – 8]

4.3.5 Authentication of work

Teachers must be confident that the work they mark is the candidate's own. This does not mean that a candidate must be supervised throughout the completion of all work but the teacher must exercise sufficient supervision, or introduce sufficient checks, to be in a position to judge the authenticity of the candidate's work.

Wherever possible, the teacher should discuss work-in-progress with candidates. This will not only ensure that work is underway in a planned and timely manner but will also provide opportunities for assessors to check authenticity of the work and provide general feedback.

Candidates must not plagiarise. Plagiarism is the submission of another's work as one's own and/or failure to acknowledge the source correctly. Plagiarism is considered to be malpractice and could lead to the candidate being disqualified. Plagiarism sometimes occurs innocently when candidates are unaware of the need to reference or acknowledge their sources. It is therefore important that centres ensure that candidates understand that the work they submit must be their own and that they understand the meaning of plagiarism and what penalties may be applied. Candidates may refer to research, quotations or evidence but they must list their sources. The rewards from acknowledging sources, and the credit they will gain from doing so, should be emphasised to candidates as well as the potential risks of failing to acknowledge such material. Candidates may be asked to sign a declaration to this effect. Centres should reinforce this message to ensure candidates understand what is expected of them.

Please note: Centres must confirm to OCR that the evidence produced by candidates is authentic. The Centre Authentication Form includes a declaration for assessors to sign and is available from the [OCR website](#) and [OCR Interchange](#).

4.3.6 Internal standardisation

It is important that all internal assessors, working in the same subject area, work to common standards. Centres must ensure that the internal standardisation of marks across assessors and teaching groups takes place using an appropriate procedure.

This can be done in a number of ways. In the first year, reference material and OCR training meetings will provide a basis for centres' own standardisation. In subsequent years, this, or centres' own archive material, may be used. Centres are advised to hold preliminary meetings of staff involved to compare standards through cross-marking a small sample of work. After most marking has been completed, a further meeting at which work is exchanged and discussed will enable final adjustments to be made.

4.3.7 Moderation

All work for controlled assessment is marked by the teacher and internally standardised by the centre. Marks are then submitted to OCR, after which moderation takes place in accordance with OCR procedures: refer to the OCR website for submission dates of the marks to OCR. The purpose of moderation is to ensure that the standard of the award of marks for work is the same for each centre and that each teacher has applied the standards appropriately across the range of candidates within the centre.

Each candidate's work should have a cover sheet attached to it with a summary of the marks awarded for the task in relation to the marking criteria defined in Section 4.3.4. If the work is to be submitted in digital format, this cover sheet should also be submitted electronically within each candidate's files.

4.4 Submitting the moderation samples via the OCR Repository

The OCR Repository is a secure website for centres to upload candidate work and for assessors to access this work digitally. Centres can use the OCR Repository for uploading marked candidate work for moderation.

Centres can access the OCR Repository via OCR Interchange, find their candidate entries in their area of the Repository, and use the Repository to upload files (singly or in bulk) for access by their moderator.

The OCR Repository allows candidates to send evidence in electronic file types that would normally be difficult to submit through postal moderation; for example multimedia or other interactive unit submissions.

There are three ways to load files to the OCR Repository:

- 1 Centres can load multiple files against multiple candidates by clicking on 'Upload candidate files' in the Candidates tab of the Candidate Overview screen.
- 2 Centres can load multiple files against a specific candidate by clicking on 'Upload files' in the Candidate Details screen.
- 3 Centres can load multiple administration files by clicking on 'Upload admin files' in the Administration tab of the Candidate Overview screen.

The OCR Repository is seen as a faster, greener and more convenient means of providing work for assessment. It is part of a wider programme bringing digital technology to the assessment process, the aim of which is to provide simpler and easier administration for centres.

Instructions for how to upload files to OCR using the OCR Repository can be found on OCR [Interchange](#).

The OCR GCSE Design and Technology: Industrial Technology units A541 and A543 can be submitted electronically to the OCR Repository via Interchange. Please check Section 7.4.1 for unit entry codes for the OCR Repository.

Support for GCSE Design and Technology: Industrial Technology

5.1 Free resources available from the OCR website

The following materials will be available on the OCR website:

- GCSE Design and Technology: Industrial Technology Specification
- [specimen assessment materials for each unit](#)
- [Guide to controlled assessment](#)
- [Teacher's Handbook](#)
- [sample schemes of work and lesson plans](#)

5.2 Other resources

OCR offers centres a wealth of high quality published support with a choice of 'Official Publisher Partner' and 'Approved Publication' resources, all endorsed by OCR for use with OCR specifications.

5.2.1 Publisher partners

OCR works in close collaboration with publisher partners to ensure you have access to:

- published support materials available when you need them, tailored to OCR specifications
- high quality resources produced in consultation with OCR subject teams, which are linked to OCR's teacher support materials.



Hodder Education is the publisher partner for OCR GCSE Design and Technology: Industrial Technology.

Hodder Education produces the following resources for OCR GCSE Design and Technology: Industrial Technology:

- OCR Design and Technology for GCSE: Resistant Materials and Industrial Technology Teacher Resource DVD-ROM by Steve Pinnock ISBN:9780340991718
- OCR Design and Technology for GCSE: Industrial Technology Student Book by Dave Carlson, Harry King, Steve Pinnock ISBN: 9780340982020

5.2.2 Endorsed publications

OCR endorses a range of publisher materials to provide quality support for centres delivering its qualifications. You can be confident that materials branded with OCR's 'Official Publishing Partner' or 'Approved publication' logos have undergone a thorough quality assurance process to achieve endorsement. All responsibility for the content of the publisher's materials rests with the publisher.



These endorsements do not mean that the materials are the only suitable resources available or necessary to achieve an OCR qualification.

5.3 Training

OCR will offer a range of support activities for all practitioners throughout the lifetime of the qualification to ensure they have the relevant knowledge and skills to deliver the qualification.

Please see [Event Booker](#) for further information.

5.4 OCR support services

5.4.1 Active Results

Active Results is available to all centres offering OCR's GCSE Design and Technology: Industrial Technology specification.

activeresults

Active Results is a free results analysis service to help teachers review the performance of individual candidates or whole schools.

Data can be analysed using filters on several categories such as gender and other demographic information, as well as providing breakdowns of results by question and topic.

Active Results allows you to look in greater detail at your results:

- richer and more granular data will be made available to centres including question level data available from e-marking
- you can identify the strengths and weaknesses of individual candidates and your centre's cohort as a whole
- our systems have been developed in close consultation with teachers so that the technology delivers what you need.

Further information on Active Results can be found on the [OCR website](#).

5.4.2 OCR Interchange

OCR Interchange has been developed to help you to carry out day-to-day administration functions online, quickly and easily. The site allows you to register and enter candidates online. In addition, you can gain immediate and free access to candidate information at your convenience (with a hyperlink to the interchange page on the website): Sign up on the [OCR website](#).

6.1 Equality Act information relating to GCSE Design and Technology: Industrial Technology

GCSEs often require assessment of a broad range of competences. This is because they are general qualifications and, as such, prepare candidates for a wide range of occupations and higher level courses.

The revised GCSE qualification and subject criteria were reviewed by the regulators in order to identify whether any of the competences required by the subject presented a potential barrier to any disabled candidates. If this was the case, the situation was reviewed again to ensure that such competences were included only where essential to the subject. The findings of this process were discussed with disability groups and with disabled people.

Reasonable adjustments are made for disabled candidates in order to enable them to access the assessments and to demonstrate what they know and can do. For this reason, very few candidates will have a complete barrier to the assessment. Information on reasonable adjustments is found in *Access Arrangements, Reasonable Adjustments and Special Consideration* by the Joint Council www.jcq.org.uk.

Candidates who are unable to access part of the assessment, even after exploring all possibilities through reasonable adjustments, may still be able to receive an award based on the parts of the assessment they have taken.

The access arrangements permissible for use in this specification are in line with Ofqual's GCSE subject criteria equalities review and are as follows:

	Yes/No	Type of Assessment
Readers	Y	All written examinations
Scribes	Y	All written examinations
Practical assistants	Y	Practical assessments
Word processors	Y	All written examinations
Transcripts	Y	All written examinations
Oral language modifiers	Y	All written examinations
BSL signers	Y	All written examinations
Modified question papers	Y	All written examinations
Extra time	Y	All written examinations

We do not foresee any part of the assessment forming a barrier to any student. There are Design and Technology endorsements which will pose barriers for some disabled candidates.

Candidates with a physical disability may be limited in the range of designing and making contexts they can use, but this should not pose a barrier to assessment. For example, candidates may use CAD/CAM for the making process and practical assistants may be used to support students with physical disabilities in this process.

Candidates with a visual impairment may find elements of the assessment difficult, such as when designing; however, there should be no barriers to assessment.

It is important to note that where access arrangements are permitted, they must not be used in a way that undermines the integrity of the assessment. For example, practical assistants can be used to help learners set up but cannot help perform skills which are assessed, such as the ability to physically manipulate equipment.

6.2 Arrangements for candidates with particular requirements (including Special Consideration)

All candidates with a demonstrable need may be eligible for access arrangements to enable them to show what they know and can do. The criteria for eligibility for access arrangements can be found in the JCQ document *Access Arrangements, Reasonable Adjustments and Special Consideration*.

Candidates who have been fully prepared for the assessment but who have been affected by adverse circumstances beyond their control at the time of the examination may be eligible for special consideration. As above, centres should consult the JCQ document *Access Arrangements, Reasonable Adjustments and Special Consideration*.

7 Administration of GCSE Design and Technology: Industrial Technology

In December 2011 the GCSE qualification criteria were changed by Ofqual. As a result, all GCSE qualifications have been updated to comply with the new regulations.

The most significant change for all GCSE qualifications is that, from 2014, unitised specifications must require that 100% of the assessment is terminal.

Please note that there are no changes to the terminal rule and re-sit rules for the January 2013 and June 2013 examination series:

- at least 40% of the assessment must be taken in the examination series in which the qualification is certificated
- candidates may re-sit each unit once before certification, i.e. each candidate can have two attempts at a unit before certification.

For full information on the assessment availability and rules that apply in the January 2013 and June 2013 examination series, please refer to the previous version of this specification [GCSE Design and Technology: Industrial Technology July 2009](#) available on the website.

The sections below explain in more detail the rules that apply from the June 2014 examination series onwards.

7.1 Availability of assessment from 2014

There is one examination series available each year in June (all units are available each year in June).

GCSE Design and Technology: Industrial Technology certification is available in June 2014 and each June thereafter.

	Unit A541	Unit A543	Unit A545	Certification availability
June 2014	✓	✓	✓	✓
June 2015	✓	✓	✓	✓

7.2 Certification rules

For GCSE Design and Technology: Industrial Technology from June 2014 onwards, a 100% terminal rule applies. Candidates must enter for all their units in the series in which the qualification is certificated.

7.3 Rules for re-taking a qualification

Candidates may enter for the qualification an unlimited number of times.

Where a candidate re-takes a qualification, **all** units must be re-entered and all externally assessed units must be re-taken in the same series as the qualification is re-certificated. The new results for these units will be used to calculate the new qualification grade. Any results previously achieved cannot be re-used.

For each of the controlled assessment units, candidates who are re-taking a qualification can choose either to re-take that controlled assessment unit or to carry forward the result for that unit that was used towards the previous certification of the same qualification.

- Where a candidate decides to re-take the controlled assessment, the new result will be the one used to calculate the new qualification grade. Any results previously achieved cannot be re-used.
- Where a candidate decides to carry forward a result for controlled assessment, they must be entered for the controlled assessment unit in the re-take series using the entry code for the carry forward option (see section 7.4).

7.4 Making entries

7.4.1 Unit entries

Centres must be approved to offer OCR qualifications before they can make any entries, including estimated entries. It is recommended that centres apply to OCR to become an approved centre well in advance of making their first entries. Centres must have made an entry for a unit in order for OCR to supply the appropriate forms and administrative materials.

It is essential that correct unit entry codes are used when making unit entries.

For the controlled assessment units, centres can decide whether they want to submit candidates' work for moderation through the OCR Repository or by post. Candidates submitting controlled assessment must be entered for the appropriate unit entry code from the table overleaf. Candidates who are re-taking the qualification and who want to carry forward the controlled assessment should be entered using the unit entry code for the carry forward option.

Centres should note that controlled assessment tasks can still be completed at a time which is appropriate to the centre/candidate. However, where tasks change from year to year, centres would have to ensure that candidates had completed the correct task(s) for the year of entry.

Unit entry code	Component code	Assessment method	Unit titles
A541A	01	Moderated via OCR Repository	<i>Introduction to designing and making - Industrial Technology</i>
A541B	02	Moderated via postal moderation	<i>Introduction to designing and making - Industrial Technology</i>
A541C	80	Carried forward	<i>Introduction to designing and making - Industrial Technology</i>
A543A	01	Moderated via OCR Repository	<i>Making quality products - Industrial Technology</i>
A543B	02	Moderated via postal moderation	<i>Making quality products - Industrial Technology</i>
A543C	80	Carried forward	<i>Making quality products - Industrial Technology</i>
A545	01	Written paper	<i>Sustainability and technical aspects of designing and making - Industrial Technology</i>

7.4.2 Certification entries

Candidates must be entered for qualification certification separately from unit assessment(s). If a certification entry is **not** made, no overall grade can be awarded.

Centres must enter candidates for:

- GCSE Design and Technology: Industrial Technology certification code J304

7.5 Enquiries about results

Under certain circumstances, a centre may wish to query the result issued to one or more candidates. Enquiries about results for GCSE units must be made immediately following the series in which the relevant unit was taken and by the relevant enquiries about results deadline for that series.

Please refer to the JCQ Post-Results Services booklet and the OCR *Admin Guide: 14–19 Qualifications* for further guidance on enquiries about results and deadlines. Copies of the latest versions of these documents can be obtained from the OCR website at www.ocr.org.uk.

7.6 Prohibited qualifications and classification code

Every specification is assigned a national classification code indicating the subject area to which it belongs. The classification code for this specification is 9070.

Centres should be aware that candidates who enter for more than one GCSE qualification with the same classification code will have only one grade (the highest) counted for the purpose of the School and College Performance Tables.

Centres may wish to advise candidates that, if they take two specifications with the same classification code, colleges are very likely to take the view that they have achieved only one of the two GCSEs. The same view may be taken if candidates take two GCSE specifications that have different classification codes but have significant overlap of content. Candidates who have any doubts about their subject combinations should seek advice, either from their centre or from the institution to which they wish to progress.

Other information about GCSE Design and Technology: Industrial Technology

8.1 Overlap with other qualifications

There is no significant overlap between the content of these specifications and that for other GCSE qualifications except for GCSE Design and Technology: Resistant Materials.

8.2 Progression from this qualification

GCSE qualifications are general qualifications which enable candidates either to progress directly to employment, or to proceed to further qualifications.

Progression to further study from GCSE will depend upon the number and nature of the grades achieved. Broadly, candidates who are awarded mainly Grades D to G at GCSE could either strengthen their base through further study of qualifications at Level 1 within the National Qualifications Framework or could proceed to Level 2. Candidates who are awarded mainly Grades A* to C at GCSE would be well prepared for study at Level 3 within the National Qualifications Framework.

Candidates may progress to GCE in Design and Technology or the Principal Learning in Engineering.

8.3 Avoidance of bias

OCR has taken great care in preparation of this specification and assessment materials to avoid bias of any kind. Special focus is given to the 9 strands of the Equality Act with the aim of ensuring both direct and indirect discrimination is avoided.

8.4 Regulatory requirements

This specification complies in all respects with the current: *General Conditions of Recognition; GCSE, GCE, Principal Learning and Project Code of Practice; GCSE Controlled Assessment regulations and the GCSE subject criteria for GCSE Design and Technology*. All documents are available on the [Ofqual website](#).

8.5 Language

This specification and associated assessment materials are in English only. Only answers written in English will be assessed.

8.6 Spiritual, moral, ethical, social, legislative, economic and cultural issues

These specifications offer opportunities which can contribute to an understanding of these issues in the following topics:

- imaginative and creative activity in their own practical controlled assessment, and develop an appreciation of the imagination and creativity of others in design technology
- moral, cultural, economic, environmental and sustainability issues inherent in design and technology
- moral implications of some applications of technological activities
- the relationship between cultures and societies, the influence they have on designing and making, and that the impact products have on lifestyle
- the role of technology in the context of national and European citizenship

There are no direct references to spiritual issues within these specifications. However, opportunities may exist to explore this area through the designing and making of products that relate to a religious or spiritual context.

8.7 Sustainable development, health and safety considerations and European developments, consistent with international agreements

This specification supports these issues, consistent with current EU agreements, as outlined below:

- design and technology activities are global and not solely restricted to Europe. Design and making responses are multicultural and arise from identifiable needs and opportunities. These specifications do not make specific reference to European Developments; however, it may be drawn into the course of study in many ways, e.g European Safety Standards
- emerging and existing technologies in other European countries and the world
- ways in which economic, environmental, ethical and social dimensions interact to influence designing and making
- health and safety when working with tools, equipment, components and materials
- sustainability in making decisions and combining skills with knowledge and understanding in order to design and make quality products
- ways in which economic, environmental, ethical and social dimensions interact to influence designing and making.

8.8 Key Skills

This specification provides opportunities for the development of the Key Skills of *Communication, Application of Number, Information and Communication Technology, Working with Others, Improving Own Learning and Performance* and *Problem Solving* at Levels 1 and/or 2. However, the extent to which this evidence fulfils the Key Skills criteria at these levels will be totally dependent on the style of teaching and learning adopted for each unit.

The following table indicates where opportunities may exist for at least some coverage of the various Key Skills criteria at Levels 1 and/or 2 for each unit.

Unit	C		AoN		ICT		WwO		IoLP		PS	
	1	2	1	2	1	2	1	2	1	2	1	2
A541	✓	✓			✓	✓	✓		✓	✓	✓	✓
A543	✓	✓			✓	✓			✓	✓	✓	✓
A545	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

8.9 ICT

In order to play a full part in modern society, candidates need to be confident and effective users of ICT. This specification provides candidates with a wide range of appropriate opportunities to use ICT in order to further their study of Design and Technology: Industrial Technology.

Opportunities for ICT include:

- use of CAD, CAM and control programs where appropriate
- gathering information from the World Wide Web and CD-ROMs
- using software to process data
- using software to present ideas and information on paper and on screen.

8.10 Citizenship

From September 2002, the National Curriculum for England at Key Stage 4 includes a mandatory programme of study for Citizenship.

There are opportunities for developing knowledge, skills and understanding of citizenship issues particularly in Units A541 and A543.

Unit A541

The task for this unit is for the candidate to produce a prototype, capable of being evaluated, and a concise portfolio of work to support the designing and making process.

Candidates **must** select one of the following themes as a starting point for the task.

Centres are permitted to contextualise the theme and starting point appropriately to reflect centre or community resources and access to local business and industry that may add realism to the candidates' work.

Teachers are required to ensure that candidates do not pursue the same 'theme' for their work as submitted or intended for submission for Unit A543.

Teachers must mark the task using the marking criteria provided in section 4.3.4 (Unit A541) of this specification.

In order to skilfully design and make their prototype product, candidates should refer to the content of Unit A545 and use designing, planning, making, materials, tools, equipment and process as appropriate.

Theme	Starting point
Bending jig	For line bending softened thermoplastics or for producing curved shapes in thin metal strip.
Can crusher	For collapsing empty metal food and/or drinks cans to allow easier disposal for recycling.
Embossing tool	For embossing shapes and/or lettering in paper and card or non-ferrous metal foil.
Dowelling jig	To accurately position drilled holes to allow assembly of parts using wood or metal dowels.
Bench shears	The standard bench-mounted workshop tool for cutting sheet metal or metal dowels.
Hole punch	For punching accurately positioned holes in paper and card, or for cutting holes in thin sheet metal and thin plastic sheet.
Toggle clamp	For quick clamping applications such as the clamping of thermoplastic sheets on vacuum forming machines.
Machine vice	The standard piece of workshop equipment for clamping metal and plastic parts for drilling on a bench drilling machine.

Unit A543

The task for this unit is for the candidate to design and manufacture a product. The starting point for this task must be selected from a theme set by OCR and listed below.

Centres are permitted to contextualise the theme and starting point appropriately to reflect centre or community resources and access to local business and industry that may add realism to the candidates' work.

The task can be linked to a candidate's interest or such other influences as competitions, commerce or the community.

Selection of an appropriate theme for the task will be made by the candidate and centre, taking account of constraints relating to resources and time available for completion of the task.

Teachers are required to ensure that candidates do not pursue the same 'theme' for their work as submitted or intended for submission for Unit A541. Teachers must mark the task using the marking criteria provided in section 4.3.4 (Unit A543) of this specification.

In order to skilfully design and make their product candidates should refer to the content of Unit A545 and use designing, planning, making, materials, tools, equipment and process as appropriate.

For the purposes of the making element, and to ensure completion within the timescale, castings may be taken as 'pre-manufactured components' in the context of this unit, and centres could offer a selection of suitable bare castings for use by the candidates.

Theme	Starting point
Die casting mould	A mould for casting handles onto a small screwdriver blade. The handle will be cast in a low melting point alloy and the mould should ensure safety in use and consistent quality in handles produced.
Hole punch	A device for punching holes in 1.5mm-thick aluminium strips. The strips will form part of a construction kit and must all be the same size with accurately positioned holes to allow for easy assembly of parts.
Injection moulding die	A die for producing plastic wheels for a model car. The die must be self-contained and include a means of clamping the parts together whilst the plastic is injected. The die should be capable of producing many batches of identical wheels.
Bending jig	A device for bending batches of hooks made from 1.5mm-thick aluminium strips. The blanks to make the hooks have a 4mm hole drilled in one end and all the hooks must be identical.
Drilling jig	A jig for drilling 3mm holes into 2mm mild steel strips. The strips will form part of a construction kit and must all be the same size with accurately positioned holes to allow for easy assembly of parts.
Embossing tool	A device for embossing a shape into thin card. The device should be capable of producing batches of identical cards and the embossed design must be in the same position on each card produced.
Cutting fixture	A device for cutting 2mm mild steel strips into suitable lengths for parts of a construction kit. The device must allow the strips to be cut safely by sawing or shearing, and each part produced must be of equal length.

Structure for evidence

A controlled assessment portfolio is a collection of folders and files containing the candidate's evidence. Folders should be organised in a structured way so that the evidence can be accessed easily by a teacher or moderator. This structure is commonly known as a folder tree. It would be helpful if the location of particular evidence is made clear by naming each file and folder appropriately and by use of an index called 'Home Page'.

There should be a top level folder detailing the candidate's centre number, candidate number, surname and forename, together with the code A541 or A543, so that the portfolio is clearly identified as the work of one candidate.

Each candidate produces an assignment for controlled assessment. The evidence should be contained within a separate folder within the portfolio. This folder may contain separate files.

Each candidate's controlled assessment portfolio should be stored in a secure area on the centre's network. Prior to submitting the controlled assessment portfolio to OCR, the centre should add a folder to the folder tree containing controlled assessment and summary forms.

Data formats for evidence

In order to minimise software and hardware compatibility issues it will be necessary to save candidates' work using an appropriate file format.

Candidates must use formats appropriate to the evidence that they are providing and appropriate to viewing for assessment and moderation. Open file formats or proprietary formats for which a downloadable reader or player is available are acceptable. Where this is not available, the file format is not acceptable.

Electronic controlled assessment is designed to give candidates an opportunity to demonstrate what they know, understand and can do using current technology. Candidates do not gain marks for using more sophisticated formats or for using a range of formats. A candidate who chooses to use only word documents will not be disadvantaged by that choice.

Evidence submitted is likely to be in the form of word processed documents, PowerPoint presentations, digital photos and digital video.

To ensure compatibility, all files submitted must be in the formats listed below. Where new formats become available that might be acceptable, OCR will provide further guidance. OCR advises against changing the file format that the document was originally created in. It is the centre's responsibility to ensure that the electronic portfolios submitted for moderation are accessible to the moderator and fully represent the evidence available for each candidate.

Accepted File Formats

Movie formats for digital video evidence

MPEG (*.mpg)

QuickTime movie (*.mov)

Macromedia Shockwave (*.aam)

Macromedia Shockwave (*.dcr)

Flash (*.swf)

Windows Media File (*.wmf)

MPEG Video Layer 4 (*.mp4)

Audio or sound formats

MPEG Audio Layer 3 (*.mp3)

Graphics formats including photographic evidence

JPEG (*.jpg)

Graphics file (*.pcx)

MS bitmap (*.bmp)

GIF images (*.gif)

Animation formats

Macromedia Flash (*.fla)

Structured markup formats

XML (*.xml)

Text formats

Comma Separated Values (.csv)

PDF (.pdf)

Rich text format (.rtf)

Text document (.txt)

Microsoft Office suite

PowerPoint (.ppt)

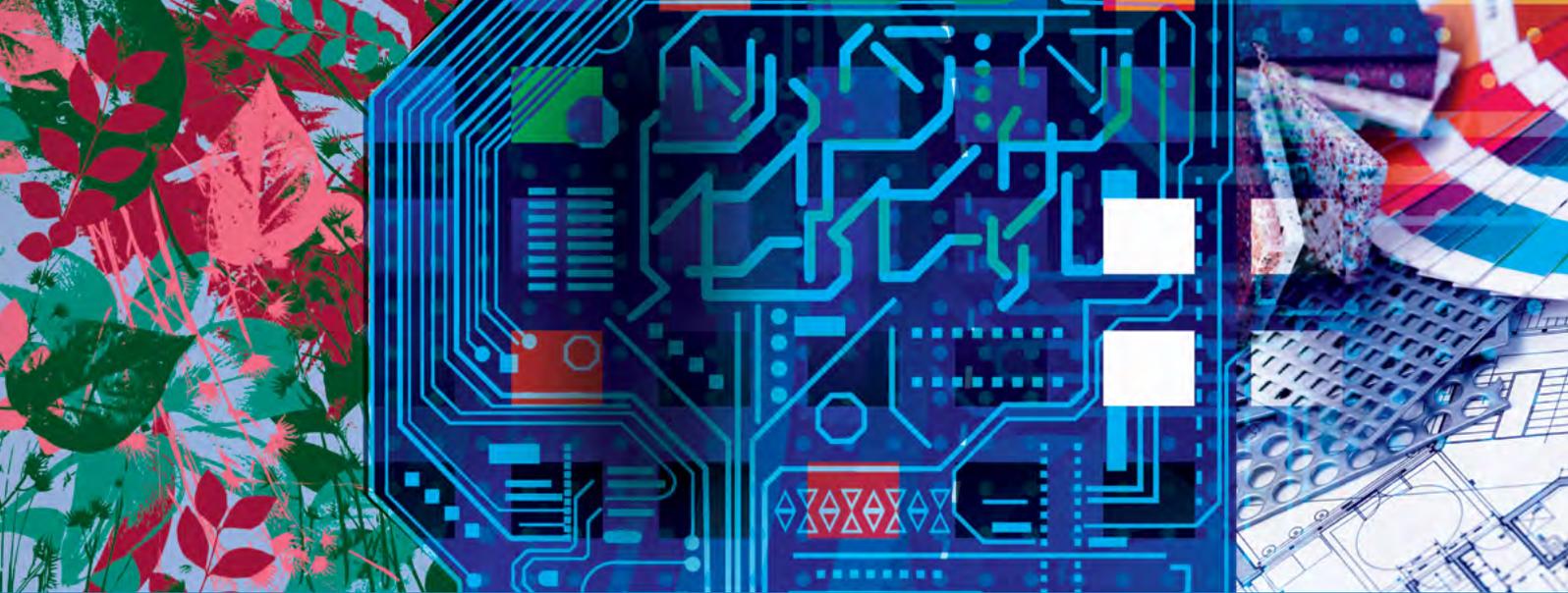
Word (.doc)

Excel (.xls)

Visio (.vsd)

Project (.mpp)





YOUR CHECKLIST

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- Be among the first to hear about support materials and resources as they become available. Register for email updates at www.ocr.org.uk/updates.
- Book your inset training place online at www.ocreventbooker.org.uk
- Learn more about active results at www.ocr.org.uk/activeresults
- Join our design and technology social network community for teachers at www.social.ocr.org.uk

NEED MORE HELP?

Here's how to contact us for specialist advice:

Phone: **01223 553998**

Email: general.qualifications@ocr.org.uk

Online: <http://answers.ocr.org.uk>

Fax: **01223 552627**

Post: **Customer Contact Centre, OCR, Progress House,
Westwood Business Park, Coventry CV4 8JQ**

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