



Engineering

GCSE 2012

Engineering

Specification

J344 – Double Award

J322 – Single Award

Version 1

April 2012



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1.1 Overview of GCSE Engineering

<i>GCSE (Single Award) Engineering</i>	
<p>Unit A621 A: Study of an Engineered Product 6 hours/30 marks</p> <p>B: Engineering a Product 14 hours/60 marks</p>	<p>Controlled Assessment 60% of the single award 30% of the double award</p> <p>Mandatory</p>
+	
<p>Unit 622 Engineering Processes 1 hour/60 marks</p>	<p>Examined unit 40% of the single award 20% of the double award</p> <p>Mandatory</p>

<i>GCSE (Double Award) Engineering = GCSE (Single Award) Engineering and:</i>	
<p>Unit A623 A: Real World Engineering 6 hours/30 marks</p> <p>B: Making an Engineered Product 14 hours/60 marks</p>	<p>Controlled Assessment 30% of the double award</p> <p>Mandatory</p>
+	
<p>Unit A624 Impact of Modern Technologies on Engineering 1 hour/60 marks</p>	<p>Examined unit 20% of the double award</p> <p>Mandatory</p>

1.2 Guided learning hours

GCSE Engineering Single Award requires 120–140 guided learning hours in total.

GCSE Engineering Double Award requires 240–280 guided learning hours in total.

1.3 Aims and Learning Outcomes

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

All specifications in engineering must enable candidates to:

- Actively engage in the processes of engineering to develop as effective and independent individuals;
- Understand the contribution that engineering makes to society and the economy;
- Develop an awareness and appreciation of commercial and industry issues and emerging technologies in the context of engineering;
- Develop and use a range of transferable skills when designing and making engineered products to enable them to become effective and independent individuals;
- Develop an awareness and understanding of environmental issues and sustainable development;
- Develop applied engineering skills as a foundation for future learning and progression;
- Apply their knowledge and understanding of engineering by using skills of evaluation and problem solving.

1.4 Prior Learning/Attainment

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

Prior learning, skills and aptitudes particularly relevant include:

- Basic craft skills;
- Some aptitude for ICT;
- Basic drawing skills;
- Some motivation to work independently.

There is however no prior knowledge required for this specification.

2.1 Unit A621: Study of an Engineered Product (1a) and Engineering a Product (1B)

This controlled assessment unit is divided into two sections (A and B) and both sections must be completed and entered for moderation at the same time.

Section 1A: Study of an Engineered Product

Candidates will investigate a variety of products that have been developed through the use of modern technology. (see Appendix B for a range of appropriate products).

Candidates will then focus on a particular product together with two more modern equivalents of the same product. They will evidence their research for inclusion within a portfolio, which may be completed electronically or in printed format.

Impact of modern technologies

Candidates should be able to give a detailed description of:

- the impact of modern technologies, smart materials and components on their development
- the advantages and disadvantages that the use of modern technology has brought to society.

Production details of materials and components and available technology

Candidates should be able to give a detailed and justified explanation of the use of materials and components and their:

- properties
- characteristics
- performance
- cost

Engineering processes

Candidates should be able to give a detailed and justified explanation of the engineering processes used.

Design solutions

Candidates should be able to suggest and explain in detail:

- design solutions
- sustainability issues.

Section 1B: *Engineering a Product*

Candidates will select a customer design brief from a list issued by OCR (see Appendix B: controlled assessment tasks).

Candidates are required to analyse the customer design brief, and engineer and evaluate the selected solution. They will also present their selected idea.

Portfolio evidence can be submitted on paper or electronically. All electronic evidence must be presented in a format that matches the requirements outlined in Appendix A: Guidance for the production of electronic controlled assessment.

Content:

Analyse client design briefs for engineered products

Candidates should be able to:

- provide a detailed and justified analysis of the client brief;
 - produce and apply a justified design specification.
-

Generate design solutions for engineered products

Candidates should be able to:

- develop a wide range of annotated design ideas and use appropriate engineering drawings to current industry standards;
 - present and justify their selection of design solution for the engineered product;
 - consider client feedback, respond appropriately and justify changes made.
-

Engineer a product

Candidates should be able to:

- make a complete, high-quality prototype of the design solution;
 - select and safely use a wide range of appropriate materials, parts and components, processes, tools and equipment;
 - appropriately apply and detail a range of quality control techniques.
-

Analyse and revise the completed product, taking into account how it could be improved

Candidates should be able to:

- suggest detailed and justified modifications to the design solution and original specification, giving consideration to the use of modern materials, processes and technologies.
-

2.2 Unit A622: Engineering Processes

This unit will be assessed by a written examination. Questions will be a mix of short answer and free response styles, and will require candidates to demonstrate practical application of knowledge related to products and engineering environments that they have studied.

Where possible, links should be made with an engineering company to allow candidates' access and exposure to 'real-life' engineering practice. Candidates should concentrate on one of the engineering sectors listed below and should study a range of products within that sector.

Some examples of products are given for each sector below:

Engineering Sectors

Aerospace

- wing
- rotors
- passenger aircraft doors

Automotive

- wheels
- glass (privacy, quick-clear, laminated)
- safety features

Chemical & Process

- coatings (paint, plastics)
- cement
- shampoo

Computers, Communication and IT

- portable data storage
- webcams
- radio

Electrical and Electronics

- electric toothbrush
- smoke alarm
- radio-controlled car

Medical and Pharmaceutical

- blister packs
- wheelchairs
- monitors (heart, blood pressure)

Rail and Marine

- passenger information systems
- power sources (wind, electricity, fossil fuels, human, solar)
- safety features

Structural and Civil

- tunnels
- artificial environment domes (e.g. eco-domes, arboretum, leisure, winter sports domes)
- wind power generators

2: Engineering Processes (continued)

Engineering materials and their properties in the following groups:

Candidates will demonstrate knowledge and understanding of the following:

- ferrous and non-ferrous metals and alloys;
 - polymers;
 - ceramics;
 - composites that combine the properties of different materials.
-

Function of components

Candidates will demonstrate knowledge and understanding of the following:

- mechanical components;
 - electrical/electronic components;
 - pneumatic/hydraulic components.
-

The properties, characteristics and features of materials

Candidates will demonstrate knowledge and understanding of the following:

- ability to be shaped and formed;
 - ability to be treated;
 - ability to be given a surface finish;
 - ease of handling;
 - cost implications;
 - availability, form and supply.
-

Engineering processes

Candidates will demonstrate knowledge and understanding of the following:

- material removal;
 - shaping and manipulation;
 - joining and assembly;
 - heat and chemical treatment;
 - surface finishing.
-

Quality control techniques

Candidates will demonstrate knowledge and understanding of the following:

- checking task outcomes against design brief;
 - sampling;
 - comparing results with intended results;
 - action to be taken.
-

New technology used in and by the engineering industries

Candidates will demonstrate knowledge and understanding of the following:

- information, communications and digital technologies – research, digital communication with clients, suppliers;
 - modern and smart materials and components – which are used in products manufactured in a chosen sector;
 - systems and control technology to organise, monitor and control production – basic control systems and technology in terms of input/output (IO) and feedback.
-

2: Engineering Processes (continued)

Impact of Modern Technologies:

Candidates will demonstrate knowledge and understanding of the following:

- when manufacturing an engineered product – impact on workforce, company and local environment;
- on engineered products – to end user;
- on engineering industries – sustainability.

Stages in manufacturing an engineered product

Candidates will demonstrate knowledge and understanding of the following:

- design;
- marketing;
- production planning;
- material supply and control;
- processing and production;
- assembly and finishing;
- packaging and dispatch;
- disposal.

Advantages and disadvantages that the use of modern technology has brought to society

Candidates will demonstrate knowledge and understanding of the following:

- redundancy;
- working conditions;
- cost;
- availability of products;
- impact on the environment;
- training;
- transport;
- lifestyle;
- health and safety.

Engineered products

Candidates will demonstrate knowledge and understanding of the following:

- a variety of engineered products that use modern technology;
- the impact of modern technology on the design and production of a range of engineered products.

Designing a product

Candidates will demonstrate knowledge and understanding of the following:

- analysing client design briefs for engineered products;
- producing, using and modifying design specifications for engineered products;
- generating design solutions for engineered products;
- reading, understanding and creating a range of appropriate engineering drawings to current industry standards;
- presenting a design solution for engineered products; responding to client feedback.

2: Engineering Processes (continued)

Engineering a product

Candidates will demonstrate:

- producing and using production plans;
 - selecting and using a range of appropriate materials, parts and components;
 - selecting and using appropriate processes;
 - applying quality control techniques;
 - selecting and using appropriate tools and equipment;
 - applying health and safety procedures;
 - analysing and revising the completed product, taking into account how it could be improved.
-

2.3 Unit A623: Real World Engineering

This controlled assessment unit is divided into two sections (A and B); both sections must be completed and entered for moderation at the same time.

Section 3A: Real World Engineering

Candidates will study the engineering of a product which could be observed through 'real-life' experiences such as industrial visits or work experience. Alternatively the product could be researched using commercially or centre-produced resource materials.

Candidates will evidence their findings and conclusions for inclusion within a portfolio, which may be completed electronically or in printed format.

Indicate the stages in engineering a product

Candidates should be able to:

- identify and explain all the stages in engineering the product.
-

Consider production details and constraints

Candidates should be able to identify and explain the production details and constraints to include:

- labour
 - available technology
 - quality standards
 - handling and storage.
-

Identify materials and constraints

Candidates should be able to:

- consider the identified product giving detail, and justify all materials and components and their constraints through their availability, form and supply.
-

Consider systems and control technology

Candidates should be able to:

- identify and explain systems and control technology, and to organise, monitor and control production of the product.
-

Identify and discuss the impact of modern technologies

Candidates should be able to:

- identify and explain the impact of modern technologies when engineering the product.
-

Section 3B: Making an Engineered Product

Candidates must select a product from a list issued by OCR (see Appendix B: controlled assessment tasks). Candidates will then produce and apply a detailed production plan to engineer a high quality prototype of the product. Health and safety and quality control will both be considered and applied together with an analysis and revision of the completed product.

Portfolio evidence can be submitted on paper or electronically. All electronic evidence must be presented in a format that matches the requirements outlined Appendix A (Guidance for the production of electronic controlled assessment).

Work should be individually produced and reflect only the tasks undertaken by the individual candidates.

Undertake production planning

Candidates should be able to:

- produce and apply a detailed production plan.
-

Develop an engineering prototype

Candidates should be able to select use and justify the use of a wide range of appropriate:

- make a complete, high quality prototype of the engineered product.
 - processes
 - materials
 - parts
 - components
 - tools
 - equipment.
-

Apply health and safety and quality control

Candidates should be able to:

- detail their individual application of health and safety procedures and
 - quality control techniques.
-

Analyse and revise products

Candidates should be able to:

- analyse and revise the completed product and explain how and why it could be improved.
-

2.4 Unit A624: Impact of Modern Technology on Engineering

This unit will be assessed by a one-hour computer-based test or a one-hour written examination.

Questions will be a mix of short answer and free response styles, and will require candidates to demonstrate practical application of knowledge related to products and engineering environments they have studied. In particular they should focus on **engineering for sustainability**.

Where possible, links should be made with an engineering company to allow candidates access to real-life engineering practice.

Engineering Sectors

Aerospace

- landing gear
- turbines
- passenger aircraft doors

Automotive

- fairings
- seating
- displays

Chemical & Process

- cement
- washing up liquid
- coatings (paint, plastics)

Computers, Communication and IT

- PDA
- video conferencing systems
- radio

Electrical and Electronics

- electric toothbrush
- vending machine
- security system

Medical and Pharmaceutical

- household disability aids (eating and drinking, gripping and turning, reaching)
- mobility aids (scooters, powered wheelchairs)
- heart monitors

Rail and Marine

- drive systems
- navigation
- safety features

Structural and Civil

- tunnels
- temporary accommodation (site buildings, emergency)
- outdoor storage

4: Impact of Modern Technologies on Engineering (continued)

Candidates will demonstrate knowledge and understanding of the following:

Sustainability – design for the environment

- *manufacture without producing hazardous waste*
- use of clean technologies
- reduction of product chemical emissions
- reduction of product energy consumption
- use of non-hazardous recyclable materials
- use of recycled material and reused components
- design for ease of disassembly
- product reuse or recycling at end of life.

Engineering materials and their properties in the following groups

- *ferrous and non-ferrous metals and alloys*
- polymers
- ceramics
- composites that combine the properties of different materials.

The functions of:

- *mechanical components*
- electrical/electronic components
- pneumatic/hydraulic components.

The properties, characteristics and features of materials that affect

- *ability to be shaped and formed*
- ability to be treated
- ability to be given a surface finish
- ease of handling
- cost implications
- availability, form and supply.

Engineering processes

- *material removal*
- shaping and manipulation
- joining and assembly
- heat and chemical treatment
- surface finishing.

Quality control techniques

- sampling
 - comparing
 - action.
-

4: Impact of Modern Technologies on Engineering (continued)

New technology used in and by the engineering industries

Information, communications and digital technologies – research, production planning systems, digital communication with clients, suppliers;

- modern and smart materials and components;
- systems and control technology to organise, monitor and control production:
 - automation
 - sensors
 - inputs
 - outputs
 - CAD CAM CIE.

Impact of modern technologies

when manufacturing an engineered product – impact on workforce, company and local environment

- on engineered products – to end user
- on engineering industries – sustainability
- stages in manufacturing an engineered product:
 - design
 - marketing
 - production planning
 - material supply and control
 - processing and production
 - assembly and finishing
 - packaging and dispatch
 - disposal.

Advantages and disadvantages that the use of modern technology has brought to society

redundancy

- working conditions
- cost
- availability of products
- impact on the environment
- training
- transport
- lifestyle
- health and safety.

Engineered products

- a variety of engineered products that use modern technology
- the impact of modern technology on the design and production of a range of engineered products.

4: *Impact of Modern Technologies on Engineering* (continued)

Designing a product

- analysing client design briefs for engineered products
 - producing, using and modifying design specifications for engineered products
 - generating design solutions for engineered products
 - reading, understanding and creating a range of appropriate engineering drawings to current industry standards
 - presenting a design solution for engineered products
 - responding to client feedback.
-

Engineering a product

- producing and using production plans
 - selecting and using a range of appropriate materials, parts and components
 - selecting and using appropriate processes
 - applying quality control techniques
 - selecting and using appropriate tools and equipment
 - applying health and safety procedures
 - analysing and revising the completed product, taking into account how it could be improved.
-

3.1 Overview of the assessment in GCSE Engineering

For GCSE Engineering, candidates must take:

GCSE Engineering J322	
Unit A621: 1A Study of an Engineered Product and 1B Engineering a Product (controlled assessment)	
60% of the total GCSE marks: Controlled assessment. Section 1A: 20% of the total GCSE marks. 30 marks	Section A: Study of a Engineered Product Candidates are required to undertake a product analysis of a product (selected from a list provided by OCR) and its modern equivalents. The candidate should identify two products, similar to the initial selected product, that have developed through the influence of modern technologies. Once the range of products has been identified, a thorough product analysis should be carried out.
Section 1B: 40% of the total GCSE marks. 60 marks	Section B: Engineering a Product Candidates are required to work from a given client brief selected from a list of tasks provided by OCR. They will analyse the client brief, produce and design a specification and produce a range of design ideas. They will then produce a quality prototype and finally carry out a full evaluation of the finished product.
The time limit available to complete each assessment task is approximately 20 hours. For guidance on the suggested time allocation for controlled assessment see section 4.	
This unit is internally assessed and externally moderated.	
Unit A622: Engineering Processes	
40% of the total GCSE marks. 1 hr written paper. 60 marks	This unit will be assessed by a one hour written examination. Questions will be a mix of short answer and free response styles, and will require candidates to demonstrate practical application of knowledge related to products and manufacturing environments they have studied.
This unit is externally assessed.	

3.2 Overview of the assessment in GCSE (Double Award) Engineering

For GCSE (Double Award) in Manufacturing candidates must take:

GCSE (Double Award) Engineering (J344)	
GCSE Engineering units as above, Unit A621 being 30% and Unit A622 being 20% of the GCSE (Double Award) marks, and:	
Unit A623: 3A Real World Engineering and 3B Making a Engineered Product.	
30% of the total GCSE (Double Award) marks. Controlled assessment. Section 3A: 10% of the total GCSE (Double Award) marks. 30 marks	Section 3A: Real World Engineering Candidates are required to undertake the study of an engineered product from the first stage of production through all the associated stages up to the completed item being delivered to the client.
Section 3B: 20% of the total GCSE (Double Award) marks. 60 marks	Section 3B: Making a Engineered Product Candidates are required to work from a given product provided by OCR. They will work as a member of a team and produce a batch of items. The candidate will be expected to present production details about the product and carry out individual tasks, as a member of the team, leading to the production of an assembled quality product. Care will be taken to follow health and safety requirements and quality assurance procedures will be fundamental during the production process. A final evaluation will reflect on processes, tools and machinery used as well as how the product could be produced in the real world.
The time limit available to complete each assessment task is approximately 20 hours. For guidance on the suggested time allocation for controlled assessment see section 4.	
This unit is internally assessed and externally moderated.	
Unit A624: Impact of Modern Technologies on Engineering (Examined unit)	
20% of the total GCSE (Double Award) marks. 1 hr written paper. 60 marks	This unit will be assessed by a one hour computer-based test or written examination. Questions will be a mix of short answer and free response styles, and will require candidates to demonstrate practical application of knowledge related to products and engineering environments they have studied. In particular, they should focus on designing products for manufacture and sustainability.
This unit is externally assessed.	

3.3 Assessment Objectives (AOs)

In the context of the content described, candidates are expected to demonstrate their ability to:

AO1	recall, select and communicate their knowledge and understanding of a range of contexts
AO2	apply skills, knowledge and understanding, including quality standards, in a variety of contexts and to plan and carry out investigations and tasks, involving a range of tools, equipment, materials and components;
AO3	analyse and evaluate evidence, make reasoned judgements and present conclusions.

3.3.1 AO weightings – GCSE (Single Award) Engineering

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 A621: <i>1A: Study of an Engineered Product & 1B: Engineering a Product</i>	10%	40%	10%	60%
Unit A622: <i>Engineering Processes</i>	16%	16%	8%	40%
Total	26%	56%	18%	100%

3.3.2 AO weightings – GCSE (Double Award) Engineering

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 A621: <i>1A: Study of an Engineered Product & 1B: Engineering a Product</i>	5%	20%	5%	30%
Unit A622: <i>Engineering Processes</i>	8%	8%	4%	20%
Unit A623: <i>3A: Real World Engineering & 3B: Making an Engineered Product</i>	5%	20%	5%	30%
Unit A624: <i>Impact of Modern Technologies on Engineering</i>	8%	7%	5%	20%
Total	26%	55%	19%	100%

3.4 Grading and awarding grades

Both GCSE and GCSE (Double Award) results are awarded on the scale A* to G (A*A* to GG). Units are awarded a* to g. Grades are indicated on certificates. However, results for candidates who fail to achieve the minimum grade (G, GG or g) will be recorded as unclassified (U, UU 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. 41/90.

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
60/30%	90	81	72	63	54	45	36	27	18	0
40/20%	60	54	48	42	36	30	24	18	12	0

Qualification	Max Uniform Mark	Qualification Grade								
		A*	A	B	C	D	E	F	G	U
GCSE (Single Award)	150	135	120	105	90	75	60	45	30	0

Qualification	Max Uniform Mark	Qualification Grade															
		A*A*	A*A	AA	AB	BB	BC	CC	CD	DD	DE	EE	EF	FF	FG	GG	UU
GCSE (Double Award)	300	270	255	240	225	210	195	180	165	150	135	120	105	90	75	60	0

For the single award the written papers will have a total weighting of 40% and controlled assessment a weighting of 60%. For the double award the written papers will have a total weighting of 20% and controlled assessment a weighting of 30%.

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

3.5 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.

3.5.1 Grade F

Candidates recall, select and communicate knowledge and understanding of basic aspects of engineering.

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.

3.5.2 Grade C

Candidates recall, select and communicate sound knowledge and understanding of engineering.

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.

3.5.3 Grade A

Candidates recall, select and communicate detailed knowledge and thorough understanding of engineering.

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.

3.6 Quality of written communication

Quality of written communication is assessed in units A622 and A624 and is integrated in the marking criteria.

Candidates are expected to:

- ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear;
- 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 [Guide to controlled assessment in Engineering](#).

Teaching and Learning

Controlled assessment is designed to be an integral part of teaching and learning. Unit A621 Section A, and Section B, and Unit A623 Section A, and Section B have been designed to be internally assessed, applying the principles of controlled assessment.

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

4.1 Controlled assessment tasks

All controlled assessment tasks are set by OCR.

Centres can choose one from a number of product-based tasks offered by OCR. See Appendix B. These tasks can be used with a minimum amount of adaptation or they can be adapted so that they allow the usage of local resources available to any centre. These tasks may also be set within overarching scenarios and briefs more relevant to centres' own environment and targeted at their particular cohorts of candidates.

Controlled assessment tasks may be adapted by centres in ways that 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 the product 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 will include a section that briefly specifies the type and degree of adaptation that is appropriate (See Appendix B).

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

Controlled assessment tasks are available on Interchange from 1 June for the following examination series.

Assessment tasks are reviewed every two years and amended where necessary. 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 by checking carefully the examination dates of the tasks on Interchange.

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 about 20 hours of assessment for each unit A621 and A623. Candidates should be allowed sufficient time to complete all 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):

Teachers should apply appropriate time to explore 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.

Research/collection of evidence:

During the research phase, candidates can be given support and 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

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

Producing final piece of work (formal supervision)

Formal supervision means under direct teacher supervision: teachers must be able to authenticate the work and there must be acknowledgement and referencing of any sources used. If writing up is carried out over several sessions, work must be collected in between sessions.

- The final piece of work should be indexed and include headings that identify materials presented by the candidate. Footnotes, figures, tables, diagrams, charts and appendices should be included where appropriate.
- 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 be marked with the:
 - centre number
 - centre name
 - candidate name
 - candidate number
 - 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 A at the end of this specification. Work submitted on paper must be secured by treasury tags.

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 in a digital format is supplied 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* below). 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 will provide 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 objectives/ criteria, teachers select the most appropriate band descriptors provided in the marking grid that 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 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.

The final mark for the candidate for the controlled assessment unit is out of a total of 90 and is found by totalling the marks for each of the marking objective/criteria strands.

There should be sufficient 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 for an internally assessed unit, then the work should be assessed according to the marking criteria and the appropriate mark, including zero marks, awarded.

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. T

he writing of comments on candidates' work 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

Unit A621 Section A: *Study of an Engineered Product*

0 marks = no response or no response worthy of credit

Basic ability	Sound Ability	High Ability
For the engineered products studied the candidate:		
<p>gives a basic description of:</p> <ul style="list-style-type: none"> the impact of modern technologies, smart materials and components on their development; the advantages and disadvantages that the use of modern technology has brought to society. <p style="text-align: right;">[1 2 3]</p>	<p>gives a description of:</p> <ul style="list-style-type: none"> the impact of modern technologies, smart materials and components on their development; the advantages and disadvantages that the use of modern technology has brought to society. <p style="text-align: right;">[4 5 6]</p>	<p>gives a detailed description of:</p> <ul style="list-style-type: none"> the impact of modern technologies, smart materials and components on their development; the advantages and disadvantages that the use of modern technology has brought to society. <p style="text-align: right;">[7 8 9]</p>
<p>gives a basic explanation of the use of materials and components and some of their:</p> <ul style="list-style-type: none"> properties; characteristics; performance; cost. <p>There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of spelling, punctuation and grammar may be intrusive.</p> <p style="text-align: right;">[1 2 3]</p>	<p>gives an adequate explanation of the use of materials and components and their:</p> <ul style="list-style-type: none"> properties; characteristics; performance; cost. <p>There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar.</p> <p style="text-align: right;">[4 5 6]</p>	<p>gives a detailed and justified explanation of the use of materials and components and their:</p> <ul style="list-style-type: none"> properties; characteristics; performance; cost. <p>Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar.</p> <p style="text-align: right;">[7 8 9]</p>
<p>gives a basic explanation of the:</p> <ul style="list-style-type: none"> engineering processes used. <p style="text-align: right;">[1 2]</p>	<p>gives a detailed explanation of the:</p> <ul style="list-style-type: none"> engineering processes used. <p style="text-align: right;">[3 4]</p>	<p>gives a detailed and justified explanation of the:</p> <ul style="list-style-type: none"> engineering processes used. <p style="text-align: right;">[5 6]</p>
<p>suggests, with some explanation, limited:</p> <ul style="list-style-type: none"> modifications to design solutions; sustainability issues. <p style="text-align: right;">[1 2]</p>	<p>suggests and explains:</p> <ul style="list-style-type: none"> modifications to design solutions; sustainability issues. <p style="text-align: right;">[3 4]</p>	<p>suggests and explains in detail:</p> <ul style="list-style-type: none"> modifications to design solutions; sustainability issues. <p style="text-align: right;">[5 6]</p>

Unit A621 Section B: *Engineering a Product*

0 marks = no response or no response worthy of credit

Basic ability	Sound Ability	High Ability
Using the client design brief for an engineered product the candidate:		
<p>provides a basic analysis of the client brief;</p> <p>produces and partially applies a design specification;</p> <p style="text-align: right;">[1 2 3]</p>	<p>provides an analysis of the client brief;</p> <p>produces and applies a design specification;</p> <p style="text-align: right;">[4 5 6]</p>	<p>provides a detailed and justified analysis of the client brief;</p> <p>produces and applies a justified design specification.</p> <p style="text-align: right;">[7 8 9]</p>
<p>develops some design ideas using engineering drawings to current industry standards;</p> <p>presents their selection of design solutions for the engineered product;</p> <p>gives some considered client feedback;</p> <p style="text-align: right;">[1 2 3 4 5]</p>	<p>develops a range of annotated design ideas using appropriate engineering drawings to current industry standards;</p> <p>presents and explains their selection of design solution for the engineered product;</p> <p>considers client feedback and responds appropriately;</p> <p style="text-align: right;">[6 7 8 9 10]</p>	<p>develops a wide range of annotated design ideas using appropriate engineering drawings to current industry standards;</p> <p>presents and justifies their selection of design solution for the engineered product;</p> <p>considers client feedback, respond appropriately and justify changes made;</p> <p style="text-align: right;">[11 12 13 14 15]</p>
<p>makes a prototype of the design solution;</p> <p style="text-align: right;">[1 2 3 4 5 6]</p>	<p>makes a quality prototype of the design solution;</p> <p style="text-align: right;">[7 8 9 10 11 12]</p>	<p>makes a complete, high quality prototype of the design solution;</p> <p style="text-align: right;">[13 14 15 16 17 18]</p>
<p>selects and safely uses appropriate materials, parts and components, processes, tools and equipment;</p> <p>applies some quality control techniques;</p> <p style="text-align: right;">[1 2 3]</p>	<p>selects and safely uses a range of appropriate materials, parts and components, processes, tools and equipment;</p> <p>appropriately applies a range of quality control techniques;</p> <p style="text-align: right;">[4 5 6]</p>	<p>selects and safely uses a wide range of appropriate materials, parts and components, processes, tools and equipment;</p> <p>appropriately applies and details a range of quality control techniques;</p> <p style="text-align: right;">[7 8 9]</p>
<p>suggests some modifications to the design solution giving some consideration to the use of modern materials, processes and technologies.</p> <p style="text-align: right;">[1 2 3]</p>	<p>suggests modifications to the design solution giving consideration to the use of modern materials, processes and technologies.</p> <p style="text-align: right;">[4 5 6]</p>	<p>suggests detailed and justified modifications to the design solution giving consideration to the use of modern materials, processes and technologies.</p> <p style="text-align: right;">[7 8 9]</p>

0 marks = no response or no response worthy of credit

Unit A623 Section A: Real World Engineering

0 marks = no response or no response worthy of credit

Basic ability	Sound Ability	High Ability
For the engineered products the candidate:		
gives a basic explanation of most stages in engineering the product; [1 2]	identifies and explains most stages in engineering the product; [3 4]	identifies and explains all the stages in engineering the product; [5 6]
gives a basic outline of the engineering processes and quality control techniques used to produce the product; [1 2]	identifies and explains the engineering processes and quality control techniques used to produce the product; [3 4]	identifies and comprehensively explains the engineering processes and quality control techniques used to produce the product; [5 6]
gives limited consideration to the product with some detail of materials and components and their: <ul style="list-style-type: none"> • functions; • properties; and • characteristics; [1 2]	considers the identified product, giving detail of materials and components and their: <ul style="list-style-type: none"> • functions; • properties; and • characteristics; [3 4]	considers the identified product giving detail and justifying all materials and components and their: <ul style="list-style-type: none"> • functions; • properties; and • characteristics; [5 6]
gives a basic explanation of some of the systems and control technology, to organise, monitor and control production of the product; [1 2]	identifies and explains systems and control technology, to organise, monitor and control production of the product; [3 4]	identifies and comprehensively explains systems and control technology, to organise, monitor and control production of the product; [5 6]
gives a basic explanation of the impact of modern technologies when engineering the product. [1 2]	identifies and explains the impact of modern technologies when engineering the product. [3 4]	identifies and comprehensively explains the impact of modern technologies when engineering the product. [5 6]

Unit A623 Section B: *Making an Engineered Product*

0 marks = no response or no response worthy of credit

Basic ability	Sound Ability	High Ability
For the engineering product made the candidate:		
produces and refers to a basic production plan; [1 2 3 4]	produces and applies a production plan; [5 6 7 8]	produces and applies a detailed production plan; [9 10 11 12]
makes a prototype of the engineered product; [1 2 3 4 5 6]	makes a quality prototype of the engineered product; [7 8 9 10 11 12]	makes a complete, high-quality prototype of the engineered product; [13 14 15 16 17 18]
<p>selects and uses:</p> <ul style="list-style-type: none"> • processes; • materials; • parts; • components; • tools; • equipment. <p>There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of spelling, punctuation and grammar may be intrusive.</p> <p>[1 2 3 4]</p>	<p>selects, uses and explains the use of appropriate:</p> <ul style="list-style-type: none"> • processes; • materials; • parts; • components; • tools; and • equipment. <p>There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar.</p> <p>[5 6 7 8]</p>	<p>selects, uses and justifies the use of a wide range of appropriate:</p> <ul style="list-style-type: none"> • processes; • materials; • parts; • components; • tools; • equipment. <p>Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar.</p> <p>[9 10 11 12]</p>
<p>gives limited detail of their individual application of:</p> <ul style="list-style-type: none"> • health and safety procedures; • quality control techniques. <p>[1 2 3]</p>	<p>details their individual application of:</p> <ul style="list-style-type: none"> • health and safety procedures; • quality control techniques. <p>[4 5 6]</p>	<p>comprehensively details their individual application of:</p> <ul style="list-style-type: none"> • health and safety procedures; • quality control techniques. <p>[7 8 9]</p>
<p>gives some analysis and revision of the completed product, stating how or why it could be improved.</p> <p>[1 2 3]</p>	<p>analyses and revises the completed product, explaining how and why it could be improved.</p> <p>[4 5 6]</p>	<p>provides a detailed analysis and revision of the completed product, explaining how and why it could be improved.</p> <p>[7 8 9]</p>

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.

The sample of work which is presented to the Moderator for moderation must show how the marks have been awarded in relation to the marking criteria defined in Section 4.3.4.

Each candidate's work should have a cover sheet attached to it with a summary of the marks awarded for the task. 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.

The OCR GCSE Engineering unit(s) A621 / A623 can be submitted electronically to the OCR Repository via Interchange: please check Section 7.4.1 page 42 for unit entry codes for the OCR Repository.

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](#).

5.1 Free resources available from the OCR website

The following materials will be available on the OCR website:

- [GCSE Engineering Specification](#)
- Specimen assessment materials for each unit: [A622](#) [A624](#)
- [Guide to controlled assessment](#)
- [Teachers Handbook](#)
- Sample Schemes of work and lesson plans: [A621-1a](#) [A621-1b](#) [A622](#) [A623-3a](#) [A624](#)

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 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.

5.3.1 Active Results

Active Results is available to all centres offering OCR's GCSE Engineering specifications.



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

Devised specifically for the UK market, 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](#).

5.3.2 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. Sign up at [OCR Interchange](#).

6.1 Equality Act information relating to GCSE Engineering

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
BSL signers	Y	All Written Examinations
Modified question papers	Y	All Written Examinations
Extra time	Y	All Written Examinations

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 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*.

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 Engineering (September 08) and GCSE (Double Award) Engineering 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 Engineering certification is available in June 2014 and each June thereafter.

GCSE (Double Award) Engineering certification is available in June 2014 and each June thereafter.

	Unit A621	Unit A622	Unit A623	Unit A624	Certification availability
June 2014	✓	✓	✓	✓	✓
June 2015	✓	✓	✓	✓	✓

7.2 Certification rules

For GCSE Engineering 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.

For GCSE (Double Award) Engineering, from June 2014 onwards, where a candidate is taking GCSE (Double Award) for the first time and where they have not previously been awarded GCSE Engineering, a 100% terminal rule applies. Candidates must enter for all their units in the series in which the qualification is certificated.

From June 2014, candidates who have already been awarded GCSE Engineering, and decide to move on to GCSE (Double Award) Engineering have three options available to them for certification of the double award:

- Take just the additional units required for GCSE (Double Award) and carry forward the result for GCSE Engineering.
- Re-take all of the GCSE Engineering units alongside the additional units required for GCSE (Double Award) Engineering. The new results for the units that have been re-taken will then be used to calculate the GCSE (Double Award) Engineering grade.
- Any results previously achieved will not be re-used.
- Re-take the externally assessed unit A622 alongside the additional units required for GCSE (Double Award) Engineering and carry forward the result for the controlled assessment unit A621 that was previously used towards GCSE Engineering. The new result for the externally assessed unit A622 will then be used in the calculation of the GCSE (Double Award) Engineering grade.

Candidates must choose which of these options they want to follow before entries for the double award are made. All new and re-taken units must be entered in the series in which the double award is certificated.

Where a candidate decides to carry forward a result for the controlled assessment unit A621 they must be entered for this unit in the series in which the double award is certificated, using the entry code for the carry forward option (see section 7.3.1.).

Where a candidate decides to carry forward the complete result for GCSE Engineering they must be entered for the carry forward unit code A620 in the series in which the double award is certificated.

GCSE Engineering and GCSE (Double Award) Engineering can be certificated concurrently if all units are taken in the same series.

7.3 Rules for re-taking a qualification

Candidates may enter for each 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 will not 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 will not 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 7.3.1).

For any further advice on rules for re-taking a qualification, please contact OCR.

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 below. 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 in which they enter the work for assessment.

Unit Entry code	Component code	Submission/ Examination method	Unit titles
A621	01	<i>OCR Repository</i>	<i>Section A: Study of an Engineered Product and Section B: Engineering a Product</i>
A621	02	<i>Postal moderation</i>	
A621C	80	<i>Carried Forward</i>	
A622	02	<i>Written Paper</i>	<i>Engineering Processes</i>
A623A	01	<i>OCR Repository</i>	<i>Section A: Real World Engineering and Section B: Making an Engineered Product</i>
A623B	02	<i>Postal moderation</i>	
A623C	80	<i>Carried Forward</i>	
A624B	02	<i>Written Paper</i>	<i>Impact of Modern Technologies on Engineering</i>
A620	80	<i>Carried Forward</i>	<i>GCSE Engineering (J322) result carried forward</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.

Candidates may be entered for one or both of the following:

- GCSE Engineering certification code J322
- GCSE (Double Award) Engineering certification code J344.

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 0009

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.

8.1 Overlap with other qualifications

There is no significant overlap between the content of these specifications and that for other GCSE qualifications.

8.2 Progression from this qualification

GCSE qualifications are general qualifications that 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.

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 Engineering*. 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

This specification offers opportunities which can contribute to an understanding of these issues in the following topics.

Issue	Opportunities for developing an understanding of the issue during the course
Spiritual issues	spiritual development, through helping pupils recognise their own creativity and the creativity of others in finding solutions to problems, and through recognising the tension between material and non-material needs;
Moral issues	moral development, through helping pupils to reflect on how technology affects the environment so they can make informed choices when designing and making and through discussing the moral dilemmas posed by introducing new technologies within different values systems and the advantages and disadvantages of new technology to local, national and global communities;
Ethical issues	helping candidates work together productively on complex tasks and helping them see the benefits of collective co-operation.
Social issues	social development through helping pupils recognise the need to consider the views of others when discussing design ideas;
Legislative issues	European examples should be used where appropriate in the delivery of the subject content. Relevant European legislation is identified within the specification where applicable.
Economic issues	economic development: helping candidates make informed decisions about the management and use of materials
Cultural issues	cultural development, through exploring the contribution of products to the quality of life within different cultures, and through valuing and reflecting on the responses of people from other cultures to design solutions.

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.

This specification provides opportunities to promote education for sustainable development, through developing knowledge and understanding of the principles of sustainable design and production systems, developing skills in creative problem solving and evaluation, and exploring values and ethics in relation to the application of design and technology. Whereas candidates will not be specifically assessed in terms of their knowledge and awareness of issues associated with energy usage, it is anticipated that, whenever possible, candidates will be encouraged to consider that benefits and drawbacks associated with the use of different sources of energy.

The specification content includes a specific requirement to consider issues associated with health and safety and the environment.

OCR has taken account Resolutions of the Council of the European Community in preparing this specification and associated specimen assessments. European examples should be used where appropriate in the delivery of the subject content. Relevant European legislation is identified within the specification where applicable.

8.8 Key Skills

This specification provides opportunities for the development of the Key Skills of *Communication*, *Application of Number*, *Information 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
B231:1A	✓	✓			✓	✓	✓		✓	✓		
B231:1B	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓
B232	✓	✓			✓	✓	✓		✓	✓		
B233:3A	✓	✓			✓	✓	✓		✓	✓		
B233:3B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
B234	✓	✓	✓	✓	✓	✓	✓		✓	✓		

Detailed opportunities for generating Key Skills evidence through this specification are posted on the [OCR website](#). A summary document for Key Skills Coordinators showing ways in which opportunities for Key Skills arise within GCSE courses has been published.

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 Science.

Opportunities for ICT include:

- gathering information from the World Wide Web and CD-ROMs
- gathering data using sensors linked to data-loggers or directly to computers
- using spreadsheets and other software to process data
- using animations and simulations to visualise scientific ideas
- 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.

GCSE Engineering is designed as education for future citizens which not only covers aspects of the Citizenship programme of study but also extends beyond that programme by dealing with important aspects of engineering which people encounter in their everyday lives.

Citizenship	Opportunities for Teaching Citizenship Issues during the Course
Consider the needs of others	A621 1A, A621 1B, A622
Consider issues surrounding a particular product and its surroundings	A622
Seek opinions of others and be flexible and adaptable in responding to their needs	A622
Consider the need to work together as a team	A622, A623
Seek the opinions of others	
Consider the health and safety of others	A621 1B, A622

Appendix A: Guidance for the production of electronic controlled assessment

A

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 relevant unit code, 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 represent the evidence available for each candidate.

Accepted File Formats

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)

Microsoft Office suite

PowerPoint (.ppt)

Word (.doc)

Excel (.xls)

Visio (.vsd)

Project (.mpp)

Text formats

Comma Separated Values (.csv)

PDF (.pdf)

Rich text format (.rtf)

Text document (.txt)

Unit A621/1A Study of an Engineered Product

Candidates must select one of the following products as a starting point for the controlled assessment project, Unit A621 1A Study of Engineered Product. When analysing the product they will need to identify two similar products that have been subsequently developed using modern technology.

1940s Telephone	1940s Bicycle	1920s Domestic oven
1940s Sewing machine	1940s Hairdryer	1920s Cooker
1950s Camera	1940s Model vehicle	1920s Kettle
1950s Electric toaster	1950s Radio	1940s Television
1950s Bottle	1950s Lawnmower	1940s Toy
1970s Walkman	1950s Footwear	1950s Washing Machine
1970s Electric calculator	1960s Crash helmet	1950s Vacuum cleaner
1970s Video recorder	1990s Personal computer	1980s Games machine

Unit A621/1B Engineering a Product

Candidates must select one of the following client based briefs as a starting point for the controlled assessment project, Unit A621 1B Engineering a Product. Through investigation of the brief candidates can devise their own starting point.

- A local company has identified that there is a need for a greater choice in the market on items that are used for storage around the home.
- A local charity would like to introduce collecting boxes that can be used to collect donations from the general public.
- Car security is becoming a great concern. Devise a car alarm that could be introduced onto the market.
- The Crime prevention officer has noticed an upturn in theft from houses in the area and would like to run a campaign promoting home security. He needs posters to make people aware of the situation as well as devices that can be used to deter opportunist thieves.
- In order to avoid damage to the car when driving into a garage or while it is reversing, a sensor is needed that will warn the motorist when he/she is getting near to a hazard.
- A company that specialises in security would like an alarm introduced that can be stored in a pocket or bag and used by the person as a warning device if a person was attacked.
- Mechanical toys entertain a wide variety of people from children to executives to relieve boredom. Design a new device that can be sold by a local retailer.
- A garden centre would like to sell devices that indicate when plants need watering.
- Novelty egg timers will be introduced to a range of kitchen items sold in a local store. Explore this idea and produce a prototype that could be sold at the store.
- A cycle store would like to introduce a range of devices that can be used to attach mobile phone to cycles.
- A local hardware store has identified that there is a market for interchangeable screwdrivers. Explore this and come up with a device that can be sold in the store.
- Dentists would like to introduce a device to encourage young children to brush their teeth for a minimum of two minutes a day, twice daily. The item should appeal to younger users.
- A DIY outlet would like to add new products to its range of clamping devices that are used when carrying out jobs around the home or in the garage. Explore this situation and produce an appropriate device.
- A sports shop has identified a need for devices that can be used by fishermen to hold items while they prepare flies for future fishing sessions.
- A DIY outlet would like to add quick-action-release clamps to its range of devices that are used when carrying out jobs around the home or in the garage. Explore this situation and produce an appropriate device.
- A local company would like to produce holders that can be used by individuals while soldering components onto a printed circuit board.
- A local company would like to produce stands that can be used by individuals to hold hot soldering irons.
- A touring caravan dealer is looking to improve ways of getting fresh water to a caravan.
- A novelty radio is to be introduced to a range of products sold in a local shop.
- A farmer wants to increase the size of his herd of cows and therefore the volume of animal feed.
- A vehicle manufacturer wants to improve the operation of the lights on their latest model.

Unit A623/3A Real World Engineering

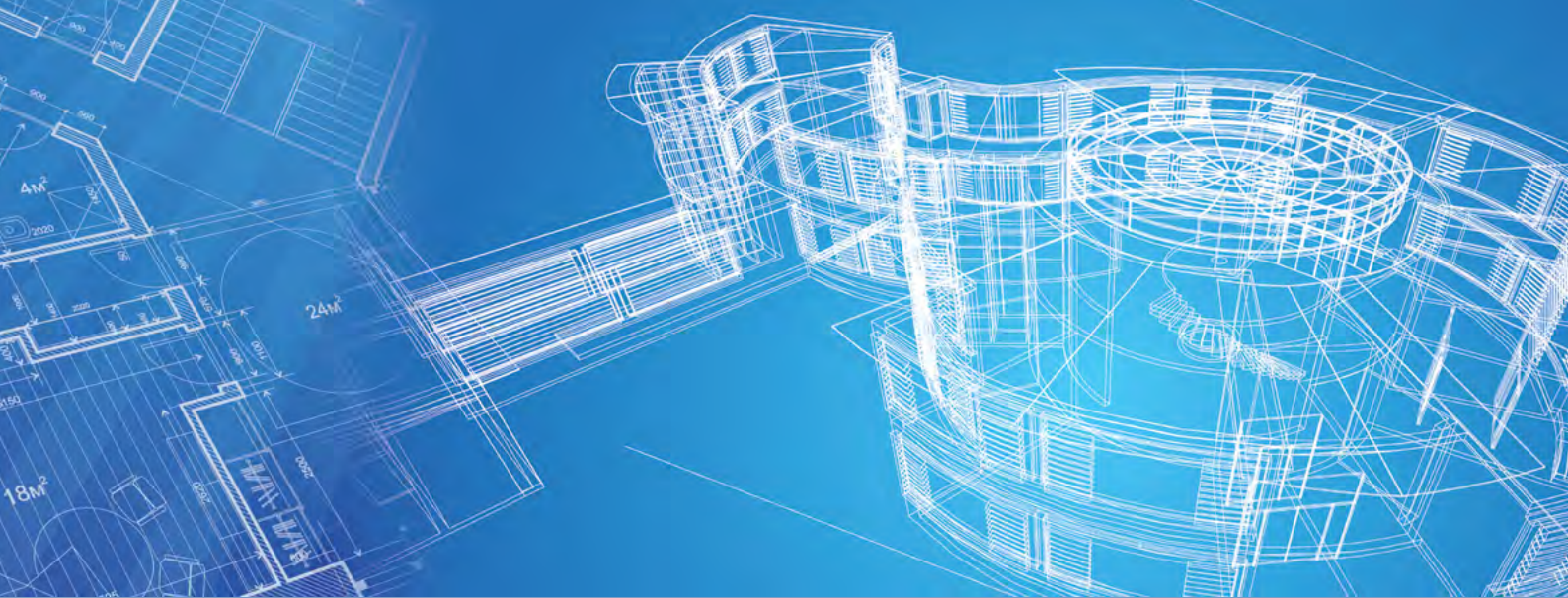
Candidates must select one of the following products as a starting point for the activity. Through investigating the product, candidates, working in teams, can devise their own particular starting point.

Alloy car wheels	Greenhouse	Roller bearings
Aluminium saucepan	House brick	Roller blades
Artificial limb	I Pod/MP3 player	Safety guards
Calculators	In-flight fuelling systems	Spectacles
Climbing frame	Kitchen cabinet	Stainless steel teapot
Computer mouse	Lamp post	Surgical appliances
Dehumidifier	Laser printer	Tumble dryer
Dental accessories	Lathes	uPVC window
Digital cameras	Lawnmower	Walking frame
Domestic iron	Mobile phone	Washing machine
Electric kettle	Mortise locks	Water pumps
Electric plug top	Motor car	Wheelbarrow
Electric toaster	Motor car engine	Wheelie bin
Electronic door locking systems	Motorbike fairing	Wristwatch
Garage doors	Petrol pumps	Garden hose
Garden gate	Power drill	Can crusher
Toy	Touch screen device	Video recorder
Removable electronic storage device	Footwear	Trailer

Unit A623/3B Making an Engineered Product

Candidates must select one of the following products for the Controlled Assessment project, Unit A623 3B Making an Engineered Product.

Adjustable spanner	Cramp	Shoe storage
Adjustable tent pegs	Garden hand tools	Sliding bevel
Alternative to tool box storage	Garden tool storage	Sliding coat storage
Axle stands	Hacksaw	Small sack truck
Bicycle stand	Hole punch	Soldering clamp
Camping stove	Indoor cricket stumps	Soldering iron stand
Chess set	Mechanical toy	Step stool
Climbing frame	Mobile phone holder	Storage of sports equipment
Clock	Model engine	Table tennis net supports
Cricket net supports	Moisture sensor	Telescopic fishing rod support
Depth gauge – manual or electronic	Nightlight	Toolmaker's clamp
Drilling clamp	Oscillating engine	Towing alarm
Egg timer	Paper cutter	Vice
Electronic door alarm	PCB holder	Watchmaker's clamp
Engineer's tool clamp	Pill storage device	Watering hose storage
Engineer's vice	Quick-release-action clamp	Wheel nut clamp
Executive toy	Reversing warning device	Recycling bin
Fly-tying vice	Rolling storage unit	Squirrel proof bird feeder
Folding golf trolley	Rotary clothes line storage	Bike chain cleaner
Greenhouse window operator	Cupcake holder	Wind turbine
Plant watering system	Mobile phone	Animal carrying cage
House plant turntable		



YOUR CHECKLIST

Our aim is to provide you with all the information and support you need to deliver our specifications.

- Bookmark www.ocr.org.uk/gcse2012
- 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 engineering 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**

WHAT TO DO NEXT

Become an approved OCR centre – if your centre is completely new to OCR and has not previously used us for any examinations, visit www.ocr.org.uk/centreapproval to become an approved OCR centre.

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