Rewarding Learning

CCEA GCSE Specification in Engineering

For first teaching from September 2009

For first assessment from Summer 2010
For first award in Summer 2011

Subject Code: 0009

engineering

single award

Foreword

This booklet contains CCEA's General Certificate of Secondary Education (GCSE) Engineering for first teaching from September 2009. We have designed this specification to meet the requirements of the following:

- GCSE Subject Criteria for Engineering;
- GCSE Qualifications Criteria;
- Common Criteria for all Qualifications;
- GCSE Controlled Assessment Regulations for Engineering; and
- GCSE Controlled Assessment Generic Regulations.

We will make the first full award based on this specification in summer 2011.

The first assessment for the following unit will be available in summer 2010:

- Unit 3: Engineering Technology.

We will notify centres in writing of any major changes to this specification. We will also publish changes on our website at www.ccea.org.uk

The version on our website is the most up-to-date version. Please note that the web version may be different from printed versions.

Subject Code	0009
QAN	500/4618/4

Contents

1 Introduction

This specification sets out the content and assessment details for our GCSE Engineering course. First teaching begins from September 2009, and we will make the first awards for this specification in 2011. You can view and download the latest version of this specification on our website at www.ccea.org.uk

The specification builds on the broad objectives of the Northern Ireland Curriculum. It is also relevant to key curriculum concerns in England and Wales.

This specification may help students progress to a GCE in Technology and Design and/or a BTEC National in Engineering/Manufacturing. It also provides some of the underpinning knowledge and understanding required for the National Vocational Qualification in Performing Engineering Operations.

1.1 Aims

This specification aims to encourage students to:

- actively engage in the engineering process, and develop as effective and independent learners;
- understand the contribution that engineering makes to society and the economy;
- develop an awareness and appreciation of commercial and industrial 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 learners;
- develop an awareness and understanding of environmental issues and sustainable development;
- develop applied engineering skills as a foundation for future learning and progression; and
- apply their knowledge and understanding of engineering by using evaluation and problem-solving skills.

1.2 Key features

The key features of the specification appear below:

- This specification is now a single award course.
- The course offers opportunities to build on the skills and capabilities developed through the delivery of the Key Stage 3 curriculum in Northern Ireland.
- It provides students with a broad background to, and core knowledge of, the engineering industry.
- It encourages students to develop design, computer-aided design (CAD) and technical skills, and knowledge and understanding of the engineering industry.
- It encourages a student-centred approach to learning and gives students opportunities to apply their developing knowledge in relevant, enjoyable and work-related contexts.
- This specification helps to raise achievement amongst a wider range of learners due to its high practical and kinaesthetic content.
- It helps students to make informed choices regarding their career progression.
- It encourages students to develop and practise key transferable skills and adopt a positive attitude to sustainable engineering techniques.

1.3 Prior attainment

There is no particular level of attainment required to study this specification. Students are not required to have any prior experience of engineering courses or the engineering industry.

1.4 Classification codes and subject combinations

Every specification is assigned a national classification code that indicates the subject area to which it belongs. The classification code for this qualification is 0009.

Progression to another school/college

Should a student take two qualifications with the same classification code, schools and colleges that they apply to may take the view that they have achieved only one of the two GCSEs. The same view may be taken if students take two GCSE qualifications that have different classification codes but have content that overlaps significantly. Students who have any doubts about their subject combinations should check with the schools and colleges that they wish to attend before embarking on their planned study.

Centres in England

Centres in England should also be aware that, for the purpose of the School and College Achievement and Attainment Tables, if a student enters for more than one GCSE qualification with the same classification code, only one grade (the highest) will count.

2 Specification at a Glance

The table below summarises the structure of this GCSE course:

Content	Assessment	Weighting	Availability
Unit 1: Engineering Design and Graphical Communication	**Controlled assessment** **Time: 25 hours** Students produce a portfolio that includes: • evidence to show how they have: – analysed a client brief; – detailed production constraints; – developed a range of design specifications; and – selected a final design solution; • engineering drawings of their final solution; and • evidence of having tested their final solution against the original brief.	30%	Summer Terminal
Unit 2: Engineering Production	**Controlled assessment** **Time: 25 hours** Students make an engineered product. This must include two components of different materials. Marks are awarded for the complexity of the product and the quality of making and finishing.	30%	Summer Terminal

See overleaf for Unit 3: Engineering Technology.

Content	Assessment	Weighting	Availability
Unit 3: Engineering Technology	**External assessment** **Two 1 hour examinations** **Paper 1 (1 hour)** Students are tested on: • their knowledge of the use and impact of: – ICT; – automation; – components; – modern materials; and – control technology; and • their knowledge and understanding of products, tools and equipment associated with the engineering industry. **Paper 2 (1 hour)** This paper is based on pre-release materials. It tests students on their research into a product specified in the pre-release materials. (No additional support materials will be provided.)	40%	Every January and Summer (beginning in Summer 2010)

At least 40 percent of the assessment (based on unit weightings) must be taken at the end of the course as terminal assessment.

3 Subject Content

We have divided this course into three units. The content of each unit, as well as the respective learning outcomes, appears below.

3.1 Unit 1: Engineering Design and Graphical Communication

This unit is about the process of designing. Students analyse a client brief, detail production constraints, develop a range of design specifications and choose a final design solution. They produce engineering drawings of their final design to test it against the original brief and to present information to the client.

Through studying this unit, students learn how to:

- analyse client design briefs;
- develop design specifications and solutions;
- read and produce engineering drawings;
- choose appropriate drawing techniques; and
- present their design solutions.

There may be links between this unit and the production processes covered in Unit 2: Engineering Production, and with the knowledge and understanding developed in Unit 3: Engineering Technology.

Content	Learning Outcomes
3.1.1. Design Briefs	Students should be able to: • know that there may be more than one design solution that meets a client's needs; • know how to evaluate the strengths and weaknesses of different design solutions; and • analyse the client design brief for an engineered product or engineering service to identify its key features, for example: – function: where and what the product will be used for; – quality standards: sector and/or client quality standards; – styling/aesthetics: the product's appearance and appeal; – performance: how well the product has to perform; – intended markets: who might use the product, competition with similar products and the client's own customer base; – size: the approximate size in three dimensions; – maintenance: how this is planned for in design; – production methods and materials; – cost: including design, production and material costs; – regulations: including health and safety; and – scale of production: the quantity required and use of mass or batch production.

Content	Learning Outcomes
3.1.2. Design Specifications and Solutions	Students should be able to: • produce a design specification from the design brief and use it to produce a final design solution through: – researching and analysing information and data; – considering scientific principles, for example the recognition and use of structures and how to support and reinforce them; – generating ideas and solutions; – evaluating ideas and solutions, testing and making subsequent modifications; – using 2D and 3D drawing and sketching techniques; and – using modelling techniques; • select the most appropriate final design solution from the range of initial design ideas; • provide details of their final design idea; • give justifications for their final choice that refer to the key features in the client design brief and their design specification; • explain how the solution meets the client's requirements and complies with sector standards;
3.1.3. Engineering Drawings	• read and use engineering drawings; and • produce a selection of engineering drawings that comply with sector specific standards and conventions (for example BS8888 and BS3939) using both manual and computer techniques that include: – freehand sketches; – isometric projection; – oblique projection; – perspective drawing; – block diagrams; – flow diagrams; – schematic diagrams; – circuit diagrams; – first angle orthographic projection; – third angle orthographic projection; – assembly diagrams; and – exploded diagrams.

Content	Learning Outcomes
3.1.3. Engineering Drawings (cont.)	Students should be able to: • read electrical/electronic, pneumatic/hydraulic and mechanical engineering drawings and diagrams; • recognise a selection of appropriate standard symbols, including: – electrical/electronic components: resistors, thermistors, LEDs, capacitors, bulbs, batteries, motors, buzzers, variable resistors and diodes; – mechanical features: holes and screw threads (internal and external); – dimensions: toleranced dimensions, radii, centres and springs; and – pneumatic and hydraulic valves, cylinders, reservoirs, pipework and filters;
3.1.4. Choosing Engineering Drawing Techniques	• choose drawing techniques that take account of the purpose of the engineering drawing and the intended audience; • choose suitable drawing techniques for: – a working/manufacturing drawing; – a servicing/repairing drawing; and/or – an assembly drawing; and • consider what type of engineering drawings would be most suitable for: – service engineers; – manufacturing engineers; and – technical customers. *We do not expect students to become expert in any of these techniques, but they must learn how to produce drawings, or appropriate parts of drawings and diagrams, by both manual and computer generated methods. They must be able to use computer-aided design (CAD) and link this with computer-aided manufacture (CAM).*

Content	Learning Outcomes
3.1.5. Presenting a Design Solution	Students should be able to: • explain their final design solution in their portfolio; • give reasons for their final choice that refer to the key features in the design brief and their design specification; • show details of their final design idea; • explain how their final design solution meets the client design brief; and • respond to feedback, checking against the design criteria and suitability for the user, and modifying their proposed solution, if necessary.

3.2 Unit 2: Engineering Production

In this unit, students make an engineered product from two different materials.

Through studying this unit, students develop their understanding of the process of designing and producing a product. Students learn how to:

- use product specifications;
- read and interpret engineering drawings and diagrams;
- use production processes and begin to understand their importance for functional and aesthetic reasons;
- use quality control techniques to check that the quality of their work conforms to the standards required;
- use processes, tools and equipment, including computer-aided manufacture (CAM), to make an engineered product; and
- apply health and safety procedures.

There may be some links between this unit and Unit 1: Engineering Design and Graphical Communication, and with the knowledge and understanding developed in Unit 3: Engineering Technology.

Content	Learning Outcomes
3.2.1. Using a Product Specification	Students should be able to: • understand and use the information in a given product specification by extracting the following essential information required for a product: – size, shape and form; – materials, parts and components; – process methods, where these are specified; – quantity required, for example single unit, batch or volume production; and – time scales;
3.2.2. Production Planning	• use a production plan for their product that gives information about: – the materials, parts and components to be used; – the processes to be used; – the tools, equipment and machinery to be used; – the sequence of production, including critical production and quality control points; – how quality will be checked and inspected; and – the health and safety factors to be considered; and
3.2.3. Choosing Materials, Parts and Components	• use materials and components with suitable characteristics and properties.

Content	Learning Outcomes
3.2.3. Choosing Materials, Parts and Components (cont.)	Students should be able to: • use alternative materials, parts or components if required and note that materials and their properties may be considered in the following groups: – ferrous and non-ferrous metals and alloys; – polymers, such as thermosetting polymers and thermoplastic polymers; – hardwood, softwood and manufactured board; – ceramics; and – composites which combine the properties of different materials, for example bi-metal strips, carbon composites and sintered metals; • recognise and understand the function of mechanical, electrical/electronic and pneumatic/hydraulic parts and components; • use appropriate parts and components for the development of an engineered product, including: – mechanical components, such as nuts, bolts, screws, springs, rivets, pins, clips, keys and drive mechanisms, including gear trains; – knock down fittings; – electrical/electronic components, such as resistors, capacitors, diodes, LEDs, bulbs, wire, cable, insulators, batteries, motors, buzzers, variable resistors, thermistors, transistors and integrated circuits; and – pneumatic/hydraulic components, such as directional and flow control valves, cylinders, reservoirs and filters; and • appreciate the properties, characteristics and features of the materials they select and use for their product, such as: – the ability to be shaped and formed, for example by hammering, casting, forging, forming, bending and coiling; – the ability to be treated, for example by heat or chemicals; – the ability to be given a surface finish, for example by painting or chrome plating; – their ease of handling, for example by being small or light or having no sharp edges; – their cost, for example the relative cost compared with other alternative materials and components; and – their availability, form and supply, for example by being available in standard sizes and standard values.

Content	Learning Outcomes
3.2.4. Using Processes	Students should be able to: • use the following processes and understand their importance for functional and aesthetic reasons: – material removal, such as turning, drilling, etching, milling and grinding; – shaping and manipulation, such as hammering, forming and bending; – joining and assembly, such as crimping, soldering, adhesion, wiring, threaded fasteners, welding and brazing; – heat and chemical treatment, such as annealing, tempering, hardening, etching and plating; and – surface finishing, such as polishing and coating;
3.2.5. Quality Control Techniques	• inspect, test, measure and compare engineered products to their product specification to ensure they comply with the standards required, taking into account that important features in a product specification include: – the dimensions; – the tolerances; – the fit; – the finish; – the performance; and – the quality;
3.2.6. Tools and Equipment	• use appropriate tools, equipment and/or computer-aided manufacture (CAM); • care for tools and equipment and maintain them where appropriate;
3.2.7. Health and Safety	• consider health and safety issues relating to the use of materials, components, tools and equipment required for their engineering activities, including: – taking reasonable care of themselves and others in an engineering environment; – wearing appropriate clothing and using safety equipment as appropriate; – following health and safety procedures and instructions; and – keeping a safe, clean and tidy workplace.

3.3 Unit 3: Engineering Technology

In this unit, students learn about:

- engineering materials and their properties;
- the functions of mechanical, electrical/electronic and pneumatic/hydraulic components;
- the properties, characteristics and features of materials;
- quality control techniques;
- new technology used in and by the engineering industries;
- the impact of modern technologies; and
- engineered products.

There may be some links between this unit and Unit 1: Engineering Design and Graphical Communication and Unit 2: Engineering Production.

Content	Learning Outcomes
3.3.1. Engineering Materials and Their Properties	Students should be able to: • demonstrate knowledge and understanding of the following engineering materials and their properties: – ferrous and non-ferrous metals and alloys; – polymers, including plastics, adhesives and coatings; – hardwood, softwood and manufactured board; – ceramics; and – composites that combine the properties of different materials; • demonstrate an effective working knowledge of the above materials as they relate to the manufacture of an engineering product; • appreciate how to source, specify and order materials, and know that the properties of these materials influence the design and manufacture of an engineered product;
3.3.2. Functions	• demonstrate knowledge and understanding of the functions of: – mechanical components; – electrical/electronic components; and – pneumatic/hydraulic components; and • have knowledge and understanding of how standard components can be assembled and used in engineering.

Content	Learning Outcomes
3.3.3. Properties, Characteristics and Features of Materials	Students should be able to: • demonstrate knowledge and understanding of the properties, characteristics and features of materials that affect their: – ability to be shaped and formed; – ability to be treated; – ability to be given a surface finish; – ease of handling; – cost implications; and – availability, form and supply; • appreciate quality finish and accuracy in engineering products;
3.3.4. Quality Control Techniques	• apply quality control techniques by inspecting, testing and measuring when producing engineering products;
3.3.5. New Technology Used in and by the Engineering Industries	• demonstrate knowledge and understanding of new technology used in and by the engineering industries, for example: – information, communications and digital technologies; – modern and smart materials and components; and – systems and control technology to organise, monitor and control production; • demonstrate knowledge and understanding of process/quality control, automation, and embedded computers, such as those used in both industrial and domestic appliances; • demonstrate knowledge and understanding of robotics, including continuous operation, improved reproducibility, increased speed and work in hazardous environments; and • demonstrate knowledge and understanding of ICT as applied to integrated manufacturing/engineering systems, computer integrated engineering (CIE), computer integrated manufacturing (CIM), and CAD/CAM links.

Content	Learning Outcomes
3.3.6. Impact of Modern Technologies	Students should be able to: • demonstrate knowledge and understanding of the impact of modern technologies on: – engineering a product; – engineered products; – engineering industries; – the stages in engineering a product; and – everyday life in modern societies; • understand the impact of these modern technologies on: – the range, types and availability of products; – the design and development of products; – the materials and components used; – the safety and efficiency of modern methods of production in terms of materials, energy consumption and time; – improved characteristics of products, such as size, weight/density, ease of use, disposability and reclaimability; and – markets for the products; and
3.3.7. Engineered Products	• develop and demonstrate knowledge and understanding of engineered products, and in particular: – investigate a variety of engineered products that use modern technology; and – investigate the impact of modern technology on the design and production of a range of engineered products.

4 Scheme of Assessment

4.1 Assessment opportunities

The availability of examinations and controlled assessment appears in Section 2 of this specification.

Candidates can choose to resit individual assessment units once. The better result for each assessment unit counts towards their GCSE qualification. Results for individual assessment units remain available to count towards a GCSE qualification until we withdraw the specification.

4.2 Assessment objectives

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

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

4.3 Assessment objective weightings

The table below sets out the assessment objective weightings for each assessed component and the overall GCSE qualification:

Assessment Objective	Component Weighting			Overall Weighting
	Unit 1	Unit 2	Unit 3	
AO1	–	7.5%	17.5–27.5%	25–35%
AO2	22.5%	19.5%	3–13%	45–55%
AO3	7.5%	3%	4.5–14.5%	15–25%
Total	**30%**	**30%**	**40%**	**100%**

4.4 Quality of written communication

In GCSE Engineering, candidates must demonstrate their quality of written communication. In particular, they must:

- ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear;
- select and use a form and style of writing appropriate to their purpose and to complex subject matter; and
- organise information clearly and coherently, using specialist vocabulary where appropriate.

The quality of candidates' written communication is assessed in their responses to tasks that require extended writing. Teachers and examiners assess the quality of candidates' written communication within all the assessment objectives in Unit 1: Engineering Design and Graphical Communication and Unit 3: Engineering Technology.

4.5 Reporting and grading

We report the results of individual assessment units on a uniform mark scale (UMS) that reflects the assessment weighting of each unit. We determine the grades awarded by aggregating the uniform marks obtained on individual assessment units.

We award GCSE qualifications on an eight grade scale from A*–G, with A* being the highest. For candidates who fail to attain a grade G, we report their results as unclassified (U).

The grades we award match the grade descriptions published by the regulatory authorities (see Section 5).

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 depends in practice upon the extent to which the candidate has met the assessment objectives overall. Shortcomings in some aspects of candidates' performance in the assessment may be balanced by better performances in others.

Grade	Description
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.
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.
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.

6 Guidance on Controlled Assessment

6.1 Controlled assessment review

We review our controlled assessment tasks every year to ensure that they continue to set an appropriate challenge and remain valid, reliable and stimulating.

6.2 Skills assessed by controlled assessment

Teachers must assess the following skills through controlled assessment:

- design a product; and
- engineer a product.

In addition, elements of these skills may be assessed externally.

6.3 Level of control

Rules for controlled assessment in GCSE Engineering are defined for the three stages of the assessment:

- task setting;
- task taking; and
- task marking.

6.4 Task setting

There are two tasks for GCSE Engineering:

- Unit 1: Engineering Design and Graphical Communication (30% of overall award); and
- Unit 2: Engineering Production (30% of overall award).

Candidates should complete all elements of the tasks.

The level of control for the setting of these tasks is high. We, therefore, provide a number of comparable tasks for each unit and centres must choose the most appropriate task for their candidates.

We issue the tasks in September of each year for candidates starting Year 11. Candidates must submit the completed tasks in May of Year 12.

Centres wishing to contextualise the task(s) to better suit their centre-specific circumstances must contact us to obtain approval for their proposals.

6.5 Task taking

For both tasks, the level of control for task taking is medium. Information in the table below applies to both the Unit 1 and Unit 2 tasks except in instances where only one unit is specified:

Areas of Control	Detail of Control
Authenticity	Candidates must complete their assessed portfolio within the classroom environment under informal supervision. For the Unit 1 task, candidates can carry out research outside of the classroom with limited supervision for Unit 3.1.1: Design Briefs and 3.1.3: Engineering Drawings. For the Unit 2 task, candidates can practise the required skills outside of the classroom environment under limited supervision. Teachers must be able to authenticate the work as being the candidate's own. Teachers must ensure that candidates acknowledge and reference any ideas and sources used.
Feedback	Teachers must guide and supervise candidates in relation to the following: • monitoring progress; • preventing plagiarism; • ensuring compliance with health and safety requirements; • ensuring work is completed in accordance with the specification requirements; and • ensuring work can be assessed in accordance with the procedures and marking criteria. Candidates should reach their own conclusions. Teachers must record any support or guidance they give to candidates on the Candidate Record Sheet and adjust the marks appropriately.
Time Limit	Research – **5 hours** Production of portfolio – **20 hours** Candidates may submit their work in May of Year 12 after they have completed five terms of study.
Collaboration	Candidates' work may be informed by working with others, but each candidate must provide an individual response.

Areas of Control	Detail of Control
Resources	Candidates' access to resources is determined by those available to the centre. Centres with limited resources or with candidates who need to use special equipment must contact us for advice on how to proceed before offering this course to their candidates.

6.6 Task marking

For both tasks, the level of control for task marking is medium.

Teachers must mark the controlled assessment tasks for both units in accordance with the supplied marking criteria and mark bands in Appendix 1.

Teachers must ensure that the work they mark is the candidate's own. For up-to-date advice on plagiarism or any other incident in which candidate malpractice is suspected, please refer to the Joint Council for Qualifications' *Suspected Malpractice in Examinations and Assessments: Policies and Procedures* on the JCQ website at www.jcq.org.uk

6.7 Internal standardisation

Centres with more than one teaching group must carry out internal standardisation of the controlled assessment tasks before submitting them to us. This is to ensure, as far as possible, that each teacher has applied the assessment criteria consistently when marking assessments.

6.8 Moderation

This qualification is subject to visiting moderation. We will provide instructions on the details of moderation in advance of first teaching.

6.9 Drafting/Redrafting

Teachers must not correct candidates' work in detail and return it to them to write up a fair copy. Responsibility for drafting a piece of work towards completion lies entirely with the candidate. Once a candidate has submitted the assignment and it has been awarded a mark, that mark is final. The candidate may not carry out further work.

See Appendix 2 for a glossary of terms for controlled assessment.

7 Links

7.1 Support

We provide the following resources to support this specification:

- our website;
- a subject microsite within our website;
- specimen papers and mark schemes; and
- controlled assessment tasks.

Some support material from the previous specification may also remain useful.

We intend to expand our range of support to include the following:

- past papers;
- mark schemes;
- Chief Examiner's reports;
- Principal Moderator's reports;
- guidance on progression from Key Stage 3;
- schemes of work;
- centre support visits;
- support days for teachers;
- portfolio clinics;
- agreement trials;
- student guides;
- controlled assessment guidance for teachers; and
- exemplification of standards.

You can find our Annual Support Programme of events and materials for Engineering on our website at www.ccea.org.uk

7.2 Curriculum objectives

This specification addresses and builds upon the broad curriculum objectives for Northern Ireland, England and Wales. In particular, it enables students to:

- develop as individuals and contributors to the economy, society and environment;
- progress from Key Stage 3 Northern Ireland Curriculum requirements;
- gain knowledge and understanding of spiritual, moral, ethical, social, legislative (including equality and disability discrimination), economic and cultural issues through the study of the impact of modern technologies, production plans, teamwork and developing design ideas;
- gain knowledge and understanding of sustainable development, health and safety considerations and European developments through the study of design briefs, product specifications, materials, components and their associated constraints;
- explore the 'skills agenda' and employability; and
- gain knowledge and understanding of the effective use of technology.

For further guidance on how this specification enables progression from the Northern Ireland Curriculum at Key Stage 3, go to our subject microsite, which you can access at www.ccea.org.uk

7.3 Key Skills

This specification provides opportunities for students to develop and generate evidence for assessing the following nationally recognised Key Skills:

- Application of Number;
- Communication;
- Improving Own Learning and Performance;
- Information and Communication Technology;
- Problem-Solving; and
- Working with Others.

You can find details of the current standards and guidance for each of these skills on the QCA website at www.qca.org.uk

7.4 Examination entries

Entry codes for this subject and details on how to make entries are available on our Examinations Administration Handbook microsite, which you can access at www.ccea.org.uk

Alternatively, you can telephone our Examination Entries, Results and Certification team using the contact details provided in this section.

7.5 Equality and inclusion

We have considered the requirements of equalities legislation in developing this specification.

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

The revised GCSE and qualification criteria were reviewed to identify whether any of the competences required by the subject presented a potential barrier to any students with disabilities. 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 and equality groups and with people with disabilities.

During the development process, we carried out an equality impact assessment. This was to ensure that we identified any additional potential barriers to equality and inclusion. Where appropriate, we have given consideration to measures to support access and mitigate against barriers.

Reasonable adjustments are made for students with disabilities in order to reduce barriers to access assessments. For this reason, very few students will have a complete barrier to any part of the assessment. However, students with a visual impairment may find aspects of the qualification difficult. Similarly, students who have difficulty managing manually may be restricted in the range of tools, equipment and materials they use.

It is important to note that where access arrangements are permitted, they must not be used in any way that undermines the integrity of the assessment. **You can find information on reasonable adjustments in the Joint Council for Qualifications' document *Access Arrangements and Special Consideration: Regulations and Guidance Relating to Candidates Who Are Eligible for Adjustments in Examinations*.**

7.6 Contact details

The following list provides contact details for relevant staff members and departments:

- Specification Support Officer: Catriona Skelton
  (telephone: (028) 9026 1200, extension 2292, email: cskelton@ccea.org.uk)

- Officer with Subject Responsibility: Paddy McShane
  (telephone: (028) 9026 1200, email: pmcshane@ccea.org.uk)

- Examination Entries, Results and Certification
  (telephone: (028) 9026 1262, email: entriesandresults@ccea.org.uk)

- Examiner Recruitment
  (telephone: (028) 9026 1243, email: appointments@ccea.org.uk)

- Distribution (past papers and support materials)
  (telephone: (028) 9026 1242, email: cceadistribution@ccea.org.uk)

- Support Events Administration
  (telephone: (028) 9026 1401, email: events@ccea.org.uk)

- Information Section (including Freedom of Information requests)
  (telephone: (028) 9026 1200, email: info@ccea.org.uk)

- Business Assurance (appeals)
  (telephone: (028) 9026 1244, email: appealsmanager@ccea.org.uk).

Appendix 1

Assessment Criteria and Mark Bands for Controlled Assessment Tasks

Unit 1: Engineering Design and Graphical Communication

Skill(s) to be assessed	Mark Band 1 At this level, work must show:		Mark Band 2 At this level, work must show:		Mark Band 3 At this level, work must show:	
(a) Analyse client briefs AO3 **6 marks**	• an analysis of the brief to identify basic client needs, with the identification of some key features of the engineering product; • limited spelling, punctuation, grammar and legibility; • analysis that uses a limited form and style; • analysis that has limited coherence; • use of a limited range of specialist terms;	1–3	• an analysis of the brief to identify the main client needs, with a description of the main key features of the engineering product; • satisfactory spelling, punctuation, grammar and legibility; • analysis that uses a satisfactory form and style; • analysis that is coherent and organised; • use of a satisfactory range of specialist terms;	4–5	• an analysis of the brief to explain the main client needs, with a justification of the main key features of the engineering product; • excellent spelling, punctuation, grammar and legibility;. • analysis that uses an excellent form and style; • analysis that is coherent and very well organised; • use of a wide range of specialist terms;	6
(b) Produce, use and modify design specifications AO2 **7 marks**	• a design specification that describes basic details of the product criteria and of the production constraint; • limited spelling, punctuation, grammar and legibility; • ideas that use a limited form and style; • ideas that have limited coherence; • use of a limited range of specialist terms;	1–3	• a design specification that describes some of the main details of the product and of the production constraints; • satisfactory spelling, punctuation, grammar and legibility; • ideas that use a satisfactory form and style; • ideas that are coherent and organised; • use of a satisfactory range of specialist terms;	4–5	• a design specification that describes the main details of the product and of the production constraints; • excellent spelling, punctuation, grammar and legibility; • ideas that use an excellent form and style; • ideas that are coherent and very well organised; • use of a wide range of specialist terms;	6–7

Skill(s) to be assessed	Mark Band 1 At this level, work must show:		Mark Band 2 At this level, work must show:		Mark Band 3 At this level, work must show:	
(c) Generate design solutions AO2 **12 marks**	• the generation of basic design ideas and the development of simple design solutions;	1–5	• the generation of alternative design ideas and the development, in some detail, of design solutions;	6–9	• the generation of imaginative design ideas and the development of detailed and appropriate design solutions;	10–12
(d) Read, understand and create drawings AO2 **6 marks**	• the selection and use of a limited range of engineering drawing techniques to communicate the final solution;	1–2	• the selection and use of a range of engineering drawing techniques to communicate, in some detail, the final solution;	3–4	• the selection and use of an effective range of engineering drawing techniques to communicate, in detail, the final solution;	5–6
(e) Present a design solution AO3 **5 marks**	• limited testing against the design criteria to select and outline the final design solution;	1–2	• a range of testing against the design criteria to select and describe the final design solution;	3–4	• objective testing against the design criteria to select and justify the final design solution;	5
(f) Respond to client feedback AO2 **8 marks**	• limited description of how the final design solution meets the brief and specification, with an identification of some relevant modifications; • limited spelling, punctuation, grammar and legibility; • a response that uses a limited form and style; • a response that has limited coherence; • use of a limited range of specialist terms.	1–3	• description, in some detail, of how the final design solution meets the brief and specification, describing relevant modifications; • satisfactory spelling, punctuation, grammar and legibility; • a response that uses a satisfactory form and style; • a response that is coherent and organised; • use of a satisfactory range of specialist terms.	4–5	• an explanation, in some detail, of how the final design solution meets the brief and specification, explaining relevant modifications; • excellent spelling, punctuation, grammar and legibility; • a response that uses an excellent form and style; • a response that is coherent and very well organised; • use of a wide range of specialist terms.	6–8
Total marks available: 44						
When a candidate has not met any of the above criteria then a zero, 0, mark should be awarded.						

Unit 2: Engineering Production

Skill(s) to be assessed	Mark Band 1 At this level, work must show:		Mark Band 2 At this level work must show:		Mark Band 3 At this level work must show:	
(a) Independent use of a production plan AO2 **4 marks**	• limited use of a supplied production plan;	1–2	• satisfactory use of a supplied production plan;	3	• competent use of a supplied production plan;	4
(b) Independent use of appropriate processes AO1 **6 marks**	• limited use of a limited range of basic processes demonstrating low level engineering skills;	1–2	• satisfactory use of a range of appropriate processes demonstrating a good level of engineering skills;	3–4	• competent use of a broad range of challenging processes demonstrating high level engineering skills;	5–6
(c) Independent application of controls to the accuracy of the product AO1, AO2, AO3 **12 marks**	• limited application of quality controls demonstrating low level accuracy and precision working to a tolerance of +/- 1.5 mm;	1–5	• satisfactory application of quality controls demonstrating a good level of accuracy and precision quality controls working to a tolerance of +/- 1.0 mm;	6–9	• competent application of quality controls demonstrating high level accuracy and precision when working to a set tolerance of +/- 0.5 mm;	10–12
(d) Independent application of controls to the finish of the product AO2, AO3 **8 marks**	• limited application of quality controls demonstrating low level finishing techniques on the product;	1–4	• satisfactory application of quality controls demonstrating a good level of finishing techniques on the product;	5–6	• competent application of quality controls demonstrating high level appropriate finishing techniques on the product;	7–8

Skill(s) to be assessed	Mark Band 1 At this level, work must show:		Mark Band 2 At this level work must show:		Mark Band 3 At this level work must show:	
(e) Independent use of tools and equipment AO2 **6 marks**	• limited use of tools and equipment demonstrating low level engineering skills;	1–2	• satisfactory use of a range of appropriate tools and equipment demonstrating a good level of engineering skills;	3–4	• competent use of a broad range of appropriate tools and equipment demonstrating high level engineering skills;	5–6
(f) Application of health and safety procedures AO2 **4 marks**	• limited application of health and safety procedures under supervision.	1–2	• satisfactory application of appropriate health and safety procedures on instruction.	3	• competent application of appropriate health and safety procedures at all times.	4
Total marks available: 40						
When a candidate has not met any of the above criteria then a zero, 0, mark should be awarded.						

Appendix 2
Glossary of Terms for Controlled Assessment Regulations

Term	Definition
Component	A discrete, assessable element within a controlled assessment/qualification that is not itself formally reported and for which the awarding body records the marks May contain one or more tasks
Controlled assessment	A form of internal assessment where the control levels are set for each stage of the assessment process: task setting, task taking, and task marking
External assessment	A form of independent assessment in which question papers, assignments and tasks are set by the awarding body, taken under specified conditions (including detailed supervision and duration) and marked by the awarding body
Formal supervision (High level of control)	The candidate must be in direct sight of the supervisor at all times. Use of resources and interaction with other candidates is tightly prescribed.
Informal supervision (Medium level of control)	Questions/tasks are outlined, the use of resources is not tightly prescribed and assessable outcomes may be informed by group work. Supervision is confined to: • ensuring that the contributions of individual candidates are recorded accurately; and • ensuring that plagiarism does not take place. The supervisor may provide limited guidance to candidates.
Limited supervision (Low level of control)	Requirements are clearly specified, but some work may be completed without direct supervision and will not contribute directly to assessable outcomes.

Term	Definition
Mark scheme	A scheme detailing how credit is to be awarded in relation to a particular unit, component or task Normally characterises acceptable answers or levels of response to questions/tasks or parts of questions/tasks and identifies the amount of credit each attracts May also include information about unacceptable answers
Task	A discrete element of external or controlled assessment that may include examinations, assignments, practical activities and projects
Task marking	Specifies the way in which credit is awarded for candidates' outcomes Involves the use of mark schemes and/or marking criteria produced by the awarding body
Task setting	The specification of the assessment requirements Tasks may be set by awarding bodies and/or teachers, as defined by subject-specific regulations. Teacher-set tasks must be developed in line with awarding body specified requirements.
Task taking	The conditions for candidate support and supervision, and the authentication of candidates' work Task taking may involve different parameters from those used in traditional written examinations. For example, candidates may be allowed supervised access to sources such as the internet.
Unit	The smallest part of a qualification that is formally reported and can be separately certificated May comprise separately assessed components

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