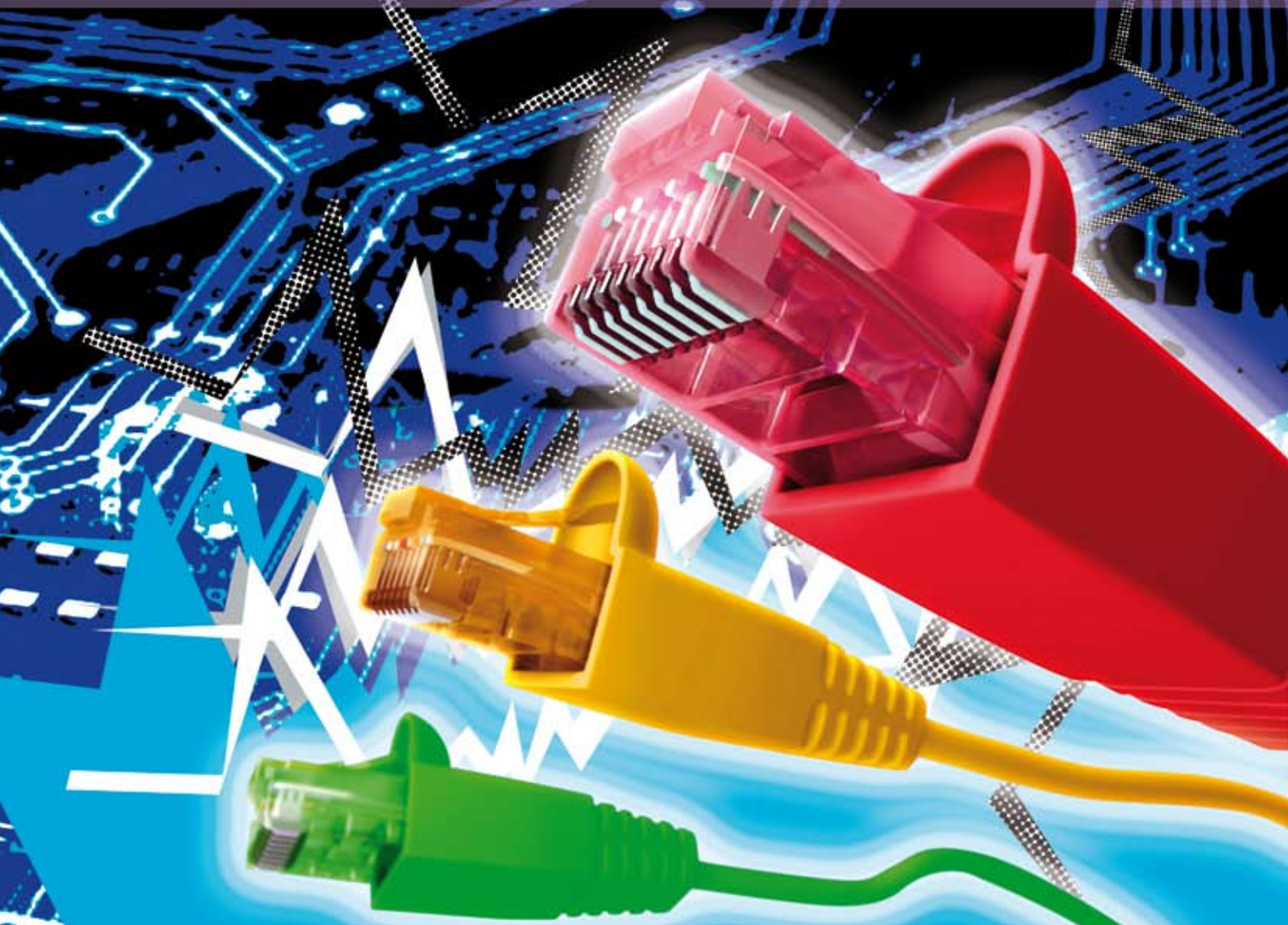
AQA

GCSE
Specification

Design and Technology: Electronic Products

For exams June 2010 onwards
For certification June 2011 onwards



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1 Introduction

1.1 Why choose AQA?

AQA is the UK's favourite exam board and more students receive their academic qualifications from AQA than from any other board. But why is AQA so popular?

AQA understands the different requirements of each subject by working in partnership with teachers. Our GCSEs:

- enable students to realise their full potential
- contain engaging content
- are manageable for schools and colleges
- are accessible to students of all levels of ability
- lead to accurate results, delivered on time
- are affordable and value for money.

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- access to subject departments
- training for teachers including practical teaching strategies and approaches that really work presented by senior examiners
- personalised support for Controlled Assessment
- 24 hour support through our website and online *Ask AQA*
- past question papers and mark schemes
- comprehensive printed and electronic resources for teachers and students

AQA is an educational charity focused on the needs of the learner. All our income goes towards operating and improving the quality of our specifications, examinations and support services. We don't aim to profit from education – we want you to.

If you are an existing customer then we thank you for your support. If you are thinking of moving to AQA then we look forward to welcoming you.

1.2 Why choose Design and Technology: Electronic Products?

This specification has been designed to encourage candidates to be able to design and make quality electronic products with creativity, originality and flair using a wide range of electronic components with appropriate materials to package the electronic circuit. Candidates will be enthused and challenged by the range of practical opportunities this Specification offers. The packaging of the electronic circuit can include individually designed cases made from a range of resistant materials, textiles, card or recycled materials. Alternatively, candidates can purchase a commercially made case and modify the case to meet their project needs.

The new specification is designed to foster awareness amongst candidates of the need to consider sustainability and environmental impact on their designing. The Specification retains much of the content of the very successful previous GCSE Specification and continues to provide the candidate with the opportunity to design and make an electronic product using new technologies and modern electronic devices.

Changes have been made to the controlled assessment criteria: they now reflect the style of the GCE Design & Technology courses where mark ranges are defined for each component of the controlled assessment. The changes continue to allow full credit to be given to candidates who undertake innovative work including projects with a very high CAD/CAM content and exclusive use of microcontrollers.

The assessment criteria continues to allow strengths in one area to compensate for weaknesses in another and reflects the holistic approach to assessment characterised by AQA.

It is useful, but not a requirement, for candidates to have studied the National Curriculum for Design and Technology at Key Stage 3. The new Specification provides an excellent route into GCE Systems and Control Technology, Electronics, Product Design and the Diplomas in Manufacturing, Engineering, or Product Design at Level 3.

1.3 How do I start using this specification?

Already using the existing AQA Design and Technology: Electronic Products specification?

- Register to receive further information, such as mark schemes, past question papers, details of teacher support meetings, etc, at **http://www.aqa.org.uk/rn/askaqa.php** Information will be available electronically or in print, for your convenience.
- Tell us that you intend to enter candidates. Then we can make sure that you receive all the material you need for the examinations. This is particularly important where examination material is issued before the final entry deadline. You can let us know by completing the appropriate Intention to Enter and Estimated Entry forms. We will send copies to your Exams Officer and they are also available on our website (**http://www.aqa.org.uk/admin/p_entries.php**).

Not using the AQA specification currently?

- Almost all centres in England and Wales use AQA or have used AQA in the past and are approved AQA centres. A small minority is not. If your centre is new to AQA, please contact our centre approval team at **centreapproval@aqa.org.uk**

1.4 How can I find out more?

Ask AQA

You have 24-hour access to useful information and answers to the most commonly-asked questions at **http://www.aqa.org.uk/rn/askaqa.php**

If the answer to your question is not available, you can submit a query for our team. Our target response time is one day.

Teacher Support

Details of the full range of current Teacher Support meetings are available on our website at **http://www.aqa.org.uk/support/teachers.php**

There is also a link to our fast and convenient online booking system for Teacher Support meetings at **http://events.aqa.org.uk/ebooking**

If you need to contact the Teacher Support team, you can call us on 01483 477860 or email us at **teachersupport@aqa.org.uk**

2 Specification at a Glance

This specification is one of a suite of seven Full Courses and one Short Course in Design and Technology offered by AQA. There is one tier of assessment covering grades A* to G.

Electronic Products 4542

Unit 1: Written Paper (45401)

2 hours –120 marks – 40%

Candidates answer all questions in two sections

Pre-Release material issued

plus

Unit 2: Design and Making Practice (45402)

Approximately 45 hours – 90 marks – 60%

Consists a single design and make activity selected from a range of board set tasks

3 Subject Content

Design and Technology is a practical subject area which requires the application of knowledge and understanding when developing ideas, planning, producing products and evaluating them. The distinction between Designing and Making is a convenient one to make, but in practice the two often merge. For example, research can involve not only investigating printed matter and people's opinions, but also investigating e.g. proportions, adhesives, colour, structures and materials through practical work.

Designing Skills

Candidates should be taught to:

- be creative and innovative when designing;
- design products to meet the needs of clients and consumers;
- understand the design principles of form, function and fitness for purpose;
- understand the role that designers and product developers have, and the impact and responsibility they have on and to society;
- analyse and evaluate existing products, including those from professional designers;
- develop and use design briefs and specifications for product development;
- consider the conflicting demands that moral, cultural, economic, and social values and needs can make in the planning and in the designing of products;
- consider environmental and sustainability issues in designing products;
- consider health and safety in all its aspects;
- anticipate and design for product maintenance where appropriate;
- design for manufacturing in quantity and to be aware of current commercial/industrial processes;
- generate design proposals against stated design criteria, and to modify their proposals in the light of on-going analysis, evaluation and product development;
- reflect critically when evaluating and modifying their design ideas and proposals in order to improve the products throughout inception and manufacture;
- use, where appropriate, a range of graphic techniques and ICT (including digital media), including CAD, to generate, develop, model and communicate design proposals;
- investigate and select appropriate materials and components;
- plan and organise activities which involve the use of materials and components when developing or manufacturing;
- devise and apply test procedures to check the quality of their work at critical/key points during development, and to indicate ways of modifying and improving it when necessary;
- communicate the design proposal in an appropriate manner;
- be flexible and adaptable when designing;
- test and evaluate the final design proposal against the design specification;
- evaluate the work of other designers to inform their own practice;
- recognise the advantages of working collaboratively as a member of a design team;
- understand the need to protect design ideas.

Making Skills

Candidates should be taught to:

- select and use tools/equipment and processes to produce quality products;
- consider the solution to technical problems in the design and manufacture process;
- use tools and equipment safely with regard to themselves and others;
- work accurately and efficiently in terms of time, materials and components;
- manufacture products applying quality control procedures;
- have knowledge of Computer-Aided Manufacture (CAM) and to use as appropriate;
- ensure, through testing, modification and evaluation, that the quality of their products is suitable for intended users and devise modifications where necessary that would improve the outcome(s);
- recognise the advantages of working as part of a team when designing and making products.

3.1 Unit 1: Written paper

Materials and Components

Knowledge and understanding of materials and making processes should be of sufficient depth for candidates to make an appropriate and reasoned choice when designing and making an electronic system.

Knowledge and understanding of the materials and processes listed below may be tested in the written examination, but knowledge of the properties and characteristics of other common materials will not be tested in the written papers. It is expected that candidates through their coursework will be able

to show a general knowledge of the properties and characteristics of a wider range of materials, including textiles.

It is expected that much of the knowledge and understanding of components will be delivered through consideration of the electronic building block circuits. Candidates should develop their understanding of the concepts of input, process and output and the importance of feedback in controlling systems. They should be able to describe the function of the building blocks listed below and be able to combine two or more of them to satisfy a design specification.

Components

Power Supplies

Candidates should be taught to:

- select a dc power source to provide a suitable voltage for a particular purpose;
- understand the use of low voltage regulators i.e. L7805 and 78L05.

Mechanical Switches

Candidates should be taught to:

- recognise and use the following types of switches: slide, toggle, rocker, push (PTM and PTB), key, micro, reed, rotary, membrane and tilt;
- understand the terms: pole, throw, normally open, normally closed, in relation to SPST and SPDT switches;
- use switches connected in series or parallel;
- know how to eliminate the effect of switch bounce.

Resistors

Candidates should be taught to:

- understand and use resistors to control voltage and current in electronic circuits and use Ohms Law calculations to determine current flowing through a resistor and voltage across a resistor and determine the value of resistors in series;
- use potentiometers or variable resistors within electronic circuits;
- understand that LDRs and thermistors are types of variable resistors and know how their resistance varies with light and temperature respectively;
- determine the value of a fixed resistor by using the resistor colour code and a multimeter and use the units of measurement correctly (limited to three colour band resistors + tolerance band);
- use fixed resistors as pull-up and pull-down resistors connected to inputs;
- know that resistors are commonly available in preferred value series, i.e. E24 (5%);
- be aware that several resistors can be packaged in a single in line (SIL) resistor network or in a dual in line (DIL) IC.

Capacitors

Candidates should be taught to:

- understand that capacitors store electrical charge;
- identify polarised and non-polarised capacitors and use the units of measurement correctly;
- identify the anode and cathode leads of a polarised capacitor;
- use a capacitor and resistor in combination to achieve a time delay;
- understand the use of capacitors to smooth a dc voltage supply.

Diodes

Candidates should be taught to:

- understand that diodes allow current to flow in one direction only;
- identify the anode and cathode leads;
- use a diode to protect components from back electro-motive force (emf);
- use a diode to protect components against incorrect battery polarity.

Light Emitting Diodes (LEDs)

Candidates should be taught to:

- understand that LEDs are special types of diodes that emit light;
- identify the anode and cathode leads;
- use LEDs in electronic circuits, calculate and select a suitable current limiting resistor from the E24 resistor range;
- be aware that LEDs are available as bi-colour, tri-colour, and also as IR emitters.

Bi-polar Transistors

Candidates should be taught to:

- know how and when to use a bi-polar transistor;
- recognise the circuit symbol for an NPN bi-polar transistor and photo transistor;
- identify the base, emitter and collector leads;
- draw the circuit diagram and understand the use of a Darlington pair transistor configuration used as a transducer driver (NPN only), i.e. BC548 and BC639;
- be aware that a Darlington Pair can be packaged as a single transistor, i.e. BCX38;
- be aware that Darlington driver transistors can be packaged as a transistor array consisting of several transistors packaged in a single IC, i.e. ULN2803 and ULN2003.

Field Effect Transistors

Candidates should be taught to:

- know how and when to use a Field Effect Transistor;
- recognise the circuit symbol for a metal oxide silicon Field Effect Transistor (MOSFET) only;
- identify the gate, drain and source leads of a MOSFET.

Thyristors

Candidates should be taught to:

- know how and when to use a thyristor;
- identify the gate, anode, and cathode leads;
- use and describe the action of a thyristor as a latch in an electronic circuit;
- understand that a thyristor latch is an example of a bistable circuit.

Relays

Candidates should be taught to understand that relays are used to interface between electrical circuits without any electrical connection by the use of magnetism.

Opto-isolators

Candidates should be taught to understand that Opto-isolators use an infra-red emitting diode and a phototransistor to interface between electronic circuits without any electrical connection by the use of infra-red light.

Operational Amplifiers

Candidates should be taught to:

- understand the function of an operational amplifier and be able to describe the use of the non-inverting and inverting inputs;
- use operational amplifiers which require a single power supply, i.e. 3140 IC;
- use an operational amplifier as a comparator and an inverting amplifier;
- know how to limit the gain of an operational amplifier by using an input resistor and a feedback resistor (negative feedback only).

Logic

Candidates should be taught to:

- understand that logic is used when circuits require more than one input;
- use the following logic gates and construct their truth tables (limited to 2 inputs): AND, OR and NOT;
- understand that logic gates respond to, and output, digital signals and distinguish these from analogue signals.

Microcontrollers

Candidates should be taught to:

- understand that microcontrollers are programmable integrated circuits;
- demonstrate an awareness that a programming language can be used to integrate a variety of sub-system routines into one program and can be downloaded onto a microcontroller;
- use a programming method to develop sub-system routines which include the following functions: start, stop, output, wait, decision, compare, expression, increment, decrement, pulse, sound, count, infrared and end;
- be aware that decimal and binary numbers can be used to control the logic state of outputs;
- show how sub-system routines can be combined to produce complex outcomes;
- use digital and analogue input sensors with a microcontroller;
- interface microcontrollers with a transducer driver;
- interface microcontrollers with output devices which generate light or sound;
- interface microcontroller with other types of ICs, i.e. 4017 IC and 4026 IC;
- use an infrared receiver and transmitter with a microcontroller.

Circuit Symbols

see page 12

Electronic System Blocks

Potential Dividers

Candidates should be taught to:

- use a potential divider to control voltages in a circuit;
- construct a constant voltage potential divider from two fixed resistors in series;
- construct a variable voltage potential divider from a fixed resistor and an LDR or thermistor in series;
- construct a potential divider consisting of an LDR or thermistor in series with a potentiometer or variable resistor to set a threshold switching voltage.

Electronic Switches

Candidates should be taught to use transistors, logic gates and microcontrollers as electronic switches.

Timers

Candidates should be taught to use a capacitor and resistor in series to produce a time delay.

Integrated Circuits (ICs)

Candidates should be taught to:

- describe what is meant by a Dual In Line (DIL) IC package;
- identify the pin numbers on a dual in line IC;
- describe the use of an IC socket;
- show awareness of dedicated ICs found in toys and greeting cards e.g. melody generators, siren generators and various other sounds.

Monostable Timers

Candidates should be taught to:

- use a 555 IC to produce a monostable time delay and calculate the time period;
- understand how to adjust the time delay of the monostable.

Astable Circuits (Pulse Generators)

Candidates should be taught to:

- use a 555 IC as a pulse generator and calculate the frequency of the pulses;
- understand equal and unequal mark space ratios;
- understand how to adjust the frequency of the astable.

Counters

Candidates should be taught to use decade counters to achieve simple counting i.e. 4017 IC and 4026 IC.

Interface Devices

Candidates should be taught to select and use an appropriate amplifier/transducer driver for a particular purpose limited to Darlington drivers, op-amps, field effect transistors, bi-polar transistors and thyristors.

Output Devices

Candidates should be taught to describe applications for, and use LEDs, buzzers, lamps, bells, loudspeakers, sirens, piezo sounders, solenoids and seven segment displays.

Transducer Input Devices

Candidates should be taught to describe applications for, and use LDRs, thermistors, piezos, moisture sensors and microphones.

Calculations

see page 13

Materials

Candidates should be taught to:

- show a working knowledge of the following materials: acrylic, High Impact Polystyrene (HIP), Medium Density Fibreboard (MDF), softwoods and low carbon (mild) steel;
- recognise materials which are conductors and insulators of electrical current.

Smart Materials

Candidates should be taught to:

- describe how materials can be combined and processed to create more useful properties and how these changed materials are used in industrial application;
- be aware of the use of smart materials, i.e. electro-luminescent materials, shape memory metals, polymer fibre optical cables, photovoltaic cells, piezoelectric cable, semi-conductor material and Quantum Tunnelling Composite (QTC).
- have an awareness of the development and possible applications of nanoelectronics in the area of Design and Technology.

Preparing Materials

Candidates should be taught to:

- understand the process of manufacturing circuit boards by the photo-etch method, routing, milling or any other suitable method;
- use standard components, electronic input and output devices in combination to develop and produce electronic circuits.

Processes

Candidates should be taught to describe the following processes: vacuum forming, injection moulding, line bending, laser cutting and rapid prototyping.

Manipulating Materials

Candidates should be taught to:

- cut, shape and form materials to specific dimensions in the assembly and fitting of electronic components, input and output devices, PCBs and batteries within cases, or any other suitable packaging.

Applying Finishes

Candidates should be taught to:

- understand and use alternative finishes and techniques in the assembly of electronic circuit boards and associated cases or packaging to house circuit boards and batteries;
- appropriately use single and multi core wire, the twisting together of flying leads attached to input and output devices, making wires tidy and secure by using spiral wrap, using colour coded insulation for polarity identification, using strain holes to secure battery clips.

Optimum Use of Materials

Candidates should be taught to use materials and components efficiently taking into account the size of the PCB, the type of battery to be used and the cost of input and output devices housed in a suitable package or case.

Commercial Manufacture

Candidates should be taught to:

- describe one-off production of prototypes;
- describe batch production to produce small quantities of identical PCBs;
- describe the use of a high volume production line to manufacture large quantities of PCBs, or cases, to house electronic circuits.

Systems and Control Procedures

Candidates should be taught to:

- analyse and design open and closed loop electronic systems using the terms INPUT, PROCESS, OUTPUT and FEEDBACK;
- use system diagrams to demonstrate the relationship between sub-systems;
- devise criteria to analyse the performance of a system.

Design and Market Influences

Candidates are required to demonstrate their design and technology capability through acquiring and applying knowledge, skills and understanding when evaluating processes and products and examining the wider effects of design and technology on society.

3

Evaluation Techniques

Adaptations

Candidates should be taught to generate design proposals to satisfy the brief and specifications, and modify their proposals in the light of ongoing analysis and product development including prototyping.

Quality

Candidates should be taught to:

- suggest modifications which will improve the performance of the product and match previously identified moral, cultural, environmental or sustainability considerations;
- know why quality is important at all stages (quality assurance) of the designing and making process and how testing (quality control) can be applied to industrial products and candidates' own work.

Social, Cultural, Moral, Environmental and Sustainability Issues

Candidates should be taught to:

- consider the following when examining the wider effects of design and technology on society when designing and making solutions:
  - pollution and health hazards associated with electronic systems
  - the recycling of household electrical appliances
  - the elimination of dangerous chemicals from landfill sites by the collection of batteries and cells
  - the recycling of materials for reuse
  - the designing of products to use recycled materials
  - products designed to be recycled
  - the sustainability of products
  - designing for maintenance
  - product life-cycle and its stages, the introductory stage, the growth stage, the maturity stage, the declining stage linked to sales, profit, and product evolution.
- automation and its implications on job opportunities;
- the moral issues of products designed with planned product obsolescence and their impact on life style;
- extensive marketing of products which are labelled as fashion items and are targeted at the consumer;
- industrial applications of electronic systems;
- identify and describe the use of micro-processors within society and explain the positive and negative effects;
- be aware of the social, economic and environmental changes brought about by the development of electronic technology.

Information and Communication Technology

Using Computer Aided Design (CAD)

Candidates should be taught to:

- be aware of CAD and use it where appropriate;
- understand how CAD is used to generate designs for electronic circuits, PCB track layouts and cases;
- understand how CAD can be used to model electronic systems, to test system proposals or calculate values;
- understand how CAD can be used to develop programmes which control microcontrollers.

Computer Aided Manufacture (CAM)

Candidates should be taught to:

- understand the use of photo-etch, milling or routing method to produce a PCB e.g. to make a mask to be used in PCB production or use a routing machine to cut the profile of a PCB;
- understand the use of a CNC milling machine to produce moulds for injection moulding or use a CNC routing machine to produce moulds for vacuum forming;
- understand the use of a laser cutting machine or rapid prototyping machine to manufacture cases or suitable packaging to house an electronic circuit and battery;
- show awareness of how CAD/CAM enables easier, faster and more flexible methods of manufacture, e.g. Computer Integrated Manufacture (CIM), developing product and design, stock control, high speed assembly, automatic production and quality control.

Processes and Manufacture

Candidates are expected to be able to manufacture products using a range of materials and processes. They should have a broad understanding of manufacturing systems for the production of commercial products both in the industrial and the developing world.

Health and Safety

Candidates should be taught to:

- show awareness of the implications of Health and Safety when designing and making;
- apply safe practice and procedures when working with electronic systems in practical situations;
- recognise hazards in products, activities and environments when working with electricity;
- work safely with tools, equipment and materials, in practical activities and in different environments, including those that are unfamiliar;
- recognise hazards, assess consequent risks and take steps to control the risks to themselves, and others, in a variety of workshop situations including, the use of tools, equipment and processes to manipulate resistant materials and construct electronic systems;
- distinguish between immediate and cumulative risks;
- be aware of ways to manage environments to ensure the safety of themselves and others;
- use equipment and components safely and act in an appropriate manner in the event of an accident.

Industrial Practice

Candidates should be taught to:

- anticipate the implications that volume production will have on the design of a product;
- use a range of industrial applications when working with familiar materials and processes;
- take account of industrial considerations and constraints when designing and making;
- demonstrate knowledge of industrial practices;
- show awareness of industrial practices when designing and making.

Construction Techniques

Candidates should be taught to:

- design and build electronic circuits of high quality using a variety of temporary and permanent construction methods;
- use temporary construction methods to prototype electronic circuits including breadboards and electronic prototyping kits;
- understand permanent construction methods to manufacture an electronic circuit, i.e. stripboard, etching, milling or routing with components soldered in place;
- understand the difference between the through hole construction method and the surface mount component method in the design and manufacture of electronic circuit boards;
- understand the use of pick and place component machines, wave soldering baths, wire stripping and cutting machines in the industrial manufacturing process.

Test Equipment

Candidates should be taught to understand the use of multimeters, logic probes and LED testers to inspect components and fault find electronic circuits.

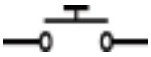
3

Circuit Symbols

Candidates should be taught to recognise and draw the circuit symbols shown below:

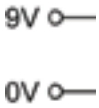

Cell


Light emitting diode


Push to make switch


Diode


Bell



Voltage rails


Battery


Flashing light emitting diode


Push to break switch


Thyristor

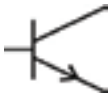

Microphone


Earth

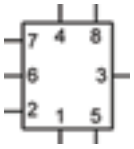

Resistor


Bi-colour light emitting diode


Single pole single throw switch


NPN transistor


Buzzer



555 timer IC

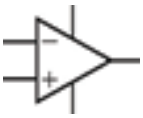

Variable resistor


Tri-colour light emitting diode


Single pole double throw switch


Field effect transistor


Loudspeaker


Operational Amplifier

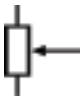
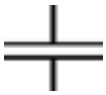

Potentiometer


Photo transistor


Capacitor


AND gate


Lamp

Voltage regulator


Thermistor


Opto-isolator


Electrolytic capacitor


OR gate

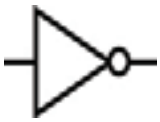
Motor


Crossing of conductors


Light dependent resistor

Ammeter


Piezo crystal oscillator


NOT gate

Voltmeter


Joined Conductors

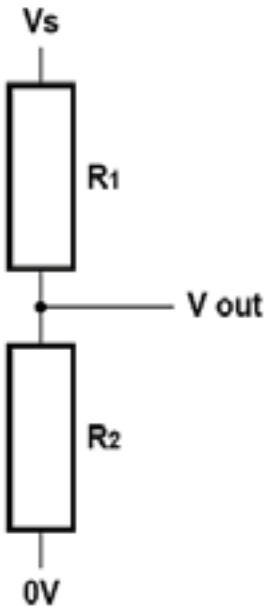
Calculations

Candidates should be taught to use the formulae listed below:
(these formulae will be listed in the examination paper);

Potential Difference — Potential Difference = Current × Resistance (V = I × R)

Series Resistors — R_{total} = R1 + R2 + R3 etc

Potential Divider



$$V\ out = \frac{R2}{R1 + R2} \times Vs$$

where V out = signal value
Vs = supply voltage
R1 and R2 are resistance values

Time Constant — Time Constant ≃ Resistance × Capacitance (T ≃ R × C)

Astable Frequency for 555 — $f = \frac{1.44}{(R1 + 2R2) \times C}$

Mark Space Ratio — $= \frac{\text{Time high}}{\text{Time low}}$

Time High — = 0.693 x (R1 + R2) x C

Time Low — = 0.693 x R2 x C

Inverting Op.Amps — $\text{Gain} = \frac{-Rf}{Rin}$ Where Rf = feedback resistor value
Where Rin = input resistor value

3

3.2 Unit 2: Controlled assessment criteria

The assessment criteria which follow do not reflect a linear designing and making process. The project undertaken by the student should be viewed holistically and credit awarded wherever in the project it can be identified that a particular criterion has been met. As in any holistic assessment, a weak performance in one aspect of a student's work may be balanced by a strong performance in another. The principle of 'best fit' should be applied when using these criteria. For example, it is not necessary for a student's work to meet all of the bullet points in a particular mark band in order for a mark in that band to be awarded.

It should be noted that some marks attributable to the finished outcome can be obtained from criterion other than "Making", for example they may be evidenced in the folder or seen as part of the development process.

Candidates should undertake a single design and make activity which is selected from a range of board-set tasks. The tasks will be reviewed every two years. Candidates should submit a 3-dimensional outcome and a concise design folder and/or appropriate ICT evidence. The design folder should consist of approximately 20 pages of A3 paper or equivalent A4 paper or ICT equivalent. It is expected that candidates should spend approximately 45 hours on this activity.

All candidates should provide photographic evidence of the finished outcome and it is strongly recommended that photographic evidence at various stages of making is submitted.

Level of control

Within the controlled assessment component, levels of control are defined for the following three stages of assessment:

- task setting
- task taking
- task marking

Task setting

Students are required to submit a single design and make project which should be selected from a list of tasks provided by AQA at the start of the academic year. These tasks are broadly comparable and students can only submit a project which has been selected from this list. In certain situations it may be appropriate for centres to contextualise a given task in order to best suit their centre specific circumstances. Controlled assessment advisers will be available to provide guidance to centres. The list of board set tasks will be reviewed every two years and amended/added to as appropriate.

Task taking

Authenticity control – research and preparation may be completed under limited supervision. However, all work, with the exception of research and preparation, should be completed by students under informal supervision. This means that the centre must ensure that plagiarism does not take place, that sources used by students are clearly recorded and that each student's preparation for the final production of the work is his/her own.

Feedback control – teachers may review students' work and may provide advice at a general level. Teachers, however, must not provide detailed and specific advice on how the draft may be improved to meet the assessment criteria. The nature of any guidance provided and the details of any feedback given must be clearly recorded. Students may be guided as to the approach they might adopt but the outcome must remain their own. Likewise, feedback may evaluate progress to date and propose suggested broad approaches for improvement but the detailed correction or annotation of work for feedback purposes is not allowed.

Time control – each student should produce a design folder (paper or electronic) and a completed outcome. It is expected that the total activity should take approximately 45 hours to complete, including preparation but not including additional time for the teaching and learning of the subject content. We are keen to encourage succinctness and a focussed approach to this task and for this reason it is expected that the design folder should consist of approximately 20 pages of A3 paper (or the A4 or electronic equivalent). Examinations Officers should contact AQA Candidate Services for advice on any students who may need special consideration and, therefore, may require additional time.

Collaboration control – the work of individual students may be informed by working with others, for example when undertaking research, but students must provide an individual response in the task outcome.

Resources – students' access to resources is likely to be determined by the availability in centres. Examinations Officers should contact AQA Candidate Services for advice on any students who may require the use of any special equipment.

Task marking

Teachers should mark the controlled assessment using the assessment criteria given below. Further details regarding this process are given in section 6. Moderation of the controlled assessment work is by inspection of a sample of students' work sent by post or electronically through the e-Portfolio system from the centre to a moderator appointed by AQA. Further details are provided in section 7.

Summary of Controlled Assessment Criteria

The following is a summary of the assessment criteria for controlled assessment together with an indication of how these marks relate to the assessment objectives.

Assessment Criteria	Maximum Mark Allocation	AO1	AO2	AO3
1. Investigating the design context	8	5		3
2. Development of design proposals (including modelling)	32	2	30	
3. Making	32	2	30	
4. Testing and Evaluation	12			12
5. Communication	6	6		
Total	90	15	60	15

Criterion 1 Mark Band	Investigating the Design Context
7–8	• Discrimination shown when selecting and acquiring relevant research that will promote originality in designing • Excellent understanding and analysis of the design context • Detailed analysis of relevant existing products or systems undertaken related to design intentions • Comprehensive analysis of relevant and focussed research undertaken • Clear and specific design criteria identified, reflecting the analysis undertaken • Target market identified and the intended consumer/user profiled
5–6	• Good understanding and analysis of the design context • Good analysis of relevant products or systems undertaken • Good analysis of relevant research and context • Design criteria which reflects the analysis undertaken • Target market for product has been identified
3–4	• Basic understanding and analysis of the design context • Some analysis of related products or systems undertaken • Made a superficial analysis of most of the research material and the context • Design criteria reflects most of the analysis undertaken • Some consideration has been taken of the likely consumer/user
0–2	• Limited understanding or analysis of design context • Minimal analysis of other products or systems undertaken • Provided little evidence of research and analysis of context • Design criteria is very general and lacking in any detail • Limited understanding of the target market/user evident

Criterion 2 Mark Band	Development of Design Proposals (including modelling)
26–32	• Imaginative and innovative ideas have been developed, demonstrating creativity, flair and originality.Further developments made to take account of ongoing research • A coherent and appropriate design strategy, with clear evidence of a planned approach, adopted throughout • The implications of a wide range of issues including social, moral, environmental and sustainability, are taken into consideration and inform the development of the design proposals • Excellent development work through experimentation with a wide variety of techniques and modelling (including CAD where appropriate) in order to produce a final design solution • Appropriate materials/ingredients and components selected with full regard to their working properties • Fully detailed and justified product/manufacturing specification taking full account of the analysis undertaken
19–25	• Imaginative ideas demonstrating a degree of creativity, which are further developed to take account of ongoing research • An appropriate design strategy, with evidence of planning, adopted for most aspects • Development of design proposals take into account the main aspects relating to a variety of social, moral, environmental and sustainability issues • Good development work achieved through working with a variety of techniques and modelling (including CAD where appropriate) • Appropriate materials/ingredients and components selected with regard to their working properties • Product/manufacturing specification is complete and reflects key aspects of the analysis undertaken
12–18	• Design ideas show some degree of creativity and further development • An appropriate design strategy, with some evidence of planning, adopted for some aspects • Developments of design solutions are influenced to some extent by factors relating to social, moral, environmental and sustainability issues • Adequate development work achieved through working with a range of techniques and modelling (including CAD where appropriate) • Materials/ingredients and components selected with some regard to their working properties • Product/manufacturing specification reflects most aspects of the analysis
6–11	• Ideas show some variation in approach or concept • A limited design strategy, with minimal planning, is evident • Some consideration taken of social, moral, environmental and sustainability issue in development of design solutions • Development work is lacking in detail but makes reference to a number of techniques and modelling (including CAD where appropriate) • Materials/ingredients and components selected with limited regard to their working properties • Limited product/manufacturing specification which reflects most obvious features of analysis
0–5	• Ideas are lacking in imagination with minimal development or further research • Little evidence of a logical approach being adopted, with no indication of planning • Development work shows little consideration of social, moral, environmental and sustainability issues • Basic development work undertaken using a limited range of techniques • Materials/ingredients and components selected with little regard to their working properties • Produced a simple product/manufacturing specification which is general in nature

Criterion 3 Mark Band	Making
26–32	• Final outcome(s) shows a high level of making/modelling/finishing skills and accuracy • Selected and used appropriate tools, materials and/or technologies including, where appropriate, CAM correctly, skilfully and safely • Worked independently to produce a rigorous and demanding outcome • Quality controls are evident throughout the project and it is clear how accuracy has been achieved. • The outcome has the potential to be commercially viable and is suitable for the target market
19–25	• Final outcome shows very good level of making/modelling/finishing skills • Selected and used appropriate tools, materials and/or technologies including, where appropriate, CAM correctly and safely • Outcome demonstrates a high level of demand • Quality control checks applied in the manufacture of the product • The outcome is suitable for the target market and could be commercially viable with further development
12–18	• Final outcome shows good level of making/modelling/finishing skills • Used appropriate materials, components, equipment and processes correctly and safely (including CAM) • Parts of outcome show high levels of demand • Applied quality control checks broadly but superficially • The outcome requires further development in order to be suitable for the target market
6–11	• Final outcome is largely complete and represents a basic level of making/modelling/finishing skills • Used materials, components and equipment correctly and safely (including CAM if appropriate) • Some aspects of outcome are demanding • Some evidence of limited quality control applied throughout the process • The outcome has some weaknesses which limit its suitability for the target market
0–5	• Final outcome is incomplete or represents an undemanding level of making/modelling/finishing skills • Used materials, components and equipment safely under close supervision • Worked with some assistance to produce outcome of limited demand • There is limited evidence of any quality control and levels of accuracy are minimal • The outcome has significant weaknesses which limit its suitability for the target market

Criterion 4 Mark Band	Testing and Evaluation
9–12	• Detailed testing and evaluation as appropriate throughout the designing and making process taking account of client/user or third party opinion • All aspects of the final outcome have been tested against the design criteria and/or the product/manufacturing specification • Evaluate and justify the need for modifications to the product and consideration given as to how the outcome might need to be modified for commercial production
6–8	• Appropriate testing and evaluation evident throughout the designing and making process • Most aspects of the final outcome have been tested against the design criteria and/or the product/manufacturing specification • Evaluate and justify the need for improvements or modifications to the product
3–5	• Evidence of some testing and evaluation leading to the production of the final outcome • Some evidence of testing against the design criteria and/or the product/manufacturing specification • Some improvements or modifications to product suggested
0–2	• Minimal testing and evaluation throughout the designing and making process • Limited or no testing of final outcome against the design criteria and/or the product/ manufacturing specification • Limited mention of some improvements or modifications that could be made to the product

Criterion 5 Mark band	Communication
5–6	• Design folder is focussed, concise and relevant and demonstrates an appropriate selection of material for inclusion • All decisions communicated in a clear and coherent manner with appropriate use of technical language • The text is legible, easily understood and shows a good grasp of grammar, punctuation and spelling
3–4	• Design folder shows some skill in choice of material for inclusion but includes some irrelevant content • Most decisions communicated with some clarity and with some use of technical language • There are a small number of errors in grammar, punctuation and spelling
0–2	• Design folder shows excessive duplication of information and a lack of brevity and focus resulting in irrelevant content • Ideas and decisions communicated at a simplistic level with a limited grasp of the concepts involved and a limited use of technical vocabulary • Numerous errors in grammar, punctuation and spelling

4 Scheme of Assessment

4.1 Aims and learning outcomes

This specification in Design and Technology: Electronic Products encourages candidates to be inspired, moved and challenged by following a broad, coherent, satisfying and worthwhile course of study and gain an insight into related sectors, such as manufacturing and engineering. It prepares candidates to make informed decisions about further learning opportunities and career choices.

GCSE specifications in design and technology enable candidates to:

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

4.2 Assessment Objectives (AOs)

AO1 Recall, select and communicate knowledge and understanding in design and technology including its wider effects.

AO2 Apply knowledge, understanding and skills in a variety of contexts and in designing and making products.

AO3 Analyse and evaluate products, including their design and production.

Quality of Written Communication (QWC)

In GCSE specifications which require candidates to produce written material in English, candidates 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 purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

In this specification QWC will be assessed in the Controlled Assessment and in the written paper. The controlled assessment criteria give further information on marks to be awarded in respect of QWC.

Weighting of Assessment Objectives for GCSE

The table below shows the approximate weighting of each of the Assessment Objectives in the GCSE units.

Assessment Objectives	Unit Weightings (%)		Overall Weighting of AOs (%)
	Unit 1	Unit 2	
AO1	15	10	25
AO2	15	40	55
AO3	10	10	20
Overall weighting of units (%)	40	60	100

4.3 National criteria

This specification complies with the following.

- The Subject Criteria for GCSE Design and Technology including the rules for Controlled Assessment
- Code of Practice
- The GCSE Qualification Criteria
- The Arrangements for the Statutory Regulation of External Qualifications in England, Wales and Northern Ireland: Common Criteria
- The requirements for qualifications to provide access to Levels 1 and 2 of the National Qualification Framework.

4.4 Prior learning

There are no prior learning requirements. However, it is useful for candidates to have studied the National Curriculum for Design and Technology at Key Stage 3.

Any requirements set for entry to a course following this specification are at the discretion of centres.

4.5 Access to assessment: diversity and inclusion

GCSEs often require assessment of a broader 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 to identify whether any of the competences required by the subject presented a potential barrier to any candidates regardless of their ethnic origin, religion, gender, age, disability or sexual orientation. If this was the case, the situation was reviewed again to ensure such competences were included only where essential to the subject. The findings of this process were discussed with groups who represented the interests of a diverse range of candidates.

Reasonable adjustments are made for disabled candidates in order to enable them to access the assessments. For this reason, no candidates will have a barrier to any part of the assessment. Further details are given in Section 5.4.

5 Administration

5.1 Availability of assessment units and certification

Examinations and certification for this specification are available as follows:

	Availability of Units		Availability of Certification
	Unit 1	Unit 2	GCSE Award
June 2010	✔		
June 2011 onwards	✔	✔	✔

5.2 Entries

Please refer to the current version of *Entry Procedures and Codes* for up to date entry procedures. You should use the following entry codes for the units and for certification.

Unit 1 – 45401
Unit 2 – 45402

GCSE certification – 4542 (Entry Code).

QCA's 40% terminal rule means that 40% of the assessment must be taken in the examination series in which the qualification is awarded. This rule is not dependent on the size of the qualification. Therefore, all GCSE candidates, whether taking short course, single and double awards, must have 40% of their assessment taken at the end.

5.3 Private candidates

This specification is not available to private candidates.

5.4 Access arrangements and special consideration

We have taken note of equality and discrimination legislation and the interests of minority groups in developing and administering this specification.

We follow the guidelines in the Joint Council for Qualifications (JCQ) document: *Access Arrangements, Reasonable Adjustments and Special Consideration: General and Vocational Qualifications.* This is published on the JCQ website **(http://www.jcq.org.uk)** or you can follow the link from our website **(http://www.aqa.org.uk)**.

Access arrangements

We can make arrangements so that candidates with special needs can access the assessment. These arrangements must be made **before** the examination. For example, we can produce a Braille paper for a candidate with a visual impairment.

Special consideration

We can give special consideration to candidates who have had a temporary illness, injury or indisposition at the time of the examination. Where we do this, it is given **after** the examination.

Applications for access arrangements and special consideration should be submitted to AQA by the Examinations Officer at the centre.

5.5 Language of examinations

We will provide units for this specification in English only.

5.6 Qualification titles

The qualification based on this specification is:

- AQA GCSE in Design & Technology: Electronic Products.

5.7 Awarding grades and reporting results

The GCSE and GCSE short course qualifications will be graded on an eight-grade scale: A*, A, B, C, D, E, F and G. Candidates who fail to reach the minimum standard for grade G will be recorded as U (unclassified) and will not receive a qualification certificate.

We will publish the minimum raw mark for each grade, for each unit, when we issue candidates' results. We will report a candidate's unit results to centres in terms of uniform marks and qualification results in terms of uniform marks and grades.

For each unit, the uniform mark corresponds to a grade as follows.

Unit 1: Written Paper
(maximum uniform mark = 160)

Grade	Uniform Mark Range
A*	144–160
A	128–143
B	112–127
C	96–111
D	80–95
E	64–79
F	48–63
G	32–47
U	0–31

Unit 2: Design and Making Practice

Controlled Assessment
(maximum uniform mark = 240)

Grade	Uniform Mark Range
A*	216–240
A	192–215
B	168–191
C	144–167
D	120–143
E	96–119
F	72–95
G	48–71
U	0–47

We calculate a candidate's total uniform mark by adding together the uniform marks for the units. We convert this total uniform mark to a grade as follows.

GCSE Design & Technology
(maximum uniform mark = 400)

Grade	Uniform Mark Range
A*	360–400
A	320–359
B	280–319
C	240–279
D	200–239
E	160–199
F	120–159
G	80–119
U	0–79

5.8 Re-sits and shelf-life of unit results

Unit results remain available to count towards certification within the shelf life of the specification whether or not they have already been used.

Candidates may re-sit a unit once only. The better result for each unit will count towards the final qualification provided that the 40% rule is satisfied. Candidates may re-sit the qualification an unlimited number of times.

Candidates will be graded on the basis of the work submitted for assessment.

Candidates must take units comprising at least 40% of the total assessment in the series in which they enter for certification.

6 Controlled Assessment Administration

The Head of Centre is responsible to AQA for ensuring that controlled assessment work is conducted in accordance with AQA's instructions and JCQ instructions.

6.1 Authentication of controlled assessment work

In order to meet the requirements of Code of Practice AQA requires:

- **candidates** to sign the Candidate Record Form to confirm that the work submitted is their own
- **teachers/assessors** to confirm on the Candidate Record Form that the work assessed is solely that of the candidate concerned and was conducted under the conditions laid down by the specification
- **centres** to record marks of zero if candidates cannot confirm the authenticity of work submitted for assessment.

The completed Candidate Record Form for each candidate should be attached to his/her work. All teachers who have assessed the work of any candidate entered for each component must sign the declaration of authentication.

If teachers/assessors have reservations about signing the authentication statements, the following points of guidance should be followed.

- If it is believed that a candidate has received additional assistance and this is acceptable within the guidelines for the relevant specification, the teacher/assessor should award a mark which represents the candidate's unaided achievement. The authentication statement should be signed and information given on the relevant form.
- If the teacher/assessor is unable to sign the authentication statement for a particular candidate, then the candidate's work cannot be accepted for assessment.

If, during the external moderation process, there is no evidence that the work has been properly authenticated, AQA will set the associated mark(s) to zero.

6.2 Malpractice

Teachers should inform candidates of the AQA Regulations concerning malpractice.

Candidates must **not**:

- submit work which is not their own;
- lend work to other candidates;
- allow other candidates access to, or the use of, their own independently sourced source material (this does not mean that candidates may not lend their books to another candidate, but candidates should be prevented from plagiarising other candidates' research);
- include work copied directly from books, the internet or other sources without acknowledgement and attribution;
- submit work typed or word-processed by a third person without acknowledgement.

These actions constitute malpractice, for which a penalty (for example disqualification from the examination) will be applied.

If malpractice is suspected, the Examinations Officer should be consulted about the procedure to be followed.

Where suspected malpractice in controlled assessments is identified by a centre after the candidate has signed the declaration of authentication, the Head of Centre must submit full details of the case to AQA at the earliest opportunity. The form JCQ/M1 should be used. Copies of the form can be found on the JCQ website (**http://www.jcq.org.uk/**).

Malpractice in controlled assessments discovered prior to the candidate signing the declaration of authentication need not be reported to AQA, but should be dealt with in accordance with the centre's internal procedures. AQA would expect centres to treat such cases very seriously. Details of any work which is not the candidate's own must be recorded on the Candidate Record Form or other appropriate place.

6.3 Teacher standardisation

AQA will hold annual standardising meetings for teachers, usually in the autumn term, for controlled assessment. At these meetings we will provide support in contextualising the tasks and using the marking criteria.

If your centre is new to this specification, you must send a representative to one of the meetings. If you have told us you are a new centre, either by submitting an intention to enter and/or an estimate of entry or by contacting the subject team, we will contact you to invite you to a meeting.

AQA will also contact centres if

- the moderation of controlled assessment work from the previous year has identified a serious misinterpretation of the controlled assessment requirements, *or*
- a significant adjustment has been made to a centre's marks.

In these cases, centres will be expected to send a representative to one of the meetings. For all other centres, attendance is optional. If a centre is unable to attend and would like a copy of the written materials used at the meeting, they should contact the subject administration team at **dandt@aqa.org.uk**.

6.4 Internal standardisation of marking

Centres must standardise marking to make sure that all candidates at the centre have been marked to the same standard. One person must be responsible for internal standardisation. This person should sign the Centre Declaration Sheet to confirm that internal standardisation has taken place.

Internal standardisation may involve:

- all teachers marking some trial pieces of work and identifying differences in marking standards;
- discussing any differences in marking at a training meeting for all teachers involved in the assessment;
- referring to reference and archive material such as previous work or examples from AQA's teacher standardising meetings.

6.5 Annotation of controlled assessment work

The Code of Practice states that the awarding body must require internal assessors to show clearly how the marks have been awarded in relation to the marking criteria defined in the specification and that the awarding body must provide guidance on how this is to be done.

The annotation will help the moderator to see as precisely as possible where the teacher considers that the candidates have met the criteria in the specification.

Work could be annotated by either of the following methods:

- key pieces of evidence flagged throughout the work by annotation either in the margin or in the text;
- summative comments on the work, referencing precise sections in the work.

6.6 Submitting marks and sample work for moderation

The total mark for each candidate must be submitted to AQA and the moderator on the mark forms provided, by Electronic Data Interchange (EDI) or through the e-Portfolio system (only available for certain units/components) by the specified date (see **http://www.aqa.org.uk/deadlines.php**).
Centres will normally be notified which candidates' work is required in the sample to be submitted to the moderator (please refer to section 7.1 for further guidance on submitting samples).

6.7 Factors affecting individual candidates

Teachers should be able to accommodate the occasional absence of candidates by ensuring that the opportunity is given for them to make up missed controlled assessments.

If work is lost, AQA should be notified immediately of the date of the loss, how it occurred, and who was responsible for the loss. Centres should use the JCQ form JCQ/LCW to inform AQA Centre and Candidate Support Services of the circumstances.

Where special help which goes beyond normal learning support is given, AQA must be informed through comments on the Candidate Record Form so that such help can be taken into account when moderation takes place.

Candidates who move from one centre to another during the course sometimes present a problem for a scheme of controlled assessment work. Possible courses of action depend on the stage at which the move takes place. If the move occurs early in the course the new centre should take responsibility for controlled assessment work. If it occurs late in the course it may be possible to arrange for the moderator to assess the work through the 'Educated Elsewhere' procedure. Centres should contact AQA at the earliest possible stage for advice about appropriate arrangements in individual cases.

6.8 Retaining evidence

The centre must retain the work of all candidates, with Candidate Record Forms attached, under secure conditions, from the time it is assessed, to allow for the possibility of an enquiry about results. The work may be returned to candidates after the deadline for enquiries about results. If an enquiry about a result has been made, the work must remain under secure conditions in case it is required by AQA.

7 Moderation

7.1 Moderation procedures

Moderation of the controlled assessment work is by inspection of a sample of candidates' work, sent by post or electronically through the e-Portfolio system from the centre to a moderator appointed by AQA. The centre marks must be submitted to AQA and to the moderator by the specified deadline (see **http://www.aqa.org.uk/deadlines.php**). Centres entering fewer candidates than the minimum sample size and centres submitting through the e-Portfolio system should submit the work of all of their candidates.Centres entering larger numbers of candidates will be notified of the candidates whose work will be required in the sample to be submitted for moderation.

Candidates are encouraged to provide photographic evidence of the finished outcome as well as photographs at various stages of making. This will facilitate the moderation process. However, in some instances it may be necessary for the moderator to visit a centre to inspect a sample of the practical outcomes. Should this be necessary the moderator will contact the centre and make the necessary arrangements. Centres should ensure that the practical work of candidates is available for inspection throughout the moderation period. AQA reserves the right to inspect the practical outcomes of candidates where it is felt appropriate.

Following the re-marking of the sample work, the moderator's marks are compared with the centre marks to determine whether any adjustment is needed in order to bring the centre's assessments into line with standards generally. In some cases it may be necessary for the moderator to re-mark the work of other candidates in the centre. In order to meet the possible request, centres must retain under secure conditions and have available the work and the Candidate Record Forms of every candidate entered for the examination and be prepared to provide them on demand. Mark adjustments will normally preserve the centre's rank order, but where major discrepancies are found, we reserve the right to alter the rank order.

Moderation will normally take place in June. Moderators will make contact to set a mutually convenient date for the visit.

7.2 Consortium arrangements

If there are a consortium of centres with joint teaching arrangements (i.e. where candidates from different centres have been taught together but where they are entered through the centre at which they are on roll), the centres must inform AQA by completing the JCQ/CCA form.

The centres concerned must nominate a consortium co-ordinator who undertakes to liaise with AQA on behalf of all centres in the consortium. If there are different co-ordinators for different specifications, a copy of the JCQ/CCA form must be submitted for each specification.

AQA will allocate the same moderator to each centre in the consortium and the candidates will be treated as a single group for the purpose of moderation.

7.3 Post-moderation procedures

On publication of the results, we will provide centres with details of the final marks for the controlled assessment work.

The candidates' work will be returned to the centre after the examination. The centre will receive a report, at the time results are issued, giving feedback on the accuracy of the assessments made, and the reasons for any adjustments to the marks.

We may retain some candidates' work for awarding, archive or standardising purposes

Appendices

A 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 should be interpreted in relation to the content outlined 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 (see Section 4) overall. Shortcomings in some aspects of the candidates' performance may be balanced by better performances in others.

Grade	Descriptions
A	Candidates recall, select and communicate detailed knowledge and thorough understanding of design and technology, including its wider effects. They apply relevant knowledge, understanding and skills in a range of situations to plan and carry out investigations and tasks effectively. They test their solutions, working safely and with a high degree of precision. They analyse and evaluate the evidence available, reviewing and adapting their methods when necessary. They present information clearly and accurately, making reasoned judgements and presenting substantiated conclusions.
C	Candidates recall, select and communicate sound knowledge and understanding of design and technology, including its wider effects. They apply knowledge, understanding and skills in a range of situations to plan and carry out investigations and tasks. They test their solutions, working safely and with precision. They review the evidence available, analysing and evaluating some information clearly, and with some accuracy. They make judgements and draw appropriate conclusions.
F	Candidates recall, select and communicate knowledge and understanding of basic aspects of design and technology, including its wider effects. They apply limited knowledge, understanding and skills to plan and carry out simple investigations and tasks, with an awareness of the need for safety and precision. They modify their approach in the light of progress. They review their evidence and draw basic conclusions.

B Spiritual, Moral, Ethical, Social, Legislative, Sustainable Development, Economic and Cultural Issues, and Health and Safety Considerations

AQA has taken great care to ensure that any wider issues, including those particularly relevant to the education of students at Key Stage 4, have been identified and taken into account in the preparation of this specification. They will only form part of the assessment requirements where they relate directly to the specific content of the specification and have been identified in Section 3: Content.

European Dimension

AQA has taken account of the 1988 Resolution of the Council of the European Community in preparing this specification and associated specimen units.

Environmental Education

AQA has taken account of the 1988 Resolution of the Council of the European Community and the Report "Environmental Responsibility: An Agenda for Further and Higher Education" 1993 in preparing this specification and associated specimen units.

Avoidance of Bias

AQA has taken great care in the preparation of this specification and specimen units to avoid bias of any kind.

C Overlaps with other Qualifications

Some overlaps exist between this and other Design and Technology specifications. The overlap is primarily in the design process and the scheme of assessment. As all specifications conform to the GCSE Design and Technology Subject Criteria, there are also overlaps of broad content.

Overlaps may also occur with GCSE Electronics.

D Key Skills – Teaching, Developing and Providing Opportunities for Generating Evidence

Introduction

The Key Skills Qualification requires candidates to demonstrate levels of achievement in the Key Skills of Communication, Application of Number and Information and Communication Technology.

The Wider Key Skills of Improving own Learning and Performance, Working with Others and Problem Solving are also available. The acquisition and demonstration of ability in these 'wider' Key Skills is deemed highly desirable for all candidates.

Copies of the Key Skills Standards may be downloaded from QCA's website:
http://www.qca.org.uk/qca_6444.aspx

The units for each Key Skill comprise three sections:

- What you need to know
- What you must do
- Guidance.

Candidates following a course of study based on this specification for Design and Technology: Electronic Products can be offered opportunities to develop and generate evidence of attainment in aspects of the Key Skills of:

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

Areas of study and learning that can be used to encourage the acquisition and use of Key Skills, and to provide opportunities to generate evidence for Part B of units, are provided in the Teachers' Resource Bank for this specification.

The above information is given in the context of the knowledge that Key Skills at levels 1 and 2 will be available until 2010 with last certification in 2012.

GCSE D&T Electronic Products Teaching from 2009 onwards

Qualification Accreditation Number: 500/4605/6

Every specification is assigned a national classification code indicating the subject area to which it belongs. The classification code for this specification is 9010.

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, schools and 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 check with the institution to which they wish to progress before embarking on their programmes.

To obtain free specification updates and support material or to ask us a question register with Ask AQA:

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Free launch meetings are available in 2008 followed by further support meetings through the life of the specification. Further information is available at:

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