

**GCE**

AS and A Level Specification

# Information and Communication Technology

AS exams 2009 onwards

A2 exams 2010 onwards



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Vertical black lines indicate a significant change or addition to the previous version of this specification.

# 1 Introduction

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## 1.1 Why choose AQA?

It's a fact that AQA is the UK's favourite exam board and more students receive their academic qualifications from AQA than from any other board. But why does AQA continue to be so popular?

- **Specifications**

Ours are designed to the highest standards, so teachers, students and their parents can be confident that an AQA award provides an accurate measure of a student's achievements. And the assessment structures have been designed to achieve a balance between rigour, reliability and demands on candidates.

- **Support**

AQA runs the most extensive programme of support meetings; free of charge in the first years of a new specification and at a very reasonable cost thereafter. These support meetings explain the specification and suggest practical teaching strategies and approaches that really work.

- **Service**

We are committed to providing an efficient and effective service and we are at the end of the phone when you need to speak to a person about an important issue. We will always try to resolve issues the first time you contact us but, should that not be possible, we will always come back to you (by telephone, email or letter) and keep working with you to find the solution.

- **Ethics**

AQA is a registered charity. We have no shareholders to pay. We exist solely for the good of education in the UK. Any surplus income is ploughed back into educational research and our service to you, our customers. We don't profit from education, you do.

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 Information and Communication Technology?

This exciting new specification brings the study of ICT up to date for the 21st century. It has the backing of a range of industries, higher education and the National Computing Centre.

The key points of this specification are that:

- it allows greater opportunities for practical work than previous specifications
- practical work can be carried out using a wide range of software and hardware of a centre's choice
- it allows for greater flexibility in modes of delivery
- students can be truly engaged in their studies by becoming active investigators rather than passive learners

- there are greater opportunities than in previous specifications for effective personalised learning, for target setting and for differentiated outcomes
- it builds on, rather than replicates, students' functional ICT skills.

The specification has been developed for students who wish to progress to higher education or to the world of work, where understanding how ICT can be used in society and organisations, and the implications of its use, will be a valuable asset.

Ideas for teaching, including practical exercises, will be provided in the Teacher Resource Bank and support meetings for this specification.

## 1.3 How do I start using this specification?

### Already using the existing AQA GCE Information and Communication Technology 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 **[www.aqa.org.uk/admin/p\\_entries.html](http://www.aqa.org.uk/admin/p_entries.html)**

### Not using an 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 are not. If your centre is new to AQA, please contact our centre approval team at **[centreapproval@aqa.org.uk](mailto: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.html>**

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 0161 957 3925 or email us at **[teachersupport@aqa.org.uk](mailto:teachersupport@aqa.org.uk)**

# 2 Specification at a Glance

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**AS Examinations**

**Unit 1 – INFO1**  
**Practical Problem Solving in the Digital World**  
 50% of AS, 25% of A Level  
 1 hour 30 minutes examination  
 80 marks  
 Section A: short answer questions  
 Section B: structured questions  
 Available January and June

**Unit 2 – INFO2**  
**Living in the Digital World**  
 50% of AS, 25% of A Level  
 1 hour 30 minutes examination  
 80 marks  
 Section A: short answer questions  
 Section B: structured questions  
 Available January and June

AS  
Award  
1521

**A2 Examinations**

**Unit 3 – INFO3**  
**The Use of ICT in the Digital World**  
 30% of A Level  
 2 hour examination  
 100 marks  
 Section A: structured questions based on pre-release material  
 Section B: questions requiring extended answers  
 Available January and June

**Unit 4 – INFO4**  
**Coursework: Practical Issues Involved in the Use of ICT in the Digital World**  
 20% of A Level  
 Coursework project report, marked by centre and moderated by AQA  
 70 marks  
 Students complete a project involving the production of an ICT-related system over an extended period of time  
 Available January and June

A Level  
Award  
2521

AS + A2 = A Level

# 3 Subject Content

## 3.1 Unit 1 INFO1 Practical Problem Solving in the Digital World

### Introduction

Courses based on this unit should provide students with the opportunity to develop their knowledge and understanding of the development of ICT systems through **practical experience** in using a range of applications software in a structured way. Students should then be able to apply the skills, knowledge and understanding gained from this practical work to the solution of problems.

### Range of Software/Problems

Students are expected to make practical use of a range of applications software, hardware and communication technologies to address several different types of problem. The range of applications software used should cover the processing of text, images, numbers and sound.

Students should address several problems. These problems can be selected to meet the individual needs of learners. Examples of suitable solutions to problems could include several from the following:

- an electronic photo album
- a rolling multimedia presentation for a school open day
- a website for a local nursery
- organising a blog for a local councillor
- producing invoices for a small business
- organising a set of podcasts for a teacher
- an interactive multimedia display for a tourist information centre.

Students should be provided with opportunities to develop the following skills:

- analysing
- designing
- implementing
- testing
- evaluating systems.

### Assessment

Assessment of this unit is by examination so candidates can show their understanding of the processes they have completed by their ability to repeat those processes (e.g. identifying suitable software to solve a given problem), or by being questioned about what they have done.

Questions will test candidates' practical experience in identifying methods of solution, and the design, implementation, testing, and evaluation of actual solutions based on a variety of applications software that process different types of data. Candidates will also be asked to identify evidence from Sample Work that they have completed and brought into the examination.

### Sample Work

Candidates must bring into the examination a sample of their work which addresses one or two problems. This Sample Work must be submitted with the question paper/answer booklet at the end of the examination.

The Sample Work must address at least one problem and provide evidence as follows.

1. A problem identification together with a list of requirements for the problem and interpretation of those requirements as input, processing and output (see Topic 2 for details).
2. A test plan and clearly annotated samples of testing evidence that are cross-referenced to the test plan (see Topic 9 for details).

Items 1 and 2 could be from the same or two different problem solutions.

Candidates are expected to provide between 10 and 20 pages of Sample Work. It must be succinct, clearly laid out and legible to the examiner. Page numbers must be clearly visible. (The purpose of numbering is to facilitate the candidate and the examiner in finding the required evidence quickly and referencing it accurately.) Page numbering should therefore **be sequential from start to end** and not subdivided into sections. It should be noted that, if the pages are not numbered, examiners will not have time to search through the Sample Work for the appropriate references.

### Supervision and authentication of Sample Work

The first page of the Sample Work must be the Candidate Record Form which, in advance of the examination, must be completed and signed by the candidate and the teacher responsible for the supervision of the candidate's work in order to authenticate that the Sample Work is the candidate's own. This is a similar procedure to that concerning authentication of coursework; see Section 6.1.

For further details and examples of Sample Work, see the Teacher Resource Bank.

Topic	Key Concepts	Content and Amplification
1. Health and safety in relation to the use of ICT systems	The need for and application of current health and safety legislation that relates to the use of the ICT systems.	
	Health and safety guidelines cover the design and introduction of new software.	
2. Analysis	Problem identification.	Description of a problem that requires solving, including identifying who needs the solution to the problem (the Client), who will use the solution and what their (the Users') skills are, and any further intended audience.
	Produce a list of the Client's requirements.	Precisely what the solution is to produce and how the solution is to work.
	Interpret lists of requirements as input, processing and output for ICT solutions.	What information in what format is required as output? What data is needed to produce the outputs required? What processing is involved in converting the data inputs to information output?
3. Design of solutions	Select design tools and techniques, and apply them to identified problems. Design of data entry into ICT systems.	Design techniques will depend upon the solution chosen. See the Teacher Resource Bank for examples. Design of data capture forms and other input methods e.g. video and audio capture. Design of robust data entry using validation and verification techniques as: <ul style="list-style-type: none"> <li>• errors can occur as data is entered into an ICT system</li> <li>• data needs to be accurate</li> <li>• data needs to be valid.</li> </ul>
	Design of processes.	Design of each process to be implemented. See the Teacher Resource Bank for further details and examples.
	Design of output of information.	Design of output method and format. Information to be produced in suitable formats and with suitable sequencing. See the Teacher Resource Bank for further details and examples.
	Designs need to be used by other people.	Produce designs that could be implemented by a third party.
4. Selection and use of input devices and input media	Select from input devices and input media available, and justify why items selected were suitable to solve each particular problem.	By knowing the following, candidates will be able to select and justify the most suitable input devices and media: <ul style="list-style-type: none"> <li>• the broad characteristics of current input methods</li> <li>• appropriate situations for use of each method</li> <li>• the input devices and media used for each method of input</li> <li>• any limitations of current input devices and media.</li> </ul>

Topic	Key Concepts	Content and Amplification
5. Selection and use of storage requirements, media and devices	Select from storage media and devices available, and justify why items selected were suitable to solve each particular problem.	<p>By knowing the following, candidates will be able to select and justify the most suitable storage devices and media:</p> <ul style="list-style-type: none"> <li>• data needs to be stored for future use</li> <li>• data can be stored at different physical locations from where it may be used</li> <li>• the broad characteristics of current storage media</li> <li>• appropriate contexts for use of media</li> <li>• the devices needed for reading and/or writing data to the storage media</li> <li>• any limitations of current storage devices and media.</li> </ul>
6. Selection and use of output methods, media and devices	Select from output methods, media and devices available, and justify why items selected were suitable to solve each particular problem.	<p>By knowing the following, candidates will be able to select and justify the most suitable methods, media and devices:</p> <ul style="list-style-type: none"> <li>• the broad characteristics of current output methods</li> <li>• appropriate situations for the use of each method</li> <li>• the output devices and media used for each method of output</li> <li>• any limitations on current output devices and media.</li> </ul>
7. Selection and use of appropriate software	<p>Identify software available and justify why the selected software was suitable to solve each particular problem.</p> <p>Systems software and applications software</p>	<p>By knowing the following, candidates will be able to select and justify their choice of software:</p> <ul style="list-style-type: none"> <li>• an awareness of the concept of software, the need for and function of software</li> <li>• the role and functions of systems software and the role and the functions of applications software</li> <li>• appropriate uses of current applications software</li> <li>• the features available in commonly used software.</li> </ul>
8. Implementation of ICT-related solutions	Production of working solutions.	Use of the hardware and software and appropriate communications technologies as required to provide working solutions to identified problems.
9. Testing of ICT-related solutions	Construct test plans that include a range of suitable test data, identify expected outcomes and test that the client's requirements have been met.	<p>A test plan that shows the design of representative examples of tests to ensure:</p> <ul style="list-style-type: none"> <li>• validity of data input</li> <li>• accuracy of output</li> <li>• presentation of output</li> <li>• that the solution meets the requirements of the client</li> <li>• that the solution is usable by the end user(s) and/or intended audience</li> <li>• that it incorporates the data to be used for testing the solution and the expected results of each test.</li> </ul>
	Follow test plan in a systematic way.	<p>Testing evidence that is cross-referenced to the test plan.</p> <p>Testing evidence that is clearly annotated to show an understanding of the testing process.</p> <p>Interpret the results of tests and take appropriate action.</p> <p>The results of testing evidence are used in the evaluation of the solution.</p>



Topic	Key Concepts	Content and Amplification
10. Evaluation of ICT-related solutions	Assessment of the effectiveness of the solution in meeting the Client's requirements and showing an understanding of what makes an ICT solution effective.	Candidates should ask themselves the following questions: <ul style="list-style-type: none"> <li>• does the solution do what it is supposed to do?</li> <li>• does the solution do it in the way it is supposed to do it?</li> <li>• is the solution an effective one?</li> <li>• if it is not, then what is wrong with the solution and what would make the solution an effective one?.</li> </ul>

### 3.2 Unit 2 INFO2 Living in the Digital World

Today's students are living in a world where the use of ICT surrounds them, and where they, and others, frequently take this use for granted.

It is increasingly important for future adults to be aware of the numerous issues arising from the use of ICT for individuals, society and organisations. The issues change rapidly and increasingly involve environmental and ethical ones.

This unit is designed to give students the wider picture of the use of ICT and to enable the understanding of basic terms and concepts involved in the study of the subject. Students should be able to discuss and comment on issues from a position of knowledge and they can do this only if they have the knowledge and understanding that underpins the subject.

Students should be encouraged to consider the important issues involved in the use of ICT by themselves and by others. Students should also study the immediate effect on themselves and also the longer term effects on society and the world in general.

Students should be asking questions such as:

- why is ICT being used
- is it appropriate to use ICT
- what are the implications of its use for me, now and in the future
- how does a particular use of ICT affect society?

It is expected that students will study much of the content of this unit through the investigation of examples of ICT use, and the issues involved in those examples.

The Teacher Resource Bank will provide further amplification.

Topic	Key Concepts	Content and Amplification
1. An ICT system and its components	What is ICT?	The use of technology for the input, storage, processing and transfer of data and the output of information.
	What is a system?	Any system involves input, processing and output.
	What is an ICT system?	ICT systems are those where the output from the system goes directly to a human being or into another ICT system.
	Any ICT system is made up of components.	The components are: <ul style="list-style-type: none"> <li>• people</li> <li>• data</li> <li>• procedures</li> <li>• software</li> <li>• hardware</li> <li>• information.</li> </ul>

Topic	Key Concepts	Content and Amplification
2. Data and information	Data	Define data. How data can arise. Data can be in different forms including text, still and moving images, numbers and sound. The need to code data on collection to enable effective processing. The need to encode data on input to an ICT system.
	Data is processed to produce information.	Processing is required to enable information to be produced from data.
	Information	Define information. Factors that affect the quality of information.
3. People and ICT systems	ICT systems are designed for and used by people. ICT systems are commissioned for a purpose.	
	Characteristics of users.	Different users have differing requirements dependent upon: <ul style="list-style-type: none"> <li>• experience</li> <li>• physical characteristics including age</li> <li>• environment of use</li> <li>• task to be undertaken.</li> </ul>
	How users interact with ICT systems.	Students should be able to discuss the need for effective dialogue between humans and machines. Appropriate interface design to provide effective communication for users. The need for the provision of appropriate help and support for users of ICT systems. The benefits and limitations of different types of user interfaces.
	Working in ICT.	Students should be aware of the many different jobs available to ICT professionals. The personal qualities and general characteristics necessary for an ICT professional to work effectively within the industry. The characteristics of an effective ICT team.

Topic	Key Concepts	Content and Amplification
4. Transfer of data in ICT systems	Students should be aware of current and emerging communication technologies.	
	Basic elements of an ICT network.	Students should be aware of what is available in order to create and use an ICT network: <ul style="list-style-type: none"> <li>• communication devices</li> <li>• networking software</li> <li>• data transfer media</li> <li>• standards and procedures</li> <li>• ICT networks for different geographical scales and uses should be considered.</li> </ul> See the Teacher Resource Bank.
	Characteristics of networks.	The World Wide Web and the Internet and the ability to distinguish between them. The characteristics of intranets and extranets.
	Uses of communication technologies.	Candidates should be able to comment on the appropriate and inappropriate use of networks and other technologies for a range of activities.
	Standards	The need for standards when transferring data.
5. Safety and security of data in ICT systems	The need to protect data in ICT systems.	Students should be able to discuss issues involving the: <ul style="list-style-type: none"> <li>• privacy of data in ICT systems</li> <li>• legislation and regulations to protect data</li> <li>• commercial and intrinsic value of data.</li> </ul>
	Threats to ICT systems.	There are different threats to ICT systems, including: <ul style="list-style-type: none"> <li>• internal and external threats</li> <li>• malpractice and crime.</li> </ul>
	Protecting ICT systems.	The measures that can be taken to try to protect all parts of ICT systems, including networks, against threats: <ul style="list-style-type: none"> <li>• hardware measures</li> <li>• software measures</li> <li>• procedures.</li> </ul>
	Legislation and regulations	Students should be aware of the provisions for legal action to be taken in the event of security breaches. The current legislation and regulations. Students should be aware that regulations and regulatory bodies are used to enforce both UK and European legislation but that not all breaches of regulations are automatically a criminal offence.

Topic	Key Concepts	Content and Amplification
6. Backup and recovery	The need for regular and systematic backup.	Case studies can be used to illustrate effective strategies and the problems of not having backup for individual users and groups of users
	Different individuals and organisations have different needs for backup and recovery.	These depend on the uses which are made of ICT. Options for backup and recovery dependent upon: <ul style="list-style-type: none"> <li>• what</li> <li>• when</li> <li>• how</li> <li>• storage, including media and location.</li> </ul>
	Responsibility needs to be allocated for backup and recovery procedures. The need for continuity of service.	Examples where continuity of service is different, including where different types of processing are used.
7. What ICT can provide	What ICT can provide.	ICT can provide: <ul style="list-style-type: none"> <li>• fast, repetitive processing</li> <li>• vast storage capability</li> <li>• the facility to search and combine data in many different ways that would otherwise be impossible</li> <li>• improved presentation of information</li> <li>• improved accessibility to information and services</li> <li>• improved security of data and processes.</li> </ul>
	Is the use of ICT systems always appropriate?	Students should be able to discuss ICT systems that: <ul style="list-style-type: none"> <li>• have limitations in what they can be used for</li> <li>• have limitations in the information that they produce</li> <li>• do not always provide the most appropriate solutions.</li> </ul>
	Types of processing.	There are different types of processing: <ul style="list-style-type: none"> <li>• batch</li> <li>• interactive</li> <li>• transaction.</li> </ul> (See Teacher Resource Bank for definitions.) Characteristics of each type. Appropriate contexts for their use.
8. Factors affecting the use of ICT	How the use of ICT is influenced by the following factors: <ul style="list-style-type: none"> <li>• cultural</li> <li>• economic</li> <li>• environmental</li> <li>• ethical</li> <li>• legal</li> <li>• social.</li> </ul>	Students should be able to discuss current issues, using examples to illustrate where and how each of the factors has had an effect on the use of ICT.  See Teacher Resource Bank for ideas and resources.
9. The consequences of the use of ICT	For individuals. For society.	Students should be able to discuss, using examples, the consequences of the use of ICT for different groups of individuals and society as a whole.  See Teacher Resource Bank for ideas and resources.

### 3.3 Unit 3 INFO3 The Use of ICT in the Digital World

This unit looks at the fast changing subject of ICT, including developments in technology and ICT system capabilities, and how this might affect the world that makes use of ICT.

The content is designed to address issues associated with the management of ICT and its use within organisations. A range of organisations should be studied, including charities, clubs and societies, small, medium and large businesses, both national and multi-national public and private organisations. The number of people involved could range from one or two to many thousands.

Each organisation will have the same ICT-related issues to consider on a scale appropriate to their own needs, for instance, the introduction and testing

of ICT systems, the training and support needed for users of ICT systems and the outside organisations which affect the way the organisation runs its ICT.

It should be remembered when teaching this unit that ICT systems are there to support the activities of organisations, and are essential in the modern world. It is expected that students will study much of the content of this unit through the investigation of examples of the uses made of ICT by organisations.

The Teacher Resource Bank will provide further amplification.

Pre-release material for each INFO3 examination will be issued to centres in advance. The Teacher Resource Bank provides further details.

Topic	Key Concepts	Content and Amplification
1. Future developments	Emerging technologies.	Enabling devices for remote and mobile working. Advances in technology that give business and leisure benefits.
	Potential future uses of ICT.	Developments in uses of current and future ICT systems.
	Implications of future developments and future use of ICT.	The impact on society. The impact on the way organisations are run. The impact on individuals as consumers and as workers. The social, cultural, legal, technical, ethical, economic and environmental issues surrounding the rapid development of ICT.
2. Information and systems	Different organisations have different information needs.	Type and scale of organisation. Nature and management style.
	Different activities within an organisation have different information needs.	Ordering systems, customer support
	Different levels of task have different information needs.	Strategic, Tactical, Operational Managing, Operating
	Different personnel have different information needs.	Suppliers, customers, official and legal bodies.
	Organisations have to exchange information with external bodies.	Privacy, security, legal and regulatory compliance implications.
	ICT systems support the activities of organisations.	The role of ICT is to improve the efficiency and effectiveness of business processes.
	Common ICT systems exist such as payroll, personnel and accounting. There is a need for information to be transferred between ICT systems both internally and externally.	The demands of the organisation itself. The requirements of external agencies. Supply chain. New systems interfacing with legacy systems. See the Teacher Resource Bank for further guidance.

Topic	Key Concepts	Content and Amplification
	Types of ICT system and their uses.	Corporate Information System Back Office Systems. Transaction processing systems; workflow and document management systems; system for collaborative working. Management Information Systems (MIS). Enterprise systems, Customer Relationship Management. Decision Support Systems (DSS). E-commerce. For example: online sales, ticket reservations, licence applications. See the Teacher Resource Bank for further guidance.
3. Managing ICT	The size of an organisation affects the degree of formality with which ICT is managed.	Small organisations have informal systems. Large organisations tend to have formal ones.
	An ICT strategy should match the long-term aims of an organisation. ICT policies outline how a strategy would be put into operation.	An organisation might have the aim of increasing its market share which may in turn necessitate a change to its ICT strategy to develop/further develop ecommerce.
	Contribution of ICT management to business strategy.	Chief Information Officer's role as member of the company executive.
4. ICT strategy	Factors that influence an ICT strategy within an organisation.	For example, business goals, available finance, legacy systems, geography of clients and business fulfilment, external factors: compliance, legislation.
	The management of information assets over time.	Students need to be aware that the long-term use of ICT systems involves the need to manage an increasing volume of data.
	The need for a corporate strategy covering technology for ICT systems in large organisations.	Future proofing, developments in technology, procurement. Technology lifecycle, information management, people considerations.
	Standards exist that may affect strategic choices.	For example, for exchanging data.
5. ICT Policies	Organisations will have policies covering different aspects of the use of ICT, such as security, training and procurement.	
6. Legislation and regulations	The implication of legislation and regulations on ICT policies. Legislation will impact on procedures within an organisation.	Students should be aware that regulations and regulatory bodies are used to enforce both UK and European legislation but that not all breaches of regulations are automatically a criminal offence.

Topic	Key Concepts	Content and Amplification
7. Developing ICT solutions	Factors that contribute to a successful development process.	For example, Management and End User involvement at appropriate times; effective ICT teamwork.
	Factors during the development process that might contribute to the failure of a newly introduced system.	For example, inadequate analysis; losing control of the project plan.
8. Development methods	ICT systems need to be developed in stages.	Systems development life cycle.
	The stages of development.	Analysis of the problem and proposed solution. Design and specification of the solution. Constructing the solution (writing code, customising a package). Testing (Module, Functional, Systems, User, Operational). Installation and Conversion (including documentation, training and handover). Review and maintenance.
	The need for systematic, formal methods.	Project management; agreed deliverables, milestones, sign-off and approval to proceed.
	Development methodologies.	Students need to be aware of a variety of linear and iterative methods.
9. Techniques and tools for systems development	Investigating and recording techniques.	Students need to be aware of the techniques available and their appropriate uses.
	Business process modelling tools.	Students need to know, understand and be able to use diagrams and tools used in the modelling of business processes including prototyping.
	Data modelling tools.  Techniques for testing.	Students need to know, understand and be able to use diagrams and tools used in the modelling of data.  Students need to be aware of the range of techniques available. For example, techniques such as test harnesses, volume testing, scalability, prototypes, multi-platform, use of simulated environments.  See the Teacher Resource Bank for further advice.
10. Introducing large ICT systems into organisations	Scale	Large ICT systems can be used not only within a single organisation but also across multiple small organisations. For example, ordering systems used in newsagents; NHS systems used across the country in trusts but also in a single GP surgery.
	Reliability and testing.	Students need to be aware of the issues involved in testing large ICT systems: <ul style="list-style-type: none"> <li>ensuring that large ICT systems always operate as expected</li> <li>designing testing to ensure reliable operation – techniques and the people involved</li> <li>the specialist skills and facilities required for the testing of network based systems.</li> </ul>

Topic	Key Concepts	Content and Amplification
	Installation	Essential features of a successful installation plan for a large-scale ICT system. Methods of introducing systems. Hardware installation and testing. Software installation and testing. Documentation. Resources (cross-referenced to training)
	Backup and recovery.	Strategies for backup of large scale systems. Risk Analysis. Scale of backup. Procedures for recovery of large scale systems. Disaster Recovery/Contingency planning. Options for recovery. Cross-reference to training.
	Maintenance	Types of maintenance on large scale systems. Adaptive Corrective Perfective Maintenance teams; handover. Cross-reference to User support.
11. Training and supporting users	Users of ICT systems can be both internal and external to the organisation. The training and support requirements may be different.	Different levels of staff need to learn different functionality of systems to match job and role requirements. External users may require training.
	Training	Training methods available. The relative merits of the different methods of training for: <ul style="list-style-type: none"> <li>• the organisation</li> <li>• the individual being trained.</li> </ul>
	Support	Support options available. Factors an organisation would consider when selecting a suitable support option.
	Customers	Interfaces available. The relationship between the choice of interface and business activities. Managing the interface between the organisation and its customers.



Topic	Key Concepts	Content and Amplification
12. External and internal resources	Using external ICT services and business support.	Students need to be aware of a range of ICT services available such as outsourcing, offshore, bulk printing (payroll, billing). Students need to be aware of different ways that organisations can obtain ICT services from suppliers such as contracting (people, space, equipment), leasing (software, communication links, equipment).
	Managing internal resources.	Planning the management and control of: <ul style="list-style-type: none"> <li>• hardware resources</li> <li>• software resources</li> <li>• communication resources</li> <li>• consumables</li> <li>• facilities and power</li> <li>• people.</li> </ul>

### 3.4 Unit 4 INFO4 Coursework: Practical Issues Involved in the Use of ICT in the Digital World

This unit provides students with the opportunity to complete a substantial project involving the production of an ICT-related system over an extended period of time. In so doing, students will enhance their transferable practical skills.

The unit is designed to be taught alongside or after Unit 3 and topics covered in Unit 3 may provide the stimulus for work for this Unit 4, but the centre or student can explore new areas of ICT if they wish.

#### Possible projects

In addition to those given below, AQA will provide guidance on task setting in the Teacher Resource Bank. Annual Standardisation Meetings will also be provided for the purpose of giving guidance to teachers in the conduct of coursework and its marking.

There is the scope for work to be tailored to the individual needs of learners and for a wide range of ICT-related systems to be created. It is also important for each candidate's project to have a level of complexity and demand appropriate to the second year of an A Level.

The following may help to illustrate the range of possible projects that could be undertaken, and how groups of students could work together (see below), whilst still producing an individual project report that has their own work clearly identified.

Students may, for example, produce:

- a software solution such as an e-commerce or multimedia system

- a training system, including training materials for a client. This could, for example, be for a course for someone working from home
- a user support system, such as for a user help desk in a company or school/college, or a fault logging system
- a system for ensuring the security of an organisation's ICT systems. An idea here would be to formulate a policy to specify appropriate use of a company or a school's/college's laptop computers and other mobile devices, or a database to record usage
- a system for communication within an organisation: for example, for how schools could use technology to communicate with students within the school or a communal diary system
- a system for evaluating new software to be purchased or for a new system to be installed, including hardware, software, communications, consumables and services
- a backup and recovery system and a disaster recovery plan for an organisation
- a system for managing relationships with customers.

More suggestions are given later in this section along with ideas on how to enable groups of students to work together.

## Working together

It is intended that this unit will provide opportunities for students to become involved in *real or realistic* situations in organisations where they can apply their skills, knowledge and understanding of ICT to solve problems for a client. An organisation is defined as any group of people who use ICT to achieve their aims and objectives. Examples of an organisation include a local company, a retailer, a school or college, a charity, a club or society, or just a group of people coming together to organise an event.

It is quite acceptable for students to work in teams for the same client, if that is what is required for the work being undertaken. Students at this level are expected to work, in some part, collaboratively with others. The team could consist of two or more students working with one or more members from the client organisation. This approach is encouraged if it allows students to become involved in larger more realistic projects where each student can work on part of a system.

## Using software

The project should involve the students in the use of applications software for a variety of purposes and should also introduce students to the fundamentals of project management and, although there is no requirement to use dedicated project management software, students may wish to so that they can better manage their own project or their part in a larger project.

Students will have used a variety of applications software during their study of Unit 1; Unit 4 provides students with the opportunity to enhance their skills or develop new ones.

Students will be expected to make full use of the functionality available in word processing software for the production of the project report and, if required, to enable collaborative working.

## Skills

The skills set down in the QCA Subject Criteria for GCE ICT are those necessary to undertake an ICT-related project: thus, as part of this unit, students will have the opportunity to enhance their transferable skills in:

- investigation
- analysis
- definition of requirements
- design of effective solutions to meet a requirements specification, including the methods to be used for testing and installation
- selection and use of appropriate technologies
- implementation

- testing
- documentation
- evaluation of solutions and their own performance.

The project should encourage students to think creatively, innovatively, analytically, logically and critically as they consider and suggest alternative approaches, investigate and discuss possibilities, and recommend actions to be taken.

Students will produce a project report which will be assessed internally by the centre, to the criteria provided in this specification. The centre's assessment will then be moderated by AQA. For this reason, although collaborative working is encouraged, it is *imperative* that assessors are able to identify each student's own contribution, and each student must produce their own project report.

## Further project ideas

The following may help to illustrate the range of possible projects that could be undertaken, and how groups of students could work together, whilst still producing an individual project report that has their own work clearly identified.

- **Website, intranet site or extranet site**

For any organisation (or event), students could produce parts of an intranet for different departments within an organisation, working collaboratively to establish house styles and consistency of end-product, and in sharing their skills in the use of the variety of applications software needed to create the end-product.

- **Training materials**

Training materials could be developed for a course within the centre or for an external organisation. Materials could take a variety of formats and be created using a range of software. Individual students could work on one aspect or one format, whilst the whole group has to adopt consistent styles and approaches to development. For example, training could be needed in:

- a new piece of software
- using new laptops, PDAs or other portable devices
- using loan items such as digital cameras or recording equipment
- a new security policy
- a backup and recovery strategy
- health and safety legislation or guidelines
- environmental policies, such as disposal of computer equipment.

Other students could perhaps develop a system for storing, cataloguing or loaning out training materials that have been created.

- **User support and fault logging**

A group of students could each work with a different type of user, or a different department of a school or other organisation. Materials required might be similar in purpose, but need to be produced so as to best suit the individual types of user, or some may have specialist needs which need supporting. Recording and storage of requests for maintenance, error reporting or fault logging could be built in.

- **Managing relationships with customers**

This could involve a system for the collection of customer feedback via a website and a back office system that can collect, store and classify responses, plus a system that results can be fed into for statistical analysis. Individual students could take on one of the elements, where collaboration would be essential to ensure effective data transfer, correctness and accuracy.

- **Multimedia solutions**

These can be used in a variety of situations. They can be extremely large systems and frequently need to be broken down into manageable chunks. Separate students could work on parts of an overall solution. This could include producing an interactive map, where subject specialisms or special interests could determine with what areas students became involved. For example, one student could prepare and incorporate information on areas of interest for young adults, another on sporting venues, a third on flora and fauna. This could be produced for the local tourist board or town council.

Additional information and examples are available in the Teacher Resource Bank.

	<b>The Project Report Should Include</b>	<b>Amplification</b>
1. Background and investigation	An introduction to the organisation.	This should include the type and purpose of the organisation, and give an idea of its size and scale of operation. The student's contact within the organisation should be identified.
	A description of the current system (or existing situation) and its environment.	Moving down in scale to describe the system (or existing situation) within the organisation/for the organisation, which is under investigation. The people/departments involved.
	Identification of client and users.	Who is it for? Clear identification of client, users and audience if necessary.  N.B. It is likely that there is one client, but multiple users. At this level of study, it is expected that this will be the case.
	A business case (reasons) for change.	Why the project is needed by the organisation.
	Evidence of the use of relevant investigation techniques.	Evidence of, for example, planning, conducting, documenting and evaluating meetings with clients, interviews, observation, questionnaires, research as appropriate. (See the Teacher Resource Bank.)
	Requirements of the client.	What is the proposed system to provide?
2. Analysis and deliverables	Statement of scope.	This should include any internal or external constraints on the proposed system. These may include hardware, communication technologies, software, format of external information requirements, staffing and environmental factors.
	Description of the proposed system.	This may take various formats but should include the benefits for, and likely impacts on, the organisation.
	Documentation of processes.	Again, the format for the documentation is not fixed but should be appropriate to the system being analysed.
	Description of the users of the proposed system.	Details of the skills of the users of the proposed system, appropriate to the system.
	Evaluation criteria.	Both quantitative and qualitative criteria against which the solution can be tested and evaluated. These should be derived from the requirements of the client.

	<b>The Project Report Should Include</b>	<b>Amplification</b>
	Agreed deliverables.	What is to be produced and handed over to the client? This may be a prototype system or a partial system.
	Evidence of checking the findings with the client.	Findings must be presented in such a way as to be understandable to the client.
3. Design and planning for implementation <sup>1</sup>	Evidence of investigating alternative design solutions.	Should include investigating options for all elements of an ICT system as appropriate to the project.
	Draft design work.	To be able to discuss with client.
	Final design work.	From which to implement.
	Plan for implementation, testing and installation, including proposed time scales.	
	Training requirements for the new system.	This may include what documentation will be required for training the users.
	Testing strategy.	Should set out what testing is necessary, who will do it, when and where. Students should describe here any constraints on live testing that require a simulated environment to be used.
	Test plan.	The tests that will be undertaken, what the tests are testing, the order in which the tests will be completed.
4. Testing and documentation of the implementation	Evidence of testing.	Where testing in the intended environment is not possible, testing in a simulated environment will be acceptable providing this has been explained and justified in the testing strategy.  Testing should concentrate on the testing of complete processes and the system as a whole. Evidence of functional or unit tests, for example for validation or for the backing up of one file, is not required.
	Evidence of testing should include evidence of client and/or user testing and audience if necessary.	As appropriate, depending on whether the client is also a user.
	Comprehensive documentation of the solution that would allow the solution to be used or maintained or developed further which is appropriate for the client/users.	Documentation could be technical or user documentation depending on the individual project undertaken and the agreed deliverables.
5. Evaluation of the implemented solution	A critical evaluation of the solution that would allow the solution to be used/ maintained or developed further which is appropriate for the client/user.	The solution should be critically evaluated against the evaluation criteria and the client needs, as defined during the investigation and analysis stages. Evidence from testing should be referenced.
	An evaluation of the student's own performance.	This should identify strengths and weaknesses in the approach they have identified, how they would improve their performance on a similar project in the future.

N.B. Students are not required to produce separate documentary evidence of implementation as this is provided through testing evidence and the final documentation of the solution.

<sup>1</sup> The verb 'to implement' is taken to mean to create or produce an ICT-related system. Thus 'implementation' refers to whatever has been created.

	<b>The Project Report Should Include</b>	<b>Amplification</b>
6. The Project Report	The complete work should be submitted in the format of a project report.	The report should be well structured and should make use of facilities available within software packages to enable this to be done: for example, by including a contents list, headers/footers, pagination, indexes, effective use of appendices and presentation techniques.  Appropriate use of technically accurate illustrative and visual material for effective communication. An appropriate style of writing has been adopted. The standard of the student's written communication will be assessed in the report.

## Marking Criteria

1	Background and investigation	14 marks
2	Analysis and deliverables	15 marks
3	Design and planning for implementation	14 marks
4	Testing and documentation of implementation	13 marks
5	Evaluation of the implemented solution	7 marks
6	The Project Report	7 marks
	<b>Total</b>	<b>70 marks</b>

### 1 Background and investigation (14 marks)

This section is intended to assess the candidate's ability to investigate situations, work with others, use appropriate techniques and analysis, and present their findings in an appropriate manner.

<b>0 - 6 MARKS</b>	<b>7 - 10 MARKS</b>	<b>11 - 14 MARKS</b>
<p>The candidate has provided a brief introduction to the organisation and the current system (or existing situation), showing some understanding.</p> <p>The client for the ICT-related system has been identified and the candidate shows that he/she has an idea of why a new system is required and what the client requires.</p> <p>The candidate has shown that he/she can use one investigation technique.</p>	<p>The candidate has provided an introduction to the organisation and shows understanding of the current system (or existing situation).</p> <p>The client for the ICT-related system and some of the users have been identified and the candidate shows that he/she has some understanding of why a new system is required. The client's requirements have been listed.</p> <p>The candidate has shown that he/she can use more than one investigation technique with an understanding of why it is appropriate for the task.</p>	<p>The candidate's introduction to the organisation and description of the organisation are comprehensive, showing a full understanding of the system, the organisation and its environment.</p> <p>The candidate has described the client and all users of the proposed system (both technical and non-technical, if appropriate).</p> <p>A justification for the required system is given with full understanding shown of the client's requirements.</p> <p>The candidate has used more than two investigation techniques appropriate for the task.</p>

## 2 Analysis and deliverables (15 marks)

This section is intended to assess the candidate's ability to think analytically and logically, to present their findings using appropriate techniques, and to produce a specification to use during Design.

0 - 5 MARKS	6 - 9 MARKS	10 - 15 MARKS
<p>A simple problem has been analysed with limited scope. The candidate has produced a brief statement of the scope of the project and has included a superficial description of the proposed system that shows some ability to analyse a system.</p> <p>Processes have been identified and some understanding of what is involved in the new system is shown.</p> <p>The candidate has attempted to identify the skills of a user or some users.</p> <p>Evaluation criteria have been provided, showing some understanding of the need for the objective assessment of a solution.</p> <p>Some deliverables have been referred to in the report, showing that the candidate has an idea of what he/she has to produce. (Note: the maximum mark achievable in this section is 5 if a simple task, rather than a system, has been analysed.)</p>	<p>A substantial problem has been analysed. There is a statement of the scope of the project.</p> <p>The candidate shows a good understanding of the proposed system and the likely benefits.</p> <p>The candidate has outlined the processes in the new system, showing some understanding of what is involved in each process.</p> <p>The skills of some users have been described, showing an understanding of the need to consider user skills when designing a solution.</p> <p>Both qualitative and quantitative evaluation criteria have been included, showing some understanding of the need for the objective assessment of a solution.</p> <p>The deliverables are listed, demonstrating some understanding of what the candidate has to produce.</p> <p>There is some evidence that findings have been checked with the client, demonstrating that the candidate understands the need for client involvement.</p>	<p>A substantial problem has been analysed. There is a statement of scope along with an appreciation of any internal or external constraints on the project. The candidate has described the proposed system and included the benefits and likely impacts on the organisation.</p> <p>The candidate shows an understanding of the processes, which are fully documented and include the inputs and outputs required. The documentation could be used for design work, the candidate exhibiting strong skills of analysis and logical thinking.</p> <p>The skills of most users have been described, showing an understanding of the need to consider user skills in designing a solution. How the users will use the proposed system is described.</p> <p>Qualitative and quantitative evaluation criteria have been included that match the client requirements and show a good understanding of the need for the objective assessment of a solution.</p> <p>The candidate shows a full understanding of the deliverables that are required.</p> <p>There is evidence of how all findings have been checked with the client and amended as necessary, demonstrating an effective response and full understanding of the need for client involvement.</p>

### 3 Design and planning for implementation (14 marks)

This section is intended to assess the candidate's ability to design and document effective solutions, using their capacity to think creatively and innovatively, and to select appropriate solutions. A candidate's skills in logical thought and planning are also assessed through his/her ability to design appropriate implementation and testing strategies and plans.

0 - 5 MARKS	6 - 10 MARKS	11 - 14 MARKS
<p>The candidate has shown evidence of investigating alternative solutions.</p> <p>The candidate has included design work for the new system.</p> <p>The candidate shows limited understanding of the testing process, but has included a test plan that may only include functional testing. (Note: the maximum mark achievable in this section is 5 if a simple task, rather than a system, has been designed and planned.)</p> <p>The candidate has produced a limited plan for testing and installing the system with suggested deadlines, showing a basic understanding of the issues involved. The training required has been identified.</p>	<p>The candidate understands the basic principles of investigating and evaluating alternative solutions.</p> <p>The candidate has shown evidence of understanding the iterative nature of the design process by including design work for the new system that he/she has amended as a result of client feedback.</p> <p>There is a test strategy for testing the effectiveness of the implemented system. The test plan shows an understanding of the need to test the system against evaluation criteria or client needs.</p> <p>The candidate has produced a time plan for implementing, testing and installing the system and for any training required in its use. The time plan includes expected durations as well as deadlines showing some understanding of the need to quantify time requirements.</p>	<p>Alternative solutions have been considered and evaluated objectively in relation to client needs.</p> <p>The candidate shows full understanding of the design process and has included draft design work, which has been amended as a result of well-evidenced client feedback, and the resultant final design for the new system.</p> <p>The process of testing a system is well understood with a strategy and plan that includes testing against both evaluation criteria <b>and</b> client needs.</p> <p>The candidate has produced a time plan for implementing, testing and installing the system and for any training required in its use. The time plan includes expected durations as well as deadlines showing an understanding of the need to quantify time requirements. The candidate includes an explanation of how the plan meets the client's requirements and the needs of the users.</p>

### 4 Testing and documentation of the implementation (13 marks)

This section is intended to assess the candidate's ability to implement and document effective solutions, shown through his/her testing and documentation of the system.

0 - 5 MARKS	6 - 9 MARKS	10 - 13 MARKS
<p>The candidate has carried out some testing of the implementation that shows a limited understanding of the testing process.</p> <p>Some documentation has been provided that partly describes the implemented solution. The documentation would not be easily understood by a third party. (Note: the maximum mark achievable in this section is 5 if a simple task, rather than a system, has been tested and documented.)</p>	<p>There is evidence that the candidate understands the need to test the processes in the system and the need to involve the client in the testing process. The candidate has shown client involvement in testing.</p> <p>The documentation is appropriate. The candidate has made some attempts to make the documentation suitable for the client and/or user(s) and, as a result, the documentation is understandable.</p>	<p>Appropriate testing of the whole solution has been carried out, showing understanding of the purpose of testing. The candidate understands the need to involve both the client and user(s) in the testing process and has explained how he/she has achieved this, with evidence being shown.</p> <p>Documentation is comprehensive and could easily be used by the client and/or user(s), and for maintenance or upgrading of the solution – thus showing a good understanding of the purpose of documentation for an ICT-related system.</p>

## 5 Evaluation of the implemented solution (7 marks)

This section is based upon a candidate's ability to carry out logical, reasoned, critical evaluation that is related to the evaluation criteria and client's needs, for the solution, and to his/her own development.

<b>0 - 4 MARKS</b>	<b>5 - 7 MARKS</b>
<p>The candidate shows skills in evaluation by carrying out an evaluation of his/her implemented solution. Some strengths or weaknesses in the solution have been referred to.</p> <p>Reference is made in the evaluation to the client's needs or the evaluation criteria.</p> <p>The candidate shows some understanding of the need to evaluate his or her own performance in completing the work.</p>	<p>Evaluation is well understood, with critical evaluation having been completed that identifies strengths and weaknesses of the solution and suggests possible improvements that could be made.</p> <p>Evaluation refers to the client's needs and evaluation criteria.</p> <p>The candidate has identified the strengths and weaknesses in the approach he/she has taken to his/her work and has identified how he/she could improve his/her performance on similar work in the future.</p>

## 6 The Project Report (7 marks)

The quality of written communication and the ability to use appropriate documentation, as well as the software skills needed to create it, are assessed in this section.

<b>0 - 4 MARKS</b>	<b>5 - 7 MARKS</b>
<p>The candidate shows some understanding of the requirements of a professional report. Software used appropriately.</p> <p>The language used by the candidate is generally appropriate to the report, but the content may be disorganised.</p> <p>Some illustrative material has been included, but shows that the candidate has only a basic understanding of how to use illustrative material appropriately.</p>	<p>A well-structured report has been produced to a professional standard that makes good use of the software package used.</p> <p>The language used is suitable and the report is logical and well organised.</p> <p>The report is well illustrated, with appropriate material showing that the candidate has an understanding of the use of such material.</p>



# 4 Scheme of Assessment

## 4.1 Aims

AS and A Level courses based on this specification should encourage candidates to:

- become discerning users of ICT, developing a broad range of ICT skills, and knowledge and understanding of ICT. This should form a basis for progression to further learning, including progression from AS to A2, and/or employment.
- This specification encourages students to develop:
  - the capacity for thinking creatively, innovatively, analytically, logically and critically
  - the skills to work collaboratively
- the ability to apply skills, knowledge and understanding of ICT in a range of contexts to solve problems
- an understanding of the consequences of using ICT for individuals, organisations and society and of social, legal, ethical and other considerations about the use of ICT
- an awareness of emerging technologies and an appreciation of the potential impact these may have on individuals, organisations and society.

## 4.2 Assessment Objectives (AOs)

The Assessment Objectives are common to AS and A Level. The assessment units will assess the following Assessment Objectives in the context of the content and skills set out in Section 3 (Subject Content).

### AO1 Knowledge and understanding

Candidates should be able to demonstrate knowledge and understanding of:

- the characteristics of data and information, and the need for their organisation and manipulation to facilitate effective use
- the use of ICT for a range of purposes
- the influence of social, cultural, legal, technical, ethical, economic and environmental considerations on the use of ICT
- the consequences of using ICT for individuals, organisations and society
- the components, characteristics and functions of ICT systems (including hardware, software and communication) which allow effective solutions to be achieved
- the systematic development of high quality ICT-related solutions to problems
- emerging technologies and their implications for future use of ICT.

### AO2 Skills

Candidates should be able to:

- investigate and analyse problems and produce a specification
- design effective solutions
- select and use appropriate application software
- test and implement an effective ICT-related system
- document specifications and solutions
- evaluate solutions and their own performance.

### Quality of Written Communication (QWC)

In GCE 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 where appropriate.

In this specification, QWC will be assessed appropriately in all units.

## Weighting of Assessment Objectives for AS

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

Assessment Objectives	Unit Weightings (%)		Overall Weighting of AOs (%)
	Unit 1	Unit 2	
AO1	15	45	60
AO2	35	5	40
Overall weighting of units (%)	50	50	100

## Weighting of Assessment Objectives for A Level

The table below shows the approximate weighting of each of the Assessment Objectives in the AS and A2 units.

Assessment Objectives	Unit Weightings (%)				Overall Weighting of AOs (%)
	Unit 1	Unit 2	Unit 3	Unit 4	
AO1	7.5	22.5	15	5	50
AO2	17.5	2.5	15	15	50
Overall weighting of units (%)	25	25	30	20	100

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## 4.3 National Criteria

This specification complies with the following.

- The Subject Criteria for Information and Communication Technology
- The GCSE, GCE, Principal Learning and Project Code of Practice April 2010
- The GCE AS and A Level Qualification Criteria
- The Arrangements for the Statutory Regulation of External Qualifications in England, Wales and Northern Ireland: Common Criteria

## 4.4 Prior Learning

We recommend that candidates should have acquired the skills and knowledge associated with a GCSE Information and Communication Technology course or equivalent.

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

## 4.5 Synoptic Assessment and Stretch and Challenge

Synoptic assessment in GCE Information and Communication Technology is assessed in the A2 units. Drawing on Assessment Objectives 1 and 2, synoptic assessment tests candidates' holistic understanding of the subject and the connections between different elements of it.

Synoptic assessment in Information and Communication Technology requires candidates to make connections between different areas of GCE Information and Communication Technology represented in the specification.

The requirement that Stretch and Challenge is included at A2 is met by the nature of the assessment methodologies used where candidates are required to apply their knowledge, understanding and skills to unfamiliar contexts, and by the more holistic approach taken.

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## 4.6 Access to Assessment for Disabled Students

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

Reasonable adjustments are made for disabled candidates in order to enable them to access the assessments. For this reason, very few candidates will have a complete barrier to any part of the assessment.

Candidates who are still unable to access a significant part of the assessment, even after exploring all possibilities through reasonable adjustments, may still be able to receive an award. They would be given a grade on the parts of the assessment they have taken and there would be an indication on their certificate that not all the competences had been addressed. This will be kept under review and may be amended in the future.

# 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	
	AS	A2	AS	A Level
January 2009	✓			
June 2009	✓		✓	
January 2010	✓	✓	✓	
June 2010	✓	✓	✓	✓
January 2011 onwards	✓	✓	✓	✓
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 – INFO1

Unit 2 – INFO2

Unit 3 – INFO3

Unit 4 – INFO4

AS certification – 1521

A Level certification – 2521

## 5.3 Private Candidates

The AS only is available to Private Candidates. The A2 units, leading to an A Level qualification, are 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 disabilities (under the terms of the DDA) 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.

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## 5.5 Language of Examinations

We will provide units in English only.

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## 5.6 Qualification Titles

Qualifications based on this specification are:

- AQA Advanced Subsidiary GCE in Information and Communication Technology, and
- AQA Advanced Level GCE in Information and Communication Technology.

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## 5.7 Awarding Grades and Reporting Results

The AS qualification will be graded on a five-point scale: A, B, C, D and E. The full A Level qualification will be graded on a six-point scale: A\*, A, B, C, D and E. To be awarded an A\*, candidates will need to achieve a grade A on the full A Level qualification and an A\* on the aggregate of the A2 units. For

both qualifications, candidates who fail to reach the minimum standard for grade E will be recorded as U (unclassified) and will not receive a qualification certificate. Individual assessment unit results will be certificated.

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## 5.8 Re-sits and Shelf-life of Unit Results

Unit results remain available to count towards certification, whether or not they have already been used, as long as the specification is still valid.

Candidates may re-sit a unit any number of times within the shelf-life of the specification. The best result for each unit will count towards the final qualification. Candidates who wish to repeat a

qualification may do so by re-taking one or more units. The appropriate subject award entry, as well as the unit entry/entries, must be submitted in order to be awarded a new subject grade.

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

# 6 Coursework Administration

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

## 6.1 Supervision and Authentication of Coursework

The Code of Practice for GCE requires:

- **candidates** to sign the Candidate Record Form (CRF) to confirm that the work submitted is their own
- **teachers/ assessors** to confirm on the CRF that the work assessed is solely that of the candidate concerned and was conducted under the conditions laid down by the specification.

The completed CRF for each candidate must 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. Failure to sign the authentication statement may delay the processing of the candidates' results.

The teacher should be sufficiently aware of the candidate's standard and level of work to appreciate if the coursework submitted is beyond the talents of the candidate.

In most centres, teachers are familiar with candidates' work through class and homework assignments. Where this is not the case, teachers should make sure that coursework is completed under direct supervision.

In all cases, some direct supervision is necessary to ensure that the coursework submitted can be confidently authenticated as the candidate's own.

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.

## 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 or attribution;
- submit work typed or word-processed by a third person without acknowledgement.

These actions constitute malpractice, for which a penalty (eg 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 coursework/portfolio 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 coursework/portfolios 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 coursework/portfolio cover sheet or other appropriate place.

## 6.3 Teacher Standardisation

We will hold annual standardising meetings for teachers, usually in the autumn term, for the coursework units. At these meetings, we will provide support in developing appropriate coursework 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 estimate of entry or by contacting the subject team, we will contact you to invite you to a meeting.

We will also contact centres to invite them to send a representative if:

- the moderation of coursework from the previous year has identified a serious misinterpretation of the coursework requirements
- inappropriate tasks have been set
- a significant adjustment has been made to a centre's marks.

For all other centres, attendance is optional. If you are unable to attend and would like a copy of the materials used at the meeting, please contact the subject team at **ict-subjects@aqa.org.uk**

## 6.4 Internal Standardisation of Marking

Centres must standardise marking within the centre 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 involves:

- 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 Coursework

The Code of Practice for GCE 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:

- the use of marking grids provided by AQA. These will provide space for teachers to include page references for where evidence can be found and comments to justify the marks awarded
- 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 or by Electronic Data Interchange (EDI) by

the specified date. Centres will be informed which candidates' work is required in the samples to be submitted to the moderator.

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## 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 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 Candidate Services of the circumstances.

Where special help which goes beyond normal learning support is given, AQA must be informed through comments on the CRF 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 internal assessment. 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 assessment. 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.

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## 6.8 Retaining Evidence and Re-using Marks

The centre must retain the work of all candidates, with CRFs 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 coursework is by inspection of a sample of candidates' work, sent by post 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. We will let centres know which candidates' work will be required in the sample to be submitted for moderation.

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 call for the work of other candidates in the centre. In order to meet this possible request, centres must retain under secure conditions and have available the coursework and the CRF of every candidate entered for the examination and be prepared to submit it on demand. Mark adjustments will normally preserve the centre's order of merit, but where major discrepancies are found, we reserve the right to alter the order of merit.

## 7.2 Post-moderation Procedures

On publication of the AS/A Level results, we will provide centres with details of the final marks for the coursework unit.

The candidates' work will be returned to the centre after the examination. The centre will receive a report giving feedback on the appropriateness of the tasks

set, the accuracy of the assessments made, and the reasons for any adjustments to the marks.

We may retain some candidates' work for archiving or standardising purposes.

# Appendices

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## A Performance Descriptions

These performance descriptions show the level of attainment characteristic of the grade boundaries at A Level. They give a general indication of the required learning outcomes at the A/B and E/U boundaries at AS and A2. 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 examination may be balanced by better performance in others.

## AS performance descriptions for Information and Communication Technology

	Assessment Objective 1	Assessment Objective 2
Assessment objectives	<p><b>Candidates should be able to demonstrate knowledge and understanding of:</b></p> <ul style="list-style-type: none"> <li>• the characteristics of data and information, and the need for their organisation and manipulation to facilitate effective use</li> <li>• the use of ICT for a range of purposes</li> <li>• the influence of social, cultural, legal, technical, ethical, economic and environmental considerations on the use of ICT</li> <li>• the consequences of using ICT for individuals, organisations and society</li> <li>• the components, characteristics and functions of ICT systems (including hardware, software and communication) which allow effective solutions to be achieved</li> <li>• the systematic development of high quality ICT-related solutions to problems</li> <li>• emerging technologies and their implications for future use of ICT.</li> </ul>	<p><b>Candidates should be able to:</b></p> <ul style="list-style-type: none"> <li>• investigate and analyse problems and produce a specification</li> <li>• design effective solutions</li> <li>• select and use appropriate application software</li> <li>• test and implement an effective ICT-related system</li> <li>• document specifications and solutions</li> <li>• evaluate solutions and their own performance.</li> </ul>
A/B boundary performance descriptions	<p><b>Candidates characteristically demonstrate:</b></p> <ol style="list-style-type: none"> <li>a) an understanding of the characteristics of data and information</li> <li>b) a clear understanding of the need for organisation of data and information to facilitate effective use of ICT</li> <li>c) a knowledge of how ICT is used for a range of purposes</li> <li>d) an understanding of how social, cultural, legal, technical, ethical, economic and environmental considerations affect the use of ICT</li> <li>e) an understanding of the consequences of the use of ICT on society, individuals and organisations</li> <li>f) a thorough knowledge of the characteristics and functions of the hardware components and application software that make up an ICT system and how these are used to provide effective ICT solutions</li> <li>g) an understanding of the communications systems that support ICT use</li> <li>h) an understanding of the need for a systematic approach when developing ICT solutions to problems.</li> <li>i) an understanding of the development of ICT technologies and the implications of emerging technologies for the future use of ICT.</li> </ol>	<p><b>Candidates characteristically demonstrate:</b></p> <ol style="list-style-type: none"> <li>a) the ability to use subject-specific terminology appropriately and accurately</li> <li>b) the ability to analyse a complex problem and produce a specification</li> <li>c) the ability to design effective solutions, documented appropriately</li> <li>d) the selection and use of application software to implement effective solutions</li> <li>e) the ability to design and implement an appropriate testing strategy</li> <li>f) evaluation skills which analyse their own performance and that of their solution.</li> </ol>

	Assessment Objective 1	Assessment Objective 2
E/U boundary performance descriptions	<p><b>Candidates should be able to demonstrate knowledge and understanding of:</b></p> <ul style="list-style-type: none"> <li>a) the characteristics of data and information, and the need for their organisation and manipulation to facilitate effective use</li> <li>b) the use of ICT for a range of purposes</li> <li>c) the influence of social, cultural, legal, technical, ethical, economic and environmental considerations on the use of ICT</li> <li>d) the consequences of using ICT for individuals, organisations and society</li> <li>e) the components, characteristics and functions of ICT systems (including hardware, software and communication) which allow effective solutions to be achieved</li> <li>f) the systematic development of high quality ICT-related solutions to problems</li> <li>g) emerging technologies and their implications for future use of ICT.</li> </ul>	<p><b>Candidates should be able to:</b></p> <ul style="list-style-type: none"> <li>a) investigate and analyse problems and produce a specification</li> <li>b) design effective solutions</li> <li>c) select and use appropriate application software</li> <li>d) test and implement an effective ICT-related system</li> <li>e) document specifications and solutions</li> <li>f) evaluate solutions and their own performance.</li> </ul>

## A2 performance descriptions for Information and Communication Technology

	Assessment Objective 1	Assessment Objective 2
Assessment objectives	<p><b>Candidates should be able to demonstrate knowledge and understanding of:</b></p> <ul style="list-style-type: none"> <li>the characteristics of data and information, and the need for their organisation and manipulation to facilitate effective use</li> <li>the use of ICT for a range of purposes</li> <li>the influence of social, cultural, legal, technical, ethical, economic and environmental considerations on the use of ICT</li> <li>the consequences of using ICT for individuals, organisations and society</li> <li>the components, characteristics and functions of ICT systems (including hardware, software and communication) which allow effective solutions to be achieved</li> <li>the systematic development of high quality ICT-related solutions to problems</li> <li>emerging technologies and their implications for future use of ICT.</li> </ul>	<p><b>Candidates should be able to:</b></p> <ul style="list-style-type: none"> <li>investigate and analyse problems and produce a specification</li> <li>design effective solutions</li> <li>select and use appropriate application software</li> <li>test and implement an effective ICT-related system</li> <li>document specifications and solutions</li> <li>evaluate solutions and their own performance.</li> </ul>
A/B boundary performance descriptions	<p><b>Candidates characteristically demonstrate:</b></p> <ol style="list-style-type: none"> <li>clear understanding of the characteristics of data and information</li> <li>a thorough understanding of the need for organisation of data and information to facilitate effective use</li> <li>a thorough knowledge of how ICT is used for a wide range of purposes</li> <li>an in-depth understanding of how social, cultural, legal, technical, ethical, economic and environmental considerations affect the use of ICT</li> <li>a full understanding of the consequences of the use of ICT on society, individuals and organisations</li> <li>an in-depth knowledge of the characteristics and functions of the hardware components and application software which make up an ICT system and how these are used to provide effective ICT solutions</li> <li>a clear understanding of the communications systems that support ICT use</li> <li>a full understanding of the systematic approach required to develop high quality ICT solutions to problems</li> <li>a comprehensive understanding of the development of ICT technologies and the implications of emerging technologies for the future use of ICT.</li> </ol>	<p><b>Candidates characteristically demonstrate:</b></p> <ol style="list-style-type: none"> <li>the ability to use subject-specific terminology appropriately and accurately</li> <li>the ability to analyse a complex problem and produce a detailed specification</li> <li>the ability to design an effective and efficient solution, with clear and detailed documentation</li> <li>the selection and use of appropriate software, using advanced features, to implement an effective solution</li> <li>the ability to design and implement a rigorous testing strategy using evaluation skills which analyse in depth their own performance and that of their solution.</li> </ol>

	Assessment Objective 1	Assessment Objective 2
E/U boundary performance descriptions	<p><b>Candidates characteristically demonstrate:</b></p> <ul style="list-style-type: none"> <li>a) some understanding of the characteristics of data and information</li> <li>b) a basic understanding of the need for organisation of data and information to facilitate effective use</li> <li>c) a basic knowledge of how ICT is used for a range of purposes</li> <li>d) a superficial understanding of how social, cultural, legal, technical, ethical, economic and environmental considerations affect the use of ICT</li> <li>e) a basic understanding of the consequences of the use of ICT on society, individuals and organisations</li> <li>f) a basic knowledge of the characteristics and functions of the hardware components and application software which make up an ICT system and how these are used to provide effective ICT solutions</li> <li>g) a basic understanding of the communications systems that support ICT use</li> <li>h) a basic understanding of the systematic approach required to develop ICT solutions to problems.</li> <li>i) a basic understanding of the development of ICT technologies and the implications of emerging technologies for the future use of ICT.</li> </ul>	<p><b>Candidates characteristically demonstrate:</b></p> <ul style="list-style-type: none"> <li>a) a basic use of subject-specific terminology appropriately and accurately</li> <li>b) the ability to analyse a problem and draw up a basic specification</li> <li>c) the ability to design a solution with basic documentation</li> <li>d) the ability to select appropriate software with which to produce a solution and justify their choice to some extent</li> <li>e) the use of appropriate features of application software to implement working solutions</li> <li>f) the ability to design and implement a limited testing strategy</li> <li>g) evaluation skills which analyse both their own performance and that of their solution.</li> </ul>

## Synoptic assessment

Synoptic assessment draws on both Assessment Objectives and will test candidates' understanding of the connection between different elements of the subject. The statements within the Assessment Objectives contain an element of synoptic assessment.

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## B Spiritual, Moral, Ethical, Social and other Issues

### 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.

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## C Overlaps with other Qualifications

A list of titles of the AQA compulsory and optional units for the GCE in Applied ICT is given below. There are links between the GCE specifications and several of these units both at AS and A2. Further details are given in the AQA specification support material.

### Compulsory Units AS

- 1 ICT in Society
- 2 ICT and Organisations
- 3 Data Handling
- 4 ICT Solutions

### Optional Units AS

- 5 Fundamentals of Programming
- 6 Computer Artwork
- 7 Creating a Website

### Compulsory Units A2

- 8 Project Management
- 9 Software Development
- 10 Advanced Spreadsheet Design

### Optional Units A2

- 11 Communications and Networks
- 12 Publishing
- 13 Systems Analysis
- 14 Interactive Multimedia
- 15 Supporting ICT users



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## 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 Technology.

The units for 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, but they do not form part of the Key Skills Qualification.

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 GCE Information and Communication Technology can be offered opportunities to develop and generate evidence of attainment in aspects of the Key Skills of:

- Communication
- Application of Number
- Information 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 the units, are signposted on the next page.

The above information is given in the context of the knowledge that Key Skills at level 3 will be available until 2010 with last certification in 2012.

Key Skills Qualifications of Communication, Application of Number and Information and Communication Technology will be phased out and replaced by Functional Skills qualifications in English, Mathematics and ICT from September 2010 onwards. For further information see the AQA website:

**<http://web.aqa.org.uk/qual/keyskills/com04.php>**

## Key Skills Opportunities in GCE Information and Communication Technology

	Unit 1	Unit 2	Unit 3	Unit 4
<b>Communication</b>				
C3.1a	✓	✓	✓	✓
C3.1b	✓	✓	✓	✓
C3.2	✓	✓	✓	✓
C3.3	✓	✓	✓	✓
<b>Application of Number</b>				
N3.1	✓	✓	✓	✓
N3.2	✓	✓	✓	✓
N3.3	✓	✓	✓	✓
<b>Information Technology</b>				
ICT3.1	✓	✓	✓	✓
ICT3.2	✓	✓	✓	✓
ICT3.3	✓	✓	✓	✓
<b>Working With Others</b>				
WO3.1	✓	✓	✓	✓
WO3.2	✓	✓	✓	✓
WO3.3	✓	✓	✓	✓
<b>Improving Own Learning and Performance</b>				
LP3.1	✓	✓	✓	✓
LP3.2	✓	✓	✓	✓
LP3.3	✓	✓	✓	✓
<b>Problem Solving</b>				
PS3.1	✓	✓	✓	✓
PS3.2	✓	✓	✓	✓
PS3.3	✓	✓	✓	✓



## GCE Information and Communication Technology (2520) 2009 onwards

Qualification Accreditation Number: AS 500/2437/1 - A Level 500/2349/4

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