



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Information and Communication Technology 5521/6521 2008

Material accompanying this Specification

- Reports on the Examination
- Teachers' Guide

SPECIFICATION

This specification will be published annually on the AQA Website (www.aqa.org.uk). If there are any changes to the specification centres will be notified in print as well as on the Website. The version on the Website is the definitive version of the specification.

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Contents

Background Information

1	Advanced Subsidiary and Advanced Level Specifications	5
2	Specification at a Glance	6
3	Availability of Assessment Units and Entry Details	7

Scheme of Assessment

4	Introduction	9
5	Aims	10
6	Assessment Objectives	11
7	Scheme of Assessment – <i>Advanced Subsidiary (AS)</i>	13
8	Scheme of Assessment – <i>Advanced Level (AS+A2)</i>	14

Subject Content

9	Summary of Subject Content	16
10	AS Module 1 – Information: Nature, Role and Context	17
11	AS Module 2 – Information: Management and Manipulation	20
12	AS Module 3 – Coursework: The Use of Generic Application Software for Task Solution	23
13	A2 Module 4 – Information Systems within Organisations	25
14	A2 Module 5 – Information: Policy, Strategy and Systems	29
15	A2 Module 6 – Coursework: Use of Information Systems for Problem Solving	32

Key Skills and Other Issues

- | | | |
|----|---|----|
| 16 | Key Skills – Teaching, Developing and Providing Opportunities for Generating Evidence | 35 |
| 17 | Spiritual, Moral, Ethical, Social, Cultural and Other Issues | 38 |

Centre-Assessed Component

- | | | |
|----|---|----|
| 18 | Nature of Centre-Assessed Component | 39 |
| 19 | Guidance on Setting Centre-Assessed Component | 40 |
| 20 | Assessment Criteria | 44 |
| 21 | Supervision and Authentication | 55 |
| 22 | Standardisation | 56 |
| 23 | Administrative Procedures | 57 |
| 24 | Moderation | 59 |

Awarding and Reporting

- | | | |
|----|---------------------------------|----|
| 25 | Grading, Shelf-Life and Re-Sits | 60 |
|----|---------------------------------|----|

Appendices

- | | | |
|---|------------------------------------|----|
| A | Grade Descriptions | 61 |
| B | Candidate Record Forms | 63 |
| C | Centre Declaration Sheet | 67 |
| D | Project Advice Form | 68 |
| E | Overlaps with Other Qualifications | 69 |

Background Information

1

Advanced Subsidiary and Advanced Level Specifications

1.1 Advanced Subsidiary (AS)

Advanced Subsidiary courses were introduced in September 2000 for the award of the first qualification in August 2001. They may be used in one of two ways:

- as a final qualification, allowing candidates to broaden their studies and to defer decisions about specialism;
- as the first half (50%) of an Advanced Level qualification, which must be completed before an Advanced Level award can be made.

Advanced Subsidiary is designed to provide an appropriate assessment of knowledge, understanding and skills expected of candidates who have completed the first half of a full Advanced Level qualification. The level of demand of the AS examination is that expected of candidates half-way through a full Advanced Level course of study.

1.2 Advanced Level (AS+A2)

The Advanced Level examination is in two parts:

- Advanced Subsidiary (AS) - 50% of the total award;
- a second examination, called A2 - 50% of the total award.

Most Advanced Subsidiary and Advanced Level courses are modular. The AS comprises three teaching and learning modules and the A2 comprises a further three teaching and learning modules. Each teaching and learning module is normally assessed through an associated assessment unit. The specification gives details of the relationship between the modules and assessment units.

With the two-part design of Advanced Level courses, centres may devise an assessment schedule to meet their own and candidates' needs. For example:

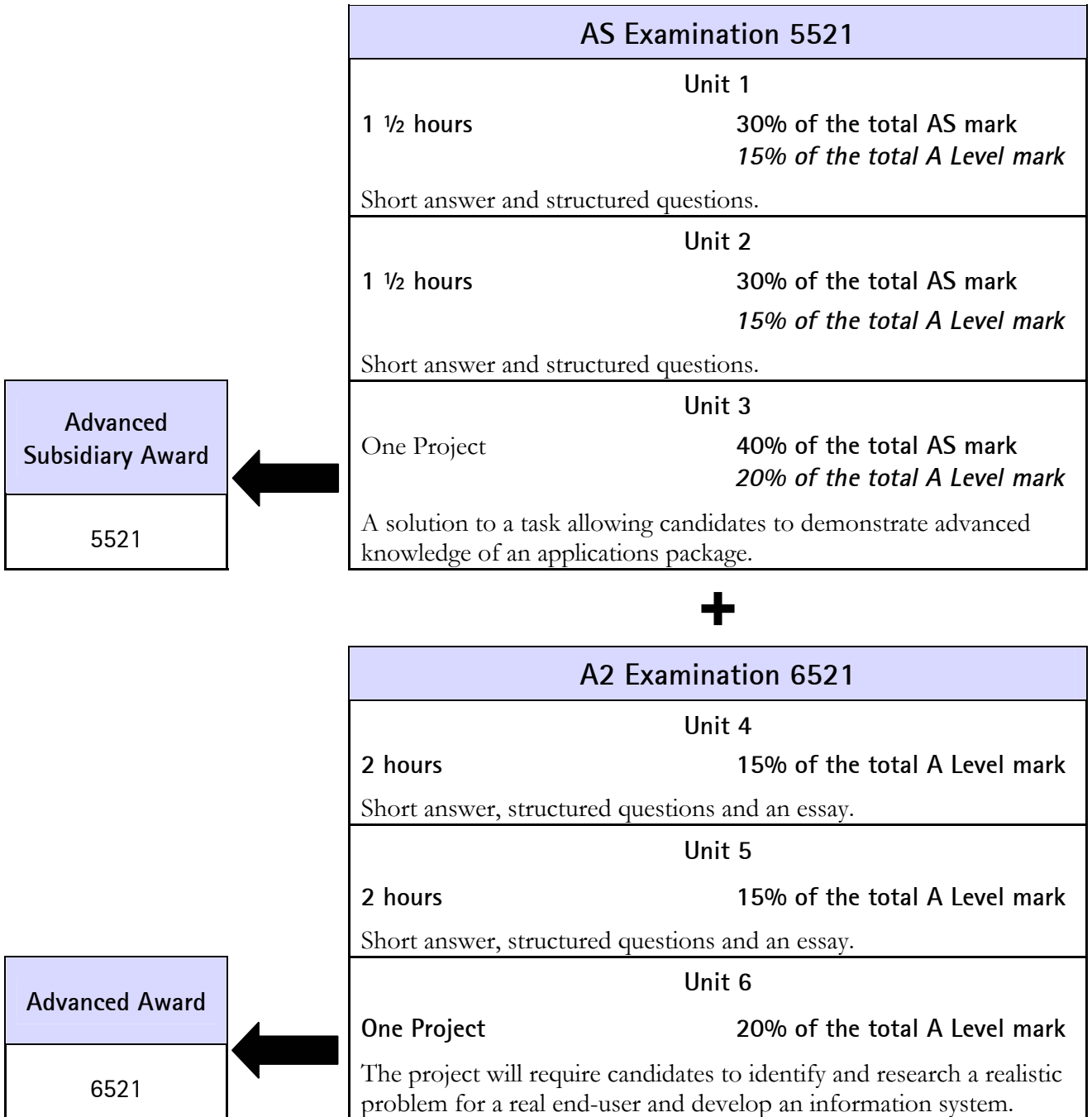
- assessment units may be taken at stages throughout the course, at the end of each year or at the end of the total course;
- AS may be completed at the end of one year and A2 by the end of the second year;
- AS and A2 may be completed at the end of the same year.

Details of the availability of the assessment units for each specification are provided in Section 3.

2

Specification at a Glance

Information and Communication Technology



3

Availability of Assessment Units and Entry Details

3.1 Availability of Assessment Units

Examinations based on this specification are available as follows:

	Availability of Units		Availability of Qualification	
	AS	A2	AS	A Level
June	1, 2 and 3	4, 5 and 6	✓	✓
January	1, 2 and 3	4, 5 and 6	✓	✓

3.2 Sequencing of Units

It is expected that candidates will do 1, 2 and 3 before 4, 5 and 6.

3.3 Entry Codes

Normal entry requirements apply, but the following information should be noted.

The following unit entry codes should be used:

AS	A2
Unit 1 - ICT1	Unit 4 - ICT4
Unit 2 - ICT2	Unit 5 - ICT5
Unit 3 - ICT3	Unit 6 - ICT6

The **Subject Code** for entry to the AS only award is 5521.

The **Subject Code** for entry to the Advanced Level award is 6521.

3.4 Private Candidates

This specification is only available for candidates who attend an AQA centre that will supervise the coursework for units 3 and 6. Private candidates should write to the AQA for a copy of '*Supplementary Guidance for Private Candidates*'.

3.5 Access Arrangements and Special Consideration

AQA pays due regard to the provisions of the Disability Discrimination Act 1995 in its administration of this specification.

Arrangements may be made to enable candidates with disabilities or other difficulties to access the assessment. An example of an access arrangement is the production of a Braille paper for a candidate with a visual impairment. Special consideration may be requested for candidates whose work has been affected by illness or other exceptional circumstances.

Further details can be found in the Joint Council for Qualifications (JCQ) document:

*Access Arrangements and Special Consideration
Regulations and Guidance Relating to Candidates who are Eligible for
Adjustments in Examination
GCE, AEA, VCE, GCSE, GNVQ, Entry Level & Key Skills*

This document can be viewed via the AQA web site (www.aqa.org.uk)

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

Scheme of Assessment

4

Introduction

4.1 Rationale

The specification is not required to include the A/AS Criteria in Computing.

Whilst Information and Communication Technology has many facets and pervades the whole curriculum, there emerges from the implementation of ICT systems in a range of applications, an appreciation of the approach, body of principles, knowledge and skills which constitute information and communications technology. An Advanced and Advanced Subsidiary specification has been developed that will be open to all students, of whatever discipline, who are capable of achieving an Advanced level standard. It uses a task driven approach to problem solving and decision making that relies on the effective use of information and communication technology systems enhancing the student's role as a communicator and adviser. The specification also extends the student's conception of the effects and limitations of information and communication technology and understanding of the new opportunities it can create within organisations and society. It is recommended that, wherever possible, teaching/learning strategies should be substantially achieved through the practical use of information and communication technology resources to perform useful tasks. This is carried through to the Scheme of Assessment where students will be required to utilise the full facilities of various packages and bring together their knowledge and skills to solve a real and realistic problem.

This qualification is a recognised part of the National Qualifications Framework. As such, AS and A Level provide progression from Key Stage 4, through post-16 studies and form the basis for entry to higher education or employment.

4.2 Structure of the Specification

The subject content has been arranged in two columns to show Topics and Amplification. The specification emphasises the nature of information, the use of information systems within organisations, the management of information and its uses in the policy and strategy of organisations. This, together with the practical skills developed in the coursework, provide an integrated course in Information and Communication Technology.

4.3 Prior level of attainment and recommended prior learning

The A/AS specifications in Information and Communication Technology have been developed to enable students who have followed a course in the National Curriculum Information Technology to continue their studies at a higher level. It could enhance career opportunities or provide a coherent, satisfying and worthwhile course of study for students who do not progress to further study in the subject.

5

Aims

The specification will aim to develop:

- a. problem-solving skills through the practical application of information and communication technology
- b. the ability to analyse, appraise and make critical judgements about the use of information and communication technology systems
- c. interpersonal skills necessary for communicating with others
- d. an understanding of the nature of information, its structure, application and implications of its use
- e. an awareness of the role of information technology in the management, manipulation and dissemination of information
- f. a broad and balanced view of the range of applications and information systems, an understanding of the capabilities and limitations, and the implications for their use
- g. an understanding of the role of people, technology and systems in organisations
- h. an awareness of the economic, social and ethical implications of the use of information technology systems.

6

Assessment Objectives

The following statements are intended to provide a general indication of the knowledge and abilities which the examination will be designed to test, in conjunction with the subject matter listed in the later sections.

6.1 Knowledge and Understanding

Candidates should be able to demonstrate, in context, a knowledge and understanding of :

- the nature and structure of information and explain how information and communication technology can be used to manage and manipulate that information
- the characteristics of information systems (hardware, software and communications) which allow effective solutions to be achieved
- the need for and the use of various forms of data organisation and processing to support the information requirements of a particular application
- the systematic development of quality solutions to problems and the techniques appropriate for implementing such solutions;
- the institutional, economic, legal, spiritual, moral, ethical and social consequences of current uses of information and communication technology
- the role of information and communications technology in organisations.

6.2 Skills

Candidates should be able to demonstrate, in the context of realistic situations, their ability to:

- identify needs, opportunities and potential benefits arising from the use of information and communication technology
- identify, as appropriate, an information technology solution to a problem and assess the value and effectiveness of the solution
- select and apply information technology techniques and tools appropriate for the solution of an identified problems
- test information technology solutions against appropriate criteria
- evaluate the applicability and suitability of the information technology techniques and tools deployed.

6.3 Quality of Written Communication

The quality of written communication is assessed in all assessment units where candidates are required to produce extended written material. Candidates will be assessed according to their ability to:

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

Specifically, written communication is assessed through coursework in both modules 3 and 6 and through specified questions in the written papers for modules 4 and 5. Written communication will not be assessed in modules 1 and 2.

The assessment of the quality of written communication is included in Assessment Objectives 6.1 and 6.2.

8

Scheme of Assessment – *Advanced Level (AS+A2)*

The Scheme of Assessment has a modular structure. The A Level award comprises three compulsory assessment units from the AS Scheme of Assessment and three compulsory assessment units from the A2 scheme of assessment.

8.1 AS Assessment Units

Unit 1 15% of the total A Level marks	Written Paper	1 ½ hours
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Unit 2 15% of the total A Level marks	Written Paper	1 ½ hours
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Unit 3 20% of the total A Level marks	Coursework 60 marks	
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8.2 A2 Assessment Units

Unit 4 <i>15% of the total A Level marks</i>	Written Paper	2 hours
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Short answer, structured questions and an essay assessing Module 4.

Unit 5 <i>15% of the total A Level marks</i>	Written Paper	2 hours
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Short answer, structured questions and an essay assessing Module 5.

Unit 6 <i>20% of the total A Level marks</i>	Coursework 90 marks	
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The project will require candidates to identify and research a realistic problem for a real end-user and develop an information system.

8.3 Synoptic Assessment

The Advanced Subsidiary and Advanced Criteria state that A Level specifications must include synoptic assessment (representing at least 20% of the total A Level marks).

Synoptic assessment draws on both Assessment Objectives and is designed to test candidates' understanding of the connections between different elements of the subject.

Synoptic assessment in Information and Communication Technology requires candidates to make connections between different areas of information and communication technology represented in the specification. In particular, candidates should be required to draw on:

- their knowledge and understanding of information, software, data handling, communications, applications and effects, when demonstrating the skills associated with analysis, design, implementation and evaluation of information technology-based systems
- their knowledge of communications, software and information when discussing the applications and effects of information and communication technology, e.g., drawing on their understanding of the characteristics of networks when discussing the economic, social, legal, ethical and other consequences of information and communication technology.

By the nature of the subject, the two Assessment Objectives are brought together in all components.

8.4 Weighting of Assessment Objectives for A Level

The approximate relationship between the relative percentage weighting of the Assessment Objectives (AOs) and the overall Scheme of Assessment is shown in the following table.

A Level Assessment Units (AS + A2)

Assessment Objectives	Unit Weightings (%)						Overall Weighting of AOs (%)
	1	2	3	4	5	6	
Knowledge and Understanding	12½	12½	5	12½	12½	5	60
Skills	2½	2½	15	2½	2½	15	40
Overall Weighting of Units (%)	15	15	20	15	15	20	100

Candidates' marks for each assessment unit are scaled to achieve the correct weightings.

Subject Content

9 Summary of Subject Content

9.1 AS Modules

MODULE 1 – Information: Nature Role and Context

MODULE 2 – Information : Management and Manipulation

MODULE 3 – Coursework: The Use of Generic Application Software for Task Solution

9.2 A2 Modules

MODULE 4 – Information Systems within Organisations

MODULE 5 – Information: Policy, Strategy and Systems

MODULE 6 – Coursework: Use of Information Systems for Problem Solving

AS Module 1

Information: Nature, Role and Context

10.1 Knowledge, Information and Data	<p>Understand the distinction between knowledge, information and data. Information has context and its meaning is determined by that context.</p> <p>Understand the nature of data, e.g. recorded facts, events or transactions.</p> <p>Understand the different ways in which data can arise: direct capture or as a by-product of another operation.</p> <p>Describe the effect of the quality of the data source on the information produced.</p> <p>Understand the need to encode information as data.</p> <p>Understand the problems associated with the coding of value judgements.</p>
10.2 Value and Importance of Information	<p>Understand that information is a commodity and as such, can have a monetary value, the level of which depends on its accuracy, its potential use and its particular intended use.</p> <p>Describe the overheads involved in ensuring that information is up-to-date and of use to an organisation/individual.</p>
10.3 Control of Information	<p>Describe the legal rights and obligations on holders of personal data to permit access.</p> <p>Understand that the sale of entitlement to access to data may mean paying for a more convenient form of access, the right of which already exists.</p> <p>Understand that files on individuals and on organisations that are non-disclosable have commercial value.</p>
10.4 Capabilities and Limitations of Information and Communication Technology	<p>Understand that ICT systems offer fast repetitive processing, vast storage capability and the facility to search and combine data in many different ways that would otherwise be impossible.</p> <p>Understand that the response speed of technology within ICT systems facilitates the use of feedback, e.g. maintenance of optimum stock levels, electronic fund/money management systems.</p> <p>Understand that there are limitations in the use of ICT systems and in the information they produce. Factors could include limitations in hardware, software and communications, in addition to inappropriate data models and data control mechanisms.</p>

10.5	The Social Impact of Information and Communication Technology	Explain the benefits and drawbacks of the use of information and communication technology in manufacturing, industry, commerce, medicine, the home, education and teleworking.
10.6	Role of Communication Systems	<p>Explain the use of global communications between single or multiple sources and recipients, including public networks such as the Internet.</p> <p>Describe the hardware, software and services required to access the Internet.</p> <p>Describe the facilities offered and the relative merits of: telephone, fax, e-mail, teleconferencing, viewdata, teletext, remote databases and other relevant communication systems.</p> <p>Explain the use of the Internet for a range of activities including communication, information searching and information publication.</p> <p>Candidates should be aware of the recent developments in the area of communication systems.</p>
10.7	Information and the Professional	Recall the personal qualities and general characteristics necessary for a person to work effectively within the ICT industry and as part of an ICT team.
10.8	Information Systems Malpractice and Crime	<p>Explain the consequences of malpractice and crime on information systems.</p> <p>Describe the possible weak points within information technology systems.</p> <p>Describe the measures that can be taken to protect information technology systems against internal and external threats.</p> <p>Describe the particular issues surrounding access to, and use of the Internet, e.g. censorship, security, ethics.</p>
10.9	The Legal Framework	<p>This section applies to current British legislation and its relationship to the Council of Europe Convention directives.</p>
	Software and data misuse	<p>Describe the provisions of the Computer Misuse Act.</p> <p>Describe the principles of software copyright and licensing agreements.</p>
	Data protection legislation	<p>Recall the nature, purpose and provisions of the current data protection legislation of the Public Register.</p> <p>Recall the type of data covered and various exemptions from the legislation.</p> <p>Recall the definitions of processing and consent to process.</p> <p>Explain how the requirements of the legislation impact on data collection and use.</p> <p>Describe the obligations of data users under the legislation.</p> <p>Recall the rights of individuals under the legislation.</p> <p>Recall the role of the Commissioner in encouraging good practice, acting as Ombudsman and enforcing legislation.</p>

Health and safety

Describe the provisions of the current health and safety legislation in relation to the use of information systems.

Recognise that health and safety guidelines cover the design and introduction of new software.

AS Module 2

Information : Management and Manipulation

11.1	Data Capture	<p>Describe methods of data capture and identify appropriate contexts for their use.</p> <p>Understand the concept of data encoding.</p>
11.2	Verification and Validation	<p>Understand the distinction between accuracy of information and validity of data.</p> <p>Explain possible sources and types of error in data capture, transcription, transmission and processing.</p> <p>Describe methods of preventing and reducing such errors.</p> <p>Describe appropriate validation techniques for the various stages within an ICT system, from data capture to report generation.</p>
11.3	Organisation of Data for Effective Retrieval	<p>Describe the nature and purpose of a relational database and how it works.</p> <p>Understand that data needs to be organised in a relational database to allow for effective updating and retrieval.</p> <p>Understand how data can be retrieved to produce meaningful information.</p> <p>Recall the relevant advantages of relational databases over flat file information storage and retrieval systems.</p> <p>Select and justify appropriate file and relational database structures for particular applications.</p>
11.4	Software: Nature, Capabilities and Limitations Nature and types of software	<p>Describe the need for interfacing with peripherals storage devices, input and output devices and display devices.</p> <p>Describe the need for printer and other peripheral drivers.</p> <p>Describe the distinction between systems software and applications software.</p> <p>Describe the purposes of operating systems.</p> <p>Describe the nature of package software, generic and specific, and of bespoke software.</p> <p>Describe the general characteristics of generic packages and the integration of objects and facilities for processing data protocols and standards.</p> <p>Describe the functionality offered by software which provides access to the Internet.</p>

Capabilities of software	Describe the desirable features of packages that would be appropriate to particular users and activities such as; links to other packages; search facilities; macro capabilities; application generators; editing capabilities; ability to change or extend data and record structures; short access times; data portability and upgrade paths.
Upgradeability	Explain the technical and human implications of package change/upgrade.
Reliability	Explain the difficulties of thoroughly testing complex software.
11.5 Manipulation and/or Processing	Describe the different modes of operation: batch, interactive, transaction and real-time, identifying appropriate contexts for use. Describe the characteristics of processing data in the form of text, pictures, numbers and sound.
11.6 Dissemination/Distribution	Describe the need for suitable output formats and orderings to communicate the results of data interrogation and undertake report generation.
11.7 Hardware: Nature, Capabilities and Limitations	Describe the broad characteristics, capabilities and limitations of current input, storage, communications, processing and output devices, identifying appropriate contexts for use by each device.
11.8 Security of Data	Understand the importance of, and the mechanisms for, maintaining data security, describing the distinction between security and privacy. Understand simple processes that protect the integrity of data against malicious or accidental alteration, e.g., standard clerical procedures, passwords, levels of permitted access, write protect mechanisms, backup procedures, restoration and recovery procedures.
Backup systems	Understand the need for regular and systematic backup and procedures for recovery.
11.9 Network Environments	Describe the characteristics and relative advantages of network and stand-alone environments. Describe the difference between a Local Area Network (LAN) and a Wide Area Network (WAN). Describe the required elements of network environments including hardware, software, communications and topology.

11.10 Human/Computer Interface

Understand the need to facilitate an effective dialogue between humans and machines.

Explain the need to design systems which are appropriate to users at all levels and in different environments, e.g. the impact of clarity of structure and layout.

Describe how the user-interface can be designed for effective communication with the user.

Describe the advantages of common user interfaces between different generic application packages.

Describe the advantages and limitations of a natural language interface.

AS Module 3

Coursework: The Use of Generic Application Software for Task Solution

For the AS Module 3, candidates will be required to undertake a project.

For this project the candidates will be expected to tackle a task-related problem which will have a limited scope and be self-contained. The solution is very likely to be based on the facilities of one piece of generic software but candidates are encouraged to use other software tools and objects as appropriate to complete the solution.

It is not within the spirit of this syllabus for candidates to use a stand-alone general purpose programming language.

The problems could be set by the candidates' teacher, who will then act as the end-user, or by a real end-user. To help with authentication of candidates' work, if the same problem is given to more than one candidate, it must be tailored individually by each candidate to allow for differentiated outcomes.

To gain high marks, candidates will be expected to provide a detailed solution specification. This solution should reflect the use of advanced generic and package specific skills. It is desirable that a project log be included so that candidates can show their approach to the solution and development of the solution, with regard to the use of alternative techniques and tools.

12.1 Process Skills

Develop generic and package-specific skills and apply as appropriate. Detailed advice can be found in the Teacher Support Booklet.

12.2 Specification

Produce a requirements specification for the identified problem, to match end-user needs.

State the input, processing and output needs to match the requirements specification.

Select and apply appropriate design tools and techniques.

Determine the test strategy and test plan for the solution. The test plan should include suggested test data.

12.3 Implementation

Make full and effective use of the chosen hardware and software facilities to develop and implement a design as an information technology solution.

Use appropriate data capture and validation procedures, data organisation methods, output contents and formats, operational procedures and user interface(s) when developing the IT solution.

Relate the solution to the capabilities of the available hardware, software and human resources and to the time constraints.

12.4 Testing

Test the implementation to ensure full compliance with the requirements specification.

Follow the test plan in a systematic manner using typical, erroneous and extreme (boundary) data. Annotate each test output, cross-referencing to the testing plan.

12.5 Evaluation

Assess the effectiveness of the solution in relation to the original requirements specification.

12.6 User Guide

Provide appropriate user documentation.

13

A2 Module 4

Information Systems within Organisations

13.1	Organisational Structure	Understand the basic concepts of organisational structure as they impact on/affect ICT systems.
13.2	Information Systems and Organisations	Understand the difference between an information system and a data processing system. Understand the role and relevance of an information system in aiding decision making.
	Definition of a management information system (MIS)	Recall that an MIS is a system to convert data from internal and external sources into information. This is communicated in an appropriate form to managers at different levels, enabling them to make effective decisions for planning, directing and controlling activities for which they are responsible.
	The development and life cycle of an information system	Recognise the existence of formal methods, the need for clear time scales, agreed deliverables and approval to proceed.
	Success or failure of a management information system	Understand the factors influencing the success or failure of an information system, e.g. inadequate analysis; lack of management involvement in design; emphasis on computer system; concentration on low-level data processing; lack of management knowledge of ICT systems and capabilities; inappropriate/excessive management demands; lack of teamwork; lack of professional standards.
13.3	Corporate Information Systems Strategy	Describe the factors influencing an information system within an organisation: organisation and functions of management, methods for planning and decision-making, legal and audit requirement, general organisation structure, responsibility for the information system within an organisation, information flow, hardware and software, standards and behavioural factors, e.g. personalities, motivation, ability to adapt to change.
	Information flow	Describe the methods and mechanisms of information flow within an organisation, both formal and informal, and the constraints imposed upon that flow by organisational structures.
	Personnel	Understand the levels of task/personnel within an organisation: strategic; implementation; operational. Relate the needs of these three levels to the information system.

13.4 Information and Data

Data

Understand that data may require translation or transcription prior to entry into the system. This can affect the accuracy of the data.

Discuss the impact of quantity and quality of data on the method of data capture together with the control and audit mechanisms required to manage data capture.

Information

Understand management information needs: the concept of relevance and methods of interpretation.

Understand that information has many characteristics and can be classified in many ways. Examples include:

Source - internal, external, primary, secondary

Nature - quantitative, qualitative, formal, informal

Level - strategic, tactical, operational

Time - historical, current, future

Frequency - real-time, hourly, daily, monthly

Use - planning, control, decision

Form - written, visual, aural, sensory

Type - disaggregated, aggregated, sampled.

Discuss the value of information in aiding the decision making process.

Understand the difference between internal and external information requirements.

Describe the characteristics of good information and delivery, e.g. relevant; accurate; complete; user confidence; to right person; at right time; in right detail; via correct channel of communication; understandable.

Describe the advantages and characteristics of good information within an applications context.

Effective presentation

Understand the effect that the method and style of presentation has upon the message/design in relation to the intended audience.

13.5 The Management of Change

Understand that the introduction or development of an information system will result in change which must be managed. Changes could occur in relation to re-skilling, attitude, organisational structure, employment pattern and conditions, internal procedures.

13.6 Legal Aspects

Understand the need for a corporate information system security policy and the rôle it would fill within an organisation. Factors could include prevention of misuse, detection, investigation, procedures, staff responsibilities, disciplinary procedures.

Describe the content of a corporate information system security policy.

Describe methods of improving awareness of security policy within an organisation, cross-referencing to training and standards.

Audit requirements	<p>Understand that many information systems are subject to audit.</p> <p>Understand the impact of audit on data and information control.</p> <p>Describe the need for audit and the role of audit management/software tools in information systems.</p> <p>Understand the function of audit trails and describe applications of use, e.g. ordering systems; student tracking; police vehicle enquiries.</p>
Disaster recovery management	<p>Describe the various potential threats to information systems, e.g. physical security; document security; personnel security; hardware security; communications security; software security.</p> <p>Understand the concept of risk analysis.</p> <p>Understand the commercial need to ensure that an information system is protected from threat.</p> <p>Describe a range of contingency plans to recover from disasters and relate these to identified threats.</p> <p>Describe the criteria used to select a contingency plan appropriate to the scale of an organisation and installation.</p>
Legislation	<p>Understand that implementation of legislation will impact on procedures within an organisation.</p> <p>Describe the methods of enforcing and controlling data protection legislation within an organisation.</p> <p>Describe the methods of enforcing and controlling software misuse legislation within an organisation.</p> <p>Describe the methods of enforcing and controlling health and safety legislation within an organisation.</p> <p>Discuss the implications of the various types of legislation.</p>

13.7 User Support

Describe the ways in which software houses provide user support, relating these to cost and package credibility.

Describe the range of user support options available with industry standard packages. These could include existing user base, support articles, utilities, specialist bulletin boards, communications systems, e.g. Internet; e-mail.

Select and justify an appropriate user support system for a particular context.

Explain the need for different levels of documentation related to user and task.

Training

Explain the need for different levels of training related to user and task.

Understand the need for continual skill updating and refreshing.

Describe the methods by which users can gain expertise in software use and discuss the relative merits.

Understand the need to develop training strategies to respond to growing user awareness.

13.8 Project Management and Effective ICT Teams

Understand why projects are often sub-divided into tasks and allocated to teams.

Describe the characteristics of a good team, e.g. leadership; appropriate allocation of tasks; adherence to standards; monitoring; costs; control.

13.9 Information and the Professional

Discuss the social, moral and ethical issues associated with the introduction and use of information and communication technology systems, which affect a professional working within the industry.

Understand that ‘codes of practice’ exist which are separate from any legal requirements with which professional organisations are expected to comply.

Understand the need for a code of practice for ICT users in an organisation.

Employee code of practice

Understand what is meant by an employee code of practice or acceptable use policy.

Describe the contents of such a code of practice e.g. responsibilities; authorisation; security; penalties for misuse.

A2 Module 5

Information: Policy, Strategy and Systems

14.1 Policy and Strategy Issues

Understand the need for an information technology policy.

Understand the strategic implications of software, hardware and configuration choices for an organisation.

Appreciate the range of needs of different users.

Methods of enhancing existing capabilities

Discuss the reasons why organisations may wish to upgrade hardware/software provision. Factors could include hardware/software development, organisation ethos, task driven change, software change.

Future proofing

Understand that hardware and software exists which allow packages to run on different platforms, and the advantages and disadvantages of these approaches.

Backup strategies

Describe the different options available for backup systems and understand the implications and limitations of use.

Understand the strategies for backup scheduling and storage of backups.

14.2 Software

Evaluation of software

Describe the mechanisms/procedures for software evaluation e.g. establish client/user needs, establish software capabilities and match.

Evaluation criteria

Understand the need for establishing evaluation criteria, to include;

agreed problem specification

functionality

performance – use of benchmarks

usability and human-machine interfaces

compatibility with existing software base

transferability of data

robustness

user support

resource requirements including hardware, software and human

upgradeability

portability

financial issues –

development cost

development opportunities.

Evaluation report	Understand the function of an evaluation report and know that the content will include: methodology used actual evaluation recommendations justification.
14.3 Database Management Concepts	Explain the purpose of a database management system (DBMS). Explain the role of the database administrator. Explain what is meant by data consistency, data integrity, data redundancy and data independence. Describe what is meant by entity relationships and data normalisation.
14.4 Communication and Information Systems	Describe the use of networked systems for various applications. Describe the network infrastructure required to support the World Wide Web e.g. the role of routers and servers.
Applications of communication and information systems	Select and justify an appropriate networked system for a particular application.
Distributed systems	Understand that distribution can apply to both data and control. Describe the uses of distributed databases and understand the advantages and limitations of such distribution.
Client/server systems	Describe the concept of a client/server database. Recall the relevant advantages of a client/server database over a non-client/server database.
14.5 Networks	
Network security, audit and accounting	Understand the particular security, audit and accounting problems associated with networks and recall the steps which can be taken to preserve security. Describe the measures taken to protect network traffic against illegal access. Understand the reasons for using audit software in providing a network service. Understand the reasons for using accounting software in providing a network service.
Network environments	Understand how a network environment affects the user interface provided, e.g. security, control of software, control of files, access rights.

14.6	Human/Computer Interaction	Describe the psychological factors that affect human/computer interaction, e.g. user friendly, give help to novices, provide short cuts for experts, make use of human long-term memory to maximise efficiency.
14.7	Human/Computer Interface	Recall different approaches to the problem of communication with ICT systems and discuss the resource implications of sophisticated HCI. Discuss the implications for customising software to develop a specialist HCI.
14.8	Software Development	Understand that there are different ways of providing software solutions to specialist applications, e.g. user written, internal development team/department, external software house to specification. Describe the possible criteria for selection of software solutions to specialist applications and the place within the corporate strategy.
14.9	Software Reliability	Describe methods of ensuring that software is reliable: α testing, β testing, agreements between software houses and purchaser for testing. Understand the reasons why fully-tested software may fail to operate successfully when implemented as part of an information technology system. Understand the need for maintenance release(s).
14.10	Portability of Data	<p>Protocols and standards Explain the need for portability of data, e.g. ease of transferring numerical, graphical and textual data between applications. Describe the need of standards for interchanging numerical, graphical and textual data between different hardware and software platforms.</p> <p>Communication standards Know of the existence, benefits and limitations of standards. Understand the protocols and addressing mechanisms used to support the World Wide Web.</p> <p>Emergence of standards Recognise the existence of de facto standards based on historic precedent and sales success in comparison to formal standards.</p>

A2 Module 6

Coursework: Use of Information Systems for Problem Solving

For the A2 Module 6, candidates will be required to undertake a project.

The project will require candidates to identify and research a realistic problem for which there must be a real end-user. (Candidates are not permitted to be their own end-user) The problem will be of a substantial nature and is intended to integrate the various skills and concepts developed during the course. The emphasis will be on the project being an open system of a cyclic nature, such as being repeated once a year or once an event. The solution is likely to involve the appropriate use of a range of advanced features and functionalities. It is possible that these may be provided by a suite of generic application software.

It is not within the spirit of this syllabus for candidates to use a stand-alone general purpose programming language.

To obtain high marks it is expected that the candidates' solution must accommodate the system's information flow and data dynamics. This might include data flows between packages, such as Dynamic Data Exchange. There is likely to be some consideration of initialising the system, clearing down data from the previous use, processing data, transferring data such as logging transactions and archiving data.

15.1 Analysis

Identify a real/realistic problem(s) for which an IT solution is appropriate and beneficial.

Analyse the current situation and identify any dissatisfaction with the system. For the current system identify the data flows and processing requirements.

Identify the problem's information flow and data dynamics, both in time, e.g. from one year end to the start of the next, and in processing.

Subdivide the problem into manageable tasks and integrate the tasks into a coherent system.

Produce a requirements specification for the identified tasks and the system as a whole; identify the precise needs of the users in relation to the identified tasks, i.e. derive the user and information requirements of a system considering the human aspects and physical environment.

Identify the users' current IT skill level and further training needs.

Determine evaluation criteria for the system.

15.2 Design

Derive the input, processing and output needs to match the requirements specification.

Divide the overall task into sub-tasks and schedule them.

Outline a solution in IT terms meeting the requirements specification of the identified sub-tasks.

Determine appropriate data capture and validation procedures, data organisation(s), output contents and formats, operational procedures and user interface(s) for the IT system.

Relate possible solutions to the capabilities of the available hardware, software and human resources.

Evaluate alternative IT strategies for meeting the requirements specification.

Justify the choice of hardware and software to be used.

Specify the financial and human implications of the proposed solution.

Document the design to provide a detailed system specification, suitable for a third party to implement the system.

Schedule the various stages of the implementation of the system.

Determine the test strategy, including identifying the test data, for the system.

15.3 Implementation and Testing

Make full and effective use of the chosen hardware and software facilities to implement the design.

Test the system with typical, extreme (boundary) and erroneous data to ensure full compliance with the requirements specification, documenting the results and fully annotating the test output.

Document the implementation stage in a technical manner that would be suitable for a maintenance developer.

15.4 User Guide

Provide an appropriate user guide including installation and backup procedures.

15.5 Evaluation

Produce an evaluation report. that applies the determined evaluation criteria to the solution to assess its compliance and its degree of effectiveness as a workable system.

Involve the end-user in the process.

15.6 Report

Produce a well-written project report to give an overview of the system and to enable the system to be used and maintained unaided.

Key Skills and Other Issues

16

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

16.1 Introduction

The Key Skills qualification requires candidates to demonstrate levels of achievement in the key skills of *Application of Number*, *Communication* 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.

Copies of the Key Skills Units may be downloaded from the QCA web site <http://www.qca.org.uk/keyskills>.

The units for each Key Skill comprise three sections:

- A What you need to know
- B What you must do
- C Guidance.

Candidates following a course of study based on this specification for 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* and *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 below. More specific guidance on integrating the delivery of key skills in courses based upon this specification is given in the AQA specification support material.

16.2 Key Skills Opportunities in Information and Communication Technology

The broad and multi-disciplinary nature of information and communication technology, that calls upon candidates’ abilities to demonstrate the transferability of their knowledge, understanding and skills, make it an ideal vehicle to assist candidates to develop their knowledge and understanding of the Key Skills and to produce evidence of their application. The matrices below signpost the opportunities for the acquisition, development and production of evidence for Part B of the Key Skills units at *Level 3*, in the

teaching and learning modules of this specification. The degree of opportunity in any one module will depend upon a number of centre-specific factors, including teaching strategies and level of resources.

Communication

What you must do:	Signposting of Opportunities for Generating Evidence in Modules					
	1	2	3	4	5	6
C3.1a Contribute to discussions	✓	✓	✓	✓	✓	✓
C3.1b Make a presentation	✓	✓	✓	✓	✓	✓
C3.2 Read and synthesise information	✓	✓	✓	✓	✓	✓
C3.3 Write different types of documents	✓	✓	✓	✓	✓	✓

Application of Number

What you must do:	Signposting of Opportunities for Generating Evidence in Modules					
	1	2	3	4	5	6
N3.1 Plan and interpret information			✓			✓
N3.2 Carry out multi-stage calculations			✓			✓
N3.3 Present findings, explain results and justify choice of methods			✓			✓

Information Technology

What you must do:	Signposting of Opportunities for Generating Evidence in Modules					
	1	2	3	4	5	6
IT3.1 Plan and use different sources to search for and select information	✓	✓	✓	✓	✓	✓
IT3.2 Explore, develop and exchange information, and derive new information	✓	✓	✓	✓	✓	✓
IT3.3 Present information including text, numbers and images	✓	✓	✓	✓	✓	✓

Working with Others

What you must do:	Signposting of Opportunities for Generating Evidence in Modules					
	1	2	3	4	5	6
WO3.1 Plan the activity			✓			✓
WO3.2 Work towards agreed objectives			✓			✓
WO3.3 Review the activity			✓			✓

Improving Own Learning and Performance

What you must do:	Signposting of Opportunities for Generating Evidence in Modules					
	1	2	3	4	5	6
LP3.1 Agree and plan targets			✓			✓
LP3.2 Seek feedback and support			✓			✓
LP3.3 Review progress			✓			✓

Problem Solving

What you must do:	Signposting of Opportunities for Generating Evidence in Modules					
	1	2	3	4	5	6
PS3.1 Recognise, explain and describe the problem			✓			✓
PS3.2 Generate and compare different ways of solving problems			✓			✓
PS3.3 Plan and implement options			✓			✓
PS3.4 Agree and review approaches to tackling problems			✓			✓

NB The signposting in the six tables above, represents opportunities to acquire and produce evidence of the key skills which are possible through the specification. There may be other opportunities to achieve these and other aspects of key skills via this specification, but such opportunities are dependent on the detailed course of study delivered within centres.

16.3 Key Skills in the Assessment of Information and Communication Technology

The key skills of *Application of Number*, *Communication and Information Technology* must contribute to the assessment of Information and Communication Technology. *Communication* is an intrinsic part of Assessment Objective 3. Aspects of *Application of Number* will form an intrinsic part of the assessment requirements for Modules 3 and 6. Both key skills will, therefore, be a part of the scheme of assessment of this specification.

16.4 Further Guidance

More specific guidance and examples of tasks that can provide evidence of single key skills or composite tasks that can provide evidence of more than one key skill are given in the AQA specification support material.

Spiritual, Moral, Ethical, Social, Cultural and Other Issues

17.1 Spiritual, Moral, Ethical, Social and Cultural Issues

The study of Information and Communication Technology can contribute to candidates' understanding of spiritual, moral, ethical, social and cultural issues. The specification provides opportunities for candidates to explore a wide range of these issues through their study in the theory modules.

Social impacts can be found specifically in AS Module 1, 10.5, AS Module 2, 11.10, A2 Module 4, 13.5, 13.9. Moral and ethical issues can be found specifically in AS Module 1, 10.8, A2 Module 4, 13.9.

17.2 European Dimension

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

Specifically the section of the legal framework in AS Module 1 specifies that candidates should be aware of the Council of Europe Convention directives.

17.3 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 papers.

17.4 Avoidance of Bias

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

Centre-Assessed Component

18

Nature of Centre-Assessed Component

18.1 AS Module 3 Coursework: Task Solution

Candidates will be required to undertake a project.

For this project candidates will be expected to tackle a task-related problem which will have limited scope and be self-contained. The solution is likely to be based on the facilities of one piece of generic software but candidates are encouraged to use other software tools and objects as appropriate to complete the solution.

It is not within the spirit of this specification for candidates to use a stand-alone general purpose programming language.

The problems could be set by the candidates' teacher, who will then act as the end-user, or by a real end-user. If the same problem is given to more than one candidate, it must be tailored individually by each candidate to allow for differentiated outcomes. This will also help teachers to authenticate the work of individual candidates.

To gain high marks, candidates will be expected to provide a detailed solution specification. This solution should reflect the use of advanced generic and package specific skills. It is desirable that a project log be included so that candidates can show their approach to the solution and the development of the solution.

18.2 A2 Module 6 Coursework: Use of Information Systems for Problem Solving

Candidates will be required to undertake a project.

The project will require candidates to identify and research a realistic problem for which there must be a real end-user. (The candidate is not permitted to be their own end-user) The problem will be of a substantial nature and is intended to integrate the various skills and concepts developed during the course. The emphasis will be on the project being an open system of a cyclic nature, such as being repeated once a year or once an event. The solution is likely to involve the appropriate use of a range of advanced features and functionalities. It is possible that these may be provided by a suite of generic application software.

It is not within the spirit of this specification for a candidate to use a stand-alone general purpose programming language.

To obtain high marks, it is expected that the candidate's solution must accommodate the system's information flow and data dynamics. There is likely to be some consideration of initialising the system, clearing down data from the previous use, processing data, transferring data such as logging transactions and archiving data.

Guidance on Setting Centre-Assessed Component

19.1 AS Module 3 Coursework: Task Solution

In the AS Module 3 project, emphasis will be on the full exploitation of particular generic application software and the advanced facilities available within them. The project will be a self-contained problem. The emphasis in the project will be on the candidate's ability to produce a high quality implementation to the problem.

It is anticipated that teachers will introduce candidates to problem-solving techniques involving the use of a range of generic software facilities. These will include relational databases, spreadsheets, document processing, desk top publishing, multi-media presentations and graphics packages. However, teachers may wish to introduce other types of software or packages and are encouraged to do so.

For successful completion of this module, candidates will be expected to devise and test a solution to a task-related problem that provides adequate scope for them to employ appropriate and advanced package skills. **The criteria are devised so as to genuinely create an opportunity for candidates to learn and progress throughout the duration of the project rather than only provide an assessment point at the end of the module.** The standards expected from this project are to be maintained, but the software tools for completion of the work are not restricted to a single package. Candidates should focus on the issue of “appropriate tools for the task”. If that requires the use of facilities from two or more generic packages, then that is deemed to be wholly appropriate.

In the marking criteria, great emphasis has been placed on the issue of planning for testing, the methods of completing this testing and assessment of results. While the main focus remains on the acquisition and use of software skills, candidates are required to show an appreciation of whether their solution is appropriate in the context of the problem and for the IT solution as a whole.

In completing a project, candidates will be required to undertake the following processes:

the definition of a problem in information technology terms

the derivation or specification of information technology tasks

the completion of appropriate design work from which to implement the solution

the determination of a schedule of activities

the determination of a plan for testing, which should be clearly documented

the implementation and testing of a solution, which will involve the use of advanced functionalities of the package(s) in the most efficient way to achieve the desired results

Specification

evaluation of the solution against the requirements of any potential user.

Candidates are required to provide a written commentary of these processes in document form.

The following comments on the method of assessment should be read with reference to the module specification and the assessment criteria.

From a clear statement of the problem to be solved, with background information, there should be an appropriate specification given. This specification, depending on the problem area, should reflect the end-user's requirements of the solution, the desired outcomes (as an implementation free specification) and any constraints or limitations on the development of the solution, e.g. human and physical resources.

The input, processing and output needs which match the requirements specification, must be clearly stated, although the format of this section will vary according to the software solution available. For example, a database solution will need a database design from which to complete the project.

Before implementation, the candidate should produce an appropriate test strategy. This should address the elements which need to be completed as progress is made towards the solution, the type of test to be carried out and the desired outcome from which success or otherwise can be measured.

In addition, an effective and full testing plan should be devised. The testing plan should include, for each element, the test data to be used, the reasons why this data has been selected and the expected outcomes.

From this section, the candidate is expected to have a clear understanding of the exact nature of the problem to be solved and the steps that will be needed to achieve the solution. The candidate should be aware of the need for testing, be able to select appropriate tests for the various stages and be clear on the success criteria for those stages.

Implementation and testing

The ultimate goal of these sections is for candidates to produce an effective solution to a stated problem. The solution must satisfy the requirements specification and, specifically, be able to be operated in the proposed environment. The interface provided must map well to the skills of the intended end-user. It is expected that candidates will make sensible and appropriate use of data capture and validation procedures, data organisation methods, output contents and formats and user interfaces. This will, of course, be dependent upon the software selected and/or available for the completion of the solution.

It is very much in the spirit of this specification that candidates implement and test in a modular fashion. The evidence for this aspect, and that of the Testing section, may well be presented together. Candidates are expected to consider the limitations not only of the whole solution, but also of individual aspects. They can gain further credit by identifying improvements and designing new test criteria, implementing and testing again as the project develops.

For example, on completion of part of a project where data is input, it may become apparent that validation is needed where none was previously considered. Further credit is then available if the candidate corrects this omission, implementing an improved version and making appropriate tests.

This approach is designed to be more conducive to candidates' learning throughout the duration of the coursework, whilst still providing an appropriate form of assessment.

Documentation is expected on the implementation work which has been completed, which will contribute to the assessment of whether the candidate fully employed package specific skills in an effective and appropriate manner. Also, that the selections of the chosen hardware and software facilities have been fully justified in relation to the solution developed. The project log recommended in the specification for Module 3 is expected to contribute towards the evidence for this aspect.

The results of any testing activities should be fully documented, with hard copy evidence available. Where practicable this should be cross-referenced to the original test plans.

Evaluation

A written evaluation is expected at the conclusion of the project. This should reflect the candidate's own awareness of the effectiveness of their solution in meeting the initial requirements specification. The candidate, regardless of success, is expected to show an awareness of the criteria for a successful information technology solution and to be able to identify how well their solution maps to the selected criteria. This assessment should discuss any remaining limitations of the solution and the reasons for those constraints.

User guide

The candidate is expected to produce extensive user documentation which is appropriate for the solution. Similar documentation is also required for the hardware and software available. This may include on-line help in some format, in addition to paper-based user guides and manuals.

It should cover all aspects relevant to the solution, but it is also expected that this will always include normal operation of the software solution, with solutions for common problems that have been found to occur. The material presented should always be appropriate to the needs of the end-user, regardless of the nature of the user guides or help provided.

19.2 A2 Module 6
Coursework: Use of
Information Systems for
Problem Solving

The project will be assessed at the end of the course. This will involve the candidate identifying a problem which requires information technology tools and techniques for its possible solution, then their selecting the appropriate tool or tools for the solution of the problem.

The emphasis in the project will be on candidates' ability to produce high quality analysis and design and to then document the solution in a comprehensive manner.

It is expected that candidates will carry out the following stages in the work:

- identify and research a real and realistic problem to determine the client's requirements and to then identify the role of the information technology in meeting these requirements.
- produce an agreed requirement specification
- analyse the problem and design an appropriate solution
- implement, test and document the chosen solution
- produce an appropriate user guide, including installation and backup procedures
- evaluate the chosen solution
- compile an ongoing record, giving reasons for each decision made.

Candidates should be encouraged to make their own choice of project.

Proposals for projects, after initial approval by the teacher responsible for the supervision of work, may be submitted to the Board for comment and guidance. The facility is provided by the Board so as to reduce the possibility of candidates embarking on projects that are unlikely to provide access to the full range of marks available. Centres are encouraged to make use of this facility, since it disciplines the candidate to focus on the required level of detail. An example of a *Project Advice Form* is provided in Appendix D.

Candidates are required to write a report on their project. This written report should not exceed 4000 words in length, excluding diagrams and annotated printouts. This should not be regarded as a rigid limitation.

The work must not be submitted on disk.

Assessment Criteria

20.1 Introduction

Assessment of project work

It is necessary to provide a structure for the assessment of project work so that all teachers are, in general, following a common procedure. Such a procedure will assist with the standardisation of assessment from centre to centre. Each project is, therefore, to be assessed in accordance with the criteria set out below. In assessing candidates, centres must ensure that comparable standards are observed between different teaching groups. Each centre must produce a single order of merit for the centre as a whole.

20.2 Criteria for the Assessment of Unit 3

The following categories are to be used in the assessment of the project. The criteria for marking these categories are listed below. The project is marked out of a total of 60.

Specification	13 marks
Implementation	20 marks
Testing	12 marks
Evaluation	6 marks
User Documentation	9 marks
Total	60 marks.

Specification (13 marks)

- 11-13 A detailed requirements specification has been produced for the identified problem, which matches the needs of the stated end-user(s).
The input, processing and output needs, which match the requirements specification, are clearly stated.
Effective designs have been completed which would enable an independent third party to implement the solution.
An appropriate test strategy has been determined. An effective test and full testing plan has been devised. The testing plan includes the test data, expected outcomes and directly relates to the requirements specification.
- 8-10 A requirements specification has been produced for the identified problem, which matches the needs of the stated end-user(s).
The input, processing and output needs, which match the requirements specification, are stated.
Designs have been completed but lack detail, thereby preventing an independent third party implementation of the solution, or are inefficient in relation to the problem stated.
A test strategy has been determined and testing plans have been devised which are limited in scope or do not relate to the requirements specification stated.

4-7 A requirements specification has been produced for the identified problem, but does not fully match the needs of the stated end-user(s), or lacks detail and clarity.

The input, processing and output needs are stated, but do not fully match the requirements' specification or are unclear.

Design work has been attempted but is incomplete and does not reflect an efficient solution to the problem stated.

A test strategy has been determined but is either incomplete or does not relate to the requirements specification stated. The testing plan is either vague or has been omitted.

1-3 The requirements specification is vague or has been omitted.

The input, processing and output needs are only vaguely considered or have been omitted.

There is little or no effort on design.

The test strategy and testing plan are vague or missing.

0 The candidate has produced no work.

Implementation (20 marks)

16-20 An effective solution has been developed which is operable in the proposed environment by the intended end-user.

Appropriate data capture and validation procedures, data organisation methods, output contents and formats and user interface(s) have been used.

Generic and package specific skills have been fully employed in an effective and appropriate manner.

The selection of the chosen hardware and software facilities has been fully justified in relation to the solution developed.

11-15 A solution has been developed which is operable in the proposed environment by the intended end-user, but which has some inefficiencies.

There is evidence of the use of some appropriate data capture and validation procedures, data organisation methods, output contents and formats and user interface(s).

Generic and package specific skills have been employed, but not always in an effective and appropriate manner.

The selection of some of the chosen hardware and software facilities has been justified in relation to the solution developed.

6-10 A partial solution has been developed, but those aspects completed are useable by the intended end-user.

There is some evidence of the use of some data capture and validation procedures, data organisation methods, output contents and formats and user interface(s).

Some generic and package specific skills have been employed, but not always in an effective and appropriate manner.

The selection of some of the chosen hardware and software facilities has been only vaguely justified in relation to the solution developed.

- 1-5 A solution has been developed which is very limited and not practically operable in the proposed environment by the intended end-user.
- Few, if any, data capture and validation procedures, data organisation methods, output contents and formats and user interface(s) have been used.
- The generic and package specific skills used are simplistic and/or were not always applied appropriately.
- The selection of the chosen hardware and software facilities are not justified in relation to the solution developed.
- 0 The candidate has not implemented the system.

Testing (12 marks)

- 9-12 The test strategy and test plan previously devised have now been followed in a systematic manner, using typical, erroneous and extreme (boundary) data.
- The results of testing are fully documented, with outputs cross-referenced to the original plan.
- Corrective action taken due to test results is clearly documented.
- 5-8 The test strategy and plan devised have been followed in a systematic manner, but using only normal data.
- The results of testing are partially documented, with some evidence of outputs cross-referenced to the original plan.
- There is some evidence of corrective action taken in response to test results.
- 1-4 The test strategy and plan devised have been followed in a limited manner using only normal data.
- There is little or no documentation of the results of testing.
- There is little or no indication of corrective action required due to test results.
- 0 There is no evidence of testing.

Evaluation (6 marks)

- 4-6 The effectiveness of the solution in meeting the detailed requirements specification has been fully assessed, with the candidate showing full awareness of the criteria for a successful information technology solution. The limitations of the solution have been clearly identified.
- 1-3 The effectiveness of the solution in meeting the original requirements specifications has been partly assessed, with the candidate showing only partial awareness of the criteria for a successful information technology solution. The limitations of the solution are vague or have been omitted.
- 0 There is no evidence of evaluation.

User documentation
(9 marks)

- 7-9 There is extensive user documentation for the solution which covers all relevant aspects, including normal operation and common problems, and is appropriate to the needs of the end-user.
- 4-6 A user guide is included, which describes the functionality of the solution and is appropriate to the needs of the end-user.
- 1-3 A limited user guide is included which describes only the basic functionality of the solution.
- 0 There is no evidence of user documentation.

20.3 Criteria for the Assessment of Unit 6

As outlined in paragraph 20.1 above, it is expected that the teacher will be involved at various stages in the development of the candidate’s solution. However, in the award of marks, the teacher should attempt to solely assess the candidate’s contribution. In applying the criteria, account should be taken of the amount of assistance given. The criteria give scope for discriminating between candidates who tackled more demanding problems, compared to those who undertook problems of a less demanding nature. The following categories are to be used in the assessment of the project. The criteria for marking these categories are listed below. The project is marked out of a total of 90.

Analysis	18 marks
Design	16 marks
Implementation	15 marks
Testing	15 marks
User Guide	8 marks
Evaluation	10 marks
Report	8 marks
Total	90 marks

Analysis (18 marks)

15 – 18

The candidate has identified an appropriate problem in conjunction with their end-user and independently of the teacher.

A clear, statement covering both the context and the nature of the problem has been provided.

The candidate has clearly identified and delimited a substantial and realistic problem, recognising the requirements of the intended user(s) and the capabilities and limitations of the available resources.

All of the requirements are specified and clearly documented.

The candidate has fully identified the information flow and data dynamics of the problem.

The analysis indicates understanding of the full potential of the appropriate hardware and software facilities which are available and, as appropriate, the limitations.

The candidate has identified the user’s current IT skill level and training needs.

Qualitative and quantitative evaluation criteria have been identified in detail and analysis has been completed without undue assistance.

10 – 14

The candidate has identified an appropriate problem with reference to their end-user and independently of the teacher.

A clear outline statement covering both the context and the nature of the problem has been provided.

The candidate has identified a substantial problem, recognising many of the requirements of the intended users and many of the capabilities and limitations of the available resources.

The documentation is intelligible but is lacking in some respects.

The analysis indicates which software will be used, but may not make it clear how the software will be used.

The candidate has partly identified the information flow and data dynamics of the problem.

Reasonable evaluation criteria have been identified.

Some assistance has been required to reach this stage.

Alternatively, the candidate has identified a relatively straightforward problem and has proceeded unaided, covering most or all of the points required for 15-18 marks.

- 6 – 9 The candidate has required some guidance from the teacher to identify an appropriate problem with an end-user.

A simple outline statement has been provided.

The candidate has selected a substantial problem and attempted to identify many of the requirements of the intended users and many of the capabilities and limitations of the resources available but has required assistance in analysing the problem.

The candidate has identified only a limited subset of the information flow and data dynamics of the problem.

The documentation is available but is incomplete.

Alternatively, the candidate has identified a fairly simple problem and has recognised most of the requirements of the intended users and most of the capabilities and limitations of the resources available.

The candidate has required assistance to analyse the problem.

The documentation is complete in most respects.

- 3 – 5 The candidate required considerable guidance from the teacher to identify an appropriate problem with an end-user.

A superficial outline statement was provided.

The candidate has identified a fairly simple problem, recognising some of the requirements of the intended users and some of the capabilities and limitations of the available resources.

Few, if any, indications of what must be done to carry out the task are present.

There is little indication of how the software will be used.

The candidate has not identified the information flow and data dynamics of the problem.

Documentation is weak and incomplete.

The candidate has required much assistance in analysing the problem.

- 1 – 2 The candidate has identified a simple problem or been given a straightforward problem.
- There is only minimal recognition of either the requirements of the intended users or capabilities and limitations of the available resources
- The documentation is poor and substantial assistance has been required.
- 0 No analysis is present.

Generation of possible solutions and solution design

The design phase includes bringing together results of the analysis and gathering and ordering information related to the background of the problem, to then generate a range of possible solutions. This may be alternative types of package or alternative solutions within a package.

The solution design should be specified so that it can be implemented by a competent person. There should be a clear specification of how each sub-task identified in the analysis is to be solved.

The detailed design (16 marks)

- 13 – 16 A relevant range of appropriate approaches to a solution has been considered in detail. Compelling reasons for final choice of solution are given which have been fully justified and the likely effectiveness has been fully considered.
- A completely detailed solution has been specified so that it could be undertaken by a competent third party. The proposed solution has been clearly broken down into sub-tasks, with the necessary indications of how those are to be solved. All the requirements are specified and clearly documented.
- A well-defined schedule and work plan have been included, showing in detail how the task is to be undertaken. This explains what is required in a comprehensible manner – it can include layout sheets, record structures, spreadsheet plans, design for data-capture sheets, as appropriate.
- An effective and full testing plan has been devised, with a comprehensive selection of test data and reasons for the choice of the data clearly specified.
- This stage has been undertaken without assistance.
- 9 – 12 A relevant range of appropriate approaches to a solution has been considered. Reasons for final choice of solution are provided which have been justified and the likely effectiveness has been reasonably considered.
- A solution has been specified which a competent third party could carry out, but with some difficulty. The proposed solution is broken down into sub-tasks, with some indication of how those are to be solved. Some of the requirements are specified and clearly documented.

- A schedule and work plan has been included, showing how the tasks are to be undertaken. This explains what is required in a reasonable manner – it can include layout sheets, record structures, spreadsheet plans, design for data-capture sheets, as appropriate.
- A testing plan has been devised, with some test data clearly specified.
- This stage has been undertaken without undue assistance.
- 6 – 8 A limited range of approaches which may have required some assistance. The reasons given for the final choice are weak and the likely effectiveness has not been discussed in detail.
- Sufficient detail has been given so that the candidate, but not another person, can replicate the solution at a later date. An attempt has been made to break down the solution into sub-tasks, with some indications of how these are to be solved. The documentation is clear but lacking in some respects.
- A schedule and work plan are included but limited in nature.
- A testing plan is present.
- This has been undertaken without undue assistance.
- 3 – 5 Only one approach considered which may have required considerable assistance. Only vague reasons given for the final choice and the likely effectiveness has not been discussed.
- Sufficient detail has been given so that the candidate, but not another person, can replicate the solution at a later date, but with some difficulty. An attempt has been made to break down the solution into sub-tasks but with insufficient indications as to how those are to be solved. The documentation is lacking in many respects.
- A schedule and work plan should be included, but which are poorly thought out.
- A testing plan is included but is poor.
- Substantial assistance may have been required.
- 1 – 2 Little or no consideration has been given to approaches to the solution. No or invalid reasons given for final choice of solution.
- A superficial outline of the solution has been chosen so that the candidate is unable to replicate the solution at a later date. Little attempt has been made to break down the problem into sub-tasks. The schedule and work plan are vague or missing. The testing plan is vague or missing. The documentation is poor and substantial assistance may have been required.
- 0 No detail of chosen solution given.

Implementation (15 marks)

- 11 – 15 The candidate has fully implemented the detailed design unaided, in an efficient manner and with no obvious defects. All the appropriate facilities of the software and hardware available were fully exploited. The documentation is clear and thorough.
- 6 – 10 The candidate has implemented the essential elements of the design reasonably effectively and largely unaided. The implementation has exploited some of the relevant features of the software and hardware available. The documentation lacks detail or may have been omitted. Alternatively, the candidate has fully-implemented a simple design.
- 1 – 5 The design has been partially implemented. The implementation has exploited few relevant features of the software and hardware available. The documentation lacks detail or may have been omitted.
- 0 There is no implementation.

Testing (15 marks)

- 11 – 15 The candidate has shown insight in demonstrating effective test data to cover most or all eventualities. There is a clear evidence of full end-user involvement in testing. The system works with a full range of test data (typical, extreme, erroneous), the test outputs are fully annotated
- 6 – 10 The candidate has demonstrated a range of appropriate test data perhaps with some assistance. There is evidence of end-user involvement during testing. The system works with a limited range of test data, the tests outputs are annotated to a limited extent.
- 1 – 5 There is little evidence of testing. There has been only limited involvement of the end-user in testing. It does not meet the design specification.
- 0 There is no evidence of testing.

User guide (8 marks)

- 6 – 8 A comprehensive, well-illustrated user guide has been produced that deals with all aspects of the system (installation, backup procedures, general use and trouble shooting).
- 4 – 5 An illustrated user guide has been produced that deals with general use of the system, but only vaguely considers other areas required to gain 6 – 8 marks.
- 1 – 3 A user guide has been produced that deals with general use of the system.
- 0 There is no user guide.

Evaluation of the project
(10 marks)

- 9 – 10 The candidate has considered clearly a full range of qualitative and quantitative criteria for evaluating the solution. The candidate has fully evaluated his/her solution intelligently against the requirements of the user(s). Evidence of end-user involvement during this stage has been provided.
- 6 – 8 The candidate has discussed a range of relevant criteria for evaluating the solution. The candidate has evaluated his/her solution against the requirements of the user(s) in most respects. Some, but not all, performance indicators have been identified. Any modifications to meet possible major limitations and/or enhancements have been specified, maybe with assistance.
- 3 – 5 The system has only been partially evaluated against the original specification and the requirements of the user(s). This may be because the original specification was poor. Few, if any, performance indicators have been identified. Discussion concerning the limitations or enhancements to the system have largely been omitted or have required some prompting.
- 1 – 2 Little attempt at evaluation has been made. No performance indicators have been identified. Discussion concerning the limitations or enhancements to the system have been omitted or are limited and have required considerable prompting.
- 0 No attempt at evaluation has been made.

Preparation of the report
(8 marks)

- 7 – 8 A well-written, fully illustrated and organised report has been produced. It describes the project accurately and concisely.
- 5 – 6 A well-written report has been produced, but lacks good organisation. Alternatively a well-organised report has been produced which is of limited quality.
- 3 – 4 The report is of generally poor quality but shows some evidence of organisation. There has been a number of deficiencies and omissions.
- 1 – 2 The report has been poorly organised and presented with few or no diagrams. There has been a considerable number of omissions.
- 0 No report is present.

20.4 Evidence to Support the Award of Marks

Coursework must be presented in a clear and helpful way for the moderator. The work must be annotated to identify, as precisely as possible, where the relevant assessment criteria have been satisfied so that the reasons for the award of marks are clear. An indication must also be given at the appropriate point in the work, or in accompanying information, of any further guidance given by the teacher (or other person) which may have significant assessment implications.

During the course, teachers should keep records of their assessments in a form which facilitates the complete and accurate submission of the final assessments on completion of the course.

When the assessments are complete, the final marks awarded under each of the assessment criteria must be entered on the *Candidate Record Form*, with supporting information given in the spaces provided. A specimen *Candidate Record Form* appears as Appendix B; the exact design may be modified before the operational version is issued.

A *Candidate Record Form* must be attached to each candidate's work.

21

Supervision and Authentication

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- 21.1 **Supervision of Candidates' Work** Candidates' work for assessment must be undertaken under conditions which allow the teacher to supervise and authenticate the work. If it is necessary for some assessed work to be done outside the centre, sufficient work must take place under direct supervision to enable the teacher to authenticate each candidate's whole work with confidence.
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- 21.2 **Guidance by the Teacher** The work assessed must be solely that of the candidate concerned. Any assistance given to an individual candidate beyond that given to the group as a whole, must be recorded on the *Candidate Record Form*.
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- 21.3 **Unfair Practice** At the start of the course, the supervising teacher is responsible for informing candidates of the AQA Regulations concerning malpractice. Candidates must not take part in any unfair practice in the preparation of coursework to be submitted for assessment. They must understand that to present material copied directly from books or other sources without acknowledgement will be regarded as deliberate deception. Centres must report suspected malpractice to AQA. The penalties for malpractice are set out in the AQA Regulations.
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- 21.4 **Authentication of Candidates' Work** Both candidate and teacher are required to sign declaration confirming that the work submitted for assessment is solely that of the candidate. The teacher declares that the work was conducted under the specified conditions and records details of any additional assistance.
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Standardisation

22.1 Standardisation Meetings

Annual standardising meetings will usually be held in the autumn term. Centres entering candidates for the first time must send a representative to the meetings. Attendance is also mandatory in the following cases:

- where there has been a serious misinterpretation of the specification requirements
- where the nature of coursework tasks set by a centre has been inappropriate
- where a significant adjustment has been made to a centre's marks in the previous year's examination.

Otherwise attendance is at the discretion of centres. At these meetings, support will be provided for centres in the development of appropriate coursework tasks and assessment procedures.

22.2 Internal Standardisation of Marking

The centre is required to standardise the assessments across different teachers and teaching groups in order to ensure that all candidates at the centre have been assessed against the same standards. If two or more teachers are involved in marking a component, one teacher must be designated as responsible for internal standardisation. Common pieces of work must be marked on a trial basis. Differences between assessments should be discussed at a training session in which all teachers involved must participate. The teacher responsible for standardising the marking must ensure that the training includes the use of reference and archive materials, such as work from a previous year or examples provided by AQA. The centre is required to send the moderator the *Centre Declaration Sheet*, (Appendix C) confirming that the marking of centre-assessed work has been standardised. If only one teacher has undertaken the marking, that person must sign that form.

Administrative Procedures

23.1 Recording Assessments

The candidates' work must be marked according to the assessment criteria set out in Sections 20.2 and 20.3. The marks and supporting information must be recorded in accordance with the instructions in Section 20.4. The completed *Candidate Record Form* for each candidate must be attached to the work and made available to AQA on request.

The teacher should record on the *Candidate Record Form* the nature of any assistance given to candidates and to what extent the project actually works.

At the beginning of the course, centres must inform AQA on Form A (*Early Information*) of the approximate number of candidates to be entered for the examination so that the appropriate number of *Candidate Record Forms* may be despatched.

23.2 Submitting Marks and Sample Work for Moderation

The total component mark for each candidate must be submitted to AQA by the specified dates on the marks sheets provided or by Electronic Data Interchange (EDI), in both cases, by the specified date. Centres will be informed which samples of candidates' work is required to be submitted to the moderator.

23.3 Factors Affecting Individual Candidates

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

Special consideration should be requested for candidates whose work has been affected by illness or other exceptional circumstances. Information about the procedure is issued separately in the document, "*Regulations and Guidance relating to Candidates with Particular Requirements*", which can be obtained from AQA.

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. AQA will advise on the procedures to be followed in such cases.

Where special help which goes beyond normal learning support is given, AQA must be informed, so that such help can be taken into account when assessment and moderation take 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 accept the assessments made at the previous centre. Centres should contact AQA at the earliest possible stage for advice about appropriate arrangements in individual cases.

23.4 Retaining Evidence and
Re-Using Marks

The centre must retain the work of all candidates, with *Candidate Record Forms* attached, under secure conditions, from the time it is assessed, to allow for the possibility of an enquiry upon issue of results. The work may be returned to candidates after the issue of results, provided that no enquiry is to be made which will include re-moderation of the coursework component. If an enquiry upon result is to be made, the work must remain under secure conditions until requested by AQA.

Moderation

24.1 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 by 15 May. A sample of work will be requested by the moderator shortly after this date.

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 order to meet this possible request, centres must have available the coursework and *Candidate Record Form* of every candidate entered for the examination and be prepared to submit both on demand. Mark adjustments will normally preserve the centre's order of merit, but where major discrepancies are found, AQA reserves the right to alter the order of merit.

24.2 Post-Moderation Procedures

On publication of the GCE results, the centre is supplied with details of the final marks for the coursework component.

The candidates' work is returned to the centre after the examination. The centre receives a report form from the moderator giving feedback to the centre on the appropriateness of the tasks set, the accuracy of the assessments made and the reasons for any adjustments to the marks.

Some candidates' work may be retained by AQA for archive purposes.

Awarding and Reporting

25

Grading, Shelf-Life and Re-Sits

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- 25.1 **Qualification Titles** The qualifications based on these specifications have the following titles:
- AQA Advanced Subsidiary GCE in Information and Communication Technology*
- AQA Advanced GCE in Information and Communication Technology*
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- 25.2 **Grading System** Both the AS and the full Advanced qualifications will be graded on a five-grade scale: A, B, C, D and E. 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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- 25.3 **Shelf-Life of Unit Results** The shelf-life of individual unit results, prior to the award of the qualification, is limited only by the shelf-life of the specification.
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- 25.4 **Assessment Unit Re-Sits** Each assessment unit may be re-taken an unlimited number of times within the shelf-life of the specification. The best result will count towards the final award. Candidates who wish to repeat an award must enter for at least one of the contributing units and also enter for certification (cash-in). There is no facility to decline an award once it has been issued.
- An AS result can be converted into a full A Level award by taking the A2 examination at any examination series when **Information and Communication Technology** is available.
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- 25.5 **Minimum Requirements** Candidates will be graded on the basis of work submitted for the award of the qualification. Zero marks rather than absent will be recorded where no work for a component has been submitted.
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- 25.6 **Awarding and Reporting** This specification complies with the grading, awarding and certification requirements of the current GCSE, GCE, VCE, GNVQ and AEA Code of Practice 2006/7 and will be revised in the light of any subsequent changes for future years.

Appendices

A

Grade Descriptions

The following grade descriptors indicate the level of attainment characteristic of the given grade at Advanced Level. Each descriptor should be interpreted in relation to the content outlined in the specification and is not designed to define that content. The descriptors give a general indication of the learning outcomes and levels of attainment likely to be shown by a representative candidate performing within each stated grade. In practice, most candidates will show uneven profiles across the attainments listed, with strengths in some areas compensating in the award process for weaknesses or omissions elsewhere.

- Grade A Candidates demonstrate:
- good understanding of the principles of information systems and the associated theoretical concepts
 - appropriate and accurate use of technical language and demonstrating excellent communication skills
 - detailed knowledge of a range of applications packages
 - informed opinions on the effects of information and communications technology on society and an understanding of the role of information and communications technology in organisations
 - the application of knowledge and understanding to unfamiliar problems
 - good understanding of data types and structures and how these are used
 - good understanding of organisation, audit and legal requirements
 - effective and appropriate use of a range of software
 - ability to design and produce high quality, efficient solutions to complex problems
 - methodical, analytical and critical approaches to problem solving
 - the ability to design, operate and justify appropriate testing strategies
 - clear communication of design decisions and solutions to problems
 - effective skills of evaluation.

Grade C Candidates demonstrate:

- understanding of the main theoretical concepts
- accurate use of technical terms, demonstrating good communication skills
- knowledge of a range of applications, the main effects on society and an understanding of the role of information and communications technology in organisations
- the application of knowledge and understanding to familiar problems
- understanding of data types and structures and how these are used
- ability to use a range of software
- ability to design and produce solutions to substantial problems
- a methodical and analytical approach to problem solving
- the ability to design and operate appropriate testing strategies
- clear communication of solutions to problems
- skills of evaluation.

Grade E Candidates demonstrate:

- some relevant knowledge and limited understanding of theoretical concepts
- use of basic technical terms and simple communication
- basic knowledge of applications and the subsequent effects
- recognition of hardware and software elements, appropriate to a given simple situation
- some knowledge of data types and structures
- basic use of analytical methods to solve straightforward familiar problems
- some limited skill in justifying or considering alternatives
- the ability to test solutions in a limited way
- the ability to produce basic documentation
- basic evaluative skills.

The Candidate Record Forms have been deleted from this specification because of changed requirements. The latest version of the forms are on the [Coursework Administration](#) pages of the Website.

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Overlaps with Other Qualifications

A list of titles of the AQA compulsory and optional units for the Advanced VCE is given below. There are links between the GCE specifications and several of these units. Further details are given in the AQA specification support material.

Compulsory Units

- 1 Presenting Information
- 2 ICT Serving Organisations
- 3 Spreadsheet Design
- 4 System Installation and Configuration
- 5 Systems Analysis
- 6 Database Design

Optional Units

- 7 Communications and Networks
- 8 Interactive Multimedia Presentations
- 9 Computer Artwork
- 10 Publishing
- 11 Internet Services and Web Page Design
- 12 Supporting ICT Users
- 13 ICT Training
- 14 ICT Solutions for People with Individual Needs
- 15 Impact of ICT on Society
- 16 Programming

There are links between AQA GCE Computing and this specification.