

Accredited

**AS/A LEVEL GCE**

**ICT**

**Teachers' Guide**

H117 and H517

Version 2

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# 1 INTRODUCTION

The new structure of assessment at Advanced level has been introduced for teaching from September 2008. The specifications are designed to provide candidates with an introduction to Information and Communications Technology.

These specifications are set out in the form of units. Each teaching unit is assessed by its associated unit of assessment. Guidance notes are provided with these specifications to assist teachers in understanding the detail necessary for each unit.

It is important to make the point that this Teacher Guidance booklet plays a secondary role to the Specification itself. The Specification is the document on which assessment is based and specifies what content and skills need to be covered in delivering the course. At all times, therefore, this teacher support should be read in conjunction with the Specification. If clarification on a particular point is sought then that clarification should be found in the Specification itself.

This Teacher Guidance booklet is designed to assist teachers in the delivery and assessment of the OCR ICT Advanced Subsidiary GCE and Advanced GCE specifications. It includes:

- a brief summary of the specification within each unit;
- guidance on each unit (AS and A2);
- possible teaching strategies for each unit (AS and A2);
- guidance on Written Examination Papers.

OCR recognises that the teaching of this qualification will vary greatly from school to school and from teacher to teacher. With that in mind, this booklet is offered as guidance but will be subject to modifications by the individual teacher.

## 2 AS UNIT G061: INFORMATION, SYSTEMS AND APPLICATIONS

### 2.1 AVAILABILITY

The assessment is only available in June.

### 2.2 PAPER LENGTH

The paper is 2 hours long.

### 2.3 PAPER TYPE

This paper has one section, comprising short and long answer questions.

Candidates are required to answer all questions in this paper.

The assessment of this unit carries a weighting of 60% of the AS assessment and 30% of the advanced GCE. The total number of marks awarded for the paper is 120. The quality of written communication (QWC) will be assessed on one or more long/essay questions. The candidate will be informed in the paper which questions will have QWC assessment within them. The QWC mark will not be specified separately as a mark on the paper but integrated into the marking using a banded response model.

### 2.4 POSSIBLE TEACHING STRATEGIES

#### 2.4.1 DATA, INFORMATION, KNOWLEDGE AND PROCESSING

The structure of this section and the content is progressive. It covers the definition of terms - information, data and knowledge and the different methods by which meaning can be represented. The candidates must not only be aware of the differences, but need to explain the differences using examples from the context. Much of the understanding for the methods of conveying information, the data types and sources of information will come from the necessary practical work on databases, spreadsheets and other generic packages which will be required before candidates can undertake the structured tasks as they will work on validation and verification.

Encoding data should not be confused with encrypting data. A thorough understanding of the wide range of vocabulary and definitions used in this section is essential.

Candidates are required to be able to produce a diagram (bullet point 3.1.1.n) of input, processing, output, storage and feedback and explain the terms, the relationship between them and to apply the terms in context. Since this application area is concerned with Information, Knowledge and Processing, the terms must be seen within this light. For example, feedback refers to items such as turnaround documents rather than sensors and control systems.

#### 2.4.2 SOFTWARE AND HARDWARE COMPONENTS OF AN INFORMATION SYSTEM

This application area is concerned with the more technical aspects of ICT. The two components which are covered are hardware and software.

The 'types of hardware' section is descriptive. The candidates need to be able to describe a variety of devices and components, covering their purpose and typical use. Understanding the differences between input, storage and output devices will be required. They will have to select devices which are appropriate for a specific context.

The depth of knowledge required of hardware components is not considerable and the emphasis should be placed on suitability for purpose rather than technical specifications. This includes hardware and software useful for physically disabled users and different types of interface.

This application area is complicated by the fast development of computer peripherals. The candidate must be up to date with the latest input and output devices and have an understanding of their areas of use.

### 2.4.3 CHARACTERISTICS OF STANDARD APPLICATIONS SOFTWARE AND APPLICATION AREAS

This section deals with the characteristics of standard applications software which are found in business, commerce and education. This includes styles, templates and wizards. The section also covers the advantages and disadvantages associated with tailoring applications software to specific applications (e.g. style sheets for a particular company) and the transfer of data between applications (e.g. transferring data from comma separated format into a spreadsheet). The candidate is required to identify basic tasks for which standard/generic packages can be used.

#### 2.4.4 SPREADSHEET CONCEPTS

This section deals with the characteristics of modelling software. Candidates should be aware that other modelling software exists and not solely concentrate on spreadsheets. Candidates should know about variables, formulae, functions and rules, graphs, charts and the customisation of worksheets. The vocabulary and concepts of spreadsheets should be learned including absolute and relative cell referencing, the difference between workbooks and worksheets and the use of what-if? questions in modelling.

#### 2.4.5 RELATIONAL DATABASE CONCEPTS

The structured tasks of unit G062 specifically refer to this section, and it is anticipated that the theory of databases and database terminology is acquired by the pupils before attempting any database related structured tasks.

The understanding of database terminology is essential and the candidate must be able to identify and describe a variety of elements.

This section deals with the characteristics of relational database systems. Included in the assessment will be the understanding of what is meant by the normalisation of relational databases up to third normal form (3NF), the advantages and disadvantages of normalising data, the organisation of the entities and the components of a data dictionary. Candidates will also be expected to be able to create data entry forms both on paper and screen, perform both simple and complex queries (a complex query involves the use of either an OR or an AND or both). Candidates will not be required to normalise data themselves, but will be required to recognise normalised and un-normalised data.

### 2.4.6 APPLICATIONS SOFTWARE USED FOR PRESENTATION AND COMMUNICATION OF DATA

This section deals with the techniques used for presenting information either in printed form or as a presentation using slideshow software. The presentation could be in the form of a book or to an audience in a hotel. Common techniques used in creating presentations will be assessed such as using standard documents, importing and exporting text and images, clipart galleries and image libraries, and mail merging. In general they will be the techniques used in creating any presentation. Also assessed will be the tools used to prepare presentations such as word processing and desktop publishing tools, graphics tools and effects, and multimedia and hypertext tools, graphics libraries and cartography.

Describing non-linear and hierarchical presentations is new to the specification (Bullet point 3.1.6 j of the specification).

#### 2.4.7 THE ROLE AND IMPACT OF ICT

The candidate should be able to consider both the positive and negative sides of the issues raised by these bullet points, most of which are at the discuss level.

The topics covered in this final application area are general and wide ranging. They cover capabilities and limitations of ICT, the changing use of ICT, social impact of ICT, health and safety issues involving ICT and ICT and the disabled amongst others. Candidates should be aware of the implications of ICT and be able to construct a reasonable discussion, imbuing their answer with evidence as required.

The specification incorporates changes resulting from European Directives and candidates need to be aware of any updates to English law.

Various methods for keeping data safe and secure should be discussed as should the advantages and disadvantages of networking computers and the impact of different organisations and networks having different standards. The more technical aspects of networking are covered at the A2 level.

## 3 AS UNIT G062 STRUCTURED ICT TASKS

### 3.1 AVAILABILITY

This Advanced Subsidiary (AS) unit is only available in June. The tasks will be sent to Centres in the September prior to the June in which candidates will submit their work. Only one set of tasks will be offered in each academic year. Candidates who wish to retake the unit, to attempt to improve a previous mark, will only be able to do so by submitting the tasks presented in the following year. There is no possibility of re-submitting the same tasks. Candidates can start the tasks as soon as the tasks are made available, however, candidates cannot work on the tasks after the official deadline for marks to be sent to OCR.

Centre work can only be submitted on paper, by post.

### 3.2 TASK LENGTH

Candidates may spend as much time as they think appropriate on the module providing their results are submitted for moderation by the specified date.

The tasks are worth 40% of the total AS and 20% of the Advanced GCE. 80 marks will be available for this unit.

### 3.3 TASK TYPE

The Structured Practical Tasks will contain a number of tasks.

There are no restrictions on the software which candidates may use although it is recommended that they choose software carefully in order to meet the requirements of the task.

Not all questions will involve the use of software. Some, for example, may involve the design of a solution, the production of test data or a test strategy, or the interpretation of a solution.

Candidates need to understand that marks may only be awarded if there is hard copy evidence of solutions.

### 3.4 POSSIBLE TEACHING STRATEGIES

#### 3.4.1 DESIGN

Any design of a solution implies that the solution itself is not created. The design may incorporate data structures, hardware and software requirements and any special security measures required. Annotation of the design is useful in explaining why each element is required.

The design section is not limited to any particular software package, but the main areas which will need to be considered are: Databases, Spreadsheets, Presentations, Web Based Products. Designs of data capture forms and reports may also be required.

#### 3.4.2 SOFTWARE DEVELOPMENT

This section requires the creation of the solution. The software tool used to interpret the design into a working solution is open to interpretation, although the task will lend itself more naturally to one family of tools than another.

When producing the evidence of creation, it is essential that all relevant printouts are provided and that there is some indication on these printouts as to what they are and what they contain.

Printouts should encompass all the important elements of the project and this could include spreadsheet formulas, database functions and web based code for example. Candidates will be told in the instructions of the tasks what evidence is required. In general this usually takes the form of printed evidence, annotated evidence or annotated evidence that explains how the solution constructed meets the requirements.

Some solutions may involve the tailoring of a software package. This may include the addition of macros and coding at a basic level.

### 3.4.3 TESTING

If asked to produce data to test a situation, it is not sufficient to produce a table of data with, or without, expected results. Candidates need to explain the purpose of the data. When producing sets of test data, the set must contain all the data, it cannot only contain part of the data used.

If three sets of test data are used, this may imply that the sets are to test normal, extreme and erroneous workings of the system.

Test plans may be required as opposed to the creation of test data. Candidates are expected to include precise data for testing in addition to the location of where that data should be input and what the exact expected outputs will be.

### 3.4.4 DOCUMENTATION

Candidates will be expected to produce documentation appropriate to the specified audience. This user documentation may be asked for in electronic format. The technical documentation might show how a software solution was developed. All aspects of user documentation should be present and appropriate to the task – i.e. Overview, Contents, Hardware/Software Requirements, Instructions, Glossary, Troubleshooting.

External documentation such as user guides or help sheets should be produced to a professional standard suitable for distribution to the intended audience. Headings and sub headings should be present and should follow a consistent style. Images should be appropriately resized and cropped. Page numbers should be present and correct.

## 4 A2 UNIT G063: ICT SYSTEMS, APPLICATIONS AND IMPLICATIONS

### 4.1 AVAILABILITY

The assessment is only available in June.

### 4.2 PAPER LENGTH

The paper is 2 hours long.

### 4.3 PAPER TYPE

The examination will contain 2 sections. Section A and Section B.

Section A will consist of 6-8 questions which will not be based around a common scenario and will mostly require answers based on definitions. The total number of marks awarded for Section A is 40.

The questions in Section B will usually be based around a common scenario and will require more in-depth answers. There will be 6-8 questions with a total mark of 80.

The questions in this unit will be based not only upon the material in G063 but also upon the knowledge, understanding and skills covered in G061 Information, Systems and Applications. The concepts encountered in that unit will be examined in greater depth. This unit is concerned with communication between computers and interaction between humans and computers.

The assessment of this unit carries a weighting of 60% of the A2 assessment and 30% of the whole qualification. The total number of marks awarded for the paper is 120. The quality of written communication (QWC) will be assessed on one or more long/essay questions. The candidate will be informed in the paper which questions will have QWC assessment within them. The QWC mark will not be specified separately as a mark on the paper but integrated into the marking using a banded response model.

### 4.4 POSSIBLE TEACHING STRATEGIES

Teachers should note the meanings given to key words such as "identify", "explain", "describe" and "discuss" and as indicated elsewhere in this guide.

This part of the specification is divided into six sections. The examination will cover aspects of all six sections although not all learning outcomes will be assessed every year.

#### 4.4.1 THE SYSTEMS CYCLE

The system cycle will be learned at the time the ICT project is being undertaken and this is an ideal time to link the theory with the practical. As well as the system cycle the candidate will also be taught the contents of the systems documentation including test plan, test data, design and system specification and the responsibilities of various members of the project team. Project planning tools and methods of interpreting parts of the project by diagram are part of this unit. The candidate will be expected to describe, interpret and create data flow diagrams and flowcharts, critical path analysis diagrams and Gantt charts.

#### 4.4.2 DESIGNING COMPUTER-BASED INFORMATION SYSTEMS

Various processing systems are examined with the emphasis on the discussion of the relative merits of each system and the suitability of a particular system for a particular task. Different operating systems are described though the candidate does not need to know any particular system in great detail.

The human-computer interface is discussed and the candidate will be expected to understand and to comment on the suitability for a particular task of various forms of interface and the use of colour, language and controls used in the design of those interfaces.

Some psychology is introduced with the candidate needing to be able to explain the user's mental approach when confronted by a particular interface and how this mental model is taken into account when designing the interface, with particular reference to the design tool known as the Model Human Processor, developed by Card Moran and Newell.

#### 4.4.3 NETWORKS AND COMMUNICATIONS

This section deals with communications on a very general level. The candidates do not need to have specific knowledge of protocols or an in depth understanding of networks. They are required to discuss characteristics of intranets, extranets and the Internet.

The candidate must be aware of the hardware and software requirements necessary for a network to function both in terms of a LAN and a WAN.

Since ICT changes so quickly, particularly the area of networks and communications, it will be necessary to follow developments and include them in the teaching as this section covers a wide range of communication methods many of which will be familiar to the candidate on a day to day basis. It is important to note the key word in each bullet point so as to know the depth to which the subject matter should be studied.

Describe how satellite communications systems are used in various systems, for instance, does not require a technical understanding. However, explaining the advantages and disadvantages of using satellites for these applications does require an understanding of the merits of such systems.

#### 4.4.4 APPLICATIONS OF ICT

In this section the candidate will be exploring the use of ICT in the world of work and at home. Descriptions only are required of the use of ICT in telephone systems, banking and so on. No technical details of the system are required. It is all about how ICT is used rather than the science behind it.

Distributed databases are discussed, but again it is the use of these rather than any knowledge of technical complexities that is required.

Using databases for helping managers, such as expert systems and management information systems are described or explained whereas the services offered by digital television networks must be discussed.

The whole focus of this section is how ICT is used rather than how the systems are created.

#### 4.4.5 IMPLEMENTING COMPUTER-BASED INFORMATION SYSTEMS

This section is scenario based, and the student should be able to describe the steps involved in producing a purpose-built system and the various advantages and disadvantages of the system within this scenario. They should be able to contrast this with buying off-the-shelf systems. They should also be able to explain the upgrading, installation and maintenance of a system.

#### 4.4.6 IMPLICATIONS OF ICT

This section is scenario based. The way in which the world of ICT rapidly changes and the way in which this effects the organisation should be discussed. Applications at the cutting edge of technology, such as chip implants in the human body, may be based on current advances in ICT and may not be specifically mentioned in the specification.

The emphasis here is on controlling ICT with professional bodies, the law and with practical solutions such as virus checkers.

We hope that the candidates will keep abreast of the latest developments in ICT and discuss in the classroom any implications that this might bring.

## 5 A2 UNIT G064: ICT PROJECT

### 5.1 AVAILABILITY

The assessment will only be available in June.

Centre work can either be submitted electronically via the OCR Repository (unit code G064/01) or it can be paper-based (unit code G064/02). It is important to ensure that the correct code is used when submitting entries for the unit.

### 5.2 PROJECT TYPE

This is a practical module. Candidates will need to produce a written report as evidence that the task was carried out. The teacher marks the project using the 'Guidance on Marking Information and Technology Projects' as detailed in the specification. Moderation of these projects will take place according to OCR procedures.

Since the ICT project seeks to assess the systems analysis section of the specification in a practical manner, the candidate should not produce a system from their own limited knowledge of the requirements of the organisation.

### 5.3 PROJECT LENGTH

The project is worth 20% of the whole qualification. 80 marks are available for this unit.

### 5.4 NATURE OF THE PROJECT

A project should:

- allow candidates to demonstrate their knowledge and understanding of ICT systems and their skills in the assessment objectives;
- encourage the sensible use of computers and communications systems to produce a solution, which solves a problem sensibly, within the constraints of resources available to candidates;
- show the successful completion of a whole task from the initial definition involving a third party to acceptance and evaluation by that third party and other possible users. Projects that involve much repetitive design, analysis or especially implementation, leading to unwieldy reports, are to be discouraged;
- involve all elements of the skills of definition, analysis, design, development, testing, documentation, installation and evaluation. Projects need not be "stand alone": the enhancement or modification of an existing system provided that all these elements are covered, is more likely to be a real world situation;
- involve a client and/or third party user, who may be different people and who will provide information for the analysis, use the solution and contribute towards its evaluation. Whilst a teacher could act as the third party, this arrangement is far from ideal. Candidates should, individually, look beyond school life into business and organisations in their community for their projects. Though it is recognised that this may be impractical, a member of the family is often an ideal client/user. The student should seek to involve them and present them with a report on the work which has been carried out.

The client/user has to be someone who is willing to be involved in the project throughout, but particularly at the following stages:

- in the analysis of the problem, where their requirements are obtained. This will include an interview with the candidate and taking an active part in decision making;
- at the design stage where they are expected to provide feedback on system designs;
- at the software development, testing and installation stages, where they are involved in prototyping;
- at the evaluation stage, where they are involved in checking that the system is completed as specified and, leading on from this, is then willing to write a letter of acceptance of the system, including any criticism of it.
- candidates should make the final choice of the problem for solution in collaboration with the potential client/user, although guidance about the suitability of the chosen problem should be given by the supervisor. Guidance should continue throughout the life of the project. This should include guidance on the appropriateness of an implementation on a stand-alone or networked computer-based information system or other available facility. In a well-organised project the candidate will focus on the production of an overall system analysis and design.

The solution may be implemented using one or more of:

- a standard generic applications software package;
- prewritten modules;
- toolkits/authoring/publishing software;
- interface/client software (including HTML/JAVA).

Descriptions of any software used, together with reasons for their selection, should be included in the report.

Test data should be devised and used systematically to thoroughly test the effectiveness of the solution in solving the problem. The choice of test data used, and the reason for choice, should be included. A description of the methods of testing should also be included, together with evidence of testing. Tests should be specific enough so that a third party may carry them out. This includes stating clear test data, as well as specific expected outcomes.

The projects should contain the title, a contents list, a description and justification of investigation, analysis, design and an evaluation. Pages should be clearly numbered.

The report must be supported by appropriate evidence of implementation, such as screen dumps or photographs of screen layouts and printouts, paper based documentation and a letter(s) from the client/third party user to support the evaluation.

Candidates should **not** submit magnetic or optical media as supporting evidence but can make references to web pages available over the Internet or photographic evidence supplied. A witness statement would also provide suitable evidence where it is not possible to produce suitable hard copy evidence of parts of their solution, eg hyperlinks.

The projects will seldom involve programming or the installation of hardware but will involve the choosing of the types of hardware and software that will be needed to implement the solution.

The mark scheme has attempted to be as generic as possible, but there will, doubtless, be occasions when candidates are creating a solution which is not adequately covered by the mark scheme. On these occasions please contact OCR for advice about adapting the given scheme to fit the solution.

Some possible ideas are given below. However, it is important for candidates to realise that the project chose should be user driven. This means that candidates must

understand that they should find possible users of ICT systems and find out their needs before developing an idea.

The examples do not show the analysis of the problem nor do they give all facilities which may be required by the user. For example, the staff who run the village hall bank may well require many other facilities that can only be ascertained by interviewing the appropriate staff and, possibly, some of the users of the bank. The examples only give a few ideas of the type of project, which could provide candidates with the opportunities to demonstrate Advanced GCE ICT skills and an understanding of solving real life problems.

## 5.5 PROJECT EXAMPLES

### EXAMPLE 1

*The local village hall committee has a bank that is used by a large number of local people to save money for Christmas. The staff who run the bank must keep details of people who use the bank as well as details of individual accounts. It is useful to have a list of all the people who use the bank together with addresses and so on, which help the staff to contact them. Sometimes the staff need to contact someone urgently.*

*Villagers need bank statements from time to time. This occurs when someone asks for a statement or at the end of November. The statements are sent automatically as emails or email attachments to the bank users.*

*The bank statements must give details of each transaction such as deposit number, amount withdrawn, amount deposited and an up-to-date balance. It should also show any interest payments.*

*The staff have to be able to create a separate statement for each person and it must only be accessed by the person's account number. Sometimes people forget their account numbers and the staff must be able to provide them on proof of identity.*

*The committee who run the scheme are particularly worried about the security of the files.*

Candidates would be expected to produce a tailored solution with an appropriate interface. An obvious solution would be to use a table of customers, each record being linked to a spreadsheet of activity for the

person's account. Data could be extracted from the table and relevant spreadsheet to produce a statement and a photograph could be appended to records to provide proof of identity.

### EXAMPLE 2

*A local hotelier wants to have a website to advertise the facilities available at the hotel.*

*You are to design a computer-based information system that could be used by the hotelier.*

This would involve the student in analysing the problem, collecting the necessary information, designing a solution and fully developing the site.

Candidates should be aware that, on one level, this is a fairly trivial problem. The teacher/examiner will be looking for detailed analysis of the problem, and design solutions, which involve the hotelier at all stages. It will also be necessary to ensure that some of the implementation is at more than a basic level. For a website system to meet complexity requirements to be classed as a non-linear system, there should be automatic data transfer to and from a backend spreadsheet or database. Examples could include the ability to search for and download documents like the hotel brochure from the site; a link to the file which keeps a record of all queries sent to the site, or the ability to book rooms and pay for them in advance through the site (though candidates hoping to do this would be made aware of the difficulties before they start).

As the original problem was to create a website to advertise a hotel, it is reasonable to insist that part of the problem solution must be to make the website available over the Internet. This would mean that the candidate must provide a URL to allow the site to be accessed during assessment.

### EXAMPLE 3

*Ms Johnson has a small newsagent's shop and employs eight people to deliver the papers. She wishes to be able to produce delivery lists for each morning round and each evening round. At the moment she does not deliver Sunday papers but may wish to do so in the future.*

*She wants to keep details of her customers, including which morning papers and which evening papers they have and which delivery round they are on. Some customers only have one morning and one evening paper, others do not have both a morning and evening paper. Some customers have weekly*

*magazines, some fortnightly magazines and some monthly magazines.*

*Ms Johnson would also like to be able to produce a weekly paper bill for each customer.*

*You are to design a computer-based information system that could be used by Ms Johnson including the facility to browse on-line for information.*

(Note that the actual production of the lists for the rounds in specific orders is difficult and has been avoided during the problem formulation. The problem is difficult enough, particularly when considering the unknown number of papers and periodicals that each person may order).

This is an example of a popular type of project, being based on database software, however the formulation of the problem is everything with this type of problem and candidates should be wary of too simplistic an approach. The solution which simplifies the problem unreasonably will also be penalised.

### EXAMPLE 4

*The student is asked by the head teacher of a school to develop an information system for use in the classrooms and public areas. The information needs to be on computer screens, which can be amended from a central location.*

*The student is involved in analysing the problem in respect to site of screens, user interfaces, types of information, pass-wording to allow users to edit only their pages etc.*

*You are to design a computer-based information system that could be used by the school.*

The implementation of the system is relatively straightforward using a piece of authoring software. However, the candidate can enlarge the scope of the project by including, for instance, a budgeting system so that individual departments are allocated a set amount of time or an accounting system so that departments can be billed on a monthly basis. Another extension might be to include an archiving system to store messages for future inspection.

The teacher/examiner should be looking for a detailed analysis of the requirements and a measure of extension to the basic problem, which would illustrate the candidate's ability to integrate the information into other software.

**EXAMPLE 5**

*A teacher in the EAL (English as an Additional Language) department of a school is looking to find an interesting way to engage younger pupils in learning new vocabulary.*

*He has asked the student if a computer game could be made which would help to teach new words and grammar to the pupils and give them a reward system to encourage development.*

*The teacher is also keen to know how the pupils are getting on when they work on the game alone, so has asked for a facility whereby he can be sent an electronic leader board each week.*

The candidate could use a range of games development software to help with this task. They would need to carefully consider the needs of the client and the end user; the game is only a means to an end.

Although developing a game can seem a fairly trivial solution, candidates should be seeking to find ways of using input data (e.g vocabulary lists, pupil details) and processing it effectively to give output in the form of feedback to the pupil and the weekly leader board for the teacher.

This will require specific manipulation of the software to make the game specific to the needs of the EAL teacher and his pupils.

## 6 GUIDANCE ON MARKING INFORMATION AND COMMUNICATIONS TECHNOLOGY PROJECTS

The project should be awarded marks according to the following module headings.

- (a) Definition, Investigation and Analysis **[23 marks]**
- (b) Design **[15 marks]**
- (c) Software Development, Testing and Installation **[21 marks]**
- (d) Documentation **[10 marks]**
- (e) Evaluation **[8 marks]**
- (f) Presentation of Report **[3 marks]**

## Exemplification of Mark Scheme: Teachers' Notes

### (a) Definition, Investigation and Analysis

[23 marks]

#### (i) Definition – nature of the problem to be investigated

[2 marks]

1 mark	a brief description of the organisation or group that has the problem and an introduction to the client and/or the end user(s) and their place within the organisation or group; <i>For example: name, location, purpose, number of employees, name(s) of relevant staff, their positions in the company, consideration of different users (end user, client, managers) who may have different needs, may be an organisation chart.</i>
1 mark	an outline of the problem that needs to be solved. <i>A very brief outline of the problem as seen at this early stage, can be given by the company.</i>

This section will be relatively short; one or two paragraphs would suffice.

#### (ii) Investigation

[12 marks]

2 marks	thorough planning of the mechanics of the interview situation; <i>where, when, how (e.g. email, telephone, in person). Consideration of why the method(s) was/were chosen.</i>
3 marks	reasoned set of questions to elicit important information (possible responses have been considered and follow-up questions have been planned); <ul style="list-style-type: none"> <li>• <b>3 marks:</b> a comprehensive list of questions with follow up questions for some. Reasoning for each question or group of questions. <b>Questions will be different for different groups of people where relevant (client/end user)</b></li> <li>• <b>2 marks:</b> a list of basic questions with some attempt at justifying most of them. <b>Some attempt at follow up questions</b></li> <li>• <b>1 mark:</b> a basic set of questions with little or no reasoning.</li> </ul>
1 mark	record of key responses of interview, demonstrating two-way discussion; a record of responses from the interviewee(s) including follow-ups. Does not have to be a verbatim transcript of the entire conversation. <b>All relevant parties who have involvement in the system will have been interviewed</b>

3 marks	evidence of analysis of the current system or of likely problem areas, arriving at reasoned conclusions that will show evidence of being agreed by client; <b>3 marks:</b> full summary of the current situation with all problem areas discussed, conclusions about what the issues are, agreement from the client in the form of a signed letter/document <b>2 marks:</b> summary of the current situation, a discussion of problem areas in the current system, agreement from the client as before. <b>1 mark:</b> brief summary of the current method/system used
2 marks	Information collected about the requirements of the new system <b>2 marks:</b> a complete set of information about the new system, with justification <b>1 mark:</b> some information collected but may be incomplete and/or unjustified
1 mark	clear presentation of the information collected about the new system

**(iii) Analysis****[9 marks]**

3 marks	a requirements specification containing a number of clearly defined objectives that the solution should meet. These must be arrived at through consultation with the client; <b>3 marks:</b> a list of requirements which cover all aspects discovered during data collection. This may be reworked several times, if necessary, in consultation with the client. If so, this should be documented. Agreement, in writing, from the client. <b>The requirements are specific.</b> <b>2 marks:</b> a list of requirements, covering <b>most</b> of the aspects of the proposed solution and can be linked to the investigation. Agreement, in writing, from the client. <b>The requirements lack detail</b> <b>1 mark:</b> some basic requirements which cover <b>some</b> of the aspects of the proposed solution, agreed to in writing by the client.
3 marks	a comparison of a number of different methods of solution, one of which may be the present solution and at least two others to allow a reasoned decision to be made in consultation with the client; <b>2-3 marks:</b> three solutions are considered in terms of cost, feasibility, extent to which they meet the objectives. Chosen system is identified and justified in terms of cost and benefits to the organisation. <b>1 mark:</b> three solutions are considered to a limited depth. The final system will be identified with limited justification
3 marks	a reasoned list of hardware and software requirements for the new system, providing clear justification for each choice in relation to the problem to be solved. <b>3 marks:</b> clear list of hardware and software, possibly offering two alternative choices for each, with sensible justification based on the needs of the client and/or solution. Inputs, processing, outputs and storage devices and software are all covered for 3 marks. <b>1-2 marks:</b> a list of hardware and software with basic justification for each and with limited reference to the client/solution needs. There may be gaps.

**(b) Design****[15 marks]****(i) Nature of the solution****[13 marks]**

4 marks	<p>design of data handling, including capture, preparation and storage or design of website to include map and diagrammatic representation of links;</p> <p><b>4 marks:</b> a complete set of system designs appropriate to the solution including some or all of the following as relevant: data storage, data flows and processes. The designs can be in diagrammatic or textual format. The designs should be sufficient that they could be picked up and developed by a third party.</p> <p><b>2-3 marks:</b> some of the above are evident but elements appropriate to the solution may be missing or incomplete.</p> <p><b>1 mark:</b> a basic attempt at the above. More than one element appropriate to the solution is missing.</p>
4 marks	<p>design of inputs, processing and outputs, including error capture reports as appropriate, based clearly on the analysis of the client requirements;</p> <p><b>4 marks:</b> designs and design specifications for all <b>input forms</b>, including colours, fonts, sizes etc. Complete <b>interface designs</b> showing any validation, lookups, calculations which are carried out. Complete <b>processing</b> designs for example, queries, calculations, formulae, manipulation of HTML or other code. <b>Security</b> procedures which may include back up and restore routines, passwords and access rights.. Design of <b>outputs</b>, automated emails, files created and appended to. <b>All designs are logically correct and fit for purpose.</b></p> <p><b>2-3 marks:</b> may be missing some of the above elements but must cover all areas of input, output, processing and storage. There may be loose ends.</p> <p><b>1 mark:</b> basic designs showing little depth and missing important elements.</p>
1 mark	<p>clear evidence of end user/client involvement in decision making and evidence that the options of the user/client have had an effect on the solution.</p>
4 marks	<p>a test plan that will identify a number of tests that will be carried out on completion of the work. Each test outlined should be clearly related to the relevant requirements stated in the requirement specification, all of which should feature in the test plan. The specific test to be carried out should be included in the plan together with the result expected. The tests specified in the test plan will be completed during the testing of the solution (some elements of testing should involve the end user(s)).</p> <p><b>4 marks:</b> a complete plan which tests the solution in relation to the requirements, pathways through the system and validation routines. Normal, erroneous, extreme data are considered where relevant.</p> <p><b>2-3 marks:</b> test plan covers most aspects of the system against all three points above. Consideration of one or two of normal, erroneous, extreme data but probably not all three.</p> <p><b>1 mark:</b> a basic plan which does not consider extreme/erroneous data or have specific inputs and expected outputs identified.</p>

**(ii) Project plan** [2 marks]

2 marks	<p>Clear description, diagrammatic or otherwise, of the different tasks necessary to complete the solution and a clear timetable.</p> <p><b>2 marks:</b> a complete task model (e.g Gantt Chart, Pert Chart, CPA, table, calendar) which is progressive and covers all of the software development section. There will be consideration of predecessors and successors. It is accepted that, at this level, pupils will not necessarily judge timings accurately.</p> <p><b>1 mark:</b> a basic model with occasional gaps or with some tasks out of order.</p>
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**(c) Software Development, Testing and Installation** [21 marks]**(i) Software Development and Testing** [14 marks]

8 marks	<ul style="list-style-type: none"> <li><b>6-8 marks:</b> the candidate has solved a problem that has needed a level of complexity greater than a simple linear type solution;</li> <li><b>3-5 marks:</b> the candidate has attempted to solve a problem that has needed a level of complexity greater than a simple linear type solution and has been successful in some aspects;</li> <li><b>0-2 marks:</b> the candidate has produced a solution that is a linear style of solution in the use of software;</li> </ul> <p><b>General Notes on this section:</b>  <i>This section should include printouts/screen shots of every screen in the system and all code written by the candidate should be identified and annotated.</i>  <i>For a <b>database</b> this might include: tables, forms, queries, reports, macros, code. For a <b>spreadsheet:</b> all worksheets, formula view, macros, users forms, named ranged. For a <b>website:</b> all pages, associated data, structure (e.g. database/spreadsheet/text files attached), macro code, HTML code, CSS code, directory structure printout.</i></p>
2 marks	<p>evidence of the development of one aspect of the system that processes data</p> <p><b>2 marks:</b> detailed evidence of the development of one aspect of the system that involves the processing of data. The detail is sufficient for that aspect to be recreated.</p> <p><b>1 mark:</b> annotated evidence of the development of one aspect of the system that involves the processing of data. There may be gaps in the evidence provided.</p>

2 marks	<p>hard-copy evidence of an effective HCI with annotations explaining its effective solutions for problems that had been highlighted in the requirements specification;</p> <p><b>2 marks:</b> <i>annotated evidence of a HCI and how it meets user requirements. Evidence of customisation of the interface, for example, of changing colours, adding images/logos or removal of record selectors.</i></p> <p><b>1 mark:</b> <i>annotated evidence of a HCI which meets some but not all requirements. Limited additional customisation of the interface.</i></p>
2 marks	<p>evidence that each of the tests specified in the test plan have been carried out, that they are linked to the hard copy evidence, that the results have been analysed and that any necessary action has been identified.</p> <p><b>2 marks:</b> <i>Screenshot evidence of all tests in the test plan being carried out. Actual input and output data as specified in the test plan is clearly identified. Any failed tests are documented, corrected and retested. There is clear evidence of user testing of the system.</i></p> <p><b>1 mark:</b> <i>Most tests are carried out, but inputs and outputs may not always be clearly identified. Failed tests are not always corrected and /or retested. There is some evidence of user testing being attempted.</i></p>

**(ii) Installation****[7 marks]**

3 marks	<p>details of the training that will need to be available for the staff who must use the new system;</p> <p><b>3 marks:</b> <i>detailed description of training with a plan of training required by staff including where, when, by whom, the data is needed. There will be full consideration of different groups of users, where relevant, and what their training needs will be.</i></p> <p><b>2 marks:</b> <i>may be missing some of the above elements but must cover all areas of administration and a basic plan of training needs.</i></p> <p><b>1 mark:</b> <i>basic description of training needs with little or no specific detail.</i></p>
2 marks	<p>details of the means by which the new files are going to be created, including some indication of the scale of the problem, and also the possible need for hardware installation and the installation of the software on the hardware;</p> <p><b>2 marks:</b> <i>consideration of the volume of data, numbers of people involved, timescales, how data will be created or transferred.</i></p> <p><b>1 mark:</b> <i>basic consideration of data files but with few specific details.</i></p>
2 marks	<p>details of appropriate, different, methods of changeover explained so that the client can make a reasoned decision.</p> <p><b>2 marks:</b> <i>detailed consideration of the different methods of changeover related to the system being installed.</i></p> <p><b>1 mark:</b> <i>basic consideration of different methods of changeover.</i></p>

**(d) Documentation****[10 marks]****Manual**

8–10 marks	Candidates will produce detailed and accurate documentation. The manual will be presented in a well-structured and coherent format. Subject specific terminology will be used accurately and appropriately. The documentation will include a complete and detailed user guide covering all operations that the user would be required to perform. The on-screen guide should be well presented and easy to follow. There will be few if any errors in spelling, grammar and punctuation.
4–7 marks	Candidates will provide clear documentation. The documentation will be well presented. There is clear on-screen help to support the end user. The supporting documentation and on-screen help is well presented and covers most aspects of the operations that the user would be required to perform. Some subject specific terminology will be used. There may be occasional errors of spelling, grammar and punctuation.
0–3 marks	Candidates will provide a superficial documentation with weak supplementary user documentation covering few aspects of the operations that the user will be required to perform. The information will be poorly expressed and limited technical terms will be used. Errors of spelling, grammar and punctuation may be intrusive.

**(e) Evaluation****[8 marks]**

4 marks	Evaluation of each of the requirements from the requirements specification including showing how the completed solution meets the requirements. Areas from the requirements specification that have not been met are discussed. <b>4 marks:</b> a detailed evaluation of the system which includes a description of whether the requirements specification was met or not met. Any shortfalls are explained in detail. <b>2-3 marks:</b> an evaluation of the system which may lack specific detail but should include a description of whether the requirements specification was met. Shortfalls are mentioned but there is limited depth in the discussion of why they were not achieved. <b>1 mark:</b> some material which attempts to evaluate whether the solution meets the requirements specification.
2 marks	details of extensions to the project and how these might be completed; <b>2 marks:</b> detailed description of extensions to the system and consideration of how they might be implemented <b>1 mark:</b> basic consideration of extensions with no details on how they could be implemented.
2 marks	evaluation of the finished development against the project plan from design <b>2 marks:</b> detailed evaluation comparing the actual development against the project plan, giving reasons for any differences <b>1 mark:</b> basic evaluation identifying the differences between the development and the project plan

**(f) Presentation of report****[3 marks]**

3 marks	The candidate has provided a detailed and accurate means of navigation of the report and has tailored the language used, both technical and non-technical, to the audience for which the parts of the report were aimed. Subject-specific terminology will be used correctly. A professional approach to the presentation will be expected and a clearly understandable, dated log of events will be kept. The information will be presented in an ordered and well structured manner. There are few if any errors of grammar or spelling.
2 marks	The candidate will produce a navigable report. The contents will be determined by the requirements of the candidate rather than the reader. A log of events will have been kept. The information is presented in an ordered fashion that maintains some coherence. There may be some occasional errors of grammar or spelling.
0–1 mark	The candidate has produced some material that explains part of the solution attempted. It will be difficult to navigate and will assume much knowledge of the solution that the reader will probably not possess. The information may be expressed without a structure. Errors of grammar or spelling may be intrusive.

## 7 GUIDANCE ON WRITTEN EXAMINATION PAPERS

Examiners take into account the following factors when creating an exam paper:

- Covering a wide range of the specification without going beyond the stated content;
- Avoiding concentration on one particular area of the specification;
- Varying the nature of the questions over a period of time;
- Meeting the needs of the assessment objectives;
- Ensuring accessibility and readability for the target group of candidates;
- Designing questions which can be marked consistently by the examining teams.

The examples given below illustrate the point under consideration. They are often taken from the specimen questions but these may have been modified to emphasise a specific point.

### 7.1 THE KEY WORDS IN A QUESTION

There is a list of acceptable answers in the mark scheme. However whilst the setters of the question papers are bound by the specification the candidates' answers are not. A correct response should gain the stipulated number of marks.

Throughout this specification certain words will be taken to have the meanings detailed below.

#### ADVANTAGES/DISADVANTAGES

The advantages or disadvantages of a system will also be taken to include the benefits and drawbacks, the pros and cons, the good points and bad points of a system.

#### CHARACTERISTICS

Characteristics will be taken to be any distinguishing part or function or feature of a system that makes it the system it is. Characteristics however will not include uses.

#### USES

The use of a system will be taken to be its purpose. Why and what it is used for.

Within the specification a number of words will be used advisedly. These are hierarchical. They follow in this order:

- **State**, a one word answer, phrase or sentence usually worth one mark.
- **Describe**, at least a sentence required with up to two marks awarded.
- **Compare/contrast**, need to identify a factor common to both and describe it.
- **Explain**, a description of how or why something is done, with some further expansion usually an advantage or disadvantage. This can be seen as the reason.
- **Discuss**, more than one position– of impacts and consequences with a conclusion.

Questions will never be asked in the AS examination of a higher order of any word used in a particular learning objective, but they may be asked of a lower order in the hierarchy.

Questions in the A2 examination that cover synoptic topics from the AS will not be restricted to the keywords and can utilise a higher order keyword than that in the AS specification.

### 7.2 DIAGRAMS

Candidates will only be asked to draw a diagram if it appears as a learning objective in the specification.

Diagrams may be used if they would help to illustrate the answer to a question but they must be properly annotated to receive credit.

### 7.3 OPEN OR CLOSED LISTS

Closed lists are where the only topics examined on that learning objective will be listed in the specification.

Open lists are examples of the areas to cover. The teacher is expected to cover the general characteristics of that type of system.

## 7.4 EXAMPLE QUESTIONS AND ANSWERS

### EXAMPLE 1

*The manager of each shop uses a mail-merge process to produce reminders for each customer that owes money on account. Generic application software is used for this task.*

*Give two advantages of using mail merge for this task. [2]*

The candidate needs to give two advantages – there is no need for description or explanation. Only the first two answers given will be marked.

### EXAMPLE 2

In some cases the question will tell the candidates how many responses are required. The candidate should not give more, or less, than the required number of answers.

*Describe two facilities available on an electronic mail (e-mail) system. [4]*

As a single description is worth two marks, the candidate needs to make sure that the description is in enough detail to gain both marks. This is typically done by identifying a point (for a mark) and then expanding on the point for a second mark.

### EXAMPLE 3

The candidate has to make a simple statement of fact. This is the only time a one word answer would be acceptable.

*A spreadsheet package can be used to manipulate data held in tables. For example, data can be sorted.*

*State three data manipulation functions, other than 'sort', commonly available on a spreadsheet. [3]*

The answer should be three from: filter, search, index, look-up for example.

A single word is all that is required.

### EXAMPLE 4

#### Give

Give is an odd question, it can be a state or it could be an explanation, it depends on the question.

*Head office is worried about the increasing possibility of crime since the company has also decided to provide on-line services on the Internet.*

*Give two examples of ICT crime. [2]*

The candidate's answers should include two statements:  
*from fraudulent use of data*  
*hacking into restricted files intercepting credit card details*

Just putting the one word answer 'fraud' down would not gain any marks since the candidate has not told us what the fraud is related to.

Other correct answers are possible and the candidate would gain marks from these.

Give can also require an answer with extended writing, for example:

*Give two reasons why an organisation should have a house style. [4]*

This requires more than a single word.

The candidate's answers should include two statements from:

*To allow for customer recognition of any documents received from the company*

*To allow any members of staff working on documents to follow the house style and not make decisions on their own about how the document should look*

*To look professional and a company that can be trusted*

Just putting the one word answer 'recognisable' down would not gain any marks since the candidate has not told us what the recognisable is related to.

Other correct answers are possible and the candidate would gain marks from these.

**EXAMPLE 5**

In some cases the questions will ask the candidate to give a long answer. The candidate would be advised to look at the number of marks required by the question and the key word and decide how many points to make. Give/state are usually one mark each, describe and explain, as a rule of thumb are two marks each.

*A company uses a spreadsheet to create a simulation of what would happen if it expanded its business by acquiring a competitor.*

*Explain the advantages of using a spreadsheet to create the simulation.* **[6]**

The candidate needs to give more than one advantage (the question asks for advantages). If the candidate gives only one advantage they cannot score more than five marks. As an explanation is commonly awarded two marks each, the candidate could give three advantages. However, as there is no number of advantages given the candidate could give two, in depth advantages and gain full marks.

**EXAMPLE 6****Compare**

Compare is marked using a banded response. This means that a mark is not given for each individual point made but the entire response is read and placed within the band where there is the best fit.

A compare question is out of four marks and the candidate needs to make two comparisons. A comparison is not a description of one item, it is a feature that applicable to both and then how that feature relates to both.

Take the following question:

*Compare delivering a presentation using printed acetate and using a computer and projector.* **[4]**

The first thing to do is to identify the features that are going to be compared. In this case, it could be changing the order of the slides and the use of video and sound. Having decided on the features, take them in turn:

Changing the order of the slides – describe how is this done in printed acetate and then how this is done with a computer and projector. Then, move onto the second

feature and describe how the feature applies to both.

This will give a comparison rather than a description of one and then a description of the other.

A comparison can be either similarities or differences.

**EXAMPLE 7****Justify**

This is a question where you are given a decision that has already been made and need to come up with reasons to support it. It is not about questioning the decision.

*A USB external hard drive has been chosen to use as a backup device for a laptop. Justify the choice of this device for the given task.* **[6]**

This is marked as a banded response and to get in the top band the candidate will need to give more than one reason, in detail – an explanation.

**EXAMPLE 8****Evaluate**

This is a question where a decision needs to be made and you need to weigh up both sides and come to a conclusion.

*Evaluate the suitability of using bit map graphics in a website.* **[6]**

This is marked using a banded response and the top band requires a balance – positive and negative reasons given in detail and a reasoned conclusion.

**EXAMPLE 9****Explain**

An explanation is a description with a reason or a how.

*Explain two methods that can protect an ICT system.* **[4]**

In this question, the answer can be built up:

*Identification: Passwords*

*Description: Code known only to the user that allows access to resources*

*Reason/How: If you do not know the code you cannot access the resource*

The question is actually asking – identify a method that could be used to protect an ICT system and explain how this method protects the system. A description of the method is not enough for an explanation.

### EXAMPLE 11

#### Discuss

A discussion is an extension of an explain-type answer but the candidate also has to consider the impacts and consequences and include a relevant conclusion. Discussion question will be marked using the banded response model. This means that simple lists of points will never score more than a few marks whereas the more detailed and well argued the points become the higher up the bands the candidate moves. For the top band the candidate needs to have considered the question from more than one point of view.

*Many of a newsagent's customers are gaining access to the Internet. This allows them to read a wide range of on-line newspapers and magazines.*

*Discuss the impact on individuals and newsagents of the availability of news and magazines online.* **[11]**

The answers expected include a discussion of both the advantages and disadvantages. Possible themes for discussion could be:

- *up-to-date news*
- *global news not just national news*
- *less chance of bias eg state control of media undermining of censorship laws*
- *levelling out of style to fit browser displays*
- *less capital needed to publish*
- *more variety of reading*
- *greater access to marketplace*
- *copyright of images/texts harder to police*
- *multi-media hyperlinks to follow threads*
- *not easily portable*
- *feel of real paper lost*
- *links with TV and other media*
- *less need for traditional newsagent*
- *automated cuttings services*
- *customised newspapers*

with a statement in conclusion which gives the view of the candidate (for the top band).

These are only identifications, to move through the banded response the point would need to be expanded on and explained – what is the impact, why is it the impact and what are the implications of the impact.

Other correct answers are possible and the candidate would gain marks from these.

## 7.5 USING SOURCE MATERIAL

The candidate may have to use a scenario created by the question in order to provide an answer.

Questions such as 'With reference to' or 'Relating your answers to ABC plc', give specific instructions to the candidates. Answers to questions containing these phrases should be related to the scenario.

For example:

*A newsagent's shop is one in a chain of 500 shops. Each shop typically offers for sale supplies of twelve daily newspapers, six Sunday papers with supplements and eighty monthly magazines. Details of each newspaper are held on the computer in a flat file with fixed length records. The primary key in each record is a two-character code representing the title of the newspaper or magazine.*

There would then follow a number of questions related to this scenario. The scenario may reflect a real situation or not as the case may be. Even if the candidate has never come across the given scenario it should be used since this is what is done at the present. Each question should be answered within the context of the scenario. General answers should not be given.

## 7.6 EXPRESSING AN OPINION

Higher order questions, where a large number of marks are available, expect the candidate to express (and maybe justify) an opinion.

These are more open-ended questions and candidates need to think carefully about how to structure their answers to obtain all the marks available.

The use of examples and fully developed responses considering all aspects of the question asked is often essential if candidates are to convince the examiner that they understand the topic.

At no time will a question be asked such as 'What do you think ...?' This is because the answer must always be correct since it is the candidate's opinion!

## 8 EXTERNAL RESOURCES

### 8.1 OCR COMMUNITIES

There is an ICT community:

<http://social.ocr.org.uk/groups/ict> available to teachers.

It is a discussion group and contains a web space that contains documents that are useful to the delivery of the specification.

### 8.2 ENDORSED PRODUCTS

The following products are endorsed by OCR:

OCR ICT for AS ISBN 9781444168600

OCR ICT for A2 ISBN 9781444168624

OCR ICT for AS Revision Guide ISBN 9781444110937

OCR ICT for A2 Revision Guide ISBN 9781444111231

OCR ICT AS Dynamic Learning ISBN 9780340967003

OCR ICT A2 Dynamic Learning: ISBN 9780340972793

Exam Question Software

[http://www.examquest.co.uk/sec/pinfo.asp?ver=12&pid=RA\\_ICT](http://www.examquest.co.uk/sec/pinfo.asp?ver=12&pid=RA_ICT)

### 8.3 OTHER RESOURCES

Other resources include coursework consultancy, access to the Qualifications Manager and Senior Assessors. There are also past papers and mark schemes, reports on the examinations, sample projects and FAQs.

To give us feedback on, or ideas about the OCR resources you have used, email [resourcesfeedback@ocr.org.uk](mailto:resourcesfeedback@ocr.org.uk)

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