# GCE AS

## Information and Communication Technology

## Summer 2009

# Mark Schemes

Issued: October 2009

**NORTHERN IRELAND GENERAL CERTIFICATE OF SECONDARY EDUCATION (GCSE)**
**AND NORTHERN IRELAND GENERAL CERTIFICATE OF EDUCATION (GCE)**

**MARK SCHEMES (2009)**

## Foreword

### *Introduction*

Mark Schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

### *The Purpose of Mark Schemes*

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of 16- and 18-year-old students in schools and colleges. The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes therefore are regarded as a part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

The Council hopes that the mark schemes will be viewed and used in a constructive way as a further support to the teaching and learning processes.

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# Information and Communication Technology

## Assessment Unit AS 1

*assessing*

Module 1: Fundamentals of Information and Communication Technology

**[ASW11]**

**THURSDAY 4 JUNE, AFTERNOON**

# MARK SCHEME

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| 1 | (a) | A **direct** data source is designed for a specific data capture purpose<br>The questionnaire was designed to find out shopping habits<br>[1] for each of **two** points<br><br>A data source becomes **indirect** when the data it produces is used for a purpose other than the original purpose<br>[1]<br>The data captured by the questionnaire could be used for a mailing list . . . or sold to a third party<br>[1] for **one** point | [4] | |
| | (b) | How up-to-date the data source is<br>The information will not reflect the current situation<br>[1] for each of **two** points<br><br>How relevant the data source is<br>The information may not include the essential details<br>Some data may have changed, e.g. address<br>[1] for each of **two** points<br><br>How complete the data source is<br>The information may omit essential details<br>Some questions may have been omitted<br>[1] for each of **two** points<br><br>How accurate the data source is<br>The information may be incorrect<br>[1] for each of **two** points<br><br>How well presented the information is<br>It may not be appropriate for its intended audience<br>[1] for each of **two** points<br><br>[2] for each of **four** factors | [8] | 12 |
| 2 | (a) | **Input**<br>The cash card is inserted<br>The PIN is entered<br>A menu choice is selected<br>An amount is entered or selected<br>[1] for each of **two** points<br><br>**Processing**<br>The customer's data is retrieved from the bank's database<br>The PIN is validated<br>The amount is checked against the customer's balance<br>The amount is deducted from the customer's balance<br>[1] for each of **two** points | | |

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| | **Storage**<br>Customer data is stored in the cash card<br>Customer details are stored in the bank's database<br>Details of the transaction are stored in the bank's database<br>[1] for each of **two** points | | | |
| | **Output**<br>Instructions/menu choices are displayed on the ATM screen<br>A receipt may be printed<br>A sum of money is issued<br>The card is ejected<br>[1] for each of **two** points | | [8] | |
| **(b)** | The amount is immediately deducted from the customer's balance<br>. . . so that the balance is always up to date/the customer cannot withdraw an unauthorised amount<br>[1] for each of **two** points | | | |
| | If an error or exceptional condition occurs/the card is invalid/the PIN is incorrect/the withdrawal amount is not possible<br>. . . an error message appears on the ATM screen to which the user must respond<br>[1] for each of **two** points | | | |
| | [2] for each of **two** examples | | [4] | 12 |
| **3** **(a)** | **System software** manages the resources of the computer<br>. . . at a low level/at hardware level, e.g. internal and external memory<br>It includes the operating system<br>. . . and utility programs<br>. . . such as compilers, loaders, linkers, and debuggers<br>Provides the user interface<br>[1] for each of **three** points | | | |
| | **Application software** consists of programs designed for the end user<br>. . . to carry out specific/practical/business tasks<br>Example: internal + external memory<br>It includes generic software<br>. . . such as word processors, databases and electronic spreadsheets<br>. . . and customised software such as payroll software<br>Provides newer interface<br>[1] for each of **three** points | | [6] | |
| **(b)** | Communications software<br>[1]<br>Makes it possible to send and receive data<br>. . . for example emails<br>. . . over a network<br>. . . or over a telephone line through a modem<br>[1] for each of **two** points | | [3] | 9 |

| | | | AVAILABLE MARKS |
|---|---|---|---|
| 4 | (a) | **Checkout operators**<br>Their jobs have become less manual/more productive<br>They have less data entry to perform<br>. . . due to the use of bar codes<br>. . . and card readers<br>. . . and electronic scales<br>They have fewer data inputs/key strokes<br>. . . due to the use of a touch screen<br>They have less arithmetic to perform<br>. . . due to the automatic calculation of sales amounts<br>[1] for each of **three** points [3] | |
| | | **Customers**<br>Queues should be shorter/Price queries should be answered more quickly<br>. . . due to the electronic speed of data input/barcode scanning<br>Receipts should be more accurate<br>. . . due to the reliability of computer calculations<br>Receipts should be more detailed<br>. . . due to electronic access to supermarket's database<br>There should be fewer stock outages<br>. . . due to automatic stock reordering<br>The customer may be able to use a "self checkout"<br>. . . where the customers can scan the items themselves<br>[1] for each of **three** points [3] | |
| | | **Supermarket management**<br>They should have access to better quality information<br>. . . in the form of reports<br>. . . such as up to date sales/stock level figures<br>. . . and detailed sales/stock level figures<br>. . . to enable them to hold optimum stock levels<br>. . . thus minimising costs/maximising profits<br>[1] for each of **three** points [3] | 9 |
| 5 | (a) | He/she enters the search criteria/key words<br>The results will be displayed in order of relevance<br>The search can be restricted to include all words/match an exact phrase/ exclude words<br>The search can be further restricted to specific domains/languages/file types<br>. . . and can be filtered for content, e.g. images<br>The teacher can follow links<br>[1] for each of **four** points [4] | |
| | (b) | The teacher could use the Internet for communication<br>. . . by setting up an email account<br>. . . and creating an address book/list of contacts<br>Emails can be sent to a group of people<br>Attachments can be sent<br>[1] for each of **four** points | |

| | | | AVAILABLE MARKS |
|---|---|---|---|
| | The teacher could use the Internet to disseminate information<br>. . . by making information/educational materials available<br>. . . or posting messages/details of school events<br>. . . by subscribing<br>. . . to an electronic bulletin board/forum<br>[1] for each of **four** points | | |
| | The teacher could access an educational website<br>. . . and obtain resources<br>. . . such as past papers, revision material<br>. . . which can be manipulated electronically,<br>e.g. copy/print/email<br>[1] for each of **four** points | | |
| | The teacher could make an on-line purchase<br>. . . e.g. buy text books<br>. . . by filling a shopping basket<br>. . . and paying by a secure method<br>. . . using a credit/debit card/PayPal<br>[1] for each of **four** points | | |
| | [4] for one method | [4] | |
| **(c)** | Faster download speeds are possible<br>Larger volumes of data can be transferred at a time<br>. . . due to the high bandwidths<br>. . . enabling real-time downloading of music/video<br>. . . or interactive gaming/messaging<br>[1] for each of **two** points | | |
| | Broadband provides a permanent/always open connection to the Internet<br>. . . and there is no need to dial up/log in/log out<br>. . . so users can respond in real-time to emails/businesses can respond in real-time to customer orders or queries<br>A telephone line is unaffected<br>. . . so phone calls can be made while the Internet is being used<br>[1] for each of **two** points | | |
| | [2] for each of **two** points | [4] | 12 |
| **6** **(a)** | **Application testing**<br>Performed by the developer<br>The software is tested against the system requirements<br>It includes module testing<br>. . . integration testing<br>. . . and system testing<br>Test plans are followed/test data is used/valid/invalid/extreme data<br>Black box and white box testing are used<br>[1] for each of **four** points | | |

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| | **Acceptance testing**<br>Performed when the software is ready to be released/handed over to the client/users<br>Intended to give the end users the confidence that the software meets their requirements<br>A group representing the end users tests the application<br>. . . using real world scenarios/data<br>The users report back/provide feedback on any problems<br>Eventually, the users sign off the software/complete the contract<br>[1] for each of **four** points | | [8] | |
| | **(b)** This is performed throughout the active life of the software/it is the last stage in the software life cycle/after implementation<br>During corrective maintenance<br>. . . errors not detected during application/acceptance testing are removed<br>During perfective maintenance<br>. . . the performance of the software is improved<br>During adaptive maintenance<br>. . . additional functionality is added<br>The software will have to be retested<br>. . . to show that errors have been removed<br>. . . to show that additional errors have not been introduced/ regression testing [1] for each of **six** points | | [6] | 14 |
| **7** | **(a)** The software needed to develop the system [1]<br>. . . such as a productivity tool, e.g. Visual Basic<br>. . . must be purchased<br>. . . or a site licence obtained<br>[1] for **one** point<br><br>Additional/new systems software [1]<br>. . . such as a new operating system/utility software<br>. . . must be purchased<br>. . . or a site licence obtained<br>[1] for **one** point<br><br>The software needed to plan the development [1]<br>. . . such as project management software<br>. . . must be purchased<br>. . . or a site licence obtained<br>[1] for **one** point<br><br>[2] for each of **three** costs | | [6] | |

| | | | AVAILABLE MARKS |
|---|---|---|---|
| **(b)** | Hardware costs<br>New PC/components/peripherals/must be purchased/leased<br>. . . communication components/cabling must be purchased<br>[1] for each of **three** points | [6] | |
| | Personnel costs<br>New staff may have to be employed to use the new system<br>Existing staff may have to be retrained<br>Surplus staff may have to be made redundant<br>Technicans may have to be employed to install the system<br>[1] for each of **three** points | | |
| **(c)** | Technical documentation [1]<br>This is used during the development of the system/during maintenance<br>It includes the system specification requirements<br>. . . fact finding results<br>. . . models (DFDs, ERDs, data dictionary)<br>. . . module specifications<br>. . . code listings<br>. . . test plans/data/results/logs<br>[1] for each of **two** points | | |
| | User documentation [1]<br>This is used during the installation/use of the system by end users<br>It includes the HW and SW configuration<br>. . . installation instructions<br>. . . a user guide<br>. . . training materials<br>[1] for each of **two** points | [6] | 18 |
| | | QWC | 4 |
| | | **Total** | **90** |

**Quality of Written Communication (QWC) in GCE Mark Schemes.**

The assessment of quality of written communication.

Marks are to be allocated to QWC in accordance with the following criteria.

| Performance Level | Criteria | Marks |
|---|---|---|
| Threshold | Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately. | 0, 1 |
| Intermediate | Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility. | 2, 3 |
| High | Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy; deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision. | 4 |

Rewarding Learning

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# Information and Communication Technology

## Assessment Unit AS 2

*assessing*

## Module 2: Components of Information and Communication Technology

**[ASW21]**

**FRIDAY 12 JUNE, AFTERNOON**

# MARK SCHEME

| | | | AVAILABLE MARKS |
|---|---|---|---|
| 1 | **(a)** | To store user data<br>. . . 'permanently'/when the computer is switched off/for future access<br>[1] for each of **two** points<br><br>To store application software<br>. . . from where it will be loaded into RAM to be executed/where SW is installed<br>[1] for each of **two** points<br><br>To store the 'non-core' of the operating system<br>. . . from where it will be loaded into RAM to be executed<br>[1] for each of **two** points<br><br>[2] for each of **three** ways [6] | |
| | **(b)** | *Points in italics awarded <u>once</u> only*<br><br><u>CD-R</u><br>Data is written once but can be read many times<br>*Data is burned onto the disk using a laser*<br>The recording surface contains an organic dye<br>. . . which changes colour when heated<br>*. . . to denote 0s and 1s/binary data/pits*<br>*The data is recorded in spiral tracks/The disk has a grooved track to guide the laser*<br>[1] for each of **three** points<br><br><u>DVD-RW</u><br>A recordable medium/ the disc can be erased & recorded over multiple times<br>*Data is burned onto the disk using a laser*<br>The recording surface contains a phase change material<br>. . . which changes from highly reflected to dull when heated<br>*. . . to denote 0s and 1s/binary data*<br>*The data is recorded in spiral tracks*<br>[1] for each of **three** points [6] | 12 |
| 2 | **(a)** | It is more difficult to control access/security<br>Measures are needed to stop users from using programs and data that they do not have access to<br>[1] for each of **two** points<br><br>A network can be difficult/expensive to set up<br>. . . and needs to be maintained by an experienced network manager<br>. . . purchase of network SW/cabling<br>. . . training of users<br>[1] for each of **two** points<br><br>If the file server fails<br>. . . all the users are affected<br>. . . not just one user as in the case of a stand-alone computer<br>[1] for each of **two** points<br><br>[2] for each of **two** disadvantages [4] | |

| | | | AVAILABLE MARKS |
|---|---|---|---|
| **(b)** | A <u>star network</u> consists of a central computer or hub<br>. . . to which all the other computer/nodes in the network are directly connected<br>The central computer which acts as a coordinator transmitting messages<br>All communication/data transmission is via the central computer<br>[1] for each of **three** points<br><br>All the computers in a bus network share a single communications line/backbone<br>. . . which has terminators at each end<br>All computers are connected directly to the bus<br>Collision handling must be used<br>[1] for each of **three** points | [6] | |
| **(c)** | <u>Star</u><br>Only data transfer/communication between the server<br>. . . and the appropriate node is affected<br>[1] for each of **two** points<br><br><u>Bus</u><br>If the bus fails, all data transfer/communication may fail<br>the position of the break may effect the severity of disruption<br>If a link from a node to the bus fails, only data transfer/communication to/from the node is affected<br>[1] for each of **two** points | [4] | 14 |
| **3** **(a)** | It performs comparisons operations/decisions<br>. . . such as '1s a value >0', '1s a value <0', 1s a value =0'<br>[1] for each of **two** points<br><br>It signals/flags special conditions/error conditions<br>. . . such as a zero result or the setting of a carry bit<br>[1] for each of **two** points<br><br>It performs Boolan logic operations<br>. . . such as AND/OR/NOT<br>[1] for each of **two** points<br><br>[2] for each of **two** functions | [4] | |
| **(b)** | Component Control unit [1]<br>Purpose Maintains the proper sequence of events required for the processing task/program instructions [1]<br>Component Internal memory/IAS [1]<br>Purpose Stores (temporarily) the results of calculations/processing<br>Stores SW currently in use [1]<br><br>[2] for each of **two** components | [4] | 8 |

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| **4** | **(a)** | Formula<br>An arithematic calculation can be performed automatically<br>Example D3 contains the formula B3 + C3<br>[1] for each of **two** points<br><br>Cell Formatting<br>The appearance of the contents of a cell can be specified/altered<br>Example B3 is displayed as currency<br>[1] for each of **two** points<br><br>Function<br>A complex/specialised calculation can be performed automatically<br>Example D9 contains the function SUM(D3:D7)<br>[1] for each of **two** points<br><br>Cell replication<br>The contents of one cell/a range of cells can be copied and pasted to other cells/a range of cells and updated accordingly<br>Example The formula is cell B9 can be copied to cells C9:D9<br>[1] for each of **two** points | [8] | |
| | **(b)** | The value in cell G3<br>. . . which is the percentage increase in salary<br>. . . can be changed to see the effect of different percentage increases<br>[1] for each of **three** points | [3] | 11 |
| **5** | **(a)** | Icons<br>Each icon represents a task/program/option<br>. . . using a common/intuitive symbol/shape/picture/image<br>The user clicks the icon<br>. . . to activate it<br>[1] for each of **three** points<br><br>Menus<br>The menu contains a list of options<br>The user clicks the required option<br>A sub menu will appear<br>. . . pop-up/pull-down menus<br>Some options may include shortcuts<br>[1] for each of **three** points<br><br>Windows<br>Each window has a standard layout<br>. . . with maximise/minimise/close icons<br>. . . and represents a separate application/task<br>Windows can be resized<br>Windows can sometimes be personalised<br>A number of windows can be open at the same time<br>. . . but at any time only one of them will be active<br>The user can interact with the active window<br>. . . and switch between windows<br>Data can be moved/copied between windows<br>[1] for each of **six** points | [12] | |

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| | **(b)** | The list of commands must be known in advance/learned<br>There are usually a large number of commands<br>[1] for each of **two** points<br><br>Commands must be typed very accurately<br>If there is even a single spelling mistake/syntax error, the command will fail<br>[1] for each of **two** points<br><br>A CLI is not intuitive<br>If you do not know the correct command, you can't just try and guess what the command might be<br>[1] for each of **two** points<br><br>[2] for each of **two** disadvantages | [4] | 16 |
| **6** | **(a)** | Range check<br>The data must lie within two limits/be greater or less than a value<br>[1] for each of **two** points<br><br>Format check/input mark<br>The data must comply with a specific syntax/picture such as ddmmyyyy<br>[1] for each of **two** points<br><br>Type check<br>The characters in the data must be text and/or numerics<br>[1] for each of **two** points<br><br>Presence check<br>The data value must be supplied<br>[1] for each of **two** points<br><br>Length check<br>The number of characters must match a set value<br>[1] for each of **two** points<br><br>Existence check<br>. . . from a lookup table<br>[1] for each of **two** points<br><br>[2] for each of **three** validation checks | [6] | |
| | **(b)** | The correct PIN includes a check digit<br>When the incorrect PIN is input, the check digit is re-calculated<br>The calculated check digit will not match the check digit in the incorrect PIN<br>[1] for each of **three** points | [3] | |
| | **(c)** | To ensure that the data which is input<br>. . . is as intended/matches the source document<br>It is a human responsibility<br>[1] for each of **two** points | [2] | |

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| | **(d)** | Proof reading [1]<br>The data input operator would be required to confirm that the details that have been entered are correct. [1]<br>Double entry [1]<br>A second data input operator enters the data and the computer checks that it matches the first data entry. [1]<br><br>[2] for **one** verification check | [2] | 13 |
| **7** | **(a)** | There may be duplication of data/data redundancy<br>The same (non-key) data will be stored more than once<br>This will require more storage space than is actually needed<br>[1] for each of **two** points<br><br>There may be data inconsistency/poor data integrity<br>The same attribute may have different values in different files<br>[1] for each of **two** points<br><br>[2] for each of **two** problems | [4] | |
| | **(b)** | The following tables will be created<br>CUSTOMER<br>PRODUCT<br>INVOICE or ORDER<br>INVOICE-LINE or ORDER-LINE<br>[1] for each of **four** tables<br><br>Each table will have a key field<br>… such as CustomerID/ProductID/InvoiceNumber<br>[1] for each of **two** points<br><br>The tables will be linked<br>… by a composite key<br>… such as InvoiceNumber + ProductID<br>[1] for each of **three** points<br><br>MAX [5] | [5] | |

| | | | AVAILABLE MARKS |
|---|---|---|---|
| **(c)** | A query is created<br>. . . identifying the search criteria<br>This identifies the tables<br>. . . and attributes<br>. . . and conditions<br>A report is attached to/created from the query<br>. . . describing how the query results should be displayed<br>. . . such as header/footer/attributes<br>A wizard maybe used<br>Prompts are provided<br>The user selects tables/fields<br>Data may be ordered<br>Formatting can be set<br>[1] for each of **three** points | [3] | 12 |
| | | QWC | 4 |
| | | **Total** | **90** |

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| High | Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy; deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision. | 4 |