

**GCE A2**

**Information and  
Communication Technology**

**January 2009**

**Mark Schemes**

Issued: April 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 A2 1**

*assessing*

**Module 4: Development of Information Systems**

**[A2W11]**

**FRIDAY 16 JANUARY, MORNING**

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**MARK  
SCHEME**

- 1 (a) (i) Off-the-shelf**  
 Cheaper  
 ... as development costs shared among many users  
**Outsourced**  
 The full development costs must be met by the procurer  
 [1] for each of **three** points [3]
- (ii) Off-the-shelf**  
 Immediate  
 ... as it is already available  
**Outsourced**  
 All the development stages must be carried out  
 [1] for each of **three** points [3]
- (iii) Outsourced**  
 Should meet the exact needs of the user  
 ... as it is specially developed for them  
**Off-the-shelf**  
 Designed for a group of users/typical users  
 [1] for each of **three** points [3]
- (b) "In house"**  
 [1]  
 The software is developed by ICT specialists/a special ICT department  
 ... already employed/from with the organisation  
 A system is developed from scratch  
 ... which should meet the exact needs of the users  
 [1] for each of **two** points [3]

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- 2 (a) To enable hardware devices from different manufacturers  
... to pass data/message to one another in a coherent way  
... using agreed formats/error handling/speeds  
[1] for each of **two** points [2]
- (b) (i) Each node/station listens to see if the network is busy  
... before starting to transmit data  
If the network is free, the station transmits data  
A collision occurs when two nodes/stations start to send data  
simultaneously. When a collision is detected, both stations will  
retransmit the data after a random period of time  
... determined by a “back off” algorithm  
[1] for each of **three** points [3]
- (ii) Consists of two layers  
FTP supports the transfer of files between computer systems  
TCP deals with data packets  
... and is responsible for verifying the correct delivery of data  
... by detecting errors or lost data  
The IP uniquely identifies the address  
This is used to control source/destiny  
[1] for each of **three** points [3]
- (c) (i) Fibre optic cable has a greater data transfer capacity than co-axial  
cable  
... because many frequencies/data signals can be sent simultaneously  
[1] for each of **two** points [2]
- (ii) Fibre optic cable is less susceptible to signal interference  
than co-axial cable  
... because it uses light/because co-axial cable uses electrical signals/  
is made of copper  
[1] for each of **two** points [2]

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- 3 (a)** General environmental factors  
 ... such as lighting, ventilation, noise  
 [1] for each of **two** points
- Computer environment factors  
 ... such as desk and seating layouts/screen positions  
 [1] for each of **two** points
- Health factors  
 Use of ergonomics to reduce RSI, skeletal disorders  
 [1] for each of **two** factors
- [2] for each of **three** factors [6]
- (b)** Human perception  
 How users identify, interpret or attach meaning to what they experience  
 through their senses  
 ... particularly visual perception/colours/shapes/movement  
 ... and auditory perception/sounds/beeps  
 [1] for each of **three** points [3]
- Human memory  
 The difference between long-term  
 and short-term memory  
 Short-term memory should not be overloaded/humans can store only between  
 5 and 9 pieces of information in short-term memory  
 Options should be clearly visible/menus or icons should be used  
 Standard interfaces should be used  
 [1] for each of **three** points [3]

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- 4 (a) More efficient processing  
Data can be stored/processed where it is generated/created/most used/needed  
[1] for each of **two** points
- More efficient use of resources  
There is no need for a fully resourced central processing location  
[1] for each of **two** points
- More secure from natural disaster  
... it is unlikely that all sites would be damaged  
[1] for each of **two** points
- Less reliant on telecommunications  
... less data transfer over long distances  
[1] for each of **two** points
- [2] for each of **two** advantages [4]
- (b) More difficult to update a master file  
... since modifications may have been made at a number of locations/  
a number of copies may exist  
[1] for each of **two** points
- More difficult to control data security  
... as data is held in a number of different places  
[1] for each of **two** points
- [2] for each of **two** disadvantages [4]
- (c) Read and copy  
A user is permitted to make a copy data and edit it  
[1] for each of **two** points
- Read and update/write  
A user is permitted to read data and make changes to it  
[1] for each of **two** points
- [2] for each of **two** types of access [4]
- (d) The identity of each logged-on user  
The time each user logged on/off  
The terminal/location each user logged on to  
The files/data files/software accessed by each user  
Data modifications by each user  
Unsuccessful logon attempts  
[1] for each of **four** points [4]

- 5 (a) To oversee/manage the development of the new system  
 To schedule the project/set timescales  
 To manage the budget  
 To allocate resources – human, hardware, software  
 To monitor progress  
 To identify/respond to risk/bottlenecks  
 To report to management/clients  
 [1] for each of **five** points [5]
- (b) (i) To assist the creation of DFDs, ER diagrams  
 A set of standard model shapes  
 ... can be electronically manipulated/saved/edited/re-used  
 Models can be validated  
 [1] for each of **three** points [3]
- (ii) The dictionary is automatically populated  
 ... with entities/data flows/data stores/processes  
 ... as models are created/modified  
 The dictionary can be edited electronically, e.g. process descriptions  
 inserted  
 [1] for each of **three** points [3]
- (iii) Program code will be created automatically  
 ... from user interface designs/input output specifications  
 ... or formal module specifications  
 The code can be edited electronically, e.g. comments inserted  
 [1] for each of **three** points [3]

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- 6 (a) (i) Performed by the developer  
 Module testing  
 Each module is tested against its specification  
 Integration testing  
 The modules are tested working together  
 System testing  
 The software is tested against the system specification  
 [1] for each of **three** points [3]
- (ii) Performed after alpha testing  
 Pre-release testing  
 The software is tested by a group of potential/representative users  
 ... in realistic conditions/using real data  
 The users provide feedback to the developers  
 [1] for each of **three** points [3]
- (b) Regression testing  
 All the original testing involving the module must be carried out  
 ... using the original test data  
 Module testing will be performed  
 Any integration testing involving this module will be performed  
 At least partial system testing will be carried out  
 [1] for each of **four** points [4]

- 7 (a) The many-to-many relationship must be resolved/replaced by two one-to-many relationships  
 [1]



- [1] for ComponentCar entity  
 [1] for each of **two** relationships [4]

- (b) There will be three tables  
 ... one for each entity/Component/Car/ComponentCar  
 Each table will have a key field  
 ComponentId for the Component table  
 CarId for the Car table  
 ComponentId+CarId for the ComponentCar table  
 The relationships will be used to create links between tables  
 [1] for each of **six** points [6]

Quality of written communication

**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.

<b>Performance Level</b>	<b>Criteria</b>	<b>Marks</b>
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



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**Information and Communication Technology**

Assessment Unit A2 2

*assessing*

Module 5: Uses of Information Systems

**[A2W21]**

**FRIDAY 16 JANUARY, MORNING**

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**MARK**  
**SCHEME**

- 1 (a) The DVD can contain multimedia materials/animations/spoken words/movies ... while the printed version can only contain static text and textures  
[1] for each of **two** points

The DVD can include a variety of navigation methods/the user can search for help on a topic and go automatically to the appropriate part of the DVD ... whereas the printed version can only be used sequentially or via an index  
[1] for each of **two** points

One DVD could replace a number of bulky manuals ... due to its greater capacity  
[1] for each of **two** points

[2] for each of **two** advantages [4]

- (b) The user could use the trouble shooting section ... and follow appropriate questions and answers ... until a solution to the problem is found  
Alternatively, the user could look up the problem in the index ... and be directed to the section dealing with the particular problem  
[1] for each of **four** points [4]

- (c) A help-line  
The user can phone a special number/or follow a link to the number  
The user will be able to choose from a list of help-related options ... to hear a possible solution to the problem ... or the user could speak to a person experienced in using the system ... or with access to a database of common problems and their solutions  
[1] for each of **two** points  
[1] for each of **four** points [4]

12

- 2 (a) It will assist employees/managers dealing directly with actual sales  
They will use detailed sales figures reports ... to make immediate/short-term decisions on ... which products are more popular and need reordered in greater quantities ... which products are less popular and need reordered in smaller quantities  
[1] for each of **four** points [4]

- (b) It will assist middle managers responsible for planning  
They will use both reports to help them make medium-term decisions on ... how to respond to sales trends ... or changes in customer shopping habits ... by introducing new stock lines  
[1] for each of **four** points [4]

(c) Strategic decision making  
 It will assist top level managers/the supermarket's directors  
 ... to plan the future of the supermarket  
 ... by identifying long-term trends in sales/customer shopping habits  
 ... to help them decide on expansion of the business  
 [1] for each of **four** points [4] 12

3 (a) (i) The data processing will deal with daily transactions  
 ... sales and rentals  
 ... and updating the stock and customer databases  
 [1] for each of **three** points [3]

(ii) The information system will use data from the data processing system  
 ... and provide queries and reports  
 ... about sales/rentals/customers  
 [1] for each of **three** points [3]

(b) (i) Current sales and rentals  
 ... so that they can identify popular/unpopular movies/rental periods  
 [1] for each of **two** points

Current costs e.g. rent/heating/light/wages  
 ... so that profitable rental rates/selling prices can be determined  
 [1] for each of **two** points

A survey of their own customers  
 ... to enable them to decide what films to stock  
 [1] for each of **two** points  
 [2] for each of **two** sources [4]

(ii) Rental charges/selling prices of competitors  
 ... so that competitive rental rates/selling prices can be set  
 [1] for each of **two** points

News about upcoming blockbusters/surveys of movie goers  
 ... so that they can decide what new movies to stock  
 [1] for each of **two** points

Technology innovation  
 ... to anticipate new media  
 [1] for each of **two** points

Relevant legislation  
 ... e.g. changes to film classifications  
 [1] for each of **two** points  
 [2] for each of **two** points [4] 14

- 4 (a) (i) A mirror copy of the data should be kept  
... on a separate computer system/RAID  
If the live system fails  
... the organisation can switch automatically to the mirror system  
[1] for each of **four** points [4]
- (ii) The backup should be performed at regular intervals  
Only data which has changed since the last backup needs backing up/  
A complete backup can be performed  
The backup should be stored away from the computer system  
In the event of data loss, the backup copy can be retrieved  
[1] for each of **four** points [4]
- (b) The critical resources involved  
... personnel/data/hardware/software  
[1] for each of **two** points
- Confidentiality of data  
How Data Protection Legislation will be implemented  
[1] for each of **two** points
- Acceptable use policy  
Employer's and employee's responsibilities regarding copyright/use of ICT  
including e-mail and the Internet  
[1] for each of **two** points  
[2] for each of **two** sections [4]
- 5 (a) The expert system can diagnose a wider range/more up to date range of  
illnesses  
... than an individual doctor/consultant  
[1] for each of **two** points
- The expert system will produce more consistent diagnoses  
... as it is programmed  
... unlike a human who can be erratic due to external distractions, for example  
[1] for each of **two** points
- The expert system can improve the productivity of a doctor/consultant  
... who can focus on dealing with the patient once the diagnosis is known  
[1] for each of **two** points
- Patients may respond more accurately/confidentially  
... to a machine  
[1] for each of **two** points
- [2] for each of **two** benefits [4]

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- (b) The user interface  
 ... where the user responds to questions and prompts  
 [1] for each of **two** points
- The inference engine  
 ... which applies the rules in the rule base to a specific situation  
 [1] for each of **two** points
- The knowledge base  
 ... what is known about diseases/illnesses  
 [1] for each of **two** points
- [2] for each of **two** components [4]

- (c) An expert systems designer/developer  
 ... possibly by using a shell  
 ... will question a range of medical consultants/doctors  
 ... or consult medical textbooks/encyclopaedias  
 ... about symptoms of the widest possible range of illnesses
- Connections will be identified  
 ... between symptoms and illnesses  
 [1] for each of **two** points
- [1] for each of **four** points [4]

12

- 6 (a) Maintain the structure of the database/database design  
 Maintain the data dictionary  
 Identify new tables/relationships  
 Create pre-set/standard queries/reports  
 [1] for each of **two** points
- Configure hardware  
 ... and install new versions of software  
 [1] for each of **two** points
- Maintain user accounts  
 Add/remove users  
 Allocate user names and passwords  
 [1] for each of **two** points
- Maintain the security of the data  
 ... oversee backup and recovery  
 ... assign access rights to users/create user profiles  
 [1] for each of **two** points
- [2] for each of **two** responsibilities [4]

		AVAILABLE MARKS
<p><b>(b)</b> Data maintenance Appropriate users will be able to insert data/delete data/update data [1] for each of <b>two</b> points</p> <p>Information retrieval Users will be able to run preset queries and reports Users will be able to create ad hoc queries and reports [1] for each of <b>two</b> points</p> <p>[2] for each of <b>two</b> facilities</p>	[4]	
<p><b>(c)</b> Obtaining information should be more efficient ... as there will be no data redundancy ... so there will be less data in the database</p> <p>The information should be more accurate/improved data integrity ... as there will be no data inconsistency [1] for each of <b>four</b> points</p>	[4]	12
<p><b>7</b> Staff working in the office Many of the staff's previous duties will be carried out by computer ... for example, handing over a ticket in exchange for payment ... so fewer staff may be required They will handle less cash Staff will need to be trained to sell tickets using the computerised system Staff will have more time for other duties e.g. sending out mail shots [1] for each of <b>four</b> points</p> <p>The cinema's manager ... will have access to improved information ... about bookings/booking patterns ... from regular reports The cinema's manager will be able to make more informed decisions ... about when to stop showing a film [1] for each of <b>four</b> points</p> <p>The cinema's customers ... will be able to book tickets 24/7 ... or from any Internet connection ... will be able to check film times without going to the cinema/looking up the local press ... will be exposed to the risk of computer fraud ... will be able to compare prices and times with other cinemas [1] for each of <b>four</b> points</p>	[12]	12
<p>Quality of written communication</p>		4
<b>Total</b>		<b>90</b>

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