GCE AS MARKING SCHEME

SUMMER 2019

A2 (NEW)
INFORMATION AND COMMUNICATION TECHNOLOGY - UNIT 3
1530U30-1

INTRODUCTION

This marking scheme was used by WJEC for the 2019 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCE INFORMATION AND COMMUNICATION TECHNOLOGY

SUMMER 2019 MARK SCHEME
GCE IT3

<table>
<tr><td>1</td><td>Award a maximum of 3 marks for each factor x2

Indicative content

<table>
<tr><td>Disabled Access</td><td>• Visually impaired people can have their screens configured using large fonts.
• Magnify areas of the screen for people with poor eyesight.
• Visually impaired people can also use special Braille keyboards to enter the data and can use Braille printers to produce output which other blind people can read.
• Visual messages on screen instead of sound for the deaf.
• Use of correct colour schemes for colour blind people.
• Use large mouse or trackerball for people with poor co-ordination.
• Blow pipes (sip and puff switches) or eye movements for entering text controlling devices for those who cannot use their arms, etc.
• Brainwave controlled devices for physically handicapped with no arm/hand movement.
• Voice recognition software or foot mouse for users who cannot use their hands.
• Sans serif fonts for dyslexic users.</td></tr>
<tr><td>Expertise of the user</td><td>• Could provide tutorials for novice users / Novices will need easy access to help
• Step by step approach / novice users should never be left wondering what to do next / wizards
• Novice users tend to stick to the mouse/touch screen / Graphical user interface (GUI)
• Novice user will need clear navigation structure / colour scheme making it easier to use i.e. showing routes through a program (hyperlinks)
• Provide shortcuts for experts / command line interface
• Experts often type at high speed and can memorise key combinations/commands (1) and this is faster than using the mouse and clicking on icons or going through a series of windows
• An expert can customise the interface to suit their needs
• Increased numbers of ways of performing the same operation – interfaces have a number of routes and allow the user the choice, i.e. a novice user would prefer to use a drop down menu or click on an icon to print whilst an expert will want to use CTRL/P</td></tr>
</table>
</td><td>2X3</td></tr>
</table>

<table>
<tr><td>2</td><td>Award 1 mark for definition and award up to 2 marks for advantages

EDI is the computer-to-computer exchange of business documents in a standard electronic format between business partners (1)

<table><tr><td>Cost effective</td><td>Cutting paper and all paper processing quickly reduces paper cost. (paper buying, post cost, proof reading costs, document storage costs)</td></tr><tr><td>Accuracy/error control</td><td>Cloud computing and machine learning eliminates computational repetition, redundancies and errors that would be more common among humans. Reduces reprocessing work. Reduces typing errors</td></tr><tr><td>Speed</td><td>The electronic transfer of data ensures more consistency and accuracy without sacrificing pace/ immediate transmission of shipping notices</td></tr><tr><td>Service</td><td>Faster processing means better customer service, over all; helping a company expand their customer base; improves relationship with customer as kept better informed</td></tr><tr><td>Environmental issues</td><td>Less use of paper/ink etc</td></tr></table></td><td>3</td></tr>
<tr><td>3</td><td>Award no mark for the factor but up to a maximum of 3 for the expansion

<table><tr><th>Factor</th><th>Expansion</th></tr><tr><td>Catalogue of stock for sale</td><td>Keeping stock database containing all the details prices descriptions etc of the products for sale Catalogue of stock, stock database/table so that one can immediately see if something is available or whether there will be a delay.</td></tr><tr><td>Database of customer orders</td><td>As a customer enters the goods he want into his shopping basket the system must store these details in a customer’s orders database</td></tr><tr><td>Track progress</td><td>Order/bid tracking / email confirmation.
Some sites allow you to keep track of the progress of your order</td></tr><tr><td>Maintenance</td><td>Maintaining a company web site and keeping prices etc up to date, advising on out of stock products. / need for trained staff.</td></tr></table></td><td>3</td></tr>
</table>

4	**One mark for each factor and one for each further explanation x 3** **Context must relate to a company or be neutral** **Identify potential risks** e.g. viruses / fire / natural damage / hacking / systems failure / fraud, etc **Likelihood of risk occurring** - some things such as power cut are inevitable but explosions much less likely - senior managers have to assess the likelihood of each risk occurring and put in the necessary security **Short and long term consequences of threat** - resources (staff, equipment, etc) need to be directed towards recovering the data / may have to pay compensation / financial loss due to loss of business through not being able to sell mortgages, loans etc. / embarrassment/ prosecution / loss of integrity / bankruptcy / cost of replacing equipment / alternative premises **How well equipped is the company to deal with the threat** (What procedures are in place) - has to be reviewed periodically because of changing needs - disaster recovery programme - backup strategy - cost (how much they are prepared to spend), use of firewalls - use of anti virus **NB Should not be talking about Health & Safety**	4x2
5	**Award 1 mark per advantage/ disadvantage up to a maximum of 6** **Indicative content:** **Advantages of mesh** • Fault tolerant – if one of the cables/routes fails, then the other computers can still be used. • Easy to add extra computers – extra computers can be added without disturbing the network. • Data can be transmitted from different devices simultaneously, Can withstand high traffic • Reduces dead spots – improves coverage • Can give faster streaming speeds than conventional single routers • Can be used to propagate a wireless network **Disadvantages of mesh** • There are high chances of redundancy in many of the network connections • Overall cost of the network is high compared to other networks • Set-up and maintenance of this topology is very difficult. • Harder to administer the network. **N.B. Do not accept points which are really about peer to peer or client server Networks OR the same point for both**	6

6	**Award 1 mark for the factor (up to a maximum of 4) and 1 mark for expansion/example x4** **Accuracy and relevancy of the data** The data used from the transaction systems that supply data to the management system must have passed a data validation and verification check. Avoid information overload by not producing any data that is not needed as this can waste time and make the information harder to use. (Can't see the wood for the trees). **Present data in the most appropriate format** Managers will need the data presented in the easiest form for them to interpret; some will want it in tabular form and some in graphical. **Accessible to a wide range of users / Different expertise** Can be used by managers who have a range of ICT skills and knowledge. **Give information when required** Timing is critical as there is no point in giving good information after the date it is needed for. (Implication of deadline).	4x2
7	**Award 1 mark per advantage/ disadvantage up to a maximum of 6 (need at least 2 of each for max)** Indicative content **Advantages** • Cost efficiency- elimination of investment in standalone software/servers/ save on licensing costs • Convenience and continuous availability – services are available wherever the end user is located/server uptime better • Backup and Recovery – process is simplified as not on a physical local device • Environmentally friendly – takes fewer resources to compute hence saving energy and local machine not on all the time • Resiliency and Redundancy – built on robust architecture and automatic fall-over between hardware platforms • Scalability and Performance – scalability is built in to cloud deployments and customer only pays for what they use instead of having to buy a lot of extra not being used • Increased Storage Capacity – Can store much more data compared to a PC • Device Diversity and Location Independence – can access the data at a variety of devices and from a lot of different locations • Smaller learning curve • Collaborative working **Disadvantages** • Security and Privacy – could argue that a company is giving away private data that might be sensitive and confidential • Dependency – hard to migrate from one provider to another • Technical difficulties and Downtime – If something goes wrong it is out of the user's control • Increased vulnerability – exposed on the public internet • Increasing cost of storage • More complex systems administration of data and services • Need for a fast reliable broadband • Online versions of software may not have the same functionality as the full client.	6

8	**4 out of the following (Legal (1) Moral (1))x4**	4x2

Factor	Legal	Moral
Intellectual Property Rights	**Copyright Act** Do not copy software/documents for use where not authorised **Computer Misuse Act** Do not copy programs/files/ data/music Do not steal / damage hardware • If you scan in the text of the book 'The Da Vinci Code' and put it on the Internet for all to be freely read; are you breaking the law? • Can you sue someone who sells you an essay which is full of factual errors? The growth and exchange of ideas on the Internet has led to many legal disputes and lack of legal clarity as to one's intellectual property rights. Do the Copyright Laws of one country apply to another country? Free access principles were applied to 'text of books, music, essays. There is an ongoing argument between organisation trying to protect the earning potential of their products and those who do not want to see the Internet become 'owned and controlled' by a few large corporate organisations as the media has become.	Should you use a resource that you have found on the internet? If you see a resource on the Internet can you sell that resource to another company? How do you attribute something when you do not know the author on the internet If you put a resource on the Internet do you own it?

Disinformation	Legal – Estate Agent putting false information in adverts or creating false websites. *Estate Agent* Legal requirements = **Properties Act** *Hardware & software sales* **Legal requirements = Trade Descriptions Act**	a property developer not telling his client the property has subsidence problems or a violent history Moral – not fully informing potential customers or clients of all available facts concerning products or services e.g. imminent introduction of new models salespersons selling hardware and software soon to become obsolete ensure salesmen do not pressurise unwilling customers to accept e.g. loyalty cards, instore credit accounts or particular brands Employees shall not misinterpret or selectively withhold information on capabilities of products, systems or services Employees must not persuade or give opinions on other products or services they have an interest in Employees shall complete work on time and to budget and shall advise their client as soon as practical if they cannot do so
Privacy	Legal requirements = Data Protection Act Informing data subjects of their legal rights and processes for complying with those rights. Selling on private information Don't access other people's files/No Hacking	Monitoring company emails. Electronic monitoring systems can be used to track emails. A systems technician might open other people's emails to detect misuse or simply to be nosey. an employee using company data to create mailing lists for his own private home business

	Employment Patterns	**Effects upon the workforce.** ICT has transformed the workplace • Some people have been de-skilled by the arrival of ICT and their skills are no longer required and they lose their jobs • Others have gained and have the required skills e.g. computer Programmers **Personal empowerment.** • There have been changes in working patterns e.g. teleworking • Businesses are able to reach a wider market via the Internet e.g. Individuals can sell goods on Ebay	• Call centres have caused many people to lose jobs as they have been moved abroad where labour is cheaper leading to ICT 'sweat shops' • Impersonal communications e.g. being sacked by email / text • Stress and mental health issues caused by isolation • Wasting work time by going on social media.	

9	**Award a maximum of two marks per factor x3** **Three factors and any relevant point for each** Some examples are shown **Economic and technological factors** In developing countries we can all guess that money isn't something everyone has, and every on that does have it, doesn't have a lot of it, how does this effect the gap? Well these people simply do not have the money to buy the equipment needed to bridge the gap, and in most cases, countries that are in poverty are more worried about the basic things of life such as clean water, teaching hygiene and putting food on the table, than they are about getting a computer so that they can access the internet! **Social factors –fear of technology, lack of motivation, lack of training** It has been stereotyped that girls are all about make up and doing their hair and boys are all about their gadgets. Because of this stereotype the female sex is not encouraged enough to actually go forward and use the technology that is so readily available, they feel as if it's not meant for them and so in turn don't have the confidence to use this. It seems as if industries seem to aim their products at the male sex, using advertisements that appeal to them etc. and the females don't feel the need to catch onto the technology needed. Age can be treated in the same way. **Geographic factors (location)** Access to the world of information is also dependent on where you live. In the UK, some areas have access to broadband connections - some do not. In rural areas there may be fewer schemes for community access to the Internet (libraries, cybercafes etc). Geographical location may influence a person's wealth or education. Wealthier families are more likely to have Internet access at home. There may be more ICT-related job opportunities in large cities...so the need to use digital technology will be greater. Internet access also depends on which country you live in. Some countries have better communications links than others. There may be poor links in countries that have large areas with few people (eg deserts, mountains) The governments of some countries have schemes for education that involve providing hardware and Internet access for educational institutions as well as for communities. Schools, colleges and libraries may be connected to the Internet. The governments of poorer countries will not be able to do this.	3x2

10	**Award 1 mark for the factor and 1 mark for an extension x3** • *System Access*-- user ids, passwords, levels of access (e.g. who can update web pages) firewalls, encryption i.e. establishing procedures for accessing data such as logon procedures. firewalls • Continuous investigation of irregularities i.e. query any transactions that are out of the ordinary for customers • Prevention of misuse- staff screening, routines for distributing viruses, establish security rights for updating web pages, establish disaster recovery procedures • Personnel administration – training (including prevention of accidental misuse) , fitting the employee to the task, ensuring that staff are controlled, staff screening • Operational procedures including disaster recovery planning and dealing with threats from viruses, backup, updating antivirus • Audit trails for detection – to see who, what, where • Staff code of conduct and responsibilities, e.g. Downloading from the internet, bringing in USB sticks • Disciplinary procedures – verbal warning, written warning, final warning etc. **Extensions can appear under many factors BUT only award the first time you see it**	3x2
11	**Award up to a maximum of 2 marks for each factor x3** **How the system will be used** • What type of applications do users require? / Are the users going to require a wide range of applications? • Will they need large data storage? / Are they going to store a large number of data files? • From where will they operate the network e.g. at home in office or remote access from different locations. / Where does the processing get done? **Performance in terms of: speed of processing** • Different parts of the organisation may have different performance requirements. • Real-time e-commerce system may require greater speeds. **NOT just "faster networks"** A good example can cover these points **Cost of the network** • Initial purchasing of equipment. • Installation and training. • Maintenance / Personnel costs. • Size of the available budget will determine what can be done e.g. fibre optic cable is faster but is also more expensive. • Wireless systems are flexible but need more maintenance.	3x2

<table>
<tr><td>12</td><td>Award one mark for a description of any three of the following and award a second mark for example/extension x3

Consistency - Data consistency is the relationship between the input data, the processed data and the output data as well as other related data.(1) If the system is working properly the data will be correct at each stage and is said to be consistent.(1)
OR
Data consistency is using one file to hold a central pool of data. / A company may hold all its customer data in one file. (1) This avoids the need to input data twice so that if data is changed in one file it won't need to be changed in another and remains consistent.(1)
OR
Data being inconsistent in a flat file due to possibility of different formats etc (1) and being consistent in a RDBMS as each record is only stored once so cannot have different attributes(1)

Redundancy Data redundancy is where you store an item of data more than once / A company may hold its data in different files.(1) This is wasteful because some data may need to be input twice and if data is changed in one it will need to be changed in the other. / Data which is repeated unnecessarily is called redundant data.(1)

Independence Data independence – the data and the applications/programs used to access it are independent/separate.(1) New applications can be developed to access the data without changing the data / New systems can still use existing data. (1)</td><td>3x2</td></tr>
<tr><td>13</td><td>Award 1 mark for the factor and 1 mark for an extension x5

<table>
<tr><td>Factor</td><td>Extension/Example</td></tr>
<tr><td>Definition of the scope of the present system</td><td>Organisational chart
Define sources of data
Methods of data capture</td></tr>
<tr><td>Major data processing functions and processes</td><td>High level (contextual view) data flow</td></tr>
<tr><td>Identification of problems with the present system</td><td>This could be done through observation, interviews, inspection of records and questionnaires.
Operational issues.</td></tr>
<tr><td>Identify user requirements for the new system</td><td>What will be the scope of the project? Will it need to be just in one area or over the whole organisation? Any constraints or an individual example</td></tr>
<tr><td>Analysis of costs and benefits of the new system</td><td>What advantages will the organisation gain and will these outweigh what they have to spend. Evaluation of costs e.g. human, licences etc.</td></tr>
</table>
</td><td>5x2</td></tr>
</table>

14	**Award 2 marks for definition and up to 6 marks for advantages / disadvantages** **A distributed database is a single database that is under the control of a DBMS where the storage devices are not all attached to a common processor (1). Instead the data is stored in storage devices attached to multiple computers usually located across a network (1).** **Or** **A distributed database has data stored on a number of computers at different locations (1) but appears as one logical database (1).** **To get full marks candidates need to have at least 2 advantages and 2 disadvantages** **Advantages** • If data lost on central site it could be reduplicated from local site. • Allows sharing of the data and the results of processing the data. • New locations (shops) can be added to the database without the need for rewriting the entire database. • Faster response to user queries of the database. • Non-dependence on one central huge store of data. • Easy to backup and copy data from one server to another. • If one server fails then the other servers can be used. • Reduces network traffic as **local queries** can be performed using the data on the company's server. **Disadvantages** • More complex and consequently cost more to install and maintain • Increased security risk because files are transferred across the network • If one of the servers fails, then it can have an effect on the database and staff may not be able to access some of the data • The system relies on data communications, so if a communication line fails, then the data may not be able to be accessed • As large numbers of staff access the access the database, there is a chance that you could get inconsistencies in the data	8

15	**Award 1 mark for process 1 mark for example x2** **NOT aiding the decision making process** **Process: Monitor progress** **Example:** A shop analyses the performance of its POS terminal operators and warns operators who are too slow or make too many mistakes. Information obtained by market research and sales figures can help achieve this. **Process: Can target reasoning and strategy (resources) making to gain advantage over competitors** **Example:** Buy more of a certain commodity because sales are good. Advertising and marketing a product should be aimed at people likely to buy it otherwise it is a waste of time. **Example:** Information can identify gaps in a particular market which can then, on the basis of sound information be filled. **Example:** A manufacturer spends money developing a new product because they have seen a gap in the market. A company developed special sized shampoo bottles when airline companies limited the amount that could be taken into the cabin. Information about customers' buying habits is valuable here and can lead to an organisation or company becoming more profitable. Information can tell an organisation how well it is doing compared to its competitors. **Example can be worth 2 marks if concept of targeting resources is clear.** **Example 1:** Company decides to spend money on advertising in Area B to promote a particular product. ('… because they have noticed sluggish sales' may qualify for spotting trends mark). **Example 2**: Information from research is used to identify gaps in a particular market which can then be filled by developing a new product. **Process: Spot trends** **Example:** Analyse sales data and realise when something is out of fashion e.g. sales of tape recorders or if one region buys more of something than another.	2x2

16	**Award 1 mark for characteristic and 1 mark for extension x3**	3x2

Volume

Characteristic	Extension
Big data implies enormous volumes of data(1) how much data there is	• Data is generated by machines, devices and networks • Data is generated by human interaction on many systems like social media

Variety

Characteristic	Extension
There are many sources and types of data both structured and unstructured.	• Data comes in many forms e.g. word processed documents, PDFs, spreadsheets databases, emails, photos, videos, audio, monitoring devices, , etc. • This variety of **unstructured data creates problems** for storage, mining and analysing data

Validity

Characteristic	Extension
Correctness of the data for use.	• Initial data is likely to be very dirty, more important to see if there are links/relationships • Data then needs to be validated as it will be applied to an operational condition • Big data sources need to be valid if they're going to be used for future research.

17	**Award 1 mark for method and 1 mark for extension x4** **Can get extension mark if method not there**	4x2

Firewalls	• To prevent hacking • To prevent spyware / viruses Must match
Methods of securing integrity of transmitted data	Encryption methods including symmetric and asymmetric methodologies
Screening potential employees	• CRB/DBS checks • Background checks
Access rights/logon procedures / audit trails / Define security status	• (Logon procedures) use of suitable username and hierarchy of passwords. • (Audit trails) for tracing of access and detection of irregularities.
Methods for physical protection of hardware and software	Antivirus software, locks on computers etc
Use of proxy servers	• A proxy server can act as an intermediary between the user's computer and the Internet to prevent from attack and unexpected access. • It allows client computers to make indirect network connections to other network services and hide our IP address. • As soon as getting such request, the proxy server will seek for the resources from the cache in its local hard disk. • To implement internet access control like authentication for Internet connection, bandwidth control, online time control, Internet web filter and control filter etc. • To scan outbound content, e,g, for data leak protection.
Security of document filing systems	• Passwords and User IDs etc