



GCE MARKING SCHEME

**COMPUTING
AS/Advanced**

SUMMER 2015

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2015 examination in GCE COMPUTING. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were 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 conferences was to ensure that the marking schemes were 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' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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GCE COMPUTING - UNIT CG1
Mark Scheme - June 2015

Qu	Answer	Mark	AO1	AO2
1	<p>A macro is either: a sequence of coded instructions a series of keystrokes recorded</p> <p>That can be executed or run later or assigned to a button/menu or keystroke</p> <p>One benefit for using a macro in this case is because: it saves time as quicker to click a button than type these lines of text it is less work/easier to click a button than type these lines of text</p>	1 1 1	3	
2 (a)	<p>Parent contact telephone number - string</p> <p>Gender of the child, M or F - character</p> <p>Number of days each week that the child attends - integer</p> <p>Whether the child has an allergy - boolean</p>	1 1 1 1		4
2 (b)	<p>1 byte</p> <p>11 bytes</p>	1 1	2	
2 (c)	<p>Array can store one type of data</p> <p>There are many different data types being stored about one child</p>	1 1		2
3	<p>Benefits of PC hard disc drive and external hard disc drive:</p> <ul style="list-style-type: none"> • Very fast access to files regardless of internet connection speed – not just ‘fast’ alone • No one has access to ‘private’ files • Cost of external hard disc drive. (Must be justified) • No internet connection required <p>Drawbacks of PC hard disc drive and external hard disc drive:</p> <ul style="list-style-type: none"> • Backed up data is NOT protected from natural disaster or theft as in same location as PC hard drive <p>Benefits a third party storage provider:</p> <ul style="list-style-type: none"> • Data can be accessed by any device such as desk top PC or mobile tablet • Data is not taking up storage space on physical device • Data can be accessed anywhere in the world • Fast transfer achievable (depending on network speed) for daily uploads • Cost - Can be cheap (or free for limited storage space) • Data is backed up by third party provider • Data is stored securely and safely on protected servers (or should be! with encryption, passwords and firewall etc...) • Allows collaborative working/file sharing • Unlimited storage space could be available at a price <p>Drawbacks of a third party storage provider:</p> <ul style="list-style-type: none"> • No internet connection then no access • Files could be compromised by hacker or employee • Slow internet connection and upload and download will be frustrating • Maximum file upload size may be limited • Limited storage space unless user pays a premium • Cloud servers down (service unavailable) then files cannot be accessed <p>NOTE: A benefit of one could be a drawback of the other so award marks for either but NOT both.</p>	6	6	

Qu	Answer	Mark	AO1	AO2																		
	<p>5 - 6 marks Candidates give a clear, coherent answer fully and accurately discussing the benefits and drawbacks of each method of storage.</p> <p>3 - 4 marks Candidates give clear answers describing the benefits or drawbacks of each method of storage.</p> <p>1 - 2 marks Candidates simply state benefits or drawbacks of one method of storage.</p> <p>0 mark No appropriate response</p>																					
4 (a)	to manage the execution of instructions/synchronise operations to process and manipulate data / performs calculations / logical operations to temporarily store data or control information used for a specific purpose	1 1 1	3																			
4 (b)	Bus has two parts consisting of address bus and data bus Address bus - carries an identification about where the data are being sent (accept memory location) Data bus - carries the actual data (to be processed) CONDONE – Control bus, carries control signals	1 1	2																			
5 (a)	Any three from: Database would be easy to and quick to search for a book or member details Easy to back up book or member details in a computerised database It is easy to overwrite / amend / update book or member details in a database Database allows useful reports such as all overdue books or reminder letters to members to be produced Database can automatically alert user about overdue books Database allows different access rights for different library staff	3	3																			
5 (b)	<p>One mark for each correct row – maximum three marks</p> <p>Description of field not required if field name is meaningful such as Publisher but could help answer if field name is not clear.</p> <table><tr><th>Field Name</th><th>Field type</th><th>Field description</th></tr><tr><td>Book code</td><td>Integer/String</td><td>Primary Key</td></tr><tr><td>Title</td><td>String</td><td>Title of the book</td></tr><tr><td>Author</td><td>String</td><td>Author of the book</td></tr><tr><td>Publisher</td><td>String</td><td>Publisher of the book</td></tr><tr><td>Edition</td><td>String</td><td>Edition of the book</td></tr></table> <p>Data MUST relate to a book (and NOT members or loans) and can be anything reasonable but type must follow and be suitable</p>	Field Name	Field type	Field description	Book code	Integer/String	Primary Key	Title	String	Title of the book	Author	String	Author of the book	Publisher	String	Publisher of the book	Edition	String	Edition of the book	3		3
Field Name	Field type	Field description																				
Book code	Integer/String	Primary Key																				
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Author	String	Author of the book																				
Publisher	String	Publisher of the book																				
Edition	String	Edition of the book																				

Qu	Answer	Mark	AO1	AO2										
5 (c)	<p>The check must be described correctly with enough detail so that it is clear that the invalid data would be detected by the check described.</p> <p>One mark for check correctly named or described. One mark for an example of invalid data that the check described would detect.</p> <table><tr><th>Suitable checks</th><th>Example of invalid data</th></tr><tr><td>Presence check</td><td>Nothing in box</td></tr><tr><td>Format check to ensure that a data item matches a previously determined pattern; for example, data must match LLDD DLL where L is Letter and D is a digit</td><td>AB12 XCD or AB12 34D</td></tr><tr><td>Length check to ensure that the data entered are of a reasonable length; for example, postcode must be between 7 and 9 characters long</td><td>AB1 XCD or AB12 34CDEF</td></tr></table> <p>NOTE - Example of invalid data must follow check described Postcode does not have to be any recognised pattern as long as a format is described</p>	Suitable checks	Example of invalid data	Presence check	Nothing in box	Format check to ensure that a data item matches a previously determined pattern; for example, data must match LLDD DLL where L is Letter and D is a digit	AB12 XCD or AB12 34D	Length check to ensure that the data entered are of a reasonable length; for example, postcode must be between 7 and 9 characters long	AB1 XCD or AB12 34CDEF	2	2			
Suitable checks	Example of invalid data													
Presence check	Nothing in box													
Format check to ensure that a data item matches a previously determined pattern; for example, data must match LLDD DLL where L is Letter and D is a digit	AB12 XCD or AB12 34D													
Length check to ensure that the data entered are of a reasonable length; for example, postcode must be between 7 and 9 characters long	AB1 XCD or AB12 34CDEF													
5 (d)	<p>A different check must be described correctly with enough detail so that it is clear that the invalid data would be detected by the check described.</p> <p>One mark for check correctly named or described. One mark for an example of invalid data that the check described would detect.</p> <table><tr><th>Suitable checks</th><th>Example of invalid data</th></tr><tr><td>Presence check</td><td>Nothing in box</td></tr><tr><td>Format check to ensure that a data item matches a previously determined pattern; for example, tel num must match DDDDD DDDDDD where D is a digit</td><td>12345678X</td></tr><tr><td>Length check to ensure that the data entered are of a reasonable length; for example, tel num must be between 10 and 13 characters long</td><td>123456789 or 12345678912345</td></tr><tr><td>Type check to ensure that a data item is of a particular type; for example, all entries should be digits</td><td>Bob or 160J</td></tr></table> <p>NOTE - Example of invalid data must follow check described Telephone number does not have to be any recognised pattern as long as a format is described</p>	Suitable checks	Example of invalid data	Presence check	Nothing in box	Format check to ensure that a data item matches a previously determined pattern; for example, tel num must match DDDDD DDDDDD where D is a digit	12345678X	Length check to ensure that the data entered are of a reasonable length; for example, tel num must be between 10 and 13 characters long	123456789 or 12345678912345	Type check to ensure that a data item is of a particular type; for example, all entries should be digits	Bob or 160J	2	2	
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6 (a)	Data Flow (Diagram) Systems analyst or programmer	1 1	2											
6 (b)	External Entity	1	1											
6 (c)	A – Electoral register (must be a noun) B – Local authority checks register/establishes eligibility (must be a verb) C - Result of decision (must be a noun) D – Agency (must be a noun)	1 1 1 1	4											

Qu	Answer	Mark	AO1	AO2
7 (a)	<p>Store employee or customer could accidentally damage past orders</p> <p>Prevent this damage – any one of: Ensure past orders are read only for customers and employees Confirmation of deletion/amendment message</p>	<p>1</p> <p>1</p>	2	
7 (b)	<p>Customer or store employee (if not used in part (a)) could accidentally damage contact details</p> <p>Prevent this damage – any one of: Confirmation of deletion/amendment message (NOT if used in part(a)) Suitable validation or verification checks on contact details when being entered or amended</p>	<p>1</p> <p>1</p>	2	
7 (c)	<p>Prevent access – Authentication / Firewall</p> <p>Make the data unusable – encrypt the data</p>	<p>1</p> <p>1</p>	2	
8 (a)	<p>Any 3 from: Data is fairly and lawfully processed Personal data stored for no longer than necessary Personal data shall be adequate, relevant and not excessive Data can only be transferred outside EC to countries with adequate DP legislation Processed in line with your rights Data is processed for limited purposes</p> <p>NOT Held securely Data must be accurate and up to date</p>	3	3	
8 (b)	<p>On receipt of a freedom of information request from a person the hospital must: inform person whether or not it holds the information requested communicate the information requested to the person making that request or refusal of request with valid reason</p>	<p>1</p> <p>1</p>	<p>1</p> <p>1</p>	
9	<p>(a) set Total = Total + Num (b) set Count = Count + 1 (c) input Num (d) set Mean = Total / Count</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>		4
10	<p>In a sequential file the records are stored in order (usually on primary key field) (1) while in a serial file the records are not stored in any order (1) (or order of arrival). To add to a serial file the new record is appended to the end of the file (1). To add to a sequential file, a new file is made by copying the old file until an insertion is required then inserting the new record (1) and copying the rest of the file (1)</p> <p>Suitable example of sequential file</p> <p>Suitable example of serial file</p>	<p>5</p> <p>1</p> <p>1</p>	7	

Qu	Answer	Mark	AO1	AO2														
11	<table><tr><th>Y</th><th>Z</th></tr><tr><td>2</td><td>TRUE</td></tr><tr><td>3</td><td>TRUE</td></tr><tr><td>4</td><td>TRUE</td></tr><tr><td>5</td><td>TRUE or FALSE</td></tr><tr><td>6</td><td>FALSE</td></tr><tr><td></td><td></td></tr></table> <p>One mark for each correct row.</p> <p>Note that Z changes from true to false during the loop and has both values when Y is 5. Accept true or false when Y = 5 as it depends at which point in the algorithm the trace table is updated.</p> <p>NOTE Deduct one mark for each completed additional rows</p>	Y	Z	2	TRUE	3	TRUE	4	TRUE	5	TRUE or FALSE	6	FALSE			5	5	
Y	Z																	
2	TRUE																	
3	TRUE																	
4	TRUE																	
5	TRUE or FALSE																	
6	FALSE																	
12	<p>Typical roles of the operating system in providing a graphical user interface:</p> <ul style="list-style-type: none">• Provides user interface with meaningful icons / avoid text input / drop-down menus• Allows customisation of interface e.g. change desktop colours / layout• Allows access to system settings such as hardware• Allows copying / deleting / moving / sorting / searching of files or folders• Allows creation of shortcuts• Allows user to have more than one window open and to switch between tasks (programs/windows)• Provides user with error/warning/help messages• Provides user with context sensitive help from library or on-line <p>The description of any of the points should be extended with examples and more detail and gain extra marks.</p> <p>4 - 6 marks Candidates give a clear, coherent answer fully and accurately describing how the operating system provides a user interface with relevant examples.</p> <p>1 - 3 marks Candidates simply list features of the user interface provided by the operating system.</p> <p>0 marks No appropriate response</p> <p>Example answer worth three marks – create shortcut with extension and example</p> <p>One feature of the user interface provided by the operating system is to allow the creation of shortcuts. The user can create a shortcut to a commonly used application or visited web site on the desk top. If you use Google as your search engine you could create a shortcut to Google on your desktop</p> <p>Example answer worth three marks – meaningful icons with extension and example</p> <p>Another feature is to provide the user interface with meaningful icons. Most applications will have a unique icon, for example Mozilla Firefox has its own which is a fox on a globe and IKEA will have their logo as an icon. This makes the web site or application easily recognisable and distinguishable from other icons</p>	6	6															

Qu	Answer	Mark	AO1	AO2
13 (a)	<p>Annotation: price without VAT input by user price without VAT added amount of VAT to pay</p> <p>Variables are: NetPrice GrossPrice AmountVAT</p> <p>Constant = RateVAT</p>	1 1 1	3	
13 (b)	Constants in computer programs do not change very often but when they do it is easier to change them once at the top rather than where they occur in the body of the program.	1	1	
14 (a)	<p>Starting at the beginning of the array SearchValue is compared to every consecutive item in SearchArray (1) until either an item matches (1) SearchValue or the end of the array is reached(1).</p> <p>Alternatively candidate could give an algorithm - accepted not expected</p> <pre> i = 1 repeat if SearchValue = SearchArray(i) then item found increment i until (item found) or(end of array) </pre> <p>Marking of algorithm Comparison and increment (1) Terminating loop conditions (2x1)</p>	3		3
14 (b)	<p>Array is searched as before but if an element greater than SearchValue is encountered then</p> <p>the search can terminate (because all other items left in the array are greater than SearchValue)</p> <p>OR</p> <p>Alternatively a binary search would be an improved method.</p> <p>Binary search (All these points may be shown on a diagram)</p> <ul style="list-style-type: none"> • Calculate/determine mid and compare SearchValue to middle element • If not found, search lower or upper half and repeat until found (or not present) <p>Alternatively candidates could give an algorithm – accepted not expected</p>	1 1 1 1	2	

Qu	Answer	Mark	AO1	AO2
15	<p>Benefits for the programmers</p> <ul style="list-style-type: none"> • Can receive feedback on the app • Can provide updates as soon as they become available • Can reach potential massive market so app can be sold at cheap price • App is downloaded so no postage or package costs • No physical media required so app can be cheaper (more profit) • Can generate revenue from advertising on free apps • Can target niche market by exploiting global marketplace • Environmental benefits improve green credentials for the company • Can sell directly to customers so no commission to third party app store • Payment is received immediately • Programmer could receive recognition of successful app and be 'head hunted' and find a very good job <p>Benefits for customers</p> <ul style="list-style-type: none"> • Can download and use immediately • Can download anytime (24/7) • Save time and/or money travelling to shop to buy • Can read other customer's reviews before buying • Can download again if app is lost / corrupted or new device • Can access updates as soon as they become available (not twice) • Potential massive market so app can be bought at cheap price (not twice) • App is downloaded so no postage or package costs (not twice) <p>4 - 6 marks Candidates give a clear, coherent answer fully and accurately describing benefits for the programmers and for the customers.</p> <p>1 - 3 marks Candidates simply list benefits for the programmers and for the customers.</p> <p>0 marks No appropriate response</p>	6	6	

Qu	Answer	Mark	AO1	AO2
16	<p>Study the existing system documentation - This is suitable for investigating current data storage requirements or data flow</p> <p>Benefits Team can see how current system 'should' be operating Inexpensive method of gathering lots of information fairly quickly Can identify storage requirements</p> <p>Drawbacks Staff may not be following procedures in documentation and may be using system in their own way Documentation may be out of date and not updated to reflect system changes</p> <p>Carry out a questionnaire of staff - This is suitable because the staff might be spread over a wide geographical area and there are many of them.</p> <p>Benefits Relatively cheap to produce for a large number of people Can be distributed worldwide Could be completed on-line so results can be available very quickly</p> <p>Drawbacks Have to be designed by experts or information could be unusable People are 'too busy' and may not complete People may not give correct answers</p> <p>Interview staff - This is suitable when the analysts require a lot of information from a small number of people such as key staff</p> <p>Benefits Can gather large amount of detailed information Can make judgements on validity of information from personal contact or body language Can ask 'follow up' or 'open ended' questions to gather more detailed information in selected areas</p> <p>Drawbacks Time consuming and expensive to carry out Has to be carried out by trained interviewer or closed questions written by experts Difficult to analyse large amount of information Difficult to analyse wide variety of information</p> <p>Observe the current system in practice - This is suitable for gathering information first hand</p> <p>Benefits Can actually see what is really happening and do not have to rely on what people tell you what they think is happening</p> <p>Drawbacks Very time consuming and therefore expensive to carry out Staff may feel like they are being watched and therefore behave differently so do not actually see what goes on every day Cost of sending analysts around the world.</p> <p>The description, benefits or drawbacks of any of the methods could be extended with more detail and gain extra marks</p>	13	13	

Qu	Answer	Mark	AO1	AO2
	<p>Advantages of using a team of analysts compared with using an individual:</p> <ul style="list-style-type: none"> • Investigation should be completed quicker • Different levels of experience and expertise so can carry out different tasks, for example senior analysts could interview managers • More people have a more varied experience of businesses and Investigation <p>The description of any of the advantages of using a team of analysts could be extended with more detail and/or examples and gain extra credit.</p> <p>10 - 13 marks Candidates give a clear, coherent answer fully and accurately describing methods of investigation and the benefits of working as a team. They use appropriate terminology and accurate spelling, punctuation and grammar.</p> <p>5 - 9 marks Candidates give a clear, coherent answer describing method(s) of investigation. There are a few errors in terminology and accurate spelling, punctuation and grammar.</p> <p>1 - 4 marks Candidates give an answer simply listing methods of investigation or describe one method of investigation. There are significant errors in spelling, punctuation and grammar.</p> <p>0 marks No appropriate response</p>			
	Total	100	84	16

- 01 **Any 2 of:** 2x1
- Speeds up text input / faster than typing
 - Can be used by someone who is unable to type / not a skilled typist / disabled
 - May help to avoid RSI
 - Allows user to simultaneously do some other task
 - Takes up less room than a keyboard and mouse (useful in mobile devices)

Not: hygiene concerns.

Not just “more intuitive”

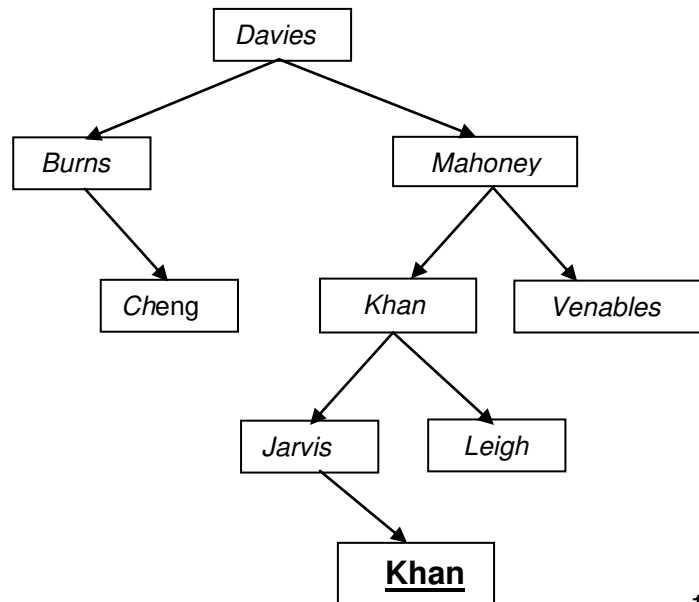
- 02 Different words may sound the same (e.g. week/weak) 1
 Command words may be taken as input words (or vice versa) (eg "end sentence") 1

- 03 Binary tree 1

- 04 Root (node) 1

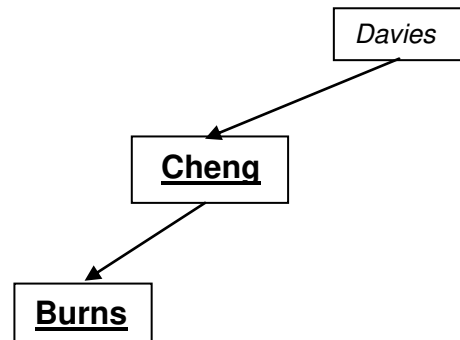
- 05 Advantage: faster to add a value / search for a value. 1
 Disadvantage: more complex to program / process / May slow processing/traversal if unbalanced. 1

06



1

07



Marking: 1 mark for reversed names; 1 mark for different arrow 1+1

- 08 Example situation could be e.g. customer records – sales etc 1
- Because need to update them in an unpredictable order as sales come in (particularly where large file and large number of transactions) 1
- 09 The new data is diverted to an overflow area instead of the original 1
- When an attempt is made to access this data, the same process will occur (will access original location fail to find the data and access the overflow) 1
- 10 Files are often encrypted to safeguard the data by making it impossible to read ... 1
- ... a key and algorithm is used to encrypt/decrypt the data 1
- 11 An algorithm is a (finite) set of rules / instructions 1
- to solve a (specific) problem 1
- Any 2 of:
- structured English
 - flowchart
 - pseudo-code
- (Accepted not expected:)
- formal language e.g. Z
- CONDONE annotated code 1+1

- 12 Passing by value:
 local copy of the data is created for the procedure (discarded later) 1
- Passing by reference: 1
 the address of the data is passed (rather than the actual data) 1
- Benefit of passing by value:
 Avoids problem (associated with passing by ref) of unintended side effects where the Parameter has its value changed in the main program as well as in the procedure 1
- Benefit of passing by reference:
 Any one of:
 • Avoids the larger amount of processing/storage (associated with passing by value) - possibly large amounts of copying 1
 • Allows (desirable) change to be passed back to the calling program
- 13 10001101 1
- 14 010111001000 0101 (Spacing unimportant)
- 23 -> 10111
 0.125 -> 001
- Marking: 1 for correct exponent, 1 for correct mantissa 1+1
- 15 +9 = 00001001 so -9 = 11110111 1+1
- 9 * 11110111 +
 4 * 00000100
 * 11111011 -> 00000101
- Marking: If see all three lines of the correct addition (*) -> first mark
 If see correct conversion back to 00000101 -> second mark
- 16 OR 1
- | | | |
|-------|--------|-------------------------------------|
| Input | Output | |
| 0 0 | 0 | |
| 0 1 | 1 | (all four need to be correct for 1) |
| 1 0 | 1 | |
| 1 1 | 1 | |
- 17 AND 1
- | | | |
|-------|--------|-------------------------------------|
| Input | Output | |
| 0 0 | 0 | |
| 0 1 | 0 | (all four need to be correct for 1) |
| 1 0 | 0 | |
| 1 1 | 1 | |
- 18 A system like this will be safety-critical – human life is at risk if the software fails (has to fail safe) 1
- It is also likely to be highly complex software (and hardware) – there would probably be multiple inputs, has to work in real time (with a fast moving train) 1

- 19 Benefit: any 1 of:
- saves cost once installed - no need for level crossing staff 1
 - not subject to possibly fatal human error
- Drawback:
Any one of:
- may not detect unlikely situation eg car on track / may lead to people trying to dodge round barriers 1
 - could fail with potentially catastrophic results (even if high quality)
- Not** unemployment could result
- 20 Any 2 of:
- check the correspondence between the actual design and its specification / user requirements / objectives / safety critical aspects (related particularly to level-crossing safety) 1+1
 - confirm that the most appropriate techniques have been used, particular bearing in mind the safety-critical aspects in this case
 - confirm the HCI is appropriate
- not** cost-related answers
- 21
- Cannot see / feel / try-on the item (for a tangible item) / may not be as advertised
 - Lacks the social aspect of shopping
 - Need access to a debit card / credit card / on-line banking 6x1
 - Can't get the item immediately (tangible item)
 - There is often a delivery charge (tangible item)
 - If not at home when delivered you may need to visit post office, etc (tangible item) / you need to be at home when delivered
 - Something may get lost or broken in the post (tangible item)
 - May need to return item – more difficult than going back to shop (tangible item)
 - Website may be fraudulent-may not receive goods (Separate points
 - Website may be fraudulent-credit card details may be stolen if well argued)
 - May have an impact on traditional shops closing down.
- Not** health related risks eg RSI / lack of exercise
Not could introduce virus

An example of an extended answer worth six marks is:

With on-line shopping, the purchaser can't see or try-on the item and it may not be as advertised. There is also a delay in receiving the item and there may be a delivery charge. If the customer is not at home when the item delivered they may need to visit post office etc. Something may also be damaged or lost in the post. If the customer needs to return the item it will probably be more difficult than to return it to a shop. There are also concerns over fraud etc - the website may be fraudulent and the customer may not receive the goods or credit/debit card details might be stolen. On-line shopping lacks the social aspect of normal shopping and may also result in high-street shops closing down.

- 22 A multiprogramming computer system is one where more than one job is held in the computer's main memory at the same time and can be processed in the computer's central processing unit (CPU) at (apparently) the same time. Multiprogramming is used to ensure the most efficient use of the CPU and prevent the CPU being idle while waiting for a slower peripheral. The real-time clock causes regular interrupts to create time-slices, which the operating system allocates to the various jobs: this process is called scheduling and is controlled by a scheduler program. Each job is checked sequentially to ensure that it gets its appropriate share of time – this is known as polling. To allow more than one job to be resident in the main memory at any one time, the memory needs to be separated into separate parts - this is called partitioning.

6

[When answers are given in well-expressed point form:

6 marks may be gained for six or more of the individual points listed below

5 marks may be gained for five of the individual points listed below

4 marks may be gained for four of the individual points listed below

3 marks may be gained for three of the individual points listed below

2 marks may be gained for two of the individual points listed below

1 mark may be gained for one of the individual points listed below

However answered, can't get all 6 unless gained mark for each of scheduling & partitioning

- More than one job is in memory at same time
- More than one job is processed (apparently) at same time
- Real-time clock causes regular interrupts to create time-slices
- Scheduling allocates time-slices to each job
- Polling is the sequential checking of jobs so that each gets its appropriate share of time
- OS uses partitioning, ie the division of computer memory for different jobs
- OS pages jobs in and out to make better use of memory
- OS promotes efficient use of CPU

- 23 A **router** holds information about the addresses of devices in the network or other networks 1

... and can send data to the correct destination. 1

Protocols are necessary to specify data formats etc to enable devices to communicate with each other 1

Examples: any 1 of:

- Linking a computer to a printer 1
- Using ftp/http/smtp/tcp /pop3 etc
- Linking mobile phones by Bluetooth

- 24
- | | | | | | |
|-----------|-----|----------------------------|------------------------------------|---|---|
| <letter> | ::= | a b c ... z A B... Z | (condone only upper or only lower) |) | |
| <digit> | ::= | 0 1 2 ... 9 | |) | 1 |
| <undersc> | ::= | _ | |) | |
| <char> | ::= | <letter> <digit> <undersc> | | | 1 |
| <chars> | ::= | <char> <char><chars> null | | | 1 |
| <varname> | ::= | <letter><chars><letter> | | | 1 |

Marking:

- One mark for attempted recursion even if incorrect:
 - same item Left and Right + other item(s) on Right are needed
- Can't get 4 unless completely correct including handling of 2 or more chars
- Notation error max 1 mark lost

- 25 A database administrator is the person in a company who is responsible for the structure, security and management of the database system and the data in it. 1
- 26 Data mining: the analysis of a large amount of data (in a data warehouse) to provide new information / find patterns/trends in the data 1
1
- Supermarket: could attempt to attract customer to make additional purchases using analysis of data from customer personal data & purchases 1
- Insurance company: Any 1 of:
 - might use data mining to try to detect fraud 1
 - might use data mining to try to attract new business
- For both supermarket and insurance company:
must be mass data, not data applying to one person
- 27 TEACHER (TeacherID, TeacherName, TeacherAddress)
 CONTRACT (TeacherID ModuleID, StartDate, HoursWorked,) 7
 MODULE (ModuleID, ModuleName)
 SKILL (TeacherID, ModuleID)
- [Marking:** Four suitably named tables 1
 Each table with suitable PK shown as such (2 or 3 correct = 1 mark) 2
 Each FK shown as such 4
- Any number of bad fields / bad FKs – remove only 1 mark
 Ignore additional / irrelevant fields
- Other approaches are possible and will be given full credit if correct.
- e.g. CONTRACT (ContractID, TeacherID ModuleID, StartDate, HoursWorked,)

<pre> 1 input NumStu 2 Set OverallMax = 0 3 for StuCount = 1 to NumStu 4 set Total = 0 5 set Max = 0 (or any integer < 0) 6 set Min = 10 (or any integer > 10) 7 for MarkCount = 1 to 8 8 input Mark 9 set Total = Total + Mark 10 if Mark > Max then Max = Mark 11 if Mark < Min then Min = Mark 12 endfor 13 set Total = Total - Min - Max 14 output "Final Mark = ", Total 15 If Total > OverallMax then set OverallMax = Total 16 endfor 17 output "Highest Mark = ", OverallMax </pre>	<p>Marking</p> <p>Initialise all 4 (condone 3) (my lines 2,4,5,6)</p> <p>Outside loop</p> <p>Inside loop</p> <p>Input & increment both max & min</p> <p>Calc & output final mark</p> <p>Calc OverallMax inside loop & output it outside loop</p>	<p>1 6</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
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[Marking: Other approaches are possible and will be given full credit if correct.
No marks are given for brevity / efficiency / elegance.]

- 29 Why standardised: any 1 of 1
- program written in a certain language on one computer/environment is likely to run easily on a different computer/environment
 - programmer familiar with the language on one computer/environment is likely to be able to adapt easily to working on a different computer/environment
- Why difficult to standardise: 1
- different manufacturers / developers approaching problem differently - may not be keen to share for commercial reasons
- 30 Subprogram libraries contain utilities / common tasks, etc 1
- and can be used by any user, avoiding re-writing (and have been tested) 1
- 31 Any one of:
- A module might be useful in another program. If it has been compiled as part of a whole program, it will not be available in compiled form for the new program. 1
 - If any errors are corrected / changes made, the whole program will have to be re-compiled.
 - It may be preferable to test each module before combining into the whole program / It is easier to find errors in smaller modules.
- Not** simply "It will take longer to compile"
- 32 OOL: Any 2 of: 1+1
- uses objects - include both data and associated processing
 - enables production of buttons / icons, etc - useful in a visual environment
 - uses features such as inheritance, encapsulation etc (Accepted not expected)
- Class: template specifying methods/properties etc. 1
- Method: program (routine) defined within the class/contained within the object 1

- A CASE tool is a software tool which provides a number of functions which assist with the design and testing of a computer system / program.
- provides a data dictionary
- includes a graphics / diagram production feature
- may provide repositories of reusable code
- may provide project management tool(s)
- may incorporate version control
- may carry out report generation
- may include prototyping tool
- may include application generator
- may include code generator
-
- A compiler is a software tool which is used to translate a program (written in a high-level language) into a low-level program ready for execution on the computer.
- It has various stages: lexical analysis, syntax analysis, semantic analysis, code generation, optimisation (**1 mark for naming >=3 if no marks for describing them**)
- During *** Lexical Analysis, input stream is broken into tokens, spaces etc removed
- During *** Syntax Analysis, symbol table produced, tokens are checked for fit to grammar (or symbol table can be described in lexical analysis instead)
- During *** Semantic Analysis, a check is made that all variables are declared, and operations are legal eg real values are not being assigned to integer variables
- During Code Generation, machine code is generated
- During Optimisation, the code is improved if necessary to make it more efficient / faster / less resource greedy
- Produces error messages at any stage when needed (**once only for compiler**)
- A debugger is a software tool used to detect, locate and correct faults in a program
- program trace/step-through/step-into: enables the programmer to see the progress through the program - which statements/procedures are being executed at any time
- break point: allows the programmer temporarily to halt execution in order to ascertain the value of variables at that point (or to step through the program from that point)
- variable watch: lists the value of a variable at specific points during the execution
- store dump: lists the entire contents of memory at a specific point
- error diagnostics: provision of messages relating to errors in the program
- post-mortem routines: enables programmer to see the values of variables at the point where the program failed - **accepted not expected**
- **Note:** if only name various facilities eg trace, break point, variable watch, worth 1 only

*** Lexical An, Syntax An and Semantic An can each get two marks for 2 or more good points

- 9-12 Candidates give a clear, coherent answer fully and accurately describing and explaining all three tools. They use appropriate terminology and accurate spelling, punctuation and grammar.
- 5-8 Candidates describe and explain a reasonable part of the subject area, but responses lack clarity. There are a few errors in spelling, punctuation and grammar.
- 0-4 Candidates simply list a range of points or give a brief explanation the subject area. The response lacks clarity and there are significant errors in spelling, punctuation and grammar.

**[Maximum of 9 if only two of the three tools discussed
maximum of 5 if only one of the three tools discussed]**



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