GCE AS MARKING SCHEME

SUMMER 2018

AS
COMPUTER SCIENCE - COMPONENT 1
B500U10-1

INTRODUCTION

This marking scheme was used by WJEC for the 2018 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.

WJEC Eduqas
GCE AS Computer Science – Component 1

Summer 2018 Mark Scheme

Q	Answer	Marks	AO1	AO2	AO3	Tot
1a	One mark for each of the following: • Impossible to create networks that communicate without standards. / Allows communication between different network devices. • Easier to develop – can be done one layer at a time • Allows different companies to work together / international standardisation • Not forced to use one vendor / no monopoly. • Leads to more competitive pricing.	4	1.1b			4
1b	One mark for each of the following: • Simple Mail Transfer Protocol (SMTP) is an Internet standard for electronic mail (email) transmission between servers • Internet Message Access Protocol (IMAP) is an Internet standard protocol used by email clients to retrieve e-mail messages from a mail server over a TCP/IP connection (IMAP ensures that the mail server and client remain in synchronisation).	2	1.1b			2
1c	One mark for each of the following up to a maximum of three: • Each packet has a destination address • Packets are analysed by each node • Packets are sent down the most appropriate path to reach its destination • Each node maintains a routing table • Packets may take different routes • Packets reassembled at destination.	3	1.1b			3

Q	Answer	Marks	AO1	AO2	AO3	Tot
2	One mark for each of the following maximum of two from each, total of four. Solid State Drive • Solid State Drives feature a non-mechanical design of NAND flash mounted on circuit boards • NAND flash is shock resistant • SSDs have faster data access than BD • No moving parts to an SSD • Files are stored on microchips • Non-volatile. Blu-ray Drive • Optical drives work by using lasers to store data • Burning microscopic indentations into a disc • This pattern of indentations is created in a spiral pattern, starting from the middle • Indentations and their absence create pits and lands • A laser is aimed at the disc and reflected back, which can cause interference with the original laser • Blu-ray data is stored on two layers • Blu-ray data can be stored on both sides of the disc • Two lasers of differing wavelength are used to read data from the two layers • Pits and lands are stored closer together, meaning that the laser's wavelength must be shorter (blue) • Non-volatile. One mark for each of the following up to a maximum of four. Typical Capacity • **SSD**: 500MB – 4 TB • **BD**: 25GB – 128GB Typical Use • **SSD:** Programs / OS / Server backup / phones / cameras • **BD:** Movies / Games	4 4	1.1b			8

<table>
<tr><th>Q</th><th>Answer</th><th>Marks</th><th>AO1</th><th>AO2</th><th>AO3</th><th>Tot</th></tr>
<tr><td>3a</td><td>
<table>
<tr><th>A</th><th>B</th><th>A AND B</th><th>A OR B</th><th>(A OR B) XOR (A AND B)</th><th>NOT((A OR B) XOR (A AND B))</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr>
</table>

One mark for each of the following columns:
• A AND B
• A OR B
• (A OR B) XOR (A AND B)
• NOT((A OR B) XOR (A AND B))
</td><td>4</td><td></td><td>2.1a</td><td></td><td>4</td></tr>
<tr><td>3bi</td><td>One mark for each of the following:
• Use AND logical operator
• Mask 10000000_2
• Worked example:

00111001
<u>10000000</u>
00000000</td><td>3</td><td></td><td>2.1a</td><td></td><td>3</td></tr>
</table>

Q	Answer	Marks	AO1	AO2	AO3	Tot
3bii	One mark for each of the following: • Use AND logical operator • Mask 00000000_2 • Worked example: 10111001 <u>00000000</u> 00000000 **<u>Or</u>** • Use XOR logical operator • Mask 00111001_2 • Worked example: 10111001 <u>10111001</u> 00000000	3		2.1a		3

Q	Answer	Marks	AO1	AO2	AO3	Tot
4	One mark for each of the following (Max 3): • Fixed length record has same number of bytes in each record and same number of fields, whereas variable length record has different number of bytes in each record or different number of fields • Fixed length records are easier to program as it can be calculated know how much space will be required whereas variable length record makes it difficult to calculate how much space will be required • Fixed length records are quicker to process (read/write) by computer as start and end locations are known whereas variable length records are slower to process (read/write) by computer as start and end locations have to be calculated at read/write time • Fixed length record wastes storage space as fields have blank space whereas variable length record saves storage space as no blank space • Fixed length record will truncate long fields whereas variable length record avoids truncation as each field can extend to accommodate any number of characters One mark for each of the following up to a maximum of 2: Fixed length example: DOB / NINO / Tel Number Variable length example: Surname / Address	3 2	1.1b			5
5	Award one mark up to a maximum of six from the following • File B will take longer to load than File A • File A is stored **on a single track** which is quicker for the HDD head to read. • The read head reading A does not physically move • File B is fragmented • File B has been split and physically stored on different parts of the disk • Defragmentation can be used to overcome the problem • Files are physically rearranged and stored together on disk.	6		2.1b		6

Q	Answer	Marks	AO1	AO2	AO3	Tot
6a	$6F_{16} = 01101111_2$ $AB_{16} = 10101011_2$ 01101111_2 $\underline{10101011_2}$ 100011010_2	1 1 1		2.1a 2.1a 2.1a		3
6bi	1111.111 Mantissa = 0.1111111 Exponent = 0100	1 1 1		2.1a 2.1a 2.1a		3
6bii	Mantissa = 0.8125 Exponent = 5 Answer = $0.8125 \times 2^5 = 26_{10}$	1 1 1		2.1a 2.1a 2.1a		3
6c	Award one mark from each of the following up to a maximum of two. Advantages of integers (any two of): • Numbers are stored accurately • Less complex processing • Exact representation of zero • Less storage space Award one mark from each of the following up to a maximum of two. Advantages of floating-point (any two of): • Very large/small numbers can be stored • Larger range of numbers can be represented • Fractions/decimal places can be represented	 2 2	 1.1b 1.1b			4
7	One mark for each of the following: Boolean • 1 bit Character • 8 bits / 7 bits ASCII String • 8 bits / 7 bits ASCII (per character) Short Integer • 16 bits	4	1.1a			4

Q	Answer	Marks	AO1	AO2	AO3	Tot

8	Declare Subroutine ConvertWeight
	
	weight is real
	
	do
	output "Please input next weight"
	input weight
	if weight >= 0 then
	if weight = val(weight) then
	set weight = weight * 0.453592
	output "Weight in kg is",
	weight
	else
	output "Incorrect value
	entered"
	end if
	end if
	
	while (weight > 0)
	
	End Subroutine
	
	One mark for each of the following:
	• Declare or initialise variables
	• Loop
	• Input weight
	• Validation for weight input (real)
	• Correct conversion
	• Output conversion
	• Rogue value to terminate loop
		7			3.1c	7

9	One mark for each of the following: • Process is carried out with no user interaction • Batch processing may avoid using computer resources at times when demand is high /off-peak • Errors are stored in a file for later use and not dealt with as they occur • Application: payroll / utility billing	4	1.1b			4
10	One mark for each of the following: $P.(\overline{Q}+R)+Q.(P+\overline{Q})+R.(P+R)+\overline{S}.S$ $P.(\overline{Q}+R)+Q.(P+\overline{Q})+R.(P+R)$ $P.\overline{Q}+P.R+Q.P+Q.\overline{Q}+R.P+R.R$ $P.\overline{Q}+P.R+Q.P+R.P+R.R$ $P.\overline{Q}+P.R+Q.P+R.P+R$ $P.\overline{Q}+P.R+Q.P+R$ $P.(\overline{Q}+Q+R)+R$ $P.(1+R)+R$ $P+R$	8		2.1a		8

Q	Answer	Marks	AO1	AO2	AO3	Tot
11a	One mark for each of the following: • Sequencing is the specific order in which instructions are performed in an algorithm. • Instructions are carried out one after the other.	2	1.1b			2
11b	Any two from the following: • Comparisons are made • Data placed in the right position • Move other items along	2	1.1b			2
11c	One mark for each of the following: • Never ending loop • inserted will always be FALSE	2		2.1b		2
11d	`26  while (j >= 0 AND inserted = FALSE)` **OR** The terminating condition of the do while loop needs to be changed to `inserted = FALSE`	1		2.1b		1
11e	One mark for each of the following: • Bubble sort • A pass is made through the data, comparing each value with the following one and swapping them if necessary. • A number of passes is made until the data is in order. Other types of sort accepted but not expected	3	1.1b			3

12	One mark for each of the following:
	• Read-only
	  ○ When the user is unable to alter the file
	• Archive
	  ○ When the file no longer in regular use but may be required sometime in the future
	• System
	  ○ When the file is only used by the operating system (for example a device driver)
	• Hidden
	  ○ When the user is unable to see the file (for example many files are hidden in Windows as the user cannot view or amend them if you view certain directories)
		3
		3
			1.1a
			1.1b
						6

Q	Answer	Marks	AO1	AO2	AO3	Tot

13	**Indicative content**
	
	Investigation and Analysis
	Study the existing system documentation
	• Benefits
	  • Analyst can see how current system 'should' be operating
	  • Inexpensive method of gathering lots of information fairly quickly
	  • Can identify storage requirements
	
	• 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
	
	Carry out a questionnaire of staff
	• 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
	
	• 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
		10	1.1b			10

Q	Answer	Marks	AO1	AO2	AO3	Tot

	Interview staff
	• 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
	
	• 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					

	Observe the current system in practice
	• Benefits
	  • Can actually see what is really happening and do not have to rely on what people tell you what they think is happening
	• 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.					

Q	Answer	Marks	AO1	AO2	AO3	Tot
	Effects on the nature of employment • New jobs have been created. • Computers speed up the repetitive, boring parts of jobs, leaving people free to do the creative, interesting parts. • Computers are cheaper to run, so have led to a reduction in the cost of manufactured goods. Repetitive jobs, such as copying documents or stamping metal, are carried out more reliably by computers. • Some jobs have disappeared completely. • People worry about not being able to use new systems. • Learning new systems can take time. • New computer systems can be expensive to install. • Teleworking / video conferencing					

Band	AO1.1b Max 10 marks				
3	**8 - 10 marks** The candidate has: • written an extended response that has a sustained line of reasoning which is coherent, relevant, and logically structured • shown clear understanding of the requirements of the question and a clear knowledge of the indicative content. Clear knowledge is defined as a response that provides eight to ten relevant detailed points which relate to an extensive amount of the indicative content • addressed the question appropriately with minimal repetition and no irrelevant material • has presented a balanced discussion and justified their answer with examples • used appropriate technical terminology referring to the indicative content confidently and accurately.				
2	**4 - 7 marks** The candidate has: • written a response that has an adequate line of reasoning with elements of coherence, relevance, and logical structure • shown adequate understanding of the requirements of the question and a satisfactory knowledge as specified in the indicative content. Satisfactory knowledge is defined as a response that provides four to seven points as signalled in the indicative content. • has presented a discussion with limited examples • used appropriate technical terminology referring to the indicative content.				
1	**1 - 3 marks** The candidate has: • written a response that that lacks sufficient reasoning and structure • produced a discussion which is not well developed • attempted to address the question but has demonstrated superficial knowledge of the topics specified in the indicative content. Superficial knowledge is defined as a response that provides one to three points as signalled in the indicative content • used limited technical terminology referring to the indicative content.				
0	**0 marks** Response not credit worthy or not attempted.				
	Total	100	57	36	7	100