Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE **9608/13**

Paper 1 Written Paper **October/November 2018**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)(i)</td><td>3</td><td>1</td></tr>
<tr><td>1(a)(ii)</td><td>1 mark per bullet point

• Number of pixels: 6 × 6 = 36
• Number of bits: Number of pixels (36) × 3
• 108 bits / 13.5 bytes</td><td>3</td></tr>
<tr><td>1(b)(i)</td><td>1 mark per bullet point

• Number of pixels: 50 000 × 50 000 = 2 500 000 000
• Number of bytes: Number of pixels (2 500 000 000) × 4 //
10 000 000 000 //
Number of bits: Number of pixels (2 500 000 000) × 32 //
80 000 000 000
• Conversion to gigabytes
• 10 GB / 9.3 GB</td><td>4</td></tr>
<tr><td>1(b)(ii)</td><td>1 mark for correct tick in each row.

<table><tr><th>Compression method</th><th>Lossy</th><th>Lossless</th></tr><tr><td>Cropping the image</td><td>✓</td><td></td></tr><tr><td>Reducing the resolution of the image</td><td>✓</td><td></td></tr><tr><td>Using run-length encoding (RLE)</td><td></td><td>✓</td></tr><tr><td>Reducing the colour depth of the image</td><td>✓</td><td></td></tr></table></td><td>4</td></tr>
<tr><td>1(c)</td><td>1 mark per bullet point to max 3

• Looks for runs of consecutive pixel of the same colour
• Stores the colour value once and the number of times it occurs
• Lossless method of compression
• Reference to the given image in context</td><td>3</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>1 mark per bullet point

Relative addressing:
• A number (the offset) is added to the base address to give the actual address

Indexed addressing:
• The contents of the index register are added to operand to give the actual address</td><td>2</td></tr>
<tr><td>2(b)(i)</td><td>242</td><td>1</td></tr>
</table>

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Question	Answer	Marks
2(b)(ii)	**F2**	**1**
2(b)(iii)	**–14**	**1**
2(b)(iv)	1 1 1 1 0 0 1 1	**1**
2(c)	**1 mark** per bullet point • Loading 8 (instruction 20) • Comparison and loading 453 (instructions 21–23) • Outputting & (instruction 26) • Loading, incrementing and storing in 96 (instructions 27–29) • Incrementing Index Register (instruction 30) • Jumping and loading 452 (instruction 23) • Jumping, loading, incrementing, storing in 96, incrementing IX and end (instructions 24–32)	**7**

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Instruction address	ACC	Memory address						IX	OUTPUT
		93	94	95	96	97	98		
		453	453	452	8	10	453	8	
20	8								
21									
22									
23	453								
24									
25									
26									&
27	8								
28	9								
29					9				
30								9	
31									
21									
22									
23	452								
24									
25									
27	9								
28	10								
29					10				
30								10	
31									
21									
22									
32									

Question	Answer	Marks
3(a)	**Either** Ethical • He is booking the holiday in his own time / lunchtime // he is self-employed • He has been given permission • Reference to IEEE <u>in context</u> **Or** Unethical • Should not use company computer for personal use • Should be working whilst at work • Reference to IEEE <u>in context</u>	**2**
3(b)	Unethical: **Max 2 marks** from • Company will get a bad reputation • Should be supporting his colleague • Reference to IEEE <u>in context</u>	**2**
3(c)	**Either** Ethical • She is supporting her colleague • Working in the best interests of the company • Reference to IEEE <u>in context</u> **Or** Unethical • Praising one team member instead of the whole team • Others in the team may also have contributed, so she is not being supportive of the whole team • Reference to IEEE <u>in context</u>	**2**

Question	Answer	Marks
4(a)	**1 mark** for **1 letter** in correct space **2 marks** for all **3 letters** in correct places 1 **C** 2 URL goes to Domain Name Service (DNS) 3 **B** 4 **A** 5 DNS returns IP address to client	**2**
4(b)(i)	**1 mark** per bullet point • <u>258</u> is too large/largest individual numbers is 255 • 4 numbers needed/1 number missing/only 3 groups of numbers given	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(b)(ii)</td><td>1 mark per bullet point

• L not a valid hexadecimal number
• Only one double colon is allowed</td><td>2</td></tr>
<tr><td>4(c)</td><td>1 mark per row

<table>
<tr><th>Description</th><th>Public</th><th>Private</th></tr>
<tr><td>The address can be reached over the Internet.</td><td>✓</td><td></td></tr>
<tr><td>The address is more secure.</td><td></td><td>✓</td></tr>
<tr><td>The address can only be accessed through the same LAN.</td><td></td><td>✓</td></tr>
<tr><td>The address can be duplicated in different networks.</td><td></td><td>✓</td></tr>
</table>
</td><td>4</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>5(a)(i)</td><td>1 mark per bullet point, max 2

• Restricted use
• Source code not provided // source code protected
• Anyone can purchase/download if agree to the terms
• Limited number of installations allowed // Software key needed to install</td><td>2</td></tr>
<tr><td>5(a)(ii)</td><td>1 mark for name and 2 marks for description

Either
Open Source
• The source code is released with the program
• Users can change / edit the source code to enhance the game
• Users can re-release the game under the same terms // the game might spread more easily

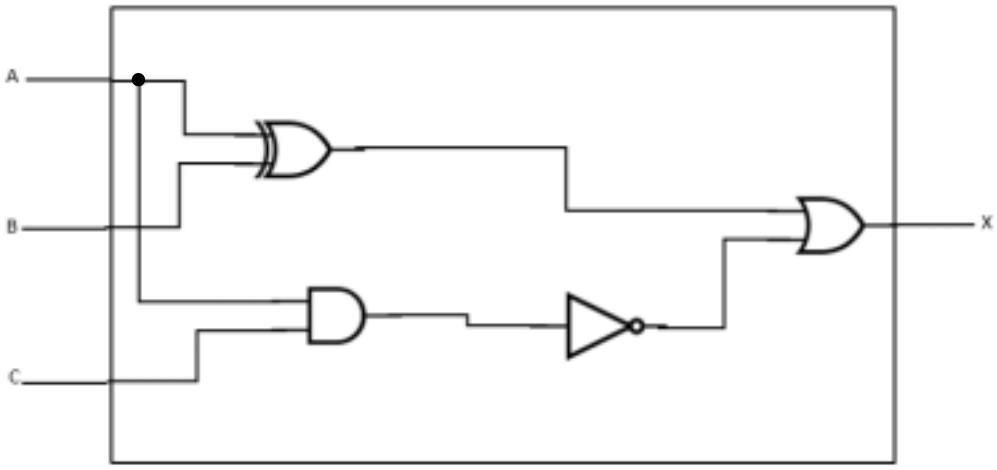
Or
Shareware
• Users get free trial or limited access for set time
• Users do not have access to the source code // source code may not be edited
• At end of trial period, users may have to pay or register to continue using the game // Can get people ‘hooked’ and then charge a fee
Or
Freeware
• There is no fee for the game
• The game could be copyrighted
• Modification, re-distribution or reverse engineering of the game without permission is prohibited</td><td>3</td></tr>
</table>

Question	Answer	Marks
5(b)	**1 mark** per bullet point, **max 3** • Firewall / proxy • Encryption • Username and Password • Physical security • Biometric authentication // by example • Two-step authentication // by example • Anti-malware	**3**

Question	Answer	Marks
6(a)(i)	MAR ← [**PC**] PC ← PC + 1 **MDR** ← [[MAR]] **CIR** ← [MDR]	**3**
6(a)(ii)	**1 mark** from: • The contents of the MAR is an address, it is the contents of that address which is transferred to MDR • The contents of the address pointed to by the MAR is transferred to the MDR	**1**
6(b)	**1 mark** per bullet point to **max 2** • A signal from a source / device • Telling the processor its attention is needed	**2**
6(c)	**1 mark** per row	**5**

Statement	DRAM	SRAM
Does not need to be refreshed as the circuit holds the data while the power supply is on		✓
Mainly used in cache memory of processors where speed is important		✓
Has less complex circuitry	✓	
Requires higher power consumption under low levels of access, which is significant when used in battery-powered devices	✓	
Requires data to be refreshed occasionally so it retains the data	✓	

Question	Answer	Marks
7(a)	**1 mark** per benefit to **max 3** • Devices can be more mobile as they do not have to be connected to cable • Easier to set up // no cables need to be installed • Add additional devices is easier • Many different types of device can be connected at the same time	**3**
7(b)	**1 mark** for a drawback from the following: • Easi**er** to hack • Interference • Signal degrades quickly	**1**

Question	Answer	Marks
8(a)	**1 mark** for each logic gate with the correct inputs  	**4**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>8(b)</td><td>One mark for each correct pair of lines
<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working Space</th><th>X</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td></td><td>1</td></tr>
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