

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
Cambridge International Advanced Level

## **MARK SCHEME for the May/June 2015 series**

### **9608 COMPUTER SCIENCE**

**9608/32**

Paper 3 (Written paper), maximum raw mark 75

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.

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Page 2	Mark Scheme	Syllabus	Paper
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1	(a) (i)	‘;’ missing	1
	(ii)	‘2’ is not a variable	1
	(iii)	‘e’ is not a valid letter	1
	(b)	<pre> &lt;assignment statement&gt; ::=                                 &lt;variable&gt; = &lt;variable&gt;&lt;operator&gt;&lt;variable&gt;;  &lt;variable&gt; ::= &lt;letter&gt; &lt;letter&gt;&lt;letter&gt;  &lt;letter&gt;&lt;letter&gt;&lt;letter&gt;  &lt;letter&gt; ::= a b c d  &lt;operator&gt; ::= =+ - * ÷ </pre>	2 2 1 1
	(c)	<pre> &lt;letter&gt;   &lt;letter&gt;&lt;variable&gt; // &lt;letter&gt;   &lt;variable&gt;&lt;letter&gt; </pre>	2
	(d) (i)	debugging is <u>faster</u> / <u>easier</u> // can debug incomplete code // better diagnostics	1
	(ii)	compiler produces executable version – not readable / no need for source code // difficult to reverse-engineer	1
			<b>Total: 13</b>
2	(a)	<ul style="list-style-type: none"> <li>Spam</li> <li>Worm</li> </ul> <p><b>Pharming</b> redirect website to fake website // domain name server compromised // proxy server compromised</p> <p><b>Phishing</b> <u>through email</u> attempt to obtain somebody’s confidential data / install malware</p>	1 1  1  1
	(b)	<p><b>Spam</b></p> <ul style="list-style-type: none"> <li>user’s inbox is filled by large amount of unwanted email</li> <li>user / email server employs filtering software that can divert / delete spam email</li> </ul> <p><b>Worm</b></p> <ul style="list-style-type: none"> <li>could corrupt user’s computer // delete data // consume bandwidth</li> <li>run anti-virus software in the background // not connect to the Internet // keep OS up-to-date</li> </ul>	1 1 <b>or</b> 1  1

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(c)	encryption: process of turning plain text into cipher text	1			
	public key: key widely available that can be used to encrypt message that only owner of private key can decrypt // can be used to decrypt a message thereby confirming originator of message	1			
(d) (i)	digital signature	1			
(ii)	<ul style="list-style-type: none"> <li>software is put through hashing algorithm</li> <li>hash total is encrypted with private key (digital signature)</li> <li>software + encrypted hash / digital signature are sent</li> <li>receiver is in possession of sender's public key</li> <li>the received hash total / digital signature is decrypted with public key (SH)</li> <li>the receiver hashes received software (RH)</li> <li>If SH matches RH then software is authentic and has not been altered</li> </ul>	Any four points 1 mark each			
		<b>Total: 13</b>			
3	(a) (i)	enumerated	1		
	(ii)	record	1		
	(iii)	MyMonthOfBirth ← DateOfBirth.ThisMonth	1		
(b) (i)	TYPE LocationRainfall	1			
	DECLARE LocationName : STRING DECLARE LocationHeight : INTEGER DECLARE TotalMonthlyRainfall : <u>ARRAY[1..12]</u> OF REAL ENDTYPE	1 1 1 1 + 1			
(ii)	<ul style="list-style-type: none"> <li>no need to re-sort data every time new data is added</li> <li>only a small file so searching will require little processing</li> <li>new records can easily be appended</li> </ul>	1 1 1 [max 2]			
		<b>Total: 10</b>			
4	(a) (i)	Circuit 1			1
		A	B	X	
		0	0	1	
		0	1	1	
		1	0	1	
		1	1	0	

(ii)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="3">Circuit 2</th> </tr> <tr> <th>A</th> <th>B</th> <th>X</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	Circuit 2			A	B	X	0	0	1	0	1	1	1	0	1	1	1	0	1
Circuit 2																				
A	B	X																		
0	0	1																		
0	1	1																		
1	0	1																		
1	1	0																		
(b) (i)	<ul style="list-style-type: none"> <li>circuit 1: <math>\overline{A.B}</math></li> <li>circuit 2: <math>\overline{A + B}</math></li> </ul>	1 1																		
(ii)	$\overline{A.B} \equiv \overline{A + B}$	1																		
(c)	$\overline{\overline{(A + B).B}}$ Mark as follows: $\overline{(A + B)}$ $.B$ bar over whole expression	1 1 1																		
(d)	$\overline{\overline{(A + B).B}}$ $= \overline{\overline{(A + B) + B}}$ $= \overline{(A + B) + \overline{B}}$ $= A + (B + \overline{B})$ $= A + 1$ $= 1$ allow f.t. from (c)	1 1 1 1 1 [max 3]																		
		<b>Total: 11</b>																		
5 (a)	Monitoring system	1																		
(b)	<ul style="list-style-type: none"> <li>temperature sensor ...</li> <li>transmits measured temperature</li> <li>analogue to digital converter ...</li> <li>converts analogue signal from sensor to digital value that can be stored</li> <li>storage device // data logger...</li> <li>for recording readings from sensor</li> <li>transmission hardware ...</li> <li>to transfer data from sensor to storage device</li> <li>processor ...</li> <li>to process incoming data</li> </ul>	1 1 1 1 1 1 1 1 1 1 [max 6]																		

Page 5	Mark Scheme	Syllabus	Paper
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(c) (i)	temperature reading in location 5 has been processed	1 1										
(ii)	0100 0000 1111 1011 1 mark per byte	2										
(d) (i)	AND #B00010000 // AND #&10 // AND #16 1 mark for AND, 1 mark for address mode, 1 mark for mask, 1 mark for indication of numbering system	1 + 1 + 1 + 1										
(ii)	OR #B00000001 // OR #&01 // OR #1 1 mark for OR, 1 mark for mask	1 + 1										
		<b>Total: 17</b>										
6 (a)	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Description</th> <th style="text-align: center;">Protocol used</th> </tr> </thead> <tbody> <tr> <td style="border: 1px solid black; padding: 5px;">email client downloads an email from an email server</td> <td style="border: 1px solid black; padding: 5px;">HTTP</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">email is transferred from one email server to another email server</td> <td style="border: 1px solid black; padding: 5px;">POP3</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">email client sends email to email server</td> <td style="border: 1px solid black; padding: 5px;">SMTP</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">browser sends a request for a web page to a web server</td> <td style="border: 1px solid black; padding: 5px;">SMTP</td> </tr> </tbody> </table>	Description	Protocol used	email client downloads an email from an email server	HTTP	email is transferred from one email server to another email server	POP3	email client sends email to email server	SMTP	browser sends a request for a web page to a web server	SMTP	1 mark for correct arrow from each description
Description	Protocol used											
email client downloads an email from an email server	HTTP											
email is transferred from one email server to another email server	POP3											
email client sends email to email server	SMTP											
browser sends a request for a web page to a web server	SMTP											
(b)	peer-to-peer	1										
(c) (i)	<b>Tracker:</b> central server that: stores details of other computers that have all / part of file to be downloaded // has data on those peers downloading and uploading file // shares IP addresses with other clients in swarm allowing them to connect	1  1										
(ii)	<b>Seed:</b> peer computer that has 100% of file // is uploading downloaded content	1 1										
(iii)	<b>Swarm:</b> all the connected peer computers that have all or part of the file to be downloaded / uploaded // share a torrent	1 1										
		<b>Total: 11</b>										