



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

---

**COMPUTER SCIENCE**

**0478/13**

Paper 1

**May/June 2017**

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2017 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

© IGCSE is a registered trademark.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

---

This document consists of **8** printed pages.

Question	Answer	Marks
1(a)	1 mark for <b>any</b> two correct values, 2 marks for all 4 correct values. 29FC	2
1(b)	<b>Two</b> from: <ul style="list-style-type: none"> <li>• Easier/quicker to understand/read</li> <li>• Easier to debug/identify errors</li> <li>• Fewer digits are used / shorter // takes up less space on screen // more can be shown on screen / page</li> </ul>	2
1(c)	<b>Two</b> from: <ul style="list-style-type: none"> <li>• Notations for colour in HTML // HTML colour (codes)</li> <li>• Error messages</li> <li>• MAC address // IP address</li> <li>• Locations in memory</li> <li>• Memory dump</li> </ul>	2

Question	Answer	Marks
2(a)	<b>Two</b> from: <ul style="list-style-type: none"> <li>• Closer to human language // closer to English</li> <li>• Independent of a particular type of computer/device/platform // portable language</li> <li>• A language such as Python, Java, Pascal, etc. (any suitable example)</li> </ul>	2
2(b)	<b>One</b> from: <ul style="list-style-type: none"> <li>• Compiler</li> <li>• Interpreter</li> </ul>	1
2(c)	Must relate to answer given in 2b. No follow through for incorrect answer in part 2b.  <b>Compiler – Three</b> from: <ul style="list-style-type: none"> <li>• Translates the whole program as a complete unit / at once</li> <li>• Creates an executable file / object code</li> <li>• A report / list of errors in the code is created</li> <li>• Optimises the source code (to run efficiently)</li> </ul> <b>Interpreter – Three</b> from: <ul style="list-style-type: none"> <li>• Translates a program one line of code at a time</li> <li>• Machine code is directly executed // The interpreter is used each time the program / code is executed</li> <li>• Will identify an error as soon as it finds one in a line of code</li> </ul>	3

Question	Answer	Marks															
3	1 mark per correct tick	4															
	<table border="1"> <thead> <tr> <th>Statement</th> <th>true (✓)</th> <th>false (✓)</th> </tr> </thead> <tbody> <tr> <td>47KB is larger than 10MB.</td> <td></td> <td>✓</td> </tr> <tr> <td>250bytes is smaller than 0.5MB.</td> <td>✓</td> <td></td> </tr> <tr> <td>50GB is larger than 100MB.</td> <td>✓</td> <td></td> </tr> <tr> <td>1TB is smaller than 4GB.</td> <td></td> <td>✓</td> </tr> </tbody> </table>	Statement	true (✓)	false (✓)	47KB is larger than 10MB.		✓	250bytes is smaller than 0.5MB.	✓		50GB is larger than 100MB.	✓		1TB is smaller than 4GB.		✓	
Statement	true (✓)	false (✓)															
47KB is larger than 10MB.		✓															
250bytes is smaller than 0.5MB.	✓																
50GB is larger than 100MB.	✓																
1TB is smaller than 4GB.		✓															

Question	Answer	Marks																		
4	1 mark per correct tick	5																		
	<table border="1"> <thead> <tr> <th>Statement</th> <th>True</th> <th>False</th> </tr> </thead> <tbody> <tr> <td>Data is transmitted in one direction only, one bit at a time.</td> <td></td> <td>✓</td> </tr> <tr> <td>Data is transmitted in both directions, multiple bits at a time.</td> <td></td> <td>✓</td> </tr> <tr> <td>Data is transmitted in one direction only, multiple bits at a time.</td> <td></td> <td>✓</td> </tr> <tr> <td>Data is transmitted in both directions, but only one direction at a time. Data is transmitted one bit at a time.</td> <td>✓</td> <td></td> </tr> <tr> <td>Data is transmitted in both directions, but only one direction at a time. Data is transmitted multiple bits at a time.</td> <td></td> <td>✓</td> </tr> </tbody> </table>	Statement	True	False	Data is transmitted in one direction only, one bit at a time.		✓	Data is transmitted in both directions, multiple bits at a time.		✓	Data is transmitted in one direction only, multiple bits at a time.		✓	Data is transmitted in both directions, but only one direction at a time. Data is transmitted one bit at a time.	✓		Data is transmitted in both directions, but only one direction at a time. Data is transmitted multiple bits at a time.		✓	
Statement	True	False																		
Data is transmitted in one direction only, one bit at a time.		✓																		
Data is transmitted in both directions, multiple bits at a time.		✓																		
Data is transmitted in one direction only, multiple bits at a time.		✓																		
Data is transmitted in both directions, but only one direction at a time. Data is transmitted one bit at a time.	✓																			
Data is transmitted in both directions, but only one direction at a time. Data is transmitted multiple bits at a time.		✓																		

Question	Answer	Marks												
5(a)	1 mark per correct tick <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Received byte</th> <th>corrupted during transmission (✓)</th> <th>not corrupted during transmission (✓)</th> </tr> </thead> <tbody> <tr> <td>10110100</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>01101101</td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>10000001</td> <td style="text-align: center;">✓</td> <td></td> </tr> </tbody> </table>	Received byte	corrupted during transmission (✓)	not corrupted during transmission (✓)	10110100	✓		01101101		✓	10000001	✓		<b>3</b>
Received byte	corrupted during transmission (✓)	not corrupted during transmission (✓)												
10110100	✓													
01101101		✓												
10000001	✓													
5(b)	<p><b>Four</b> from:</p> <ul style="list-style-type: none"> <li>• Uses acknowledgement and time out</li> <li>• Check performed on received data // error is detected by e.g. parity check, check sum</li> <li>• If error detected, request sent to resend data // negative acknowledgment is used</li> <li>• If no acknowledgement is sent that data is received // positive acknowledgement is used</li> <li>• Data is resent / Resend request repeated, till data is resent correctly ...</li> <li>• ... or request times out // limit is reached</li> </ul>	<b>4</b>												

Question	Answer	Marks
6	<p>1 mark for correct bus name and up to 2 further marks for appropriate purpose.</p> <p><b>Address (bus)</b>  <b>Two</b> from:</p> <ul style="list-style-type: none"> <li>• Carries / transports an address / location ...</li> <li>• ... of the next item to be fetched</li> <li>• Data travels one way (unidirectional)</li> </ul> <p><b>Data (bus)</b>  <b>Two</b> from:</p> <ul style="list-style-type: none"> <li>• Carries / transports data / example of data ...</li> <li>• ... that is currently being processed // that will be / has been processed</li> <li>• Data can travel in both directions (bidirectional)</li> </ul> <p><b>Control (bus)</b>  <b>Two</b> from:</p> <ul style="list-style-type: none"> <li>• Carries / transports signals</li> <li>• Control / directs the actions of the CPU / processor</li> <li>• Can be either Unidirectional or Bidirectional</li> </ul>	<b>6</b>

Question	Answer	Marks
<p>7</p>	<p>1 mark for correct line till 5 marks given.</p>	<p>5</p>

Question	Answer	Marks
<p>8</p>	<ul style="list-style-type: none"> <li>• Secondary</li> <li>• HDD/SSD</li> <li>• SSD/HDD</li> <li>• Primary</li> <li>• ROM/RAM</li> <li>• RAM/ROM</li> </ul>	<p>6</p>

Question	Answer	Marks
9	<p>1 mark for appropriate device name and 1 further mark for appropriate purpose.</p> <p><b>Input devices</b> Two from:</p> <ul style="list-style-type: none"> <li>• <b>Keypad / Keyboard</b> ...</li> <li>• ... e.g. to allow customer to input the quantity of an item</li> <li>• <b>Touchscreen</b> ...</li> <li>• ... e.g. to allow a customer to select a payment method</li> <li>• <b>Barcode scanner / Barcode reader</b> ...</li> <li>• ... e.g. to allow a customer to scan in their shopping</li> <li>• <b>Card reader // Cash deposit / intake</b> ...</li> <li>• ... e.g. to allow a customer to pay for their shopping</li> <li>• <b>Weighing scales</b> ...</li> <li>• ... e.g. to allow a customer to weigh fresh produce</li> </ul> <p><b>Output devices</b> One from:</p> <ul style="list-style-type: none"> <li>• <b>Display / Touchscreen</b> ...</li> <li>• ... e.g. to allow a customer to see the running total of their shopping</li> <li>• <b>Speaker</b> ...</li> <li>• ... e.g. to give audio instructions to a customer about how to use the self-checkout</li> <li>• <b>Printer</b> ...</li> <li>• ... e.g. to print a receipt for the customer</li> </ul>	<b>6</b>

Question	Answer	Marks															
10(a)	<p>1 mark for four correct outputs only</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td><b>1</b></td> </tr> <tr> <td>0</td> <td>1</td> <td><b>0</b></td> </tr> <tr> <td>1</td> <td>0</td> <td><b>0</b></td> </tr> <tr> <td>1</td> <td>1</td> <td><b>0</b></td> </tr> </tbody> </table>	A	B	Output	0	0	<b>1</b>	0	1	<b>0</b>	1	0	<b>0</b>	1	1	<b>0</b>	<b>1</b>
A	B	Output															
0	0	<b>1</b>															
0	1	<b>0</b>															
1	0	<b>0</b>															
1	1	<b>0</b>															
10(b)	<p>1 mark for each correct section of the statement</p> <ul style="list-style-type: none"> <li>• (A AND B)</li> <li>• AND</li> <li>• (C OR NOT B)</li> </ul>	<b>3</b>															

Question	Answer	Marks
11	<p><b>Three</b> from e.g. :</p> <ul style="list-style-type: none"> <li>• (Provides an) interface</li> <li>• Loads / opens / installs / closes software</li> <li>• Manages the hardware // manages peripherals // spooling</li> <li>• Manages the transfer of programs into and out of memory</li> <li>• Divides processing time // processor management</li> <li>• Manages file handling</li> <li>• Manages error handling // manages interrupts</li> <li>• Manages security software</li> <li>• Manages utility software</li> <li>• Manages user accounts</li> <li>• Multitasking</li> <li>• Multiprogramming // time slicing</li> <li>• Batch processing</li> </ul>	<b>3</b>

Question	Answer	Marks
12(a)	<p>1 mark for appropriate sensor and 1 further mark for appropriate use.</p> <p><b>Two</b> from:</p> <ul style="list-style-type: none"> <li>• <b>Gas (sensor)</b> ...</li> <li>• ... e.g. to measure the levels of oxygen/carbon dioxide / nitrogen in the factory to make sure they are not too high / low</li> <li>• <b>Temperature (sensor)</b> ...</li> <li>• ... e.g. to measure the temperature of the chemicals to make sure it is not too high/low</li> <li>• <b>Motion / Infra-red (sensor)</b> ...</li> <li>• ... e.g. to detect any persons in an unauthorised area of the factory</li> <li>• <b>Pressure (sensor)</b> ...</li> <li>• ... e.g. to measure the pressure of chemicals flowing through pipes to check that level are not too high / low</li> <li>• <b>pH (sensor)</b> ...</li> <li>• ... to measure the pH to make sure the acidity / alkalinity of the chemicals is correct</li> <li>• <b>Light (sensor)</b> ...</li> <li>• ... to measure the level of light to make sure it remains at a constant level for the chemical process</li> </ul>	<b>4</b>
12(b)	<p><b>Five</b> from:</p> <ul style="list-style-type: none"> <li>• Sensors send signals to microprocessor</li> <li>• Analogue signals are <u>converted to digital</u> (using ADC)</li> <li>• Microprocessor compares value to stored value ...</li> <li>• ... If out of range / matches stored values ...</li> <li>• ... signal sent to alert workers (e.g. sound alarm)</li> <li>• ... microprocessor send signal to cause an action to occur e.g. cool a process down, heat a process up, add a chemical</li> <li>• ... no action taken</li> <li>• Output/record readings</li> <li>• Monitoring is continuous</li> </ul>	<b>5</b>

Question	Answer	Marks
13(a)	<b>Two</b> from: <ul style="list-style-type: none"> <li>• Smaller file to transmit</li> <li>• The file is transmitted quicker</li> <li>• Uses / requires less bandwidth</li> </ul>	<b>2</b>
13(b)(i)	<ul style="list-style-type: none"> <li>• Lossless (compression) ...</li> <li>• ... It is important the code must be (exactly) the same as the original file</li> <li>• ... If it does not match the original file it will not work</li> </ul>	<b>3</b>
13(b)(ii)	<ul style="list-style-type: none"> <li>• Lossy (compression) ...</li> <li>• ... It would make the file smaller than lossless compression / the file would stream faster than lossless compression</li> <li>• ... The quality of the video can be reduced but it can still be viewed</li> </ul>	<b>3</b>