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**COMPUTER SCIENCE**

**0478/22**

Paper 2

**March 2017**

MARK SCHEME

Maximum Mark: 50

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**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.

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Question	Answer	Marks										
1(a)(i)	Many correct answers, the identifier must be meaningful and appropriate size if present. These are examples only <code>ReactionTime [1:650], ReactionTime [0:649],  ReactionTime [650], ReactionTime[649], ReactionTime[ ]</code>	1										
1(a)(ii)	Many correct answers, the identifier must be the same as part 1(a)(i) including appropriate size if present. These are examples only <code>ReactionTime [1:50], ReactionTime [0:49], ReactionTime [50],  ReactionTime[49], ReactionTime[ ]</code>	1										
1(a)(iii)	Any <b>two</b> from: – can store multiple reaction times under a single identifier – reduces the number variables – arrays have an index which identifies each stored element – can use iteration to loop through an array – allows for more efficient programming – programs are easier to debug	2										
1(b)	Any <b>three</b> from: – an effective loop to accept 650 records – prompt for <b>all three</b> inputs – within the loop reads <b>all three</b> INPUT values – storing input values in appropriate arrays  Sample Answer. <code>FOR Counter ← 1 TO 650  OUTPUT ('Input House, Age and Reaction Time')  INPUT HouseArray [Counter], AgeArray [Counter],  ReactionTimeArray[Counter]  NEXT</code>	3										
1(c)	1 mark for correct type of test data (max 3) ..... 1 mark for appropriate example (max 3)  <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 50%;">Normal / Valid</td> <td>12 / 13 / 14 / 15 / 16</td> </tr> <tr> <td>Erroneous / Abnormal / Invalid</td> <td>13.5 / Twelve / 9</td> </tr> <tr> <td>Boundary (accepted)</td> <td>12 or 16</td> </tr> <tr> <td>Boundary (rejected)</td> <td>11 or 17</td> </tr> <tr> <td>Extreme</td> <td>12 or 16</td> </tr> </tbody> </table>	Normal / Valid	12 / 13 / 14 / 15 / 16	Erroneous / Abnormal / Invalid	13.5 / Twelve / 9	Boundary (accepted)	12 or 16	Boundary (rejected)	11 or 17	Extreme	12 or 16	6
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1(d)	Any <b>five</b> from following explanations: – user input for House and Age – loop through the arrays – use selection statements to identify the elements that meet <b>both</b> criteria – maintain counter of elements (that met criteria of House and Age input) – maintain a sum of reaction times (that match criteria of House and Age input) – calculate the average from element counter and sum of reaction times – create appropriate output message – output message and average outside of loop	5										

Question	Answer	Marks
1(e)	Any <b>two</b> from following explanations: – variable used to hold fastest time will have to initialised to a high value / variable used to hold <b>fastest</b> time will be given first record value – store array value in variable if reaction time less than current value in variable – store array value of age with the same index in a variable – Output age and fastest reaction time	<b>2</b>

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<b>Section B</b>																																						
2	<p>1 mark for each error identified <b>with</b> effective corrective action</p> <pre>01 Num18 = 0 02 INPUT Age 03 WHILE Age &gt;= 0 DO 04     IF Age &gt;= 18 THEN 05         Num18 = Num18 + Age 06     END IF 07 END WHILE 08 PRINT Num18 - Age</pre> <p>Error – Line 04 or IF Age &gt;= 18 and Correction – IF Age &gt;18</p> <p>Error – Line 05 or Num18 =Num18 + Age and Correction – Num18 = Num18 + 1</p> <p>Error – Line 08 or PRINT Num18 - Age and Correction – PRINT Num18</p> <p>Error – INPUT Age missing inside loop and Correction – Include INPUT Age after test and before exiting loop</p>	<b>4</b>																																				
3	<p>1 mark for each correctly completed element of the grid</p> <table border="1" data-bbox="308 1055 1326 1406"> <thead> <tr> <th><i>Variable</i></th> <th><i>Data Type</i></th> <th><i>Appropriate Validation Check</i></th> </tr> </thead> <tbody> <tr> <td><i>EmployeeID</i></td> <td>String</td> <td>Length Check / Presence Check / Format Check / Type check</td> </tr> <tr> <td><i>Manager</i></td> <td>Boolean</td> <td>Type Check / Presence Check</td> </tr> <tr> <td><i>AnnualHoliday</i></td> <td>Integer</td> <td>Type Check / Range Check / Presence Check</td> </tr> <tr> <td><i>PayGrade</i></td> <td>Char</td> <td>Presence Check / Length Check / Type Check</td> </tr> </tbody> </table>	<i>Variable</i>	<i>Data Type</i>	<i>Appropriate Validation Check</i>	<i>EmployeeID</i>	String	Length Check / Presence Check / Format Check / Type check	<i>Manager</i>	Boolean	Type Check / Presence Check	<i>AnnualHoliday</i>	Integer	Type Check / Range Check / Presence Check	<i>PayGrade</i>	Char	Presence Check / Length Check / Type Check	<b>8</b>																					
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4	<p>1 mark for each correct column</p> <table border="1" data-bbox="456 1507 1195 1951"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>4</td> <td>4</td> <td></td> </tr> <tr> <td></td> <td>8</td> <td>3</td> <td></td> </tr> <tr> <td></td> <td>12</td> <td>2</td> <td></td> </tr> <tr> <td></td> <td>16</td> <td>1</td> <td>16</td> </tr> <tr> <td>3</td> <td>3</td> <td>3</td> <td></td> </tr> <tr> <td></td> <td>6</td> <td>2</td> <td></td> </tr> <tr> <td></td> <td>9</td> <td>1</td> <td>9</td> </tr> <tr> <td>-1</td> <td></td> <td></td> <td>Exit</td> </tr> </tbody> </table>	A	B	C	Output	4	4	4			8	3			12	2			16	1	16	3	3	3			6	2			9	1	9	-1			Exit	<b>4</b>
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5(a)	<ul style="list-style-type: none"> <li>– initialising counter outside the loop</li> <li>– updating counter inside loop</li> <li>– suitable exit value at start of loop</li> <li>– correct use of WHILE ... DO ... ENDWHILE</li> </ul> <p>Example:</p> <pre> INPUT Num Counter ← 1 WHILE Counter &lt;= 12 DO   Num ← Num * Counter   A [Counter] ← Num   Counter ← Counter + 1 ENDWHILE </pre>	<b>4</b>																														
5(b)	<ul style="list-style-type: none"> <li>– WHILE has criteria check at start / pre-test</li> <li>– may never run</li> <li>– REPEAT UNTIL has criteria check at end / post-test</li> <li>– will always run at least once</li> </ul>	<b>4</b>																														
6(a)	<p>Alan Swales Chantel Law</p> <ul style="list-style-type: none"> <li>• Correct data</li> <li>• Correct order</li> </ul>	<b>2</b>																														
6(b)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Field:</td> <td style="width: 20%;">Device ID</td> <td style="width: 20%;">Device Type</td> <td style="width: 20%;">Purchase Date</td> <td style="width: 25%;">Purchase Price (\$)</td> </tr> <tr> <td>Table:</td> <td>DEVICE</td> <td>DEVICE</td> <td>DEVICE</td> <td>DEVICE</td> </tr> <tr> <td>Sort:</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Show:</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Criteria:</td> <td></td> <td>Like 'Desktop'</td> <td>&lt;#31/12/2016#</td> <td></td> </tr> <tr> <td>or:</td> <td></td> <td></td> <td></td> <td>&lt;1000</td> </tr> </table> <p>1 mark for each correct column</p>	Field:	Device ID	Device Type	Purchase Date	Purchase Price (\$)	Table:	DEVICE	DEVICE	DEVICE	DEVICE	Sort:					Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Criteria:		Like 'Desktop'	<#31/12/2016#		or:				<1000	<b>4</b>
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