MODULE K ALGORITHM DESIGN · K10

Explaining the purpose of an algorithm: mark scheme

21 marks · Cambridge 0478 syllabus 7.3 (purpose of a given algorithm), 7.4 (standard methods of solution), 7.5(a) (validation checks), 7.7 (trace tables)

How to use. One mark per creditworthy point up to the maximum shown. **/** separates alternative words; **//** separates alternative answers. Words in (brackets) are not needed for the mark. **...** means the point depends on the one before it. Credit any other valid answer that describes the algorithm accurately; do not credit vague answers that would fit any algorithm.

<table>
<tr><th>QUESTION</th><th>ANSWER</th><th>MARKS</th><th>GUIDANCE</th></tr>
<tr><td>1(a)
0478 7.4</td><td>One mark for each correct row:
A: Totalling
B: Counting
C: Maximum
D: Average</td><td>4</td><td>A row with more than one tick scores 0. Minimum is not used.</td></tr>
<tr><td>2(a)
0478 7.7</td><td>One mark for each correct column:
<table>
<tr><th>Minutes</th><th>Count</th><th>Total</th><th>Number</th><th>OUTPUT</th></tr>
<tr><td></td><td>0</td><td>0</td><td>0</td><td></td></tr>
<tr><td>25</td><td></td><td>25</td><td>1</td><td></td></tr>
<tr><td>40</td><td>1</td><td>65</td><td>2</td><td></td></tr>
<tr><td>30</td><td>2</td><td>95</td><td>3</td><td></td></tr>
<tr><td>15</td><td></td><td>110</td><td>4</td><td></td></tr>
<tr><td>50</td><td>3</td><td>160</td><td>5</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Average: 32</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Long sessions: 3</td></tr>
</table></td><td>5</td><td>Minutes: 25, 40, 30, 15, 50. Count: 1, 2, 3 (30 is counted). Total: 25, 65, 95, 110, 160. Number: 1, 2, 3, 4, 5. OUTPUT: both lines, in this order, after the last input. Values may be repeated on later rows and rows may be laid out differently, as long as each column's values are in the correct order. Ignore quotation marks. Accept 32.0.</td></tr>
<tr><td>2(b)
0478 7.3</td><td>Any two from:
Inputs the number of minutes for (each of) five sessions
Calculates and outputs the average / mean number of minutes (per session)
Counts and outputs how many sessions were 30 minutes or longer / at least 30 minutes
(Calculates) the total number of minutes</td><td>2</td><td>max 2. Do not accept "more than 30 minutes" or "over 30 minutes" (30 is counted). Do not accept "outputs 32 and 3" alone (results for one set of data, not the purpose).</td></tr>
</table>

QUESTION	ANSWER	MARKS	GUIDANCE
3(a) 0478 7.3	Any four from: Asks for / inputs a part code (into `Wanted`) Repeats the input until the code is (exactly) 6 characters long Searches the `PartCode` array starting at the first element / index 1 Compares each code in turn / in order with the code input Stops when the code is found // when all 500 codes have been checked If found, outputs ("Stored in bay" and) the bay number from `Bay` at the same index If not found, outputs "Part not stocked"	**4**	max 4. Credit descriptions in words or using the identifiers. Do not accept "searches for the part" alone for the search points; the answer must show the codes are checked one at a time.
3(b) 0478 7.4	Linear search	**1**	Do not accept "search" alone or binary search.
3(c) 0478 7.5(a)	Length check	**1**	Do not accept range, presence, type or format check.
4(a) 0478 7.7	13	**1**	2 + 7 + 0 + 4 = 13.
4(b) 0478 7.3	Adds up / totals the digits of the number input and outputs the total // outputs the sum of the digits of the number	**1**	Must refer to the digits. Do not accept "adds up numbers" or "outputs Y".
4(c) 0478 7.3	Output: 0 ... the condition `X > 0` is false at the first check // the loop is pre-condition so its body is never run // so `Y` keeps its starting value (of 0)	**2**	The explanation mark depends on the output 0. Accept "the WHILE loop is skipped".

Total: 21 marks