MODULE K ALGORITHM DESIGN · K9

Finding and fixing errors in an algorithm: mark scheme

21 marks · OCR J277 specification 2.1.2 (identify common errors; identify syntax/logic errors in code and suggest fixes; trace tables; correct and refine algorithms in pseudocode, flowcharts and reference language) and 2.3.2 (syntax and logic errors)

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative words or answers. Words in (brackets) are not needed for the mark. Corrected code may be in OCR Exam Reference Language or any high-level language: mark the logic, and do not penalise minor syntax slips (e.g. missing `then`, `endif`, a colon or a bracket). Credit any other valid answer that shows the same understanding.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 2.1.2, 2.3.2	1 mark per correct row: `print("Goodbye)`: Syntax error `for i = 1 to 9`: Logic error `iff code == "4821" then`: Syntax error	**3**	A row with both boxes ticked scores 0. Row 2 is a logic error: the line is valid code but the loop runs 9 times, not 10.
2(a) J277 2.1.2	Line 03 (identified) … `for i = 0 to 5` / `for i = 0 to temps.length - 1` Line 04 (identified) … `if temps[i] >= 30 then`	**4**	The correction mark for each line may be given if the line number is missing but the rewritten line makes clear which line is meant. Line 03: allow `for i in range(6)` / `range(0, 6)`. Do not allow `0 to 6` or `1 to 5`. Line 04: allow `> 29` (the readings are whole numbers) / `30 <= temps[i]`. Do not allow `>=` written as ≥ or `=>`.

<table>
<tr><th>QUESTION</th><th>ANSWER</th><th>MARKS</th><th>GUIDANCE</th></tr>
<tr><td>3(a)
J277 2.1.2</td><td>bid: 1, 2, 3, 4
amount: 25, 40, 15, 30 (in this order)
highest is 0 and never changes ... AND Output is 0 (once, at the end)
<table>
<tr><th>BID</th><th>AMOUNT</th><th>HIGHEST</th><th>OUTPUT</th></tr>
<tr><td></td><td></td><td>0</td><td></td></tr>
<tr><td>1</td><td>25</td><td></td><td></td></tr>
<tr><td>2</td><td>40</td><td></td><td></td></tr>
<tr><td>3</td><td>15</td><td></td><td></td></tr>
<tr><td>4</td><td>30</td><td></td><td>0</td></tr>
</table></td><td>3</td><td>Values may be repeated on later rows (e.g. 0 written in the highest column on every row). Allow the output on its own final row. Do not give the third mark if any other value (25, 40, 15 or 30) appears in the highest column.</td></tr>
<tr><td>3(b)
J277 2.1.2</td><td>40</td><td>1</td><td></td></tr>
<tr><td>3(c)
J277 2.1.2</td><td>Line 04 (identified)
... <code>if amount > highest then</code></td><td>2</td><td>Allow >= / <code>highest < amount</code>.
Do not credit changes to line 01 or line 05 (they do not fix the error).</td></tr>
<tr><td>4(a)
J277 2.1.2</td><td>Max 2 from:
count is never changed / stays at 0 ...
... so <code>count < 5</code> is always true
The loop never ends / it is an infinite loop
It keeps asking for parcel weights (more than five times)
The total weight is never output</td><td>2</td><td>Do not allow “it crashes” or “it doesn't work” on their own.</td></tr>
<tr><td>4(b)
J277 2.1.2</td><td>Error 1
count is never increased / updated inside the loop (lines 03 to 07)
... add <code>count = count + 1</code> inside the loop (e.g. after line 06 / before line 07)
Error 2
Line 04 sets / resets total to 0 every time the loop runs (so only the last weight is kept)
... delete / remove line 04 / move it before the loop (it is already done on line 01)</td><td>4</td><td>For the Error 1 fix, allow replacing the while loop with a count-controlled loop that runs 5 times (e.g. <code>for count = 1 to 5</code> ... <code>next count</code>).
Allow <code>count += 1</code>. Do not allow <code>count =+ 1</code>.
The fix for Error 1 must be inside the loop.</td></tr>
<tr><td>5(a)
J277 2.1.2</td><td>Heating off</td><td>1</td><td>Ignore quotation marks.</td></tr>
</table>

QUESTION	ANSWER	MARKS	GUIDANCE
5(b) J277 2.1.2	Change the decision to `temp < 18` / change > to < in the decision box	**1**	Allow `18 > temp`. Do not allow `temp <= 18`, or swapping the True and False labels / outputs on their own: the heating would then come on at exactly 18 °C, which is not below 18.

Total: 21 marks