MODULE K ALGORITHM DESIGN · K10

# Explaining what an algorithm does: mark scheme

21 marks · OCR J277 spec 2.1.2 (interpret algorithms; trace tables), 2.1.3 (identify a standard algorithm from code), 2.3.1 (maintainability: naming)

**How to use.** 1 mark per bullet up to the maximum shown. **/** separates alternatives. Words in (brackets) are not needed for the mark. **...** means the bullet 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 ("it processes the data").

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **1(a)** J277 2.1.2, 2.3.1 | 1 mark per row:<br>A: 4 (running total)<br>B: 1 (largest value)<br>C: 3 (re-enter until in range)<br>D: 2 (adds one when a condition is met) | **4** | Description 5 is not used. A row with more than one number scores 0. |
| **2(a)** J277 2.1.2 | 1 mark each:<br>y: 1, 2, 3<br>x: -1, 5, -4<br>z: 3, -1, -4<br>Output: -4 (once, after the loop ends)<br>**Example:**<br>`01: z 3 · 02: y 1 · 03: x -1 · 05: z -1 · 02: y 2 · 03: x 5 · 02: y 3 · 03: x -4 · 05: z -4 · 08: output -4` | **4** | Mark each variable's changes in order; line numbers are not marked. Values may be repeated on later rows. Each variable's values must be in the correct order. Ignore an extra final value of 4 for y. Output mark: -4 only, with no other output in the column (a blank cell is not an output). |
| **2(b)** J277 2.1.2 | Outputs the lowest / smallest / minimum / coldest (of the four) temperature(s) entered | **1** | Do not accept "outputs a temperature", "outputs the last temperature" or "sorts the temperatures". Do not accept "outputs -4" alone (that is the result for one set of data, not the purpose). |

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **3(a)**<br>J277 2.1.2 | 1 mark each to max 4:<br>Repeats / loops 20 times // once for each of 20 parcels<br>Inputs the weight of each parcel<br>Asks for the weight again until it is more than 0 and 30 (kg) or less // validates the weight (is in range 0 to 30)<br>Checks whether the weight is more than / over 25 (kg)<br>... and if so adds 1 to `heavy` // counts the parcels over 25 kg in `heavy`<br>`heavy` starts at 0<br>Outputs the number of heavy parcels (with the message "Heavy parcels: ") (after all 20 are entered) | **4** | Max 3 if no reference to the actual values (20, 0, 30, 25) is made. Do not accept "25 or more" / "at least 25" for the heavy check (25 is not counted). Accept "between 0 and 30" for the validation bullet. Do not accept "checks the weight" alone. |
| **4(a)**<br>J277 2.1.3 | Bubble sort | **1** | Do not accept "sort" alone, insertion sort or merge sort. |
| **4(b)**<br>J277 2.1.3 | 1 mark from:<br>Records / shows whether a swap was made (during a pass)<br>So the loop repeats until a pass makes no swaps // so the algorithm stops when the prices are in order / sorted | **1** | Do not accept "swaps the prices" (that is done by lines 05 to 07 using `temp`). |
| **4(c)**<br>J277 2.1.3 | Ascending (order) / smallest (price) first / lowest to highest | **1** | Do not accept "sorted" or "in order" alone, or "numerical order" alone. |
| **5(a)**<br>J277 2.1.2 | 12 | **1** | Accept 12.0. (12 + 15 + 9 = 36; 36 / 3 = 12.) |
| **5(b)**<br>J277 2.1.2 | 1 mark each to max 3:<br>Calculates / returns the mean / average water level (of the readings in the array)<br>Ignores / leaves out readings of -1 // only uses readings that were taken (successfully)<br>`t` holds the total of the (valid) readings<br>`n` counts the number of (valid) readings<br>Returns `t` divided by `n`<br>Returns 0 if there are no valid readings // stops a division by zero | **3** | Max 2 if the average / mean is not identified. Do not accept "checks the readings" or "adds up all the readings" (the -1 values are not added). |
| **5(c)**<br>J277 2.3.1 | Any name that describes the purpose, e.g. `averageLevel` / `meanLevel` / `meanValidReadings` / `average_level` | **1** | Must suggest an average / mean. Do not accept `check`, a single letter, a name with spaces, or a name that does not describe the result (e.g. `levels`, `water`). |

**Total: 21 marks**