

**Cambridge Assessment International Education**

Cambridge International General Certificate of Secondary Education

**COMPUTER SCIENCE 0478/23**

Paper 2 Problem-solving and Programming **May/June 2021**

**MARK SCHEME**

Pre-Standardisation

**MAXIMUM MARK: 50**

**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

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| GENERIC MARKING PRINCIPLE 1:  Marks must be awarded in line with:   * the specific content of the mark scheme or the generic level descriptors for the question * the specific skills defined in the mark scheme or in the generic level descriptors for the question * the standard of response required by a candidate as exemplified by the standardisation scripts. |
| GENERIC MARKING PRINCIPLE 2:  Marks awarded are always **whole marks** (not half marks, or other fractions). |
| GENERIC MARKING PRINCIPLE 3:  Marks must be awarded **positively**:   * marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate * marks are awarded when candidates clearly demonstrate what they know and can do * marks are not deducted for errors * marks are not deducted for omissions * answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous. |
| GENERIC MARKING PRINCIPLE 4:  Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors. |
| GENERIC MARKING PRINCIPLE 5:  Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen). |
| GENERIC MARKING PRINCIPLE 6:  Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind. |

**Please note the following further points:**

Please also read the additional guidance in the mark scheme, it provides further information about how to mark the question.

Please annotate **every** question on your scripts. The number of ticks given **must** match the number of marks given. If you award a benefit of doubt (BOD) mark, this **must** also have a **tick**.

The sections in brackets in the mark scheme are not necessary in the candidates answer.

The words in **bold** in the mark scheme are important text that needs to be present, or some notion of it needs to be present. It doesn’t have to be the exact word, but something close to the meaning.

If a word is underlined, this **exact** word must be present.

A single forward slash means this is an alternative word. A double forward slash means that this is an alternative mark point.

Red text in the mark scheme is a response that we think it just about okay, but that will not be published as a response.

Ellipsis (…) on the end of one mark point and the start of the next means that the candidate **cannot** get the second mark point without being awarded the first one. If a MP has ellipsis at the beginning, but there are no ellipsis on the MP before it, then this is just a follow-on sentence and **can** be awarded **without** the previous mark point.

Please inform your team leader when you have submitted your standardisation scripts. They may have many examiners that they are monitoring, so may not see your submission immediately.

The mark scheme has been agreed at standardisation, so it is the AE’s responsibility to apply it. You may have differing opinions on how the paper should be marked, but the mark scheme is what has been agreed by a panel and AE’s are required to apply it.

Please mark your allocation at a steady rate. If you are not able to mark your allocation for a number of days, inform your team leader, do not wait for them to have to chase you. Please ensure that you meet the 40% deadline. If you are not close to or meeting this at the 40% deadline, some of your allocation may be reallocated. If you are going to struggle with this deadline, you **must** inform your team leader ASAP.

There is a blank page(s) in the exam paper. This **must** be annotated with a **SEEN** annotation, to indicate it has been checked for any further responses. Also, any blank responses must have a SEEN annotation, as every question must be annotated. If you do not annotate correctly, you may be stopped by your TL.

If a candidate writes outside the zoned area for the question, this must be linked to the response, even if it is not awarded a mark. This demonstrates at grade review that you did read this part of the response.

| **Question** | **Answer** | **Marks** | **Notes** |
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|  | **Section A** |  |  |
| 1(a)(i) | **One** mark per bullet point   * Constant NumberofOptions * Value 5 * Use Storing the maximum number of options (for the referendum) | **3** | Many correct answers. They must be meaningful and related to **Task 1.** The names are examples only. |
| 1(a)(ii) | **One** mark per bullet point   * Variable UniqueNumber * Use Storing/inputting the voter’s unique identification number | **2** | Many correct answers. They must be meaningful and related to **Task 1.** The names are examples only. |
| 1(a)(iii) | A description must cover at least **two** bullet points  **One** mark for two bullet points  **Two** marks for three bullet points  **Three** marks for four bullet points  **Four** marks for five bullet points   * Suitable name e.g. IdNumber * Suitable data type e.g. Integer * Suitable array length e.g. 170 (elements) * Suitable sample data e.g. 100 * Suitable use e.g. to store the unique numbers | **4** | Range of possible answers, accept other correct statements. |
| 1(b) | Any **six** from:   1. Initialisation of totalling variables 2. Loop to cycle through all the data 3. Totalling the votes for at least one of the options 4. Totalling the votes for all five options 5. Separate totals for students and staff 6. Output to show one set of results 7. Output to show more than one set of results with messages 8. Comprehensive output to show student, staff and combined results, with messages   **Example answers**  **Version 1**  totalAS, totalBS, totalCS, totalDS, totalsES, totalAF, totalBF, totalCF, totalDF, totalEF = 0  FOR x = 0 to 150  totalAS = totalAS + StudentA[x]  totalBS = totalBS + StudentB[x]  totalCS = totalCS + StudentC[x]  totalDS = totalDS + StudentD[x]  totalES = totalES + StudentE[x]  NEXT x  FOR x = 0 to 20  totalAF = totalAF + StaffA [x]  totalBF = totalBF + StaffA [x]  totalCF = totalCF + StaffA [x]  totalDF = totalDF + StaffA [x]  totalEF = totalEF + StaffA [x]  NEXT x  output("Option Students Staff Total")  output("A " & totalAS & totalAF & (totalAS + totalAF))  output("B " & totalBS & totalBF & (totalBS + totalBF))  output("C " & totalCS & totalCF & (totalCS + totalCF))  output("D " & totalDS & totalDF & (totalDS + totalDF))  output("E " & totalES & totalEF & (totalES + totalEF))  **Version 2**  totalAS, totalBS, totalCS, totalDS, totalsES, totalAF, totalBF, totalCF, totalDF, totalEF = 0  student = input("Are you a student?")  IF student THEN  number = INPUT("Enter your number")  IF students[number] == 0 THEN  repeat  vote = INPUT("Enter preference for A")  until vote >= 1 and vote <= 5  totalAS = totalAS + vote  repeat  vote = INPUT("Enter preference for B")  until vote >= 1 and vote <= 5  totalBS = totalBS + vote  repeat  vote = INPUT("Enter preference for C")  until vote >= 1 and vote <= 5  totalCS = totalCS + vote  repeat  vote = INPUT("Enter preference for D")  until vote >= 1 and vote <= 5  totalDS = totalDS + vote  repeat  vote = INPUT("Enter preference for E")  until vote >= 1 and vote <= 5  totalES = totalES + vote  student[number] = 1  ELSE  number = INPUT("Enter your number")  IF staff[number] == 0 THEN  repeat  vote = INPUT("Enter preference for A")  until vote >= 1 and vote <= 5  totalAF = totalAF + vote  repeat  vote = INPUT("Enter preference for B")  until vote >= 1 and vote <= 5  totalBF = totalBF + vote  repeat  vote = INPUT("Enter preference for C")  until vote >= 1 and vote <= 5  totalCF = totalCF + vote  repeat  vote = INPUT("Enter preference for D")  until vote >= 1 and vote <= 5  totalDF = totalDF + vote  repeat  vote = INPUT("Enter preference for E")  until vote >= 1 and vote <= 5  totalEF = totalEF + vote  student[number] = 1  ENDIF  output("Option Students Staff Total")  output("A " & totalAS & totalAF & (totalAS + totalAF))  output("B " & totalBS & totalBF & (totalBS + totalBF))  output("C " & totalCS & totalCF & (totalCS + totalCF))  output("D " & totalDS & totalDF & (totalDS + totalDF))  output("E " & totalES & totalEF & (totalES + totalEF)) | **6** | Range of possible answers, accept any recognisable program code, pseudocode or flowchart.  Discuss at STM |
| 1(c) | Any **two** from:  Change the input prompt to show six options  Change the loop counter  Change the number of inputs for each person to six  Add another array/variable to store/total the new option votes | **2** | Range of possible answers, accept other correct statements. |
| 1(d) | Explanation  Any **three** from:   1. Using a count variable/array 2. Using a conditional statement to identify preference 1 (in the input/stored data) 3. ... and adding 1 to the count 4. …for students only 5. …using a loop to cycle through the whole array/set of inputs | **3** | Take care that the answer does more than state the task in the pre-release.  Task 3 NAQ  Programming statements can be used but must be explained. |

| **Question** | **Answer** | **Marks** | **Notes** |
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|  | **Section B** |  |  |
| 2 | **Three** marks for three or four correct  **Two** marks for two correct  **One** mark for one correct  **Data Type Description**  Real  String  Must be a whole number  Must be one of two values  May be any number  Integer  May contain any combination of characters  Boolean | **3** | CAO |
| 3 | **One** mark per bullet point for each piece of test data (3 x two marks)   * Correct validation check name * Correct use identified   **Example answers:**  **Id27@cambridgeuniversity.com**   * Validation check name Length (check) * Use Counts the number of characters in the data to make sure it   isn’t too long  **2021**   * Validation check name Range (check) * Use Checks that the number entered fits within given parameters   **Ericson-Bower**   * Validation check name Type (check) * Use Checks the type of data entered (in this case) to make sure   no numbers are present | **6** | Range of possible answers, accept other appropriate validation checks.  All validation checks must be different.  STM consider alternative answers. |
| 4(a) | **One** mark for error identified and suggested correction  Line 3 – should be FullScore ← 0  Line 7 – should be FullScore ← FullScore + Score  Line 8 – should be NEXT // alternatively Line 5 could be REPEAT with StoreLoop ← 0 just above it and StoreLoop ← StoreLoop + 1 between lines 7 and 8.  Line 11 – should be INPUT Another  **Correct Algorithm 1**  1 Count ← 0  2 REPEAT  3 FullScore ← 0  4 INPUT Number  5 FOR StoreLoop ← 1 TO Number  6 INPUT Score  7 FullScore ← FullScore + Score  8 NEXT  9 OUTPUT "The full score is ", FullScore  10 OUTPUT "Another set of scores (Y or N)?"  11 INPUT Another  12 IF Another = "N"  13 THEN  14 Count ← 1  15 ENDIF  16 UNTIL Count = 1  **Correct Algorithm 2**  1 Count ← 0  2 REPEAT  3 FullScore ← 0  4 INPUT Number  StoreLoop ← 0  5 REPEAT  6 INPUT Score  7 FullScore ← FullScore + Score  StoreLoop ← StoreLoop + 1  8 UNTIL StoreLoop = Number  9 OUTPUT "The full score is ", FullScore  10 OUTPUT "Another set of scores (Y or N)?"  11 INPUT Another  12 IF Another = "N"  13 THEN  14 Count ← 1  15 ENDIF  16 UNTIL Count = 1 | **4** |  |

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| 4(b) | **One** mark  Either  Insert the line  ScoreArray[StoreLoop] ← Score  between lines 6 and 7  OR  Replace line 6 with  INPUT ScoreArray[StoreLoop]  **One** mark per bullet  Insert the lines   * AverageScore ← FullScore/Number * OUTPUT "The average score is ", AverageScore * between lines 8 and 10 | **4** | The OUTPUT statement should have a suitable message to receive that mark.  Clip Q4a stem with 4b.  Confirm additional answers at STM |

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| 5(a) | **One** mark for each correct column   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Op** | **Value1** | **Value2** | **Ans** | **OUTPUT** | | 1 |  |  |  |  | |  | 87 |  |  |  | |  |  | 14 | 101 |  | | 3 |  |  |  |  | |  | 2 |  |  |  | |  |  | 30 | 60 |  | | 5 |  |  |  |  | |  | 10 |  |  |  | |  |  | 6 |  | Input Error | | 4 |  |  |  |  | |  | 10 |  |  |  | |  |  | 2 | 5 |  | | 0 |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | | **5** | Mark by column |
| 5(b) | To work as a calculator/to add, subtract, multiply or divide a pair of numbers | **1** | Range of possible answers, accept other correct statements. |
| 5(c) | To output/store the result/the value of Ans // Adding prompts | **1** | Range of possible answers, accept other correct statements. Discuss at STM |

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| 6(a) | **Two** marks for six correct fieldnames  **One** mark for at least three correct fieldnames   |  | | --- | | **Fieldname** | | LicenceNo | | Mileage | | TyreFLft | | TyreFRgt | | TyreRLft | | TyreRRgt | | **2** | Accept other appropriate fieldnames. |
| 6(b) | **One** mark for correct fieldnames  **One** mark for correct table names and show fields  **One** mark for correct sort  **One** mark for correct search criteria in all columns   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Field: | LicenceNo | Mileage | TyreFLft | TyreFRgt | TyreRLft | TyreRRgt | | Table: | TREAD | TREAD | TREAD | TREAD | TREAD | TREAD | | Sort: | Ascending |  |  |  |  |  | | Show: | 🗹 | 🗹 | 🗹 | 🗹 | 🗹 | 🗹 | | Criteria: |  |  | <2 | <2 | <2 | <2 | | or: |  |  |  |  |  |  | | **4** | Fieldnames must match candidate’s own from part (a).  Accept Descending order.  Allow FT for incorrect number of tyres (penalise first mark only).  Clip image for 6(a) under 6(b) to RM assessor. |