## Cambridge IGCSE ${ }^{\text {TM }}$

COMPUTER SCIENCE
0478/23
Paper 2
May/June 2021
MARK SCHEME
Maximum Mark: 50

## 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 International will not enter into discussions about these mark schemes.
Cambridge International is publishing the mark schemes for the May/June 2021 series for most Cambridge IGCSE ${ }^{\text {TM }}$, Cambridge International A and AS Level components and some Cambridge O Level components.

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.

## 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:

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 does not 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
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 is no ellipsis on the MP before it, then this is just a follow-on sentence and can be awarded without the previous mark point.

| Question | Answer | Marks |
| :---: | :---: | :---: |
| Section A |  |  |
| 1(a)(i) | One mark per bullet point <br> - Constant NumberofOptions <br> - Value 5 <br> - Use Storing the maximum number of options (for the referendum) | 3 |
| 1(a)(ii) | One mark per bullet point <br> - Variable <br> UniqueNumber <br> - Use <br> Storing/inputting the voter's unique identification number | 2 |
| 1(a)(iii) | One mark for each valid mark point (Max 4) <br> - Suitable name e.g. IdNumber <br> - Suitable data type e.g. Integer <br> - Suitable array length e.g. 170 (elements) <br> - Suitable sample data e.g. 100 <br> - Suitable use e.g. to store the unique numbers | 4 |

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| Question | Answer | Marks |
| :---: | :---: | :---: |
| 1(b) | Any six from: <br> MP1 Initialisation of totalling variables <br> MP2 Loop to cycle through all the data <br> MP3 Totalling the votes for at least one of the options <br> MP4 Totalling the votes for all five options <br> MP5 Separate totals for students and staff <br> MP6 Output to show one set of results <br> MP7 Output to show more than one set of results with messages <br> MP8 Comprehensive output to show student, staff and combined results, with messages <br> Example answers <br> Version 1 <br> TotalAS $\leftarrow 0$; TotalBS $\leftarrow 0$; TotalCS $\leftarrow 0 ;$ TotaldS $\leftarrow 0$; TotalsES $\leftarrow 0$; TotalAF $\leftarrow 0$; <br> TotalBF $\leftarrow 0$; TotalCF $\leftarrow 0$; TotalDF $\leftarrow 0$; TotalEF $\leftarrow 0$ <br> FOR Count $\leftarrow 0$ TO 150 <br> TotalAS $\leftarrow$ TotalAS + StudentA [Count] <br> TotalBS $\leftarrow$ TotalBS + StudentB[Count] <br> TotalCS $\leftarrow$ TotalCS + StudentC[Count] <br> TotalDS $\leftarrow$ TotalDS + StudentD[Count] <br> Totales $\leftarrow$ Totales + Studente [Count] <br> NEXT Count <br> FOR Count $=0$ TO 20 <br> TotalAF $\leftarrow$ TotalAF + StaffA [Count] <br> TotalBF $\leftarrow$ TotalBF + StaffA [Count] <br> TotalCF $\leftarrow$ TotalCF + StaffA [Count] <br> TotalDF $\leftarrow$ TotalDF + StaffA [Count] <br> Totalef $\leftarrow$ Totalef + StaffA [Count] <br> NEXT Count <br> OUTPUT "Option Students Staff Total" <br> OUTPUT "A ", TotalAS, TotalAF, (TotalAS + TotalAF) <br> OUTPUT "B ", TotalBS, TotalBF, (TotalBS + TotalBF) <br> OUTPUT "C ", TotalCS, TotalCF, (TotalCS + TotalCF) <br> OUTPUT "D ", TotalDS, TotalDF, (TotalDS + TotalDF) <br> OUTPUT "E ", Totales, Totalef, (Totales + Totalef) | 6 |

## Version 2

TotalAS $\leftarrow 0 ; ~ T o t a l B S ~ \leftarrow 0 ; ~ T o t a l C S ~ \leftarrow 0 ; ~ T o t a l D S ~ \leftarrow 0 ; ~ T o t a l s E S ~ \leftarrow 0 ; ~ T o t a l A F ~ \leftarrow 0 ;$
TotalBF $\leftarrow 0 ; ~ T o t a l C F \leftarrow 0 ; ~ T o t a l D F \leftarrow 0 ; ~ T o t a l E F \leftarrow 0$
OUTPUT "Are you a student? (Y or N)"
INPUT Student
IF Student = "Y" THEN
OUTPUT "Enter your number"
INPUT Number
IF Students [Number] $=0$ THEN
REPEAT
OUTPUT "Enter preference for A"
INPUT Vote
UNTIL Vote >= 1 and Vote <= 5
TotalAS $\leftarrow$ TotalAS + Vote
REPEAT
OUTPUT "Enter preference for B"
INPUT Vote
UNTIL Vote >= 1 and Vote <= 5
TotalBS $\leftarrow$ TotalBS + Vote
REPEAT
OUTPUT "Enter preference for C"
INPUT Vote
UNTIL Vote >= 1 and Vote <= 5
TotalCS $\leftarrow$ TotalCS + Vote
REPEAT
OUTPUT "Enter preference for D"
INPUT Vote
UNTIL Vote >= 1 and Vote <= 5
TotaldS $\leftarrow$ TotaldS + Vote
REPEAT
OUTPUT "Enter preference for E"
INPUT Vote
UNTIL Vote >= 1 and Vote <= 5
TotalES $\leftarrow$ TotalES + Vote

| Question |  | Marks |
| :---: | :---: | :---: |
| 1(b) | ```Student[Number] \leftarrow 1 ELSE OUTPUT "Enter your number" INPUT Number IF staff[number] = 0 THEN REPEAT OUTPUT "Enter preference for A" INPUT Vote UNTIL Vote >= 1 and Vote <= 5 TotalAS \leftarrow TotalAS + Vote REPEAT OUTPUT "Enter preference for B" INPUT Vote UNTIL Vote >= 1 and Vote <= 5 TotalBS \leftarrow TotalBS + Vote REPEAT OUTPUT "Enter preference for C" INPUT Vote UNTIL Vote >= 1 and Vote <= 5 TotalCS \leftarrow TotalCS + Vote REPEAT OUTPUT "Enter preference for D" INPUT Vote UNTIL Vote >= 1 and Vote <= 5 TotalDS \leftarrow TotalDS + Vote REPEAT OUTPUT "Enter preference for E" INPUT Vote UNTIL Vote >= 1 and Vote <= 5 TotalES \leftarrow TotalES + Vote Staff[Number] \leftarrow 1 ENDIF``` |  |


| Question | Answer | Marks |
| :---: | :---: | :---: |
| 1(b) | 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) |  |
| 1(c) | Any two from: <br> MP1 Change the maximum preferences constant to 6 <br> MP2 Change the input prompt to show six options <br> MP3 Change the loop counter <br> MP4 Change the number of inputs for each person to six <br> MP5 Add another array/variable to store/total the new option votes | 2 |
| 1(d) | Explanation <br> Any three from: <br> MP1 Initialise count variables/array for each option <br> MP2 Using a conditional statement to identify preference 1 in at least one option (in the input/stored data) <br> MP3 ... identify preference 1 in all options <br> MP4 ... and adding 1 to the appropriate option count in at least one option <br> MP5 ... for students only <br> MP6 ... using a loop to cycle through the whole array/set of inputs for each option | 3 |


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| :---: | :---: | :---: | :---: |
| Question |  | Answer | Marks |
| Section B |  |  |  |
| 2 | Three marks for three or four correct Two marks for two correct One mark for one correct <br> Data Type | Description <br> May contain any combination of characters | 3 |


| Question | Answer | Marks |
| :---: | :---: | :---: |
| 3 | One mark per mark point for each piece of test data ( $3 \times$ two marks) <br> - Correct validation check name <br> - Correct use identified <br> Example answers <br> Id27@cambridgeuniversity.com <br> - Validation check name Length (check) <br> - Use <br> 2021 <br> - Validation check name Range (check) <br> - Use <br> Checks that the number entered fits within given parameters <br> Ericson-Bower <br> - Validation check name Type (check) <br> - Use <br> Checks the type of data entered (in this case) to make sure no numbers are present | 6 |


| Question | Answer | Marks |
| :---: | :---: | :---: |
| 4(a) | One mark for error identified and suggested correction <br> Line 3 - should be FullScore $\leftarrow 0$ <br> Line 7 - should be FullScore $\leftarrow$ FullScore + Score <br> Line 8 - should be NEXT Allow ENDFOR // alternatively Line 5 could be REPEAT with StoreLoop $\leftarrow 0$ just above <br> it and StoreLoop $\leftarrow$ StoreLoop +1 between lines 7 and 8 . <br> Line 11 - should be INPUT Another ```Correct Algorithm 1 Count }\leftarrow REPEAT FullScore }\leftarrow INPUT Number FOR StoreLoop \leftarrow 1 TO Number INPUT Score FullScore \leftarrow FullScore + Score NEXT OUTPUT "The full score is ", FullScore OUTPUT "Another set of scores (Y or N)?" INPUT Another IF Another = "N" THEN Count }\leftarrow ENDIF UNTIL Count = 1``` | 4 |


| Question | Answer | Marks |
| :---: | :---: | :---: |
| 4(a) | ```Correct Algorithm 2 Count }\leftarrow REPEAT FullScore \leftarrow < 0 INPUT Number StoreLoop \leftarrow 0 REPEAT INPUT Score FullScore \leftarrow FullScore + Score StoreLoop \leftarrow StoreLoop + 1 UNTIL StoreLoop = Number OUTPUT "The full score is ", FullScore OUTPUT "Another set of scores (Y or N)?" INPUT Another IF Another = "N" THEN Count \leftarrow 1 ENDIF UNTIL Count = 1``` |  |

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| Question | Answer | Marks |
| :---: | :---: | :---: |
| 4(b) | One mark per mark point (Max 4) <br> MP1 After line $6 / /$ replace line 6 <br> MP2 ScoreArray [StoreLoop] $\leftarrow$ Score // <br> INPUT ScoreArray [StoreLoop] <br> MP3 between lines 8 and 10 <br> MP4 AverageScore $\leftarrow$ FullScore/Number <br> MP5 OUTPUT "The average score is ", AverageScore <br> Example correct algorithm for reference from part 4(a) ```Count }\leftarrow REPEAT FullScore }\leftarrow INPUT Number FOR StoreLoop \leftarrow 1 TO Number INPUT Score FullScore \leftarrow FullScore + Score NEXT OUTPUT "The full score is ", FullScore OUTPUT "Another set of scores (Y or N)?" INPUT Another IF Another = "N" THEN Count }\leftarrow ENDIF UNTIL Count = 1``` | 4 |


| Question | Answer |  |  |  |  | Marks |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5(a) | One mark for each correct column |  |  |  |  | 5 |
|  | Op | Value1 | Value2 | Ans | OUTPUT |  |
|  | 1 |  |  |  |  |  |
|  |  | 87 |  |  |  |  |
|  |  |  | 14 | 101 |  |  |
|  | 3 |  |  |  |  |  |
|  |  | 2 |  |  |  |  |
|  |  |  | 30 | 60 |  |  |
|  | 5 |  |  |  |  |  |
|  |  | 10 |  |  |  |  |
|  |  |  | 6 |  | Input Error |  |
|  | 4 |  |  |  |  |  |
|  |  | 10 |  |  |  |  |
|  |  |  | 2 | 5 |  |  |
|  | 0 |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |


| Question | PUBLISHED |  |
| :---: | :--- | :---: |
| $5(b)$ | To work as a calculator // to add, subtract, multiply or divide a pair of numbers | Marks |
| $5(\mathrm{c})$ | To output/store the result/the value of Ans // Adding prompts for data entry. | $\mathbf{1}$ |


| Question |  | Answer | Marks |
| :---: | :---: | :---: | :---: |
| 6(a) | Two marks for six correct field name One mark for at least three correct fie | field names | 2 |
|  |  | Field name |  |
|  |  | LicenceNo |  |
|  |  | Mileage |  |
|  |  | TyreFLft |  |
|  |  | TyreFRgt |  |
|  |  | TyreRLft |  |
|  |  | TyreRRgt |  |

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| Question | Answer |  |  |  |  |  |  | Marks |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 6（b） | One mark for correct fieldnames <br> One mark for correct table names and show fields <br> One mark for correct sort <br> One mark for correct search criteria in all columns |  |  |  |  |  |  | 4 |
|  | Field： | LicenceNo | Mileage | TyreFLft | TyreFRgt | TyreRLft | TyreRRgt |  |
|  | Table： | TREAD | TREAD | TREAD | TREAD | TREAD | TREAD |  |
|  | Sort： | Ascending |  |  |  |  |  |  |
|  | Show： | マ | マ | マ | マ | $\nabla$ | マ |  |
|  | Criteria： |  |  | ＜2 | ＜2 | ＜2 | ＜2 |  |
|  | or： |  |  |  |  |  |  |  |

