Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6568188501

COMPUTER SCIENCE **0478/22**

Paper 2 Problem-solving and Programming **May/June 2022**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- **Do not attempt Tasks 1, 2 and 3** in the copy of the pre-release material on page 2; these are for information only.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **12** pages.

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Section A

You are advised to spend no longer than 40 minutes answering this section.

Here is a copy of the pre-release material.

DO NOT attempt Tasks 1, 2 and 3 now.

Use the pre-release material and your experience from attempting the following tasks before the examination to answer Question 1.

Pre-release material

A program is needed to allow a Wildlife Park to sell tickets. A booking consists of one or more tickets for the same day(s) and can be made up to a week in advance. A booking can be made for a visit of one day or two consecutive days. A booking can have extra attractions included. A booking will be valid for the day(s) chosen only.

Ticket type	Cost for one day	Cost for two days
one adult	$20.00	$30.00
one child (an adult may bring up to two children)	$12.00	$18.00
one senior	$16.00	$24.00
family ticket (up to two adults or seniors, and three children)	$60.00	$90.00
groups of six people or more, price per person	$15.00	$22.50

Extra attraction	Cost per person
lion feeding	$2.50
penguin feeding	$2.00
evening barbecue (two-day tickets only)	$5.00

Write and test a program or programs for the Wildlife Park:
- Your program or programs must include appropriate prompts for the entry of data. Data must be validated on entry.
- All outputs, including error messages, need to be set out clearly and understandably.
- All variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

Task 1 – displaying the ticket options and the extra attractions available
Set up your program to:
- display the options, attractions and prices for one-day tickets
- display the options, attractions and prices for two-day tickets
- show the days available for booking; assume that there are tickets available for any valid day.

Task 2 – process a booking
Extend your program for **Task 1** to:
- input the tickets and extra attractions required, then calculate the total cost of the booking
- allocate a unique booking number
- display the booking details, including the total cost and the unique booking number
- repeat as required.

Task 3 – ensuring each booking is the best value
Check that the total for each booking gives the best value and offer an alternative if this is **not** the case. For example, buying two family tickets is better than a group ticket for a group of 10 that includes four adults and six children.

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1 All variables, constants and other identifiers must have meaningful names.

(a) (i) Identify **one** constant that you could have used for **Task 1**.
Give the value and use of the constant.

Constant .....

Value .....

Use .....

.....
[3]

(ii) Identify **one** variable that you could have used for **Task 2**.
Give the data type and use of the variable.

Variable .....

Data type .....

Use .....

.....
[3]

(b) Explain how your program showed the days available for booking in **Task 1**.

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..... [3]

(c) Explain how your program made sure that each booking number allocated in **Task 2** was unique.

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..... [2]

(d) Write an algorithm for the part of **Task 2** that inputs the tickets and extra attractions required then calculates the total cost of the booking.

Assume that the booking is for a single day.

Use pseudocode, programming statements or a flowchart.

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[6]

(e) Explain how your program decides when a family ticket is better value in **Task 3**.

Any programming statements that you include in your answer must be fully explained.

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..... [3]

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Section B starts on page 8

Section B

2 An algorithm allows a user to input their password and checks that there are at least eight characters in the password. Then, the user is asked to re-input the password to check that both inputs are the same. The user is allowed three attempts at inputting a password of the correct length and a matching pair of passwords. The pre-defined function `LEN(X)` returns the number of characters in the string, `X`

```
01  Attempt ← 0
02  REPEAT
03    PassCheck ← TRUE
04    OUTPUT "Please enter your password "
05    INPUT Password
06    IF LEN(Password) < 8
07      THEN
08        PassCheck ← TRUE
09      ELSE
10        OUTPUT "Please re-enter your password "
11        INPUT Password2
12        IF Password <> Password
13           THEN
14           PassCheck ← FALSE
15        ENDIF
16    ENDIF
17    Attempt ← Attempt + 1
18  UNTIL PassCheck OR Attempt <> 3
19  IF PassCheck
20    THEN
21     OUTPUT "Password success"
22    ELSE
23      OUTPUT "Password fail"
24  ENDIF
```

(a) Identify the **three** errors in the pseudocode and suggest a correction to remove each error.

Error 1 .....

Correction .....

Error 2 .....

Correction .....

Error 3 .....

Correction .....

[3]

(b) The algorithm includes **two** types of check on the data input.
Identify and describe each type of check.

Type of check 1 .....

Description .....

.....

Type of check 2 .....

Description .....

.....
[4]

(c) Give **two** sets of test data for this algorithm and a reason for choosing each set.

Each set of test data and its reason must be different.

Set 1 .....

Reason .....

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Set 2 .....

Reason .....

.....
[4]

3 **(a)** Describe a one-dimensional array. Include an example of an array declaration.

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..... [3]

(b) Explain how indexing could be used to search for a value stored in a one-dimensional array.

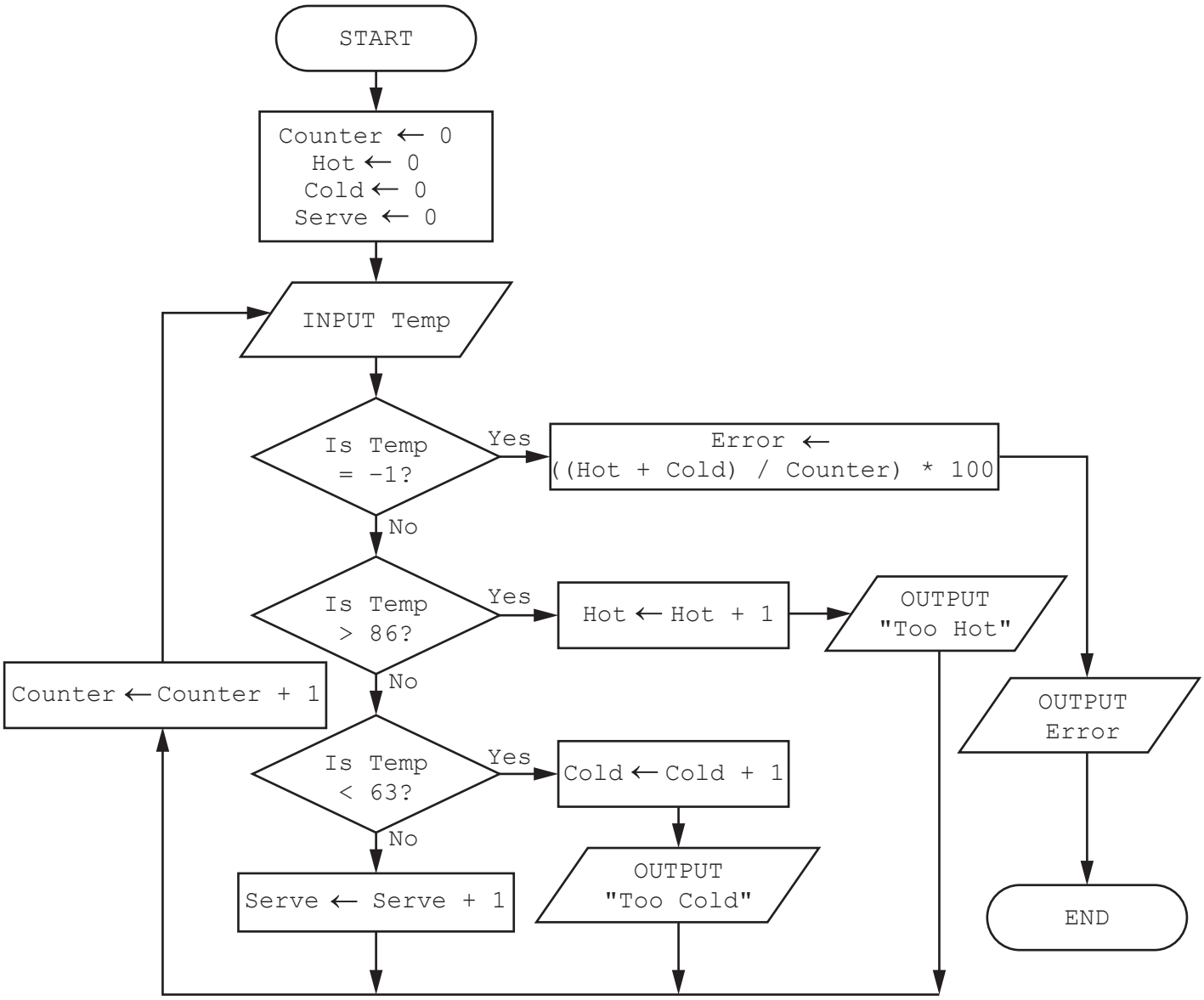
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..... [2]

4 This algorithm checks the temperature of hot food being served to customers.



(a) Complete the trace table for the algorithm using this input data:

75, 78, 84, 87, 91, 80, 75, 70, 65, 62, –1, 20

Counter	Hot	Cold	Serve	Temp	Error	OUTPUT

[7]

(b) State how the final output from the algorithm could be improved.

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..... [1]

(c) Identify the process in the algorithm that is **not** required.

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..... [1]

5 A database table, NURSE, is used to keep a record of disposable items worn by veterinary nurses.

This is part of the table:

ItemNumber	Description	SingleUse	Uses	StockLevel	ReorderLevel
DIG1	Glove (pair)	Y	1	500	800
DIA1	Apron	Y	1	700	800
DIM5	Hair net	Y	1	650	500
DIA2	Apron	N	5	25	100
DIS4	Suit	N	3	70	50
DIV9	Shoe cover (pair)	Y	1	400	250

(a) Complete this query-by-example grid to display only the item number and the description of single use items, where the stock level is below the reorder level.

Field:					
Table:					
Sort:					
Show:	☐	☐	☐	☐	☐
Criteria:					
or:					

[4]

(b) Give a reason why the field SingleUse is **not** required in the table NURSE.

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..... [1]

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