Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

0574821219

COMPUTER SCIENCE **0478/23**

Paper 2 Problem-solving and Programming **May/June 2018**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

DO NOT ATTEMPT TASKS 1, 2 AND 3 in the pre-release material; these are for information only.

You are advised to spend no more than **40 minutes** on **Section A** (Question 1).

No marks will be awarded for using brand names of software packages or hardware.

Any businesses described in this paper are entirely fictitious.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 50.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **11** printed pages and **1** blank page.

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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 tasks before the examination to answer Question 1.

Pre-release material

A car park has space for 100 cars and a barrier entrance and exit system. There is a display at the entrance to show how many spaces are empty. Cars are issued a ticket with a unique number on entry and the time of issue is stored. The car park charges $1.50 per hour and the fee is paid at a machine before leaving the car park. At the machine, the ticket number and departure time are entered; the fee is calculated by the machine and the amount due is paid by the ticket holder. Cars cannot stay overnight; the system is reset at midnight.

Write and test a program or programs for the car park manager.

- Your program or programs must include appropriate prompts for the entry of data.
- Error messages and other output 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 – Operating the car park.

The system is reset at midnight every day.
Set up a system using arrays and with suitable prompts that will carry out the following as cars enter or leave the car park:

On Entry:
- display the number of empty car park spaces
- issue the next available ticket number
- store the current time and the ticket number
- display the updated number of empty car park spaces.

On Exit:
- input a ticket number and departure time
- output the amount of time the car stayed at the car park
- delete the ticket number from the array
- display the updated number of empty car park spaces.

TASK 2 – Working out the cost and daily takings.

Amend the program so that it will calculate the amount to be paid using a charge of $1.50 per hour, or part of an hour (i.e. any amount of time into the next hour is charged for a whole hour). The amount to be paid is displayed and is added to a running total for the day, before the ticket number is deleted from the array. At the end of the day, the following information is displayed:
- total daily takings
- number of cars that have used the car park
- average charge per car
- average length of stay per car.

TASK 3 – Introducing parking restrictions.

The car park manager decides to restrict the length of stay to a maximum of eight hours, and will charge an extra $100 if a car overstays. Modify your program to implement this change and ensure the driver is aware of this extra charge. Output the number of cars that have overstayed in a day.

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1 **(a)** All variables, constants and other identifiers should have meaningful names.

(i) State the name, data type and use of **two** arrays you created for **Task 1**.

Array 1 name .....

Data type .....

Use .....

.....

Array 2 name .....

Data type .....

Use .....

.....

[4]

(ii) State the name, value and use of **two** constants you could have created for **Task 3**.

Constant 1 name .....

Value .....

Use .....

.....

Constant 2 name .....

Value .....

Use .....

.....

[4]

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[Turn over

(b) Write an algorithm to perform the set up and 'On Entry' part of **Task 1**, using **either** pseudocode, programming statements **or** a flowchart.

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(c) Explain how your program calculates if a car has overstayed the permitted parking time and how the charge is calculated and output (part of **Task 3**). Any programming statements you use in your answer must be fully explained.

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.....[4]

(d) One of the inputs required 'On Exit' in **Task 1** is ticket number. State **two** items of suitable test data you could use to test your input validation and state why you chose them.

Test data 1 .....

Reason .....

.....

Test data 2 .....

Reason .....

.....

[2]

Section B

2 Describe, using an example, the purpose of the following checks during data entry.

(a) Validation check

.....

.....

.....[2]

(b) Verification check

.....

.....

.....[2]

3 This section of program code reads the contents of the array, totals the numbers and prints out the sum and average of the numbers. Assume the array is full.

Complete the **four** missing items by writing them in the spaces provided in this code.

```
1   Numbers[1:30]
2   Total = 0
3   ..... = 0
4   FOR Count = 1 TO .....
5   Number = Numbers[Count]
6   Total = ..... + Number
7   Counter = Counter + 1
8   ..... Count
9   PRINT 'The sum of the numbers you entered is ', Total
10  PRINT 'The average of the numbers you entered is ', Total / Counter
```

[4]

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4 An algorithm is written in pseudocode:

```
INPUT Number
IF Number > 100
   THEN OUTPUT "The number is too large"
   ELSE OUTPUT "The number is acceptable"
ENDIF
```

(a) Describe the purpose of the algorithm.

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.....

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.....[2]

(b) **(i)** The algorithm only allows one attempt at inputting an acceptable value.

State how you would change the algorithm so that it continues until a suitable input is supplied.

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.....[1]

(ii) Re-write the algorithm in full, using pseudocode, to implement your answer to **part (b)(i).**

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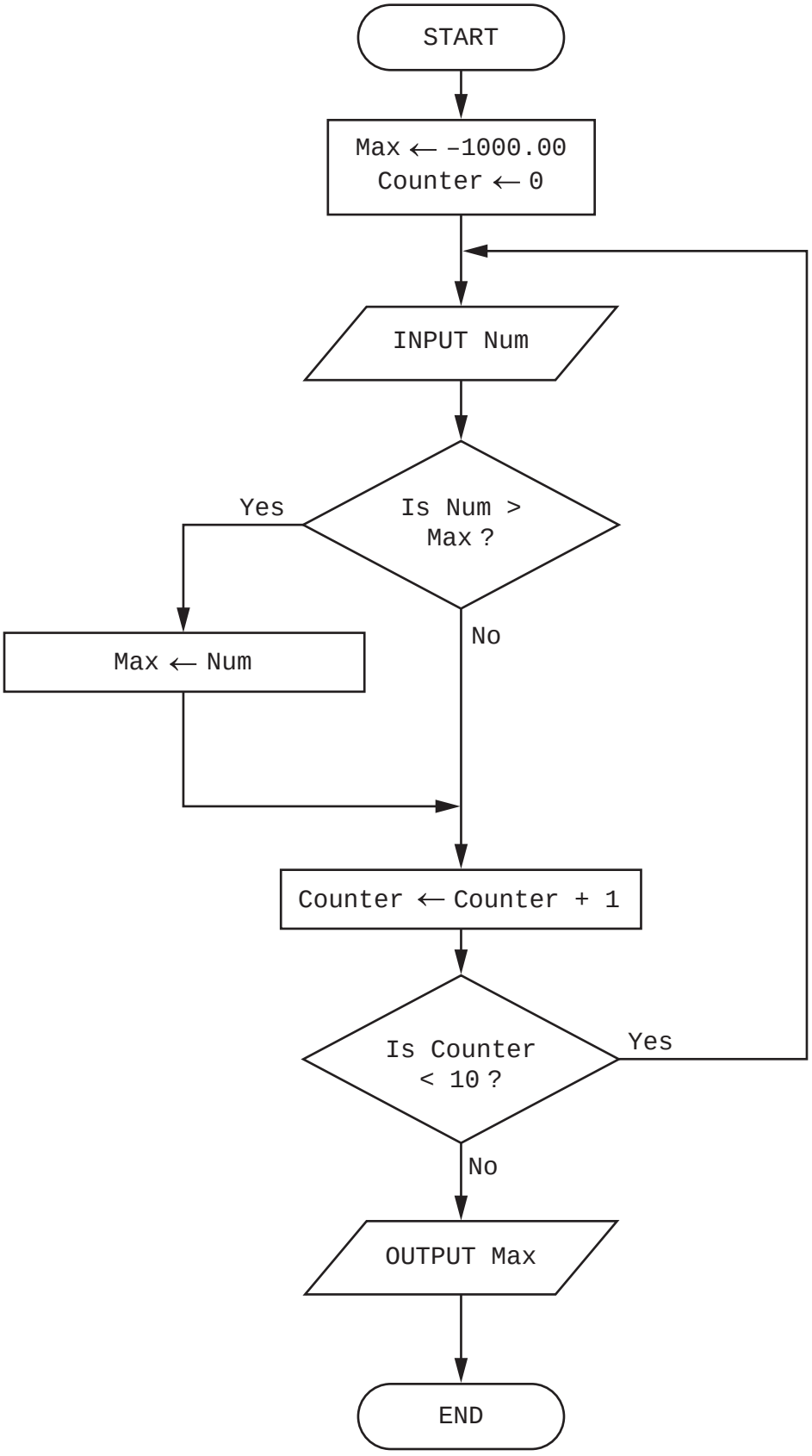
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.....[3]

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5 The flowchart allows a set of 10 numbers to be entered; it finds and outputs the largest of these numbers.



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(a) Complete the trace table for the input data:

6.30, 18.62, 50.01, 3.13, 2.05, 50.10, 40.35, 30.69, 0.85, 17.30

Max	Counter	Num	OUTPUT

[3]

(b) Describe **two** different changes you should make to the flowchart to find the smallest number instead of the largest number.

Change 1 .....

.....

Change 2 .....

.....

[2]

6 A shop that sells copies of movies to the public has set up a new database table called 2018MOV to store some new releases. Part of this table is given, showing the catalogue number, title, genres and available formats (Blu-ray, DVD or streaming) of each movie.

CatNo	Title	Genre 1	Genre 2	Blu-ray	DVD	Stream
18m01	Battery Rangers	Adventure	Fantasy	Yes	No	Yes
18m02	Golfwatch	Comedy	Drama	Yes	No	Yes
18m03	Chair 27	Comedy	Drama	Yes	Yes	No
18m04	Wander Woman	Action	Fantasy	Yes	No	Yes
18m05	Justine League	Action	Fantasy	Yes	Yes	Yes
18m06	That	Horror	Thriller	Yes	Yes	No
18m07	Insect Dude	Action	Fantasy	No	Yes	No
18m08	Dover Beach	Action	History	No	Yes	No
18m12	Slow 25	Action	Thriller	No	Yes	No
18m15	Kongkers	Adventure	Fantasy	No	Yes	No
18m16	Transducers: The Last Night	Action	Sci-Fi	Yes	Yes	Yes
18m17	The Pale Tower	Fantasy	Sci-Fi	Yes	Yes	No
18m19	Bea and the Bute	Fantasy	Romance	Yes	Yes	Yes
18m21	The Daddy	Action	Fantasy	No	No	Yes
18m22	Planet Wars: Episode X	Sci-Fi	Action	Yes	No	Yes
18m23	Guardians of the Milky Way	Action	Sci-Fi	Yes	Yes	Yes
18m26	Odin	Horror	Sci-Fi	No	Yes	Yes
18m27	That	Fantasy	Sci-Fi	No	No	Yes
18m30	Underneath	Action	Horror	Yes	No	No
18m31	Debatable Me	Animation	Action	Yes	Yes	No

(a) State the number of records in this part of the table.

.....[1]

(b) **(i)** Give the name of the field that should be used for the primary key.

.....[1]

(ii) State the reason for choosing this field for the primary key.

.....

.....[1]

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(c) Complete the table to show the most appropriate data type for each field based on the data shown in the table at the start of question 6.

Field	Data type
CatNo	
Title	
Genre 1	
Stream	

[2]

(d) List the output that would be given by this query-by-example.

Field:	CatNo	Title	Genre 1	Blu-ray	DVD	Stream	
Table:	2018MOV	2018MOV	2018MOV	2018MOV	2018MOV	2018MOV	
Sort:							
Show:	✓	✓	☐	✓	✓	✓	☐
Criteria:			="Comedy"				
or:							

.....

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.....[2]

(e) Using the query-by-example grid, write a query to identify all the movies that are categorised as Sci-Fi and available to stream. Only display the catalogue number and title of the film, with the titles listed in alphabetical order.

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

[4]

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