



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education  
Advanced Subsidiary Level and Advanced Level

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**COMPUTING**

**9691/22**

Paper 2

**October/November 2012**

**2 hours**

Candidates answer on the Question Paper.

No additional materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

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.

This document consists of **13** printed pages and **3** blank pages.

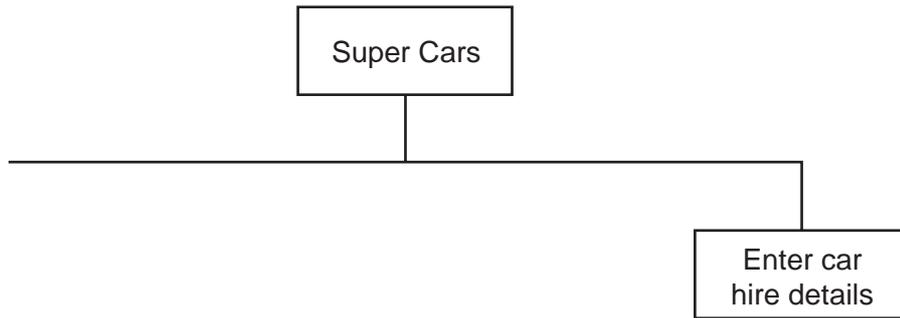


Soni works for a software house which has been asked to design software for a company, Super Cars.

1 Soni decides on the main tasks:

- enter car details
- enter car hire details for
  - hirer
  - car
  - payment

(a) Complete the structure diagram showing these tasks.



[2]

(b) State **two** reasons for dividing the main task into smaller tasks.

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..... [2]

(c) Entering car details has two subtasks:

- input the car's identification details
- input the hire rates for that car

Add these to the structure diagram in part (a).

[1]

- (d) The colour of each car is also recorded. The following pseudocode should validate car colour.

```
INPUT Colour
IF (Colour = "blue") OR (Colour = "black") OR (Colour = "grey")
  THEN
    OUTPUT Colour " is valid"
  ELSE
    OUTPUT "Invalid"
ENDIF
```

State the output when the colour input is:

- (i) green .....
- (ii) Black .....
- (iii) grey ..... [3]



(ii) Explain why 487HIRE is an invalid car registration.

.....  
.....

State the line number of your code in part (e)(i) which detects that it is invalid.

Line Number ..... [2]

(f) Eventually the software will be subject to alpha testing and beta testing.

Soni is planning each of these testing stages for this software.

Explain who will do the testing, when the testing would be carried out and what will be the purpose of each testing stage.

(i) Alpha testing

who .....

.....

when .....

.....

purpose .....

..... [3]

(ii) Beta testing

who .....

.....

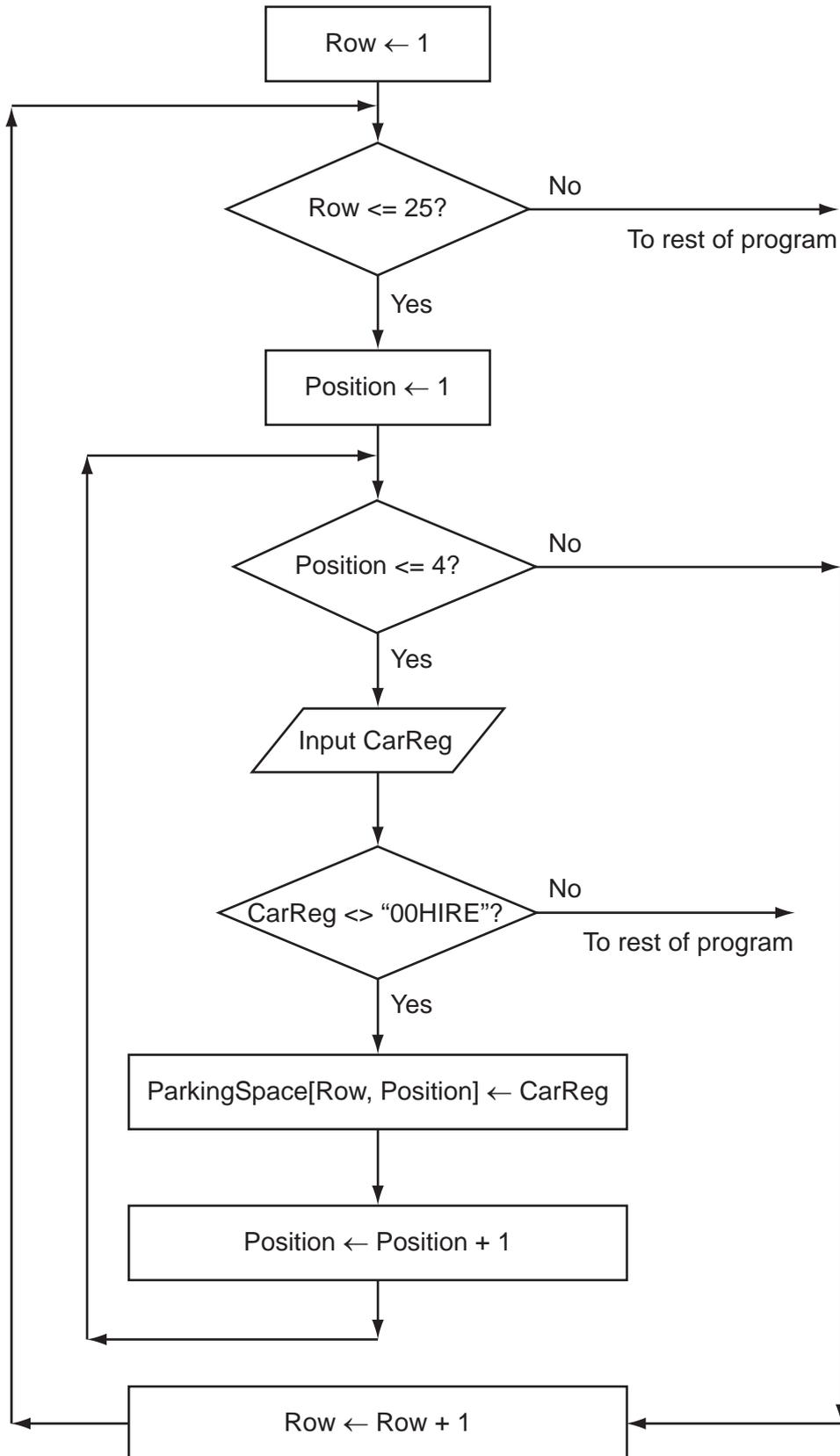
when .....

.....

purpose .....

..... [3]

- 2 Super Cars owns a rectangular car park with 25 rows; each row has 4 parking spaces. Each car is always parked in the same space. The array `ParkingSpace[25, 4]` stores the car registrations. Soni uses a flowchart to help him design a module to populate the array with the car registrations. Input is terminated using the rogue value "00HIRE".

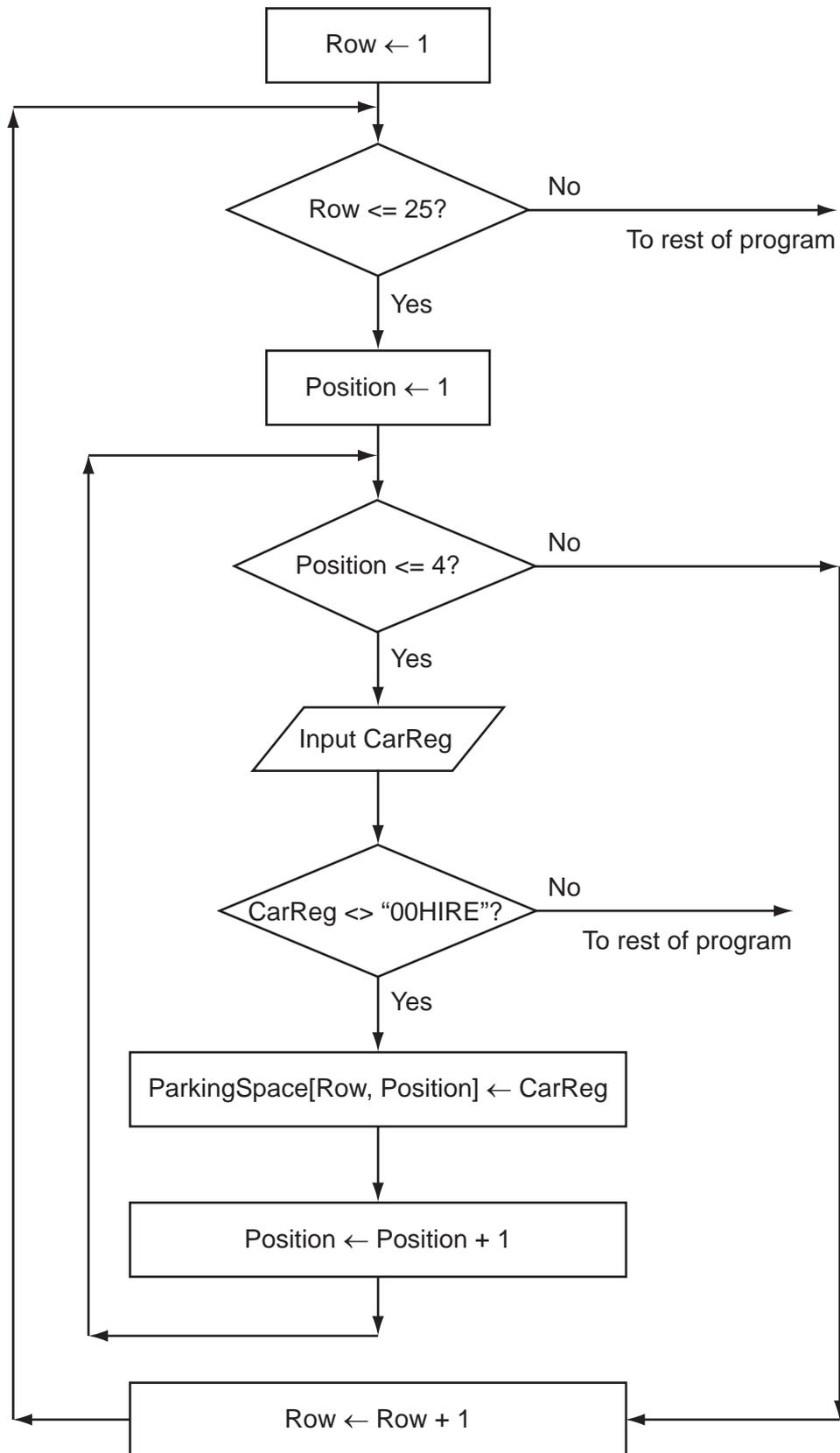


- (a) Complete the trace table for the flowchart with the first five car registrations. The to be entered are 52HIRE, 10HIRE, 67HIRE, 24HIRE, and 63HIRE. The row with the headings will also have to be completed.

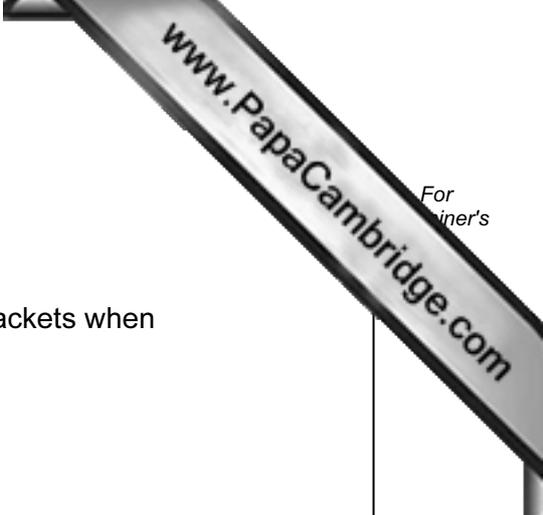
| Row | Position | Row<=25 | ParkingSpace |  |        |  |  |  |  |  |
|-----|----------|---------|--------------|--|--------|--|--|--|--|--|
|     |          |         | [1,1]        |  |        |  |  |  |  |  |
| 1   | 1        | TRUE    |              |  | 52HIRE |  |  |  |  |  |
|     |          |         |              |  |        |  |  |  |  |  |
|     |          |         |              |  |        |  |  |  |  |  |
|     |          |         |              |  |        |  |  |  |  |  |
|     |          |         |              |  |        |  |  |  |  |  |
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|     |          |         |              |  |        |  |  |  |  |  |
|     |          |         |              |  |        |  |  |  |  |  |

[6]

- (b) From the flowchart write the module code, using nested WHILE loops. Ensure that your code demonstrates good programming practice.







(c) (i) One of the modules uses the expression:

Area / (CarWidth \* CarLength - EmptySpaces)

State the value of the part of the expression inside the brackets when

CarWidth ← 3  
CarLength ← 4  
EmptySpaces ← 12

..... [1]

(ii) If this expression is used with the above values, there will be an error.

State the name of this type of error.

..... [1]

(iii) Explain how the programmer can stop this type of error occurring during execution.

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..... [2]

(d) There are a number of debugging tools associated with high-level languages.

Describe how breakpoints and stepping can be used when developing a program.

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..... [4]

3 Super Cars will store the data in files.

(a) One file will store the following data:

- car registration
- make of car
- date car bought
- whether on hire or not

Complete the following table. Use a single value for Field Size.

| Field Name | Data Type | Field Size (in bytes) |
|------------|-----------|-----------------------|
| CarReg     |           |                       |
| Make       |           |                       |
| DateBought |           |                       |
| OnHire     |           |                       |

[4]

(b) Estimate the size, in kilobytes, of the file if it stores the details of 100 cars. Show your working.

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[4]



- (c) (i) Using a high-level programming language, define a car record with id `HireCar` and the fields listed in part (a).

Programming language .....

Code

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.....  
.....  
.....  
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[5]

- (ii) Car records are stored in a file `SuperCars`.

Write a procedure, `AddCar()`, to add a record to the end of the file. The record is passed as the parameter. You should assume that the file is not already in use.

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[5]

(d) A parameter can be passed by value or by reference.

Describe each method.

By value .....

.....

.....

.....

By reference .....

.....

.....

..... [4]

4 Super Cars will need a printed report that shows how many times the top 10 cars have been hired in a given month, and the income that each generated.

Design the layout of the report.

[6]





