



Oxford Cambridge and RSA

# AS Level Computer Science

## H046/02 Algorithms and problem solving

### Tuesday 14 June 2016 – Afternoon

### Time allowed: 1 hour 15 minutes


**Do not use:**

- a calculator



First name										
Last name										
Centre number						Candidate number				

#### INSTRUCTIONS

- Use black ink.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

#### INFORMATION

- The total mark for this paper is **70**.
- The marks for each question are shown in brackets [ ].
- Quality of extended responses will be assessed in questions marked with an asterisk (\*).
- This document consists of **16** pages.

- 1 Programming languages consist of three basic programming constructs. For each construct, state its name and give a working example.

Construct 1: .....

Example: .....

.....  
.....  
.....

Construct 2: .....

Example: .....

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Construct 3: .....

Example: .....

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[6]



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- 3 (a) A software development company is planning to produce a bespoke monitoring system for a factory which produces hazardous chemicals. One testing strategy is whitebox testing.

State the name of **three** other testing strategies that the company could use.

- 1 .....
- 2 .....
- 3 ..... [3]



4 (a) Describe the steps involved in a binary search to find the value 47 in the list below.

4, 7, 8, 21, 46, 47, 51

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[4]



8

(c) The target integer 8 exists in a list of integers 1, 4, 6, 9, 8, 12, 15 but is not found during a binary search. There are no errors in the code.

(i) Give the reason why the target integer 8 is **not** found.

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..... [1]

(ii) Identify and describe an alternative search algorithm that could be used.

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.....  
..... [3]





5 A car racing team uses a car simulator to test their drivers in a range of cars on different race tracks.

(a) The car simulator uses an abstraction of the real car and race track. Identify **two** ways in which the simulator could use abstraction.

- 1 .....
- .....
- 2 .....
- ..... [2]

(b) Identify **three** inputs that will be required to configure the initial conditions for running the simulation.

- 1 .....
- 2 .....
- 3 ..... [3]



(b) The code below uses a procedure:

```
name = "Sam"  
addMessage (name)  
print (name)  
  
procedure addMessage (inText:byVal)  
    inText = "Hello " + inText  
endprocedure
```

Explain why this program outputs `Sam` rather than `Hello Sam`.

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..... [2]

(c) Explain the advantages of writing an application using a modular approach.

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.....  
..... [6]

7 Given the following pseudocode:

```
d = 5

if ((a > b) OR (b >= c)) then
  if ((c < a ) XOR (c < b)) then // Check to see if one or the other
                                // comparisons are TRUE, but not both
    d = 15
  else
    d = 16
  endif
else
  d = 14
endif

print(d)
```

- (a) State the value of d if a=42, b=41 and c=42 .....
- (b) State the value of d if a=42, b=36 and c=4 .....
- (c) State the value of d if a=42, b=36 and c=36 .....
- (d) Give **one** potential value of b if the output value of a=42, c=44  
and d=14. ....

[4]

**END OF QUESTION PAPER**

**ADDITIONAL ANSWER SPACE**

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

A large area of lined paper for writing answers. It features a vertical margin line on the left side and horizontal dotted lines for writing. The lines are evenly spaced and extend across the width of the page.

A blank sheet of lined paper. On the left side, there is a solid vertical line that serves as a margin. The rest of the page is filled with horizontal dotted lines, providing a guide for writing. The lines are evenly spaced and extend across the width of the page.

**PLEASE DO NOT WRITE ON THIS PAGE**

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