

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
AS LEVEL**

**H046/02**

**COMPUTER SCIENCE**

**Algorithms and problem solving**

**TUESDAY 14 JUNE 2016: Afternoon**

**TIME ALLOWED: 1 hour 15 minutes  
plus your additional time allowance**

**MODIFIED ENLARGED**

<b>First name</b>						<b>Last name</b>					
<b>Centre number</b>						<b>Candidate number</b>					

**DO NOT USE:  
a calculator**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS**

**Use black ink.**

**Complete the boxes on the first page 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.**

## **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 (\*).**

**BLANK PAGE**

- 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:** \_\_\_\_\_

---

---

---

**Construct 3:** \_\_\_\_\_

**Example:** \_\_\_\_\_

---

---

---

**[6]**

**BLANK PAGE**

**Discuss the content of this policy and why it is required.**

[illegible]

[illegible]

---

---

---

---

---

---



**BLANK PAGE**

- 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]**

**(b) The company decide to use whitebox testing.  
Justify why whitebox testing is used in this case.**

---

---

---

---

---

---

---

---

---

---

**[3]**

**(c) A temperature control system monitors and regulates temperature by switching a heater on or off. The temperature sensor of the system provides a reading accurate to 3 decimal places (e.g. 87.489). There are two warning lights, amber and red. The system controls the temperature and warning lights as follows:**

**The heater is turned off when the sensor reading is 97.500.**

**The heater is turned on when the sensor reading is 95.000.**

**The red warning light is on when the sensor reading is 98.100 or above.**

**The amber warning light is on when the sensor reading is outside the range 95.000 to 97.500 (inclusive), and the red warning light is NOT on.**

**Complete the boundary test table on the opposite page. [5]**

<b>Sensor value</b>	<b>Output</b>	<b>On/off</b>
<b>94.999</b>	<b>Amber light</b>	<b>on</b>
<b>95.000</b>	<b>Heater</b>	
	<b>Amber light</b>	
<b>97.500</b>	<b>Heater</b>	
	<b>Amber light</b>	
<b>97.501</b>	<b>Amber light</b>	
<b>98.099</b>	<b>Amber light</b>	
	<b>Red light</b>	
<b>98.100</b>	<b>Amber light</b>	
	<b>Red light</b>	

- 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

---

---

---

---

---

---

---

---

---

---

[4]

[illegible]

---

---

---

---

---

---



**(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.**

---

---

**[1]**

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

---

---

---

---

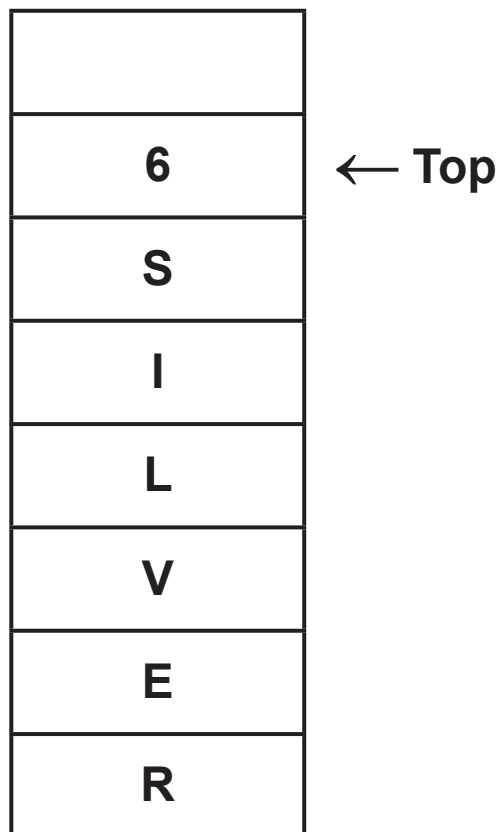
---

---

---

**[3]**

- (d) A stack, in shared memory, is being used to pass a single variable length ASCII string between two sub-systems. The string is placed in the stack one character at a time in reverse order with the last byte holding the number of characters pushed i.e the text “SILVER” would be held in the stack as:



Use pseudocode to write a procedure that will take a text string passed to it and push it to the stack in the format defined above. You may assume any given input will fit in the stack. [6]

---

---

---

[illegible]

**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]**

**BLANK PAGE**



---

---

---

---

**(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.**

---

---

---

---

**[2]**



[illegible]

## 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]**

**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).**









Oxford Cambridge and RSA

## **Copyright Information**

**OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website ([www.ocr.org.uk](http://www.ocr.org.uk)) after the live examination series.**

**If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.**

**For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.**

**OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.**