

**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>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**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 (\*).**

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

**Construct 1:** \_\_\_\_\_

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

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**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]**



**(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>	





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**(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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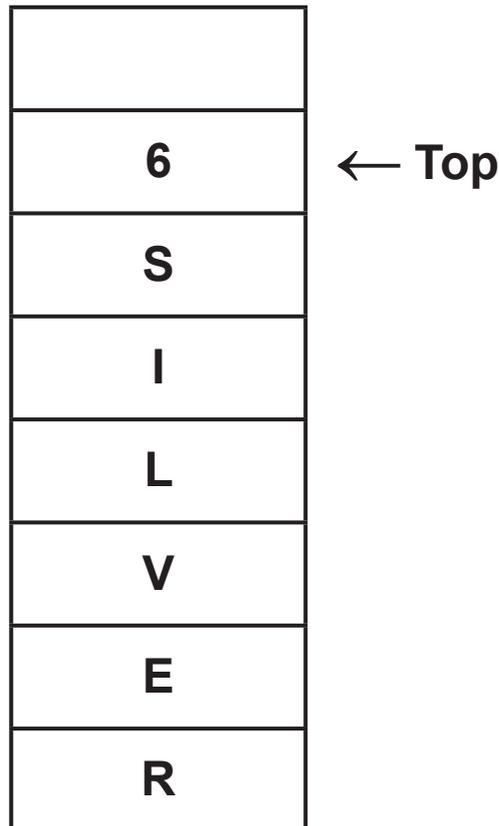
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**[3]**

(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]

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**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]**

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**(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]**



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)
```

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**(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]**










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