

Surname	Centre Number	Candidate Number
Other Names		2



GCE AS/A level

1101/01

COMPUTING – CG1 Software and System Development

A.M. MONDAY, 2 June 2014

3 hours

Suitable for Modified Language Candidates

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	5	
2.	6	
3.	10	
4.	5	
5.	6	
6.	3	
7.	4	
8.	5	
9.	6	
10.	3	
11.	9	
12.	5	
13.	4	
14.	5	
15.	7	
16.	6	
17.	11	
Total	100	

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use pencil or gel pen. Do not use correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Answers should be written in the spaces provided. If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

The intended marks for questions or part questions are given in brackets []. You are advised to divide your time accordingly. The total number of marks available is 100.

You are reminded of the necessity for good written communication and orderly presentation in your answers. Assessment will take into account the quality of written communication used in your answers to question 17.



J U N 1 4 1 1 0 1 0 1 0 1

2. Information about a diving competition is stored on a computer system. Competitors are awarded a mark out of 10 for each dive, for example 8.7. Each competitor must make six dives.

(a) State the most suitable data type for the storage of:

the mark awarded to each dive [1]

a single letter to represent gender [1]

the name of the competitor [1]

(b) State the most appropriate data structure for storing all the personal information about each competitor. [1]

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(c) Draw a diagram to show how the **six** dive scores for each of the competitors might sensibly be stored in a two-dimensional array. [2]



(b) Checks will be applied to the data when the existing member details are entered into the new computerised system.

(i) One item of data that is **validated** is the total number of whole years that they have been a member. Describe a suitable **validation** check that could be carried out in this case. Give an example of **invalid** input data that would be detected by **this** check. [2]

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(ii) One item of data that is **verified** is the member's postcode. Describe a suitable **verification** check that could be carried out on the member's postcode. Describe how **this** check would detect **input errors**. [2]

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4. (a) Disc access times on a personal computer can increase when the disc is nearly full to capacity. Describe **in detail** why saving a large file to a disc that is nearly full might be slower than saving a large file to a nearly empty disc. [2]

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(b) Describe **in detail** how the disc access speed of a nearly full disc could be increased. [2]

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(c) Briefly explain why Solid State Drives (SSD) do not suffer from this problem. [1]

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6. A section of a spreadsheet is shown below that should determine whether a person is an adult or not.

	A	B	C
1			
2	Adult Age	18	
3			
4	Name	Age	Adult YES or NO
5			
6	Harry Smith	17	
7	Bethan Lloyd	19	
8	Gary Chan	21	

(a) Write a formula for cell C6 using the cell references from the spreadsheet to output YES if the person is 18 or older and NO if they are younger than 18. [2]

(b) State the type of cell referencing that should be used for the Adult Age, B2 used in the formula that will allow the formula to be copied in column C for many names. [1]

7. Explain how a binary search is used to locate an element called **SearchValue** in an array called **SearchArray**. [4]

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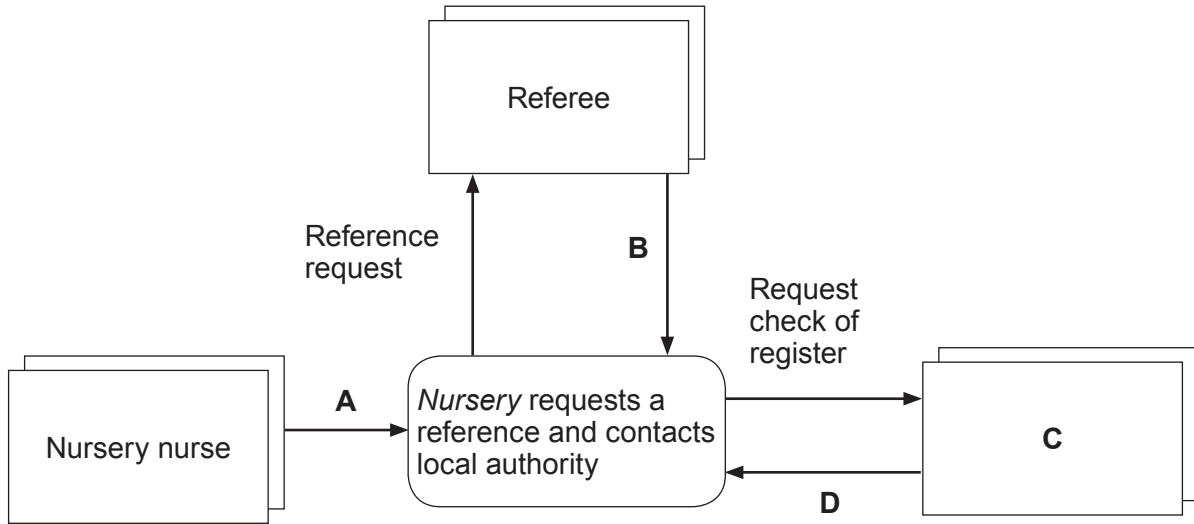
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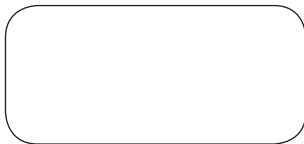


8. Nursery nurses who wish to apply for a position at a nursery are required to complete an application form. The referee named on the form is contacted by the nursery for a reference. The nursery also contacts the local authority to check that the applicant is a registered nursery nurse. The local authority checks their register and replies to the nursery.

The situation described is shown in the diagram below:



- (a) What type of object does the shape below represent? [1]



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- (b) Give a suitable name for the object shown as **A** in the diagram. [1]

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- Give a suitable name for the object shown as **B** in the diagram. [1]

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- Give a suitable name for the object shown as **C** in the diagram. [1]

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- Give a suitable name for the object shown as **D** in the diagram. [1]

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9. Below is an algorithm to produce a check digit for a three digit code.

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Algorithm CalculateCheckDigit

Digit1, Digit2, Digit3, Total, CheckDigit is integer

startmainprog
  input Digit1
  input Digit2
  input Digit3

  set Total = Digit1 + Digit2 + Digit3

  set CheckDigit = Total MOD 7

  output CheckDigit
endmainprog

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Here is a worked example for the input: Digit1 = 5, Digit2 = 6 and Digit3 = 7

Step 1: $5 + 6 + 7 = 18$

Step 2: $18 \text{ MOD } 7 = 4$ (because when 18 is divided by 7 the remainder is 4)

- (a) State the check digit produced for the following input:

Digit1 = 4, Digit2 = 3 and Digit3 = 5 Check Digit = [1]

Digit1 = 2, Digit2 = 1 and Digit3 = 2 Check Digit = [1]

Digit1 = 5, Digit2 = 2 and Digit3 = 7 Check Digit = [1]

- (b) The two codes 234 and 342 both produce the same check digit of 2.

Amend the algorithm so that a code containing the same three digits will produce different check digits. You may cross out and replace lines of the algorithm as required. [1]

Amend the algorithm in the box above – DO NOT WRITE ANYTHING HERE

- (c) State the check digit produced by **your amended** algorithm for the following input:

Digit1 = 2, Digit2 = 3 and Digit3 = 4 Check Digit = [1]

Digit1 = 3, Digit2 = 4 and Digit3 = 2 Check Digit = [1]



10. A programmer is writing low level language code that will be stored on a Read Only Memory computer chip to operate a microwave oven.

Give **three** reasons why a low level language is the most suitable language type for this application. [3]

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11. The operating system of a personal computer manages computer resources and provides an interface.

(a) Many operating systems provide a Graphical User Interface (GUI). Briefly describe **three** features of a GUI that allow the user to make effective use of the computer. [3]

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12. Below is an algorithm which attempts to calculate the total of a series of positive integers (terminated by a rogue value) input by a user.

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Algorithm FindTotal

Num is integer      {number input by user}
Total is integer    {stores the total of the numbers input}

startmainprog

    set Total = 0          {intialise variable}

    repeat

        output "type in a number"
        input Num

        set Total = Total + Num

    until (Num < 0)

    output "The Total is", Total

endmainprog
    
```

The algorithm **does not** produce the correct result.

(a) Complete the table below to show how each variable changes when the algorithm is performed on the test data given.

Test data: 2 8 5 -1

Num	Total
	0
2	

[4]

(b) Briefly describe why the algorithm does not produce the correct result.

[1]

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13. Below is an algorithm that determines whether a positive whole number greater than 2, input by a user, is a prime number or not.

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Algorithm Prime

Num is Integer
Divisor is ?????
Prime is ?????

startmainprog

    set Prime = TRUE                {intialise variables}
    set Divisor = 2

    output "type in a number"
    input Num

    repeat

        if Num MOD Divisor = 0 then
            set Prime = FALSE

        endif

        set Divisor = Divisor + 1

    until (Prime = FALSE) OR (Divisor = Num)

    if Prime = TRUE then
        output Num, "is a prime number"

    else
        output Num, "is NOT a prime number"

    endif

endmainprog

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- Give an example of annotation from the algorithm. [1]
- State the most suitable data type for the variable *Divisor*. [1]
- State the most suitable data type for the variable *Prime*. [1]
- State the logical operator used in the algorithm. [1]



14. (a) Computers utilise different types of cache memory. Two traditional types are RAM cache and disc cache. Describe **in detail** each type of cache memory. [4]

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(b) Another use of cache is storing internet pages temporarily on the computer's hard disc drive. Briefly describe the advantage of utilising this type of cache. [1]

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