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

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**	

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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.

Examiner only

1. *(a)* A leisure club has collected the email address of all members. They want to inform members about upcoming events. Describe how the club could use a feature of an email application to send the same email to all members. [1]

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(b) The club stores all the members' details in a database and the Data Protection Act applies to this data. It ensures that the data is processed for limited purposes in line with the members' rights.

State **four** other principles of the Act that will apply to the data stored by the club. [4]

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Examiner only

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 and 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]

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3. *(a)* A small private museum charges an entrance fee unless the visitor is a member of the museum society and entitled to free entry. Currently they store the details of the members on pieces of card in a small box at the entrance. The museum has a small number of members and only attracts a few visitors each day, therefore the paper-based system is working effectively.

However the museum is building a large extension and is expecting to attract many more members and numerous visitors every day.

Describe **three** problems that might arise with the museum's current paper-based system when the museum opens the extension. In each case describe how a computerised database system could solve the problem. [6]

Examiner only

(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 and describe how **this** check would detect **input errors**. [2]

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Examiner only

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]

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

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

Examiner only

5. Describe **in detail** why many mobile devices make use of a touch screen. [6]

Examiner only

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]

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(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 replicated in column C for many names. [1]

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

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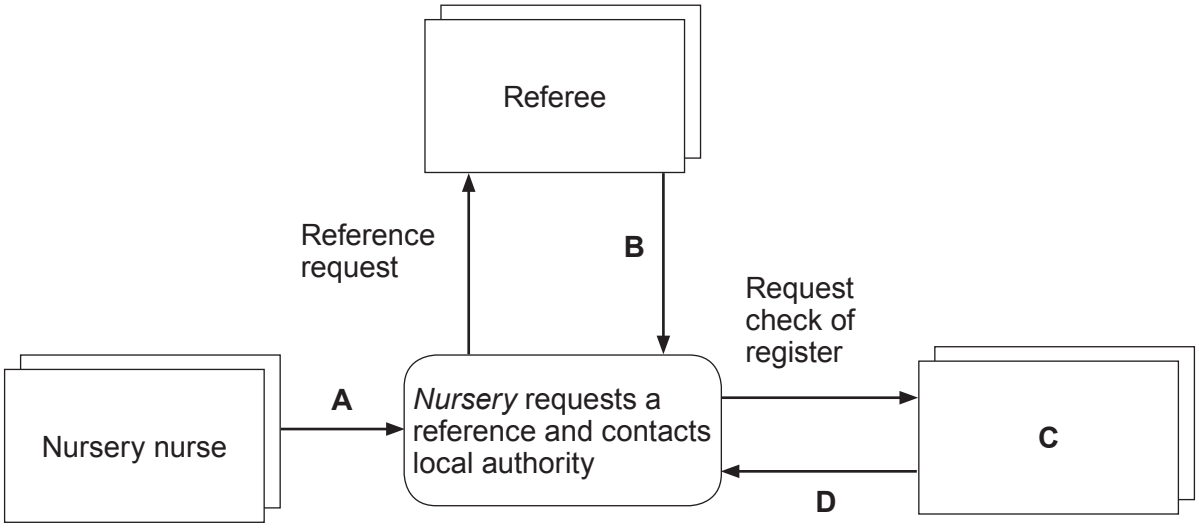
Examiner only

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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Turn over.

Examiner only

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

```
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
```

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

Step 1: 5 + 6 + 7 =18
Step 2: 18 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]

Examiner only

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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Examiner only

(b) Describe **in detail** the role of the operating system in managing computer resources. [6]

Examiner only

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.

```
Algorithm FindTotal

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

startmainprog

    set Total = 0                       {initialise 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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Examiner only

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.

```
Algorithm Prime

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

startmainprog

    set Prime = TRUE                    {initialise 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
```

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]

Examiner only

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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Examiner only

15. A business uses *serial* and *sequential* files. Describe serial file and sequential file organisation explaining how a record is added to each type of file. Give an example how each type of file could be used in a business. [7]

Examiner only

16. An on-line insurance company communicates with its customers by allowing them to log in to the company's web site. Customers can use the on-line system to view and update their personal records. They can also send a secure message to the company.

Describe any drawbacks of this on-line system for the customer. Describe **in detail** any benefits for the insurance company of this on-line system. [6]

Examiner only

17. A small business has purchased a new computer system which is supplied with documentation.

The documentation includes:

- User documentation
- Maintenance documentation
- Back up and recovery procedures
- Health and safety risks arising from computer use and reducing the risks.

Describe the typical contents of **each** of the above pieces of documentation. [11]

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END OF PAPER

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

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