Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A level

1101/01

S15-1101-01

COMPUTING – CG1
Software and Systems Development

A.M. MONDAY, 1 June 2015

3 hours

For Examiner's use only		
	Maximum Mark	**Mark Awarded**
Total	**100**	

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010001

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 16.

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1. A secretary in a solicitor's office creates many letters every day using a word processing package and often types identical lines of text in each letter. A colleague suggests creating a *macro* to insert these lines of text.

Explain the term *macro* and give a benefit for the secretary of using a macro. [3]

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Examiner only

2. Data about children attending a nursery is stored on a computer system.

(a) State the most suitable data type for storing **each** of the following data items:

Parent contact telephone number ..... [1]

Gender of a child, M or F ..... [1]

Number of whole days each week that a child attends ..... [1]

Whether a child attends the after-nursery club ..... [1]

(b) State the minimum number of bytes that would be required to store the gender of a child.

..... [1]

State the minimum number of bytes that would be required to store the telephone number 02920265000.

..... [1]

(c) Explain why a two dimensional array would **not** be a suitable data structure to store all the data about one child. [2]

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3. Brian is trying to convince his parents of the benefits of using on-line storage, sometimes called cloud storage. Brian's parents have been storing their files on the hard disc of their computer and regularly back them up to an external hard disc that sits on top of their computer.

Discuss the benefits and drawbacks of **each** method of storage described above. [6]

Examiner only

4. *(a)* Briefly describe the function of the following components of the Central Processing Unit (CPU):

control unit; [1]

.....

.....

arithmetic and logic unit; [1]

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register. [1]

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(b) The internal components of a computer are connected by a bus. Briefly describe **two** roles of the bus. [2]

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5. *(a)* A computerised database system stores data about books and the members of a library. Describe how the library benefits from using this database. [3]

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(b) Below is the incomplete record structure for the book file in the database. On the table below give a **Field Name** and a **Field Type** for the *Primary Key*.

Complete the table by writing down two additional appropriate field names together with the **Field Type** and **Field Description** in each case. [3]

Field Name	Field Type	Field Description
		Primary Key
Title	String	Title of the book

Examiner only

(c) When a new member joins the library, their details are input and validation checks are carried out on some of the data.

One item of data that is validated is their postcode. Describe a suitable validation check that could be carried out on this data. Give an example of invalid input data that would be detected by **this** check. [2]

(d) Another item of data that is validated is their telephone number. Describe a **different** suitable validation check that could be carried out on this data. Give an example of invalid input data that would be detected by **this** check. [2]

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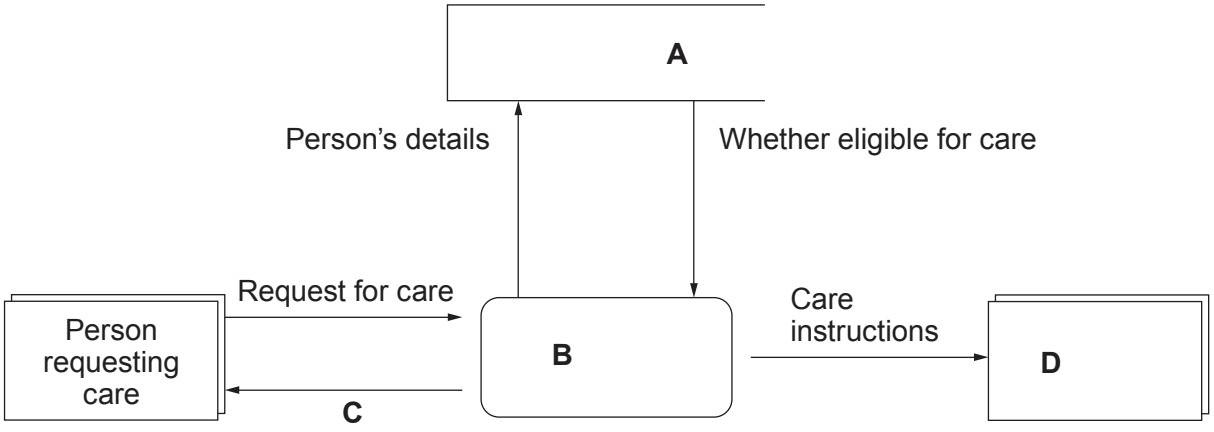
6. A local authority uses an agency that provides care workers who help and support people in their own homes.

A request is sent to the local authority for a care worker. The local authority checks the electoral register to establish eligibility. If the person is eligible for care, the local authority instructs the agency to provide the necessary care. The result of the decision is sent to the person requesting the care.

The situation described is shown in the diagram below:

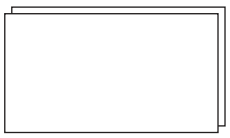


(a) State the name of this type of diagram. ..... [1]

State who would normally produce this type of diagram. [1]

.....

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



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

.....

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

.....

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

.....

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

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7. People who regularly shop at an on-line supermarket are able to view past orders and amend contact details. This data could be subject to *accidental damage*.

(a) Identify **one** person who is able to cause accidental damage to the past orders stored by the on-line supermarket and describe a measure that could prevent this damage. [2]

(b) Identify a **different** person who is able to cause accidental damage to the contact details stored by the on-line supermarket and describe a **different** measure that could prevent this damage. [2]

(c) A computer hacker might try to access customer payment details to copy and use the data for financial gain. Describe **one** measure the supermarket should have in place to prevent the hacker accessing the data and **another** measure that would make the data unusable by the hacker. [2]

Examiner only

8. A hospital stores data about patients and how it is performing against set targets. The *Data Protection Act* and the *Freedom of Information Act* apply to this data.

(a) The hospital ensures that the data is held securely, and is accurate and up to date. State **three** other principles of the Data Protection Act that will apply to the patients' data stored by the hospital. [3]

(b) Describe how the hospital must comply with the Freedom of Information Act when a request is received from a member of the public about how it is performing against set targets. [2]

Examiner only

9. Below is an algorithm with some incomplete lines. The algorithm is intended to calculate the mean of a series of positive integers input by a user. All lines are numbered.

```
1       Algorithm FindMean
2
3       Num is integer      {number input by user}
4       Total is integer    {stores the total of the numbers input}
5       Count is integer    {stores the count of the numbers input}
6       Mean is real        {stores the mean of the numbers input}
7
8       startmainprog
9
10              set Total = 0                   {initialise variables}
11              set Count = 0
12              set Mean = 0
13
14              output “type in first number”
15              input Num                       {input first number}
16
17              while (Num >0) do
18                      set Total =
19                      set Count =
20
21                      output “type in next number”
22                      input
23              endwhile
24
25              set Mean =
26              output “The mean is”, Mean
27
28      endmainprog
```

Complete the following incomplete lines of the algorithm:

(a) Line 18: set Total = ... [1]

(b) Line 19: set Count = ... [1]

(c) Line 22: input ..... [1]

(d) Line 25: set Mean = ... [1]

Examiner only

10. Giving suitable examples, describe **in detail** serial and sequential files. [7]

Examiner only

11. Below is an algorithm.

```
Algorithm June2015

X is Integer
Y is Integer
Z is Boolean

startmainprog

        set Y = 2
        set Z = TRUE                    {initialise variables}

        output “type in a number”
        input X

        repeat

                if X MOD Y = 0 then
                        set Z = FALSE
                endif

                set Y = Y + 1

        until (Z = FALSE) OR (Y = X)


        if Z = TRUE then
                output  X, “ is a prime number”
        else
                output  X, “ is NOT a prime number”
        endif

endmainprog
```

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Here is a worked example of the use of the MOD operator:

10 MOD 3 = 1 (because when 10 is divided by 3 the remainder is 1)

Complete the table below to show the value of each variable when the algorithm is performed on the data given.

The value input for X is 25

Y	Z

[5]

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12. Giving suitable examples, describe **in detail** the role of the operating system in providing a graphical user interface. [6]

Examiner only

13. Below is an algorithm that calculates the price of an item with VAT added.

```
Algorithm CalculateVAT

NetPrice is real                    {price without VAT input by user}
AmountVAT is real                   {amount of VAT to pay}
GrossPrice is real                  {price with VAT added}

RateVAT = 0·2

startmainprog

        input NetPrice

        set AmountVAT = NetPrice * RateVAT

        set GrossPrice =  NetPrice + AmountVAT

        output GrossPrice

endmainprog
```

(a) Give one example of annotation, a variable and a constant from the above algorithm. [3]

Annotation = ...

Variable = ...

Constant = ...

(b) Explain why it is good programming practice to use constants where appropriate. [1]

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Examiner only

14. *(a)* Explain how a linear search algorithm would determine whether an item called *SearchValue* is present in an **unsorted** array called *SearchArray*. [3]

(b) If the data in the array is in **ascending order**, briefly explain how the linear search method described above could be improved. [2]

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15. Programmers can write applications, sometimes called 'apps', for mobile devices and sell them via the internet. Describe the benefits of selling apps via the internet for the programmers and for the customers. [6]

Examiner only

16. A large organisation with offices throughout the country intend upgrading their existing computer systems. They will employ a team of analysts to investigate and identify problems with their current system.

Describe **in detail** the different methods of investigation available to the team, clearly explaining the advantages and disadvantages of each method.

Describe the benefits of using a team of analysts to investigate the current system. [13]

Remember the quality of written communication will be assessed in this question.

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

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