

Surname	Centre Number	Candidate Number
Other Names		2



GCE AS/A level

1101/01

**COMPUTING CG1
SOFTWARE AND SYSTEM DEVELOPMENT**

A.M. TUESDAY, 7 June 2011

3 hours

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. Where the space is not sufficient for your answer, continue the answer at the back of the book, taking care to number the continuation 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 15.

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



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1. (a) An on-line shop stores all its customers' email addresses electronically and often sends the same email to all customers.

- (i) What feature of the email package will allow the shop to send the same email to many customers? [1]

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- (ii) Briefly describe what these emails might sensibly contain. [1]

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- (iii) Briefly explain why some customers might not want to receive such emails from the shop. [1]

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- (b) The shop stores personal information about all previous customers. The Data Protection Act gives customers the right to know what information is held about them. The shop has notified the Information Commissioner and must comply with the eight principles of the Act. Two principles of the Data Protection Act are:

- that personal information must be fairly and lawfully processed
- that personal information must be held securely

State **three** other principles. [3]

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2. A running club stores information about its members on a computer system.

Name the most suitable data type for the storage of the following data.

- (a) (i) One letter to denote whether the member competes as a senior or a junior, for example S. [1]

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- (ii) Whether the member has paid the annual subscription, for example TRUE. [1]

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- (iii) The total number of competitions entered during the year, for example 3. [1]

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- (iv) The best time achieved for the 100 metres during the year, for example 11.34. [1]

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

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- (c) Members compete in up to seven 100 metre races every year.

Draw a diagram to show how data about **all** the members and their times for each race might sensibly be stored in a two-dimensional array. [2]



- The voice recognition software makes mistakes when the user is dictating the email but rarely misinterprets a command.

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- This image shows a full page of blank handwriting practice paper. It features multiple sets of horizontal lines across the entire page. Each set consists of three lines: a solid top line, a dashed middle line, and a solid bottom line. These sets are repeated vertically down the page, providing a guide for letter height and placement. The background is white, and the lines are printed in a light gray or blue color. There is no text or other markings on the page.



4. (a) A company has several computers they want to connect using a network. They are undecided whether to use a star topology or a bus topology network.

- (i) Recommend, with reasons, which network topology they should use. Explain why they should **not** adopt the other topology. [4]

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- (ii) The company also want to allow employees to make a wireless connection to the network using their laptop computers. Describe the hardware that will be required to connect to the wireless network. [2]

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- (b) State the most suitable protocol for **each** of the following uses:

- (i) copying a file from one location to another via the Internet; [1]

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- (ii) transferring multimedia web pages over the Internet; [1]

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- (iii) transferring emails between computer systems. [1]

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5. A garage that repairs and services cars, currently stores the details of the customers and their cars, on paper, in files which are kept in a small office in the workshop. One problem with the current paper-based system is that sometimes the required paperwork for a customer's car is lost.

The garage owner wants to use a computerised database system to store details of the customers and their cars.

- (a) Briefly describe **one other** possible problem with the current paper-based system and describe how a computerised database system could solve **this** problem. [2]

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- (b) The customer and car data will have to be input into a new computerised database system. Some items of data have validation checks applied to them. One such check is a presence check.

- (i) One item of data that is validated is the car's engine size. Describe a suitable validation check, other than a presence check, that could be carried out on the car's engine size, for example 1600, giving an example of invalid data that would be detected by this check. [2]

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- (ii) Another item of data that is validated is the customer's postcode. Describe a suitable validation check, other than a presence check, that could be carried out on the customer's postcode, for example CX99 2QW, giving an example of invalid data that would be detected by this check. [2]

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6. A professional photographer takes digital images and saves them on a computer. The images are **not** compressed and use a large amount of memory.

(a) A friend suggests that the files are compressed to save disc space. Give **one** reason why the photographer might **not** want to compress the images. [1]

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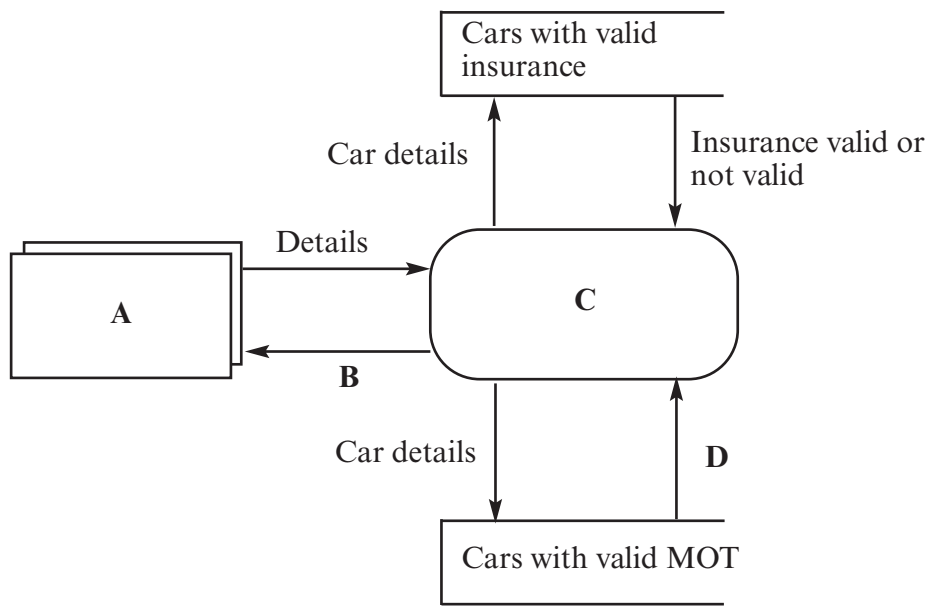
(b) The photographer wants to upload some of the images to a social networking web site. The site will only accept images in specified compressed file formats. Give **two** reasons why the web site will only accept compressed images. [2]

(c) The hard disc on the photographer's computer is 2 terabytes (2000 gigabytes). Describe **in detail** the procedures the photographer could adopt to ensure that his images are restored if the computer was destroyed. [4]

[illegible]

7. Car owners can apply to renew their tax disc on-line using a government web site. They input their details and checks are made to ensure that the car has a valid MOT certificate and insurance. If the results of these checks are satisfactory the on-line application is approved otherwise the on-line application is declined.

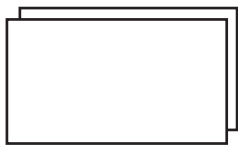
The situation described is shown in the data flow diagram below:



- (a) Who would usually produce a data flow diagram during analysis of a system? [1]

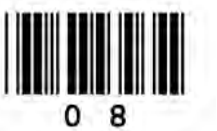
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- (b) What type of object does the following shape represent? [1]



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- (c) Draw the shape used in the diagram to represent a process. [1]



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

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

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

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

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8. Below is an algorithm which calculates the mean of a series of positive integers input by a user.

Algorithm FindMean

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Num is integer          {number input by user}
Total is integer        {stores the total of the numbers input}
Count is integer        {stores the count of the numbers input}
Mean is real            {stores the mean of the numbers input}

startmainprog

    set Total = 0                {initialise variables}
    set Count = 0
    set Mean = 0

    output "type in first number"
    input Num                    {input first number}

    repeat
        set Total = Total + Num
        set Count = Count + 1

        output "type in next number"
        input Num
    until (Num < 0)

    set Mean = Total / Count
    output "The mean is", Mean

endmainprog

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

Test data: 3 8 2 7 -1

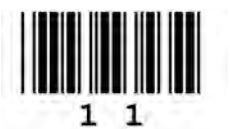
Num	Total	Count	Mean
	0	0	0
3	3	1	0
8	11		



9. (a) Describe **in detail** the role of the operating system in managing the resources of a computer. [5]

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- (b) *Real time transaction processing* could be used for booking seats for a sporting event. Describe **in detail** what happens when a seat is booked and explain why real time transaction processing is the most suitable mode of operation. [3]

[illegible]

10. Below is an algorithm that fills an array with eight random integers and then determines if a particular integer is found in that array.

Algorithm LinearSearch

Found is boolean

i is integer

Position is integer

SearchValue is integer

SearchArray is integer array [1 to 8]

declare subprocedure FillArray {procedure to fill array with random integers between 1 and 99}

start

For i = 1 to 8

SearchArray[i] = RandomNumber(99)

{standard function that generates random integers between 1 and 99}

Next i

end

declare subprocedure Search {procedure to search the array}

start

input SearchValue

set i = 1 {initialise variables}

set Position = 0

set Found = false

repeat

if SearchValue = SearchArray[i] then

Found = true

Position = i

else

set i = i + 1

endif

until (Found = true) OR (i > 8)

end

declare subprocedure Output {procedure to output messages}

start

if Found = true then

output "item found in array at ", Position

else

output "item not found in array"

endif

end

startmainprog

call FillArray

call Search

call Output

endmainprog



- (a) Write down **one** example of a self-documenting identifier from the algorithm and explain why self-documenting identifiers are used in computer programs. [2]

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- (b) Draw a circle on the algorithm to clearly indicate an example of repetition. Describe in detail the purpose of repetition in computer programs. [3]

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- (c) A standard function to generate random numbers such as RandomNumber(99) is available in many computer languages. Briefly describe **two** benefits of using standard functions when writing computer programs. [2]

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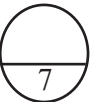
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(i) field; [1]

(i) field; [1]

(ii) record. [2]

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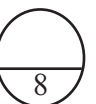
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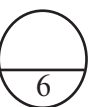
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(b) Briefly describe serial and sequential file organisation and explain the most appropriate method of adding a record to **each** type of file. [5]

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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- This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three horizontal dashed lines spaced evenly down the page, providing a guide for letter height and placement. The background is plain white, and there are no other markings or text present.



13. Below is an algorithm intended to calculate the area of a circle.

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Algorithm CalculateArea

Pi = 3.142

Area is integer

Radius is real

Startmainprog

    output "Type in the radius"

    input Radius

    Area = Pi * Radius * Radius

    Output "The area is ",Area

endmainprog

```

The algorithm uses two variables named *Area* and *Radius* and a constant named *Pi*.

(a) Why is it good programming practice to use constants in computer programs? [1]

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(b) The line '*Area is integer*' may cause a problem. Describe the problem that this line may cause and amend the algorithm to remove the problem.

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You may cross out any words or lines in the algorithm and write your own words or lines. There is no need to completely re-write the algorithm. [2]



14. Below is an algorithm.

Algorithm Numbers

Num1 is integer {number input by user}
 Num2 is integer {number input by user}
 Num3 is integer {number input by user}

startmainprog

output "type in first number"
 input Num1
 output "type in second number"
 input Num2
 output "type in third number"
 input Num3

if (Num1 > Num2) AND (Num1 > Num3) then output Num1
 if (Num2 > Num1) AND (Num2 > Num3) then output Num2
 if (Num3 > Num1) AND (Num3 > Num2) then output Num3

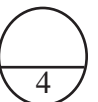
output " Finished"

endmainprog

Write down the output for the following sets of test data, the first row has been completed.

Num 1	Num 2	Num 3	Output
3	4	5	5 Finished
4	8	3	
7	5	9	
6	6	5	
7	9	9	

[4]



“The Internet has changed the way in which people live their lives and life will never be the same again.”

Explain how individuals make use of chat rooms and social networking websites and how this has changed their social life. [11]

[illegible]

Examiner
only



Handwriting practice lines consisting of 20 horizontal dotted lines.

