

Revised (Version 2)
January 2014



**For teaching from 2012
For awards from 2014**

COMPUTER SCIENCE

SPECIMEN ASSESSMENT MATERIALS

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Candidate Name	Centre Number				Candidate Number				
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GCSE

COMPUTER SCIENCE

UNIT 1: Understanding Computer Science

SPECIMEN PAPER

(1 hour 30 minutes)

INSTRUCTIONS TO CANDIDATES

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

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

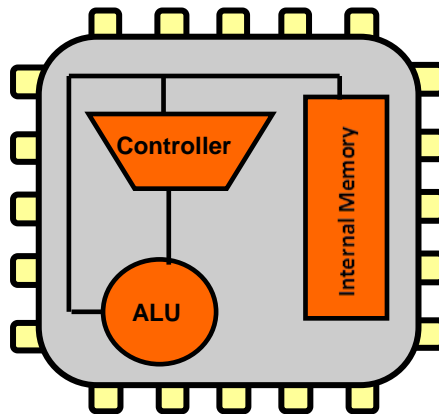
The number of marks is given in brackets at the end of each question or part-question. Quality of written communication will be assessed in question **11**.

1. Place a **tick (✓)** in the correct box to show which **four** of the tasks listed below are carried out by an operating system. [4]

Task

- Managing the printer
- Spellchecking
- Dealing with errors
- Sorting records
- Setting tabulation
- Handling data storage
- Managing emails
- Organising resources

2. The diagram shows three components of a Central Processing Unit (CPU).



- (a) Describe the purpose **of each** of these components. [3]

(i) Controller

.....

.....

(ii) ALU (Arithmetic/Logic Unit)

.....

.....

(iii) Internal Memory

.....

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(b) Briefly describe the fetch-execute cycle. [2]

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.....

3. (a) Convert the denary number 78 to an eight bit binary number. [1]

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.....
.....

(b) Convert the binary number 01001111 to a denary number. [1]

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.....
.....

(c) Convert the binary number 01001101 to hexadecimal, showing your workings. [2]

.....
.....
.....

4. Place a **tick (✓)** in the correct box to show which **four** of the data types listed below are provided by most programming languages. [4]

Boolean	<input type="checkbox"/>
Records	<input type="checkbox"/>
Integer	<input type="checkbox"/>
String	<input type="checkbox"/>
Capacity	<input type="checkbox"/>
Character	<input type="checkbox"/>
Nybble	<input type="checkbox"/>

5. (a) Describe the function of **each** of the following system maintenance tools in a computer system: [2]

Disk Compression.....

.....

Defragmentation.....

.....

- (b) Explain the difference between lossy and lossless compression. [2]

.....

.....

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.....

- (c) Give an example of a file that could be compressed and justify whether lossy or lossless compression would be best suited to this file. [3]

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- (d) The compression of files can be expressed in a number of ways. One way is a **ratio** that can be written as:

Size of file before compression : Size of file after compression

For instance, a data compression ratio of **5 : 2** means that a file of **5000 KB** in size before compression would be **2000 KB** in size after compression.

The table below shows the compression ratios for three files and their size before compression.

FILE	SIZE BEFORE COMPRESSION	COMPRESSION RATIO
File A	2000 KB	15 : 2
File B	8000 KB	16 : 5
File C	3000 KB	16 : 1

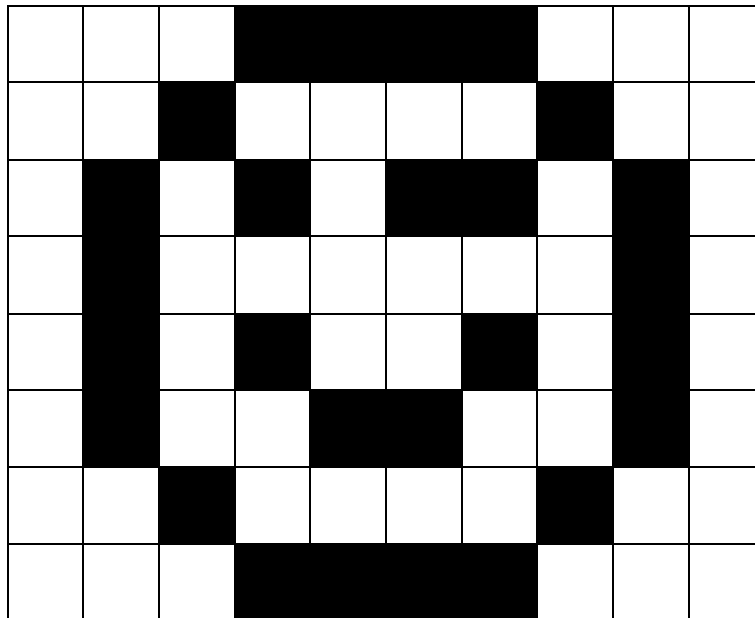
Calculate the size of files A, B and C following compression. Identify which of these files could be attached to an email with an attachment limit of a maximum size of 200KB. Show your workings. [3]

.....

.....

.....

- (e) The picture shown is stored as a black and white bitmap file.



Calculate the size of the file in bytes assuming each pixel in the bitmap requires one bit of storage. Show your workings. [3]

.....

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6. A company has decided to install a network using a bus network topology so that it can share data and peripherals over a local intranet.

(a) State **one** reason why the company may have decided on the bus network topology. [1]

.....
.....

(b) Explain **two** problems that might occur as a result of installing a bus network topology. [2]

.....
.....
.....
.....

(c) Describe **one** other network topology that could be used to network the company's computers and explain an advantage of using this topology. [2]

.....
.....
.....
.....

7. Below is an algorithm.

```
Algorithm CompareValues  
  
Val1 is integer           {value input by user}  
Val2 is integer           {value input by user}  
  
startmainprog  
  
output "Type in first value"  
input Val1  
output "Type in second value"  
input Val2  
  
if Val1>Val2 then output "Biggest is", Val1  
if Val2>Val1 then output "Biggest is", Val2  
  
endmainprog
```

(a) Write down one example of a variable from the algorithm. Give an example of data that could be stored in that variable. [2]

.....
.....

(b) Using an example from the algorithm explain the purpose of IF statements in computer programs. [2]

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.....
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.....

8. Below is an algorithm that allows a user to enter a username and password.

```

Algorithm SecurityProgram

    Username is string           {stores username input by user}
    Password is string          {stores password input by user}
    Counter is integer          {
                                }

startmainprogram

    set Counter = -1

    repeat
        output "type in username"
        input Username
        output "type in password"
        input Password

        if Username = "User1" OR Password = "Pass1" then
            output "Username and Password Correct"
        else
            output "Username or Password Incorrect"
        endif

        set Counter = Counter + 1

    until Counter = 3

endmainprogram
    
```

(a) Write down the terminating condition from the algorithm. [1]

.....

(b) One of the annotations has been omitted from this algorithm. Write a sensible annotation in the appropriate place on the algorithm above. [2]

(c) This algorithm contains an error. **Identify** the error, **state** the type of error and **re-write** the line of code correctly below. [3]

.....

(d) There is an example of a loop in this algorithm which limits the number of times a user can attempt to input data. State how many attempts a user will have at inputting data. [1]

.....

- (e) This algorithm states as one of its outputs “Username or Password Incorrect”. Explain why this is good practice from a security perspective. [3]

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9. For each of the situations below identify the **most suitable** storage medium and justify why it is the best choice.

- (a) A set of photographs stored electronically and sent physically to family overseas where the medium will be subjected to electromagnetic and magnetic radiation. [2]

Storage Medium

Justification

.....
.....
.....

- (b) Transporting a very large database (2 terabytes) from one desktop computer to another. [2]

Storage Medium

Justification

.....
.....
.....

- (c) Storing data on an on-board camera on a mountain bike moving quickly across rough terrain. [2]

Storage Medium

Justification

.....
.....
.....

- (d) Working collaboratively on the same file with workers based in different countries. [2]

Storage Medium

Justification

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.....

10. Describe the role of the following in a computer system:

(a) Random Access Memory (RAM): [2]

.....
.....
.....

(b) Flash Memory: [2]

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11. Operating systems manage system resources. Give **three** examples and discuss the potential problems that could arise if an operating system failed to manage system resources effectively. [6]

Quality of written communication will be assessed in this question.

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12. (a) State the purpose of a Domain Name System (DNS) server. [1]

.....

(b) State the purpose of an Internet Protocol (IP) Address. [1]

.....

(c) State **two** facilities that are normally available from an Internet Service Provider (ISP). [2]

.....

13. Complete the following *Truth Tables*.

(a) **TRUTH TABLE 1**

A	B	A AND B	NOT (A AND B)
1	1		
1	0		
0	1		
0	0		

[4]

(b) **TRUTH TABLE 2**

A	B	A AND B	NOT B	(A AND B) OR (NOT B)
1	1			
1	0			
0	1			
0	0			

[4]

14. (a) The ASCII standard was first published in 1963 by the American Standards Association. State the purpose of ASCII. [1]

.....

.....

- (b) In a different standard code, the letter A is represented by the binary number 00101000. The letter C is represented by 00101010. Write the binary number that would represent the letter G. [2]

.....

.....

Turn over for Question 15

15. Below is a segment of an algorithm that determines if a number is present in a sorted array with **8** elements, and if present, at what position the number is located in the array.

DIV performs a division calculation, where the remainder is ignored.

e.g. $13 \text{ DIV } 4 = 3$ (remainder 1 is ignored)

```
Start = 0
End = 7
Found = True
Position = -1

input SearchValue
repeat
    set Middle = (Start + End) DIV 2

    if SearchValue = ThisArray(Middle) then
        set Found = True
        set Position = Middle
    endif

    if SearchValue > ThisArray(Middle) then
        set Start = Middle + 1
    endif

    if SearchValue < ThisArray(Middle) then
        set End = Middle - 1
    endif

until (Found = True) or (End < Start)
```

- (a) There are **two** errors in the algorithm. On the algorithm, identify and correct both errors. [2]

(b) Test data

ThisArray

(0) (1) (2) (3) (4) (5) (6) (7)

22	26	32	48	58	63	68	75
----	----	----	----	----	----	----	----

Search value = 68

Complete the table below to show how each variable changes when the **corrected algorithm** is performed on the test data given above. [6]

Start	End	Middle	This Array(Middle)	Found	Position
0	7	3	48	False	-1
4	7			False	-1
	7			True	

End of paper



GCSE COMPUTER SCIENCE

Unit 1: Understanding Computer Science

Specimen Assessment Material

Mark Scheme

Qu.	Answer	Marks	MAX
1.	<p>1 mark for each of:</p> <p>Managing the printer Dealing with errors Handling data storage Organising resources</p>	<p>1 mark 1 mark 1 mark 1 mark</p>	4
2. (a)	<p>1 mark for each of:</p> <p>(i) Controller: Directs the flow of instructions and data within the CPU. Coordinates the other parts of the CPU</p> <p>(ii) ALU: The ALU performs all the mathematical calculations and logical operations in the CPU</p> <p>(iii) Internal memory: Where data and instructions are held for use by the CPU and where the CPU puts the results it generates</p>	<p>1 mark 1 mark 1 mark</p>	3
2. (b)	<p>Fetch-execute cycle: In the fetch phase an instruction is copied into the control unit and decoded In the execute phase the instruction is obeyed</p>	<p>1 mark 1 mark</p>	2
3. (a)	01001110	1 mark	1
3. (b)	79	1 mark	1
3. (c)	<p>Either convert back to denary and convert to Hex</p> <p>e.g. 77</p> <p>Then $(4 \times 16) + (13 \times 1) = 77$</p> <p>= 4D</p> <p>Or use the table method that uses 4 bit blocks</p> <p>Take binary number = 01001101</p> <p>Split into groups of 4</p> <p>= 0100 1101</p> <p>Use the table to convert</p> <p>0100 = 4</p> <p>1101 = D</p> <p>Therefore 4D</p>	<p>1 mark 1 mark 1 mark</p>	2
4.	<p>1 mark for each of:</p> <p>Boolean Integer String Character</p>	<p>1 mark 1 mark 1 mark 1 mark</p>	4

Qu.	Answer	Marks	MAX
5. (a)	<p>1 mark for each of:</p> <p>Disk Compression: Reducing the size of files on disk, to free up storage space</p> <p>Defragmentation: Collecting together the separate elements of split/fragmented files, to improve the access speed/ performance of a disk</p>	<p>1 mark</p> <p>1 mark</p>	2
5. (b)	<p>Lossy compression occurs when a file is compressed to make it smaller, but the compression process results in a file that cannot be restored to its original quality/data is lost</p> <p>Lossless compression occurs when a file is compressed to make it smaller, but the file can be restored to its original quality/data is not lost</p>	<p>1 mark</p> <p>1 mark</p>	2
5. (c)	<p>1 mark for appropriate example 1 for identifying compression type if appropriate to example 1 mark for justification of compression type If example is inappropriate, 0 marks</p> <p>Example where lossy compression would be appropriate:</p> <p>Image file with e.g. an image with a lot of blue sky [1] lossy compression [1] would be appropriate to reduce 2000 blue shades to 10. There is no requirement to capture all shades of blue as the naked eye would not be able to differentiate between them all, and would not notice any significant difference following compression [1]</p> <p>Example where lossless compression would be appropriate:</p> <p>Sending high quality audio files [1] electronically from a manufacturer (of e.g. a violin) in the UK to a master technician that has emigrated to the USA who detects imperfections in high quality musical instruments. Lossless compression [1] would be the preferred method as the technician can differentiate between subtle nuances in sound and this would be passed on in a lossless compressed file. Lossy compression would compromise the sound, and the technician may fail a perfectly good instrument, as the full range of sound has not been heard as a result of slicing off bass and treble in order to compress [1]</p>		3

Qu.	Answer	Marks	MAX
5. (d)	<p>3 marks for all calculations correct <u>and</u> identifying correct file 2 marks for calculating all three correctly 1 mark for calculating two correctly</p> <p>File A: $(2000/15) \times 2 = 266.67\text{KB}$</p> <p>File B: $(8000/16) \times 5 = 2500\text{KB}$</p> <p>File C: $(3000/16) \times 1 = 187.5\text{KB}$</p> <p>Therefore only file C could be attached to the email</p>	<p>1 mark 1 mark</p> <p>1 mark</p>	3
5. (e)	<p>File is 80 bits in size ($8 \times 10 = 80$) Convert to bytes ($80/8$) Write file size with units as 10 bytes</p>	<p>1 mark 1 mark 1 mark</p>	3
6. (a)	<p>Any one of the following</p> <p>To save money, as bus networks are cheap to build/install</p> <p>To save time, as bus networks are fast to install</p>	<p>1 mark</p>	1
6. (b)	<p>Condone use of “main backbone” instead of “main bus”</p> <p>1 mark for each of the following problems up to a maximum of 2 marks</p> <p>Collisions will slow the network, if many active computers are linked to the network If there is a break in the main bus, the network will fail If a terminator detaches from the end of the main bus, the network will fail</p>	<p>2 marks</p>	2

Qu.	Answer	Marks	MAX
6. (c)	<p>1 mark for describing a topology, 1 mark for explaining an advantage</p> <p>Accept an annotated diagram as an alternative to a description</p> <p>Accept other topologies, if described and advantage fully justified</p> <p>Star: All the devices are connected directly to one central node/switch/hub. (no mark for simply naming)</p> <p>Advantages:</p> <ul style="list-style-type: none"> • If one cable fails only one device is affected • Simple to isolate faults • Easy to add and remove devices • Collision problem removed as switch manages data from multiple streams • Load can be balanced by dividing the network • Different devices can transmit at different speeds • System is more secure as data is not broadcast to all machines on network. <p>Or:</p> <p>Ring: Each device is connected to a closed loop around which signals are sent. (no mark for simply naming)</p> <p>Advantages:</p> <ul style="list-style-type: none"> • Collisions do not occur as messages are passed around the ring in one direction only • Very high data transmission rates possible. 	<p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p>	2
7. (a)	<p>1 mark for either of the following</p> <p>Val1, Val2</p> <p>Can hold any whole number (e.g. 3, 5 -10)</p>	<p>1 mark</p> <p>1 mark</p>	2
7. (b)	<p>1 mark for purpose of IF Statement 1 mark for example from algorithm</p> <p>Purpose of IF statement is to execute code if a condition is met</p> <p>In the case of if Val1>Val2 then output "Biggest is", Val1 'Biggest is Val1' would be the output if Val1 was the largest</p> <p>Or:</p> <p>In the case of if Val2>Val1 then output "Biggest is", Val2 'Biggest is Val2' would be the output if Val2 was the largest</p>	<p>1 mark</p> <p>1 mark</p>	2
8. (a)	until Counter = 3	1 mark	1
8. (b)	<p>Accept any valid annotation, 1 mark for correct location, 1 mark for validity of annotation</p> <p>Counter is integer {stores the counter value that will increment as the algorithm runs}</p>	<p>1 mark</p> <p>1 mark</p>	2

Qu.	Answer	Marks	MAX
8. (c)	The OR in if Username = "User1" OR Password = "Pass1" then (Must identify that it is the OR that is the problem)	1 mark	3
	Logical error	1 mark	
	if Username = "User1" AND Password = "Pass1" then	1 mark	
8. (d)	Four	1 mark	1
8. (e)	1 mark for stating it does not identify a correct component, 1 mark for explaining how it mitigates attack, 1 mark for stating that it increases security		3
	It does not identify if one component has been input correctly	1 mark	
	Doing so would assist hackers (using e.g. a dictionary brute force attack) as they could confirm when one component was guessed correctly and focus the attack on the second component, which would speed the attack	1 mark	
	It therefore increases security against attacks of this type	1 mark	
9. (a)	1 mark for identifying media correctly, 1 mark for clear justification		2
	Storage Medium: Optical	1 mark	
	Justification: Optical methods are burnt onto media, and are not susceptible to magnetic or e-m radiation. The data would therefore not be affected by these radiation types	1 mark	
9. (b)	1 mark for identifying media correctly, 1 mark for clear justification		2
	Storage Medium: Magnetic (Specifically Removable Magnetic HDD)	1 mark	
	Justification: The only cost effective method of storing such a large file on one item of media. 2TB drives are relatively cheap (<£200) compared with other methods (e.g. 2TB of solid state would be prohibitively expensive)	1 mark	

Qu.	Answer	Marks	MAX
9. (c)	<p>1 mark for identifying media correctly, 1 mark for clear justification</p> <p>Storage Medium: Solid State</p> <p>Justification: As solid state has no moving parts and relies on electrical charge to store data, this medium is not susceptible to vibration, as would be experienced by a fast-moving mountain bike on an uneven surface. Cloud would not be appropriate here as there would be no guarantee of a satellite uplink/internet connection due to constant motion</p>	<p>1 mark</p> <p>1 mark</p>	2
9. (d)	<p>1 mark for identifying media correctly, 1 mark for clear justification</p> <p>Storage Medium: Cloud Storage</p> <p>Justification: Allows users to access the same file at the same time and work on it together from remote sites</p>	<p>1 mark</p> <p>1 mark</p>	2
10. (a)	<p>RAM: RAM is directly addressable and holds one word or byte in each location giving the same access time for each. It stores the data you are working on / stores the modules needed to make applications work / stores programs being executed / acts as a buffer for external storage devices</p>	<p>1 mark</p> <p>1 mark</p>	2
10. (b)	<p>Flash Memory: Flash memory can be electrically erased and re-programmed and is treated as an additional installed disk drive</p>	<p>1 mark</p> <p>1 mark</p>	2

Qu	Answer	Marks	MAX
11.	<p>5 – 6 marks Detailed discussion of the resources managed by an operating system and an informed discussion of the potential problems that could result because of failure to manage resources. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly</p> <p>3 – 4 marks Some discussion of the resources managed by an operating system and some of the potential problems that could arise because of failure to manage resources. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct</p> <p>1 – 2 marks Superficial coverage – could be a list. Information will be poorly expressed and there will be limited, if any, use of technical terms. There are significant errors in grammar, punctuation and spelling</p> <p>0 marks No appropriate content</p> <p>Indicative content</p> <p>Examples of points which may be discussed or expanded through use of suitable examples</p> <ul style="list-style-type: none"> • Handles the memory management • If this was not handled correctly, files would attempt to occupy the same space in RAM and programs would crash/terminate • Handles file storage • If this was not handled correctly, files would overwrite each other, data would be lost • Scheduling tasks for efficient use of the system • If this was not handled correctly, the system would not prioritise tasks that needed execution and the system would slow down • Handles allocation of resources for the software that runs on the computer • If this was not handled correctly, files would not be allocated enough space in RAM and programs would crash/terminate. Or too much, which would be wasteful and potentially not allow space for other programs • Handles all of the software drivers for the hardware and peripherals • Without these, the computer would not interface correctly with the peripherals and they would not function • Handles all of the interactions between the user and the computer • Without the HCI components (e.g. icons) the system would be unusable as actions would not correspond to the correct process • Presents the file structure of a hard drive in a manner that a user can understand • If the HDD was not represented as a logical structure the system would be unnavigable • Converts the physical motions of the user - such as moving the mouse or typing on the keyboard - for the computer • If the result of an action did not correspond to the physical motion (e.g. pressing 'k' brings a 'k' up on screen), the system would be unusable and nonsense would be input/output 		6

Qu	Answer	Marks	MAX																									
12. (a)	Converts a domain name/URL into its physical/IP address	1 mark	1																									
12. (b)	It is a unique address that identifies a computer on a network such as the Internet	1 mark	1																									
12. (c)	Any two of the following Web access Email VoIP Web hosting / FTP uploading	1 mark 1 mark	2																									
13. (a)	<p>1 mark for each correct line, up to a maximum of 4</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>A AND B</th> <th>NOT (A AND B)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> </tr> </tbody> </table>	A	B	A AND B	NOT (A AND B)	1	1	1	0	1	0	0	1	0	1	0	1	0	0	0	1	1 mark 1 mark 1 mark 1 mark	4					
A	B	A AND B	NOT (A AND B)																									
1	1	1	0																									
1	0	0	1																									
0	1	0	1																									
0	0	0	1																									
13. (b)	<p>1 mark for each correct line, up to a maximum of 4</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>A AND B</th> <th>NOT B</th> <th>(A AND B) OR (NOT B)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	A	B	A AND B	NOT B	(A AND B) OR (NOT B)	1	1	1	0	1	1	0	0	1	1	0	1	0	0	0	0	0	0	1	1	1 mark 1 mark 1 mark 1 mark	4
A	B	A AND B	NOT B	(A AND B) OR (NOT B)																								
1	1	1	0	1																								
1	0	0	1	1																								
0	1	0	0	0																								
0	0	0	1	1																								
14. (a)	Represents characters in a binary code so that computers can communicate/transfer data with the same standards.	1 mark	1																									
14. (b)	<p>1 mark for identifying the number corresponding to 'G', 1 mark for conversion to binary</p> <p>Identifying 'G' as + 4 in sequence from 'C'</p> <p>00101110</p>	1 mark 1 mark	2																									



GCSE

COMPUTER SCIENCE

UNIT 2: Solving Problems Using Computers

SPECIMEN PRACTICAL ASSESSMENT

(2 hours)

INSTRUCTIONS TO CANDIDATES

You will need a computer with a functional copy of Greenfoot pre-installed.

Carry out all tasks and make sure that you check your work carefully to ensure that the work you produce is accurate and correct.

It is important that you work independently from other candidates and make sure that what you hand in is your own unaided work.

Save your work regularly.

INFORMATION FOR CANDIDATES

The quality of written communication will be assessed in task **3**.

Task 1**[6]**

A first attempt at producing a HTML webpage to advertise a Bluetooth Hands Free Car Kit is shown below.

For Sale Bluetooth Hands Free Car Kit Make calls without wearing a headset with this Bluetooth v1.2 EDF Multipoint Hands- free Speakerphone! Click to visit www.edfweb.com to see. Simply pair this device to any Bluetooth enabled phone and talk hands-free today!

The webpage was then improved using various html tags to provide the formatting shown below.

For Sale

Bluetooth Hands Free Car Kit

Make calls without wearing a headset with this Bluetooth v1.2 EDF Multipoint Hands- free Speakerphone! Click to visit www.edfweb.com to see. *Simply pair this device to any Bluetooth enabled phone and talk hands-free today!*

Open the file *Bluetooth.txt* using a basic text editor. Insert the required html tags that would be needed to display the formatting shown in the improved webpage. Save your completed work as *FinalBluetooth.txt*

Task 2**[9]**

A mobile phone company produces screens for their phones that have to fit perfectly within the body of the mobile phone. The process of manufacturing the mobile phone screens is not completely accurate and sometimes screens are too large to fit neatly within the body of the phone. If the screen is too large to be used it is discarded.

Using a basic text editor, write an algorithm that allows the mobile phone company to input:

- the required size of screen in millimeters
- the number of screens to be tested
- the actual size of each screen

The algorithm should:

- output a message if the screen is too large and is to be discarded
- count the number of discarded screens
- output the total number of discarded screens
- calculate the percentage of discarded screens
- output a warning message if the percentage of discarded screens exceeds 20%

Save your completed algorithm as *FinalMobilePhoneScreen.txt*

An example with **inputs**:

Please enter the required size of the screen in millimeters: **101**

Please enter the number of mobile phone screens to test: **4**

Please enter the size of screen 1: **101**

Please enter the size of screen 2: **103**

Error this screen is too large.

Please enter the size of screen 3: **101**

Please enter the size of screen 4: **104**

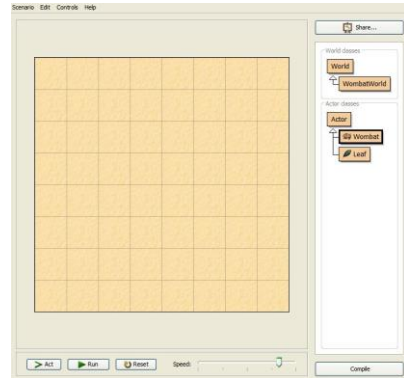
Error this screen is too large.

The total number of discarded screens was: 2

Warning, failure rate has exceeded 20%

Task 3**[15]**

- (a) Open the Wombats scenario in Greenfoot.
- (b) Populate the world with a wombat and some leaves.
- (c) Check that the scenario is working.
- (d) Edit the program code to make the wombat turn when the left or right cursor (arrow) keys are pressed so it can move back off the edge of the world.
- (e) Edit the program code so that the wombat eats a leaf when it collides with one.
- (f) Add a sound which plays every time the wombat eats a leaf.
- (g) Add a stationary predator of your choice to your world which will eat the wombat if they touch and end the game.
- (h) Add a counter to display how many leaves the wombat has eaten.
- (i) Edit the program code to make the leaves move (as if blowing in the wind) randomly around the world.
- (j) Save your completed world as *FinalWombatsWJEC*





GCSE COMPUTER SCIENCE

Unit 2: Solving Problems Using Computers

Specimen Assessment Material

Mark Scheme

Task 2	Answer	MAX
1	Declare OverLargeScreen is integer	1 mark (Must declare variables used.)
2	Declare RequiredSize is integer	
3	Declare CurrentScreenSize is integer	
4	Declare NumberToTest is integer	
5	Declare Count is integer	
6	Declare PercentageDiscarded is real	
7	Set Count = 0	
8	Set NumberToTest = 0	
9	Set OverLargeScreen = 0	
10	Set RequiredSize = 101	
11	Set CurrentScreenSize = 0	
12	Set PercentageDiscarded = 0	
13	Output "Please enter the required size of the screen in millimeters:"	
14	Input RequiredSize	1 mark ((input) award here <u>and</u> line 16)
15	Output "Please enter the number of mobile phone screens to test:"	
16	Input NumberToTest	
17	for Count = 1 to NumberToTest	1 mark (Setup a loop for number of tests to carry out)
18	Output "Please enter the size of screen: " Count	1 mark (Only if Output "correct text" & Count variable <u>and</u> for line 21)
19	Input CurrentScreenSize	
20	If CurrentScreenSize > RequiredSize then	1 mark (using IF with correct operator)
21	Output "Error this screen is too large."	
22	Set OverLargeScreen = OverLargeScreen +1	1 mark (Counting total)
23	endif	
24	next Count (end for)	
25	Output "The total number of discarded screens was: " OverLargeScreen	1 mark (output message and variable)

Task 2	Answer	MAX
26	set PercentageDiscarded = (OverLargeScreen/NumberToTest) * 100 1 mark (calculation of PercentageDiscarded)	
27	If PercentageDiscarded >20 then	
28	Output "Warning, failure rate has exceeded 20%" 1 mark (IF and Output)	
29	EndIf	
30	End	
	Line numbers not necessary Ignore indentation or lack of it Accept alternative solutions	

Task 3	Answer	MAX	
	11-15 Marks	<p>The candidate has produced a complete working solution to the task. The program is written efficiently and has been compiled. Wombat turns left and right on key press. Wombat eats leaves and a sound is played when a leaf is eaten. The counter displays the number of leaves eaten. A predator eats the wombat when they touch, ending the game. The leaves move around randomly (using a random number generator function). The program has been written coherently, technical terms have been used correctly, the meaning is clear and there are no errors in spelling and punctuation.</p> <p>Only award 15 if all tasks completed correctly (including naming of files correctly and all tasks implemented fully)</p>	15
	6-10 Marks	<p>The candidate has produced a working solution. The program has been compiled but one of the elements is missing or incomplete. Technical terms have been used correctly, the meaning is clear and there are few errors in spelling and punctuation.</p> <p>Trivial syntax errors that prevent compilation of an otherwise functional solution should not be penalised. Only award 10 marks if task j is completed (i.e. file is saved correctly)</p>	
	1-5 Marks	<p>The candidate has produced a partial solution to the task but there is some evidence of functionality. Technical terms, where used, are correct, but there are significant errors in spelling and punctuation.</p> <p>Only award 5 if the file is saved correctly (task j)</p>	
	0 Marks	No valid response	
Total Marks for Paper:			30



GCSE
COMPUTER SCIENCE
UNIT 3: Developing Computing Solutions
SPECIMEN CONTROLLED ASSESSMENT
(15 hours)

INSTRUCTIONS TO CANDIDATES

This is one of two scenarios available. Each scenario is available separately. You may choose either of the two scenarios. You will have 15 hours to complete your chosen task. Research tasks can be carried out outside timed conditions.

Read the scenario carefully to make sure that you understand what is needed.

It is important that you work independently from other candidates and make sure that what you hand in is your own unaided work.

Your report should be about 2,000 words.

Make sure that you check your work carefully to ensure that the work you produce is accurate and correct.

Save your work regularly.

INFORMATION FOR CANDIDATES

Teachers and candidates will be required to sign a declaration that all work presented is the work of the candidate alone. Failure to authenticate the work may result in grades being delayed or refused.

The quality of written communication will be assessed in your evaluation.

Scenario One

Number game application

A teacher at your school has asked you to write an application to update a number game, similar to bingo, which she uses to support learning in mathematics lessons.

The teacher has a bag containing counters numbered from 1 to 90. She draws the counters randomly from the bag and asks the pupils questions related to the number that appears on the counter. For example, when the number 63 is drawn the question might be “What number do you get if you multiply 7 by 9?”

Each pupil is given a card with a different selection of 10 numbers arranged in a grid. Pupils circle the numbers on their cards in response to the questions asked by the teacher. The winner is the first pupil to circle all the numbers on the card.

The teacher keeps a record of the answers by placing the counters drawn from the bag on a sheet of squared paper, so that she can check details when a pupil claims to have won.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90

The number game is played at the end of three lessons in one week. The teacher wishes to keep a record of how many times each counter is drawn from the bag altogether over the three games, and use these results as an introduction to the new topic of probability.

Your task is to write an application to:

- Generate random numbers, which must be integers of between 1 and 90, each of which can only appear once in a game.
- Keep a record of the numbers drawn in a game.
- Sort the numbers chosen during a game into ascending order and display them to help the teacher to check the winning cards.
- Record how many times each number is drawn over a series of three games.
- Recall and display a list of only the numbers that have been drawn over three games and how often they have been drawn.

Produce a report fully documenting your solution to automating this process. Credit will be given for the quality of your solution. Your report should be about 2000 words.

GUIDANCE FOR CANDIDATES

Your work for this assignment will be marked against the following assessment scheme.

Criteria	Marks
Design of solution	8 marks
Implementation	17 marks
Program documentation	5 marks
Testing	8 marks
Evaluation	12 marks

Candidates are reminded that **all** code in their program should **be original** and written by themselves.



GCSE COMPUTER SCIENCE

Unit 3: Developing Computing Solutions

Specimen Assessment Material

Mark Scheme

Unit 3 - Controlled Assessment - Mark Scheme

Quality of Written Communication	
The quality of written communication is assessed as an integral part of the candidate evaluation and not as a standalone element, using the following specific criteria:	
<ul style="list-style-type: none"> • legibility of text, accuracy of spelling, punctuation and grammar, clarity of meaning • selection of a form and style of writing appropriate to purpose and to complexity of subject matter • organisation of information clearly and coherently, use of specialist vocabulary where appropriate 	
Mark Grid	
Design of Solution	
Max 8 marks	
7 - 8 marks	The candidate has provided a detailed analysis of the task and a comprehensive description fully justifying their intended solution in terms of the programming facilities of the language software chosen. The pseudocode (or flow chart) is well annotated, showing a thorough understanding. The candidate has produced a complete suite of algorithms covering the whole solution as well as any validation required. There is a comprehensive testing strategy and evaluation criteria that will allow the performance of the completed system to be measured. The design demonstrates a clear sense of audience and purpose.
4 - 6 marks	The candidate has provided a brief analysis of the task and a basic description identifying a sufficient number of processes to provide a working solution to the given task. The pseudocode (or flow chart) is annotated, showing some understanding. The candidate has produced basic algorithms covering most of their solution and some evidence of discussion of any validation required. The candidate has devised a strategy allowing them to test most of the functionality and evaluate their completed solution. The design demonstrates some sense of audience and purpose.
1 - 3 marks	The candidate has produced a minimal solution and has briefly described some tasks but the outline of the solution is not specific for all parts of the solution. There is some evidence of use of pseudocode (or flow chart) although annotation may be absent. Some basic algorithms may be evident for part of the solution. The candidate has made brief comments on how the solution may be tested but has not referred to success criteria and the solution may be incomplete.
0 marks	No valid response.
Implementation	
Max 17 marks	
14 - 17 marks	The candidate has produced a fully functioning solution to the given task. They have fully exploited, as appropriate, the facilities of the chosen programming language and have demonstrated a sound understanding of the appropriate techniques available to them.
9 - 13 marks	The candidate has produced a functional solution to the given task. They have used, as appropriate, the facilities of the chosen programming language and have demonstrated an understanding of the tools and techniques used.
5 - 8 marks	The candidate has produced a solution to the given task that provides the majority of the required functionality. The candidate has used a range of the facilities of the programming language and has demonstrated some understanding of the tools and techniques used.
1 - 4 marks	The candidate has produced a partial solution to the given task. They have made some use of the facilities of the programming language, demonstrating a limited understanding of the tools and techniques used.
0 marks	No valid response.

Program Documentation		Max 5 marks
5 marks	The candidate has fully documented a solution and used appropriate self-documenting identifiers. Listings of each programming routine are appropriately laid out and contain sufficient annotation to demonstrate a sound understanding of the programming code used. The user interface is fit for audience and purpose.	
3 - 4 marks	The candidate has documented a solution with listings of all major programming routines with some evidence of use of self-documenting code and annotation, demonstrating some understanding of the programming code used. The user interface is fit for audience and purpose.	
1 - 2 marks	The candidate has produced some listings of the programming routines used but there is little evidence of self-documenting code or annotation.	
0 marks	No valid response.	
Testing		Max 8 marks
6 - 8 marks	The test plan covers all the success criteria and the candidate has included extensive evidence of thorough testing of the completed solution with an informed commentary of the testing process.	
3 - 5 marks	The test plan covers most of the success criteria and the candidate has included evidence of thorough testing of the completed solution and included commentaries describing the testing process.	
1 - 2 marks	The candidate has included brief evidence of some testing but the solution may be incomplete.	
0 marks	No valid response.	
Evaluation including Quality of Written Communication		Max 12 marks
10 - 12 marks	The candidate has produced an informed discussion of the performance of the completed solution against the evaluation criteria. The candidate is able to make valid and detailed suggestions for further improvements. The text is legible, information is organised clearly and coherently with correct use of specialist vocabulary where appropriate and meaning is clear. Spelling, punctuation and grammar are accurate. The form and style of writing is appropriate to purpose and to the complexity of the subject matter.	
7 - 9 marks	The candidate has produced a discussion of the performance of the solution against the evaluation criteria and has made some valid suggestions for further improvements to the solution. The text is legible, information is organised clearly with correct use of specialist vocabulary where appropriate and meaning is clear. Spelling, punctuation and grammar are accurate. The form and style of writing is appropriate to purpose and the subject matter.	
4 - 6 marks	There is some discussion of the performance of the solution measured against the evaluation criteria. The candidate is able to make some suggestions for further improvements to the solution. The text is legible and specialist vocabulary, where used, is appropriate. There may be errors in spelling, punctuation and grammar.	
1 - 3 marks	The evaluation is superficial. Comments lack clarity and are expressed in everyday language. Suggestions for improvements are limited or absent. There are significant errors in spelling, punctuation and grammar.	
0 marks	No valid response	
		Total 50 marks

GCSE COMPUTER SCIENCE ASSESSMENT GRID

Unit 1	Assessment Objectives Raw Marks			Total Raw Mark	QWC
	AO1	AO2	AO3		
1	4			4	
2	5			5	
3	4			4	
4	4			4	
5	7		6	13	
6	5			5	
7	2	1	1	4	
8	7	2	1	10	
9	4		4	8	
10	4			4	
11	3	3		6	✓
12	4			4	
13		8		8	
14	1	2		3	
15		2	6	8	
Total Marks	54	18	18	90	

Unit 2	AO1	AO2	AO3	Total Raw Mark	QWC
Task 1	6			6	
Task 2		9		9	
Task 3		10	5	15	✓
Total Marks	6	19	5	30	

Unit 3	AO1	AO2	AO3	Total Raw Mark	QWC
Design		2	6	8	
Implementation		17		17	
Program Documentation	4	1		5	
Testing		4	4	8	
Evaluation			12	12	✓
Total Marks	4	24	22	50	