GCSE Computer Science

May 2014

Past Papers

Name _____

The following sheets are the past papers from the OCR board and amended to reflect the topics that you study.

The grade boundaries for each exam have been adjusted and below you can see the grades achievable based on the amended question papers.

There are spaces for some papers which are not available in this booklet but we will sit in the run up to study leave.

The mark schemes will be available for you.

Paper	Mark	Available Marks	%
January 2011		68	
June 2011		55	
January 2012		61	
June 2012		52	
AQA Specimen		83	
January 2013		60	
June 2013		76	

Paper	A*	A	B	C	D	E	F
Jan 11	61(90%)	54(80%)	48(70%)	41(60%)	34(50%)	27(40%)	20(30%)
Jun 11	50(90%)	44(80%)	39(70%)	33(60%)	28(50%)	22(40%)	17(30%)
Jan 12	51(84%)	46(75%)	40(66%)	35(58%)	29(48%)	24(39%)	18(30%)
Jun 12	44(85%)	38(74%)	33(63%)	28(53%)	22(43%)	18(34%)	13(25%)
Jan 13	51(85%)	45(75%)	39(65%)	34(56%)	27(45%)	21(35%)	15(25%)
Jun 13	67(89%)	59(78%)	50(66%)	42(55%)	34(45%)	27(35%)	19(25%)

OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION

COMPUTING
Computer Systems and Programming

A451

Tuesday 11 January 2011
Afternoon

Duration: 1 hour 30 minutes

Candidate forename		Candidate surname	

Centre number						Candidate number					

INSTRUCTIONS TO CANDIDATES

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*   Answer **all** the questions.
*   Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

*   The number of marks is given in brackets **[ ]** at the end of each question or part question.
*   The total number of marks for this paper is **80**.
*   Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
*   This document consists of **16** pages. Any blank pages are indicated.

1 Jo buys a notebook computer which has a 3MHz quad-core central processing unit (CPU).

(a) State the purpose of the CPU.

....

.... **[1]**

(b) Describe what is meant by

3MHz CPU

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.... **[2]**

quad-core CPU

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.... **[2]**

2 A small business has three stand-alone computers, a printer and an internet connection in an office.

(a) State **two** advantages of connecting the computers to create a local area network.

1

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.... **[2]**

(b) Describe, using a diagram, how the computers can be connected to each other using a bus topology, stating what hardware will be needed.

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.... **[6]**

3 **(a)** Calculate the denary value of the 8-bit binary number 10010111.
You must show your working.

.... **[2]**

4   A desk-top computer's memory includes ROM and RAM.

Tick **one** box in each row to show whether each of the statements is true for ROM or RAM.

	ROM	RAM
Programs and data which are currently in use are loaded here.		
All the contents are lost when the power is turned off.		
It is used to boot up the computer when it is switched on.		

[3]

Turn over

6 A shopping centre uses several remote-controlled CCTV cameras for security. An operator uses a computer to watch, control and record the output of the cameras.

State an input, output and storage device which will be needed by the computer. For each, explain the reason why it is needed.

Input device

.... **[1]**

Reason

....

....

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.... **[2]**

Output device:

.... **[1]**

Reason

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....

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.... **[2]**

Storage device:

.... **[1]**

Reason

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....

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.... **[2]**

Turn over

7 A teacher uses a database to store the marks of pupils from all year 9 classes.

(a) PUPIL and CLASS are two entities used in this database.

Explain the term entity.

....

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....

.... **[2]**

(b) The data for the first four pupils in the PUPIL table is shown below.

PupilNumber	Surname	FirstName	ClassCode
A01	Adams	Michelle	9DK
A02	Ali	Mohammed	9BH
A03	Ali	Shirelle	9DK
A04	Azor	Michelle	9FT

(i) State the primary key for the PUPIL table and explain your answer.

Primary Key .... **[1]**

Explanation

....

....

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.... **[2]**

(ii) The database also contains a CLASS table. The primary key for the CLASS table is ClassCode.

Explain why ClassCode has also been included in the PUPIL table.

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.... **[3]**

8 A syntax error can occur when writing a program.

(a) State what is meant by a syntax error, giving an example.

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.... **[2]**

(b) Describe tools and facilities available in an integrated development environment (IDE) which can help the programmer to identify and correct syntax errors.

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.... **[4]**

9* Computer technology has changed the ways in which teenagers interact with each other. Explain how developments in software and hardware have enabled new methods of communication among teenagers.

The quality of written communication will be assessed in your answer to this question.

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.... **[6]**

10 (a) Explain how ASCII is used to represent text in a computer system.

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.... **[3]**

(b) State what is meant by the character set of a computer.

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.... **[1]**

(c) Unicode is also used to represent text in a computer system.

Explain the difference between the character sets of Unicode and ASCII.

....

....

....

.... **[2]**

PLEASE TURN OVER FOR THE NEXT QUESTION

11 Frances is writing a program which simulates a dice game played with three ordinary 6-sided dice.

(a) When the player rolls the three dice, the player is given points according to the algorithm expressed in the flow diagram below.
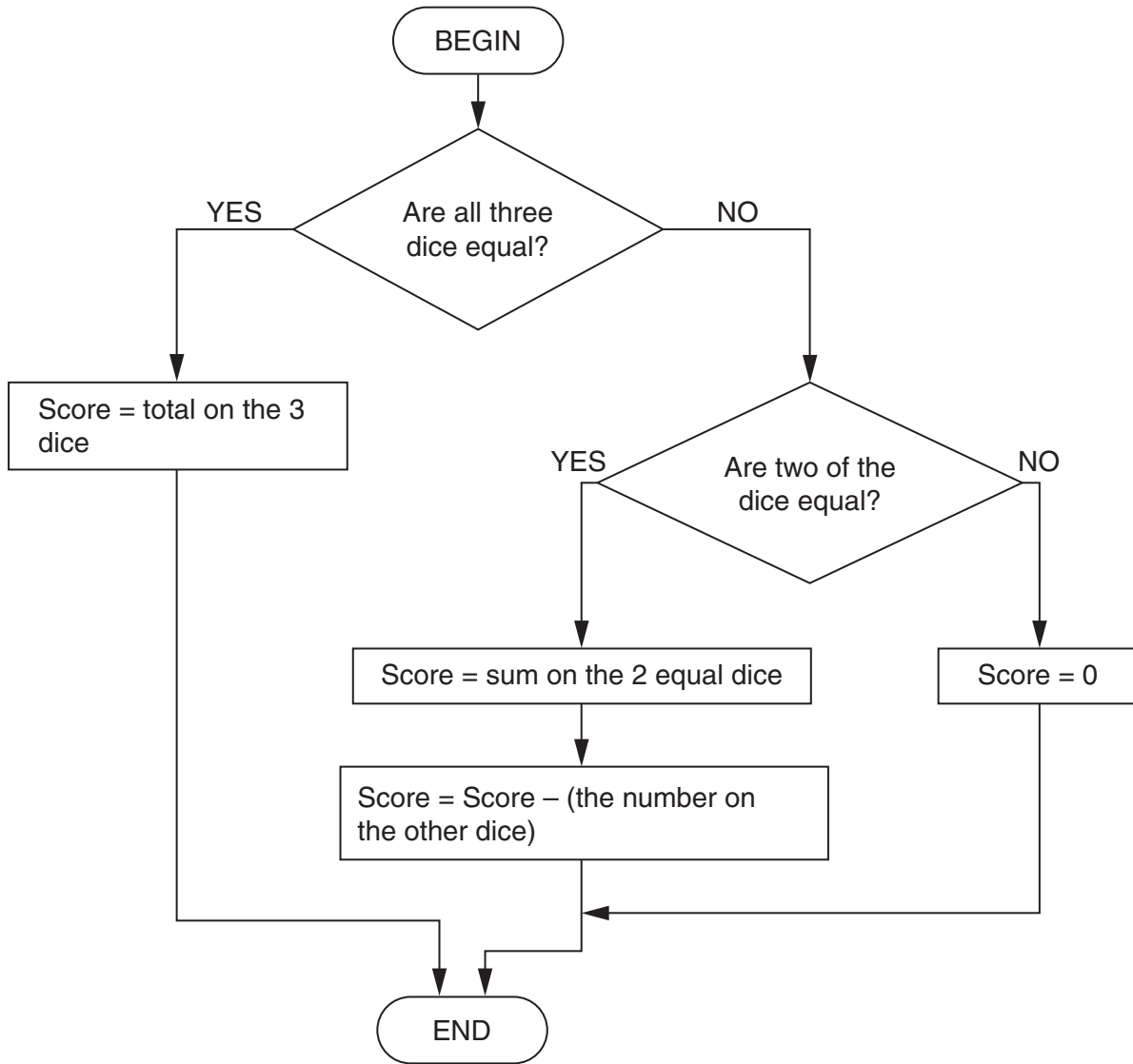
State the value of the score if the dice rolled are

3 4 5   Score : ....

4 4 4   Score : ....

5 5 6   Score : ....

[3]

(b) Some rolls of the dice result in a negative score.

State a set of three numbers which can be used to test whether the algorithm produces a negative score when it should, and state the expected output for your test data.

Set of test data: ....

Expected output: .... **[2]**

When the dice are rolled, the results are stored in an array called DiceResult.

For example, if the first dice shows a 5 then the value of DiceResult(1) becomes 5.

(c) Describe what is meant by an array.

....

....

....

.... **[2]**

(d) State the data type and size of the array DiceResult giving a reason for each.

Data type of DiceResult: ....

Reason: ....

....

Size of array DiceResult: ....

Reason: ....

.... **[4]**

PLEASE TURN OVER FOR THE LAST QUESTION

(e) The routine for rolling the dice is written as a sequence below.

```
BEGIN RollTheDice
    DiceResult(1) = Random Number between 1 and 6
    DiceResult(2) = Random Number between 1 and 6
    DiceResult(3) = Random Number between 1 and 6
END
```

Rewrite this routine so that it uses iteration.
You may use a diagram.

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.... **[4]**

[END]

OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION

COMPUTING
Computer Systems and Programming

A451

Monday 23 May 2011
Morning

Duration: 1 hour 30 minutes

Candidate forename		Candidate surname	

Centre number					Candidate number				

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Turn over

1 (a) State what is meant by a storage device, an input device and an output device in a computer system.

Storage Device:

....

....

Input Device:

....

....

Output Device:

....

....
[3]

A secondary school is upgrading its computer equipment.

(b) Complete the table below to show whether magnetic, optical or solid state storage is most appropriate for each of the following uses. Give a reason for each case.
The first one has been done for you.

Use	Magnetic, optical or solid state	Reason why this is most appropriate
Storing pictures in a digital camera	solid state	Is not affected by the camera being moved around
Handheld device used by students for field work		....
Storage drives on the school's main file server		....
Videos of the school production to be given to parents		....

[6]

(c)* The secondary school wants the computer systems to be more accessible to students with disabilities.

Describe, with examples, input and output devices which are available for students with disabilities.

The quality of written communication will be assessed in your answer to this question.

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.... **[6]**

2 A grocery shop uses a database with a DBMS to keep records of its stock.

   (a) Explain what is meant by a DBMS.

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   ....

   ....

   .... **[3]**

Here is some data from the supermarket's database.

ProductID	Description	Supplier	Quantity Left	Reorder Level	Discontinued	Price
0001	6 eggs	Hill Farm	50	20	FALSE	£0.98
0002	2 litres of milk	Hill Farm	17	20	TRUE	£1.20
0003	1kg apples	Killey's	42	50	FALSE	£0.79
0004	250g butter	Hill Farm	12	25	FALSE	£0.49
0005	500g Moku Flakes	Moku Foods	0	10	TRUE	£0.99
0006	6 salad tomatoes	Killey's	30	30	FALSE	£0.89
0007	580g can baked beans	Moku Foods	27	30	FALSE	£0.42
0008	Family tomato ketchup	Moku Foods	41	20	FALSE	£1.45

(c) The shop runs queries using logical operators to select data for different purposes.

(i) State the ProductID of the products in the above sample which fit the following criteria.

Supplier = Killey's

....

....

....

Price > £1.00 OR Supplier = Hill Farm

....

....

....

.... **[4]**

(ii) Write the criteria which can be used to select all products which are not discontinued and where the QuantityLeft is lower than the ReorderLevel.

....

....

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.... **[3]**

3 A rock band uses an internet website to advertise its music.

(b) A list of file extensions for common file standards used on the internet is shown below.

JPG   PDF   MP3   MPEG   ZIP

The rock band allows some files to be downloaded by fans.

Complete the table below to show which file format **from the list given above** may be used for each of the following files.

File	File Format
A high resolution image of the band to use as a desktop background.	
Sheet music of their songs ready to be printed in the correct format for guitar players.	
A short video extract from their latest concert tour.	
A compressed collection of 200 plain text files containing the lyrics of all their songs.	
An audio recording of a song from their album.	

[5]

(c) Some of the file formats use compression.

(i) Explain the importance of compressing files when transmitting them via the internet.

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.... **[2]**

(ii) Describe the difference between lossy and lossless compression and give an example where each would be used.

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.... **[4]**

Turn over

6 (a) Convert the hexadecimal number 6A to denary.
You must show your working.

....

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.... **[2]**

(b) Convert the hexadecimal number 6A to binary.

....

....

....

.... **[2]**

(c) Convert the binary number 00111101 to hexadecimal.

....

....

....

.... **[2]**

(d) Explain why hexadecimal numbers are often used to represent binary numbers.

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.... **[2]**

7 A program contains the following code to calculate the circumference of a bicycle wheel, using the wheel size (diameter).

```
BEGIN
    CONSTANT Pi = 3.14
    INPUT WheelSize
    Circumference = Pi * WheelSize
    OUTPUT Circumference
END
```

(a) The code uses one constant and two variables.

   (i) State the names of the constant and the variables.

   Constant: ....

   Variables: ....

   [2]

   (ii) Explain **one** difference between a constant and a variable.

   ....

   ....

   ....

   .... **[2]**

(b) The data type of WheelSize is integer and the data type of Circumference is real number.

   Explain the difference between an integer and a real number.

   ....

   ....

   ....

   .... **[2]**

Turn over

9 A dog that is 5 years old is equivalent to a 42 year old human. Ashok is writing a program which converts the age of a dog to the equivalent age for a human.

The program uses the following method:

- The user inputs age of the dog in years
- If the age is 2 or less, the human equivalent is 12 times the age
- If the age is more than 2, the human equivalent is 24 for the first 2 years, plus 6 for every additional year.

Write an algorithm to calculate and output the human equivalent of the age of a dog using the method described.

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.... **[5]**

[END]

Wednesday 11 January 2012 – Afternoon

GCSE COMPUTING

A451/01 Computer Systems and Programming

Duration: 1 hour 30 minutes

Candidate forename		Candidate surname	

Centre number						Candidate number					

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2

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PLEASE DO NOT WRITE ON THIS PAGE

1 Bytes, Kilobytes and Megabytes are units used for the amount of data stored in a computer.

(a) State which of these units is most appropriate for the following items of data.

A one page text document: ....

A ten minute movie clip: ....

A person's surname: .... **[3]**

(b) A computer has a hard disk of 2 Terabytes.

How much is this in Gigabytes?
You **must** show your working.

....

....

....

.... **[2]**

3 A mail-order company buys dresses from America and France to sell in the UK.

The company uses the following algorithm to convert sizes before printing them in its catalogue. Half sizes are not possible (e.g. size 12.5).

```
INPUT Size
INPUT Origin
IF Origin = "America" THEN
    Size = Size + 2
ELSE
    IF Origin = "France" THEN
        Size = Size – 26
    END IF
END IF
PRINT Size
```

(a) The code uses the variables Origin and Size.

(i) Describe what is meant by a variable.

....

....

....

.... **[2]**

(ii) State the most appropriate data type for the variables Origin and Size, giving a reason for your choice.

Origin

Data type ....

Reason ....

....

Size

Data type ....

Reason ....

.... **[4]**

(b) The company sells the following dresses.

Dress A	**Dress B**	**Dress C**
Origin: France	Origin: America	Origin: UK
Size: 40	Size: 8	Size: 12

State the size which will be printed in the catalogue using the algorithm given.

Dress A ....

Dress B ....

Dress C .... **[3]**

5 Peter takes a picture of himself and his friends to put on a social networking site. The picture is converted into pixels and stored as a bitmap file.

(a) Tick **one** box in each row to show whether or not each of the following items **must** be included in the bitmap file.

	Must be included	Need **not** be included
The names of the people in the picture		
The width of the picture in pixels		
The number of bits used for each pixel		
The number of people in the picture		
The colour of each pixel		

[5]

(b) (i) What is meant by the resolution of the picture?

....

.... [1]

(ii) How does the resolution affect the size of the bitmap file?

....

....

....

.... [2]

6 Mrs Smith runs a dog sitting service that looks after dogs whose owners are going away on holiday.

Mrs Smith uses a database with two tables:
- The table DOG stores the following data about each dog: DogID, name, sex, weight, date of arrival, date of departure.
- The table JOB stores the daily jobs that she needs to do with each dog.

(a) The DOG table contains fields for the sex and weight of the dog.

(i) Describe a validation check that can be done on the sex field.

....

....

....

.... **[2]**

(ii) Describe **a different** validation check that can be done on the weight field.

....

....

....

.... **[2]**

An extract of the JOB table is shown below:

JobNumber	DogID	JobType	Time	Details
35	SM13	Feed	Morning	250 g of Hundex
36	BA12	Walk	Afternoon	At least 30 minutes
37	SM13	Walk	Afternoon	Keep on leash
38	GH14	Other	Morning	Medicine: 1 tablet of Depucine
39	HT19	Other	Evening	Brush fur

(b) Explain why DogID has been included in this table.

....

....

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....

....

.... **[3]**

(c) Mrs Smith uses a query to select jobs using the following criteria:

(Time = "Afternoon") OR (Time = "Evening")

List the JobNumbers of the jobs that will be selected from the extract shown.

....

.... **[1]**

(d) Mrs Smith wants to use database management software to create a report of all the jobs that she needs to perform on any given day, using data from the DOG and JOB tables.

In the space below, design a layout for the report.

[6]

Turn over

7 A school uses a computer system to monitor the attendance, punctuality and homework of its pupils.

(a) Describe **two** ways in which modern computer technology can help the school monitor the pupils.

1. ....

....

....

....

2. ....

....

....

.... **[4]**

(b) The school has decided to use off-the-shelf software.

(i) State **two** advantages of off-the-shelf software.

1 ....

....

2 ....

.... **[2]**

(ii) State **two disadvantages** of off-the-shelf software.

1 ....

....

2 ....

.... **[2]**

(c)* Explain how the school might address any legal issues when creating a system which stores personal data about pupils.

The quality of written communication will be assessed in your answer to this question.

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.... **[6]**

Turn over

8 Mina's computer has 4 GB of RAM.

(a) Describe the purpose of RAM in the computer.

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....

.... **[2]**

(b) The computer also uses virtual memory.

(i) Explain what is meant by virtual memory.

....

....

....

.... **[2]**

(ii) State why virtual memory is needed.

....

.... **[1]**

(iii) Mina upgrades the computer to 6 GB of RAM.

Explain how this upgrade will affect the performance of the computer.

....

....

....

.... **[2]**

9 The program in a vending machine uses an array called Coins to store the value in pence of all the coins that have been entered in the current sale.

A maximum of 10 coins can be entered in each sale.

After each sale, the array is reset so that all values are 0.

(a) Here is an example of the contents of the array Coins during a sale.

10	100	20	50	5	0	0	0	0	0

In the example above, the value of Coins(1) is 10.

State the value of

Coins(4) ....

Coins(10) .... **[2]**

(b) An algorithm to reset the contents of the array Coins after each sale is shown below. This algorithm contains a logic error.

```
i = 1
REPEAT
    Coins(i) = 0
    i = i + 1
UNTIL i = 10
```

(i) State what is meant by a logic error.

....

.... **[1]**

(ii) Explain why the algorithm above contains a logic error.

....

....

....

.... **[2]**

(c) Write an algorithm to calculate the total value of the coins entered in the current sale using the contents of the array Coins.

....

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....

.... **[5]**

Thursday 17 May 2012 – Afternoon

GCSE COMPUTING

A451/01 Computer Systems and Programming

Candidates answer on the Question Paper.	**Duration:** 1 hour 30 minutes
OCR supplied materials: None	
Other materials required: None	

Candidate forename		Candidate surname	

Centre number					Candidate number				

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1   A tablet computer can be used to surf the Internet, read and reply to emails and watch on-line movies.

(a) In the table below, tick **one** box in each row to show whether each of the following is an output device or not.

	is an output device	is **not** an output device
Screen		
USB Port		
Speaker		

[3]

(b) A tablet computer has built-in input devices.

Identify **two** input devices that can be built into a tablet computer and for each state how it could be used to input data.

Device 1 ....

How it could be used ....

....

....

Device 2 ....

How it could be used ....

....

.... [4]

2   The following diagram shows how the computers in Mr Singh's office are connected to each other to form a LAN.
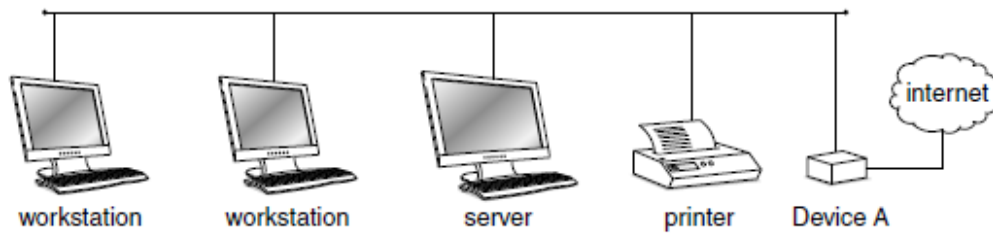
(a) State the correct name for this network topology.

    ....[1]

(b) State the name of the Device A which connects the server to the internet.

    ....[1]

(c) Give **three** functions of the server in this network.

    1 ....

    ....

    2 ....

    ....

    3 ....

    ....[3]

(d) In his home, Mr Singh has a peer-to-peer network.

    Explain what is meant by a peer-to-peer network.

    ....

    ....

    ....

    ....[2]

Turn over

4 The table below shows different standard file formats that are used to transmit media files on the internet.

Tick **one** box in each row to show whether the format is used to transmit an image file, a sound file or a video file.

	image file	sound file	video file
AVI			
BMP			
JPG			
MP3			

[4]

6 (a) Convert the denary number 55 to an 8 bit binary number.

....

....

....

.... [2]

(b) Convert the denary number 55 to hexadecimal.

....

....

....

.... [2]

7   The CPU is the component which does most of the data processing in a computer.

(a) State **two** tasks which are carried out by the CPU when processing data.

1 ....

....

2 ....

.... [2]

(b) Explain how the clock speed and the cache size of a CPU affect its performance.

Clock speed

....

....

....

....

Cache size

....

....

....

.... [4]

8   A school uses a computer program to give every new pupil a username for logging onto computers.

The algorithm used to choose the username is shown below.

```
                        ( BEGIN )
                            |
                            v
              / INPUT Firstname, Surname /
             /      and YearOfEntry     /
                            |
                            v
          [ Initial = First Letter of FirstName ]
                            |
                            v
      [ Username = YearOfEntry & Surname & Initial ]
      [          (joined into one string)          ]
                            |
                            v
                            /\
                           /  \              [ Add the character "#" to ]
              Is there another   YES ------> [ the end of the username  ]
              pupil with the  \  /
              same Username?    \/
                            |
                           NO
                            |
                            v
                        ( END )
```
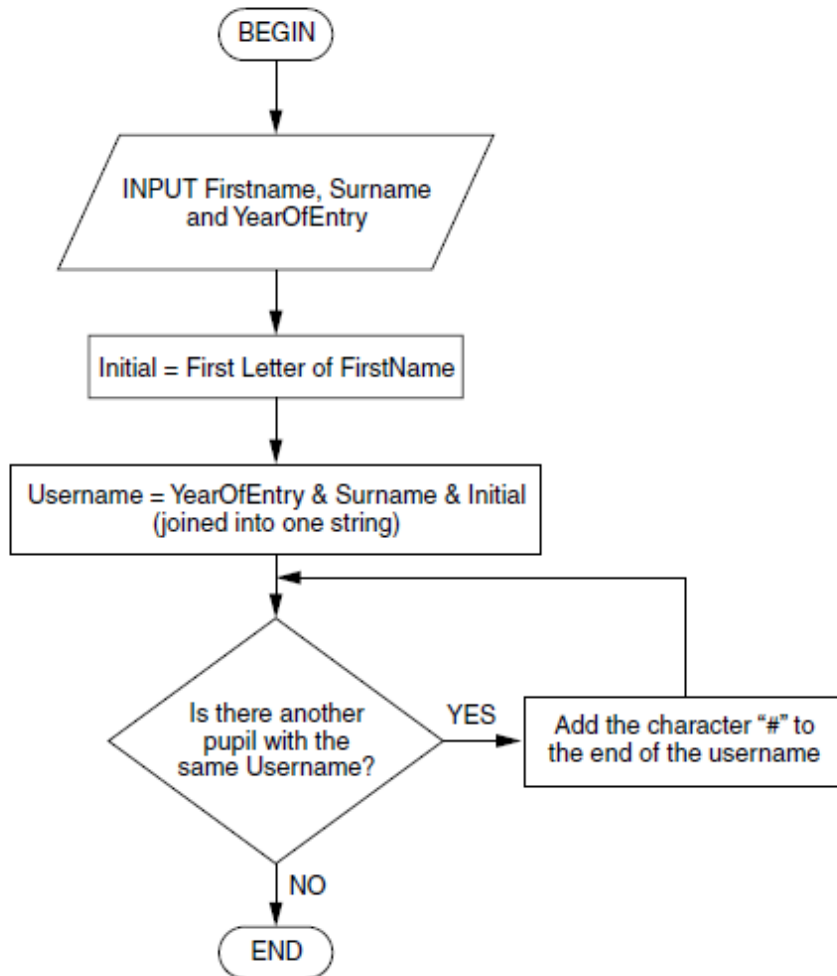
(a) Mark Johnson joins the school in 2012. No other pupil called Johnson joins the school in the same year.

State the username which Mark will be given and explain how you obtained your answer from the flow diagram.

Username ....

Explanation ....

....

....

.... [3]

(b) A pupil has the username 2010alim###.

State **four** facts that we can work out from this username.

1 ....

....

2 ....

....

3 ....

....

4 ....

.... **[4]**

10 The memory of a computer contains data and instructions in binary.

(a) Explain why computers use binary.

....

....

....

.... **[2]**

(b) Describe how instructions are stored in binary.

....

....

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....

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.... **[3]**

12 A taxi uses a computer to communicate with central office and to calculate customers' fares.

(a) The program in the computer uses sequence, selection and iteration.

State whether the operations below use **sequence**, **selection** or **iteration**.

Performing a series of different set-up operations when the computer is switched on.

....

Beeping repeatedly after a message is sent, until the driver presses a button to show that the message has been read.

....

Deciding whether to use the DayTimeRate or the EveningRate functions to calculate a customer's fare.

.... [3]

(b) The computer measures the distance travelled as a real number and then rounds it up to the next integer.

State what is meant by

a real number

....

....

an integer

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.... [2]

(c) The cost of a day-time journey is £3 for the first kilometre and £2 for every kilometre after that. If there are five or more passengers in the taxi, an extra 50% is added to the charge.

Write an algorithm to calculate the cost of a day-time journey.

Your algorithm should:
- allow the number of passengers and the distance of the journey to be input as whole numbers,
- calculate the cost of the journey,
- output the cost that has been calculated.

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.... [7]