

IGCSE Computer Science

0478/0984

Question Paper

Course	Cambridge IGCSE Computer Science
Topic	Chapter 1 : Data Representation
Paper Code	0478 (9 - 1) / 0984 (A* - G)

**To be used by students who are taking
0478 (9-1) IGCSE, the 0984 (A*-G) IGCSE
Computer Science, and the 2210 O Level
for examination in 2023 onwards.**

Students of other boards may also find this useful

Name : _____

Date : _____

Time : _____

Total Marks Available : _____

Total Marks Received : _____

1 Hexadecimal is used for MAC addresses.

Part of a MAC address is given:

97 – 5C – E1

Each pair of digits is stored as binary in an 8-bit register.

(a) Show what the binary register stores for each pair of the given digits.

97							
-----------	--	--	--	--	--	--	--

5C							
-----------	--	--	--	--	--	--	--

E1							
-----------	--	--	--	--	--	--	--

[6]

(b) Explain what is meant by a MAC address.

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[4]

(c) Give **two** other examples where hexadecimal can be used.

Example 1

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Example 2

.....

[2]

5 The following text is stored as a text file:

She sells sea shells on the seashore. The shells that she sells are sea shells I am sure.

Explain how lossless compression would compress this file.

AMU

[5]

(b) (i) Marley also needs to store ten 8-bit colour images in a file for his project.

Each image is 500 pixels wide and 300 pixels high.

Calculate the total file size in megabytes (MB) for all Marley's images.

Show all your working.

Blank handwriting practice lines.

File size MB

[3]

1 Victoria is building a website for her cake design business.

(a) She uses the hexadecimal colour code #D2E3F5 as the background colour for her website.

The colour code is stored in two 12-bit binary registers.

Show how the code would be stored in the registers.

D2E

--	--	--	--	--	--	--	--	--	--	--	--

3F5

--	--	--	--	--	--	--	--	--	--	--	--

[6]

2 An electronic guessing game compares denary integer values input by a user with pre-stored values. The pre-stored values are held in 10-bit binary format.

(a) Convert the binary values in the table to denary.

Binary	Denary
0001001110	
0110110111	
1000000001	

[3]

(b) When planning the game, the designer decided to use hexadecimal notation to represent the binary values.

Explain why the designer used hexadecimal notation.

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..... [2]

(c) State the hexadecimal equivalent of the binary value 1010110101

..... [3]

(d) The program files for the games are compressed before they are published on the Internet.

(i) Describe **one** benefit of compressing the program files.

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..... [2]

(ii) State whether **lossy** or **lossless** compression should be used.

..... [1]

1 Computer memory size is measured in multiples of bytes.

Four statements about computer memory sizes are given in the table.

Tick (✓) to show if the statement is **True** or **False**.

Statement	True (✓)	False (✓)
25 kB is larger than 100 MB		
999 MB is larger than 50 GB		
3500 kB is smaller than 2 GB		
2350 bytes is smaller than 2 kB		

[4]

4 An 8-bit binary register contains the value:

0	0	1	1	0	1	0	0
---	---	---	---	---	---	---	---

(a) Convert the binary value to denary.

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..... [1]

- (b) The contents of the register shifted one place to the right would give the result:

0	0	0	1	1	0	1	0
---	---	---	---	---	---	---	---

The contents of the register shown at the start of question 4 are shifted two places to the left.

Show the contents of the register after this shift has taken place.

--	--	--	--	--	--	--	--

[1]

- (c) State the effect this shift has on the denary value in **part (a)**.

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..... [1]

- 5 Audrey wants to send a sound file to Nico using email.

The file is too large to attach to an email so Audrey decides to compress the file.

She uses lossy compression to reduce the size of the sound file.

- (a) Describe how lossy compression reduces the size of the sound file.

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..... [4]



(b) Nico asks Audrey why she used lossy compression rather than lossless.

- (i) State **one** advantage Audrey could give of using lossy rather than lossless to compress the sound file.

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..... [1]

- (ii) State **one** disadvantage Nico could give of using lossy rather than lossless to compress the sound file.

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..... [1]

(c) The library has a website that customers can use to search for a book.

- (i) The website has a background colour with the hexadecimal colour code #F92A10

The colour code is stored in two 12-bit binary registers.

Show how the colour code would be stored in the registers.

F92											
A10											

[6]

- (ii) Videos on the library website show customers which books the library will soon have in stock.

The library wants the file size of a video to be as small as possible.

Identify **and** describe a method the library could use to reduce the file size of a video as much as possible.

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[4]

- (d) Priya shares her sound files with other students. Before sharing the sound files, she compresses the files using lossless compression.

Describe how lossless compression reduces the size of a sound file.

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..... [2]

- 5 Programmers can use denary and hexadecimal values. These values are stored in a computer system using binary.

- (a) Explain why binary is used to store data in a computer system.

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..... [2]

- (b) Complete the table to show how the denary value would be stored as binary in an 8-bit register.

Denary value	8-bit register
129	
56	

[2]

Working space

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- (c) Complete the table to show how the hexadecimal value **3A9** would be stored as binary in a 12-bit register.

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[3]

- (d) Identify **two** uses of hexadecimal values in computer science.

1

2

[2]

-
- 7 (a) Give the **denary** value of each of the three 12-bit binary values.

(i) 000000001100

..... [1]

(ii) 000011000110

..... [1]

(iii) 010011000001

..... [1]

Working space

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- (b) 12-bit binary values can also be represented as hexadecimal values.

Give the **hexadecimal** value of the 12-bit binary value.

000011101001

..... [3]

1 Pradeep is reading hexadecimal values for a project he is working on.

(a) The first three hexadecimal values he reads are **15**, **102** and **A9**.

Give the **denary** values for the three hexadecimal values.

15

102

A9

[3]

Working space

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(b) Pradeep has two 8-bit binary values that he needs to convert to hexadecimal values for his project.

Give the **hexadecimal** values for the two 8-bit binary values.

01010000

00111101

[4]

2 Ron is attending a music concert. He has bought three tickets.

Each ticket number is displayed as a hexadecimal number.

(a) Complete the table to show the **12-bit binary** values and the **Denary** values for each Hexadecimal ticket number.

Hexadecimal ticket number	12-bit binary value	Denary value
028		
1A9		
20C		

[6]

Working space

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(ii) The hexadecimal colour code **#43B7F0** is stored in three **8-bit** registers.

Give the **8-bit binary** values for each part of the hexadecimal code.

43								
B7								
F0								

[6]



- Identify which type of compression she should use and describe how this would compress the file for the website.

Description

[4]

- Benefit 1
- Benefit 2

[2]

3 (a) Four denary to 8-bit binary conversions are given.

Tick (✓) to show if each denary to 8-bit binary conversion is **Correct** or **Incorrect**.

Denary	Binary Conversion	Correct (✓)	Incorrect (✓)
145	10010001		
179	10110101		
11	00010011		
100	01100010		

[4]

(b) Convert the **12-bit** binary number into hexadecimal.

1	1	0	0	0	1	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---

[3]

- 1 A hockey club records the number of people that watch each match. An 8-bit binary register is used to store this value.

- (a) 46 people watch the first match and 171 people watch the second match.

Show how the registers would store these denary values as 8-bit binary.

Denary value	8-bit binary							
46								
171								

[2]

Working space

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- (b) Give the largest denary value that can be stored in the 8-bit binary register.

[1]

- (c) The hockey club wants to increase the number of people that can watch each match to 2000. The 8-bit binary register may no longer be able to store the value.

Give the smallest number of bits that can be used to store the denary value 2000.

[1]

Working space

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2 Gurdeep takes high definition photographs using a digital camera. She has set up a website where users can view thumbnails of her photographs. A thumbnail is a small version of the high definition photograph.

- (a) Gurdeep compresses the high definition photographs to create the thumbnails. She uses lossy compression.

Describe how lossy compression creates the thumbnails.

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[3]

- (b) Gurdeep sets up a web server to host her website. She reads about an Internet Protocol (IP) address, a Media Access Control (MAC) address and a Uniform Resource Locator (URL).

Draw a line to connect each term to the correct example.

Term	Example
IP address	192.168.0.255
MAC address	https://www.cambridgeinternational.org
URL	00:15:E9:2B:99:3C

[2]

- 1 Benedict has a computer that is assigned an Internet Protocol (IP) address. The IP address is:

198.167.214.0

The IP address is represented as denary values.

- (a) Convert the denary values 167 and 214 from the IP address to 8-bit binary.

167							
-----	--	--	--	--	--	--	--

214							
-----	--	--	--	--	--	--	--

Working space

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[2]

- 7 A music company has a website that allows users to stream music. The music is stored in sound files.

- (a) The sound files are compressed using lossless compression.

- (i) Describe how the sound files are compressed using lossless compression.

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[4]

- (ii) State **one** reason why the music company would compress the sound files using lossless, rather than lossy, compression.

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 [1]

- (iii) Give **one** benefit, to the user, of the music company compressing the sound files.

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 [1]

- (iv) Give **one** drawback of the music company using lossless, rather than lossy, compression for the sound files.

.....
 [2]

- 1 A denary value can be converted into hexadecimal and binary.

- (a) Complete the table to show the hexadecimal and 8-bit binary values of the given denary values.

Denary	Hexadecimal	8-bit binary
49		
123		
200		

[6]

Working space

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- (b) Give **two** benefits, to users, of converting binary values to hexadecimal.

Benefit 1

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Benefit 2

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[2]

- (c) Hexadecimal is used to represent Hypertext Markup Language (HTML) colour codes in computer science.

Identify **three** other ways that hexadecimal is used in computer science.

1

2

3

[3]

- 1 Greta has a computer that she uses for schoolwork and leisure.

- (a) The computer has the Media Access Control (MAC) address:

00:A0:C9:14:C8:29

- (i) Tick (✓) to show whether the MAC address is initially assigned to the computer by the network, the manufacturer or the user.

Tick (✓)

Network

☐

Manufacturer

☐

User

☐

[1]

- (ii) The values in the MAC address are hexadecimal values.

Convert the **three** given hexadecimal values into 8-bit binary.

14

A0

C9

[3]

- (iii) Convert the **two** given hexadecimal values into denary.

29

C8

[2]

- 2 Jolene displays videos on her website. She uses lossy compression to reduce the file size of the videos.

- (a)** Describe how lossy compression reduces the file size of the videos.

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..... [3]

[3]

- (b) State **two** reasons why Jolene would use lossy rather than lossless compression for the videos.

Reason 1

.....

Reason 2

[2]

1 Binary is a number system that is used by computers.

(a) Tick (✓) **one** box to show whether binary is a base-2, base-10 or base-16 number system.

Tick (✓)

☐

Base-2

☐

Base-10

☐

Base-16

[1]

(b) Hexadecimal and denary are number systems that can be used by programmers.

Convert these **four** hexadecimal values into denary values.

09

10

28

A1

[4]

Working space

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- 4 Georgia is a wedding photographer. She wants to store 10 photographs on a USB flash memory drive for a customer. Each photograph is 100 pixels wide and 50 pixels high.

The photographs are 8-bit colour photographs.

- (a) Calculate the total file size, in kilobytes (kB), of all the photographs. For this calculation, you may use the unit of measurement of 1024 or 1000.

Show all your working.

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Answer kB

[3]

- (b) Georgia compresses photographs to store them on the USB flash memory drive. It is important that the compression does **not** affect the quality of the photographs in any way.

State which type of compression is the most suitable. Justify your choice.

Compression type

Justification

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.....

[3]

- 1 (a) Denary is a number system that is used by programmers.

Tick (✓) **one** box to show whether denary is a base-2, base-10 or base-16 number system.

Tick
(✓)

☐

Base-2

☐

Base-10

☐

Base-16

[1]

- (b) Hexadecimal values can be used to represent denary values.

Convert these **four** hexadecimal values into denary values.

05

20

1A

AB

[4]

Working space

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- (c) Hexadecimal values can also be converted to binary values.

Tick (✓) **one** box to show the correct 8-bit binary value for each hexadecimal value.

- (i) Hexadecimal value 25

Tick
(✓)

☐

00011001

☐

00100101

☐

10100001

[1]

(ii) Hexadecimal value 1B

Tick
(✓)

☐

00011011

☐

10110001

☐

00011010

[1]

(d) (i) Give **one** way that hexadecimal is used in website development.

..... [1]

(ii) Give **one** way that hexadecimal is used in low-level programming.

..... [1]

(b) Sammi creates videos for the finance company website that give customers advice about their finances.

He uses lossy compression to reduce the file size of the videos for the website.

(i) Give **three** ways that lossy compression can reduce the file size of the videos.

1

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2

.....

3

.....

[3]

(ii) Give **one** drawback of using lossy compression to reduce the file size of the videos.

.....

..... [1]

(c) Sammi could have used lossless compression to compress the videos for the website.

- (i) Give **one** reason why he would use lossless compression, rather than lossy compression, for the videos.

.....
..... [1]

- (ii) Give **two** disadvantages of Sammi using lossless compression, rather than lossy compression, for the videos.

Disadvantage 1
.....

Disadvantage 2
.....

[2]

- 1 (a) Xia has **three** files stored on her computer.

Tick (✓) **one** box to show which is the largest file size.

File size	Tick (✓)
999 kB	
1 MB	
850 000 bytes	

[1]

- (b) Denise has **three** files stored on her computer.

Tick (✓) **one** box to show which is the smallest file size.

File size	Tick (✓)
4000 MB	
2 GB	
2 500 000 kB	

[1]

- 2 A sports stadium has an electronic counter that counts each person that enters the stadium.

The count is stored as binary in a 16-bit register.

A denary value of the count is displayed on a screen at the entrance.

- (a) The screen currently displays:

0	0	7	1
---	---	---	---

Give the binary value that is stored in the register to display the count shown.

Binary value:

Working space

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[2]

- (b) More people enter the sports stadium and the screen now displays:

0	2	5	7
---	---	---	---

Give the binary value that is stored in the register to display the count shown.

Binary value:

Working space

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[2]

- (c) After everyone has entered the stadium, the register stores the binary value:

0000001000000100

Show what the screen will display when this binary value is stored.

Display:

[1]

Working space

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7

- (b) Julius also creates videos to explain how to use the application that he has created. He reduces the file size of the videos using lossless compression.

- (i) Describe how lossless compression reduces the file size of the video.

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[3]

- (ii) State why Julius uses lossless compression, rather than lossy compression.

.....

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[1]

- 1 A computer stores data in binary form. Binary numbers can be represented as hexadecimal and denary numbers.

(a) Convert the 8-bit binary number 01010101 to denary.

..... [1]

Working space

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(b) Convert the binary number 11000000 to hexadecimal.

..... [1]

Working space

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(c) Convert the hexadecimal number 1A to denary.

..... [1]

Working space

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(d) Binary numbers can be stored as bytes.

State how many bits are in **two** bytes.

..... [1]

2 Nadia creates a digital image for a school project.

(a) Give **one** example of an image format.

..... [1]

(b) Describe how a digital image file is stored by a computer.

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..... [3]

(c) Nadia compresses the digital image file before emailing it to a friend.

(i) State what is meant by data compression.

.....
..... [1]

(ii) Explain why Nadia compresses the digital image file before emailing it.

.....
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..... [2]

1 Jack has an MP3 file stored on his computer.

(a) (i) Tick (✓) to show which type of data is stored in an MP3 file.

	Tick (✓)
Video	☐
Sound	☐
Image	☐

[1]

(ii) Tick (✓) to show whether the MP3 file is a lossy compressed file or a lossless compressed file or **not** a compressed file.

	Tick (✓)
Lossy compressed file	☐
Lossless compressed file	☐
Not a compressed file	☐

[1]

4 All data needs to be converted to binary data so that it can be processed by a computer.

(a) Explain why a computer can only process binary data.

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..... [2]

(b) The denary values 64, 101 and 242 are converted to 8-bit binary values.

Give the 8-bit binary value for each denary value.

64

101

242

[3]

(c) The hexadecimal values 42 and CE are converted to binary.

Give the binary value for each hexadecimal value.

42

CE

[4]

Working space

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- 5 An image is stored on a computer. The image is 16-bit colour and is 100 pixels high and 150 pixels wide.

Calculate the file size of the image in bytes. Show all your working.

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Answer bytes

[3]

- 1 (a) Denary values are converted to binary values to be processed by a computer.

Draw **one** line from each denary value to the correctly converted 8-bit binary value.

Denary	8-bit binary
	00100001
41	10100110
	00101001
174	10000110
	10101110
86	01010110

[3]

Working space

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- (b) Binary values can also be converted to denary values.

Give the correct denary value for the 12-bit binary value 000101010111
Show all your working.

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Denary value

[2]

- 2 Hexadecimal is used for Hypertext Markup Language (HTML) colour codes.

An HTML colour code is:

#2F15D6

Each pair of digits is stored as binary in an 8-bit register.

- (a) Give the 8-bit binary value that would be stored for each pair of hexadecimal digits.

2F							
15							
D6							

[6]

Working space

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- (b) HTML colour codes and Media Access Control (MAC) addresses are two examples of where hexadecimal is used in Computer Science.

Give **two** other examples of where hexadecimal can be used in Computer Science.

Example 1

Example 2

[2]

2 An aeroplane has a small display screen above each seat, to display the seat number.

- (a) The seat number is a hexadecimal value. A 12-bit binary register is used to store the data to display each seat number.

Three seat numbers, 05A, 18C and 29F, are allocated to passengers.

Give the 12-bit binary value that would be stored for each hexadecimal seat number.

05A

18C

29F

[6]

Working space

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- (c) Two of the registers store the values 010000001101 and 000001111110

Give the hexadecimal seat number that would be displayed on the screen for each of these binary values.

010000001101

000001111110

[4]

Working space

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6 Frida has a JPEG file stored on her computer.

(a) Tick (✓) to show which type of data is stored in a JPEG file.

	Tick (✓)
Video	☐
Sound	☐
Image	☐

[1]

(b) Compression can be used to reduce the size of a file.

Tick (✓) to show whether the JPEG file is a lossy compressed file or a lossless compressed file or **not** a compressed file.

	Tick (✓)
Lossy compressed file	☐
Lossless compressed file	☐
Not a compressed file	☐

[1]

(d) Frida compresses the document for storage.

The compression algorithm she uses recognises repeating patterns in the data and indexes these patterns. No data is permanently removed.

Identify the type of compression Frida has used.

..... [1]

3 A new computer comes with primary and secondary storage.

(a) Data storage is measured using binary denominations.

Complete each conversion.

8 bytes = nibbles

512 kibibytes (KiB) = mebibytes (MiB)

4 gibibytes (GiB) = mebibytes (MiB)

1 exbibyte (EiB) = pebibytes (PiB)

[4]

Working space

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4 A wildlife photographer stores their digital images on a computer.

(a) Complete the table by defining each term about images.

Image term	Definition
pixel	
resolution	

[2]

- (b) One of the images has a resolution of 1000×1000 and a colour depth of 2 bytes.

Calculate the file size of the image. Give your answer in bytes.

Show your working.

Working space

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File size bytes

[2]

- (d) The photographer compresses an image file before it is emailed.

Give **one** reason why a file is compressed.

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..... [1]

- 6 A company is involved in robotics.

One of its robots is designed to make a specific movement depending on a binary value.

- (a) The table gives some of the movements for the robot.

Complete the table by writing the missing binary, denary or hexadecimal value for each movement.

Movement	Binary	Denary	Hexadecimal
forward 1 step	00011111	31	
back 1 step		140	8C
turn right	01011010		5A
turn left		120	78

[4]

Working space

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1 Binary is a number system used by computers.

(a) Tick (✓) **one** box to show which statement about the binary number system is correct.

- | | |
|---------------------------------|--------------------------|
| A It is a base 1 system | ☐ |
| B It is a base 2 system | ☐ |
| C It is a base 10 system | ☐ |
| D It is a base 16 system | ☐ |

[1]

(b) Denary numbers are converted to binary numbers to be processed by a computer.

Convert these **three** denary numbers to 8-bit binary numbers.

50

102

221

[3]

Working space

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- (c) Binary numbers are stored in registers.

Negative denary numbers can be represented as binary using two's complement.

Complete the binary register for the denary number -78

You must show all your working.

Working space

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Register:

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[2]

- (d) Two 8-bit binary numbers are given.

Add the **two** 8-bit binary numbers using binary addition.

Give your answer in binary. Show all your working.

$$\begin{array}{r}
 00110011 \\
 + 01100001 \\
 \hline
 \end{array}$$

[3]

- (e) Two binary numbers are added by a computer and an overflow error occurs.

Explain why the overflow error occurred.

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[2]

- 2** A student has a sound file that is too large to be stored on their external secondary storage device. The student compresses the sound file to make the file size smaller.

The compression method used reduces the sample rate and the sample resolution of the sound file.

- (a)** State what is meant by the sample rate and sample resolution.

Sample rate

.....

Sample resolution

.....

[2]

- (b)** Identify which type of compression has been used to compress the sound file.

.....

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[1]

2 Binary numbers can be converted to hexadecimal.

(a) Convert the **two** binary numbers to hexadecimal.

10010011

00001101

[4]

Working space

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(b) A value is stored as a binary number in a register.

0	1	1	1	1	0	1	0
---	---	---	---	---	---	---	---

A logical right shift of **three** places is performed on the binary number.

(i) Complete the binary register to show its contents after this logical right shift.

--	--	--	--	--	--	--	--

[1]

(ii) State **one** effect this logical shift has on the binary number.

.....

..... [1]

(c) Give **two** reasons why a programmer may use hexadecimal to represent binary numbers.

1

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2

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[2]

(d) Denary numbers can also be converted to hexadecimal.

Convert the denary number to hexadecimal.

301 [2]

Working space

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3 When keys are pressed on a keyboard, the text is converted to binary to be processed by the computer.

(a) Describe how the text is converted to binary to be processed by the computer.

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..... [3]

(b) Text that is input into a computer can be stored in a text file.

A text file can be compressed using lossless compression.

(i) State what effect this has on the file size.

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..... [1]

(ii) Describe how lossless compression compresses the text file.

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..... [4]

(iii) Give **two** reasons why the text file may have been compressed.

1

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2

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[2]

1 Computers store data as binary. The binary number 10101110 is stored.

(a) Convert the binary number to denary.

..... [1]

Working space

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(b) Convert the binary number to hexadecimal.

..... [2]

Working space

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(c) A logical left shift of **three** places is performed on the binary number.

(i) Give the 8-bit binary number that would be stored after this logical left shift.

..... [1]

(ii) Tick (✓) **one** box to show which statement is true about the impact the logical left binary shift would have on the binary number.

A The least significant bits are lost.

☐

B The most significant bits are lost.

☐

C The number has been divided by six.

☐

D The number stays the same.

☐

[1]

- (d) Add the **two** 8-bit binary numbers 11101110 and 00110001 using binary addition.

Give your answer in binary. Show all your working.

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..... [4]

- (e) The denary number 301 needs to be stored.

Calculate the least number of bits that can be used to store the denary number 301.

..... [1]

Working space

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- (f) The hexadecimal number A4D needs to be stored.

Calculate the least number of bits that can be used to store the hexadecimal number A4D.

..... [1]

Working space

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2 A car park has a payment machine that allows a customer to pay for their parking.

The cost of parking is displayed as a denary number on a screen on the payment machine.

The cost of parking is stored in two 8-bit binary registers.

For the parking cost of \$10.50:

- register 1 stores the denary value 10 as binary
- register 2 stores the denary value 50 as binary.

(a) Give the parking cost that would be displayed on the payment machine when the registers store:

- register 1: 00010001
- register 2: 01000110

Parking cost displayed \$

[2]

Working space

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- (b)** The parking cost of \$14.98 is displayed on the payment machine.

Give the 8-bit binary numbers that are stored in the registers to display the parking cost.

Register 1

Register 2 [2]

Working space

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- (c)** The payment machine gives the customer a ticket when they have paid their parking cost. Each ticket has a 4-digit hexadecimal ticket number that is stored as binary.

The binary number 1010000000111101 is stored for a customer's ticket number.

Give the hexadecimal ticket number that would be displayed on this customer's ticket.

Hexadecimal ticket number [4]

Working space

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- (d)** Explain why data input into the payment machine needs to be converted to binary.

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..... [2]

5 A musician is recording herself playing the music for a song on the piano.

(a) Explain how the analogue sound is recorded and converted to digital.

[5]

(b) State **two** ways that the accuracy of the recording could be increased.

1
2 [2]

(c) The musician compresses the sound file using lossless compression instead of lossy compression.

Explain why the musician would choose to use lossless compression instead of lossy compression.

[3]



- Explain the differences between the ASCII character set and the Unicode character set.

[4]

2 A register stores the binary number:

1	1	1	0	0	0	1	1
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(a) Give the denary number for the binary number stored in the register.

..... [1]

Working space

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(b) Give the hexadecimal number for the binary number stored in the register.

..... [2]

Working space

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- (c) A logical left shift of **two** places is performed on the binary number stored in the register.

Complete the binary register to show its contents after this logical left shift.

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[1]

- (d) The negative denary number -99 needs to be stored in the register.

Complete the register to show the binary number that would be stored, using two's complement. Show all your working.

Working space

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Register:

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[2]

- (e) The number 01001100 is added to 11100011

Add the two 8-bit binary numbers, using binary addition.

Give your answer in binary. Show all your working.

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[4]

5 A band is recording their new song. They need to consider the sample rate and sample resolution of their recording.

(a) Give **one** benefit of using a higher sample rate to record the song.

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..... [1]

(b) Give **one** drawback of using a higher sample rate to record the song.

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..... [1]

(c) Describe what is meant by sample resolution.

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..... [2]

(d) The band wants to compress the sound file, but they do **not** want any data to be permanently removed.

Identify the compression method that should be used.

..... [1]

(c) The data storage in the mobile telephone can be measured using different units of measurement.

(i) State how many bits are equal to a byte.

..... [1]

(ii) State how many kibibytes (KiB) equal a mebibyte (MiB).

..... [1]

2 Humans use a denary number system and computers use a binary number system.

(a) Explain what is meant by a binary number system.

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..... [2]

(b) Convert the denary numbers 14, 59 and 234 to binary.

14

59

234

[3]

Working space

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(c) Convert the denary numbers 9, 26 and 65 to hexadecimal.

9

26

65

[3]

Working space

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(d) Convert the positive denary number 123 to 8-bit binary using two's complement.

Show all your working.

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[2]

7 A photographer takes an image with a digital camera. The photographer sets the resolution and colour depth for the image.

(a) State what is meant by the image resolution.

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..... [1]

(b) State what is meant by the image colour depth.

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..... [1]

(c) Give **one** benefit of increasing the colour depth of the image.

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..... [1]

(d) The photographer compresses the image using a method that permanently reduces the colour depth and resolution of the image.

Identify which compression method the photographer uses.

..... [1]

(e) One benefit for compressing the image is to reduce the storage space it uses.

Give **two** other benefits of compressing the image.

1
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2
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[2]