Chhetri Academy

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GCSE COMPUTER SCIENCE

2.1

Edexcel 1CP2 | Specification point 2.1.1

That computers use binary to represent data (numbers, text, sound, graphics) and program instructions...

Untiered

Answers and examiner comments

3	2020-2024	Untiered
question groups	available papers	tier

Using this booklet

1. Answer numbers match the companion question booklet.
2. Follow the original question number on marking tables.
3. Examiner comments are included where available.

Name _____ **Date** _____

Some entries use full source marking material in an appendix. Any unavailable mark schemes are identified beside the relevant answer.

1(a)	One mark for each pair of digits in the correct location. DE AF C4		**3**

Question Number	Answer	Additional Guidance	Mark
1(b)	**Binary:** One mark for 0001 0010. **Denary:** One mark for 18		**2**

Question Number	Answer	Additional Guidance	Mark
1(c)	**One** from: The number of pixels per cm^2/in^2 (1) The number of pixels on the vertical axis x the number of pixels on the horizontal axis (1) The amount of detail that can be seen (1)	Do not accept: 'Number of pixels' on its own	**1**

Question Number	Answer	Additional Guidance	Mark

1(d)	A comparison to include: Effect on colour depth (1) • More colours can be represented (with 24 bits) Effect on accuracy of representation (1) • So the image looks more realistic Effect on transmission speed/storage/memory (1) • But takes longer to transmit / creates larger file sizes / uses more memory		**3**

Question Number	Answer data	Additional Guidance	Mark
1(e)	An explanation such as: The file size is reduced (1) because repeated values (1) are assigned a number (that represents the count of the repeats) (1) OR File size is only reduced (1) if there are lots of run lengths of repeated values (1). In some instances, the 'compressed' file size is actually larger than the original. (1) OR Compressing a black and white image will produce a smaller file size (1) than producing a coloured image because only a single bit needed (1) to indicate the presence/absence of colour (1). OR There will be no loss of quality (1) because RLE is a lossless compression algorithm (1) meaning the exact bit pattern is represented (1)		**3**

Question Number	Answer	Additional Guidance	Mark

Question Number	Answer	Additional Guidance	Mark
5(a)	**One** from: • Instructions for the game do not change. • RAM is volatile. • Users aren't expected to alter the game's code or assets		**1**

Question Number	Answer	Additional Guidance	Mark
5(b)	An explanation such as: To store actions /progress during the game (1) because this data is changeable (1) OR RAM stores data that can change (such as variable values) (1) which is needed to store scores/progress during the game (1)		**2**

Question Number	Answer	Additional Guidance	Mark
5(c)	A linked response to include **two** from: Logic allows for decisions to be made (1) enabling a range of options/pathways/scenarios to be provided (1) that can adapt to ability of the player / how the player plays (1) Example response: Logic is used to compute the output response (1) generated by the player's action given their location and the location and actions of other players in the game environment (1)		**2**

Question Number	Answer	Additional Guidance	Mark
5(d)i	000 0011 010 0101 (1) 000 0100 (1) 010 0001 111 0011 010 0001 000 0011 (1)		**3**

Question Number	Answer	Additional Guidance	Mark
5(d)ii	One mark for sight of each: • 10x9 (1) • x7 (1) • 10x9/15x7 (1) Award all four marks for a complete expression including minus sign and expressed with the correct order of operations. e.g. (10x9x7)-(10x9/15x7)	Award equivalent expressions e.g. • (10x9x7)-(6x7) • (90x7)-(6x7)	**4**

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	Award one mark for: • 7 (1)	Do not award 8, as that is Extended ASCII	(1)

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	Award one mark for: • D (1)	Do not award lowercase	(1)

Question Number	Answer	Additional Guidance	Mark
2(b)	Award one mark for: • The time/number of seconds/gap between samples/measurements (1)	Do not accept answers defining sampling frequency	(1)

Question Number	Answer	Additional Guidance	Mark
2(c)	Award one mark for any of the following up to a maximum of two marks: • width × height (1) • units expressed as pixels (1) Examples: • width in pixels × height in pixels • width × height pixels • size in pixels = width × height	Allow values in any order Allow synonyms such as length for the x/y dimension Only award 2 marks for a fully correct expression	(2)

Question Number	Answer	Additional Guidance	Mark
2(d)(i)	Award one mark for each correct cell: Binary pattern / Shift / 8-bit binary result 1010 0011 / Logical shift left by 3 / 0001 1000 (1) 1100 1010 / Arithmetic shift right by 2 / 1111 0010 (1)		(2)

Question Number	Answer	Additional Guidance	Mark
2(d)(ii)	The only correct answer is B *A is not correct because all overflow errors do not cause programs to crash* *C is not correct because computers don't use hexadecimal, only humans do* *D is not correct because indexing outside an array bounds is a runtime error*		(1)

Question Number	Answer	Additional Guidance	Mark
2(d)(iii)	Award one mark for each correct nibble in the correct order: • 0111 0000	0 marks if response is not 8-bit binary	(2)

Question Number	Answer	Additional Guidance	Mark
2(d)(iv)	Award one mark for each correct nibble in the correct order: 1011 0111	0 marks if response is not 8-bit binary	(2)

Question Number	Answer	Additional Guidance	Mark
2(e)(i)	The only correct answer is D *A is not correct because the binary system has two symbols* *B is not correct because the octal system has eight symbols* *C is not correct because the denary system has ten symbols*		(1)

Question Number	Answer	Additional Guidance	Mark
2(e)(ii)	Award one mark for any of the following: • 256 (1) • 2^8 (1) • 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 (1)	Allow any equivalent programming expression, such as 2^8, 2**8	(1)

Question Number	Answer	Additional Guidance	Mark
2(f)	Award one mark for any of the following up to a maximum of two marks: • Sight of 1024^4 anywhere for number of bytes in a tebibyte (1) • 40 681 930 227 712 ÷ 1024^4 (1) Examples: 40 681 930 227 712 ÷ 1024^4 40 681 930 227 712 / 1024^4 $\frac{40\,681\,930\,227\,712}{1024 \times 1024 \times 1024 \times 1024}$ $\frac{40\,681\,930\,227\,712}{2^{40}}$	Award equivalent expressions Ignore transcription errors The first mark is for knowing the conversion units. The second mark is for an accurate expression.	(2)

Question 2 (a)(i)

Whilst many candidates did give the correct answer there were also a significant number who gave '8' as the response, which is the number of bits used by extended ASCII.

Question 2 (a)(ii)

Most candidates correctly calculated the ASCII value of D.

Question 2 (b)

Many candidates confused the frequency of sampling (number of samples taken per second) with the actual sampling interval which is the time between each separate sample.

(b) Sound waves are converted to binary using sample intervals.

Define the term 'sample interval'.

(1)

The amount of time between each sample that is taken

ResultsPlus Examiner Comments

This response scores 1 mark for defining a sample interval as the time taken between each sample.

Question 2 (c)

Many responses correctly identified *height x width* but failed to specify the units in pixels. Some candidates gave expressions for file storage size by referring to colour depth, but this was not what was required by the question. The Getting Started guide on the Pearson website gives clear amplification of the specification points and gives the size of an image as width x height in pixels.

(c) Give an expression to calculate the size of a bitmap image, not the size of the file that stores the image.

(2)

Width x Height.

ResultsPlus
Examiner Comments

This response scores 1 mark for identifying *height x width*, but does not achieve the second mark by identifying pixels as the unit.

Question 2 (d)(i)

Whilst many candidates understood the concept of logical shifts far fewer knew how to apply an arithmetic shift correctly, often failing to keep the Most Significant Bit (MSB) consistent.

(d) Computers manipulate binary patterns.



(i) Complete the table with the result of applying the shift to the binary pattern.

(2)

Binary pattern	Shift	8-bit binary result
1010 0011	Logical shift left by 3	0001 1000
1100 1010	Arithmetic shift right by 2	1111 0010

ResultsPlus
Examiner Comments

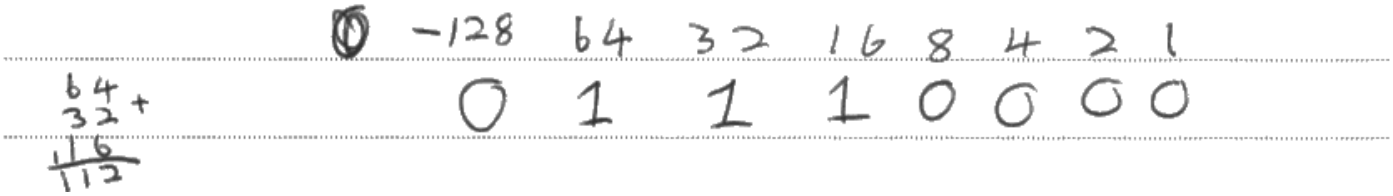
This response scores 2 marks for performing both shifts correctly.

Question 2 (d)(iii)

The vast majority of candidates could successfully convert a denary value to an 8-bit binary number.

(iii) Convert the denary value +112 to 8-bit binary representation.

(2)

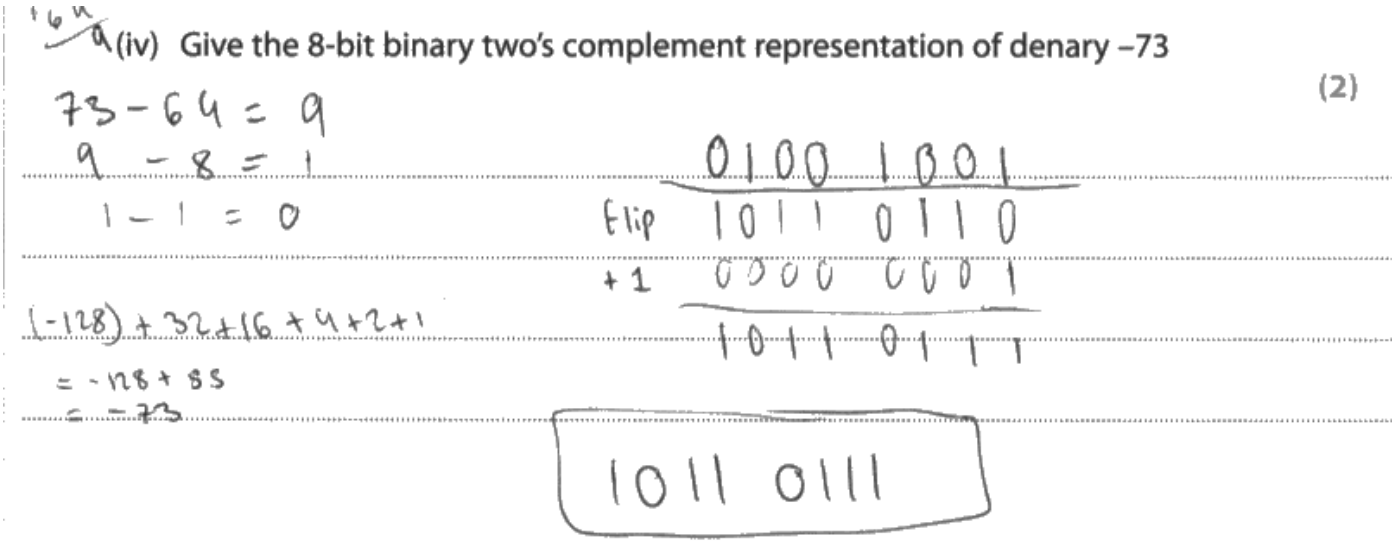


ResultsPlus
Examiner Comments

This response scores 2 marks for performing the conversion correctly.

Question 2 (d)(iv)

The vast majority of candidates demonstrated a clear understanding of how to represent a negative denary number as an 8-bit integer in two's complement. Some candidates calculated the result by writing a number line and assigning the most significant bit a negative value whilst others used the method to calculate one's complement by flipping the bits and then adding one. Where candidates used the 'flipping the bits' method a common error was to forget to add 1 to the result of this process.



ResultsPlus
Examiner Comments

This response scores 2 marks for correctly converting the denary integer into two's complement.

Question 2 (e)(ii)

Many candidates demonstrated that they knew that 8 bits enabled 256 unique addresses to be represented. The most common incorrect response was 255 where candidates gave the largest number that can be represented with 8 bits rather than the total number of representations available.

Question 2 (f)

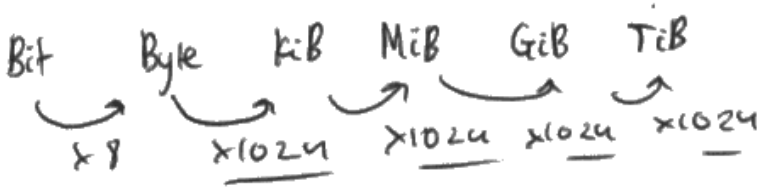
Many candidates did not manage to correctly identify how many bytes are in a tebibyte. Some candidates calculated the number of bytes in a terabyte. Other candidates did not always appreciate the relationship between KiB, MiB, GiB and TiB and gave an incorrect power such as 1024^3.

(f) Construct an expression to convert 40|681|930|227|712|bytes to tebibytes.

(2)

$$\frac{40\,681\,930\,227\,712}{1024^4}$$

(Total for Question 2 = 16 marks)



ResultsPlus
Examiner Comments

This response scores 2 marks for correctly identifying that a tebibyte contains 1024^4 bytes and that the given number of bytes needs to be divided by this value.