Chhetri Academy

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GCSE COMPUTER SCIENCE

2.1

Edexcel 1CP2 | Specification point 2.1.6

Why hexadecimal notation is used and be able to convert between hexadecimal and binary

Untiered

Answers and examiner comments

4	2016-2025	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.

Original question 1

The full source mark scheme begins on page 14. Use the original paper code, tier and question number shown above.

Question Number	Answer	Additional Guidance	Mark
5(a)	1101 1000		**1**

Question Number	Answer	Additional Guidance	Mark
5(b)	A description to include **two** from: • (Cache) Stores regularly accessed instructions/data • Reduces the need to access instructions/data from main memory • Makes up for the difference in speed of the CPU and main memory		**2**

Question Number	Answer	Additional Guidance	Mark
5(c)(i)	3D	Award one mark for each nibble in the correct location	**2**

Question Number	Answer	Additional Guidance	Mark
5(c)(ii)	Hexadecimal is used as a short-hand for binary / uses fewer digits/characters (1) so **humans** make fewer mistakes / find it easier to read/understand/remember/manipulate (1).	Do not accept answers suggesting fewer digits save storage/memory	**2**

Question Number	Answer	Additional Guidance	Mark
5(d)	A description to include **four** from: The control unit increments the program counter (1) **The control unit sends** a signal (1) along the control bus (1) ...to the memory/MAR (to tell it to send) (1) ...(the address of) the memory location (holding the instruction) (1) ...which is loaded **onto the address bus** (1) ...(and carried to RAM to tell it to) load the **instruction/** contents of the memory location **onto the data bus** (1) ...along which it is **carried** to the MDR/MBR. (1)		**4**

Question Number	Answer	Additional Guidance	Mark
5(e)	It is not sorted		**1**

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
1(a)(i)	**The only correct answer is A** *B is not correct because a kibibyte contains 8192 bits* *C is not correct because a mebibyte contains 8192 x 8192 bits* *D is not correct because a nibble contains 4 bits*	The correct answer is gibibyte	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	Award **one** mark for any of the following: • 2^7 (1) • 128 (1) • 2 × 2 × 2 × 2 × 2 × 2 × 2 (1)	Allow equivalent	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	Award **one** mark for: • 71 (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	Award **one** mark for any of the following up to a maximum of **two** marks: • Base 16 number (1) • Needs 16 different symbols to represent the range of values (1) • Hexadecimal uses the digits 0-9 (to represent values between denary 0 and 9) (1) • Hexadecimal uses the letters A-F (to represent values between denary 10 and 15) (1) • Each hexadecimal symbol requires 1 nibble/4 bits to represent it (1) • Because there are **more** (hexadecimal) **digits/symbols** than there are (denary) digits, it uses letters (1)	Do not award responses comparing hexadecimal to binary/denary Do not award responses indicating 'number' instead of 'digit', without clarification (0-9, A-F) Responses must be related to characteristics and not benefits or drawbacks of hexadecimal notation.	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	Award up to **two** marks for a linked explanation such as: • Hexadecimal numbers are easy to understand/remember (1) because they contain fewer digits (than binary) (1) • Hexadecimal numbers are easier to read/write (1) because they are not just 1s and 0s (1) • Hexadecimal numbers are shorter/easier for programmers to read/write (1) because memory addresses are binary patterns (1) • Hexadecimal numbers are less prone to error when entering values (1) because there are fewer symbols to type (1) • Memory addresses are long binary patterns (1) so hexadecimal numbers are shorter/easier to read/write (1)	For both marks, the expansion must follow/associate with the statement. Do not accept 'easier' on its own without expansion as to what is easier.	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	Award up to **two** marks for a linked explanation such as: • Some frequencies/data can be removed permanently (1) because they are out of human hearing range (1) • Because the sounds/data outside the range of human hearing (1) can be completely removed (1) • Improves streaming (1) because it decreases the download time (1) • To achieve a higher compression ratio than lossless (1) because the sound will be understandable with some content removed (1) • More files can be saved (on a finite resource) (1) because it reduces the amount of storage space each file uses (1)	For both marks, the expansion must follow/associate with the statement. Do not award responses indicating quality of playback	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	Award **one** mark for each of the following: • 315 and 923 in the numerator (1) • 7 in the numerator (1) • 8 in the denominator (1)	Award equivalent expressions	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(d)(i)	**The only correct answer is C** *A is not correct because a shift has not been applied (0001 1100)* *B is not correct because 1101 1000 is the result of a left binary shift of 1* *D is not correct because 1011 0000 is the result of a left binary shift of 2*	The correct answer is: 0001 1011	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(d)(ii)	Award **one** mark for each nibble: 0001(1) 1001(1)	Nibbles must be in the right order Each nibble must be 4 bits	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(d)(iii)	Award **one** mark for each nibble: 1111(1) 0011(1)	Nibbles must be in the right order Each nibble must be 4 bits	**(2)**

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Mark Scheme (Results)

Summer 2016

GCSE Computer Science (1CP0/01)
Paper 1: Principles of Computer Science

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

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Question Number	Answer	Additional Guidance	Mark
1(a)(i)	Any one of: • To allow connected machines to communicate • To provide the rules of communication between two networked devices	Any other response indicating communication	**1**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	Any one of: • Backbone • Connecting backbone • Internet backbone • Fibre backbone • Network backbone		**1**

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	Ring		**1**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>1(a)(iv)</td><td>One mark for each correct cell.

<table>
<tr><th>LAN</th><th>WAN</th><th>PAN</th><th>VPN</th></tr>
<tr><td></td><td></td><td>X</td><td></td></tr>
<tr><td>X</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>X</td></tr>
<tr><td></td><td>X</td><td></td><td></td></tr>
</table></td><td></td><td>4</td></tr>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>1(b)(i)</td><td>Any one of:

• To keep information private/secure/secret as it is being transmitted across networks
• So that unauthorised persons will not be able to translate/understand the transmitted data</td><td>Do not accept:
• to keep secure when stored on devices, which is not the context of the question</td><td>1</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>1(b)(ii)</td><td>
<table>
<tr><th>Plain Text</th><th>Shift</th><th>Cipher Text</th></tr>
<tr><td>d i g i t</td><td>+3</td><td>g l j l w</td></tr>
<tr><td>b i n a r y</td><td>-2</td><td>z g l y p w</td></tr>
</table>
</td><td></td><td>2</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	1 0 0 1 0 1 0 1		**1**

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	6 E	Ignore case	**1**

Question Number	Answer	Additional Guidance	Mark
1(c)(iii)	1 1 0 0 0 1 0 0	Ignore spacing Must be 8-bits	**1**

Question Number	Answer	Additional Guidance	Mark
1(c)(iv)	Any one of: • 2^n and n=8 • 2^8 • 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 • 2^4 x 2^4 • 2^2 x 2^2 x 2^2 x 2^2 • Any other appropriate formula giving a result of 256		**1**

Question Number	Answer	Additional Guidance	Mark
1(d)(i)	Any one of the following: • Data is permanently lost (during the compression process) • Resolution is lost in images, (usually where it will not be noticed by the human eye) • Signal is degraded in audio files, (usually not noticeable to the human ear)	Accept answers that indicate a loss of quality	**1**

Question Number	Answer	Additional Guidance	Mark
1(d)(ii)	Any one of: B = JPEG		**1**

Question Number	Answer	Additional Guidance	Mark
1(e)	One mark for each of: • X-Dimension = 2 • Y-Dimension = 3 Examples: • (2,3) • X=2, Y=3	Values of 2 and 3 alone, with no indication of ordering, cannot be awarded. Accept any other notation clearly indicating (x,y) ordering and values	**2**

(Total for Question 1 = 18 marks)

Question Number	Answer	Additional Guidance	Mark
2(a)	<table><tr><th>EU Cookie Law (e-Privacy Directive)</th><th>Computer Misuse Act</th><th>Copyright, Designs, and Patents Act</th></tr><tr><td></td><td></td><td>X</td></tr><tr><td></td><td>X</td><td></td></tr><tr><td>X</td><td></td><td></td></tr></table>		**3**

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	<table><tr><th>High-Level Programming Language</th><th>Low-Level Programming Language</th></tr><tr><td>X</td><td></td></tr><tr><td></td><td>X</td></tr><tr><td>X</td><td></td></tr><tr><td></td><td>X</td></tr></table>		**4**

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	Comment(s) / Annotation(s)	Do not penalise spelling	**1**

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	cubeNum	Do not penalise spelling Do not award if other information from function header is provided because the question asks for name only.	**1**

Question Number	Answer	Additional Guidance	Mark
2(b)(iv)	Any one of: • 18 to 22 • 18 - 22 • 18, 19, 20, 21, 22 • 18, 20, 22	Entire range must be provided Award any discernible notation	**1**

Question Number	Answer	Additional Guidance	Mark
2(b)(v)	Any one of: • 25 • 27		**1**

Question Number	Answer	Additional Guidance	Mark
2(b)(vi)	Any one of: • 10 • 19 • 21 • 23		**1**

Question Number	Answer	Additional Guidance	Mark
2(c)(i)	First box = $\frac{1}{2}$ or equivalent expression for 1 mark / 0.5 Second box = $\frac{1}{4}$ or equivalent expression for 1 mark / 0.25 Conversion = $2\frac{3}{4}$ or equivalent expression for 1 mark / 2.75		**3**

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)	4		**1**

Question Number	Answer	Additional Guidance	Mark
2(c)(iii)	One mark for: • Numerator (top) calculation • Denominator (bottom) calculation Any of the following: $\frac{\left(\frac{10Kilobytes}{1}\right)\left(\frac{1024bytes}{Kilobytes}\right)\left(\frac{8\ bits}{byte}\right)}{\left(\frac{10Megabits}{Seconds}\right)\left(\frac{1000Kilobits}{Megabits}\right)\left(\frac{1000\ bits}{Kilobits}\right)}$ $\frac{10\ \times 1024\ \times 8}{10\ \times 1000\ \times 1000}$ $\frac{81920}{10000000}$ $\frac{8192}{1000000}$ Any other correct calculation where the unit conversions are discernible.		**2**

(Total for Question 2 = 18 marks)

Question Number	Answer	Additional Guidance	Mark
3(a)	One mark for each concept: Organisation of files is in a **hierarchy/tree** structure A **node** is either a folder/directory/sub-folder/sub-directory or the file itself The top node/folder/directory/drive is the **root**		**3**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	One mark for each concept: The client makes a connection / shares its IP with the server The client machine (web browser) **sends a request to the server** for a web page The server machine **sends the (requested) page back** to the client machine		**2**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	One mark for One mark for both items in One mark for inside Example (3 marks) - Socket - Open Ended Example (2 marks) - Socket Example (1 mark) - Socket - Open Ended	Ignore formatting as long as enclosure <> and </> are correct	**3**

Question Number	Answer	Additional Guidance	Mark
3 (c)(i)	Any two of: • Library code has already been debugged, so it should not have a bug • Library code has already been tested, so it should produce the correct results • Using libraries can reduce the time needed to develop a solution • Library code is usually optimised/faster than own code • Library code can be reused many times without having to rewrite the code	Do not accept just 'saves time'	**2**

Question Number	Answer	Additional Guidance	Mark

3(c)(ii)	One mark for each of (**in this order only**):
	
	1. AND
	2. OR
	3. NOT
	4. AND
	
	==========
	1 Mon, 2 Tues, 3 Wed, 4 Thur, 5 Fri, 6 Sat, 7 Sun
	
	IF day >= 1 AND day <= 5 THEN
	SEND "weekday" TO DISPLAY
	ENDIF
	IF day = 6 OR day = 7 THEN
	SEND "weekend" TO DISPLAY
	ENDIF
	IF NOT (day >= 1 AND day <= 7) THEN
	SEND "error" TO DISPLAY
	ENDIF
			4

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(d)</td><td>One mark for each row (maximum 4 marks):

<table>
<tr><td>(1)</td><td>SELECT (id, description)</td><td></td></tr>
<tr><td>(1)</td><td>FROM tblProduct</td><td></td></tr>
<tr><td rowspan="2">(1)</td><td>WHERE id LIKE 'G%'</td><td>Pattern must be discernible as a string (“”), the letter G (g), and a wild card character (*,#,?)</td></tr>
<tr><td>WHERE id>=”G000” AND id <=”G999”</td><td>Pattern must be discernible as a string (“”), the letter G (g), and the operator “AND”</td></tr>
<tr><td>(1)</td><td>ORDER BY id ASC</td><td>Award ASCEND(ING)</td></tr>
</table></td><td>Do not penalise spelling</td><td>4</td></tr>
</table>

(Total for Question 3 = 18 marks)

Question Number	Answer	Additional Guidance	Mark
4(a)	Any two of: • Both the instructions and data for a program are stored in main memory • Instructions and data are stored in binary code • Instructions and data are fetched, decoded, and executed in a sequence by the CPU		**2**

Question Number	Answer	Additional Guidance	Mark
4(b)(i)	One mark for: • Software (layer) One mark for any of: • Allows the operating system on one physical computer **to simulate another computer**, usually of a different operating system. • Allows a **guest operating system** to reside on a machine • Allows **a program written for one machine to run on another** wit**hout changes (Java Virtual Machine).** • Any other appropriate and correct response.	An example (JVM or Linux on Windows) is not enough for marks	**2**

Question Number	Answer	Additional Guidance	Mark
4(b)(ii)	At least one from both sections for full marks Any four of: Sequential: • Individual instructions are executed one after another • Flow control is accomplished by jump/branch/goto instructions • Results are usually achieved less quickly than parallel processing (do not award twice) Parallel: • Individual instructions can be routed to different processors for simultaneous execution • Results are usually achieved quicker than sequential instruction (do not award twice) • Requires multi-core processors or multiple microprocessors • Tasks may be split into different parts with each part executed on a different processor • Results need to be merged back together after completion Any other appropriate and correct response.		**4**

Question Number	Answer	Additional Guidance	Mark

4(c)(i)	Coding solution **(one mark for each item):**
	• **Calli**ng code must provide an input parameter
	• `calcCircleArea` signature must take an input parameter
	• Input parameter must be used in calculation
	
	`47`
	`48 calcCircleArea (radiusOfCircle)`
	`49`
	`50 PROCEDURE calcCircleArea (radiusOfCircle)`
	`51 BEGIN PROCEDURE`
	`52 SET area TO Pi * radiusOfCircle * radiusOfCircle`
	`53 SEND area TO DISPLAY`
	`54 END PROCEDURE`
	`55`
		Ignore any reference to data types	**3**

Question Number	Answer	Additional Guidance	Mark
4(c)(ii)	One mark for each correct cell **Pupil Number Visited** / **Sub-list** 2245 / 837, 1529, 1683 1529 / 1683 1683 /		**5**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>4 (c)(iii)</td><td>One mark for each correct column

<table>
<tr><th>A</th><th>B</th><th>R = A OR B</th><th>S=NOT(A AND B)</th><th>Q=R AND S</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
</table></td><td></td><td>3</td></tr>
</table>

(Total for Question 4 = 19 marks)

Question Number	Answer	Additional Guidance	Mark
5(a)	Characteristics – Any of the following: • Branch of computer science based on enabling computers to behave like humans/mimic aspects of human intelligence • AI is implemented in software. • Combines psychology, biology, linguistics, mathematics, neuroscience, and philosophy (ethics) • AI is not the same as the general intelligence of human beings Uses – Any of the following: • Game playing (chess, quiz, video games) • Analytics (analyse buying patterns, predicting behaviours, predictive text, financial markets) • Image processing (recognising objects/patterns) • Logistics (scheduling, order fulfilment) • Control systems (cars, manufacturing, weapons, navigation) • Expert systems (medical, mechanical, electrical diagnosis) • Neural networks (simulating neuron behaviours as in brains) • Natural languages processing (chatterbots, chatbots, speech recognition) • Robotics (dangerous situations, help aged or disabled) Ethical issues – Any of the following: • Take the work of humans, thereby affecting employment rates • Is a computer to be trusted to make decisions (life-death)?	A bulleted list of facts is only worth 2 marks max.	**6**

	• If a computer discovers something that humans can't prove, should it be accepted as truth? • Do AI machines have rights? • Will people be comfortable interacting with machines that are considered intelligent? Quality of Written Communication: • 1-2: Some basic points from **at least one** of the categories; little clarification or expansion of points; spelling, grammar, and punctuation **errors hinder meaning**. • 3-4: At least one relevant point **from two categories**; some clarification or expansion of points; spelling, grammar, and punctuation **errors occur**, but do not hinder meaning. • 5-6: Relevant points from **three categories**; comprehensive clarification or expansion of points; spelling, grammar, and punctuation are **used accurately** and meaning is clear. **Example:** Robots are machines that use artificial intelligence to do jobs that people tell them to. They are not as smart as real humans. One category only; no expansion; QWC ok; 2 marks max) **Example:** Artificial intelligence is based on getting machines to behave like humans. The cleverness of AI is really in the software. AI is used in game playing. Recently the AI software has beat humans at some games. (Two categories; Some expansion; QWC ok; 4 marks max)		

	Example: AI is a branch of computer science that tries to make software imitate human intelligence. However, we're not there yet. It is used in expert systems to diagnose problems with car engines. It can also be used to predict which products people might buy in a grocery store based on their loyalty card purchases. There are problems with AI. One is the issue of ethics. Courts may decide that AI robots have the same rights as humans. People may not like the idea of computers making life and death decisions, such as when to turn off life support systems. This may make people very uncomfortable. (Three categories; Comprehensive expansion; QWC ok; 6 marks max) **Example**: AI: • Making robots behave like humans Uses: • Used to help people with disabilities live in normal homes Ethical Issues: • They will be taking over human jobs and putting people out of work (Three categories; QWC unmarkable; 2 marks max)		

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>5(b)(i)</td><td>One mark for initialisation of variables (max 1 mark)
One mark for each complete pass of loop (max 4 marks)

<table>
<tr><th>R3</th><th>R4</th><th>R5</th><th></th></tr>
<tr><td>1</td><td>2</td><td>4</td><td>1 mark</td></tr>
<tr><td>2</td><td></td><td></td><td rowspan="2">1 mark</td></tr>
<tr><td></td><td></td><td>3</td></tr>
<tr><td>4</td><td></td><td></td><td rowspan="2">1 mark</td></tr>
<tr><td></td><td></td><td>2</td></tr>
<tr><td>8</td><td></td><td></td><td rowspan="2">1 mark</td></tr>
<tr><td></td><td></td><td>1</td></tr>
<tr><td>16</td><td></td><td></td><td rowspan="2">1 mark</td></tr>
<tr><td></td><td></td><td>0</td></tr>
</table>

Other formats for this table are acceptable. For example, each combination of 2 values may be on a single line (indicated in grey).</td><td></td><td>5</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
5(b)(ii)	Calculates the number defined as one of (or equivalent statement) • $R4^{R5}$ • 16 • 2^4 • 2 x 2 x 2 x 2		**1**

Question Number	Answer	Additional Guidance	Mark
5(b)(iii)	<table><tr><th>Part</th><th>Name</th></tr><tr><td>MOV</td><td>Opcode / operation code field / operation</td></tr><tr><td>R4,#2</td><td>Operand / operand code field / operand field</td></tr></table>	• Do not penalise spelling	**2**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>5(b)(iv)</td><td>One mark for each of:
• Initialisation (R3, R4, R5)
• Correct loop construction showing blocking
• Correct two lines inside of loop blocking

<table>
<tr><td><pre>SET R3 TO 1
SET R4 TO 2
SET R5 TO 4
WHILE R5 <> 0
    SET R3 TO R3 * R4
    SET R5 TO R5 - 1
END WHILE</pre></td><td><pre>SET R3 TO 1
SET R4 TO 2
SET R5 TO 4
FOR X FROM 1 TO R5 DO
    SET R3 TO R3 * R4
    SET R5 TO R5 - 1
END FOR</pre></td></tr>
<tr><td><pre>SET R3 TO 1
SET R4 TO 2
SET R5 TO 4
REPEAT
    SET R3 TO R3 * R4
    SET R5 TO R5 - 1
UNTIL R5 = 0</pre></td><td><pre>SET R3 TO 1
SET R4 TO 2
SET R5 TO 4
FOR EACH X FROM R5 DO
    SET R3 TO R3 * R4
    SET R5 TO R5 - 1
END FOR</pre></td></tr>
</table>
</td><td>• Accept alternate solution of DO/WHILE as long as test is “R5 <> 0”
• Do not penalise pseudocode usage as long as response is blocked and discernible
• A specific language construct of a while, repeat, or for loop should be awarded if blocked and discernible</td><td>3</td></tr>
</table>

	``
	SET R3 TO 1
	SET R4 TO 2
	SET R5 TO 4
	REPEAT R5 TIMES
	    SET R3 TO R3 * R4
	    SET R5 TO R5 - 1
	END REPEAT
	``
		``
		SET R3 TO 1
		SET R4 TO 2
		SET R5 TO 4
		FOR X FROM 1 TO R5 STEP 1 DO
		    SET R3 TO R3 * R4
		    SET R5 TO R5 - 1
		END FOR
		``		

	Other solutions may be correct, as long as it includes a sensible loop with the correct test for terminating condition.			

(Total for Question 5 = 17 marks)

Total for paper = 90 marks

Content Mapping Grid

Question	Specification	Marks
1a(i)	5.1.5	1
1a(ii)	5.2.1	1
1a(iii)	5.2.9	1
1a(iv)	5.1.2	4
1b(i)	3.4.1	1
1b(ii)	3.4.2	2
1c(i)	3.1.4	1
1c(ii)	3.1.5	1
1c(iii)	3.1.5	1
1c(iv)	3.2.4	1
1d(i)	3.3.2	1
1d(ii)	3.3.2	1
1e	2.4.3 1.1.1	2
2a	6.1.3	3
2b(i)	4.5.1	4
2b(ii)	2.1.2	1
2b(iii)	2.2.1	1
2b(iv)	2.2.2	1

Question	Specification	Marks
2b(v)	2.3.5	1
2b(vi)	2.3.5	1
2c(i)	3.1.2	3
2c(ii)	3.3.1	1
2c(iii)	3.3.4	2
3a	4.4.1	3
3b(i)	5.2.4	2
3b(ii)	5.2.3	3
3c(i)	2.6.1	2
3c(ii)	4.3.2	4
3d	3.5.3	4
4a	4.2.2	2
4b(i)	4.1.1	2
4b(ii)	4.1.2	4
4c(i)	2.6.3	3
4c(ii)	1.1.8	5
4c(iii)	4.3.1	3
5a	6.1.1	6

Question	Specification	Marks
5b(i)	2.1.6	5
5b(ii)	1.1.1	1
5b(iii)	4.2.3	2
5b(iv)	2.2.2	3

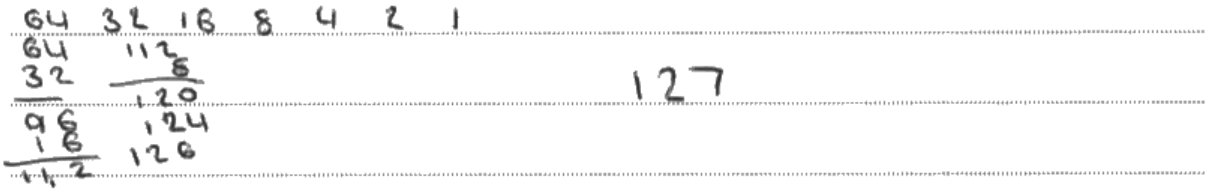
Question 1(a)ii

Most candidates responded correctly giving either 128 or 2^7.

Some candidates gave 127 which is the largest number that can be represented with 7 bits, but is not the total number of unique representations.

(ii) State the number of unique values that can be represented with 7 bits.

(1)



ResultsPlus
Examiner Comments

This response scored 0 marks for an incorrect value. It was off-by-one exemplifying a typical candidate misconception giving the largest number that can be represented rather than the number of unique values.

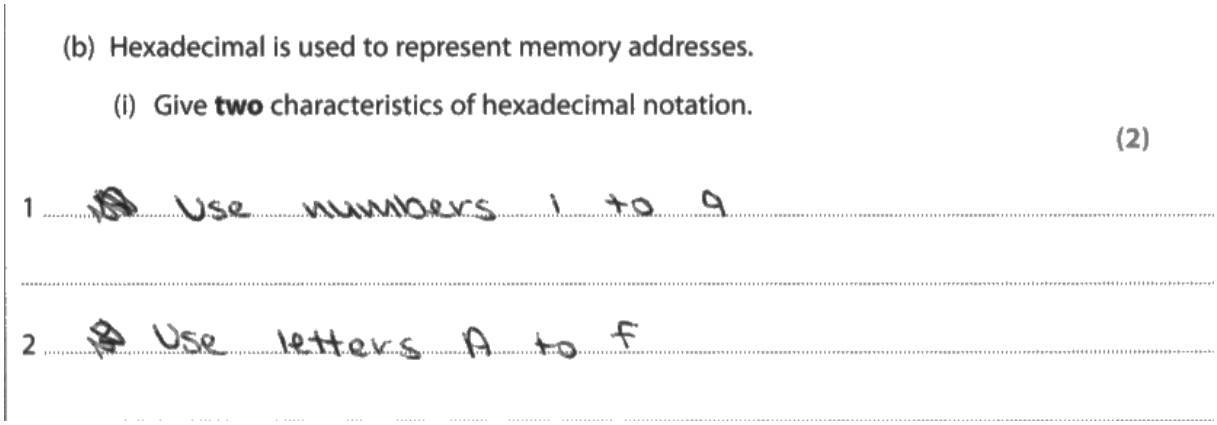
Question 1(a)iii

Most candidates gave the correct ASCII code for G which was 71.

Question 1(b)i

Candidates sometimes confused the benefits of using hexadecimal with its characteristics, giving the benefits of using hexadecimal rather than focusing on its intrinsic characteristics. The characteristics are the features of the notation. Where candidates gave characteristics, they were sometimes too vague. For example, specifying 'letters' rather than 'letters A to F are used'.

Some candidates also stated that hexadecimal digits went from 1 to 9 instead of specifying from 0 to 9.



(b) Hexadecimal is used to represent memory addresses.

(i) Give **two** characteristics of hexadecimal notation.

(2)

1 Use numbers 1 to 9

2 Use letters A to F

ResultsPlus Examiner Comments

This response scored 1 mark for stating that hexadecimal uses letters A to F. To gain the second mark the candidate would have needed to state that numbers/digits 0 to 9 are used as well, and not just 1 to 9.

Question 1(b)ii

Many candidates were able to identify a reason why programmers use hexadecimal notation such as that it is easier to read or write, but fewer were able to give the required linked explanation to give the reason for their assertion. A number of candidates wrote that hexadecimal took less storage space than binary which is incorrect - the amount of bits required to store the value is identical.

(ii) Explain **one** reason why programmers use hexadecimal to specify memory addresses.

(2)

one reason why programmers use Hexadecimal is because it is easier for ~~them~~ other programmers to understand.

ResultsPlus Examiner Comments

This response scored 1 mark for identifying that hexadecimal is easier to understand/use, but there was no expansion to give a reason to explain why this was the case for the second mark.

Question 1(c)i

Some candidates confused lossless compression with lossy compression. Many candidates were able to state that lossy compression would give higher compression ratios by removing data that would be outside the range of human hearing. Other popular reasons related to decreased file sizes for improved streaming by reducing download times.

(c) Audio and image files store data in binary.

(i) Explain **one** reason why lossy compression is used to reduce the size of an audio file.

(2)

it can be reduced more than if you used lossless ~~as~~ as some parts of the file are discarded

ResultsPlus
Examiner Comments

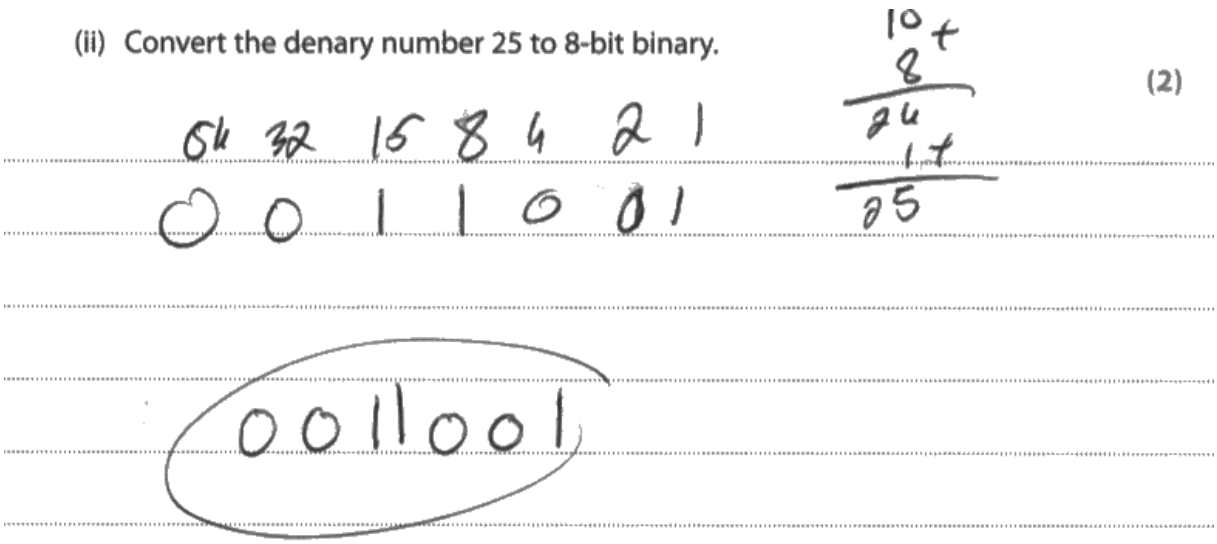
This response scored 2 marks without specifically relating to the context of lossy compression for audio. It did identify that lossy compression would achieve a higher compression ratio because some of the original data was discarded.

Question 1(c)ii

Most candidates scored at least one mark for multiplying the width (315) by the height (923) and many went on to give fully correct responses. Common errors included confusing the colour depth of 7 with 2^7 for the number of colours available and dividing by 1000 in an attempt to convert to KB rather than dividing by 8 to convert the total number of bits into bytes. A number of candidates also left one or more of the boxes empty rather than attempting to create a solution.

Question 1(d)ii

Candidates showed improved mathematical skills with the majority of candidates being able to convert an unsigned denary integer into binary. Some candidates converted the denary number 25 to the binary pattern 11001 rather than the 8-bit binary pattern 0001 1001, so scored one mark because they gave one correct nibble rather than two correct nibbles.



ResultsPlus Examiner Comments

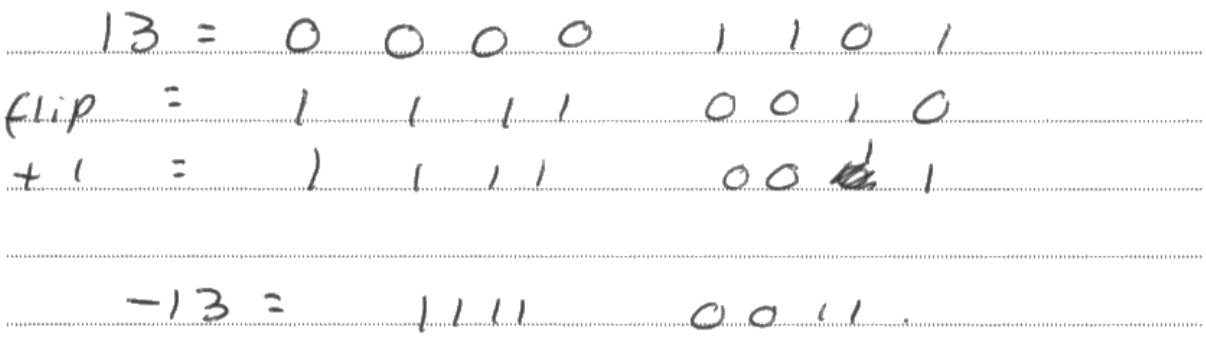
This response scored 1 mark. The response was not a full 8-bit binary number, but the right hand nibble could be identified to score a mark.

Question 1(d)iii

Fewer candidates were able to convert a negative denary integer into an 8-bit binary number using two's complement compared to a positive number conversion in d(ii). Where candidates attempted the conversion and produced incorrect responses, it was often because they tried to do the conversion by writing the positive value for -13 which was 0000 1101 and then flipping the bits to give 1111 0010, but then forgetting to add one. Many candidates also wrote out a number line starting with -128 for the most significant bit and then successfully completed the conversion using that technique.

(iii) Convert the denary number –13 to 8-bit binary using two's complement.

(2)



ResultsPlus Examiner Comments

This response scored 2 marks for a correct answer. It exemplified the method of flipping the bits and adding one to convert between positive and negative representations of numbers using two's complement.