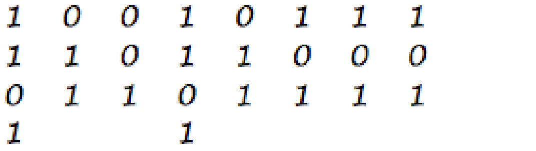
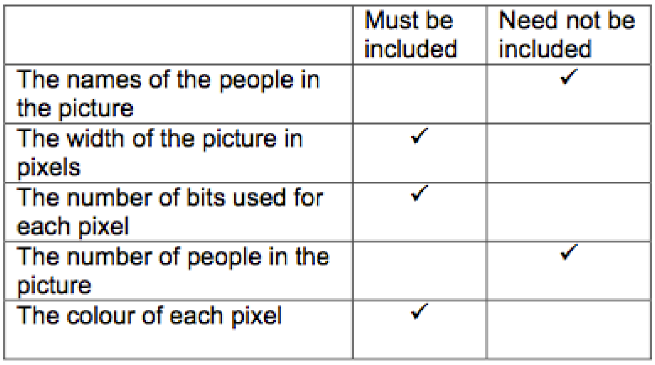
GCSE Computing – End of Topic Test Topic 2 – Binary Representation

Question			Answer	Marks
1	(a)	(i)	A group of 4 bits	1
		(ii)	• A group of 8 bits Accept “the number of bits used to represent a character	1
	(b)		• Divide by 1024 2 kilobytes	1
2	(a)		• 128 + 16 + 4 + 2 + 1 • 151	2
	(b)		 1 0 0 1 0 1 1 1 1 1 0 1 1 0 0 0 0 1 1 0 1 1 1 1 1 1 Mark points for: • First nibble correct with carries shown • Second nibble correct • There is an overflow... • ... because the result > 255/cannot be represented in 8-bits (Accept 9-bit answer)	3
3	(a)		Convert the denary number 108 into an 8 bit binary number. 0110 1100 (1 mark per nibble)	2
	(b)		Convert the denary number 108 into Hexadecimal. 6C (1 mark per digit)	2
	(c)		Convert the hexadecimal number 6C to denary. • 6*16(= 96)+12(for C) • 108	2
	(d)		Convert the hexadecimal number 6C to binary. • 0110 1100 • (1 mark per nibble)	2
	(e)		Convert the binary number 00111101 to hexadecimal. • 3D • (1 mark per digit) (Award 1 mark for working out if answer wrong due to arithmetic error)	2

<table>
<tr><td></td><td>(f)</td><td></td><td>• Hex numbers are shorter/more memorable than equivalent binary numbers..
• ... and can easily be converted to and from binary...
• ... as each hex digit corresponds to 4 binary digits

(Accept diagram)</td><td>2</td></tr>
<tr><td>4</td><td>(a)</td><td>(i)</td><td>• Each character is assigned a unique character code
• Each letter is converted to its character code (which is a binary number)</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>• 0100 0011 0100 0001 0100 0010.</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td></td><td>• All the characters which are recognised/can be represented by the computer system</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td></td><td>• ASCII uses 8 bits (Accept 7-bits)...
• ... and so can only represent 255/256 distinct characters...
• ..many more characters are needed for coping with all languages (e.g. Unicode 16bits).
ASCII does contain characters used in some languages</td><td>2</td></tr>
<tr><td></td><td>(d)</td><td></td><td>• Unicode has a much larger character set
• ... and can represent many more characters/characters from all alphabets
• Because unicode uses 16 bits...
.. and ASCII uses fewer/7/8 bits</td><td>2</td></tr>
<tr><td>5</td><td>(a)</td><td></td><td>
<table>
<tr><th></th><th>Must be included</th><th>Need not be included</th></tr>
<tr><td>The names of the people in the picture</td><td></td><td>✓</td></tr>
<tr><td>The width of the picture in pixels</td><td>✓</td><td></td></tr>
<tr><td>The number of bits used for each pixel</td><td>✓</td><td></td></tr>
<tr><td>The number of people in the picture</td><td></td><td>✓</td></tr>
<tr><td>The colour of each pixel</td><td>✓</td><td></td></tr>
</table>
(1 mark per correct row)</td><td>5</td></tr>
<tr><td></td><td>(b)</td><td></td><td>• The concentration of pixels

(Not just the number of pixels or picture quality)</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td></td><td>• (The higher the resolution) more pixels are required or the picture...
• ... which will increase the size of the bitmap file.

(Accept lower resolution→fewer pixels, smaller size)</td><td>2</td></tr>
</table>

6	(a)		• So that computers can be based on logic circuits. • (each part of the circuit) can be in one of two states • … 0 and 1/true or false	2
	(b)		• The instructions consists of an operator/op code • … and an operand • both stored as bit patterns • (op code) from a given instruction set • Each op code has a unique bit pattern	3
7	(a)		Point A: • Size: 120 • Binary: 0111 1000 • Hex: 78 Point B • Size: 60 • Binary: 0011 1100 • Hex: 3C	6
	(b)		High Level Response (6–8): A detailed explanation of both sampling rate and compression. Their effect on sound quality is also explained. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly. Medium Level Response (3–5): A clear understanding of either sampling rate or compression, with some of their effects explored. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct. Low level response (0–2): They may be an attempt to explain sampling rate and/or compression, but the explanation is incomplete and/or contains significant factual errors; Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive. Points may include: • Sampling Rate o how close together the samples are taken o the closer together, the more numbers need to be stored (and therefore larger file) o but the sound that is created is closer to the original analogue o mention of variable bit rates • Compression o use algorithms to make the file smaller (e.g for transmitting over Internet) o and then recreated to be played o can be lossy (e.g mp3) and the recreated file is of poorer quality o or lossless (e.g flac) and the recreated file is exactly the same as it was before compression	8