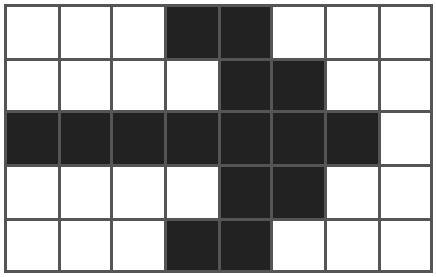
MODULE C DATA REPRESENTATION · C9

Representing images: mark scheme

20 marks · Cambridge 0478 syllabus 1.2.3

How to use. One mark per creditworthy point up to the maximum shown. **/** separates alternative words; **//** separates alternative answers. Words in (brackets) are not needed for the mark. Every bit pattern and power of 2 was checked by program. A correct final answer with no working earns full marks.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) 0478 1.2.3	The smallest (single) element / dot / square of colour in a (bitmap) image	**1**	Do not accept "a bit".
1(b) 0478 1.2.3	The number of pixels in the image // width × height (in pixels)	**1**	Accept number of pixels per unit (e.g. per inch). Do not accept "quality" on its own.
1(c) 0478 1.2.3	The number of bits used to represent each colour // each pixel	**1**	Accept "bits per pixel". Do not accept "number of colours" on its own.
2(a) 0478 1.2.3	All 5 rows correct (see grid below) At least 3 rows correct 	**2**	Rows: 00011000, 00001100, 11111110, 00001100, 00011000 (an arrow pointing right; checked by program). 2 marks all five rows; 1 mark three or four rows. Inverted colours = 0.
2(b) 0478 1.2.3	4 (bits)	**1**	$2^4 = 16$. Do not accept 16.
2(c) 0478 1.2.3	256	**1**	$2^8 = 256$. Do not accept 8 or 16.
3(a) 0478 1.2.3	3 bits: 8 5 bits: 32 128 colours: 7 (bits) 10 bits: 1024	**4**	1 mark per correct cell. $2^3 = 8$, $2^5 = 32$, $2^7 = 128$, $2^{10} = 1024$ (checked by program). Do not accept 6, 10, 64 or 20 (doubling the bits instead of using powers of 2).

QUESTION	ANSWER	MARKS	GUIDANCE
4(a) 0478 1.2.3	7 (bits)	**1**	$2^6 = 64$ is too few; $2^7 = 128$, which is at least 100. Do not accept 6 or 100.
5(a) 0478 1.2.3	True False True	**3**	1 mark per row. Row 2: colour depth changes the bits per pixel, not the number of pixels.
6(a) 0478 1.2.3	More pixels (in the image) More detail // sharper // less pixelated // higher quality Larger file size // more bits to store	**2**	Any 2 from. Do not accept "more colours".
6(b) 0478 1.2.3	Fewer bits per pixel Fewer colours can be shown // 256 colours instead of over 16 million Colours less accurate // shading less smooth // lower quality Smaller file size Resolution // number of pixels is unchanged Less storage space // less bandwidth // faster to load	**3**	Any 3 from. $2^8 = 256$; $2^{24} = 16\,777\,216$. Do not accept "the image becomes blockier / pixelated" (that is resolution). (Calculating the file size is covered in B8.)

Total: 20 marks