MODULE C DATA REPRESENTATION · C3

Hexadecimal and why we use it: mark scheme

20 marks · Cambridge 0478 syllabus 1.1.2(b)(ii), 1.1.3

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. Ignore case in hex; ignore leading 0s. A correct final answer with no working gets full marks, even where working is asked for; the working mark credits a correct method when the final answer is wrong.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) 0478 1.1.2(a)	16 // base 16	**1**	Correct answer only.
1(b) 0478 1.1.2(a)	3AF	**1**	G and H are not hex digits; values are integers only (no point). More than one tick = 0.
2(a) 0478 1.1.2(b)(ii)	5C	**1**	92 ÷ 16 = 5 remainder 12; 12 = C. Do not accept C5 or 512.
2(b) 0478 1.1.2(b)(ii)	400 = 1 × 256 + 9 × 16 + 0 // 400 ÷ 16 = 25 r 0, 25 ÷ 16 = 1 r 9 190	**2**	1 mark working, 1 mark answer. Do not accept 19 (trailing 0 dropped) or 091.
2(c) 0478 1.1.2(b)(ii)	2750 = 10 × 256 (2560) + 11 × 16 (176) + 14 // 2750 ÷ 16 = 171 r 14, 171 ÷ 16 = 10 r 11 ABE	**2**	1 mark working, 1 mark answer. 2560 + 176 + 14 = 2750. Do not accept EBA (reversed) or 101114.
3(a) 0478 1.1.2(b)(ii)	127	**1**	7 × 16 + 15 = 127.
3(b) 0478 1.1.2(b)(ii)	1 × 256 + 10 × 16 + 0 // 256 + 160 416	**2**	1 mark working, 1 mark answer. Do not accept 26 (1A only) or 1100.
3(c) 0478 1.1.2(b)(ii)	3 × 4096 + 12 × 256 + 2 × 16 + 13 // 12 288 + 3072 + 32 + 13 15 405	**2**	1 mark working (place values 4096, 256, 16, 1 used with the correct digit values), 1 mark answer.
4(a) 0478 1.1.2(b)(ii)	200	**1**	12 × 16 + 8 = 200.

QUESTION	ANSWER	MARKS	GUIDANCE
4(b) 0478 1.1.3	Any two from: MAC addresses IPv6 addresses error codes / error messages memory addresses // memory dumps assembly language / machine code (listings) // debugging URLs (special characters)	**2**	max 2. Colour codes = 0 (given in the question). Do not accept IPv4 addresses (written in denary).
5(a) 0478 1.1.3	4 (bits) // a nibble	**1**	48 ÷ 12 = 4.
5(b) 0478 1.1.2(b) (ii)	65 535	**1**	FFFF = 15 × 4096 + 15 × 256 + 15 × 16 + 15 = 65 535 (16 bits). Do not accept 65 536.
6(a) 0478 1.1.3	Any three from: hex is a shorter representation of binary // uses fewer digits one hex digit represents 4 bits / a nibble // e.g. 2 hex digits for 8 bits (so) easier for humans to read / understand / remember (so) fewer errors when reading, writing or typing it easy / quick to convert between hex and binary the computer still stores and processes the data in binary	**3**	max 3. "Easier" alone is not enough: needs a reason such as shorter. Do not accept: hex uses less storage / memory; the computer uses / understands hex; hex is faster to process.

Total: 20 marks