

1. Put the following in order of size, starting with the smallest:

Megabyte, Bit, Terabyte, Kilobyte, Gigabyte, Nibble, Byte

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[3]

2. a. Convert the following denary numbers into 8-bit binary numbers:

i. 34

ii. 37

b. Add the two binary numbers

c. Convert the following binary numbers into denary:

i. 0110

ii. 1011 1010

[9]

3. a. Convert the following hexadecimal numbers into binary and hence to denary:

i. FC

Binary: Denary:

ii. 9B

Binary: Denary:

b. Convert the following denary numbers into binary and hence to hexadecimal

i. 48

Binary: Hexadecimal:

ii. 165

Binary: Hexadecimal:

[16]

4. Explain why hexadecimal is often used instead of denary to represent binary numbers for a human audience.

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[2]

5. ASCII is a character set used to map characters to numeric values. ASCII uses 7 bits, providing 128 possible characters.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	Null	32	20	Space	64	40	@	96	60	`
1	01	Start of heading	33	21	!	65	41	A	97	61	a
2	02	Start of text	34	22	"	66	42	B	98	62	b
3	03	End of text	35	23	#	67	43	C	99	63	c
4	04	End of transmit	36	24	\$	68	44	D	100	64	d
5	05	Enquiry	37	25	%	69	45	E	101	65	e
6	06	Acknowledge	38	26	&	70	46	F	102	66	f
7	07	Audible bell	39	27	'	71	47	G	103	67	g
8	08	Backspace	40	28	(	72	48	H	104	68	h
9	09	Horizontal tab	41	29	)	73	49	I	105	69	i
10	0A	Line feed	42	2A	*	74	4A	J	106	6A	j
11	0B	Vertical tab	43	2B	+	75	4B	K	107	6B	k
12	0C	Form feed	44	2C	,	76	4C	L	108	6C	l
13	0D	Carriage return	45	2D	-	77	4D	M	109	6D	m
14	0E	Shift out	46	2E	.	78	4E	N	110	6E	n
15	0F	Shift in	47	2F	/	79	4F	O	111	6F	o
16	10	Data link escape	48	30	0	80	50	P	112	70	p
17	11	Device control 1	49	31	1	81	51	Q	113	71	q
18	12	Device control 2	50	32	2	82	52	R	114	72	r
19	13	Device control 3	51	33	3	83	53	S	115	73	s
20	14	Device control 4	52	34	4	84	54	T	116	74	t
21	15	Neg. acknowledge	53	35	5	85	55	U	117	75	u
22	16	Synchronous idle	54	36	6	86	56	V	118	76	v
23	17	End trans. block	55	37	7	87	57	W	119	77	w
24	18	Cancel	56	38	8	88	58	X	120	78	x
25	19	End of medium	57	39	9	89	59	Y	121	79	y
26	1A	Substitution	58	3A	:	90	5A	Z	122	7A	z
27	1B	Escape	59	3B	;	91	5B	[	123	7B	{
28	1C	File separator	60	3C	<	92	5C	\	124	7C	|
29	1D	Group separator	61	3D	=	93	5D	]	125	7D	}
30	1E	Record separator	62	3E	>	94	5E	^	126	7E	~
31	1F	Unit separator	63	3F	?	95	5F	_	127	7F	□

a. How many characters could be represented with an 8 bit character set?

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b. Which character is represented by the **hexadecimal** value 56?

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c. What is the **denary** representation of the character '@'?

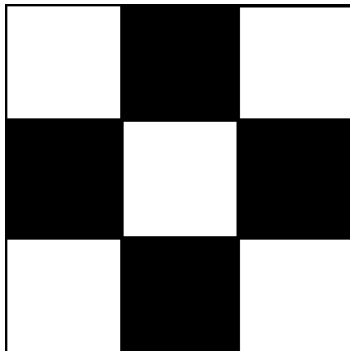
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d. Some website addresses feature the code '%20'. Looking at the hexadecimal codes above, what does this represent?

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6. Below is a bitmap image.

a. Which of the following binary files could be used to represent this image?



- A) 110 000 011
- B) 010 101 010
- C) 001 111 100

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b. Explain why the file size of the image would be larger if it were it colour.

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c. As well as colour depth (i.e. how many colours were used), give two other pieces of **metadata** that could be stored about this image.

- i.
- ii.

[5]

7. Rod wants to email a picture to his friend, but the file size is quite large. State **two** methods he could use to reduce the size of the image file.

- a.
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- b.
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[4]

8. A concert is recorded by two people, Jane and Freddy. Jane uses a recording device with a sampling rate of 22KHz. Freddy uses a recording device with a sampling rate of 44KHz.

a. Describe the difference in file size between Jane and Freddy's recording.

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b. Describe the difference in sound quality between Jane and Freddy's recording.

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[4]

9. Jemma has written a computer program. Briefly explain how the instructions are stored in the computer.

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[2]

Total / 50

Answers:

1. Bit, Nibble, Byte, Kilobyte, Megabyte, Gigabyte, Terabyte (3, -1 for each error)
2. a i. 0010 0010 (1 mark per nibble)
a ii. 0010 1011 (1 mark per nibble)
b. 0100 1101 (1 mark for answer, 1 mark for working)
c i. 6 (1)
c ii. 186 (1 mark for each nibble converted correctly)
3. a i. 1111 1100 / 252 (1 mark for each nibble – 4 in total, follow through)
a ii. 1001 1011 / 155 (4)
b i. 0011 0000 / 30 (1 mark per nibble – 4 in total)
b ii. 1010 0101 / A5 (4)
4. Each hexadecimal digit maps exactly to one nibble (1)
Two characters map exactly to one byte (1)
More efficient / uses less space / uses fewer characters than storing as denary (1) [Max 2]
5. a. 256 (1)
b. V (NB: must be capital) (1)
c. 64 (1)
d. space (2)
6. a. B (1)
b. Each pixel requires binary code to represent the colour (1)
More possible colours = more bits to represent those colours (1)
c. Any 2 of:
Height
Width
Filetype
Colour palette
Date created (2)
7. Any 2 of | Expansion (1,1)
Reduce resolution
Reduce colour depth
Use more efficient encoding, e.g. JPEG
Compression technique, e.g. ZIP
8. a. One smaller than the other (1)
Jane's is smaller (1)
b. One better quality than the other (1)
Freddy's is better (1)
9. Any 2 of: (2)
Each instruction converted to binary
Binary file stored on the computer (for later retrieval and execution)
Each instruction can be retrieved, decoded and executed
Other suitable answer