The questions on this worksheet have been taken from the OCR A-Level Computer Science Sample Paper

"3-a-day" A-Level Exam Practice (007)

Question 1

4 A real binary number may be represented in normalised floating point binary notation, using 4 bits for the mantissa followed by 3 bits for the exponent, both in two's complement binary.

(a) (i) Convert the denary value 1.75 to normalised two's complement binary in the format described.

You must show your working.

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.... **[4]**

(ii) Convert the following number to denary.

You must show your working.

0	1	1	0	1	1	1

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.... **[3]**

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Question 2

(b) A programmer has 16 bits to use to store a real binary number.
Describe the trade-off between accuracy and range when deciding how many bits to use for the mantissa and exponent.

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.... **[4]**

Question3

3 **(a)** Change the denary number 89 into the following representations.

    (i) An 8 bit binary number.

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.... **[1]**

    (b) Using the denary number 89 as an example, explain the relationship between binary and hexadecimal representations.

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.... **[3]**

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Answer 1 and 2

Question	Answer/Indicative content	Mark	
Q 4 a (i)	• 1.75 Converted to binary 1.11 • Move decimal point 0.111 • Exponent is 001 • Correct answer 0111001	[4]	
(ii)	• Exponent 111 =000 + 1 = -1 • 0110 move decimal point = 0.011 • Convert to decimal/ fraction 0.375/ $^3/_8$	[3]	Accept other methods
b	• The larger the mantissa… • …the more accurate the number • The larger the exponent… • ….the greater the range	[4]	Allow opposites

Answer 3

3	a	(i)	01011001	1
	b		-Split the binary number in groups of 4 -Change each into a single value/(Hexadecimal) digit -Digits which are between 10 and 15 are given letters A to F -In this example: 0101 = 5 and 1001 = 9/Therefore 89 = 59(hex) (1 per -, max 3)	3