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

"3-a-day" A-Level Exam Practice (008)

Question 1

(c) (i) Change the denary number –89 into a two's complement, 8 bit binary number.

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.... [1]

(ii) Change the denary number –72 into a two's complement, 8 bit binary number.

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.... [1]

(d) (i) Add the two binary answers which you obtained in part (c) using 8 bit arithmetic.

You must show your working.

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.... [2]

(ii) Explain why your answer to the addition sum is wrong.

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.... [2]

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Question 2

4   (a)   A real binary number may be represented in normalised floating point binary notation using 5 bits for the mantissa followed by 3 bits for the exponent, both in two's complement binary.

The following binary numbers are in the format described.

Calculate their denary values.

Show all working.

(i)   01100011

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.... **[3]**

(ii)   10100111

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.... **[3]**

Question3

(b)   Write the denary number +3.5 as a normalised binary number in the format described in (a).

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.... **[3]**

Answer 1

c	(i)	10100111		1	
	(ii)	10111000		1	
d	(i)	1 0 1 0 0 1 1 1 1 0 1 1 1 0 0 0 0 1 0 1 1 1 1 1 Carried 1 gets removed --> ⨯1 1 (1 for 8 bit correct answer, 1 for showing appropriate correct carries)		2	Note: follow through from candidate answers to part (c) If ft answer generates no carries – max. 1 mark
	(ii)	-Answer needs 9 bits/ Carry/overflow out of 8 bit byte -Two negative numbers have been added and the result is a positive number -Answer is 95 (1 per -, max 2)		2	NOT simply "overflow"

Answer 2

4	a	i	• Exponent 011 = 3 • Mantissa 0.1100, move point 3 places right becomes 0110. • Denary value is 6	3	Accept alternative methods
		ii	• Exponent 111 = -1 • Mantissa 1.0100, move point 1 place left becomes 1.101 • Denary value is -3/8 = -0.375	3	Accept alternative methods Accept either fraction or decimal value

Answer 3

	b		• Pure binary 11.1 so mantissa 0.1110 • Point moved 2 places so exponent 010 • 01110 010	3	