Worksheet 1.1: for testing basic understanding

1

			2^4			2^1	
					4s	2s	
1	0	1	0	0	1	1	0

a The last row in the above table shows a binary code. Fill in the top two rows of the table assuming that the code represents a binary number.

b If the binary code represents an unsigned integer is the denary equivalent an even or an odd number? Explain your reason.

c If the binary code represents an unsigned integer give the denary equivalent of the binary number in the last row.

d If the last row is a two's complement representation of a signed integer does it represent a negative or positive number? Explain your reason.

e What is the denary equivalent of this two's complement representation?

2 If the denary number 373 is to be converted to a binary representation, how many bits will be needed? Explain your reason.

3 A car has an odometer (milometer) which at the start of a journey shows 99940 and at the end shows 00230.

a Use common sense reasoning to find the distance travelled

b Try calculating this by subtracting 99 940 from 00 230. What is the problem?

c Nine's complement is defined as the number obtained by subtracting each digit from 9 and ten's complement is obtained by adding 1 to the nine's complement. Can you show a calculation to get the correct answer by converting the 99940 to a negative number by taking its ten's complement and then adding this to 00230?

4 A bitmap has an image stored that has resolution of 1024 x 768 and a colour depth of 8. Another file contains a five-minute soundtrack stored using a sampling rate of 100 samples per second and a sampling resolution of 16.

Which file is the largest?

5 Give an example where lossy compression will be useful and another where lossless compression is essential.